

2012

GREENER WAY

JOB, SKILLS, AND EQUITY IN A CLEANER U.S. ECONOMY

A REPORT BY

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WITH LAURA DRESSER AND JOEL ROGERS

COWS · BUILDING THE HIGH ROAD

ACKNOWLEDGEMENTS

This report, like all of our work on the green economy, draws on a long history of collaboration and rumination among principals at COWS on the concepts of “green” and “skill” and “equity.” Laura Dresser, Joel Rogers, and Sarah White developed the arguments in this paper through countless conversations, and the report owes much to Joel’s decades of work on these topics. Michele Mackey not only helped to focus our broad gaze, but researched and wrote the case study on Milwaukee’s vertiginously complex water sector. James Irwin, Adrienne Pagac, and Satya Rhodes-Conway contributed invaluable research and editorial support. Many people around the country offered advice, shared insights and data, and inspired this report with their important work, including Dean Amhaus, Patti Balacek, Panama Bartholomey, Margot Brandenburg, Abbey Carlton, Domiana Carter, Kevin Celata, Laura Chenven, Anastasia Christman, Todd Cohen, Nancy DellaMattera, Michael DiRamio, Marcy Drummond, Mindy Feldbaum, Benjamin Goldstein, Colin Gordon, Kate Gordon, Amy Hanauer, Mike Hansen, Jeremy Hays, Gregory Henschel, Barbara Hins-Turner, Matt Howard, Rebekah Hutton, Dave Johnson, Mark Johnson, Vijay Krishna, Kristin Lipke, Brian Lombardozi, Darlene Lombos, Jennifer McNelly, Raiana Mearns, Jonathan Njus, Bruce Pierce, Ethan Pollack, Ann Randazzo, Jeff Rickert, Geri Scott, Leslie Spencer-Herrera, Julie Strawn, Elizabeth Thelen, Carrie Thomas, Andy Van Kleunen, Jason Walsh, Brent Weil, Jane Weissman, Marge Wood, and Carol Zabin. Any errors and all opinions in this report are ours alone.

We would like to thank the Rockefeller Foundation for their generous support of this project, and for their continued investment and leadership in building a greener economy. We also appreciate the long support from the Joyce Foundation on green and workforce issues on which this paper builds.

ABOUT COWS

Based at the University of Wisconsin-Madison, COWS is a national think-and-do tank that promotes “high road” solutions to social problems. These treat shared growth and opportunity, environmental sustainability, and resilient democratic institutions as necessary and achievable complements in human development. COWS is nonpartisan but values-based. We seek a world of equal opportunity and security for all. For more information: www.cows.org. To reach lead author directly: swhite@cows.org.

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GREENER

REALITY

JOBS, SKILLS, AND EQUITY IN A CLEANER U.S. ECONOMY

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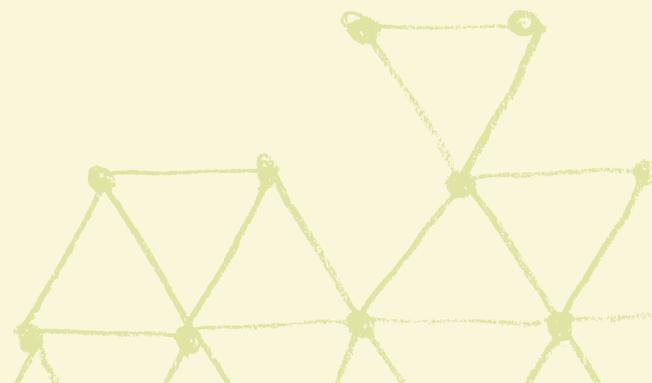
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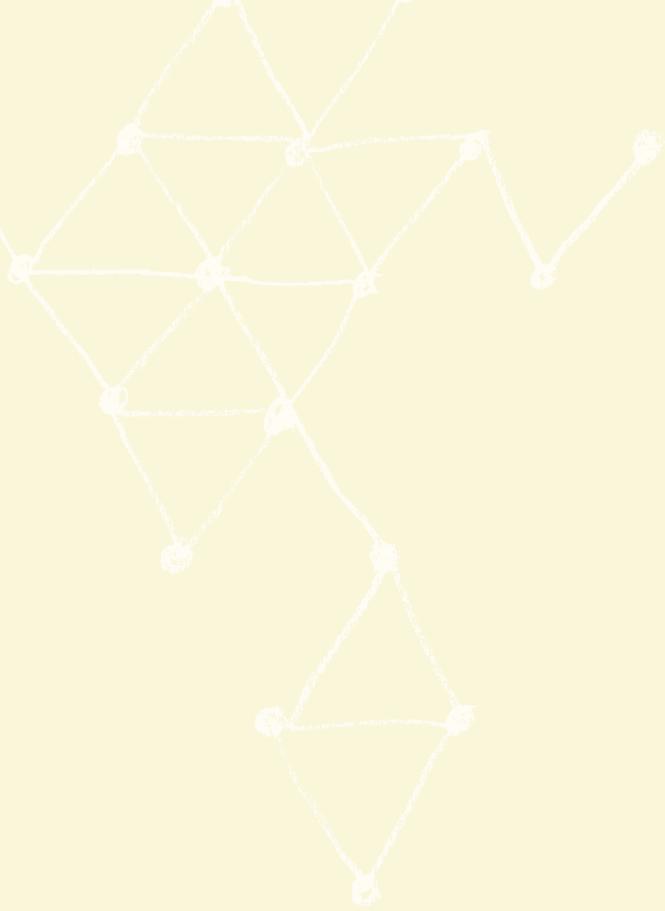
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We do not offer a blueprint for action, but a framework of possibility: a platform upon which the policy and politics of a more generous and green America can be built.

O BRAVE NEW GREEN

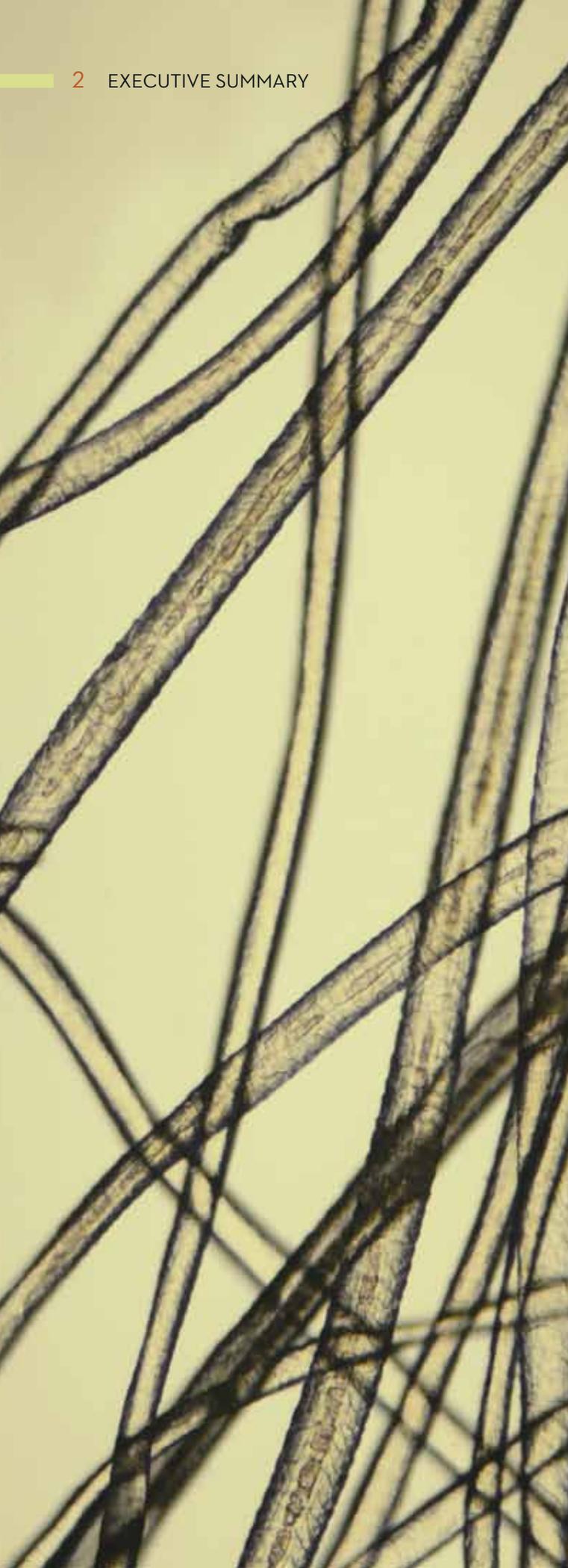
Human capital — workers' skill and knowledge and creativity — has always anchored our vision of the green economy. But as a darkening economic and political horizon circumscribes this country's exuberant green imaginings, plotting a course to our common future requires a new reckoning.

Greener Pathways (2008) and *Greener Skills* (2010) charted the intersection of workforce development and a greener economy. This report, *Greener Reality*, explores not only the practice and promise at the crossroads, but equally importantly the economic, natural, and political context which surrounds that intersection. All the work at the corner — diverse in structure and quality as it is — faces the challenges of that context, a reality increasingly defined by rising temperatures and inequality, and declining true democracy. Our efforts, and those of many other thinkers, advocates, practitioners, and policy-makers invested in building a greener economy, is surrounded and often swamped by the fierce forces at play in American politics.

So we continue to talk about meaningful and accessible credentials, but we cannot mention them without also thinking of the ways that austerity politics are making such real investments in human capital ever more unlikely. We assess education and training programs and their outcomes for workers, but find we cannot ignore the context of economic collapse that has left more than ten million workers out of jobs and many millions more toiling in dangerous, even illegal conditions. We celebrate the steady expansion of solar skills and solar panels across the nation, but worry that some will literally be underwater within thirty years. We are drawn in this report to take a broader view, critically situating the hard work of so many to connect American workers with greener skills and pathways.

Observing the serious challenges of this moment, when doubt clouds the promise of green jobs and austerity restricts our capacity to invest, we step back and take stock of the green workforce endeavor and the forces shaping it. It seems that everyone has their heads down in the weeds of project-building: technical colleges are chunking curricula; energy engineers are reducing cost per megawatt; cleantech advocates are trying to organize markets and ensure quality implementation of renewable energy and energy efficiency; workforce practitioners are trying to keep green shoots alive in communities overwhelmed by unemployment. And the public meanwhile, led by an increasing number of short-sighted ideologues, is souring on the very idea of "green jobs," and, by extension, the very investment needed to build the low-carbon economy that could produce them.





All of which means we should think less about how to structure pilot programs, and more about how to make all jobs, and all skill sets, greener. And how to do so through broad-based system-reform, making career pathways and industry partnerships business as usual, rather than special programs, by building them into basic state and federal policy structures, and institutional administration. And beyond that, we need to think about the role of human capital in a broader, more coherent, approach to greening community and economic development. This paper is an attempt to jump-start that conversation.

Our aim is not to defend green jobs. Our aim is to build and start to implement a rational policy framework for human capital development in a greening economy — one that helps ensure that low-income, under- and unemployed workers can advance into family-sustaining careers, while the communities in which they live improve resilience to climate insecurity. With this paper we hope to further the efforts of many to illuminate a “green” universe and the value propositions within it which — by advancing strategies for shared prosperity, low-wage worker advancement, and transparent, sustainable development — merit further attention.

It is precisely such strategies that place this report at the intersection of “green” skill formation and climate adaptation efforts. Building systems to improve opportunity can improve resilience. Beyond specific adaptive strategies like storm water management, improved transportation infrastructure, and quality public health systems, we know that a society’s capacity for adaptation is increased by broader strategies to promote equity and sustainability, including, for example, poverty reduction, more equitable resource allocation, higher skill development, and more efficient and accountable institutions. Greater adaptive capacity can mean increased resilience and decreased vulnerability for particular populations as for nations. In the U.S. as in the global South, then, constructing greener on-ramps to decent work for low-income, low-skill workers can improve the chances of those most vulnerable to the wide-ranging

dislocations (economic, geographic, health, etc.) driven by climate change.

Adaptation to global climate disruption, in the U.S. and around the world, will involve job creation and dissolution, as well as a concomitant shift in skills across the economy. And implicit in our cross-sectoral approach — premised on the idea that *all* jobs can and should be greener — is a commitment to exploring broad-based *mitigation* strategies: building a clean economy involves greener ways of working across the value chain in many industries, including but not limited to renewable energy and energy efficiency.

BEYOND SKILLS: BUILDING RESILIENT SYSTEMS

Our earlier papers in this series, *Greener Pathways* and *Greener Skills*, suggested that the “green moment” of recent years opened a door to move and advance an equity and skills agenda, building an economy and polity that would better serve all those who have been routinely and staggeringly failed by our education and training systems, our fraying social contract, our 1 percent winners-take-all low-road economic policy. This paper continues that argument, but broadens it. Attending to the urgency of the current reality (from sequestered budgets to rising seas), it considers human capital in a larger context of climate change and democratization.

After years of writing about the nature of jobs and training in the clean energy economy, and the skill delivery system necessary to provide more equity in its development, we must now think more broadly and systematically about building resilient systems, capable of responding holistically to a new reality dominated by uncertainty — in climate change, in politics, in labor markets.

It is a fraught political moment characterized by a variety of shocks, both sudden and gradual, that add up to a war: on workers, on the poor, on all things “green,” and even,

in the end, on accountable democratic institutions. We look beneath this ferment at three current realities — economic inequality, climate disruption, democratic decline — and the opportunities for cooperation and creativity in their transformation.

Most of the world is moving, if still uncertainly, toward mitigation and adaptation to climate change. Both imply new technical/occupational human capital requirements, and would benefit from increased efficiency in their delivery and mastery. This report concerns what those needs are and how they might be most efficiently met. But address of our climate challenges will take place, and be both complicated and better enabled by, even broader changes in the structure of power in the world, and new possibilities for human flourishing. This too implies the need for new human capital, of a less technical kind but no less important. For both sorts of skills, for reasons explored below, greater rootedness in more democratic practice, of the sort also likely to require greater voice and fairness in the decision-making and distribution, is recommended. Where twentieth-century human capital theories saw equity being achieved through greater learning, the one proposed here sees needed learning best achieved through more democracy. Because in the end, we are impressed that the human capital synthesis celebrated twenty years ago, in which the solution to all equity problems was human capital, which business would underwrite for its promised gains to productivity, was probably wrong. Some substantial increase in real democracy and social equity is what will likely drive most of the human capital demand and the ability to underwrite its costs.

HUMAN CAPITAL STRATEGIES: STORIES FROM THE FIELD

Human capital strategies are an essential part of any progressive response to climate disruption and inequality. They are, of course, utterly inadequate by themselves. Ensuring that poor and vulnerable workers have a fairer

EMERGING STORYLINES

Workers that are trained for green skills embedded in a broader set of occupational skills are in much better shape than workers trained for a discrete set of green skills only.

We can't train our way out of a jobs crisis.

Labor matters: Unions improve worker advancement and business outcomes.

Employers matter: Training programs with robust employer relationships have been able to respond nimbly to shifting labor markets and to place workers in a tough economy.

Intermediaries can bring order to the chaos of the current system.

There is tremendous disillusionment within the workforce system — and some communities — about the promise of green jobs.

chance at securing the decent jobs that do exist is a worthy enterprise, particularly where shifts in climate and energy production amplify current labor market trends, increasing precarious employment and diminishing paths to advancement for lower-skilled workers. But this discussion would be incomplete without acknowledging the critical need for demand-side strategies, some of which we address in our policy recommendations. Indeed, the employment consequences of climate disruption will be determined everywhere by the policy response of individual governments (including but not limited to energy policy), whether or not these are driven by explicit strategies of mitigation and adaptation.

Whatever the uncertainties of demand, we believe that a more nimble and accessible system of education and training, ensuring greater equity in the mechanisms that govern the supply side of the labor market, is essential. And can be improved immediately. This paper points up those strategies we think move us closer to a greener future by restating the skills agenda laid out in previous papers in the broader context of a renewed social contract. To further refine that agenda, we drill down to a cluster of critical if familiar interventions necessary to align workers, industry, and training systems in and outside of clean energy sectors.

In these cases and in the stories of many others we talked to, several common storylines emerged:

Workers that are trained for green skills embedded in a broader set of occupational skills are in much better shape than workers trained for a discrete set of green skills only. We raised this warning flag in Greener Pathways. It's depressing to see how frequently it was ignored. Training for what O*NET classifies as New and Emerging Occupations — energy auditors, weatherization installers, solar installers, and the like — was oversupplied relative to weak and unstable demand. With energy auditing in particular, we heard the same story over and over: money flowed into a region for

training in a field with few jobs for completers. Training that layers green skills on a foundation of more traditional skills gives workers more and better options in the labor market: the green skills may make them more attractive to employers, but if the market for the application of those skills is shaky they still have the foundational skills to work in a related occupation.

We can't train our way out of a jobs crisis.

Economics trumps training, even in programs imparting broader skill sets. Placements in building trades apprenticeships, for example, have been few and far between. We have long argued that the construction industry, the keystone for building energy efficiency, is an overlooked area with potentially decent jobs and clearly articulated training pathways organized on a classic earn and learn model — registered apprenticeship. Building relationships with community based organizations and improving access to and retention in the building trades for low-skill, low-income workers is a strategy that makes sense. But the beauty of the model is also its limit: it only works when there are jobs. With the exception of apprenticeship programs in the utility industry, which is one of few greening sectors that actually has jobs and is doing fairly sophisticated planning to develop and manage its pipeline of skilled workers, there has been little mobility in apprenticeship pathways. Despite many excellent efforts to build pre-apprenticeship programs and link them more effectively with joint registered apprenticeships, with so many experienced workers on the bench, JATCs are opening up application slots very selectively.

Labor matters: Unions improve worker advancement and business outcomes.

The career advancement potential of green credentialing in some sectors, like health care, is inextricably linked to the nature of union workplaces, where job positions, and career progression from one job to another, are embedded within a broader set of negotiations between labor and management. This is particularly important where “greener” positions are being developed at the lower end of the labor market, both because it clarifies pathways into those jobs, and

because it can assign measurable value to worker skill upgrades by documenting improved (i.e. greener) health, productivity, and energy outcomes.

Employers matter: Training programs with robust employer relationships have been able to respond nimbly to shifting labor markets and to place workers in a tough economy.

We have said many times that developing career pathways without linking them to related industry partnerships — which provide ongoing relationships with clusters of employers who can predict local demand and provide critical knowledge of a particular sector's skill needs — risks becoming an empty exercise in educational reform. In a languishing economy with so few job openings, it is more important than ever to engage employers, particularly in the green space. While such partnership-building takes a lot of time and a few resources, isolated attempts to contact individual employers is not enough. In the cases presented in this paper, and others we investigated, programs with strong business councils and mediated sector partnerships were most successful in reading local labor markets and connecting trainees with job opportunities.

Intermediaries can bring order to the chaos of the current system.

Our current workforce development systems are chaotic and confusing. Not only to workers who are trying to seek their way up to good skills and decent jobs, but also to employers seeking to navigate public resources for training and modernization. One reason labor unions and employers are so important to making projects work, is that they can serve a central organizing role in projects. Too many projects work with one or two employers. But both scale and meaningful training are more efficiently generated by bringing employers and unions together to identify their shared needs and build programs of training to answer those needs. Intermediaries — call them what you will, “industry partnerships,” “sector strategies,” or “workforce intermediaries” — help organize the employers and bring attention, and solutions, to industry issues. Workforce Investment Boards, community colleges, and other

regional institutions can act as conveners as well, but without a dedicated intermediary to organize the demand side, training projects are in danger of building bridges to nowhere.

There is tremendous disillusionment within the workforce system – and some communities – about the promise of green jobs. As we argue elsewhere in this report, the failure of “green jobs” is not a failure of “green” per se, but a consequence of myopic energy policy and economic disaster. Other reports in this series warned that the massive potential for job creation in a clean energy economy depended on significant industry expansion driven by specific federal policy and market signals, and argued for more focus on better skill delivery systems in general rather than more green training in particular. Hype, unfortunately, bested reason. And it is not entirely unreasonable for workers who trained for green jobs that never materialized to see in the experience yet another example of the U.S. education and training system, however well-intentioned, failing the poor and the working class. It is critical that we both **a)** improve systems serving students and workers at all skill levels, and **b)** decouple the jobs promise of the green economy (and its requisite political and material investment) from the limited employment outcomes of its recent trajectory.

THINKING ABOUT POLICY, MOBILIZATION, AND THE FUTURE

As we have argued elsewhere, getting training and workforce development to work better in this nation is neither rocket science nor particularly green. There are three foundational elements that are critical to making the system work. The first is infrastructure to help organize the demand (employer) side of regional labor markets: sector strategies, industry partnerships, and labor market intermediaries are the necessary demand-side building blocks. Second, we need to encourage innovation in education and training systems in order to create a 21st-century skill delivery system that secures access to meaningful skills for students of all ages. Key innovations on the supply side of the labor market include the creation of career pathways and bridges (these often include earn and learn programs), and the stackable, industry-recognized credentials that benchmark progress in steps toward college degrees. Finally, work to build a more robust workforce development system requires improvement of outcomes and labor standards at the bottom of the labor market. Securing greater equity requires greater investment in social supports (from career counseling to child care) and the strengthening and enhancing of the floor under wages.

Such a system, in the context of a greening economy, might finally prioritize and achieve domestically what the U.S. Department of Labor and partners on the U.S. inter-agency group team originally proposed for the “social pillar” of the international platform under discussion at the UN Conference on Sustainable Development (Rio+20) in June 2012:

“Workers are able to share in the benefits of the transition to a greener economy, and that they are equipped with the skills necessary to implement such a transition;

The fundamental rights of workers are respected when implementing new policies and investing in new and emerging sectors, and that the health and safety of workers in these sectors is protected; and

Social safety nets are provided to help those dislocated by the shift to more environmentally sound consumption and production to prevent them from being impoverished and give them the resources to find new livelihoods. Consideration should be given to vulnerable populations and the particular risks they may face.”¹

Looking forward, we encourage readers to consider some bigger ideas implied by our work. Within the context of a greening economy, the paper addresses a larger and increasingly heated “skills gap” conversation taking place in the U.S. and elsewhere. Alignment between supply and demand in the labor market

We pay particular attention to places where greening skill standards and credentials could create value for workers and businesses, helping to deliver both quality work and quality jobs; where green sector partnerships could more effectively link labor supply and demand, particularly in marginalized or vulnerable communities; and where bridge or pathway strategies provide the broadest access to skill upgrades (and related labor market advancement) for the broadest set of workers.

The report explores these interventions in the context of current political reality, defined in part by the purported bankruptcy of “green,” and describes related experiences in greener jobs training experiments across five sectors: Construction, Manufacturing, Utilities, Health, and Water.

**GREENER CONSTRUCTION:
WEATHERIZATION AND ITS
DISCONTENTS**

A review of residential energy efficiency efforts funded by the Recovery Act

**PROCESS VS. PRODUCT:
GREENER MANUFACTURING**

Standardizing worker skills and material efficiencies in industrial practice

**GREENER TRANSMISSION:
UTILITIES, GRIDS, AND CLEAN
ENERGY TRAINING**

Workforce innovation from the electric power industry

WATER, WATER, EVERYWHERE

Unpacking a water sector partnership: industry, jobs, and training

**GREENER EQUITY:
BUILDING EMERALD CITIES**

A model for community-labor alliances in (re)constructing major American metros

**NOT NECESSARILY GREENER
ON-RAMPS: BRIDGES TO
MANUFACTURING CAREERS**

Bridging the chasm between adult basic education and occupational training

**GREENER HEALTH CARE:
PARTNERSHIPS, CREDENTIALS,
AND ADVANCEMENT**

A labor-management project to expand careers for environmental service workers

GREENER STANDARDS

A round-up of initiatives designed to rationalize skill delivery in energy efficiency industries

is an economic imperative. Ensuring access to relevant skill development for poor and vulnerable workers is a moral imperative — and a political one, if we are to have the right voices at the table to shape the sort of resilient democracy we’re imagining. But education and training (or, more broadly, transforming human capital systems) will never be enough. There are simply not enough good jobs. This project therefore attempts to shift the national conversation from questions of structural unemployment to those of structural inequality.

Finally, given what we know about the limitations of education and training systems in general, the specific successes and failures of “greening” programs around the country, and the larger imperatives of climate and equity, we call on our better natures to identify the key policies — and the key opportunities to advance them — that can move us toward a greener and more equitable economy. What are the areas of focus essential to addressing the “wickedly” intertwined problems of climate change and inequality, and how do they relate, ultimately, to human capital?

We do not offer a blueprint for action, but a framework of possibility: a platform upon which the policy and politics of a more generous and green America can be built. The three key principles of that platform are laid out in the conclusion:

VALUE NATURE

LEAD WITH EQUALITY AND RESPECT

BUILD DEMOCRACY, DON’T ASSUME IT



Work on each and all can, to some degree, begin anywhere and immediately. Most important, in contemplating that work, is to see their joint necessity and connection. We won’t get the first, or be able to manage it, without the second, and won’t get the second without the third. Sustainability, equity, and democracy can’t be easily separated.

For providers of education and training, taking all three seriously has implications for practice. Understanding and embracing those implications is part of the great work before us — as a community, a country, a planet.



We must think broadly about building resilient systems, capable of responding holistically to a new reality dominated by uncertainty — in climate change, in politics, in labor markets.

REALITY CHECK²

This paper takes as its point of departure the sobering, post-utopian green moment into which we have awakened.³ After years of writing about the nature of jobs and training in the clean energy economy, and the skill delivery system necessary to provide a modicum of equity in its development, we must now think more broadly and systematically about building resilient systems, capable of responding holistically to a new reality dominated by uncertainty — in climate change, in politics, in labor markets.

OBSERVATIONS FROM THE FRONT

From the heady days of “Green Jobs Now!,” we have descended to the grim reality of the current U.S. labor market; from the grand promise of the clean energy economy to a brutal recession and devastating jobs deficit, an auspicious but clearly inadequate federal investment in the Recovery, and a continued failure to legislate any consistent energy, climate, or transportation policy that could signal those cleantech and related markets actually capable of creating the promised “green” jobs.⁴ And now many observers — both in the institutional right and on the jobless streets — conflate the collapse of the economy with the alleged illegitimacy of the green enterprise, as we discuss elsewhere in this paper.

Which brings us to the current *political reality*, in which conservatives, governed by moneyed interests and driven by a well-financed and increasingly radical right wing movement, are waging a war — on workers, on the poor, on all things “green.” And though the perceived opponents can shift — as, for example, economic malaise erodes blue-green, blue-blue, and blue-brown alliances (a variety of hard-won labor, community, and environmental coalitions), even as new ones emerge (Occupy) — it is fair to say that these are all fronts in the same war.

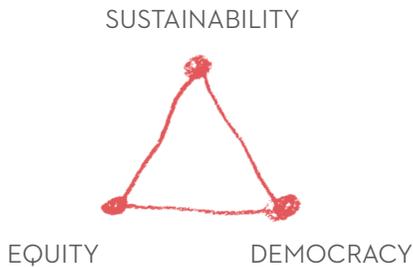
The war on labor. The assault on working people and the institutions that represent them range from state-based attacks on collective bargaining (dismantling

public sector unions, and passing right-to-work legislation that diminishes those in the private sector); to the federal defeat of the Employee Free Choice Act; and outrageous Congressional attempts to defund everything from extended unemployment insurance to wage and hour protections to the modest but critical education and training programs supported by the Workforce Investment Act.

The war on the poor. This can be seen in an austerity agenda (championed by but not limited to the right) that essentially blames the poor for their failure to navigate an incomprehensible labor market in a larger economic system most notable for its obscene and growing inequality, and at the same time dismantles the decades-old safety net once approved and advanced by some Republicans themselves. This includes the mugging of everything from health care reform and Medicaid to SNAP and the Low-Income Home Energy Assistance Program.

The war on “green.” Movement conservatives have risen in feverish opposition to virtually any policy or project even nominally related to greening the economy, from the full-court fossil press that doomed Cap-and-Trade to this summer’s Republican House attempt — in a series of cynical amendments to the 2013 Energy and Water Appropriation Bill — to defund renewable and efficiency programs at the U.S. Department of Energy, cutting the Administration’s requested budget by \$1B and shifting yet more resources to coal, oil, and gas industries.⁵ Ranging between the epic and the picayune, there has been near-unanimous GOP (and some Democratic) opposition to the clean energy agenda — from the heavy artillery arrayed against the EPA clean air rulings⁶ to the bizarre saber-rattling as the Federal Bureau of Labor Statistics attempts to more rigorously define, track and measure green employment.⁷

Accompanying and reinforcing these maneuvers is an attempt to undermine or attenuate accountable democratic institutions. This is what plutocracy looks like — from the corrosive flood of big money in the aftermath



of *Citizens United* to the garden-variety disenfranchisement of the young, the elderly, the poor, and people of color at state and local levels, in measures ranging from Voter ID acts to the repeal of same day voter registration.

This, then, is the neoliberal political reality in which we are trying to rationalize human capital systems and build a greener economy. Before thinking more about greener skill formation and industrial transformation, we need to consider the possibility (and necessity) of policy reform and movement-building in three inter-related (and reality-based) universes: The Economy, the Climate, and the Polity.

ECONOMIC REALITY: INEQUALITY

Despite the failure of a set of narrowly-identified green jobs (e.g., weatherization technicians) to materialize in numbers sufficient to absorb the supply of existing and newly-trained workers during the recession, which we discuss later in this paper, a variety of promising and reliable data analyses have documented impressive performance and/or potential in the clean economy, particularly in states like California, which have implemented relatively aggressive climate and efficiency measures.⁸ The progress in California, however, does not offset the wintry picture of the economy in general, characterized by chronic unemployment, low-road jobs, and increasing levels of inequality.

Perhaps the biggest story of the post-recession economy is not joblessness, but the unequal distribution of pain.

While unemployment dipped to 8.2 percent in spring of 2012, more than 42 percent of officially unemployed Americans have been looking for work for more than six months; more than 30 percent for a year or more.⁹ Millions have

exhausted federal and state unemployment benefits, and many more are slated to lose theirs over the summer as emergency extensions enacted during the recession are terminated or scaled back.¹⁰ Joblessness in the U.S. (and official unemployment numbers count only those still looking for work, not the actual number of individuals without jobs) has costs far beyond loss of wages; individual and community resilience — measured by economic, social and health indicators — diminishes with chronic un- and under-employment. Related hardship, while increasingly threatening middle-class workers, is not distributed evenly. Lower-skilled, minority, and younger workers suffer disproportionately from long-term joblessness by any measure.¹¹

High and chronic unemployment is not a challenge unique to this country. But it has a particular urgency here, given the peculiarities of the U.S. labor

market, where an individual's access to health insurance, pensions, and other critical supports depends most often on their relationship to a particular employer. Also because of those peculiarities, even for many of those who have found or retained employment, it is dispiriting to note that post-recession job gains have been concentrated in low-wage service sectors.¹² And the preponderance of recent evidence suggests that employment in such jobs is “sticky” — not typically a springboard to better jobs.¹³ This is bad news for the more than one in four (26 percent) working Americans holding poverty-wage jobs.¹⁴

Perhaps the biggest story of the post-recession economy is not joblessness, but the unequal distribution of pain. Close to one out of three (31 percent) working families in this country are now low income.¹⁵ Living below 200 percent of the federal poverty threshold — a bar that often serves as a proxy for self-sufficiency — these families face serious and increasing problems making ends meet.¹⁶ Factoring in race highlights further inequality: an alarming 44 percent of minority working families are low income.¹⁷

The extreme concentrations of wealth that became the touchstone for Occupy Wall Street and related movements across the country have been well-documented (*figure 1*).¹⁸ And the economic crisis that seemingly shook the U.S. to its core made little difference in the end: While everyone lost ground during the recession, in the first year of the recovery

figure 1

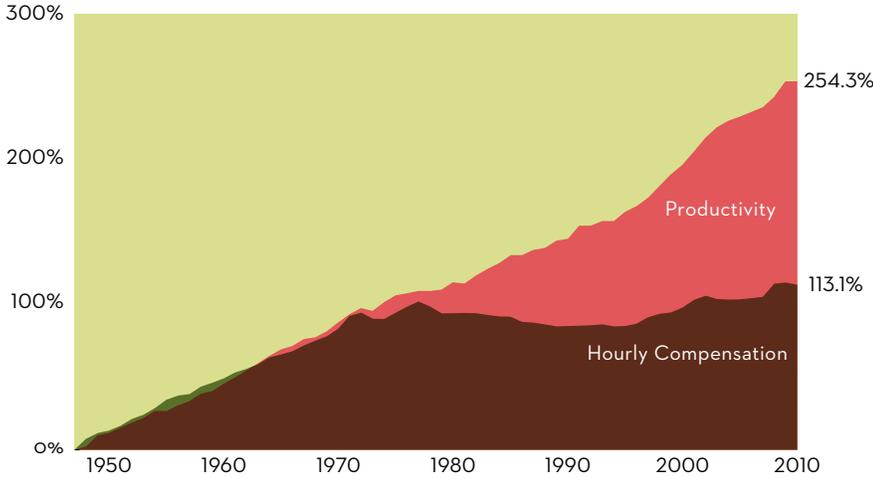
U.S. EXTREME INEQUALITY



Adapted from Mother Jones, based on data from Emmanuel Saez, UC Berkeley

figure 2

THE GREAT DIVERGENCE



Charting cumulative percent change since 1948 documents the dramatic decoupling of U.S. worker compensation and productivity in recent decades. Workers don't feel like they're getting ahead, because they're not.

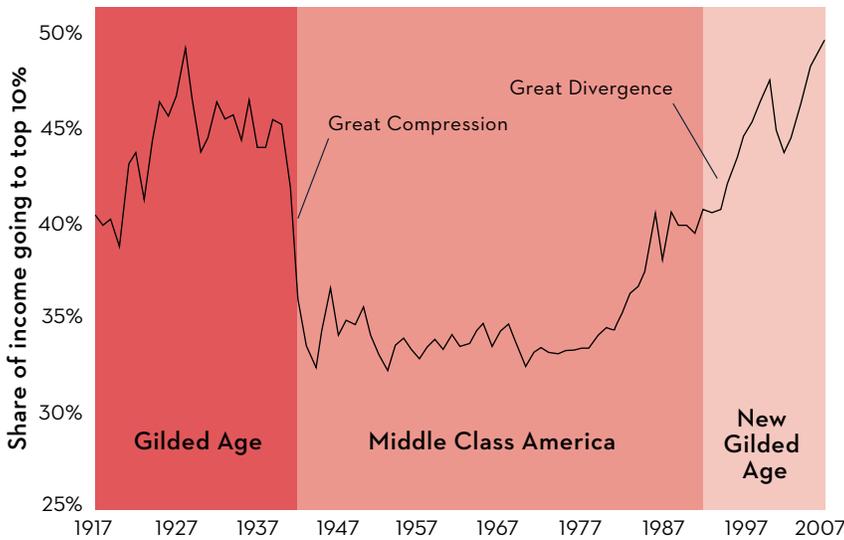
Source: Economic Policy Institute

America's richest 1 percent captured 93 percent of the income gains.¹⁹

One of the clearest indicators of the dynamics underlying this inequality is the stark disconnect between productivity and compensation that began in the mid- 1970s (figure 2). Workers' wage stagnation despite increasing productivity clearly marks the end of a postwar era of generally shared prosperity, and, particularly in the last decade, the debut of a new Gilded Age (figure 3). Indeed, according to EPI analysis the gap can be explained largely by a greater share of income going to capital than labor, and the dismal growth of median hourly compensation.²⁰ Workers don't feel like they're getting ahead, because they're not.

figure 3

THE END OF SHARED PROSPERITY



Charting the top decile income share in the U.S. over the past century shows the rise and fall of the middle class – and the unmistakable triumph of capital – in the late 20th-century. (Income includes realized capital gains).

Adapted from Thomas Piketty and Emmanuel Saez

CLIMATE REALITY:
THE CHANGE IS HERE

The clear preponderance of scientific evidence suggests that global climate disruption and associated environmental crises will deliver, sooner rather than later, some dramatic changes: rising seas and desertification; the normalization of extreme weather events; mass extinctions on land and sea.²¹ Accompanying these scourges will be food insecurity and mass migration; the increased human suffering and economic shock from what are rather clinically termed “extreme weather events” (hurricanes, tornadoes, floods, etc.); drought and wildfire, flooding and water shortage; extreme heat and public health crises including but not limited to increasing asthma rates and

the rapid spread of respiratory and infectious disease. All of which will disproportionately affect poor and vulnerable communities.²² (Which is why, later, we will talk about resilience. Because adaptation can too often simply imply increasing the capacity of the disenfranchised to absorb pain).

It's a frightening list, seemingly biblical in proportion. What is perhaps most alarming, alongside gradual, continuous processes like the Dust-Bowlification of the American southwest,²³ is the unpredictable series of global tipping points we face — triggers that can lead to a cascading and irreversible series of self-amplifying events, like the Arctic ice melt that at some point will catalyze a catastrophic release of carbon (methane)²⁴ from thawing permafrost. What we do know is that 350 parts per million (ppm) is the safe upper limit of CO₂ in the earth's atmosphere. We are currently at 397, and on target to double that in this century.²⁵ MIT and other credible sources have in fact recently revised upward the predicted pace and impact of warming in business-as-usual scenarios (*figure 4*).²⁶

Another alarming aspect of climate change is the “wicked” nature of the problem, in which a necessarily

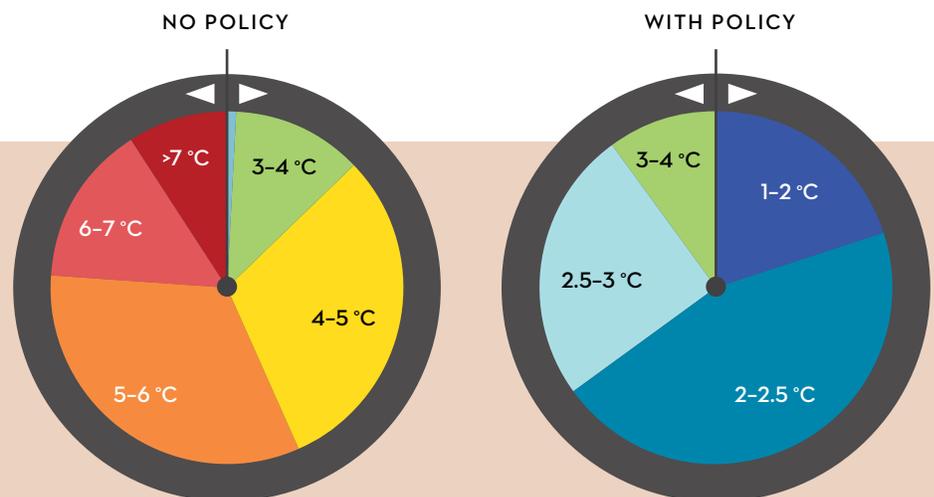
collaborative solution requires time (more than the problem allows) to forge shared understanding of the challenge and a common global commitment to resolving it.²⁷ The time horizon in this case is uncertain, but delimited by a rapidly approaching 2-degree tipping point. Two degrees Celsius (3.6°F) beyond pre-industrial levels is the warming threshold for planetary climate stabilization.²⁸ Current projections from the International Energy Agency (IEA) now show an increase of 6°C by century's end (enough to devastate food systems and leave large portions of planet uninhabitable). IEA (an independent, gold-standard, international authority, hardly a bastion of radical policy, much less hyperbole) argues that while achieving the low carbon transition required to meet the 2°C limit is technologically possible, failure of government action around the world — necessary to drive the development and deployment of clean energy technologies—has placed us all in jeopardy. Rising energy consumption and escalating CO₂ emissions (now expected to double by 2050) suggest that mitigation efforts are falling catastrophically short.²⁹

On the eve of Rio+20,³⁰ in a grim echo to the IEA report, a distinguished group of international scientists led by

figure 4

GLOBAL WARMING ROULETTE

MIT's “Greenhouse Gamble Wheels” convey both the urgency and uncertainty of climate change. The size of each color wedge reflects estimated probability of associated temperature increase by 2100. In the reference case — with no policy to limit GHG emissions — the chances of stabilizing global temperatures below a catastrophic threshold (2°C) are slim.



CHANGE IN GLOBAL MEAN TEMPERATURE: 1990-2100 (°C)

Anthony D. Barnosky at Berkeley published a paper in *Nature* suggesting (based on fresh analysis of longstanding evidence) that we are reaching a planetary-scale, human-induced tipping point — a “stage shift in Earth’s biosphere” involving massive species extermination (75 percent loss of biodiversity).³¹ These findings amplify the work of another esteemed scientific collaboration, this one headed by Johan Rockström at Stockholm University, which in 2009 famously charted biodiversity loss alongside ocean acidification, climate change, and other critical earth-system variables (*figure 5*).³²

The climate jeremiad can seem numbing in its repetition and unfathomable in its scope. It is the familiar chatter of doom in the background of a noisy new century, distracted by more tangible and immediate threats to human security. But even the most casual review of the literature throws into queasy light the inadequacy of U.S. political responses — both the facile green jobs shibboleth and the lunatic vision of mitigation as a left-wing plot to wreck the economy by dethroning Big Oil and King Coal.

POLITICAL REALITY: A DEMOCRACY DEFICIT

Disregard for inequality and an almost pathological deafness to the drumbeat of environmental catastrophe

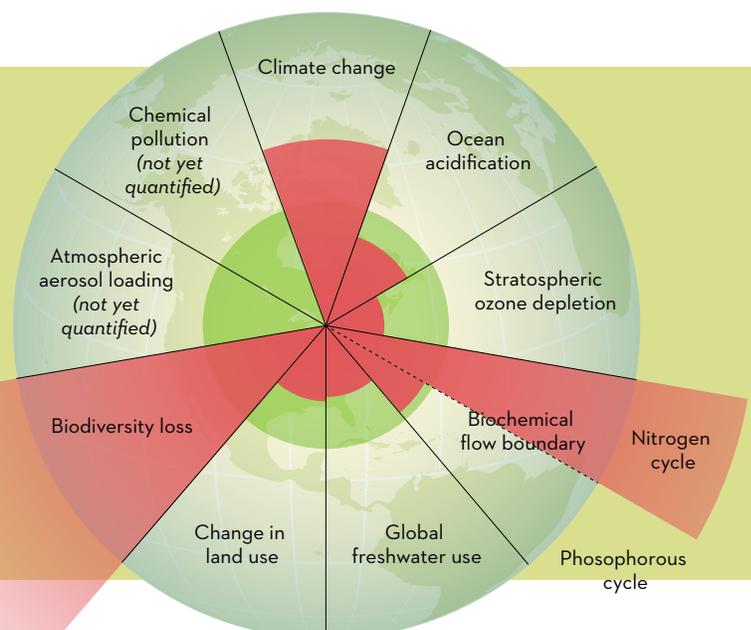
are together symptomatic of the alarming neoliberal moment we are experiencing in the U.S. as elsewhere, as an at best short-sighted and more often cynical austerity agenda threatens to increase misery at society’s margins (and middle), while further concentrating wealth at the top. Here we take neoliberal to be less a specific approach to international trade policy than a rough summary of a political economy that puts faith in the efficacy of unfettered markets (championing, i.e., free trade, deregulation, privatization, etc.); substitutes the language (and primacy) of individual responsibility and private property rights for that of the commonweal and public goods; and invokes the virtues of fiscal discipline as an antidote to some perceived excess of state power and a sluggish economy notable largely for its staggering levels of inequality.

Neoliberalism is opposed by all but its elite advocates. But there’s no majority for protectionism either, and even less for conventional democratic government (which is seen as at best incompetent, at worst corrupted by obeisance to neoliberal or more reactionary elites).³³ And, absent a left program of broad appeal (requiring general benefit, plausible strategy for reaching it, and some tie between mutual respect— fair treatment, shared opportunity, civic obligation — and its achievement), those same majorities

figure 5

HOMELAND SECURITY ADVISORY

The inner green circle represents a safe operating space for humanity within nine planetary systems. The red wedges represent estimated positions for each variable in 2009. We have already exceeded the boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle).



are resigned and quite prepared to blame the domestic “other,” (e.g. immigrants, queers, environmentalists, et al.) for as much of their problems as seems plausible. Beyond the current economic calamities, and the environmental ones, is a real political crisis.

THE SLEEP OF REASON

Francisco de Goya, watching another Northern nation reject the basic tenets of the Enlightenment — that progress is possible, that social contracts matter, that rationality is the particular gift of humanity and the key to its progress — predicted this two centuries ago: “The sleep of Reason produces monsters.”³⁴

Two related visions from the spring of 2012 — sideshows, really, in the drama described above — are quite illustrative:

The Mayor of Norfolk VA grapples with the possibility of abandoning parts of the city to the rising sea, spending \$6M annually to elevate roads and homes threatened by repeated inundation, and preparing a \$1B congressional funding request for a 30-year coastal flood and surge management plan.³⁵ As Norfolk literally sinks under the waves, the Republican-led Senate down the

coast in North Carolina passes a bill that forbids coastal counties from using climate change data to predict sea level rise, finding that the report of a state-appointed science panel to be “unreliable and harmful to economic development.”³⁶ Back in Virginia, the legislature agrees to commission a study to determine the coastal impacts of climate change, but only after excising the words “sea level rise” — a “left wing term.”³⁷

Across the country, in a region facing a trillion dollar water shortage,³⁸ a prominent piece of climate legislation prohibits the state of Arizona and its cities from “adopting or implementing” the UN principles of sustainable development.³⁹ The absurdity of SB 1507, approved by the Arizona Senate but not voted on by the House before the close of the 2012 session, is role-modeled at the top, when the Republican National Committee passes a January 2012 Resolution asserting that plans for “radical so-called ‘sustainable development’ are antithetical to the American way, and involve a “socialist/communist redistribution of wealth.”⁴⁰

Recent opinion polling offers a significantly different picture, revealing, beneath a deeply divided American public, a groundswell of concern and common sense that offers some encouragement on the climate front.



The disconnect between Tea-Party climate denial and widespread public support for climate mitigation suggests a political opening. And it also reinforces the point we make elsewhere in this paper, that solving “wicked” problems requires more innovative and inclusive democratic solutions.

A March 2012 Yale and George Mason University poll to assess public support for climate and energy policies delivered stunning results:

- 92 percent of Americans think that developing sources of clean energy should be a priority for the President and Congress;
- 72 percent believe that global warming should be a federal policy priority;⁴¹
- 75 percent support regulation of CO₂ emissions.⁴²

And more than two-thirds of Americans (68 percent) think that the U.S. should make a large- or medium-scale effort to reduce global warming, despite associated economic costs (*see figure 6 for additional responses*).⁴³

Similarly, in a 2012 Pew survey of American Values, 74 percent agreed that “there needs to be stricter laws and regulations to protect the environment.” This polling,

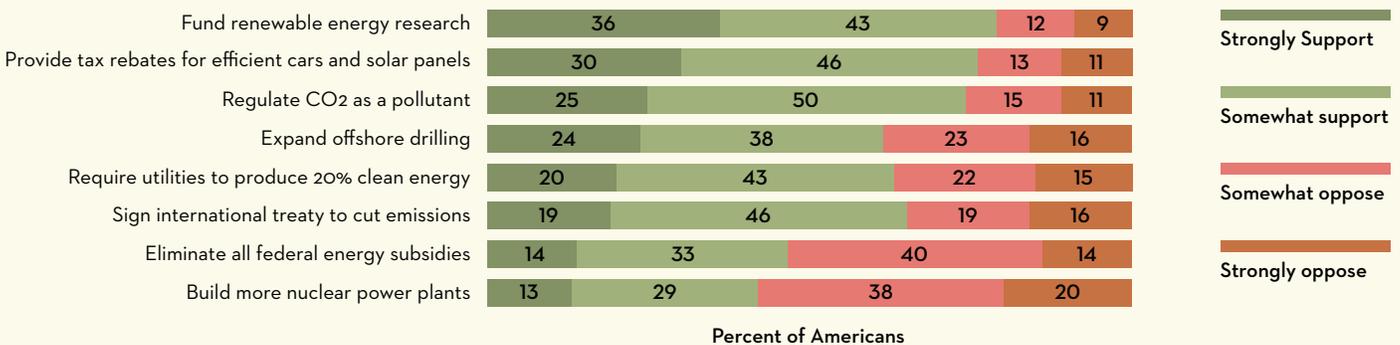
however, also reveals the dramatic unraveling of a bipartisan consensus over two decades, with less than half (47 percent) of Republicans now in favor of such regulation (a drop of nearly 40 points from 1992).⁴⁴

And in a repudiation of the loud, persistent, and often disingenuous incredulity of the deniers, a June 2012 Brookings study found that the public has (once again) become more receptive to the science of climate change, with 65 percent now convinced that there is reliable evidence for global warming.⁴⁵

The political fight, however, isn’t about science; it’s waged in the language of jobs. A new study on the use of the term “job-killers” in mainstream news media found that during the tremendous spike in related coverage during the first three years of the Obama administration (with the majority originating from conservative sources and focused on federal regulatory policy), more than 90 percent of “job-killer” stories failed to cite any evidence for the allegation. The number one issue identified as a “job killer” was climate change.⁴⁶ While this data-free argument has successfully informed the benighted energy policy and “green” funding decisions of Congressional Republicans, the Yale/GMU poll found that only

figure 6

PUBLIC SUPPORT FOR CLEAN ENERGY POLICY



In March 2012, a solid majority of Americans favored an active government role in both developing renewable energy and regulating carbon.

17 percent of Americans think that protecting the environment reduces economic growth and costs jobs. The vast majority thinks it either improves economic growth and provides new jobs (58 percent) or has no effect (25 percent). And when there is a conflict between the two, 62 percent of Americans say it is more important to protect the environment, even if it reduces economic growth.⁴⁷

This apparent divide between fossil dreams and popular values presents another opportunity — another sign, as if America needed one, that it should not yet concede the “green” moment to the conjured demons of illiberalism. But too often those of us who care about climate and equity and building a cleaner economy are back on our heels defending the validity of the green jobs promise. Politically, it feels like we’re back to 1970 (Clean Air Act) or 1999 (Teamsters and Turtles) or 2004 (Apollo Alliance), having to argue all over again that clean air and water and energy are not job killers.⁴⁸ We have spent far too much energy debunking the false dichotomy between economic and environmental priorities. It is time to start talking about resilience, and life as we want to live it.

UNCERTAINTY AND RESILIENCE

The three realities described at the start of this chapter — economic inequality, climate disruption, democratic decline — are both undesirable and unsustainable. Yet the systems that govern these realities, their potential for transformation, and the means to do so are all challenged by the same principle: uncertainty.

How to deal with uncertainty? Not through prognostication and pyramid-building; rather by cooperatively constructing resilient, flexible, diverse systems. Systems with the capacity to anticipate and adapt.

One of the problems in preparing for climate disruption (and convincing people it’s on the way) is the uncertainty of it all: As with floods, hurricanes, and epidemics, we don’t know exactly when a crisis is coming, what it will

look like, or where it will hit, but we can say with a fair degree of certainty that it is and it will, somewhere nearby. We need to prepare communities for a variety of climate-related threats. Not by building seawalls, necessarily, or mapping evacuation routes, but by creating resilient social and economic systems.

Modern American labor markets are notoriously fickle. We may not be sure exactly what skills will be required in a warming world, but we do need training and education and worker support systems that are at once nimble and resilient, capable of translating shifting industry demand into robust and appropriate human capital development. And, as we shall see, it is not that we need better workforce development systems to deliver equity (where education and skill attainment becomes the great equalizer), but that we won’t be able to build a more equitable and sustainable (greener/cleaner) society/economy unless we have everyone (our nation’s human capital) prepared, engaged, and at the table. Re-engaging Americans in the public sphere may be a prerequisite to renewing their faith in government, without which we can abandon hope for any coherent national approach to energy, infrastructure, education — the shared work of building a clean U.S. economy.

Democracy also demands of us an open embrace of uncertainty. But in the contingency lies hope. If individuals commit to an aspirational vision of democracy (in which people are free and equal in the making of social decisions), without being able to know or control its particular policy outcomes, they could create a movement and “a world quite different from the one we now inhabit, a world in which obfuscation might give way to clarity as a preferred method of public argument, in which humor might replace posturing in the relation among equals, in which vast stores of private wealth would no longer be taken as a mark of inner distinction, and the refusal to oppress others would no longer be taken as a mark of weakness.”⁴⁹ That we return to this vision for hope thirty years after it was first described, is itself a sign of resilience.

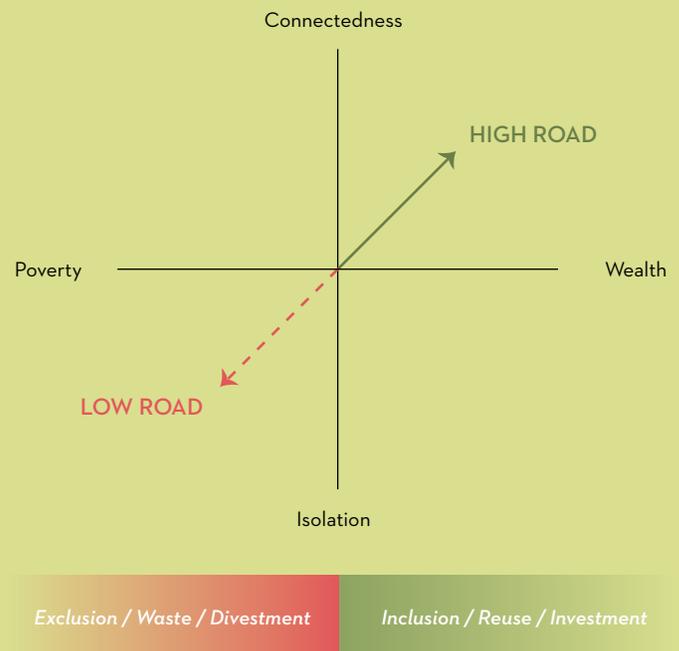
Inviting such a broad socio-political “stage-shift” as an adaptation strategy may seem to contradict traditional definitions of resilience. In physics, engineering and biosciences, resilience often refers to the capacity of a system or material to return to its original state after a disturbance or deformation. Here we employ resilience more in the spirit of the psychological concept: The capacity to recover from misfortune, a state of buoyancy.

Buoyancy may serve best in cases involving a slow burn rather than a shock per se. What does it mean to cultivate resilience (as opposed to, perhaps, resignation) in response to global warming, rising inequality, or the erosion of accountable democracy, as opposed to a system’s ability to right itself after a financial collapse or a tornado? And how can this be managed within the short-term electoral-cycle attention span of deficit-fearing American policymakers?

Resilience as a term of art in the U.S. is too often siloed. A vision of resilience applied holistically to interdependent systems — environment, economy, community — would significantly boost adaptive capacity, particularly but not exclusively in vulnerable communities. (It would also echo and advance the integration of human capital systems described in the next chapter.) The story of a depressed community coming to life thanks to a big box store or a food processing plant with sweated labor might be passed off as a demonstration of economic resilience in a blighted metro, but it hardly contributes to social or environmental resilience. This segregated view is encouraged no doubt by tradition and professional culture, where, e.g., some adaptation literature focuses almost exclusively on natural resource management, or oil companies promote pipelines as community development. Just as climate change planning must

THE HIGH ROAD IS GREENER ALREADY

“High road” (HR) denotes a family of political-economic strategies for human development, under competitive market conditions, that treat **inclusion and shared prosperity**, **environmental sustainability**, and **efficient democracy** as complements rather than tradeoffs.* As consistently used by COWS for nearly two decades, HR is not just a redistributive strategy, but a productivist one. And it takes competent and capable democratic organization to be important not just for justice, but wealth generation. In the most general terms, such organization is needed to set the rules that enable market competition in the first place, to provide the public goods and correction of market failures that markets alone cannot provide, and to ensure the breadth in social learning and innovation that is the final source of wealth. In everyday development practice, where HR recommends a repeated three-step of reducing waste, adding value, and capturing and sharing locally the benefits of doing both — such



A CHOICE FOR COMMUNITIES

necessarily involve more than a given jurisdiction's environmental agency. If we are concerned about the most vulnerable (or the entire 99 percent), part of nurturing climate resilience must involve developing an infrastructure of equity and shared prosperity.⁵⁰

Where most green jobs initiatives focus on mitigation, which generally indicates policy and practice designed to stabilize the planet's climate by reducing greenhouse gas emissions, adaption — the simultaneous work to cope with ongoing climate disruption — is also a key element in a green economy. The Rockefeller Foundation, committed to improving the adaptive capacity of the most vulnerable communities, defines climate change resilience as “the capacity of an individual community or institution to dynamically and effectively respond to shifting climate change risks and impacts, while continuing to function at an acceptable level.”⁵¹

The challenge lies in defining the threshold for “acceptable.”

Resilience as we imagine it is not improving the capacity of the poor to migrate; nor a strategy to prevent workers from rioting in the streets. It is not about enduring a shock and returning unchanged to a state of misery. It is not mere survival, but the possibility of change. More than adaptation to catastrophe, it involves planning for a practical utopia. Resilience looks a lot like building a greener high road.⁵²

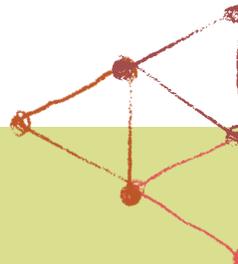
organization is needed for the social cooperation and power necessary in each step.

High road can also describe the activities of private firms or governments and allied NGOs. As applied to firms, a high road firm (HRF) is one that competes chiefly by increasing the productivity (defined as revenue per unit of input) of its managed human, physical, and natural capital and shares its surplus with non-owner stakeholders (e.g., employees, government, communities). The contrasting low road firm (LRF) competes chiefly by reducing the price of its product (e.g., by sweating labor) while externalizing the social or environmental costs of its production (e.g. by polluting and not paying taxes). A high road government or NGO is one that promotes policies (e.g. regulations, revenue regimes, public

investments) and institutions (e.g. in education/training, research, marketing, modernization) — together called “productive infrastructure” — that make it respectively harder and easier for LRFs and HRFs to compete.

Such productive infrastructure is place-specific and largely immobile. This improves the conditions for social bargaining between non-owner economy stakeholders (who are also largely immobile) with capital. At first attracted to such places for the increased return their productive infrastructure provides, firms become dependent on that infrastructure in their strategy. They are less credible in or inclined to make the sort of exit threats that commonly poison social bargaining. In this way, HR alleviates some of the worst anti-labor or anti-community effects of globalization.

*To define the terms: *inclusion and shared prosperity* means improvements in median income, education, health, and wealth, and equal opportunity to participate in and benefit from the activity that produces them; *environmental sustainability* means restoration and maintenance of the environmental services needed to support human life; *efficient democracy* means a government (and allied NGOs) that satisfies Gettysburg normative standards (i.e., “of...by...and for the people”) in ways that are both allocatively and dynamically efficient (i.e., that, respectively, assigns resources precisely to declared public ends and improves its own performance through learning and innovation).





A vision of jobs, profits, health, and risk reduction is not a dour vision of an economy languishing in regulatory hell, but a green future appealing to capital and labor alike.

A CLEANER ECONOMY

In addition to advancing the clean energy promise of a greener economy, COWS has taken the “green moment” of recent years as an opportunity to move an equity and skills agenda, aiming to shape an economy and a polity that might better serve workers, the poor, people of color, and others who have been routinely and staggeringly failed by our education and training systems, our fraying social contract, our 1 percent winners-take-all low-road economic policy. This paper continues that work. But its scope is broader, considering human capital development in a larger context of climate change and democratization. Because we believe that even if the U.S. achieved a flawless (and greener) skill-delivery system, this would not be an adequate response to the challenges of global warming and inequality. Indeed, there is nothing about human capital development that by necessity advances equity or decarbonization.

Whatever the vicissitudes (not to say insanity) of U.S. politics, most of the world is moving, if still uncertainly, toward mitigation and adaptation to climate change. Both imply evolving technical/occupational human capital requirements, and would benefit from increased efficiency in their delivery and mastery. This report concerns in part what those needs are and how they might be most efficiently met. But address of our climate challenges will take place, and be both complicated and better enabled by, even broader changes in the structure of power in the world, and new possibilities for human flourishing. This too implies the need for new human capital, of a less technical and occupational kind but no less important. For both sorts of skills, for reasons explored below, greater rootedness in more democratic practice, of the sort also likely to require greater voice and fairness in the decision-making and distribution, is recommended. If the old “human capital synthesis” saw equity being achieved through greater learning, the one proposed here sees needed learning best achieved through more democracy. Indeed, the synthesis celebrated twenty years ago, in which the solution to

most equity problems was human capital, which business would underwrite for its promised gains to productivity, was probably wrong. We have come to believe that some substantial increase in real democracy and social equity is what will drive most of the human capital demand and the ability to underwrite its costs.

CHOOSING HOPE: GREENER ENERGY

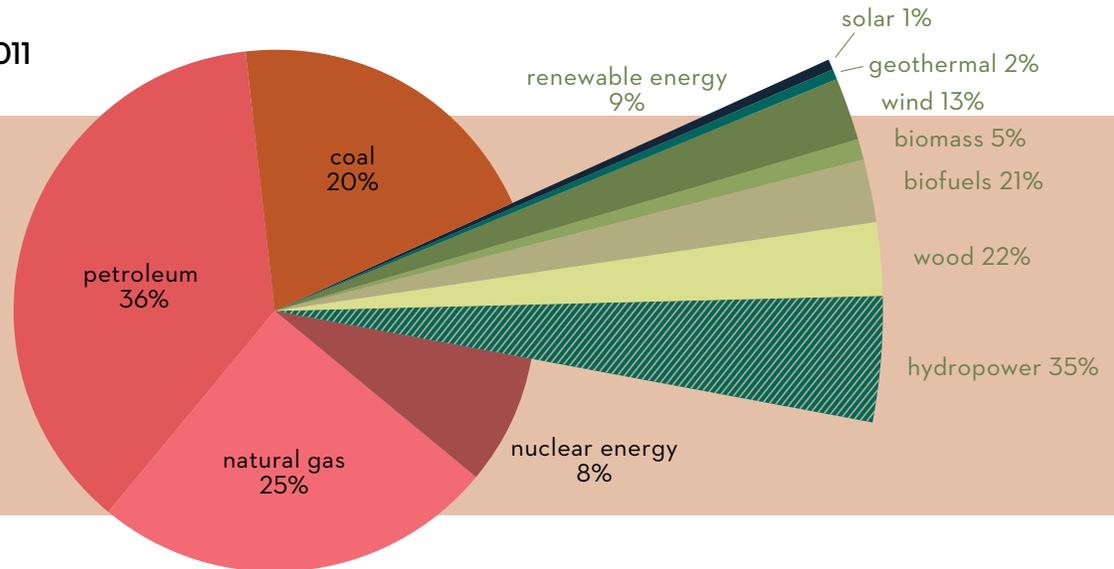
Despite the gloomy economic and climate realities described in the introduction, there is still a way forward. There is, in fact, quite rational hope for a productive, prosperous, and greener U.S. economy, one that is both fairer and cleaner. And it is important for advocates and policymakers to more effectively — in terms at once compelling and free from hyperbole — describe this possibility. To make it clear to all constituencies and in particular the American public that the green economy is a party no one wants to miss. As the International Energy Agency (IEA) noted this spring, when it warned the Clean Energy Ministerial⁵³ that the world’s most advanced economies were not on track to meet even minimum climate goals, the reason for urgency is not the vision of a coming apocalypse, but the understanding that we may be squandering “a golden opportunity to act.”⁵⁴ It is an opportunity not just to reduce greenhouse gas (GHG) emissions to a level that stabilizes planetary warming, but to reap the concomitant improvements in health, employment, energy security, and economic development.⁵⁵

The IEA calculates that the \$5 Trillion global investment required by 2020 in order to begin seriously decarbonizing the energy sector and meet climate stabilization goals would be significantly offset by nearly \$4T in corresponding fuel savings.⁵⁶ An accelerated transition away from fossil fuels and into renewable energy (RE), energy efficiency (EE), and smart transportation would not only be affordable, but the required investment would itself constitute a tremendous engine of growth. The primary obstacle, according to IEA, is not technical, but

figure 7

U.S. ENERGY SOURCES, 2011

Renewable energy is a small but growing share (9 percent) of total U.S. energy consumption, including both fuel and electricity. For the first time, natural gas (25 percent) overtook coal (20 percent).



Source U.S. Energy Information Administration

political: private investment will continue to fall short in the absence of clear and predictable government policies that address market uncertainties and other barriers to the widespread deployment of clean energy technology.⁵⁷

In terms of technology, the U.S. case is particularly promising. A massive new study from the National Renewable Energy Laboratory (NREL) demonstrates that by 2050, the U.S. could reliably deliver 80 percent of electric generation from renewable technologies commercially available today.⁵⁸ Where IEA metrics include coal — carbon capture and storage (CCS), and high-efficiency low emissions (HELE) technologies — and nuclear power in the clean energy mix, NREL models the regional development of wind, solar (PV and CSP), hydropower, biopower, and geothermal as a substitute for fossil and nuclear power sources.⁵⁹ Amory Lovins, Chair of the Rocky Mountain Institute, makes a strong business case for the strategic value and financial feasibility of such a shift, arguing in *Foreign Affairs* that:

The United States must replace its aging, dirty, and insecure electric system by 2050 just to offset the loss of power plants that are being retired. Any replacement will cost about \$6 trillion in net present value, whether it is more of the same, new nuclear power plants and

“clean coal,” or centralized or distributed renewable sources. But these differ profoundly in the kinds of risks they involve — in terms of security, safety, finance, technology, fuel, water, climate, and health — and in how they affect innovation, entrepreneurship, and customer choice.⁶⁰

Lovins argues that the most resilient grid will rely on “diverse, dispersed, renewable” sources, a view shared in that bastion of socialist radicalism, the Pentagon. In addition, the transition to a flexible electricity grid based on low-carbon inputs can, through data-driven discussions of the costs of fossil fuel dependence, shift the conversation about climate change from sacrifice to competitive advantage.⁶¹ And a vision of jobs, profits, health, and risk reduction is not a dour vision of an economy languishing in regulatory hell, but a green future appealing to capital and labor alike.

Some have embraced this vision. 2011 saw a record \$260B invested in clean energy worldwide, with the U.S. at \$55B leading total per country investment in clean energy, a 33 percent increase over 2010 that propelled the U.S. ahead of China.⁶² Indeed, despite the popular political narrative of cleantech’s failure to prove competitive, industry analysts have found the opposite to be true.

Green Biz cites record growth in the solar sector, and impressive gains in wind and green building.⁶³ A recent Environmental Defense Fund report examines the seven green economy sectors that aim most specifically at reducing California's GHG emissions. Ranging from energy storage and energy efficiency to advanced materials and clean transportation, these industries have for nearly two decades bested overall growth rates in the state's economy, and proved remarkably resilient through the worst of the recession in 2009-2010.⁶⁴ Similarly, in a 2011 report the Brookings Institution found that nationally the clean economy outperformed other sectors during the recession, though some of the highest-growth sectors, like wind and solar, were adding jobs rapidly to a very small base.⁶⁵

There is reasonable concern among clean energy advocates and businesses that the expiration of federal loan guarantee and Treasury grant programs, combined with the likely loss of the Production Tax Credit and/or failure to pass the modest National Clean Energy Standard Act,⁶⁶ will chill the investment climate and severely curtail the gains of 2011. Beyond policy miscues, anemic overall economic recovery, and climate skepticism, the greater challenge to low-carbon investment in U.S. may be the dynamics of domestic energy supply — redefined in recent years by the game-changing expansion of natural gas extraction.

Contrary to standard assumptions about peak oil and gas — the notion that declining reserves would require the U.S. and eventually the entire Western Hemisphere to rely on imports from unstable regimes in the Middle East, Africa, and the former Soviet Union — new and riskier forms of extraction have in recent years opened vast domestic reserves.⁶⁷ Cheap and abundant, but in some cases more carbon intensive and in all more prone to environmental catastrophe, unconventional fossil fuel development includes deepwater fuel beds, shale gas and oil, and tar sands. Advocates argue that their exploitation can position North America as a “new Middle East.”⁶⁸

Natural gas, because of its perceived “green-ness,” is of particular concern. Some cleantech champions, like Lovins, describe natural gas as a bridge fuel; others, including a fair number of Democrats and even at times the Obama Administration, have come to see it as a panacea — a domestically abundant, low-carbon answer to energy security. Critics argue it is a bridge to nowhere, particularly if the rush to natural gas, seen as a direct and affordable path to energy independence, precludes investment in renewable energy and energy efficiency.⁶⁹

And its value as a lower-carbon alternative is in question as well. Natural gas is widely viewed as a “cleaner” fossil fuel, because it produces about fifty percent of the CO₂ emitted by burning coal. But because the methane (CH₄) emissions generated through extraction offset the reduction in carbon dioxide (CO₂) produced during combustion, recent scientific literature suggests that the greenhouse gas footprint of shale gas (natural gas harvested through hydraulic fracturing, or “fracking”) is greater than traditional gas, oil, or coal, particularly over a near term (20-year) time horizon.⁷⁰ Even absent significant methane leakage, a recent study from the National Center for Atmospheric Research estimates that the shift to natural gas from coal would not significantly slow climate change.⁷¹

Conveying the relative merit of particular energy paths is further complicated by America's desperate need for jobs. The promise of immediate work in expanding fossil fuel industries has generated serious fractures in and between U.S. labor and environmental movements, as we discuss elsewhere in this paper. But as Kate Gordon, then Vice President for Energy at the Center for American Progress, observed pointedly in the fall of 2011, we need to imagine the longer term employment consequences of choosing a fossil fuel path: in an American future dominated by gas and oil, “most energy workers aren't inventors, manufacturers, or construction workers, but instead are making minimum wage behind the counter in gas stations.”⁷²

In terms of basic economic development, considered at a macro-level, an expanded fossil future is neither cheaper

nor more efficient than one built on clean energy. Even with abundant new oil and gas resources, the perceived short term gain of their exploitation (energy security, the retention or creation of jobs in extraction sectors) is offset by their long-term expense and inefficiency. And for those troubled by government meddling in markets, it is important to remember that the oil, coal, and gas industries have relied for decades on precisely such intervention.

Worldwide, subsidies for fossil fuels dwarf those for renewables (biofuel, wind, solar): \$409B to \$66B.⁷³ The pattern obtains in the U.S., where energy subsidies tracked over a seven-year period (2002-8) amounted to \$72.5B fossils to \$29B renewable.⁷⁴ This comparison is neither simple nor straightforward. Renewable energy subsidies are by and large time-limited (legislated through energy bills), where the bulk of fossil fuel supports are written directly into the U.S. tax code.⁷⁵ Quantifying direct subsidies does not of course address implicit subsidies granted by externalities — the economic costs generated but not born by fossil fuel industries. Credible estimates show that coal-fired electrical generation, for example, actually creates a net drag on the national economy once the health costs from associated air pollution are taken into account.⁷⁶

Recent OECD research has found

that fossil fuel subsidies are economically inefficient, distorting markets, disproportionately benefiting higher income populations, encouraging wasteful consumption, increasing CO₂ emissions and local pollution, and creating barriers to clean energy investment.⁷⁷

Their conclusion: Green growth requires not simply a regulatory and price framework that more appropriately values natural capital, but a more serious attempt by all member governments, including the United States, to remove the “perverse subsidies which encourage pollution or over-extraction of resources and place a drain on the public purse.”⁷⁸ Such measures were embraced by the early Obama Administration, and have re-emerged in Washington’s current deficit conversation. In response to booming oil profits (a record \$137B in 2011) and looming cuts to modest but critical non-defense discretionary spending, Senator Bernie Sanders (I-VT) and Representative Keith Ellison (D-MN) introduced the “End Polluter Welfare Act” which proposes to save an estimated \$113B over ten years by eliminating gas, oil and coal subsidies.⁷⁹

There is some reasonable concern that elimination of subsidies would place undue burden on the poor. But this is an inefficient means, at best, of assisting vulnerable populations. IEA analysis shows that, contrary to common assumptions, “only 8 per-

cent of the \$409 billion spent on fossil-fuel subsidies in 2010 went to the poorest 20 percent of the population.”⁸⁰

A renewable energy future, while not without developmental and distributional challenges, can be cheaper, cleaner, and of broad benefit, even and perhaps especially to the poor. Getting there requires not only transforming the economic pay-offs for greener use of natural capital (through price, subsidy and regulatory mechanisms), but the design and implementation of vigorous policies to generate cleantech investment, build green infrastructure, promote innovation, and enhance institutional capacity in and outside of the public sector.

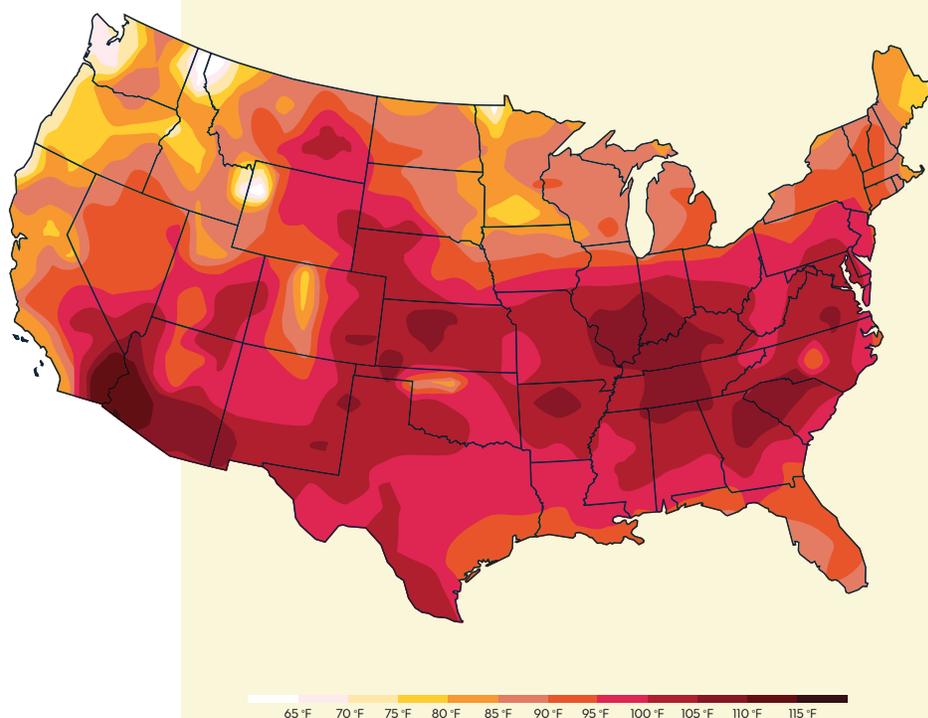
Doing so is possible, smart, and in line with multilateral global efforts. Linking advanced and emerging economies in a global effort to finally capture some of the promises of sustainable development, the United States, the Clean Energy Ministerial, and a broad swath of RIO+20 stakeholders — including civil society and private sector representatives, multilateral development banks, and numerous governments — agreed to support the compelling vision of UN Secretary General Ban Ki-moon: Sustainable Energy For All (SE4A). SE4A is a UN-led initiative to provide universal access to modern energy services; double the rate of EE improvement; and double the share of RE in the global energy

mix.⁸¹ These are laudable goals for the global South; essential, and achievable, goals for the United States.

As we noted at the beginning of this section, this will cost something.⁸² But the costs of inaction are greater. It is not in the scope of this report to summarize the literature on climate economics. But from the Stern Report in 2006 through more recent global and regional analyses, it is eminently clear that risk cuts across all industry sectors, with particularly dramatic impacts in agriculture, energy, and transportation, as well as water infrastructure (supply and treatment).⁸³ Depending on degrees of warming and social cost accounting, comprehensive disruption estimates range from 2–50 percent of world GDP. Without settling on an exact dollar figure (given the enormous uncertainties regarding interactive impacts of global warming over a variety of time horizons), the most sophisticated economic modeling argues that in all cases, “it is unequivocally less expensive to reduce greenhouse gas emissions than to suffer climate damages.”⁸⁴

Not everyone is moved by compelling graphs of carbon cost modeling. Personal experience of climate disruption is often key to moving public opinion. This report went to print in the record heat of summer 2012, which by the end of June had already smashed existing records, with U.S. surface temperatures in excess of 100° stretching almost continuously from California eastward to the Atlantic (*figure 8*).⁸⁵ Wildfire,

figure 8
2012 HEAT WAVE



By early summer (map data from June 29, 2012) the U.S. was sweltering from triple digit heat, coast to coast. Drought and wildfire scorched fields, forests, and cities, driving home the reality of a warming world and its immediate threat to crops, water, health, and livelihoods.

Adapted from Unisys

FROM GREENER SKILLS TO GREENER REALITY: COWS AND HUMAN CAPITAL

Our aim is not to defend green jobs.¹⁰⁸ Our aim is to build and start to implement a rational policy framework for human capital development in a greening economy — one that helps ensure that low-income, under- and unemployed workers can advance into family-sustaining careers, while the communities in which they live improve resilience to climate insecurity. With this paper we hope to further the efforts of many to illuminate a “green” universe and the value propositions within it which — by advancing strategies for shared prosperity, low-wage worker advancement, and transparent, sustainable development — merit further attention.

U.S. discussion about the human capital requirements and equity-promoting aspect of green jobs is problematic for five, only partially related, reasons:

- A** Green jobs are still getting defined as occupations rather than portions of FTEs with correspondingly “greener” skill sets, with resulting problems in measuring extent or contribution;
- B** We are far behind other countries in making the clean energy transition;
- C** We have not fully recognized the need — much less adequately mapped the work involved — to prepare vulnerable communities for the impact of climate change;
- D** We have a fractured education and training system, which has proven inadequate to deliver skills and equity for many, especially the poor and the working class
- E** We have an overwhelmingly business-dominated polity, now occupied at its upper reaches by the illiberal and the intransigent; along with making the prospects for direct redistribution to address ruinous inequality, or intelligent macroeconomic policy, nearly zero, this makes even the prospect of a serious competitiveness policy (in which clean energy would be a central though certainly not defining part, and of which human capital policy would be a central part) remote, since the last is not particularly desired by business.

COWS interventions in the “green jobs” discussion thus far have been: **1)** to point out the limits of that discussion, and concerns/capacities it should be rec-



ognizing/using to improve itself; **2)** to use interest in “green jobs” to move forward on the broader discussion in human capital policy that should be happening anyway (i.e., even if global warming and increased energy prices and insecurities were not any sort of an issue), but generally isn’t; **3)** to identify some industry practices that, even recognizing **E**, seem reasonable and worth promoting.

Greener Pathways (2008) was one of the first comprehensive primers on green jobs, explaining workforce development to the clean energy community and introducing the renewable and efficiency industries to the workforce development world; it emphasizes the need for both job quality and access to career pathways for low-income workers, and outlines an explicit state and federal policy agenda for building an equitable green economy. We continued the conversation in *Greener Skills* (2010), the general conclusions of which bear repeating: **1)** there is no discrete set of uniquely “green” jobs; all jobs can and should be greener; and **2)** The U.S. needs a greener and more functional system of skill standards, assessment, and pathways that operate at all levels of the labor market.

There is growing support for the notion that America needs a qualifications framework — a system that trains workers for credentials that actually mean something in the labor market, and measures advancement in terms competency achieved rather than credit earned. But no one has yet solved the thorny related question: How can public policy help drive and shape a credentialing and assessment system whose standards and value must necessarily be rooted in industry? We have explored this in many discussions with colleagues around the country, address it briefly in this paper, and think it is a critical area for continued research, analysis, experimentation, and advocacy.

But we stand now at a political moment quite different from the one that saw the release of *Greener Skills*. And a greener reality which asks a bigger question, perhaps, and certainly demands broader answers: How to build a greener economy for the 99 percent? Particularly within a polity dominated by the 1 percent? The answer is not just creating “green jobs.”¹⁰⁹ It is about building a greener economy that includes communities already marginalized or increasingly disenfranchised by the carbon-intensive economy, and supports those workers and communities who may be penalized by the transition to a cleaner one. It about resilience, equity, and democracy. It is about, in a word, sustainability — a concept that long predates the political trope of “green jobs.”¹¹⁰

continued from page 27

drought, and heat advisories have been accompanied, in some states, by devastating storms and flooding. This reality corresponds to thirty-year extreme weather data trends, and is remarkably expensive, costing the U.S. \$30B last year in insured losses alone.⁸⁶ While the immediate causal connection between climate and weather

the next chapter) that the technical skills required will in some cases be new and different, and in others not. On the latter, we know that a greener economy has tremendous potential (with appropriate investments and policy signals, also addressed in the next chapter) to generate decent work.⁹¹ We also know that some jobs will be

We need to think more about educating an engaged citizenry capable of shaping and monitoring a polity now largely under control of corporate interests, and about building the community and worker organizations that can do so.

in any one instance is debatable, Americans are talking, once again, about climate change.⁸⁷ Perhaps it is enough to say that the inaction described in business-as-usual emissions scenarios will be hugely expensive across all sectors, with some of the most clear and accessible evidence in the immediate cost of increasingly frequent and intense extreme weather events.⁸⁸ These costs will be borne by businesses, by communities (particularly as disinvestment in the public sector limits government capacity to respond), and above all by the poor and vulnerable, as recent experiences in the U.S. demonstrate.⁸⁹ Mitigation and adaptation strategies can reduce those costs.⁹⁰ What's more, the massive public and private investment required to fully scale up renewable energy and energy efficiency can drive significant economic growth, not only stabilizing carbon in the atmosphere, but creating jobs — and, if done right, good jobs.

SKILLS FOR THE TRANSITION

The social, environmental, and economic impacts of climate disruption, together with various attempts to mitigate and adapt to that disruption, will have significant implications for the world of work in terms of both skills and employment. On the former, we know (and discuss in

lost — primarily in fossil fuel and high emissions industries.⁹² Which is why it is critical to focus on a just transition, which we shall address shortly.⁹³

But a truly green future, based on a cleaner economy in and outside of the energy sector, will witness jobs created, retained, enhanced, and greened across all industries, from construction to housekeeping, materials science to finance, forest management to urban agriculture.⁹⁴ The bottom line is to ensure that policies designed to build markets and drive demand also maximize worker opportunities and job quality in greening sectors.

And these must include more than the energy sector. Earlier reports in this series were subtitled “a clean energy economy,” broadly encompassing renewable energy, energy efficiency, and smart transportation. To reflect a broader vision of green, we changed the current descriptor to a “cleaner U.S. economy.” Energy consumption and technology impacts air, water, and land, in turn affecting human health, food security, ecosystems.⁹⁵ Sustainable growth takes into account all of these; skills and employment will be affected across every related sector.

But it seems that mitigation always noses back toward energy — both its cleaner production and its more efficient use. And it is in the transformation of the energy

sector that we find some of the most entrenched interests, whose opposition to change is often voiced as concerns about the economic cost of lowering emissions.

Some of the more interesting recent international research on this topic explores ways in which labor markets themselves can buffer the potential economic shocks of rapidly reducing greenhouse gas emissions. OECD, for example, recommends combining “environmental policies with measures to increase the adaptive capacity of labour markets,” using carbon revenues, for example, to reduce taxation on labor income and invest in skill upgrades. The resulting “double dividend” delivers reduced emissions and increased employment, offsetting any potential drag on GDP from carbon pricing mechanisms.⁹⁶

Such policy approaches, however, presume the capacity to **a**) price environmental externalities, enacting carbon taxes or emissions trading schemes, and direct the attendant revenues to investing in skills and training (increase adaptability of labor markets); **b**) more equitably distribute any increased costs (i.e., offset the impact of rising energy prices on low-income households), and **c**) implement a coherent industrial policy that addresses concerns about

LESS CARBON, MORE WATER

The water sector offers particular promise. And challenge. As with energy, water is essential to individual standards of living, to economic prosperity, and to national security. Hilary Clinton, speaking on smart power at the Virginia Military Institute in April 2012, observed that “some of the greatest threats to our security come from a lack of opportunity, the denial of human rights, a changing climate, strains on water, food, and energy.”⁹⁸ Water quality and availability affect multiple sectors: transportation and manufacturing, fisheries and agriculture, tourism and recreation, sanitation and health.⁹⁹ It is a key determinant in the quality and very viability of cities. And it plays a critical but often overlooked role in the energy industry.

While 70 percent of the world’s water is devoted to agriculture, with the remainder used for industry (20 percent) and direct human consumption (10 percent), water is essential to power generation.¹⁰⁰ (Conversely, water distribution and treatment, for both industry and household use, requires a tremendous amount of energy.¹⁰¹) Policy discussions of clean energy are at last starting to address the interconnectedness of water and energy. The National Renewable Energy Laboratory, for example, argues that the transition to a primarily renewable energy base for electric power could profoundly reduce both greenhouse gas emissions and water use in the United States.¹⁰²

Academics and activists are also increasingly concerned with the cascading effects of climate change on the “water-food-energy nexus,” and this is where we feel much future research and policy reform needs to be focused.¹⁰³ Floods, storms, and rising seas, ironically, will be increasingly accompanied by drought and water scarcity.¹⁰⁴ In the absence of significant advances in efficiency, global water demand will exceed supply by 40 percent over the next two decades.¹⁰⁵ While the supply of clean drinking water has long been a concern in other parts of the world, and water wars have long been a part of the drama of the American West, water has only recently joined the green economy conversation in the U.S.¹⁰⁶ Beyond traditional conversations on natural resource management, a new focus on jobs and skills in urban water sectors has emerged alongside national concern about the decaying infrastructure of U.S. cities. As we discuss in the next chapter, the water sector is a fulcrum for greater investment in green infrastructure. If organized well – and this is a big if – blue has the potential to serve as the greenest of models, creating or retaining high-road jobs across traditional sectors through the more efficient use of natural capital.¹⁰⁷

Water efficiency is a keystone strategy in climate adaptation. Integrating water and energy policy may be equally important to mitigation, particularly where thirsty oil and gas operations compete with drought- and debt-plagued farms and cities.

competitiveness during the transition to a low-carbon economy. The United States is nowhere close to developing such capacity — though related carbon-reduction initiatives are being attempted in some promising regional experiments.⁹⁷

So while it is of course important to prevent skill bottlenecks, and to align occupational training with industry demand, some of the skills required to develop an equitable, low-carbon economy may not be technical skills at all. We need to think more about educating an engaged citizenry capable of shaping and monitoring a polity now largely under control of corporate interests, and about building the community and worker organizations that can do so.

IN SEARCH OF RESILIENCE — AND A BETTER AMERICA

Building a greener economy requires two things currently in short supply: **1**) long-range thinking and decision-making (longer than short-term profit forecasts or terms of office), and **2**) cooperative action to solve social, economic, and environmental problems.

SUPPORT DEMOCRATIZATION

Social cohesion — at its most elemental, the ability to rely on one's neighbors — is critical to community resilience (demonstrated by the experiences, for example, of the tsunami in Japan and the hurricane in New Orleans). A concept with long history in academic literature and European policy-making, it is a notion which runs contrary to a still-pervasive American frontier mythology that conflates resilience and self-reliance. And just as resilience is not a skill learned in a classroom, it is less a single competence than a quality of social thickness, which may pertain to an organization, an economy, a polity, or a neighborhood. Participants in a recent Rockefeller Foundation convening, when asked to give examples of resilience (most of which illustrated successful responses

to environmental or economic catastrophe) returned again and again to certain key contributing factors: A cohesive social fabric, marked at once by diversity and inclusivity; robust support and communications networks; tolerance of uncertainty; lithe long-range thinking; shared vision — and a sense of collective responsibility — grounded in a common set of values; citizen empowerment; good leadership — and trust in it.¹¹¹ Democratization, it would seem, is the pathway to resilience.

We think this may require developing a new culture of (and institutions for) cooperation around public goods. Common approaches to climate protection — which can be seen as a pure public good, in which emission reductions anywhere benefit people everywhere — have been derailed by questions of free riders and between-country equity.

And whether or not one believes that clean energy technology can save us, or that equity is a priority, it is critical to recognize some of the political/governance issues at stake. Globalization (more people and processes banging into one another) and greater appreciation of interdependence and uncertainty (butterfly and Heisenberg effects writ large), means that more problems — from climate change to bird flu — have a public goods (indivisible and nonexclusive) and “wicked” character (*see note 27*). For both reasons, and helped by wider dispersion of sovereign power, those problems will require a more democratic solution. In their public goods aspect, they require assent to new rules on free riders. In their wicked character, they require solution processes that are more deliberative, that are disciplined both by a commitment to solution (aka “to seeking the public good”) and to a willingness to revise strategies based on learning, which are nearly impossible to sustain without some modicum of mutual respect within recognizably fair rules of talking. At present, of course, worldwide, publics are very skeptical of existing governments’ legitimacy and capacity. In the U.S. and other democracies, they have widely lost faith in representative government. That’s

a pretty big democracy deficit, which it's reasonable to think must be closed if we are to solve these problems.

We have not yet sorted out the human capital requirements of doing that. (Public funding of election campaigns, formulary apportionment of private tax burdens, and a higher and more efficient supply of national and local public goods strike us as more immediate problems than the next *Emile*).¹¹² But certainly we know that learning is enchanted by use, so the best way to get the citizen skills as well as technical skills needed for this is to permit their meaningful exercise.

STRENGTHEN WORKER INSTITUTIONS

The net gain in jobs and GDP that would accompany the transition to a low-carbon economy is not a uniformly rosy narrative. It entails some potentially difficult shifts in employment, particularly for low-skilled workers and single-industry communities. Jobs will be lost in fossil fuel and heavy-emitting sectors, a contraction with costs borne unequally by workers, firms, and regions.¹¹³ And in the absence of a coherent industrial policy, the trajectory of transition in the United States is likely to be chaotic and unpredictable. The question, however, should not be how many jobs are lost, but how workers can transition to greener ones. And even, in some cases, create rewrite the conditions of their own employment.

A just transition would include income support and training for workers moving out of declining firms and industries, as well as some assurance of worker rights in growing and greening ones. This is not simply the crackpot vision of Europeans, trade unionists, progressive think-tanks, and other suspect parties. The U.S. Department of Labor, for example, in developing baseline value statements for the UN Conference on Sustainable Development (Rio+20), proposed that

“Workers are able to share in the benefits of the transition to a greener economy, and that they are equipped with the skills necessary to implement such a transition;



The fundamental rights of workers are respected when implementing new policies and investing in new and emerging sectors, and that the health and safety of workers in these sectors is protected; and

Social safety nets are provided to help those dislocated by the shift to more environmentally sound consumption and production to prevent them from being impoverished and give them the resources to find new livelihoods. Consideration should be given to vulnerable populations and the particular risks they may face.”¹¹⁴

As we note elsewhere, powerful forces — from deficit fear mongers to low-road profiteers and Tea-Party nihilists — are arrayed against such a vision. Organized labor is one of the few (and perhaps only) institutions with the interests and potential power to demand its implementation domestically.

Unfortunately, labor is currently in a fight for its life. Union density in the United States (the share of the workforce that belongs to a union), while varying widely by state, is now just 11.9 percent overall (37 percent in the public sector, 6.9 percent in the private).¹¹⁵ And labor is a house divided. Coalition builders like the Apollo Alliance, the Blue-Green Alliance, the Cornell Global Labor Institute, Green for All, Emerald Cities Collaborative and others have worked closely with labor to develop a strong case for the necessity, viability, and opportunity of a greener economy. But the immediate promise of job growth in unconventional coal, gas and oil industries has frayed union alliances with environmentalists, and with one another.¹¹⁶

Building a truly inclusive green economy demands robust, functional, diverse, and powerful worker institutions. In apportioning the costs and opportunities of mitigation, we believe equal distribution and shared benefit possible. And we also believe that adaptation can and should benefit rather than penalize the most vulnerable communities. But this will not happen automatically, any more than resilience is guaranteed. One institution central to shared

prosperity in the last century was organized labor, whose decline correlates directly to rising inequality (*figure 9*).¹¹⁷

Policies to help reverse that decline may also prove critical in developing a workable national response to climate change. The European literature on adaptation and mitigation strategies repeatedly points up the importance of brokered conversations between “social partners.” The social partners, formally and informally, are employer organizations and trade unions engaged in a “social dialogue” with one another and the state. The EU’s progress toward agreement on and pursuit of climate goals has been attributed in large part to the valued role of such dialogue, which can’t happen if labor is not at the table.¹¹⁸ Climate change is not a natural conversation starter. And it has become exponentially harder to conduct any sort of “social dialogue” in this country, given the declining institutional power of organized labor, the increasing public disaffection with government.¹¹⁹

Delivering skills for a green economy, then, includes cultivating informed and educated young leaders who can build the worker and community organizations necessary to establish an organized power base for true social partnership.

Labor unions, particularly in their capacity to mobilize and educate large groups of key stakeholders, are an essential part of addressing the “wicked” nature of climate change. Whatever the current imbalance of power in U.S. conversations on climate and equity, functioning labor-management partnerships are still playing a significant and positive role in local labor markets. Wherever green shoots survived the withering recession and anemic recovery, such intermediaries can help to build cleaner regional economies, as we discuss later in this paper. Registered apprenticeship has long been a high-road model for skill delivery, delivering quality work for employers and quality jobs for workers. And through better connections with community organizations and pre-apprenticeship programs, unions and the intermediaries that work with them have been better able to connect

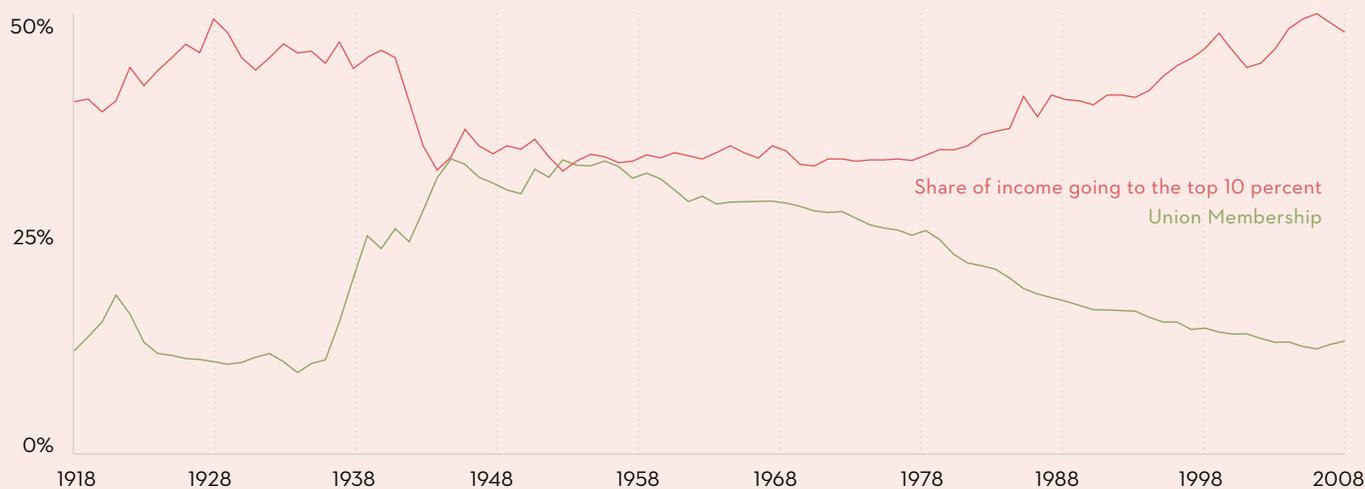
lower-skilled workers with jobs and training in and outside of apprenticeship.¹²⁰

One advantage of registered joint apprenticeship over other career pathway models is that an apprenticeship necessarily starts with a job. And even outside of a formal apprenticeship structure, it is often unions who are thinking most creatively about greening those jobs. So while effective workforce development must have intimate ties to industry, it may not be necessarily nor even primarily “employer-driven.” We should start thinking instead about worker-led industry and training innovation, whenever possible. Which is all about greening in place, as the Service Employees International Union (SEIU) is exploring and which we discuss later in the Health Care Advancement Program (H-CAP) case study. It is about capturing the value added by the millions of workers

in every industry who are or could be engaged daily in greening their workplaces through efficiencies and innovation in the management of energy, water, toxics, and garbage. Voluntary greening is neither scalable nor sustainable. To both introduce and institutionalize a greener industry transformation in any sector, unions can upgrade worker skills and use increased efficiencies as a bargaining point. Ideally, industry (with an eye to operational cost savings and improved business outcomes) supports the training, and workers themselves capture part of the greener value they create in the workplace. This is part of the work of the SEIU vision expressed in the H-CAP project. Because while businesses are increasingly investing in sustainability to improve their bottom line, the transformation of human capital and innovations essential to greening the economy across all sectors cannot be “driven” by employers alone.¹²¹

figure 9

UNIONS AND SHARED PROSPERITY



The decline of organized labor in the United States correlates directly to rising inequality and the decline of the middle class.

Source: Colin Gordon, University of Iowa

Worker-led labor market solutions transcend training and skills upgrades. Job quality demands attention. Unions are central here too. We pointed out in the introduction the “stickiness” of the low-wage labor market. An expanding green economy is no guarantee of shared prosperity. We have credible evidence that the persistent scourge of low-wage work is not in fact resolved by economic growth, but declines in proportion to inclusiveness of labor market institutions — namely, collective bargaining.¹²²

REDUCE COST (NOT STANDARD) OF LIVING

Americans like to believe that education is the great equalizer. But technical skills themselves don’t deliver equity — we need policies and institutions for that, and the skills to build them. Of course credentials and degrees deliver wage returns. But as Larry Mishel and his colleagues at the Economic Policy Institute have demonstrated so elegantly, increased productivity is by no means a guaranteed engine of increased living standards.¹²³

At some point we may simply run into foundational problems in the structure of demand. In addition to the devastating near-term crisis of demand (which, though part of a housing- and finance-induced economic meltdown, underlies

At some point we need to engage in the serious shared work of redefining quality of life in this country — to more consciously construct a culture that promotes human flourishing and measures it by standards other than growth and consumption.

the purported “failure” of the green economy), there is a more vexing structural problem with demand: the ability of low-road firms to multiply and prosper means that there are simply not enough good jobs. And that is a predicament that eludes resolution through a skills strategy.

What’s more, the challenges of globalization have not been resolved. “The great doubling” of the 1990s — a phrase used by Richard Freeman to describe the impact of China, India and the former Soviet Union entering the global market — at once flooded the global labor pool with low-wage workers and significantly reduced the ratio of capital to labor.¹²⁴ The increased power of global capital combined with an oversupply of workers can obviously exert sustained downward pressures on wages. And if wages in an interdependent world have little hope of significant increase, the U.S. needs to think harder about lowering the cost of living. Which could be accomplished through increased investment in

public goods, the deployment of green infrastructure and smart transportation, the provision of affordable health care and housing, the promotion of healthy food systems, and the more equal distribution of energy costs.

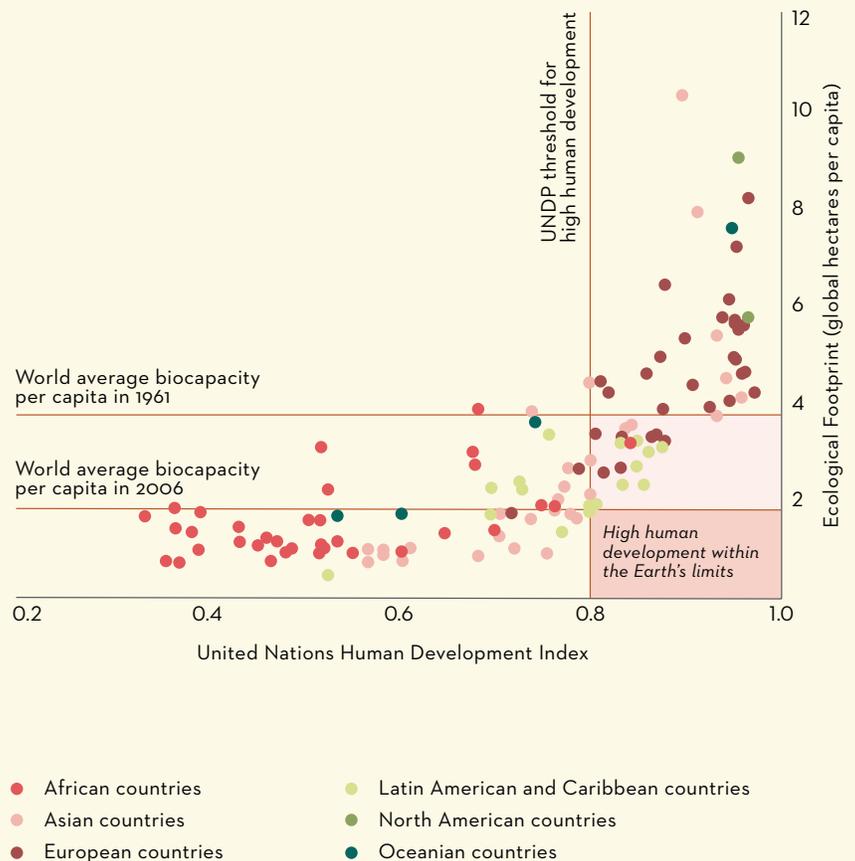
The high road logic obtains here too: greening communities can create jobs through mitigation and adaptation, capture locally the value of economic and climate protection, and share the benefit with those who produced it. It's just that benefit, in this case, would be a standard of living improved not through wage gain but through green technology and social innovation.

And finally, at some point we need to engage in the serious shared work of redefining quality of life in this country — to more consciously construct a culture that promotes human flourishing and measures it by standards other than growth and consumption. Because right now improved quality of life is negatively correlated with its sustainability (*figure 10*).¹²⁵

In the meantime, we also need to consider the practical, pressing issues of education and training. The above discussion of skills and approaches in no way suggests otherwise. Effectively answering the persistent challenges of U.S. skill delivery is imperative if we are actually going to build a cleaner economy in the U.S.

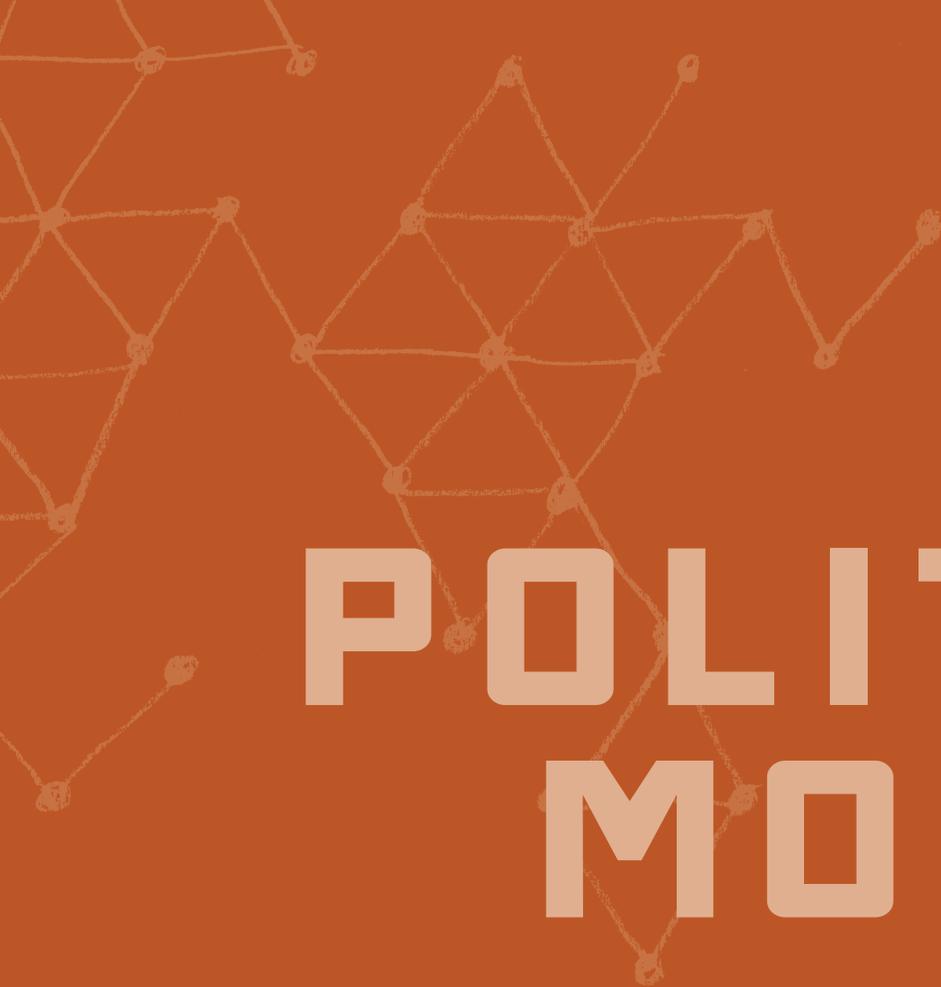
figure 10

**GREENING THE GOOD LIFE:
CONSUMPTION AND CAPACITY THRESHOLDS**



This chart correlates high living standards and unsustainable resource consumption. Countries are compared along two axes. The Human Development Index combines GDP with broader measures of well-being (e.g., health and education). The Ecological Footprint measures the land and water required to provide resources for, and capture the carbon from, human activity. The sweet spot — what we might define as an actualized green economy — is the lower right quadrant, which describes a high quality of life that is ecologically sustainable. While most nations face the challenge of increasing material well-being without depleting or destroying natural capital, the U.S. and other advanced economies must attempt the converse: to reduce their ecological imprint while maintaining — or perhaps redefining — a decent standard of living.

Source: Global Footprint Network and UN Development Programme



THE POLITICAL MOMENT

*And so we arrive at our present moment:
the rhetoric and reality of the green jobs
promise undermined by political attacks,
policy and funding inertia, market failures,
and often balkanized public programs.*

POLITICS AND REALITY

Human capital strategies are an essential part of any progressive response to climate disruption and inequality. They are, of course, utterly inadequate by themselves. Ensuring that poor and vulnerable workers have a fairer chance at securing the decent jobs that do exist is a worthy enterprise, particularly where shifts in climate and energy production amplify current labor market trends, increasing precarious employment and diminishing paths to advancement for lower-skilled workers. But this discussion would be incomplete without acknowledging the critical need for demand-side strategies, some of which we address in our policy recommendations. Indeed, the employment consequences of climate disruption will be determined everywhere by the policy response of individual governments (including but not limited to energy policy), whether or not these are driven by explicit strategies of mitigation and adaptation.

Whatever the uncertainties of demand, we believe that a more nimble and accessible system of education and training, ensuring greater equity in the mechanisms that govern the supply-side of the labor market, is essential. This chapter reviews some of the related challenges, successes, and opportunities for transformation in recent efforts to build a greener U.S. economy.

GREEN JOBS, REAL AND IMAGINED

Efforts at the national, state and local levels to create and effectively train people for jobs in the green and greening economy take place within a deeply politicized national debate about green jobs. In that debate, Republican politicians and the conservative think tanks and media outlets that provide them with ideas, data, and a communications platform for disseminating messages far and wide have conducted a concerted attack on the viability of a green economy and the very reality of green jobs.¹²⁶

This strategy reflects two intersecting priorities for the GOP and the conservative movement: **1)** to attack and dismantle any policy initiative or framework that has been a priority of the Obama Administration, of which green jobs is a high-profile example; **2)** to kill any policy response to climate change, which by necessity requires the building to scale of energy efficiency and renewable energy industries. Both climate protection and clean energy deployment require a strong role for government, which is anathema to the free-market fundamentalism that characterizes the modern GOP and conservative movement.

At the same time, fossil fuel industries and their advocates in Congress have effectively killed or stymied federal legislation subsequent to the passage of the Recovery Act that would create green jobs, or any jobs, at a scale commensurate with the employment crisis that is faced by communities across the nation. Congress has blocked public investment in infrastructure (green and gray); killed comprehensive climate legislation that would have made polluters pay for the greenhouse gas pollution they emit and supported renewable energy and energy efficiency strategies; and failed to pass a Renewable Electricity Standard that would require utilities in all states to supply a minimum level of electricity to their customers from renewable sources, as well as legislation to jump start private markets and job creation in the residential and commercial building efficiency sectors.

This Congressional strategy has been perfectly complementary and mutually reinforcing with the communications strategy to cast green jobs as a myth. Let's call it a virtue-less circle. Policies needed to correct market failures — the most egregious being polluters' freedom to externalize the costs of their carbon pollution — and to allow clean energy industries to compete with incumbent and subsidized fossil fuel industries are stymied. This policy void makes it unlikely that clean energy businesses, building owners, utilities, and energy-intensive

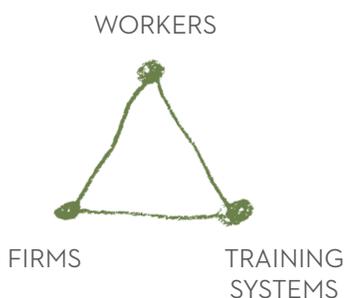
Deficits of political will, institutional coherence, and financial support conspire to thwart the best intentions of workforce practitioners.

industries will make the kind of capital investments that create green jobs. Members of Congress, pundits, and journalists then point to the allegedly few green jobs that get created as proof that green jobs are over-hyped or aren't real.

But that's not the whole story. Proponents of the green economy need to acknowledge that real gaps exist between the use of green jobs as a rhetorical device and messaging vehicle and the current reality of green job creation. According to the Brookings Institution's *Sizing the Clean Economy* report, new clean-tech segments of the economy grew at a torrid pace from 2003 to 2010, and outperformed the broader economy during the recession. But the overall number of these jobs (as they are defined in the report) is still modest relative to the economy as a whole. While their advocates have never offered green jobs as a silver bullet, and certainly not in the absence of necessary policy, consistent investment, and a healthy U.S. economy, opponents have been able to create a perception that promises were made and never fulfilled with regard to immediately realizing a green economy future.

In addition, the passage of the American Recovery and Reinvestment Act (ARRA) in 2009, which included the biggest public investment to date in the green economy, yielded some high-profile failures, like the loan guarantee awarded from the Department of Energy's Section 1705 program to Solyndra, a solar panel manufacturer, whose subsequent bankruptcy was endlessly rehashed by national media and made the poster child of the green economy's supposed failure. The Solyndra hullabaloo managed to obscure the successes of the Recovery Act's green investments, not least that the \$93B invested in the green economy through the end of 2010 created or saved an estimated 1 million jobs and boosted U.S. GDP by an estimated \$146B.

That said, the Recovery Act's implementation placed in stark relief some significant challenges, particularly with respect to training and connecting workers to the jobs created by the Recovery Act's green investments. These challenges were the consequence of various intersecting factors, which we will examine further in this paper: **1)** the unprecedented volume of funds that some public agencies had to administer and allocate very quickly; **2)** the siloed nature of programmatic implementation, particularly between state and local agencies and programs with little or no history of working together, which the funding volume and speed of implementation only exacerbated; **3)** the asynchronous allocation of funds for job-creating clean energy projects vs. funds for green job training; and **4)** the proliferation and concentration of new training programs in certain sectors — in particular weatherization and building efficiency training programs — that in some parts of the country resulted in a mismatch between labor market supply and labor market demand, a mismatch only made



worse by the failure to pass legislation subsequent to ARRA that would have catalyzed the rapid growth of this sector.

And so we arrive at our present moment: the rhetoric and reality of the green jobs promise undermined by political attacks, policy and funding inertia, market failures, and often balkanized and uncoordinated public programs and investments. And yet, the central fact remains: the development of a green economy is the only credible way to avoid catastrophic climate change that, left unchecked, will lead to a future of “hell and high water” (in the evocative phrasing of Joe Romm). We have no choice but to make it work. And it will only work — and provide opportunities for the broadest range of American workers — if our fractured economic and workforce development and energy systems can help build durable green economy industry sectors and train and connect skilled workers to the jobs they create.

GREENER HUMAN CAPITAL STRATEGIES

Getting this right on the supply side is not rocket science, or even particularly green.¹²⁸ We know what works: sector strategies (including labor market intermediaries and industry partnerships); 21st-century skill delivery (career pathways and bridges, including earn and learn programs, and the stackable, industry-recognized credentials that benchmark progress along them); attention to equity (including both social supports and labor standards, and the institutions that deliver or enforce them).

We also know that this is hard to do. Deficits of political will, institutional coherence, and financial support conspire to thwart the best intentions of workforce practitioners.¹²⁹ When trying to help policy-makers and shapers navigate this thicket, it helps to parse the universe of human capital into three elements: firms, workers, and training systems. Each has many particular and some shared interests. But all need to work in concert,

particularly if we are to include poor and vulnerable populations in a more prosperous greener future.

Without organizations or institutions representing workers, for example, it is not uncommon to find education and training systems quite successfully funneling workers into low-road jobs (i.e. those without decent wages, benefits, or opportunities for advancement). Without industry at the table, it is entirely possible to train workers beautifully — for jobs that don’t exist, or with skills and credentials irrelevant to employers. Without education and training providers who can successfully work with students of all skill levels — including low-income working adults with reading, math, and English language shortcomings, not to mention challenges in schedule, child care, and transportation — workers will lack the skills necessary to get jobs in (and drive forward) a cleaner economy, and businesses will be hampered by a lack of skilled labor (an entirely different thing than low-road firms hampered by a lack of cheap labor).

Finally, and perhaps most critically, we need intermediaries to help negotiate partnerships or at least fruitful communication between all three, and provide connections, where needed, to community organizations and workforce development or human services agencies.

These pieces of human capital systems can be assembled in lots of ways, some of which are better than others. To achieve a modicum of equity, prosperity, and environmental sustainability, this country needs greener jobs across all sectors, the training for which is accessible to low-skill, low-income workers (or unemployed high skill workers moving to different sectors), and meaningful to the businesses who can employ them.



We should think less about how to structure pilot programs, and more about how to make all jobs, and all skill sets, greener.



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A GREEN LABORATORY: SOME FINDINGS FROM RECENT EXPERIENCE

The cases that follow look at various constellations of these elements in workforce development projects across five sectors: Construction, Manufacturing, Electric Power, Health, Water.

None, of course, are perfect. And all operate under the hostile political and economic circumstances of a crushing recession, a weak recovery, and an intransigent congress (hostile to robust government and green anything). But we tried to lift up examples where **a)** greening competency-based skill standards is adding or could create value for workers and businesses, helping to deliver both quality work and quality jobs; **b)** green sector partnerships could more effectively link labor supply and demand, particularly in marginalized or vulnerable communities; and **c)** bridge or pathway strategies provide the broadest access to skill upgrades (and related labor market advancement) for the broadest set of workers.

Case Study 1

GREENER CONSTRUCTION: WEATHERIZATION AND ITS DISCONTENTS

Perhaps no industry has embodied the promise and perils of the green economy more completely than the home retrofit industry. Over the last several years, advocacy groups and policymakers became increasingly focused on the multiple opportunities presented by significantly increasing the scale of the energy efficiency upgrades of America's homes. The basic premise has been articulated ad nauseum by COWS and allies across the country for more than a decade, but it's worth repeating.¹³⁰ The more than 100 million homes in the U.S. account for roughly 23 percent of the country's energy use and carbon dioxide pollution,¹³¹ retrofitting them is therefore a global warming and energy savings solution. It is also an economic solution: on the consumer side, it saves households money by lowering energy costs, which is particularly impactful for low-income households; on the worker side, it is a labor-intensive industry that creates jobs, potentially lots of them, and potentially accessible to workers entering the labor market with lower education and skill levels.¹³²

In 2009, the moment arrived to turn rhetoric into reality. The financial crisis that began in the fall of 2008 and the (not unrelated) election to the Presidency of Barack Obama set the stage for the passage of the American Recovery and Reinvestment Act, which included an unprecedented level of investment in programs focused on building efficiency upgrades. At the Department of Energy (DOE), the Weatherization Assistance Program (WAP) received a \$5B appropriation, and the State Energy Program and the Energy Efficiency and Conservation Block Grant programs were appropriated more than \$6B combined. The Recovery Act also included an appropriation of \$500M to the Department of Labor (DOL) to fund training programs that prepared workers for energy efficiency and renewable energy industries as defined in the Green Jobs Act.

These big federal investments threw into stark relief some of the challenges inherent in bringing the home retrofit

industry to scale. Many of these are market barriers, including high transaction costs, split incentives (landlords have little incentive to pay for retrofits when their tenants pay the utility bills), limited-term tenancy or ownership, the gap between the need for up-front capital and the long-term return from energy savings, and the lack of standardized debt instruments that can be bundled and resold to secondary markets.

The Recovery Act investments also made unavoidable two particular labor market challenges in the home retrofit industry: **1)** job quality is generally not good, as the industry is dominated (with a few notable exceptions) by contractors that pay low wages, provide few if any benefits, typically don't invest in the skills of their workers, and are sometime violators of wage, hour and other employment laws; and **2)** a lack of uniform skill standards, and nationally recognized certifications, for the primary occupations within the industry, and related accreditation of training providers.¹³³

The job quality issue was made particularly visible by the inclusion within the Recovery Act of a prevailing wage provision (aka Davis-Bacon), which required contractors on construction projects receiving ARRA funds to pay workers no less than the 'prevailing' wage rate for the local area, as determined by DOL. For a number of federal programs, including the DOE programs noted above, this was a new requirement, one that generated a contentious debate about its efficacy and implications. In addition, the prevailing wage rates for workers on residential weatherization projects (as distinct from more typical residential construction projects involving renovation and repair) were not set by DOL until September 2009, which led to uncertainty and delayed implementation and confusion in some states.

No full evaluation exists of the prevailing wage requirement's impact on job quality and job creation in DOE programs that made big investments in home retrofits.

MAKING SENSE OF ENERGY EFFICIENCY TRAINING: WHAT DO WORKERS NEED TO KNOW, AND HOW DOES ANYONE KNOW THEY KNOW IT?

The absence of national skill standards has prompted a number of efforts to better organize the supply side of the clean energy labor market, and align it more consistently with (high-road) industry skill demand.¹⁵⁰ Most of these rest in one way or another on the fulcrum of credentialing. Three recent examples, in particular, may improve the quality of work and training in residential retrofitting and related efficiency sectors.

DOE GUIDELINES FOR HOME ENERGY PROFESSIONALS

The U.S. Department of Energy (DOE) Guidelines for Home Energy Professionals emerged from the Obama Administration's Recovery to Retrofit interagency workgroup and ARRA-period WAP Training and Technical Assistance Plan, which highlighted a need for both some sort of competence benchmarks and a related framework for worker certification. DOE worked with industry and labor to develop standard work specifications for residential energy upgrades, establishing minimum quality requirements for safely achieving desired health and energy outcomes. Together with the National Renewable Energy Laboratory, DOE convened industry leaders in home performance and weatherization to develop Job Task Analyses for four common jobs in the Weatherization Assistance Program: Energy Auditor, Retrofit Installer Technician, Crew Leader, and Quality Control Inspector. The Building Performance Institute (BPI), selected in a competitive process to develop and administer related certifications, is currently running professional certification pilots for those four occupations.¹⁵¹

IREC/ANSI ACCREDITATION FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY CERTIFICATE PROGRAMS

A new accreditation program from The American National Standards Institute (ANSI) and the Interstate Renewable Energy Council (IREC) aims to improve skill delivery and credential value in renewable energy and energy efficiency certificate programs. In a pilot that began

this spring, credit and non-credit programs will be evaluated against the Draft IREC Standard 14732: General Requirements for Renewable Energy and Energy Efficiency Certificate Programs. The standard, developed in consultation with industry experts, establishes quality thresholds for curriculum, administration, personnel, facilities, and equipment. Assessment to this new standard for specialty certificates will provide third-party verification to students, employers, consumers, public agencies, and policymakers, bringing some measure of quality assurance to a notoriously unregulated corner of the sprawling and disorganized clean energy credentialing marketplace.¹⁵²

AFL-CIO MULTI-CRAFT CORE CURRICULUM FOR THE BUILDING AND CONSTRUCTION TRADES

The Multi-Craft Core Curriculum is a common skills entry-point to joint industry registered apprenticeships in the AFL-CIO's Building and Construction Trades Department (BCTD). Designed as a single gateway to the trades for high-school and community college students, the Core Curriculum is also designed to provide an on-ramp to construction careers for youth disengaged from the labor market and adults in transition. The Building Trades "Core" was developed as a national industry credential by the National Apprenticeship and Training Directors in the construction industry to establish, for the first time, a set of standardized pre-apprenticeship competencies. The Core, which can be delivered as a free-standing course or integrated into existing training programs, but must be employed in partnership with a local or state Building Trades Council, teaches skills required in all building trades apprenticeships, regardless of craft. The BCTD has committed to the Emerald Cities partnerships described elsewhere in this paper. When economic recovery and green infrastructure development take off, and the apprenticeship pipelines re-open, this promises to be a welcoming, rationalized on-ramp to solid skills training for an urban, underserved workforce that traditionally viewed the trades as inaccessible.¹⁵³

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However, a perception among job advocates has been that Davis-Bacon may not be a particularly effective tool to improve job conditions in the home retrofit industry, in large part because prevailing wages, by definition, reflect nothing more than current wages (and underlying power dynamics and business practices) in the industry. In this context, the home retrofit industry is very similar to the residential construction industry, where intense competition and very low rates of unionization drive down wages for workers. And so the prevailing wage in most local areas, in this analysis, falls short of a living wage.

One of the responses to this perceived weakness of prevailing wage requirements to address the job quality shortcomings of the home retrofit industry was to advocate for the use of quality training providers and worker skills certifications in the implementation of ARRA-funded programs, in particular WAP, the biggest of those programs. This effort was led by the Laborers International Union of North America (LIUNA), part of an ambitious strategy to take advantage of the Recovery Act investments, and increased public, political, and market attention focused on the home retrofit industry, to create family-supporting long-term construction jobs and, not incidentally, increase union density within the industry.

The peril of not taking such a course was articulated forcefully by the General President of LIUNA, Terry O'Sullivan, in a letter sent to Governors:

“The scale of new federal investment in residential weatherization vastly exceeds the capacity of existing program and contractor infrastructure... The need to scale up quickly will put tremendous pressure on the ability of non-profit and public providers to manage the program as effectively as they have done in the past. It will be too easy for the quality of training, service delivery, and program management to suffer as providers attempt to cope with the proliferation of contractors and training programs. Failure to address the low labor standards and limited career options that confront

most weatherization workers could also weaken the program's economic benefits and long-term stability."¹³⁴

LIUNA put skin in the game. They mobilized their national training capacity through the Laborers Training and Education Fund, which runs 70 training centers across the country. They developed through the Fund new curricula for a residential retrofit workforce, with training programs and corresponding credentials for Weatherization Installer/Technician, Weatherization Supervisor, and Energy Auditor. In addition, LIUNA used its political strength in some states to advocate for the inclusion of language that spelled out job, training, and skill standards in WAP State Plans submitted to DOE.

To no one's surprise, LIUNA's effort presented a challenge to WAP, a program with a more than three decade-long track record, a network of Community Action Agencies (CAAs) that administer the program and contractors that have historically done the work, and no requirement that weatherization workers meet any skills standard or hold a skill certification.

We know of no survey that has systematically assessed the impacts of this effort to push a high-road training and skills agenda within WAP. We can point anecdotally to fruitful partnerships that were developed between CAAs and LIUNA locals. In Las Vegas, HELP of Southern Nevada (a CAA) and its contractors retrofitted 2,695 units over a 6-month period at the peak of WAP implementation, from mid-December 2009 through the end of May, 2010, more than doubling the agency's ARRA goal — 1222 units over a 12-month period — in half the expected time. Its biggest contractor is a signatory with LIUNA Local 872, which used its training infrastructure and new weatherization training programs to train its workers in weatherization skills, including new members for whom the training and jobs served as a pathway out of poverty. In addition, the local's hiring hall approach allowed the fast recruitment of new crews of trained workers whenever needed.¹³⁵

But if anecdote is our guide, the authors of this paper have heard far more stories of resistance from WAP's

traditional service delivery stakeholders to efforts that would have required an implementation strategy different than the status quo. The experience in two states, Delaware (DE) and New Jersey (NJ), is instructive and sobering. In both states, LIUNA had strong membership, training centers, contractors, and political relationships. They were able to get agreements from state administrative agencies, which were written into the WAP State Plans, to include job and training standards, specifically requiring that: contractors pay for the health coverage of their workers and hire trainees from programs that serve low-income communities; and that workers meet competency/skill standards. In NJ, LIUNA also won an RFP from the state, under Governor Corzine, to train 600 weatherization workers.

However, these policy and contract victories at the state level did not translate into success on the ground. In NJ, the state association of CAAs expressed no interest in working with LIUNA. The 22 CAAs responsible for implementing WAP at the local level either performed the weatherization work themselves or subcontracted to their existing contractors, none of whom were signatories with LIUNA. Only in Newark did LIUNA develop a partnership with the local CAA, but that produced a minimal number of job placements. At first, the state tried to mediate the dispute between LIUNA and the CAAs, but as soon as Governor Christie took the helm, replacing Corzine, their support for the job standards disappeared. After training 100 of the planned 600 workers, and placing only 5 of them in jobs, LIUNA made a decision to discontinue the training and return the remainder of the RFP money to the state.

In DE, the story developed in a similar fashion, but the ending was different. As in NJ, there was resistance from the CAAs to the involvement of LIUNA training and contractors. But the implementation of WAP in the state was altered dramatically by a DOE inspection in 2010 that found contractor fraud and faulty work on numerous homes that were weatherized through the program. The weatherization program was shut down and, in the

resulting shake-up, administration of it was transferred from DE's Health and Human Services agency to its environmental agency. When DE re-booted the program, LIUNA Local 55 and their workers and affiliated contractors started getting jobs. By the conclusion of the WAP Recovery Act funding period in the spring of 2012, roughly 20 percent of WAP projects in DE were being carried out by LIUNA contractors and workers.¹³⁶

This summary of efforts to implement the WAP using high-road strategies should not be mistaken for a complete and fair assessment of WAP and in particular its implementation of Recovery Act funds. Indeed, given the politicized and often inaccurate attacks on WAP from right-wing commentators and Republican policymakers, we should note here some of the successes of that implementation:

By December 2011, states, territories and tribes weatherized more than 600,000 homes, reaching this key milestone 3 months ahead of schedule.¹³⁷

Participating households are projected to save more than \$400 per year on average by reducing their energy consumption up to 35 percent. This is critical in low-income households, which typically spend 14 percent of income on energy, as opposed to the national average of 3 percent.¹³⁸

Each home weatherized will reduce annual CO₂ emissions, on average, by 2.65 metric tons.¹³⁹

The efforts to drive an expanding home retrofit industry along a high road have by no means been limited to WAP and other Recovery Act funded programs. One of the most ambitious efforts occurred in Massachusetts (MA), where the Community Labor United-led Green Justice Coalition won a commitment from state policymakers to initiate four pilot weatherization programs as part of the state's three-year plan to retrofit 130,000 homes through MassSave, the state's utility-sponsored, ratepayer-funded

energy efficiency program. The Green Justice Coalition was able to secure a 'responsible contractor agreement' with the contractors for these pilots that included: a living wage and health benefits for workers; a "first-source" hiring commitment that encouraged recruitment of workers from low-income communities; employer-paid training for certain basic weatherization skills, and clearly articulated pathways for trainees into either apprenticeship programs in the building trades or employment within the energy efficiency or utility sectors; compliance with (i.e., no violations of) wage and hour and safety laws; proper classification of workers; and a labor peace or "card check" agreement allowing workers to organize a union without employer opposition.¹⁴⁰

The four pilots were implemented in four different MA communities: Chelsea, Chinatown (Boston), Springfield, and Lynn. In all of the pilots, households earning 60–120 percent of the State Median Income were targeted. These were households with incomes too high to qualify for assistance from WAP, but still low enough to find it difficult to afford weatherization without assistance. Many were concentrated in immigrant communities and communities of color, which had historically underutilized the MassSave program. In each pilot community, a local CBO led the effort and was responsible for recruiting households for participation through extensive outreach.

Weatherization workers were trained in each of the pilot communities by union partners: LIUNA, the Painters Union, and the Carpenters Union. The training was 10 weeks in length; workers were trained for a full set of weatherization skills, and also received OSHA and lead abatement training broadly applicable to work in the construction sector. The training was tailored to address barriers presented by the trainees. For example, the Painters Union, for the first time, conducted bilingual training that was co-led by a Chinese-speaking trainer, providing monolingual Chinese workers with an entry point to an industry that was previously inaccessible to them.

And yet, despite innovative training, substantial state investment, participation and support from a range of partners, and remarkably comprehensive responsible contractor agreements, the pilots fell short in perhaps the most important measure of success: placing trained workers in jobs and careers. According to an evaluation done of two of the completed pilots, only one worker in Chelsea who graduated from the training program was hired by the contractor, and four workers were hired in Chinatown.

Two explanations for this disappointing outcome are worth emphasizing: first, even with gap financing available there were simply not enough home retrofit contracts “bundled” by community outreach to justify the hiring of new workers by the participating contractors (although enrollment targets were met in both communities); second, the protracted process of generating weatherization contracts resulted in a substantial gap in time between when trainees completed their 10-week program and when contractors could begin work on projects.¹⁴¹

In the final analysis, we should remember that the MA programs were pilots — no reasonable person had expectations of hundreds of jobs being created. But the experience there, and the example of LIUNA’s decidedly mixed success in NJ at placing the graduates of its weatherization training programs in jobs, illustrates a broader problem that has become particularly evident. Simply put, a mismatch appears to have been created between an over-supply of workers trained for jobs in weatherization and weak demand from employers for new weatherization workers. We can cite no nationwide analysis that confirms and quantifies this perception, but at this point the local and anecdotal evidence is overwhelming. Training program managers and advocates in different areas and labor markets across the country have described to us repeatedly the difficulties of placing graduates of weatherization/home retrofit training programs in jobs.

We can offer some reasons for the less-than-expected demand from employers. Certainly, as noted earlier, the failure to pass a comprehensive climate and energy bill or the HomeStar legislation froze any plans among contractors in the home retrofit industry to dramatically expand their business plans and hiring. In addition, challenges from federal regulators to PACE (Property Assessed Clean Energy) loan programs, one of the most promising strategies to enable financing of retrofits at the local level, effectively sabotaged plans developed by scores of municipalities to initiate or expand home retrofit programs into new markets beyond the income parameters of WAP and other federal subsidy programs.

Perhaps no industry has embodied the promise and perils of the green economy more completely than the home retrofit industry.

But these policy failures don't explain the disconnect between the jobs created in the residential energy efficiency sector over the last two years by the Recovery Act's massive investments (and significant additional investments from state- and ratepayer-funded programs) and the programs training workers to fill such jobs. So what explains this disconnect? We can hypothesize four reasons, some of them already suggested in the local examples provided above:

- 1) due to the collapse of the housing market and a correspondingly high unemployment rate in the construction industry (particularly residential construction), there was a surplus of trained workers "on the bench" and available to be quickly hired and put on the job by weatherization contractors;
- 2) in local labor markets where the pool of unemployed construction workers was insufficient to meet employer demand, or untapped for whatever reason, weatherization contractors, particularly those well established within the WAP program, either trained new workers on the job, or hired new workers from training programs with which they had some pre-existing relationship or affiliation, e.g., the 15 training centers across the country "verified" by the WAP Technical Assistance Center;
- 3) the lack of synchronicity between when jobs were created by Recovery

Act investments — which filtered through a process that involved allocation, implementation planning, and recruiting and completing contracts with homeowners — and when trainees completed training programs.

The fourth reason we offer requires more explanation:

- 4) There were too many new weatherization training programs created and publicly funded. We have no national count of training programs that were newly created over the last 2–3 years for occupations within the weatherization/residential energy efficiency industry. But we're confident in stating that the number is quite high and, more importantly, well in excess of any reasonable assessment of long-term employer demand in the industry and already established education and training capacity.

On this point, it's instructive to examine the Recovery Act's largest source of funding for green job training, the \$500 million Green Jobs Program (GJP) at DOL. Given considerable latitude on how to spend these funds, DOL issued grant solicitations for five separate programs. DOL received close to 1000 applications that met the requirements of the grants and ultimately awarded 189 grants across the five program areas in December 2009 and January 2010. Forty of those awards were for Pathways Out of

Poverty grants for programs that integrated training and supportive services to help low-income populations find pathways out of poverty and into economic self-sufficiency through employment in energy efficiency and renewable energy industries. In the solicitation, DOL, per the Green Jobs Act, had identified seven different industry sectors for which applicant training programs could propose to train workers, one of the seven being "energy-efficient building, construction, and retrofit industries."

However, of the 40 organizations awarded Pathways Out of Poverty funds, 38 listed some variation of the energy efficiency, construction, and retrofit industries as one of their, or their single, "industries of focus."¹⁴² This is a striking percentage, particularly given the fact that in January 2010, when the awards were announced, the national unemployment rate in the construction sector was 24.7 percent. It's certainly possible that the high percentage of awards granted to programs with a building efficiency focus was representative of the applications received by DOL, and the ratio of hype and excitement to good labor market data available to applicants with regard to these emerging industries. Unfortunately, the sequencing of DOL's grant-making was of no help in mitigating any such ignorance in the field. The 29 grants awarded to states to conduct labor market

analysis on green jobs were issued only a month before the training grants were awarded, with the result that all of the analyses were completed well after the DOL-funded green job training programs were designed and had begun implementation.

The problem of too many training providers concentrated on one emerging industry sector was compounded in Detroit, Michigan, by the fact that three different organizations — Jobs For the Future (JFF), Southwest Housing Solutions, and SER Metro — received DOL grants to train workers (each targeting low-income or unemployed workers) for jobs in Detroit’s weatherization/building efficiency industry. In the case of the grant to JFF, the Detroit portion of which is administered by the Detroit Regional Workforce Fund, this oversaturation of training resources for too few new jobs forced the Fund to make a mid-course implementation correction when they realized that they wouldn’t be able to reach their job placement goals with a focus on weatherization training.

As a workforce intermediary with strong participation from employers and state and local economic development agencies, the Fund was able to examine a range of different industries to which it could quickly redirect its training dollars. The Fund identified the environmental remediation of buildings as a growth industry, for reasons that speak volumes (but we won’t, at least not here) about urban disinvestment and blight in the U.S.: large



sections of Detroit are designated as brownfield sites, the redevelopment of which requires cleaning up hazardous substances, pollutants, or contaminants. Since many of the tens of thousands of abandoned buildings in Detroit are located on these sites, well-trained workers are required to remediate them.¹⁴³

DOL allowed JFF to modify the grant and switch training providers, subcontracting with Detroiters Working for Environmental Justice (DWEJ), which has a long history of training low-income, high-barrier Detroit residents for environmental remediation jobs. (Their motto: “You have to clean up before your green up.”) DWEJ’s training program is 11 weeks, the first 4 weeks dedicated to basic skills. The remaining weeks involve occupational-related training for a range of certifications necessary to get employment in the remediation industry: HAZWOPER, Lead Worker, and Asbestos Worker. The program also includes training on OSHA, deconstruction, confined space entry, and environmental site assessment.¹⁴⁴

By June of 2012 DWEJ had placed — in related occupations — 66 of the 88 participants that had thus far completed their DOL-funded training.¹⁴⁵ In fact, we should pause here and consider some of the successes of the DOL’s Green Jobs Program as a whole, which, as with the WAP program, is necessary context in an era when Republicans in Congress are attacking any program with clean energy goals, particularly when such programs also serve low-income workers and households (clean energy, climate protection, and poor people constituting an irresistible trifecta of targets for the GOP). We argue here (with the considerable benefit of hindsight) that DOL over-concentrated training resources on an industry that couldn’t absorb many entry-level workers. But we also lift up examples elsewhere in this paper of efforts funded by the Green Jobs Program that are greening existing industries in significant ways.

By June 2011, when most of the funded green job training programs had been operating for less than a year, grantees had served more than 52,000 incumbent and unemployed workers. The majority of the 26,000 participants who had completed training by that time were unemployed at entry. Of those, 52 percent had found work, with 83 percent in the industry or occupation for which they trained.¹⁴⁶

THE SEED CENTER’S GREEN GENOME: SELECTIVE PRESSURE FOR COMMUNITY COLLEGE TRANSFORMATION

The American Association of Community Colleges’ Sustainability Education and Economic Development (SEED) Center is helping its more than 460 college signatories work toward whole systems thinking and action through a project called the Green Genome. Strategically integrating campus sustainability principles and practices, green-related technical workforce development, and economic development efforts, the project aims for broad impact — greening not only institutions, but communities. The Green Genome lays out four key

levers to drive institutional transformation at community colleges: program design and delivery, strategic partnerships, community engagement, and governance. Each lever incorporates a set of institutional competencies which, when achieved, indicate that sustainability principles have become part of a college’s “DNA.”

Though the project will in part drive change through a prize mechanism, project tools will be widely distributed. Together with the Los Angeles Trade Technical

But to return to the subject of workforce development in the home retrofit industry, and what we have learned over the last couple of years. The California (CA) experience in this area is particularly instructive, and an example of how state policymakers have incorporated lessons learned from both on-the-ground experience and systematic evaluations into policies and a policymaking process that, we believe, holds a lot of potential to positively impact the quality of jobs, quality of work, and career pathways in the residential efficiency sector.

CA has long been the national leader in energy efficiency, using policy as well public investment to realize efficiency gains and energy savings. The Recovery Act provided a big new funding source for energy efficiency, but one that added to an already strong base of state and ratepayer funds. CA policymakers already had significant experience with energy efficiency industries and markets, and had a long-term orientation to their development that extended well beyond the three-year spend-out of ARRA funds.

The influx of Recovery Act funds on top of already existing investments sparked concerns about a shortage of skilled workers in a range of clean energy industries. To address these concerns, the California Energy Commission's (CEC's) first use of ARRA State Energy Program funding went to support a Clean Energy Workforce Training Program to fund curricula development and different kinds of training programs for jobs in clean energy fields, with a particular focus on training the workforce necessary to deliver quality installations of energy efficiency measures in California's existing building stock. The Program emphasized the use of sector strategies to shape implementation and to that end funded over 50 partnerships involving Workforce Investment Boards (WIBs), training providers, employers, unions and other stakeholders across the state. However, the connection of training with employer hiring in building efficiency sectors hit two big snags: the blow-up of the PACE loan model — invented in CA — which had been expected to generate a large number of jobs, particularly in the residential efficiency sector; and a very long time lag between when training programs produced graduates and the state's ramp-up of its ARRA-funded efficiency programs.



College, the SEED Center has developed a **Green Genome Institutional Self-Assessment**. This free tool is designed for community colleges to gauge how well they may be leading related initiatives today, and where to prioritize investment in the future. For example, the assessment prompts a college to consider how effectively they are using labor market data to green their curricula; whether the institutional culture supports commitment to a “triple bottom line”; and what capacity the campus may have to engage in community sustainability efforts

(e.g. offer a speaker series to raise awareness and ultimately help drive local demand for greener products and services).

The Green Genome promotes critical cross-silo dialogue. In doing so, it can help colleges to better align green initiatives with strategic institutional priorities, making such initiatives themselves more sustainable. The goal, after all, is not a new project but a new and more organic way of doing business.

For more information: www.theseedcenter.org

In 2011 the University of California Berkeley released the *Workforce Education and Training Needs Assessment for Energy Efficiency, Distributed Generation, and Demand Response* — a massive and robustly documented piece of research commissioned by the California Public Utility Commission (CPUC) as a deliverable of CPUC's 2008 Long-Term Energy Efficiency Plan.¹⁴⁷ The Needs Assessment included an inventory of CA's existing workforce development infrastructure, which identified an “overabundance” of programs, spread and uncoordinated across multiple institutions, training workers in energy efficiency-related occupations. For example, the inventory counted 118 separate training program tracks for auditing and/or inspection of building efficiency. The Needs Assessment concluded:

“The quantitative analysis shows that, at least through 2020, concerns about shortages of new workers for energy efficiency and related work are unwarranted, particularly for the most prominent energy efficiency occupations... [However], concerns about shortages of jobs for graduates from education and training programs are real and likely to persist through 2020, particularly for those with less than four years of college. As a result, great caution should be used in considering the funding of new training programs. For achieving energy efficiency goals the focus should be on upgrading the energy efficiency skills and knowledge of the incumbent workforce.”¹⁴⁸

The Needs Assessment also identified a high incidence of poor quality installation of energy efficiency measures and the limited prevalence of industry recognized skill certifications in related occupations. It recommended that CA emphasize both skills certifications for occupations within building efficiency-related occupations and employ other high-road strategies to improve job quality and work conditions in the industry.

These recommendations dovetailed with the implementation of AB 758, legislation passed by the CA Legislature in 2010. AB 758 requires the CEC to develop and implement a comprehensive program to achieve greater energy savings in CA's existing residential and nonresidential building stock. The legislation requires that comprehensive plan to include coordination with workforce stakeholders to create a sustainable retrofit workforce.

The combination of the state's early Recovery Act experience, the findings of the Needs Assessment, and the requirements of AB 758 led the CEC to begin using skills certification requirements as a policy lever to ensure higher quality work, better jobs, and more market certainty in the home retrofit industry. CEC has started to require that contractors using public funds to retrofit homes have a BPI-certified Building Performance Analyst on staff (although there are no analogous certification requirements for auditing or installation personnel); to ease the transition, CEC provided rebates to contractors to pay for the training. CEC has also inserted into the state's residential building code a requirement that the installation of certain energy efficiency measures in the most critical climate zones be quality checked by HERS-certified raters.

These policy reforms are hopeful signs of things to come. The AB 758 process will require a full assessment of the range of industry recognized certification that can be effectively used to help achieve the energy savings called for by the legislation. By the end of 2012, the CEC will make some very impactful decisions about the skills certification that will be required for building efficiency retrofits that receive state subsidies. Given the size of the CA economy, and the impact of market demand in the state on industry behavior, the implications of this policymaking process could be national.¹⁴⁹

Case Study 2

GREENER EQUITY: BUILDING EMERALD CITIES

The experience of the USDOE Weatherization Assistance Program (WAP) under ARRA illuminates the critical importance of aligning signals between labor supply and demand. Efforts to stand up a poorly understood and relatively disorganized industry sector (residential construction) in a period of severe recession helped to generate the glut of training for — and subsequent reaction against — “green jobs.” But before writing off retrofits as a policy experiment gone bad, it is important to remember the capacity and potential of building energy efficiency writ large. Weatherization is a small subset of the residential energy retrofit market, which is itself a subset of building efficiency as a whole.

Non-industrial building stock consumes more than 40 percent of U.S. energy, making it the largest guzzler of any major economic sector, including transportation. According to recent estimates by the Rockefeller Foundation and Deutsche Bank, energy efficiency retrofits in the U.S. across residential, commercial, and institutional building stock could yield:

- \$1T energy savings over 10 years
- 600M metric tons of CO₂ mitigation per year (reducing CO₂ emissions by 10 percent)
- 3.3M new direct and indirect cumulative job years¹⁵⁵

It is beyond the scope of this paper to discuss the political leadership and financial innovation required to fully scale U.S. building retrofits. But we can highlight one more promising effort to leverage the requisite capital (social, financial, etc.), build demand on the local level, and respond to it in ways that serve workers and their communities. Because the point of energy efficiency is not simply better (warmer, brighter, more affordable, and less carbon-intensive) bricks and mortar. Done properly, it can be a mechanism for more equitable economic development.

This is the aim of the Emerald Cities Collaborative (ECC), a national effort of leading community organizations, labor unions, and businesses to green America’s cities, build and strengthen communities, and animate democratic participation. ECC, co-created by COWS, was founded as a way to capitalize on the new opportunities presented in 2008 — by a new Administration apparently committed to greening the economy and reducing inequality — for cities to pursue high-road development strategies.¹⁵⁶ In its 10 initial member cities (Seattle, Portland, Oakland, San Francisco, Los Angeles, Milwaukee, Cleveland, Providence, New York, and Atlanta), ECC is focusing first on catalyzing large-scale energy efficiency building retrofit projects, and ensuring that the jobs created are good (meeting minimum labor standards in terms of training, wages, benefits, etc.) and available to members of local communities.

That large-scale energy efficiency retrofits of buildings create jobs and save money is not controversial. However, in few places have such programs been implemented at anything approaching their potential scale. This is due, in part, to a lack of political leadership, constrained capital, the significant complication of these projects, and uncertainty about the value proposition. ECC’s challenge is to overcome these hurdles — simplifying the process and connecting the players to build a market. Local Emerald Cities councils work to do so initially by building demand for these projects. ECC’s core membership constituencies — community groups, organized labor, business, and local philanthropy — are not accidental. This coalition has the necessary political clout to make projects happen, by convincing, and then working with and supporting local government to develop projects.

All parties recognize that without the political support this coalition can create, energy efficiency projects are unlikely to happen at significant enough scale to create the desired jobs and work. Indeed, economic and political

crises, while straining many coalitions, have also facilitated partnership-building. Unions face demographic challenges and political threats to their very right to exist; even with a significant proportion of membership on the bench, labor recognizes the need to expand and diversify its base. Community support means survival, if not power. Low-income communities of color, facing rising inequality and the decline of traditional (e.g., manufacturing, public sector) pathways to the middle class, need more access to decent jobs and the paid training to do them. These are usually delivered, at least in the construction sector, by the building trades. Both groups (though neither is by any means homogeneous or even internally united) see potential job creation and opportunity in a clean energy economy, and, to some extent, the logical advantages of joining forces to build it. This mutually beneficial partnership is the core of the ECC project.¹⁵⁷

A labor and community partnership, supported by relevant businesses and backed by philanthropy, forms a strong constituency to work with elected leaders to make projects happen. ECC's 10 local councils, composed of representatives from each of these key groups, work as market intermediaries in the cities, brokering deals, connecting property owners with financing, and making sure that resulting jobs are high quality and accessible to local workers. This process frequently involves a negotiated community workforce agreement (CWA), stipulating worker training, targeted hires, preferred training providers, and minimum worker certifications.

The local councils are supported by the national organization, composed of a small staff and several committees of volunteers from national collaborative members. These national bodies set the overall direction of the organization, develop policy, coordinate joint advocacy, and assist local councils with fundraising. The national body provides training to local councils, funds some staff, and provides project-based technical assistance to make deals happen.

Some of the best work in human capital development, green and otherwise, lies in partnerships, often brokered by an intermediary that can translate effectively between supply and demand sides of the labor market, aligning education and training, industry demand, and workers. In this tradition, Emerald Cities is attempting to coordinate place-based high-road partnerships that link green economic development, labor unions, and marginalized communities.¹⁵⁸

The approach seems to be working. San Francisco recently signed an ECC deal to retrofit 270 units of public housing, and is already pursuing financing for a second round, adding 45 properties and 1323 new units to the program — all governed by a CWA. Seattle's ECC has spurred direct investment of more than \$20 million from public and private sources in the retrofit of several MUSH (municipal/government, university, school, and hospital sector) facilities, work covered by a CWA. ECC is also nationally pursuing retrofits of community college campuses — currently 23 have signed on to the ECC Community College Sustainability Initiative. ECC Portland is mapping regional training and occupational pathways for the construction industry, and working to better integrate the community-based pre-apprenticeship pipeline with union and other contractor demand on the \$133 million retrofit of a key federal building.

Case Study 3

PROCESS VS. PRODUCT: GREENER MANUFACTURING

It's now well recognized that a clean energy economic transformation holds tremendous promise to revitalize the U.S. manufacturing sector, after decades of plant closings and job losses that have hit certain regions of the country, like the Midwest, particularly hard. The logic of this promise is straightforward: it simply takes more work to manufacture the sources of our energy than to drill and mine for them, or import them from other countries.

This transformation is already occurring, although it's threatened by inconsistent and insufficient federal policy support. According to the Brookings Institution's *Sizing the Clean Economy* report, the U.S. manufacturing sector accounts for 26 percent of the country's 2.7 million clean economy jobs, compared to 9 percent in the overall economy.¹⁵⁹ In the wind sector alone the supply chain of manufacturers now consists of 400 facilities spread across 44 different states.¹⁶⁰

However, the increase in U.S. manufacturers' production of technologies and component parts that meets market demands for renewable energy and energy efficiency products (or for products related to environmental protection, e.g. pollution control) has not translated into a corresponding need for a set of discrete manufacturing skills related specifically to the manufacture of those products. Indeed, most green jobs in the manufacturing sector meet the definition developed by O*NET for "Green Increased Demand Occupations": "The impact of green economy activities and technologies is an increase in the employment demand for an existing occupation. However, this impact does not entail significant changes in the work and worker requirements of the occupation. *The work context may change, but the tasks themselves do not.*"¹⁶¹ In other words, a CNC operator can use the same set of skills to cut steel for a wind turbine tower and an armored vehicle. The products are different (not to mention the policy decisions that create greater market demand for the latter than the former), but the skills are not.

But there's another dimension to green manufacturing, which is to make the production process — in all manufacturing sectors — greener. The Manufacturing Skill Standards Council (MSSC) — an industry-led, training, assessment and certification organization — defines green production as: "workplace activities across all industries within the manufacturing sector that require the use of equipment, technologies, and processes that will improve the environmental performance of manufacturing companies."¹⁶²

The increase in U.S. production of technologies and component parts for renewable energy, energy efficiency, and environmental protection has not translated into a corresponding need for a set of discrete manufacturing skills.

It's this set of activities, and the new skills and skill standards they require, that has become the focus of green workforce development in the manufacturing sector. It's a focus that has been driven by the industry itself. In 2009, the Manufacturing Institute, a non-profit affiliate of the National Association of Manufacturers, began an ambitious effort to develop a set of nationally portable, industry-recognized manufacturing skills certifications. They decided to build on the foundation laid by the Advanced Manufacturing Competency Model (AMCM) developed by DOL and leading industry organizations, first released in 2006.

However, in the Institute's judgment, the AMCM was outdated in one key respect: it included nothing on competencies related to green and sustainable practices in manufacturing. To the Institute, the need to do 'more with less' was the line connecting lean to green in manufacturing. This orientation is reflected in the Institute's framework for analyzing structural costs in the manufacturing sector: both 'energy costs' and 'pollution abatement' are categorized as central cost factors and subject to bottom-line attention in the same way that taxation and benefit costs are considered. In this framework, then, skills to address these kinds of structural costs should be treated as a core competency of the manufacturing workforce. DOL agreed and modified the AMCM to include a "Sustainable and Green Manufacturing" block of competencies, situated primarily in entry-level critical work functions and entry-level technical content areas.¹⁶³

But there's another dimension to green manufacturing, which is to make the production process – in all manufacturing sectors – greener.

On a parallel track, MSSC led industry efforts to codify skills certification consistent with the updated and greened up competency model, building on a foundation already laid. MSSC had established a Certified Production Technician

(CPT) skill standard and a related curriculum designed to align with that standard. The CPT certifications were divided into four modules, each representing a set of critical work functions: Safety; Quality Practices & Measurement; Manufacturing Production & Processes; and Maintenance Awareness.

In 2010, MSSC began work on adding a fifth 'green' module to the existing four CPT certificates, with funding support from the DOL Energy Training Partnership grant (one of the ARRA-funded Green Jobs Program grants).

MSSC developed a “Green Production Module” (GPM) as part of a partnership with the IUE-CWA union that also included a pilot program to train front-line manufacturing workers in Ohio in the first four CPT modules and then the GPM once it was finalized.

To develop the GPM, MSSC went through a validation process with over 60 companies, attempting to represent every sector of manufacturing as they developed the work standards that would serve as a framework for assessment. MSSC started with 10 activity areas for the GPM and dropped down to 8 as a result of the validation process. The final Module includes training in and skill standards for: conservation (e.g., energy, water, energy-efficient materials, use of recycled materials in products); emissions reduction and purification (e.g., of waste, air, water, gas, chemicals); renew-ability, recycle-ability, and final disposal of products to maximize the lifecycle efficiency of the resources, raw materials, products, and processes involved in manufacturing; and regulatory compliance and environmental assurance. MSSC estimates that GPM training should take 35–40 hours; it can be delivered online or in the classroom.¹⁶⁴

IUE-CWA was a year and a half into the implementation of the DOL grant, in which they trained hundreds of dislocated workers in the Dayton and Cincinnati areas in the four traditional CPT modules, before the GPM was ready to use in the summer of 2011. IUE-CWA then ran more than 200 dislocated workers through the pilot GPM training between August and December of 2011.¹⁶⁵ Of the 239 participants enrolled to date, 210 completed the course, and 80 gained employment.¹⁶⁶

The initial phase of the MSSC green production program seems promising. Nearly 350 individuals from seven states — including the 200-plus front-line Ohio workers — took part in the training, and 280 green credentials were awarded to participants. Overall, the Ohio credentialing program, including traditional and green modules, exceeded every goal set by MSSC: they

issued more than twice as many credentials overall as projected, including 422 full CPT certifications; the passing rates for the project (87 percent–96 percent) were higher than the national average for MSSC assessments (82 percent); and the number of job placements (425) exceeded the goal set for the grant. As evidence of project sustainability, MSSC notes that more than 30 companies in the region now prioritize the CPT credential when hiring. And their Cincinnati team, following the end of the formal grant period in January, has continued the effort, working with more than 200 dislocated workers.¹⁶⁷

The take-up of the Green Production certification is potentially big, given the national reach of the MSSC, the more than 200 community colleges across the country that are already training students on the first four CPT modules, and the employers who increasingly view the CPT as a trusted, go-to skill standard for assessing front-line production workers. (Employers have repeatedly told IUE-CWA trainers that a job applicant with a CPT certification jumps to the front of the line when decisions about hiring are made.)

Whether that take-up is big or small depends on a number of factors. Two of the most important are **1)** how vigorously MSSC promotes the GPM as a part of its overall CPT package rather than as a separate add-on module; and **2)** how effectively it can be demonstrated that workers with the GPM add value to manufacturers, and in concrete ways. Regardless, what’s clear already is that the GPM green certification, built on a CPT certification that is quickly becoming the industry-recognized standard, couldn’t be better positioned to become the skills standard-bearer for green manufacturing.¹⁶⁸

Case Study 4

NOT NECESSARILY GREENER ON-RAMPS: BRIDGES TO MANUFACTURING CAREERS

A more sustainable future demands that we build a greener economy, based in part on advanced manufacturing for clean energy industries. As the MSSC case demonstrates, greener manufacturing is as much about process as product, at least in terms of skills required. And as the CEWD case points out, one of the challenges is getting workers over basic skills hurdles into increasingly technical careers. In each case, specialization — in particular an occupationally-specific layer of “green” skills or knowledge — may not come until well down the path of occupational training. So the on-ramp to a greener career may in fact involve little to no greening at all.

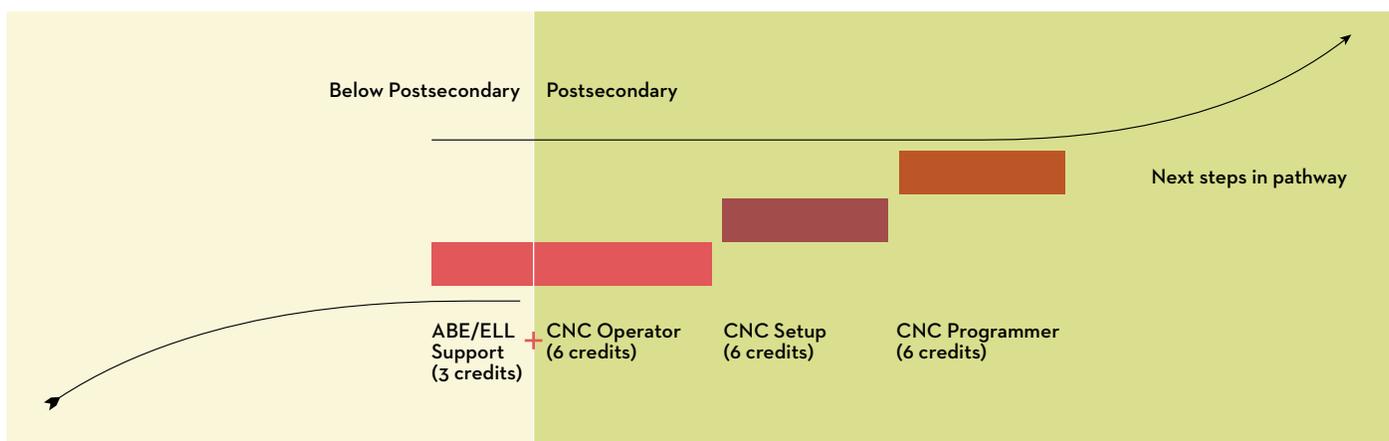
Indeed it is the access not the greenery that determines sustainability here. For the 90 million Americans with no credentials beyond high school, unprepared to enter either technical occupations or the first rung of post-secondary education, the paths that lead to training,

credentials, and decent jobs, green or otherwise, are too often confusing and inhospitable.¹⁶⁹

Technical colleges and the public workforce system in Wisconsin have helped to lead a national effort to connect more low-skilled, low-income working adults with post-secondary credentials that pay off in the labor market. As part of the Joyce Foundation’s Shifting Gears Initiative in five midwestern states, Wisconsin’s Regional Industry Skills Education (RISE) initiative promotes career pathways and related bridges — or on-ramps — in key industry sectors, including the region’s traditional backbone, manufacturing. Career pathway bridges combine basic skills instruction (things like math concepts, literacy, and language skills) with college-level coursework, reducing the time needed to achieve a post-secondary credential and accelerating career advancement for those who need it most.¹⁷⁰

figure 11

CAREER PATHWAY BRIDGE



The Western Technical College (WI) Career Pathway for CNC Machinists includes three stacked certificates that continue into a one-year technical diploma or an Advanced Manufacturing Applied Associates Degree. The first certificate is a bridge that blends basic skills instruction and college credit courses.

For the 90 million Americans with no credentials beyond high school, unprepared to enter either technical occupations or the first rung of post-secondary education, the paths that lead to training, credentials, and decent jobs, green or otherwise, are too often confusing and inhospitable.

A good example, and one which carries us beyond the abstract language of pathways, partnerships, and workforce development, is the CNC Skills Institute at Western Technical College in LaCrosse, WI.¹⁷¹

Over the past decade, key manufacturing employers in western Wisconsin have reported increasing need for workers that are skilled in computer numeric control (CNC) operation, setup, and programming. Despite this clear demand, Western Technical College has had difficulty attracting individuals to participate in CNC instruction. Until recently, Western only provided structured one- and two-year technical diploma programs in this field. Unfortunately, these diplomas are out of reach for many individuals who could benefit from such training. La Crosse's large Hmong community, for example, has been mostly relegated to low-wage employment, due in part to language and cultural barriers as well as a lack of high school credentials.

In an effort to increase awareness of opportunities in CNC/Machine Tool occupations and to provide manufacturing skills to more English language learners, Western offered one-credit Basic Machining Skills classes to Hmong participants in 2007 and 2008. These classes were team-taught by a CNC/Machine Tool instructor and a Hmong interpreter who was a Machine Tool program graduate. The experience was positive for the participants and the instructors, laying a foundation for continued collaboration and learning between Instructional Support Services and Western's CNC/Machine Tool department.

Building on this experience, Western developed the CNC Skills Institute in 2009 to help meet area employer demand as well as the needs of lower-skilled learners. Although it was designed with the region's Hmong population in mind, Western discovered during the recession that the Institute provided a good option for many non-Hmong dislocated and underemployed workers, as well as incumbent workers. Two of the students who enrolled in the pilot Bridge in Summer 2009 were incumbent workers sent by their employer.

The CNC Skills Institute comprises three tiers of instruction along a career pathway: CNC Operator, CNC Set-Up, and CNC Programming (*figure 11*). Each tier (a package of six one-credit courses) can stand alone as individual certificate courses of study, tier into higher levels of study, or be transferred into a one-year CNC/Machine Tool Operation technical diploma.

The first certificate level, which prepares participants for careers as CNC machine operators, provides foundational skills for many other manufacturing occupations in addition to machining. Western designed its CNC Skills Institute to integrate Adult Basic Education (ABE) into the delivery of the first tier's technical training. This design was based on extensive input from area employers regarding skills deficiencies in math and print reading for both incumbent and new workers. Manufacturing Math and Blueprint Reading are team-taught by an ABE instructor and a core technical CNC program instructor. In addition to the integration of basic skills instruction

into key components of the curricula, Western has included the use of video training and computer simulations in the first and second tiers of the CNC Skills Institute to aid English Language Learning (ELL) students with visual conceptualization.

Outcomes from the initial pilot of the CNC Skills Institute (Tier 1, CNC Operation) held in Summer 2009 showed great promise. Of the 13 students who participated, nine students successfully completed the course and received their certificate (two of the four students who left the program did so because they became employed in the field). All graduates of the first cohort took the Manufacturing Skills Standards Council (MSSC) Safety test and passed. Two of the graduates of CNC Operation enrolled in technical diploma programs at Western, and three others are interested in continuing their education in CNC/Machine Tool Technology, either by continuing with the next tier of the Skills Institute or by enrolling in a diploma program.

Because there was so much interest in the CNC Operation course, particularly from dislocated workers in the area (11 of 13 participants in Summer 2009 were dislocated workers), but not enough space or equipment, Western Technical College offered¹⁷³ the course again in Fall 2009. Twelve new students successfully completed the training in Fall 2009, obtained their CNC Operation certification, and registered for further instruction.

Western Technical College paid close attention to demand from area manufacturers. Staffing might require 10–20 Operation Technicians for every one to two Set-Up and Programming Technicians, and Western structured the delivery of the CNC Skills Institute Tiers with this in mind. Since Spring 2010, Western Technical University has offered the CNC Operation course twice more (Fall 2010, Spring 2011), bringing the total number of completing cohorts to four. In total, 20 of 25 students enrolled in the Fall 2010 or Spring 2011 courses obtained their certification in CNC Operation. Student success in CNC

Set-Up (Tier 2) was just as impressive. In its two offerings in Spring 2010 and Spring 2011, 19 students obtained certifications of 25 total enrolled in the two semesters (10 of 13 in Spring 2010; 9 of 12 in Spring 2011). Outcomes for the final module of the CNC Skills Institute, CNC Programmer (Tier 3) appear to match the lower demand and possibly increased difficulty of this module. The college offered it only twice — Spring/Summer 2010 and Spring/Summer 2011. The first was cancelled due to low enrollment; the second had twelve completers, but yielded only four certifications.¹⁷²

Western's CNC Institute was part of a three-year, \$2M Community Based Job Training Grant from USDOL that began in 2009, and included Welding and Industrial Maintenance Skills Institutes. Additional manufacturing bridges — funded from a variety of sources — have been developed successfully elsewhere in the Wisconsin system, including CNC Operator programs at Gateway Technical College (a 3-semester program that includes GED preparation); and a shorter boot-camp model (8–16 weeks) at Waukesha County Technical College.¹⁷³ The latter in particular demonstrates one of the advantages of career pathway bridges: flexibility. They are not necessarily offered continuously, but designed to come online when there is sufficient demand in the regions served by these colleges.

If manufacturing continues to rebound — and has a chance to respond to the production needs of a growing clean economy — Wisconsin's CNC bridges offer an excellent model. And where combined with cleaner and more efficient process at high road firms, they offer a profoundly greener vision: helping low-skill workers advance while delivering the technically proficient workers critical to a U.S. manufacturing renaissance.

Case Study 5

GREENER TRANSMISSION: UTILITIES, GRIDS, AND CLEAN ENERGY TRAINING

Any claim that the electric utility industry in the U.S. is an integral part of the green economy requires some explanation. After all, of the total electricity delivered by utilities to U.S. homes and businesses, only 13 percent of it comes from renewable resources (*figure 12*).¹⁷⁴ And electricity generation accounts for 34 percent of the greenhouse gas pollution in the U.S., the largest from any economic sector.¹⁷⁵

Despite the sobering reality of how we produce and consume electricity currently, any clean energy transformation in the U.S. economy has to run through the transmission lines and substations of the utility sector. In particular wind and solar, which will have to be scaled up dramatically, are dependent on the transmission capacity of the electric utility sector, given that the best sources of this energy are concentrated in areas far away from the

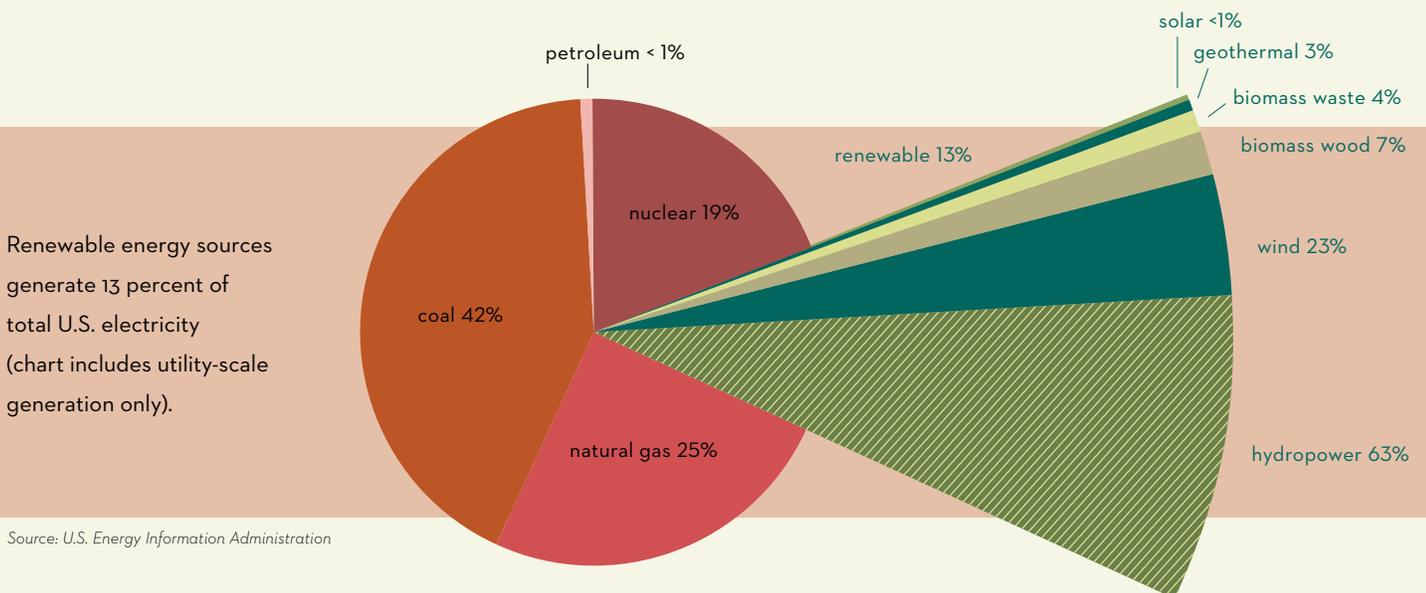
nation's biggest population centers, and will therefore have to be carried to these centers by new transmission infrastructure.

In addition, the electricity utility sector is increasingly using enabling technologies, often referred to collectively as the “smart grid,” that will advance energy efficiency, while also facilitating the deployment of renewable energy sources and distributed generation. Smart grid technologies will be particularly essential to any large-scale transition to electric vehicles: owners of plug-in hybrids will charge their vehicles at home, ideally at off-peak hours, and also send electricity back to the grid at needed times — all of which requires two-way, real-time communication between utilities and their customers.

But no renewable energy-powered electric utility sector (or dirty energy-powered utility sector, for that matter) will be possible without trained line workers, relay technicians, or electricians to build and maintain our utility infrastructure. Unfortunately, it's not a foregone

figure 12

SOURCES OF ELECTRICITY GENERATION, 2011



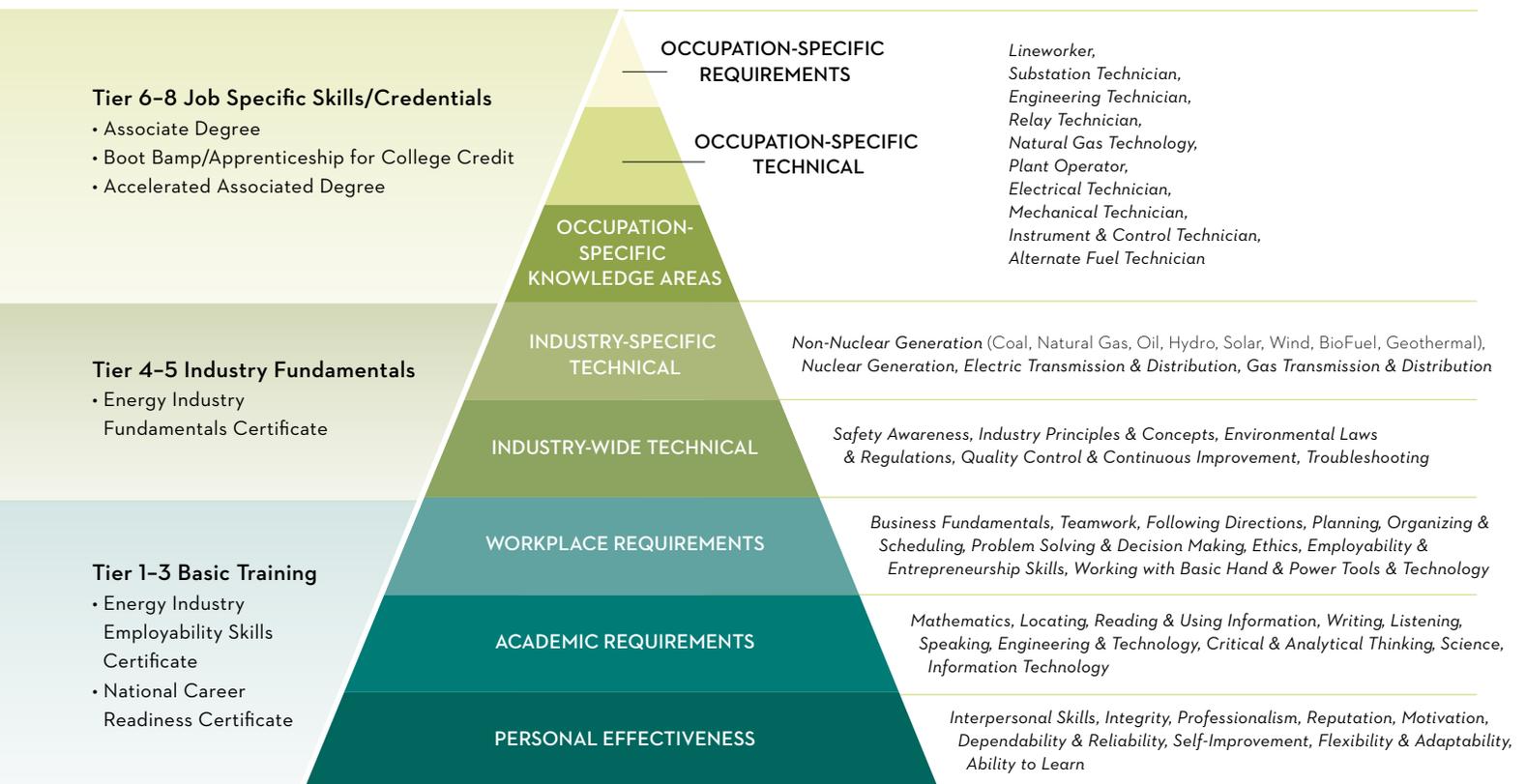
Source: U.S. Energy Information Administration

conclusion that there will be a sufficient supply of skilled workers in these occupations to meet status quo demands, let alone demands required by a national clean energy transformation. An estimated 46 percent of the utility industry workforce (approximately 200,000 workers) may need to be replaced by 2015, in large part due to baby boomers reaching retirement age.¹⁷⁶ The most critical occupations that will require replacement workers are engineers in all disciplines, particularly power engineers, and skilled utility technicians, including line workers, generation technicians, and transmission and distribution technicians.

The first responder to the projected workforce gap in the utility industry is the Center for Energy Workforce Development (CEWD), a non-profit consortium of utilities and their associations, contractors, and unions that was formed in 2006 to develop solutions to this looming shortage. CEWD is a national organization, but most of its work is guided by state energy workforce consortia which involve an analogous state partnership of CEWD's national stakeholders. Consortia have been formed in 28 states, where they each develop a state plan for meeting the needs of the utility sector and its workforce, a plan built upon an assessment of current and

figure 13

ENERGY INDUSTRY COMPETENCY MODEL



The Center for Energy Workforce Development's eight-tier competency and credentialing pyramid establishes a common skills framework for the electric utility industry. Note that training related to specific "green" technologies does not appear before tier five.

future energy workforce needs and the identification of any gaps in training.

CEWD has developed a strategic framework with four areas of focus to guide its work and that of its state consortia, branded as the Get Into Energy Career Pathways Model:

CAREER AWARENESS targets specific populations of workers for recruitment to the industry

EDUCATION includes a competency model and a system for industry credentialing

WORKFORCE PLANNING involves conducting annual workforce surveys to identify gaps in the workforce and in the skills of job applicants

STRUCTURE AND SUPPORT develops partnerships at both regional and national levels to align, leverage and coordinate resources and services.¹⁷⁷

It's worth getting into the details of the first two of these focus areas.¹⁷⁸ The **Career Awareness** focus acknowledges that the utility industry needs to do a far more intentional job of recruiting workers from groups who heretofore have been under-represented among the ranks of the industry's workforce. It also acknowledges that different groups at particular stages in their lives might be open to exploring utility industry careers. CEWD's career awareness efforts therefore target specific groups for recruitment: young adults, veterans, women, adults in 'career transition' (to dispense with euphemism, this typically means dislocated and unemployed workers) and workers interested in engineering.

CEWD's approach is premised on the idea that each of these targeted groups will need different kinds of information and resources, as well as different kinds of strategies and supports to place individuals on the starting line of a pathway into the industry. So while CEWD has developed a website (www.getintoenergy.com)

that offers information and branded materials designed for each of the target groups, its state energy workforce consortia also coordinate extensive career coaching that involves staff from WIA One-Stops, community colleges and secondary schools, depending on state needs and the targeted group.

Career coaching and other career support services are particularly important for young adults who are low-income and often constrained by barriers to employment. In recognition of the challenges involved in recruiting individuals from this group and allowing them to succeed, CEWD has started pilot programs in 8 states (with funding from the Gates Foundation) that are geared to assess and guide these young adults (ages 16–26) into career pathways in the industry.

In its **Education** area of focus, CEWD's objective is to clearly link industry-recognized competencies and credentials to employment opportunities and advancement in the industry. CEWD's systematic approach dates from shortly after its inception, when it partnered with subject matter experts and the U.S. Department of Labor (DOL) to develop a common set of competencies for Generation, Transmission and Distribution occupations. This effort was galvanized by a recognition that existing education programs across the nation were not based on common competencies and industry requirements, such that graduates of a program in one area of the country were not qualified for related jobs in another part of the country.

CEWD's "Energy Competency Model" breaks down competencies into eight separate tiers, from very basic life skills (Tier 1 — Personal Effectiveness) to specific job skills (Tiers 6–8 — Occupation Specific).¹⁷⁹ CEWD has also developed an industry credentialing framework of stackable credentials that correspond with the tiered competencies. The goal is for these credentials to become the industry standard, recognized and used by all stakeholders (*figure 13*).¹⁸⁰

CEWD has been particularly focused on Tiers 1 through 3 of the Competency Model, where the biggest skill deficits are identified by employers among the populations

targeted for recruitment to the industry. In a CEWD survey, utilities reported that 30 to 50 percent of applicants (meeting minimal requirements for a position) were unable to pass the pre-employment tests; the single biggest factor was the inability to perform basic math calculations.

For basic skills training, CEWD uses ACT's WorkKeys System, which assesses academic and work readiness skills; achievement of competencies results in ACT's National Career Readiness Certificate (NCRC). Based on ACT's occupational profiles for energy-related jobs, CEWD determined that a silver-level NCRC is an appropriate measure of attainment of the basic skills identified in the first three tiers of the Competency Model, indicating that individuals are prepared to enter training for a range of skilled technician occupations in the industry.

Correspondingly, CEWD has developed, and state consortia have implemented, different "boot camps," that train target populations in the fundamental competencies while preparing them for more technical training, ranging from (the self-explanatory) 'math boot camps' to 'line worker boot camps,' which combine basic skills training with basic information about the industry and requirements for the line worker position, and training for climbing and safety certificates and a commercial driver's license.

Individuals who have achieved the basic competencies can then use them as a foundation to move on to learn industry-wide and then occupation-specific skills, which in turn map to associated credentials. It is only at the highest occupation-specific tiers that skills related to renewable energy or energy efficiency are relevant. CEWD has divided competencies in these tiers into eight occupational categories. Reflecting the current make-up and demands of the industry as a whole, only one of these categories, termed 'alternative fuel technicians,' which encompasses occupations like wind turbine technicians and solar thermal installers, would be considered uniquely green (and once more for emphasis: unique

only at the occupation-specific level; they share basic, technical, and industry-wide competencies with all other workers in the industry).¹⁸¹

At the same time, however, workers in all of the occupations will have to become familiar with new technologies that reflect the stutter-step greening of the industry. An effort that reflects this trend is a sectoral partnership led by the Washington State Center of Excellence for Energy Technology, based at Centralia College, which includes several utilities, the International Brotherhood of Electrical Workers (IBEW), representing workers at the those utilities, other education and training organizations, WIBs, the Bonneville Power Administration, and a local economic development agency. The partnership applied for and won a \$5 million ARRA grant from the U.S. Department of Energy (DOE) for a project to deliver smart grid training for utility workers in a five-state region of the Pacific Northwest. The occupations trained for include instrument control and relay specialists; generation, load and substation operators; line workers, substation wiremen and mechanics, ground crews (utility construction workers), meter technicians, and customer service representatives.

The project will develop skill standards for occupations that do not have standards or apprenticeships already associated with them.¹⁸² Interestingly, the first skill standard in development is for customer service representative — not an occupation that many would consider in need of a skill standard. However, the household applications of smart grid technologies are new and complex, and have generated concerns regarding health and privacy issues. Consider the smart meter: a technology that customers can potentially use to better manage their energy use — but only if they understand how to use it; and a technology that has generated a consumer backlash in some parts of the country by provoking a grab-bag of fears, stemming from (to offer just two examples) the radiation it purportedly emits and the Orwellian totalitarian state that it purportedly heralds.

Early experience in the Pacific Northwest suggests that existing customer service reps don't have the skills or capacity to deal with these kinds of challenges. One utility in the project area that has already installed smart meters reported 18 of their 200 reps are out on stress disability.

The second skill standard that the project plans to develop is for the meter technician occupation. There are two points worth emphasizing here. First, the frequently made argument (we make it ourselves) about the job creation potential of the green economy, due to the labor intensity of the work involved (and other factors) is not universally applicable. Sometimes, new technology deployment destroys jobs. While there have been some (wildly) optimistic projections of jobs created by investments in the smart grid, it's indisputable that some of the technology replaces human labor. Where smart meters are installed, the meter reader becomes an occupation of the past. Second, rendering obsolete the meter reader occupation should not translate into making the workers who have spent their careers reading those meters obsolete. The second point is a principle that guides the smart grid workforce project. The goal is to retrain 200 meters reader as meter technicians and re-deploy them across the region. Exactly what kinds of skills the utilities will require from these new meter techs is the impetus for the skills standardization and curriculum development process that they're undertaking.¹⁸³

On the whole, the smart grid workforce project — like the CEWD Competency Model — illustrates how green job training consists primarily of layering green skills on a foundation of existing skills, in this case skills associated with smart grid technology laid on top of the set of skills that are foundational for different utility occupations. In effect, the smart grid requires the intersection of information technology (IT) skill sets with electronic technology skill sets. Substation operators are one example: traditionally everything in substations is operated manually; a smart grid allows much of the substation to be automated and operated electronically. Therefore,

the project's training involves instructing workers in how to perform certain tasks by computer rather than by pulling switches.

Getting smart grid training right will be a challenge. But as challenges go, it probably takes a back seat to the over-arching challenge that CEWD is trying to address: getting a substantial number of new workers into utility industry jobs. On this front, the good news is that the utility industry has well-defined pathways into quality jobs and careers that involve education and training organizations with a commitment to ensuring that each step in the career pathway is articulated to the one ahead of it and ultimately to a job at the end. The challenge is that skills requirements for entry into training and for the jobs themselves are quite high, making it difficult for workers with low basic skills and other barriers to take the first steps of the pathway.

An example from the smart grid workforce project illustrates this dynamic. One of the utility partners in the project, Avista, which serves customers throughout the Pacific Northwest, runs with Spokane Community College a four-month pre-apprenticeship training program for linemen, the Avista Lineworker Program (ALP). ALP is a partner in CEWD's nine-state effort to recruit low-income young adults to the industry. The program is working with high school counselors and WorkSource (WIA One-Stop) centers to recruit trainees. ALP is also partnering with the organization Women in Hard Hats to target women for recruitment.

ALP offers three classes per year. A class with 46 students started in January 2012. There were 400 applications for this class, from which 200 applicants were invited to interview, before the cut to 46 was made. The almost 10:1 ratio of applicants to accepted trainees is a reflection of the fact that standards for getting into the program are high, particularly with regard to math skills. For example, applicants have to pass an Algebra 2 test to be considered for program entry. This is a very different standard for entry compared to most pre-apprenticeship programs in

the construction sector, which typically accept students at lower skill levels and then focus their training on basic skills remediation, with the goal of getting those skills to a level at which students can pass an exam for entry into apprenticeship programs. In contrast, ALP teaches more occupational skills than basic or life skills. They learn how to set and climb poles, install crossarms, hardware, line, and transformers, and how to use all the tools of the trade. ALP has integrated smart grid skills into the curriculum with a 4-6 hour training module that includes an intro to smart grid applications, including components in a mock training substation that students train on.

In effect, then, ALP is both a pre-apprenticeship and entry-level utility training program. Historically, about 80 percent of its graduates are placed in the utility industry. Roughly half of the placements are directly into apprenticeship programs or to ground worker positions (essentially construction work on utility sites) that leads to apprenticeship (6 months of ground work required before entry). The primary apprenticeship program partner is the Northwest Line Construction Joint Apprenticeship and Training Committee (JATC), run by the IBEW and the National Electrical Contractors Association. Linemen first-step apprentices make over \$26 per hour with benefits; wages increase as apprentices advance, as part of a predefined scale negotiated between IBEW and its contractors.¹⁸⁴

The utility sector is that increasingly rare beast in the U.S. economy: an industry with strong demand for new workers; clearly articulated career pathways; and high levels of unionization, with the accompanying labor market arrangements that offer workers entering and advancing in the industry high quality training, good wages and benefits, and lifelong careers. And the sector happens to be the hand on the switch/finger on the button of our nation's transition to a clean energy economy. All of which is to say that whether the utility industry can recruit and train up a sufficient number of workers over the next several years is a subject that is very much in the public interest.

Case Study 6

GREENER HEALTH CARE: PARTNERSHIPS, CREDENTIALS, AND ADVANCEMENT

The health care sector, and its relation to the green economy, is notable for a number of reasons: **1)** Health care has received little to no attention as a green or greenable economic sector; **2)** According to the 2010 census, more Americans are employed in the 'Healthcare and social assistance' sector than any other major industry sector, and it's projected to grow steadily as a source of employment in the foreseeable future;¹⁸⁵ **3)** Eight of ten workers in the sector are women, in stark contrast to construction and manufacturing, most frequently cited as the growth sectors of the green economy, in which women are under-represented; **4)** The sector is accessible to workers with low to moderate levels of education and skills, but it also possesses a broad range of occupations that require higher education and skill levels — and as such career pathways have been constructed throughout the sector; **5)** Despite the proliferation of such pathways, it remains an industry in which workers with lower levels of education and skills can easily get stuck in poorly compensated jobs with no room for advancement, where employers invest nothing in their skill development.

The Healthcare Career Advancement Program (H-CAP) is a national labor-management partnership of Service Employee International Union (SEIU) locals and health care employers, operating in 8 states and 10 metropolitan regions. Over the last two years it has implemented a project to green health care and health care careers by focusing on lower-skilled workers whose jobs rank fairly low in the hierarchy of health care occupations and who are not typically viewed as agents of transformation.

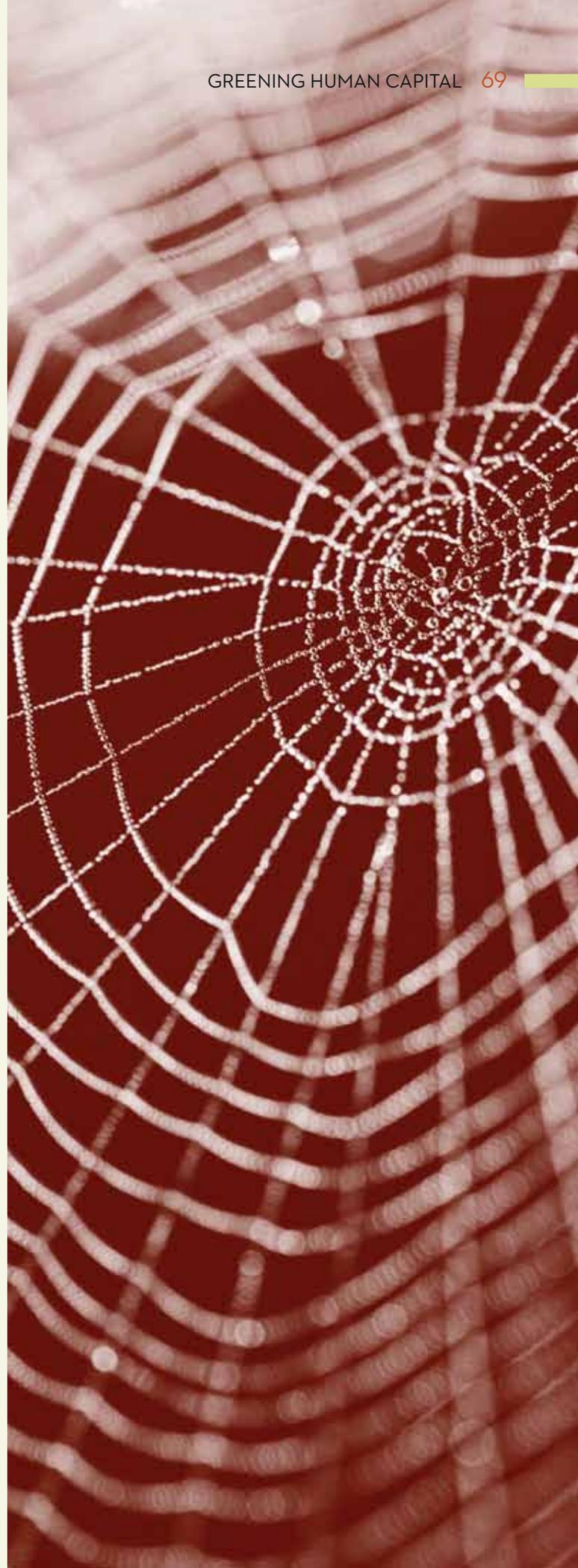
In 2010 H-CAP received an ARRA DOL grant to provide green training and develop green career pathways for workers in the environmental service (EVS, aka house-keeping) departments of hospitals administered by their employer partners, and to create 'green systems change' in those hospitals. The "EVS Green Careers Project" operates in 4 different regions of the country: Los Angeles,

Seattle, DC/Maryland and New York City. The project has since expanded to dietary departments in 2 of these regions.

The overarching goal of the Green Careers Project is to impact health care's triple bottom line: people (patients, workers and the community), planet, and profits (costs/institutional viability). EVS workers, with the right training, are ideally positioned within hospitals to make the triple bottom line concrete by implementing practices related to energy efficiency, waste and water use reduction, recycling, and improved cleaning of buildings.

The Project provides training to incumbent frontline EVS workers in 7 modules, involving 12-14 hours of training. Worker and supervisor pairs are trained to co-lead the incumbent worker green training modules. The training includes water and energy conservation in a health care setting; waste reduction; and the reduction of Hospital Acquired Infections (HAI's) through EVS work. Up to 6 additional hours of customized training are also provided, depending on the green focus of projects in different hospitals. For example, in Los Angeles, a focus on HAI reduction led to customized training on the science, identification and use of green cleaning products as a means of reducing worker and patient exposure to toxins in conventional cleaning supplies, which contain chemicals associated with respiratory irritation, skin and eye injury, cancer, and indoor air problems.

H-CAP has enrolled close to 3000 workers in the incumbent worker training across all four regions. The participating hospitals pay for incumbent workers' training time; in the experience of H-CAP leadership, employer partners have never paid for so many hours of training time for EVS workers. At the time of this report, the project has 2225 training completions. (While these are primarily incumbent workers, this number includes H-CAP's green pre-hire, train-the-trainer, and college certificate programs, with some participants completing multiple programs). Roughly 95 percent of trainees are people of color. Half are women. And several hundred



report being immigrants from non-English speaking countries (ranging from Albania to Vietnam).¹⁸⁶

Implementation of the Green Careers Project in the New York City region illustrates one of the most innovative and important parts of the initiative: the way in which it leverages labor-management committees — a central labor-management institution that dates back to the Taft Hartley Act — to identify ways in which hospitals can be greened and projects that EVS workers can undertake toward that end. These committees — which involve supervisors, front-line workers, and union and management representatives — are the drivers of ‘green systems change’ in hospitals, one of the Project’s primary goals.

In New York City the labor-management committee, involving members of 1199 SEIU Healthcare Workers East and management at one of the region’s major medical centers, explored the possibilities for improving waste management practices in the hospital. They decided to focus on recycling, in particular specific opportunities in the Operating Room (OR) for recycling and plastics reprocessing. In the OR project design phase, the committee engaged partners from throughout the hospital, including nursing, anesthesia, materials management, and administration. Recognizing that success relied in large part on the frontline Building Services Department (BSD) workers (who were the workers participating in the Green Careers Project), the committee made these staff central to the decision-making and design of the recycling effort, ultimately making them responsible for training all new staff and relief staff within the OR on proper practices. BSD staff were also asked to participate in the design of a new, facility-wide recycling strategy.

The results: OR recycling steadily increased after the implementation of the new recycling practices. But the facility-wide metrics are most dramatic. In March (before training) 27.35 tons of recycling were collected. In April and May (after training) 46.43 and 49 tons were collected, representing an average increase of 74 percent.¹⁸⁷

Another goal of the Green Careers Project was to develop a “Sustainability in Health Care” college-level certificate program as a means to more fully train workers in green health-care practices and to provide them with a credential that they can use for career or post-secondary advancement. The course was developed under the leadership of North Seattle Community College, with input from labor-management committees and college partners in the four regions around the country. The first course was launched in May of 2011 at North Seattle and later in the year at colleges in Los Angeles, New York and DC/Maryland. As of March 30, 2012, 88 workers have completed the course nationally. The course uses project-based learning as a vehicle by which workers develop knowledge and skills around developing, leading, and supporting green change projects at their hospitals. Students analyze current practices in their hospitals that could benefit from being greened, and by doing so increase their problem solving abilities, job relevant knowledge, and new green skills. Students put this analysis into practice within the labor-management committees of their respective hospitals, where they can lead green projects.¹⁸⁸ Completing the course is a pre-requisite for the project’s newly negotiated green lead positions, and could serve as an on-ramp to post-secondary educational pathways for related occupations.

The project-based learning of the certificate course suggests the kind of full-time position that H-CAP is trying to create within the hospital workplace for workers who earn the credential: a “green lead” or “green implementation coordinator” who can support ongoing and new sustainability projects, functioning at the interface between labor-management (LM) committees, EVS staff and, where needed, dietary staff. It’s here that the career advancement potential of this training is inextricably linked to the fact these are union workplaces, where job positions, and career progression from one job to another, are embedded within a broader set of negotiations between labor and management. The scope and

requirements for the new position were created through a remarkable process in which H-CAP engaged labor and management regionally before convening employer and worker representatives nationally to settle on the parameters of the new classification. To date, 8 of 11 employers have created green coordinator positions — a promotional opportunity which entails training responsibilities, project coordination and cleaning responsibilities. Promotions and accompanying increases in salary to green lead and supervisory positions have been negotiated locally for 18 workers. How many positions are ultimately created, and whether these positions are replicated in other hospital workplaces, depends on the extent to which SEIU locals prioritize these new jobs in future contract negotiations with their hospitals, and the extent to which those employers recognize a cost-savings value in having housekeeping staff trained in sustainability practices.¹⁸⁹

As is the case with career pathways in many sectors, there may be limited vertical mobility here given the relatively limited number of supervisory positions available. But incumbent worker training, which is the bulk of the Green Careers Project, provides rank-and-file workers the requisite skills and knowledge to effectively engage in a hospital's "greening" projects, improving safety and sustainability for all. And like the most far-sighted and nimble programs that "green up" existing occupations and skill sets, it may increase the employability of participants across a variety of positions. As of May 2012, the program counts 123 placements of un- and under-employed workers who completed the green pre-hire training.

Case Study 7

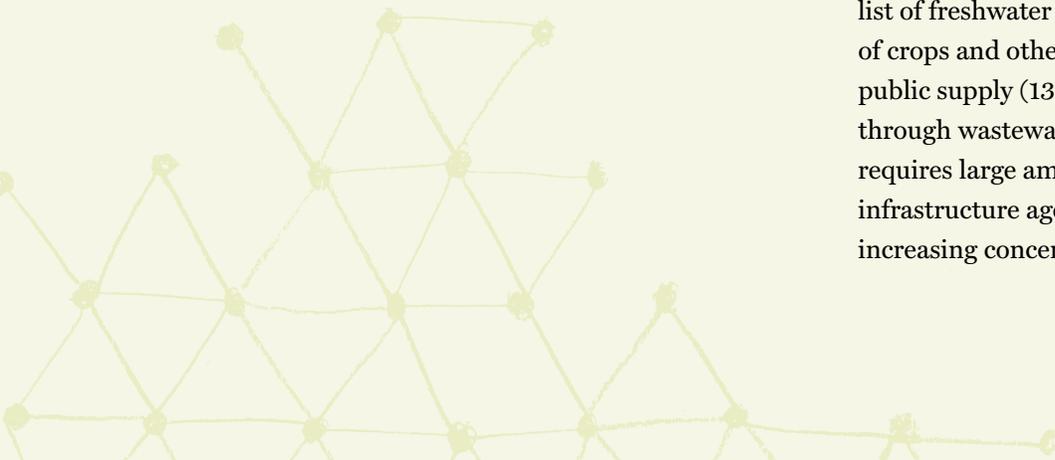
WATER, WATER, EVERYWHERE

Energy supply and demand tends to dominate discussions about greening the economy. Water, however, is a critical, irreplaceable resource indispensable to energy, agriculture, health — and human life itself. Nothing is sustainable without water.

Only one percent of the world's fresh water is accessible for use.¹⁹⁰ The United States is the largest water market, spending \$107B per year on water infrastructure at a rate of growth of 10-15 percent per year.¹⁹¹ Water resources vary by geography. The Great Lakes region sits adjacent to the world's largest available fresh water supply, while the Southwest and Plains regions face water shortages driven by topography, use (commercial and domestic), and climate change.¹⁹² The Environmental Protection Agency estimates that by 2013 at least 36 states will experience water scarcity.¹⁹³

The public water system has two parts: a drinking water system and a waste water system. Drinking water systems treat and deliver water collected from freshwater sources. Waste water systems treat and return used water back into the eco-system. In many cities, the infrastructure supporting these systems is deteriorating, over-burdened and reliant upon outdated technologies. As a result, water system failures are increasingly common, leading to service disruptions and overflows of sewage into local freshwater sources.¹⁹⁴

Limited water access and quality have economic impacts. The energy, manufacturing and agriculture sectors rely on water for production.¹⁹⁵ Energy generation leads the list of freshwater users (41 percent), exceeding irrigation of crops and other lands (37 percent) and municipal/public supply (13 percent).¹⁹⁶ Ensuring water quality through wastewater distribution and treatment, in turn, requires large amounts of energy. As the country's water infrastructure ages, water quality becomes an issue of increasing concern. A recent government study estimated



the monetary burden of water contamination within the public water system at over \$255 million.¹⁹⁷

Climate change, population growth and urbanization will only increase demand for water access and quality. Where many U.S. cities can adequately project and plan for population trends — and associated infrastructure needs, which parallel population and economic growth — climate change creates unpredictable weather extremes from drought to increased occurrences of 100-year floods.¹⁹⁸ City water systems built to 100-year flood standards have begun to fail with the increased prevalence of severe precipitation events.¹⁹⁹ Cities in arid regions fare no better, with drought reducing the reliability of water supplies and parched land unable to absorb sudden, severe precipitation.

To address the increased burden placed on the nation's aging water infrastructure, a 2011 report by Green for All, Economic Policy Institute, American Rivers and the Pacific Institute estimates a five-year investment need of \$188.4 billion. This level of investment would add \$265 billion and 1.9 million jobs to the economy.²⁰⁰

Ideal infrastructure solutions combine both gray and green strategies.²⁰¹ The traditional gray-water system of pipes, gutters, and tunnels can be integrated with advanced technologies to more efficiently manage and treat water. Green infrastructure mimics the natural water cycle using vegetation and soil. Permeable surfaces, green roofs, bioswales and rain gardens are common green infrastructure techniques. When combined effectively, the two types of infrastructure strategies improve a community's stormwater management, water quality and CO₂ emissions.²⁰²

Water infrastructure investments can also create local economic opportunities, leading to jobs in the

construction, utility, and water management sectors, indirect jobs in manufacturing, and induced jobs in the service sector as income is spent in the local economy. Like electrical utilities, water utilities face impending labor shortages as the current workforce enters retirement. Many current water operators were hired over thirty years ago during implementation of the Clean Water Act. Since this initial rash of hires, the workforce has experienced little turnover with many employers using succession planning to fill any vacancies.²⁰³ Green infrastructure solutions also create jobs for landscapers, urban farmers, and maintenance technicians.²⁰⁴ Thus, as with the other sectors profiled in this report, "green" water jobs are traditional jobs.

The need for improved management of our water resources creates economic opportunities for communities and workers. Milwaukee, Wisconsin, is one city seeking to use water for economic advantage. The city has identified regional assets including over 130 water technology companies, and post-secondary water programs at University of Wisconsin campuses in Milwaukee and Whitewater, Marquette Law School and the Great Lakes Water Institute, as well as programs at Milwaukee Area Technical College and Gateway Technical College.²⁰⁵ Wisconsin also has vast freshwater assets, with more than 15,000 lakes, 13,500 miles of navigable streams/rivers, and borders two Great Lakes.

Despite its location on Lake Michigan, Milwaukee shares the freshwater challenges of many major urban areas:²⁰⁶

- Aging, costly, gray-water infrastructure;
- Five percent of the sewerage district uses a combined system at risk of sewage overflows;
- Overburdened wastewater treatment systems;

Water is a critical, irreplaceable resource indispensable to energy, agriculture, health — and human life itself. Nothing is sustainable without water.

- Flooding caused by insufficient stormwater infrastructure and flood plain development; and
- Contaminated ground water.

In 2004, Mayor Tom Barrett established the Milwaukee Office of Environmental Sustainability (OES) to improve the city's environment and livability, including stormwater management challenges. Mayor Barrett has also instituted a number of policies to improve water system efficiencies, including requiring a 15 percent reduction in stormwater runoff from city properties, and designating the city's first green corridor.²⁰⁷

OES embarked on a comprehensive sustainability planning process for the city in 2012. Created in conjunction with municipal agencies, business leaders, and the public, Milwaukee's sustainability plan will provide a roadmap for using and re-using city resources to include water.²⁰⁸ As described during an interview with OES Director Matt Howard, the planning effort will address stormwater management and the incorporation of green infrastructure techniques into municipal projects.²⁰⁹ The Milwaukee Metropolitan Sewerage District (MMSD) will align project development with the city's sustainability plan, establishing specific sustainability targets for infrastructure projects. MMSD's work with OES builds on over ten years and 150 projects of green infrastructure investment.²¹⁰

Global water markets align with the public infrastructure system, divided between drinking water and wastewater. With support from the city, Milwaukee's business and education leaders formed the Milwaukee Water Council in 2009 to identify and develop these markets. The Council's mission is "to align the regional fresh water research community and water-related industries to establish the Milwaukee region as the World Water Hub for water research, economic development, and education."

Members of the Water Council include companies tangentially related to water infrastructure (Kohler), water users (MillerCoors), advanced science/

engineering companies (Advanced Chemical Systems), start-ups (Aquamost), and manufacturers (BadgerMeter). A 2009 study of Water Council businesses revealed 66 percent of respondents with demand for engineers and scientists, and only 19 percent needing production workers such as machinists, steamfitters, and wastewater operators. Notably, the businesses found skilled workers to be the most difficult to both attract and retain.²¹¹ The Council's capacity to generate associate- and journey-level jobs matches that of many "green" investments: not creating immediate employment opportunities, but rather providing a long-range economic development strategy. According to Dean Amhaus, Executive Director, the Water Council is "not interested in the rhetoric around job creation numbers, but rather focused on the quality of jobs and economic growth for existing businesses."²¹² An economic development organization, the Water Council seeks to facilitate knowledge transfer from the region's education and research institutions to develop companies, products and entrepreneurs.

Public and private efforts to develop a Milwaukee water sector have led to several training programs for workers. At best, these efforts are loosely connected. Through its Training/Education Committee, the Water Council is working with a network of over sixty organizations to align and leverage these local training resources. Public, private, nonprofit, and educational organizations meet on a quarterly basis to define the sector's workforce needs and connect workers at all levels to existing opportunities. The Committee currently has one articulated, measurable goal: to have 1 percent of all students pursue a career in water by 2013.²¹³ Committee members have yet to establish measurable goals for connecting Milwaukee's marginalized and under-represented populations to the sector.

Although efforts to align the workforce system with opportunities in water are just beginning, the existing programs incorporate many of the policies and practices needed for system reform. They are sector-based, target

under-skilled, low-wage individuals, and use industry partnerships to define workforce needs and verify training relevance.

This study highlights three of these training efforts: **1)** the Milwaukee Area Workforce Investment Board (MAWIB) **Jobs Accelerator Project**, **2)** the Milwaukee Area Technical College (MATC) **Water Technology Career Pathway**, and **3)** Wisconsin's Sector Alliance for the Green Economy (SAGE) **Waste Water Treatment Plant Apprenticeship**.

The Milwaukee Workforce Investment Board (MAWIB) has represented the needs of Milwaukee workers and under-skilled populations on the Water Council since its inception. Through a Workforce Innovation in Regional Economic Development (WIRED) program grant, MAWIB helped the Water Council identify regional water industries and businesses, associated occupations, and relevant workforce skills and training programs. The grant culminated in recommendations for building a water workforce that included curriculum needs and career paths. This work defined Milwaukee's water sector as:²¹⁴

- Focusing on all aspects of the water cycle: extraction, treatment, delivery, use, treatment and return to source;
- Consisting of 15 industries in five clusters: public-sector water utilities, water utility facility construction, plumbing, water utility consulting, and waste/landfill;
- Including 71 occupations that require a high level of water knowledge; and
- Needing "Water 101" early in technical education programs, certificate programs that build to higher credentials, and experiential learning programs.

The Water Council's Talent/Education Committee has continued this work, coordinating an industry-led Career Advisory Work Team to provide guidance on pathways to jobs in the water sector.²¹⁵ These businesses have identified manufacturing and food/beverage processing as additional sources of water-related jobs. Council businesses indicated that many water sector jobs require some post-secondary training, including math, computer, science (chemistry mechanics), lab, and electronics skills. And they favored candidates with two-year degrees and industry-recognized or apprenticeship certificates over the common practice of hiring engineers for technician positions.

In 2011, the collaboration between MAWIB and the Water Council led to a federal Jobs and Innovation Challenge Grant for Milwaukee, supported by the Economic Development Administration (EDA), Small Business Administration (SBA), and the U.S. Department of Labor Employment and Training Administration (DOL). Labor market data at the time of the grant application indicated fifteen occupations in manufacturing, water control and engineering with the

greatest number of openings. These occupations had 2010 hourly wages averaging from a low of \$11.91 (production workers) to a high of \$27.60 (mechanical engineering technicians). Notably, the analysis included only one water-specific occupation — Water and Liquid Waste Treatment Plant and System Operator — with an average hourly wage of \$21.54.²¹⁶ In Wisconsin, wastewater operators are union positions with career ladders, job security and family-sustaining wages. The occupation also requires certification through the Wisconsin Department of Natural Resources.²¹⁷

The DOL portion of the Jobs and Innovation Challenge Grant (\$1 million) is intended to support job growth at this nexus of manufacturing, engineering, water, and energy, and to provide opportunity for Milwaukee area workers. This **Jobs Accelerator Project** includes all three members of the area's Regional Workforce Alliance: MAWIB, the Southeast Wisconsin Workforce Development Board, and the Waukesha-Ozaukee-Washington (WOW) Workforce Development Board. These WIBs (or WDBs, as they are known in Wisconsin) will develop career pathways in water technician/engineering and water advanced manufacturing. Specific workforce goals are: **1**) to develop employees with technical skills to enhance earning potential and employer productivity, and **2**) to connect low-income, at-risk populations to the water cluster.

Partnerships with the Water Council (EDA Grant) and the Milwaukee Small Business Development Center (SBA Grant) are at the heart of the project, with a stated goal of coordinating workforce and economic development activities. Other project partners include regional technical colleges, university engineering programs, the Wisconsin Regional Training Partnership, the Center for Veteran's Issues, and the Milwaukee Water Council Talent Committee.

The Regional Workforce Alliance plans to meet its goals by targeting different worker populations.²¹⁸ MAWIB will focus on low-income, at-risk, and under-represented groups: older youth graduating from STEM programs,

dislocated workers, and veterans. The Southeast and WOW boards will work with incumbent workers in Water Council companies. The alliance has four years to train 160 individuals.²¹⁹ Funding is divided equally among the workforce partners.

MAWIB's program will feature occupational training, support services, internships, and sector outreach. In consultation with Water Council businesses, MAWIB has created a Water Skills Certification System mapping career paths and competencies. This pathway begins with an entry-level water technician occupation. In conjunction with the Milwaukee Area Technical College (MATC), MAWIB has proposed a short-term technical diploma for water technicians. This Water Technician Diploma will provide workers with foundational math, chemistry, physics, environmental health and "Water 101" knowledge, as well as lab and electrical skills. Business feedback indicates that these qualifications are in demand across traditional industries: advanced manufacturing, water utilities, construction, and food/beverage processing. In developing the diploma, MAWIB is specifically focusing on skill sets required by advanced manufacturing employers.

MATC will deliver the training through a cohort model and the realignment of existing courses. Participants can complete the diploma in less than a year, taking the courses in any sequence. Successful graduates will earn up to 25 hours of technical college credit.

To enter the program, individuals must meet technical college entry requirements, including satisfactory scores on the Accuplacer Test. At-risk and lower-skilled workers who fail to achieve satisfactory test scores may be placed in a preparatory course designed to improve math and reading scores. With a goal of improving participant outcomes, the project will also offer student support services and dual enrollment in public assistance programs as appropriate. Support services will include mentoring, career counseling and employment services. On a case-by-case basis the program will provide financial assistance with student fees,

books and equipment. MAWIB will work with Water Council businesses to develop internship opportunities for program graduates.

MAWIB is currently seeking industry validation of the course sequence, and certification associated with the water technician training. Articulation agreements with regional universities that lead from associate degrees offered by the technical colleges to bachelor's degrees in engineering or water science are also planned. The Wisconsin Regional Training Partnership — a nationally renowned workforce intermediary with deep ties to industry, community, and labor — and the One Stop job centers will assist with program outreach.

The Milwaukee Area Technical College (MATC) also offers a **Water Technology Career Pathway**, which includes bridge and occupational certificates that ladder into environmental health and water quality associate degrees. The Water Technology career pathway was developed as part of the Regional Industry Skills Education (RISE) partnership between the Wisconsin Technical College System and the Department of Workforce Development, and may at some point provide a model or courses for the Jobs Accelerator training.

The first course in the pathway, Green Technologies, helps students develop the math, reading and communication skills needed for successful completion of a technical degree. Participants are also introduced to the basics of energy efficiency and building systems (heating/cooling, plumbing, and lighting).²²⁰ Students must meet minimum adult basic education (ABE) levels prior to admission. Green Technologies transitions students from this minimum ABE level to the first level of occupational training: Introduction to Environmental Health & Water Quality. Students achieving higher ABE scores can enter the pathway at this occupational course.

Environmental Health and Water Quality is the introductory program course for the associate degree. This three-credit course introduces students to air, water and food quality concepts, as well as the roles

and responsibilities of environmental practitioners.

To earn the first credential along the Water Technology Career Pathway, the RISE Green Technologies Certificate, students must successfully complete the introductory program course and earn their GED Certificate/H.S. Diploma.

The Green Technologies Certificate prepares students for internships with the environmental/custodial services and operations and maintenance departments in a wide variety of firms, and for the academic requirements of the Environmental Health and Water Quality Technology Associate Degree program. Although the pathway is designed to allow students to move back and forth between work and learning, advancing in the labor market as they gain credentials for completed “chunks” of an academic program, completion of the first certificate provides few established industry links.²²¹

MATC identifies custodial positions as entry-level opportunities for certificate holders—opportunities that provide a period of on-the-job training and entry into facility operations and maintenance. Certainly one goal of the region's Jobs Accelerator Grant is to connect workers with basic skills to career paths in local firms, and some of the Milwaukee Water Council businesses expressed demand for employees with “basic water knowledge.” But it remains to be seen if MATC's Green Technologies Certificate will be a significant factor in local hiring.

MATC also identifies “waste water treatment operator” as a targeted occupation for the training. These infrastructure jobs offer greater security and family-sustaining wages, but also require extensive technical water knowledge and professional certification. The Green Technologies Certificate provides only foundational water knowledge and skills. It is unlikely that participants would qualify for these positions without further training. The Milwaukee Metropolitan Sewerage District's Workforce Development and Training Program is one possible step along the pathway to public utility jobs.²²² While not well-connected to the project described here,

MMSD's training program provides access to both apprenticeships (through WRTP) and internships (from regional universities) for non-traditional worker populations.

Alongside these efforts, Wisconsin's Sector Alliance for the Green Economy (SAGE) funded the creation of a **Wastewater Treatment Plant Apprenticeship**. SAGE, created through a \$6M ARRA State Energy Sector Partnership and Training Grant, aims to "green up" jobs in the construction, manufacturing and utility industries, and create opportunities for apprentices and journey workers to learn green skills.²²³ The three-year registered wastewater apprenticeship, administered by the state's Bureau of Apprenticeship Standards, is designed to introduce participants to all of the work processes related to water treatment, along with knowledge of the latest water technologies and sustainability concepts.²²⁴ The program uses a classic hybrid model that interweaves 5,500+ hours of on-the-job training with 432 hours of paid instruction by requiring students to successfully complete learning hours and competencies in order to progress with the on-the-job tasks.

The Wastewater Treatment Plant Apprenticeship seeks to create a statewide pipeline for water utilities facing labor shortages as current workers retire. As in the health care and energy sectors, however, retirement-induced demand has been delayed. Firms are not currently hiring apprentices, resulting in no participants in this program to date.²²⁵ The program is also not formally connected to the efforts of the Water Council, the Milwaukee Jobs Accelerator Grant or the Water Technology Career Pathway. Given that public infrastructure positions offer some of the best opportunities for decent work at family-sustaining wages, efforts to advance Milwaukee's low-skilled populations should build bridges to these apprenticeship opportunities — once there are jobs sufficient to create and sustain them.

The Water Council's commitment of staff resources to convene and coordinate water training/education holds promise for its future as an effective workforce intermediary. Currently the Jobs Accelerator Project, the Water Technology Career Pathway, and the Wastewater Treatment Plant Apprenticeship do not form a seamless career pathway to standardized credentials and technical jobs. The question of demand also remains. Retirements have yet to open up water utility or private-sector jobs. And, the Council has acknowledged that its goal is not jobs, but the creation of an industrial-research hub serving the global water market. Through honest, robust engagement of its member businesses, the Water Council can establish a realistic picture of demand for associate- and journey-level workers. In turn, the reality of Milwaukee's water sector should be used to right-size training investments and programming to serve not only engineers and scientists, but also the city's vulnerable and underemployed worker populations.

The Water Council is "not interested in the rhetoric around job creation numbers, but rather focused on the quality of jobs and economic growth for existing businesses."



LESSONS AND POLICY

CAUTIONARY TALES: SOME LESSONS LEARNED IN THE FIELD

In the cases recorded here and in the stories of many others we talked to, several common storylines emerged:

Workers that are trained for green skills embedded in a broader set of occupational skills are in much better shape than workers trained for a discrete set of green skills only.²²⁶ We raised this warning flag in Greener Pathways. It's depressing to see how frequently it was ignored. Training for what O*NET classifies as New and Emerging Occupations — energy auditors, weatherization installers, solar installers, and the like — was oversupplied relative to weak and unstable demand. With energy auditing in particular, we heard the same story over and over: money flowed into a region for training in a field with few jobs for completers. Training that layers green skills on a foundation of more traditional skills gives workers more and better options in the labor market: the green skills may make them more attractive to employers, but if the market for the application of those skills is shaky they still have the foundational skills to work in a related occupation.

We can't train our way out of a jobs crisis.

Economics trumps training, even in programs imparting broader skill sets. Placements in building trades apprenticeships, for example, have been few and far between. We have long argued that the construction industry, the keystone for building energy efficiency, is an overlooked area with potentially decent jobs and clearly articulated training pathways organized on a classic earn and learn model — registered apprenticeship. Building relationships with community based organizations and improving access to and retention in the building trades for low-skill, low-income workers is a strategy that makes sense. But the beauty of the model is also its limit: it only works when there are jobs. With the exception of apprenticeship programs in the utility industry, which is one of few greening sectors that actually has jobs and is doing fairly sophisticated planning to develop and manage its pipeline of skilled workers, there has been little mobility in apprenticeship pathways. Despite many excellent efforts to build pre-apprenticeship programs and link them

more effectively with joint registered apprenticeships, with so many experienced workers on the bench, JATCs are opening up application slots very selectively.

Labor matters: Unions improve worker advancement and business outcomes. The career advancement potential of green credentialing in some sectors, like health care, is inextricably linked to the nature of union workplaces, where job positions, and career progression from one job to another, are embedded within a broader set of negotiations between labor and management. This is particularly important where “greener” positions are being developed at the lower end of the labor market, both because it clarifies pathways into those jobs, and because it can assign measurable value to worker skill upgrades by documenting improved (i.e. greener) health, productivity, and energy outcomes.

Employers matter: Training programs with robust employer relationships have been able to respond nimbly to shifting labor markets and to place workers in a tough economy. We have said many times that developing career pathways without linking them to related industry partnerships — which provide ongoing relationships with clusters of employers who can predict local demand and provide critical knowledge of a particular sector’s skill needs — risks becoming an empty exercise in educational reform. In a languishing economy with so few job openings, it is more important than ever to engage employers, particularly in the green space. While such partnership-building takes a lot of time and a few resources, isolated attempts to contact individual employers is not enough. In the cases presented in this paper, and others we investigated, programs with strong business councils and mediated sector partnerships were most successful in reading local labor markets and connecting trainees with job opportunities.

Intermediaries Can Bring Order to the Chaos of the Current System. Our current workforce development systems are chaotic and confusing. Not only to workers who are trying to seek their way up to good skills and

decent jobs, but also to employers seeking to navigate public resources for training and modernization. One reason labor unions and employers are so important to making projects work, is that they can serve a central organizing role in projects. Too many projects work with one or two employers. But both scale and meaningful training are more efficiently generated by bringing employers and unions together to identify their shared needs and build programs of training to answer those needs. Intermediaries — call them what you will, “industry partnerships,” “sector strategies,” or “workforce intermediaries” — help organize the employers and bring attention, and solutions, to industry issues. Workforce Investment Boards, community colleges, and other regional institutions can act as conveners as well, but without a dedicated intermediary to organize the demand side, training projects are in danger of building bridges to nowhere.

There is tremendous disillusionment within the workforce system — and some communities — about the promise of green jobs. As we argue elsewhere in this report, the failure of “green jobs” is not a failure of “green” per se, but a consequence of myopic energy policy and economic disaster. Other reports in this series warned that the massive potential for job creation in a clean energy economy depended on significant industry expansion driven by specific federal policy and market signals, and argued for more focus on better skill delivery systems in general rather than more green training in particular. Hype, unfortunately, bested reason. And it is not entirely unreasonable for workers who trained for green jobs that never materialized to see in the experience yet another example of the U.S. education and training system, however well-intentioned, failing the poor and the working class. It is critical that we both **a)** improve systems serving students and workers at all skill levels, and **b)** decouple the jobs promise of the green economy (and its requisite political and material investment) from the limited employment outcomes of its recent trajectory.

THE GREENER SKILLS AGENDA (TOWARDS A NEW SOCIAL CONTRACT)

In an ideal future all jobs would be green or greener, and in the current economy (as demonstrated above), there are few truly novel “green jobs” — just many greener ones.²²⁷ Our call for more and better training derives less from the need to teach new green skills (though there are some) than from an ongoing and increasingly urgent need to lift our economy onto the high road.

We believe that publically supported career-tech training systems should invest in clear, seamless, affordable career pathways to in-demand and materially rewarding occupations, with portable credentials for credibly tested competencies, ideally including credit for their academic content from colleges and universities. The rationale for each element in this recommendation is the same, the promise most democratic governments make their people: to maximize equal opportunity for individual advancement without wasting public money doing so. That promise is violated by a training system that has initial barriers or steps to advancement that are not understandable, navigable, and affordable to ordinary citizens; prepares participants for unrewarded work; claims graduate competencies not credible to employers; does not increase those graduates’ labor market mobility; or fails to recognize the academic content of vocational skills, creating unnecessary drag on future learning and advancement.

In the stuttering progression toward a cleaner U.S. economy — one that eschews waste or destruction of human and natural capital, in and beyond the energy sector — we need not wait to develop a more functional skill delivery system. It may not create jobs, but it is clearly a prerequisite for equity and competitiveness. It may be, in a word, essential to resilience, broadly construed. We just need to ensure that all such efforts (prosaically lumped under the stultifying title of “workforce development”) focus on realizing the actual promise of equal opportunity and family-supporting employment, which presupposes not just massive political and financial investment in building a greener economy, but an equally robust investment in rationalizing the training systems that undergird it.



As we have argued elsewhere, such an investment would underwrite a coherent, integrated, national skills agenda, that entails:²²⁸

- 1 **Mapping regional labor markets** by skills, jobs, and careers, and providing the public with a clear way of seeing the skills needed for different jobs and career pathways.
- 2 **Modularizing training** by splitting it into manageable “chunks,” with each module delivering a certain set of competencies marked by a credential and organized into clusters related to particular careers, with advancement possible through a series of incremental steps.
- 3 **Making training demand-driven** (that is, responsive and connected to real labor market demand), with training design and supply informed by high quality and continuously revised information on labor market conditions.
- 4 **Making training student- and worker-driven** (that is, responsive and connected to student/worker realities), by offering training in any way needed to increase access and completion (e.g., online, at night, on weekends, at distance, in field settings as well as classrooms).
- 5 **Focusing on skills, and certifying their attainment** through fair, rigorous, and impartial assessment that is indifferent to the source or means of skill acquisition (i.e., if someone with no formal training can pass the test, certify the skill, and more power to them).
- 6 **Aligning certified skills with employer demand and industry best practices**, brokering broadly recognized skill standards which can be tied, at least implicitly, to compensation.
- 7 **Ensuring access and success for students regardless of income.** Students need to be able to rely on good financial aid, need-based scholarships, grants, or loans. And we all need to know federal financial aid resources are supporting good training at reasonable costs.
- 8 **Supporting low-income students and workers**, increasing their chances of success through academic and career counseling, peer support networks, and critical social services like child care, bus passes, and assistance with books and tools.

Such a system — many elements of which were employed or, unfortunately, ignored, in the previous examples — would give workers knowledge of the skills they need to succeed, income-indifferent access to them, and some assurance of payoff. This would make labor market mobility much more clearly a function of ability and effort, not race or class or gender —hardly an equal opportunity paradise, but a lot closer to one than what we have at present.



AND A POLICY FRAMEWORK TO ADVANCE IT

As we noted at the outset of the chapter, getting training and workforce development to work better in this nation is neither rocket science nor particularly green. There are three foundational elements that are critical to making the system work. The first is infrastructure to help organize the demand (employer) side of regional labor markets: sector strategies, industry partnerships, and labor market intermediaries are the necessary demand-side building blocks. Second, we need to encourage innovation in education and training systems in order to create a 21st-century skill delivery system that secures access to meaningful skills for students of all ages. Key innovations on the supply side of the labor market include the creation of career pathways and bridges (these often include earn and learn programs), and the stackable, industry-recognized credentials that benchmark progress in steps toward college degrees. Finally, to build a more robust and effective workforce development system, outcomes and labor standards at the bottom of the labor market must be improved. Securing greater equity requires greater investment in social supports (from career counseling to child care) and the strengthening and enhancement of the floor under wages.

To those in the field of workforce development, this recipe for success is familiar though worth summarizing. For those outside the day-to-day operations of the existing (often confounding system), the above-mentioned elements of success may read (quite reasonably) more as a list of buzzwords than an actual description of useful and necessary change. In order to help develop more common understanding, we quickly cover the basics of good training and workforce systems. Our brevity here does not do justice to the long labors of those who have toiled in policy, research, and program in the field (though our endnotes contain ample references to works that do).²²⁹ If the ideas sound new, it is worth noting that a system of organizing on the supply and demand sides of the labor market and ensuring labor standards has deep roots. It is, in fact, the structure of the nation's unionized apprenticeship system, now 100 years old. Unfortunately, the decline of unions and increased volatility of work have made the system less accessible even as workers need it more. It remains however, a critical model for delivering skills and decent work.

To build the case for these reforms, it is worth reiterating that the nation's workforce development system is both systematically fractured and seriously under-funded. Federal policy debates focused on the deficit do not bode well for any serious federal realignment of funding in the near future. Even so, there is much that can be done at the regional level (and here we use "regional" to mean roughly metropolitan areas or the area of the labor market's meaningful reach) especially if focusing on enhancing the role of the private sector — employers and unions where worksites are represented — in helping overcome the system's fractures and lack of information and resources. Further, a focus on reform and innovation of any region's key training infrastructure linked directly to work (likely the local community college) also provides leverage over resources more significant than the relatively smaller federal funding for workforce. And while real investments in health insurance and child care are critical for the success of this project (and nearly impossible to be managed regionally), there are student supports and labor standards enhancement that can be implemented and managed at the regional level. For these reasons, we offer an agenda for workforce skills and training reform at the regional level with the following elements:

1 THE DEMAND SIDE

Stronger organization of, input from, and commitment to training by employers and unions

2 THE SUPPLY SIDE

21st century skills for workers of all ages, and supports to make their attainment possible

3 STRONGER LABOR STANDARDS

Workforce development focused on quality jobs

4 TOGETHER INTO THE GREEN

Moving toward institutional alignment

We are advocating for a system that is more responsive to employer needs, and more sensitive to the pressures weighing down on students, especially adult students. But these reforms are meaningful only when focused on opportunity at a region's best employers, not simply any employer.

THE DEMAND SIDE: STRONGER ORGANIZATION OF, INPUT FROM, AND COMMITMENT TO TRAINING BY EMPLOYERS AND UNIONS

At a regional level, the private sector voice of employers and unions remains stifled in the discussion of workforce skills and training. Bringing private sector voices together at the regional level and working to identify common skill problems and shared solutions to them is at the core of what are often called “sector strategies” or “industry partnership” work in workforce development. Organization of employers and unions in key industry sectors focused on solving shared problems of the participating leaders is one way to ensure a tighter connection from workforce development systems to actual jobs in the labor market.

The most essential reason for the importance of this work is obvious: the process must start with real jobs. (And the lack of real jobs has stymied a number of training programs, green and not.) Putting jobs at the center of the process (and not just entry-level jobs, but jobs at all levels) refines and reforms the way that training is designed and implemented. As the case studies make clear (and as research in non-green sectors confirms), the most significant results can only be secured when the private sector is organized, engaged, and ready to hire the workers that are getting trained.

Industry partnerships, sector strategies, and workforce intermediaries all get at this core issue. While some may make distinctions about what each of these are, if the core issues are organizing employer demand for labor and identifying shared industry needs in a systematic and regional way, then the results will be there regardless of the name. Unions are especially adept at helping identify the shared workforce needs of employers in a region, not only because their members actually do the work and so can help identify required skills, but also because unions often represent multiple employers in a region and have, therefore, a better understanding of joint concerns across worksites.

THE SUPPLY SIDE: 21ST CENTURY SKILLS FOR WORKERS OF ALL AGES, AND SUPPORTS TO MAKE THEIR ATTAINMENT POSSIBLE

Community colleges provide our nation's most relevant and accessible post-secondary training system. The labor market pay-off of time at community colleges tends to come not with just a course or two, but when a student completes a short-term certificate of at least one year or other credentials up to and including the associate degree.²³⁰ The important words to note here are “credentials” and “degrees.” As much as we support the shift from credit-hours to competencies, time in college does not yet pay off in a linear way. The labor market rewards to education typically follow diplomas and degrees. Unfortunately, many students, especially working adults facing myriad financial and family pressures, simply give up on education before they get sufficient credits.

Given this reality, “career pathways” and “bridges” are two essential innovations of post-secondary education that seek to help workers achieve meaningful milestones in their education. Career pathways create a more integrated flow between work and training, allowing workers/students a stronger sense of labor market opportunities for specific modules or “chunks” of training. Working adults and students can see how a series of training relates to a specific set of jobs, and how they might move from their current employment and education level to another one within a specific industry. At their best, career pathways tie students more closely to real labor market opportunity and help workers make the transition to training more easily.

Career pathways make training more accessible for working students by identifying specific “chunks” of training that can provide credentials. Workers then can

move through a series which add up to a two-year degree. This approach, sometimes under the name “stackable certificates,” provides stepping off points, when workers need to get back to earning, and a sense of progress toward the degree, which can inspire further investment in it.

“Bridge” programs extend this ladder of opportunity further, by integrating basic education (a term referring to any education at the secondary or high-school (HS) level) with occupational education (post-secondary level training relevant to specific occupations). Bridge programs help students with less than HS competence in reading and math get training that gets them to the college competence, while providing work skills that will help them connect to better jobs. Too many students with basic skills needs simply give up on education when they see the remediation they will have to complete before getting to the course of study they are interested in. (These innovations are important for many working adults, not just those who did not complete HS. Many with HS degrees, including those who are long out of high school, cannot pass basic math or reading tests to qualify directly for post-secondary education.) Bridge programs help make the remedial training more relevant and the pathway to a credential with real labor market pay-off more navigable.

Finally, career pathways and bridges provide integrated student supports — from career and college advising to child care and transportation problem solving — that help students make progress both on the job and in the classroom. These supports are critical especially for low-wage workers balancing family, work, and school.

STRONGER LABOR STANDARDS: WORKFORCE DEVELOPMENT FOCUSED ON QUALITY JOBS

We are advocating for a system that is more responsive to employer needs, and more sensitive to the pressures weighing down on students, especially adult students. But these reforms are meaningful only when focused on opportunity at a region's best employers, not simply any employer. Within a region, then, the question of labor standards and job quality are key issues. To be clear about this, investment in training is lost when workers leave their jobs. This is a problem in the private sector, of course, but when public resources are used to support the training, turnover is a matter of public policy and interest as well. Public dollars should not be deployed to support training for the employers who are most likely to turn over workers in their entry-level jobs. Unfortunately, these employers are the very ones who are most likely to call on the public system for support, training, and new employees. At a regional level, systems must consistently seek out their better employers and resist the impulse to simply answer the phone and provide training to those who call the most. This is a first step in building a stronger approach to equity and labor standards within workforce development.

Policies that incent labor standards and training quality standards support this move, as do the use of apprenticeship utilization requirements and community access agreements for work. And, obviously, pursuit of organization and innovation on both the demand and supply side of the labor market provides the employer connections and the leverage on quality and skills development to undergird a focus on equity as well.

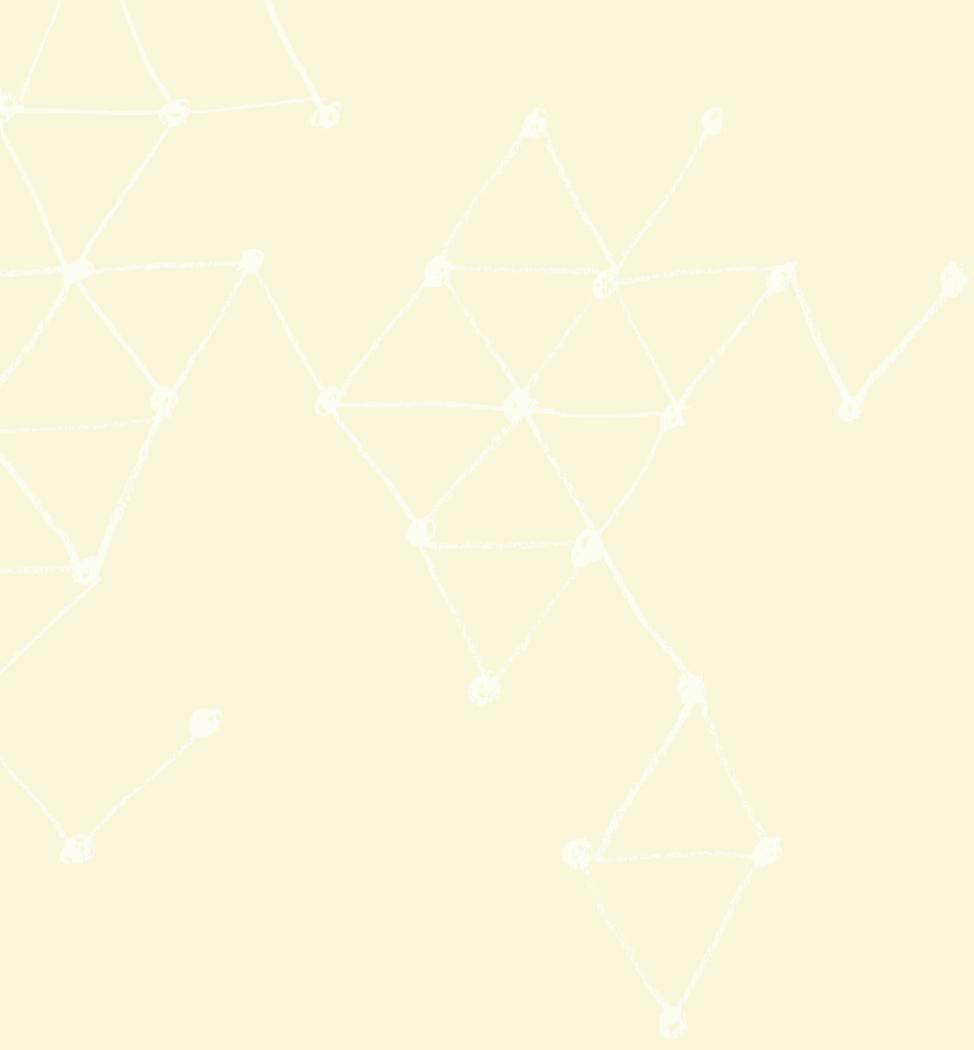
At the broadest level, however, some of this is inevitably the role of state or, most usually, federal policy. Raising, indexing, and enforcing the minimum wage — perhaps the most direct lever over the quality of low-wage work — is the subject of state or federal policy. Only the federal government can pursue changes in labor relations policies that rebalance and enhance the power of workers as they seek to organize unions and negotiate effective contracts. Only the federal government can finance and design policy to secure decent health insurance for our lowest-paid workers.

TOGETHER INTO THE GREEN: MOVING TOWARD INSTITUTIONAL ALIGNMENT

We have seen promising support for some of these approaches in the Obama Administration. In the universe of education and training this includes a wide range of innovative programming, including, for example: The Green Jobs Innovation Fund and the Workforce Innovation Fund at the Department of Labor; the Trade Adjustment Assistance Community College and Career Training initiative administered by the Department of Labor in coordination with the Department of Education; the joint letter of commitment to career pathways, sent to state agencies from the Secretaries of Education, Health and Human Services, and Labor; the Department of Education's engagement with green technical and vocational education and training (TVET) internationally; the Department of Energy's work to develop an open-source online training platform.²³¹ But the slow and halting efforts to at once modernize and align federal efforts across agencies have been consistently undermined by existential threats to core programs: the Workforce Investment Act, Pell Grants, SNAP Employment and Training, and a long list of others have in recent years come under withering Congressional assault. Fortunately, a number of promising outside efforts, with levers large and small, have emerged from philanthropic and other sectors to promote institutional and state policy change. The Aspen Institute's Prize for Community College Excellence, the SEED Center's Green Genome Project, and the Joyce Foundation's Shifting Gears Initiative come to mind, as do the many local projects of the National Fund for Workforce Solutions and the Partnership for Working Families, together with policy and advocacy initiatives from the National Skills Coalition, the Working Poor Families Project, and the AFL-CIO Working For America Institute.²³² What emerges from this dedicated labor at all levels is a vision of good workforce development practice, fundamentally underfunded and frustratingly difficult to implement without significant policy change. It's a heavy lift, though possible.

Like most things in workforce policy, the way forward requires not revolution, but persistence and vision and leadership. While the good sense of the skill agenda outlined above seems self-evident (or we certainly hope it does), its advocates face a staggering variety of often inflexible federal and local systems, institutions, and funding streams; a highly politicized atmosphere for education, training, and any sort of green public investment; and the theoretically allied but often competing interests of employers, workers, training providers — and the policymakers who fund and regulate related systems.

Like most things in workforce policy, the way forward requires not revolution, but persistence and vision and leadership.



Every day, in a blessed unrest, millions of people are moving to bend their practices toward greater sustainability and a more cooperative relation to each other and with nature.

THE TASK BEFORE US

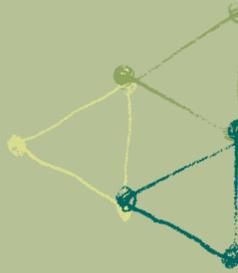
Whatever their own structure and rules, human capital systems always interact with a broader economic and social context. We've indicated some of the context in the preceding report. Along with climate change and growing resource scarcities, in the U.S. this includes widespread denial of these problems or resistance to doing much about them; a political system deeply corrupted by organized money; and little countervailing power from an informed and organized democratic public.

This context is often threatening to even the most admirable and accomplished efforts described in the preceding pages. At best, it tends to keep them small or marginal. At worst, it simply overwhelms them, washing them away without a trace.

Things are not a great deal better internationally. The world has made little concerted progress on sustainability since the first Rio summit. Globally, we see deep-seated cross-national tensions of all kinds and as much devolution as progress in the development of international regulatory institutions. In many areas, certainly including the environment, there is little leadership in the production of global public goods.

Of course, such context is not immutable. It can be changed by policy and politics. But even thinking about that sometimes seems a fool's errand. There are so many things that need to be done, and so much justified doubt that many of them will be done, that the task may seem pointless — either the detailed writing of programs with no chance of enactment, or the statement of first principles, but with a monitor turned firmly away from earth.

Our own view is, we hope not stupidly, somewhat more optimistic. We think of this as about the best as well as worst of times, and that humanity still has the power to choose a decent future for itself. Whether it will or not is the famous \$64K question. But it's not as if those wanting a choice for sustainability and resilience don't have anything to work with. We, meaning humanity, are richer than ever before, with cross national inequality substantially receding, even as within-country inequality has increased. We're also more educated than ever before, with better science and engineering than we've ever had, and almost infinitely more connected to and aware of each other's existence. And we're collectively probably more alert to the fact that greater cooperation among humanity is needed for our survival than at any time in our long history. In dealing with threats like climate or zoonose pandemics, or opportunities like broadly shared



VALUE NATURE

LEAD WITH
EQUALITY
AND RESPECT

BUILD DEMOCRACY,
DON'T ASSUME IT

Several billion years of design experience is not something to discard lightly.

prosperity via sustainable development, interdependence means we cannot escape each other even if we want to. We need to act together. Nor is this last insight privileged to elites, or incapable of moving people to action. Every day, in a blessed unrest, millions of people are moving to bend their practices toward greater sustainability and a more cooperative relation to each other and with nature. And most of humanity is on its way to cities, where such cooperation, and gains from it, is both an imperative and visible. So we have a natural platform for scaling the work that needs to be done, rooted in the everyday life of most people.

What seems most essential, in policy and politics, especially but not only in the U.S., to improving the possibilities for this work? Here are three things that strike us as key.

The elements in this trio are not abstract first principles; they derive from fact. But equally, while each has clear policy implications, they do not comprise a blueprint for positive action.* Think of them as elements of program architecture: legs on the stool or platform on which such policy and politics is possible. Each of these elements strains against our present context and if fully built would break it. But work on each and all can also, to some degree, begin anywhere and immediately. Most important, contemplating that work, is to see their joint necessity and connection.

Value nature. We are not nature worshippers. We don't think of nature as kindly, or innocent, or even primordial. So long as humans have been around, we've worked and shaped it, taming its independent forces to our ends. In some measure, we will and should continue to do so. This said, several billion years of design experience is not something to discard lightly, and it's clearly idiotic that we're pushing well beyond the limits of the physical system that enabled human life on this planet. If we care about human life and would like to continue it, we might want to learn a bit more from nature about how we organize our own productive activities, and respect those limits. And if we continue to organize our economic affairs largely through competitive markets of different kinds, one way to begin to stop that is by putting some price on what nature gives us, and on what we're doing to it by way of destruction or restoration. That means assigning, through regulation and markets, limits and costs to such things as carbon dioxide and other GHG emissions and minimal requirements and rewards for our natural capital's more efficient and restorative use. We stress that actual regulation, public power and decision, are needed here as well as markets. Markets of course can and should be used for the allocative efficiency they're pretty good at. But no market "invisible hand" should be relied upon to

* For readers wanting one, we recommend the 2012 report of the UN Secretary-General's High-Level Panel on Global Sustainability, *Resilient People Resilient Planet: A Future Worth Choosing* (available at www.un.org/gsp/report/).

magically guide self-interest toward the preservation of the global natural commons, much less the restoration of those parts of use to us. For that we need the heavy hand of public authority to set market limits, or take some things of public concern away from them entirely.

Lead with equity and respect. In the end, as we all know, all people are about the same. We all want at least some respect, and we all want a chance to do something with our lives. Large numbers of people, within this country and across the world, commonly don't get either. That's not a good thing. It may well be a possible thing, especially in the near term. The same science and engineering that give tools for sustainability give unprecedented means of surveillance and repression. Anxious private and public elites may manage to extract enough resources from the general population to keep a good portion of it in misery. But it's certainly not a good thing, and in the end is likely to frustrate any environmental aspirations. The reason is that the willing cooperation of many people, and nations, will be needed to achieve anything like resolution of our environmental problems. That cooperation will not be forthcoming if you don't treat people with respect. Temporizing admitted, there are only two endgames of threatened environmental disaster. It arrives. Or it's turned back, via greater mutual respect among the members of humanity. And respect means opportunity, which requires greater equity.

Build democracy, don't assume it. If the world is really threatened by anything now, it's not hordes of poor people overrunning elites, but a few elites destroying what's left of real democracy. With Freedom House and others, we observe the fall of dictators and the spread of formal democratic institutions. But we also see the effective hollowing out of democratic sovereignty, as nation states are gradually converted to collection agents for banks, and a decline in the forms of popular organization that once gave "the people" some real bite in the economy and politics. Such organization is urgently needed now. Yes for reasons of equity, but also for competence and

There are only two endgames of threatened environmental disaster. It arrives. Or it's turned back, via greater mutual respect among the members of humanity.

capacity, for the sake of a productive, not just redistributive, democracy. Without the organization of masses of actual people, in the economy, with a stake in the sustainability of its practices and the local intelligence and monitoring capacity to sweat the details and make those practices work, they simply won't. We know this from countless failed efforts at top-down planning or command and control regulation by government, but even more from efforts to change private institutions or public bureaucracies without the involvement of people in them. But such productive organization of people in the economy will not arrive naturally from the present organization. The big labor/big corporation/big government deals of the postwar Keynesian synthesis are largely behind us now. Firm boundaries are more permeable and elastic; variation in linkages among firms and the relevance of workforce heterogeneity are both greater. So it needs to be aimed at, deliberately supported as a matter of politics, to be achieved. The U.S. case is a limiting one, since employees don't even have the rights of association such support premises, which suggest a natural starting point for reform. But it should just be one of a series of starting points (key others are in the content of education and rules of political competition), because the real end is an informed and contributing democratic public, capable of deliberative action in both the economy and society.

In the transition to a truly resilient and sustainable economy and society, such valuing of nature, showing respect and widening opportunity, and building a productive democracy all go together. You won't get the first, or be able to manage it, without the second, and won't get the second without the third. Sustainability, equity, and democracy can't be easily separated.

For providers of education and training, taking all three seriously has implications for practice. There are of course the new occupations in the more productive or restorative use of our natural capital to prepare for. But there are also the many and myriad ways that compensation could be better tied to skill, and skill made more accessible to all. There are the many uses to which employee organizations in the economy can make the delivery of skill more efficient and credible with employers, in a positive upward reinforcing cycle of human capital demand, rewarded acquisition, productivity improvement, higher demand, etc. There is also need to revisit and revise the "civics" education now largely abandoned in our schools, considering, for children and adults, the basic public purpose of our education system. This is not to produce drones, or stratify inequality, or first distinguish, then narrow, then render vapid, the teaching of practical as well as cognitive capabilities needed by all, but to produce the cosmopolitan survivalists and productive citizens essential to the flourishing and progress, and perhaps survival, of our neighborhoods, nations, and world.

There is work for others too.

If the world is really threatened by anything now, it's not hordes of poor people overrunning elites, but a few elites destroying what's left of real democracy.

1 *Agenda, Rio+20 Social Pillar Stakeholder Consultations*, (U.S. Department of State, Washington D.C. September 20, 2011).

2 This title began as an internal joke about acronyms. Reality stood for: “Resilience, Equity, Advancement, and Labor in Industry Transformation, with a focus on Youth/Youmen. And though we do consider each of those components, it became clear that the title was, on its face, apt. Greener Reality is the place where we stand now, after the fading of the green jobs romance, still faced with existential challenges of illiberalism, economic despair, and climate change.

3 At a recent climate change and labor in the green economy meeting in Toronto, international observers had already categorized the last five years in the U.S. as a largely academic thought-experiment: the “utopian trope” of green jobs in the U.S.

4 The promise itself was also of course problematic, as earnest environmental advocates and their allies in and outside of political office made wildly optimistic economic projections that confused the potential of green job creation with its actuality.

5 H.R. 5853 — The Energy and Water Development Appropriations Act, June 6, 2012. For text of the original Fiscal Year 2013 Energy and Water Appropriations Bill a list of House adopted amendments, see <http://appropriations.house.gov/news/documentsingle.aspx?DocumentID=298625>

6 One recent example being Sen. Inhofe’s (R-OK) attempt to rescind the EPA Mercury and Air Toxics Standards for power plants, S.J. Res. 37, *Joint Resolution Disapproving a Rule Promulgated by the Administrator of the Environmental Protection Agency Relating to Emission Standards for Certain Steam-Generating Units*, (February 16, 2012).

7 Among other allegations, a September 2011 staff report, released by House Oversight and Government Reform Committee Chairman Darrell Issa (R-Calif.) at his 9/22/11 hearing on “How Obama’s Green Energy Agenda is Killing Jobs,” argued that “The metric of a ‘green job’ is nothing more than a propaganda tool.” Andrew Restuccia, “Issa’s Committee: Obama’s ‘green jobs’ push is ‘propaganda,’” *E2 Wire - The Hill’s Energy and Environment Blog* (September 21, 2011), <http://thehill.com/blogs/e2-wire/e2-wire/183059-issas-committee-obamas-green-jobs-push-is-propaganda>

8 A recent Collaborative Economics report examines the seven green economy sectors that aim most specifically at reducing California’s GHG emissions. Ranging from energy storage and energy efficiency to advanced materials and clean transportation, these industries have for nearly two decades bested overall growth rates in the state’s economy, and proved remarkably resilient through the worst of the recession in 2009-2010. Collaborative Economics and Environmental Defense Fund, *Seven Growth Sectors Driving California’s Clean and Efficient Economy* (May 2012). Similarly, in a 2011 report the Brookings Institution found that nationally the clean economy (more broadly defined) outperformed other sectors during the recession, though some of the highest-growth sectors, like wind and solar, were adding jobs rapidly to a very small base. Mark Muro, Jonathan Rothwell, and Devashree Saha, *Sizing the Clean Economy: A National and Regional Green Jobs Assessment* (Brookings, 2011).

9 U.S. Bureau of Labor Statistics, “Table A-12: Unemployed persons by duration of unemployment,” no. (June 1, 2012), <http://data.bls.gov/cgi-bin/print.pl/news.release/empsit.t12.htm>

10 On policy changes and state impact of Emergency Unemployment Compensation and Extend Benefits, see National Employment Law Project, *Phase-Out of Federal Unemployment Insurance* (2012).

11 On the individual and social costs of long-term unemployment, its demographic profile, and the way in which actual scope of long-term joblessness is not reflected in standard BLS unemployment rates, see John Schmitt and Janelle Jones, *Long-term Hardship in the Labor Market* (Center for Economic and Policy Research, 2012).

12 National Employment Law Project, *Slower Wage Growth, Declining Real Wages Undermine Recovery* (2012): 2-3. See also *The Good Jobs Deficit: A Closer Look at Recent Job Loss and Job Growth Trends Using Occupational Data* (July 2012).

13 Of the voluminous literature on low-wage labor market mobility, two particularly useful recent summaries are John Schmitt, *Low-wage Lessons* (Center for Economic and Policy Research, 2012), and Rebecca Thiess, *The Future of Work: Trends and challenges for low-wage workers* (Economic Policy Institute, 2012).

14 We define poverty-wage jobs as those jobs paying a wage insufficient to lift even a full-time, year-round worker to the poverty line for a family of four with two children. In 2010 dollars, the “poverty wage” was \$10.73 an hour or less.

15 The share of U.S. working families that are low income — struggling to meet basic needs — increased from 28 to 31 percent between 2007 and 2010. Brandon Roberts, Deborah Povich, and Mark Mather, *Overlooked and Underpaid: Number of Low-Income Working Families Increases to 10.2 Million* (The Working Poor Families Project, Winter 2011-2012).

16 According to 2010 Census Bureau federal guidelines, a family of four was officially living in poverty if its annual income was less than \$22,113. Using the 200 percent gauge, that family is considered low-income if its earnings were less than \$44,226.

17 Roberts, Povich, and Mather, *Overlooked and Underpaid*.

18 See, e.g., Congressional Budget Office, *Trends in the Distribution of Household Income Between 1979 and 2007* (2011). and Emmanuel Saez, *Striking it Richer: The Evolution of Top Incomes in the United States (Updated with 2009 and 2010 estimates)* (University of California, Department of Economics, March 2, 2012). Interactive date available here: <http://g-mond.parisschoolofeconomics.eu/topincomes/#Graphic>. For related infographics, see Dave Gilson and Carolyn Perot, “It’s the Inequality, Stupid,” *Mother Jones* (March/April 2011).

19 Saez, *Striking it Richer*.

20 Wage stagnation relative to productivity has been ably documented by Lawrence Mishel and Heidi Shierholz, *The Sad but True Story of Wages in America* (Economic Policy Institute, 2011). , which shows that the modest gap between public and private sector compensation pales compared to relative wage stagnation for both. The stark disconnect is further elaborated in Lawrence Mishel, *The Wedges Between Productivity and Median Compensation Growth* (Economic Policy Institute, 2012). On the end of shared prosperity, see Anthony B. Atkinson, Thomas Piketty, and Emmanuel Saez, “Top Incomes in the Long Run of History,” *Journal of Economic Literature* 49, no. 1 (2011): 3-71.

21 For a cogent, punchy, plain-English summary with links to critical scientific reports, see Joe Romm, “An Illustrated Guide to the Science of Global Warming Impacts: How We Know Inaction is the Gravest Threat Humanity Faces,” Blog, *Climate Progress* (2011), <http://thinkprogress.org/romm/2011/09/28/330109/science-of-global-warming-impacts/>. For scholarly analyses of consequences of a world irreparably warmed, see the Royal Society’s special issue *Four degrees and beyond: the potential for a global temperature increase of four degrees and its implications*, <http://rsta.royalsocietypublishing.org/content/369/1934.toc>

22 See, e.g., Rachel Morello-Frosch et al., *The Climate Gap: Inequalities in How Climate Change Hurts Americans & How to Close the Gap* (USC Program for Environmental and Regional Equity, 2009).

23 The term, coined by Joe Romm at *Climate Progress*, is explained in “USGS on Dust-Bowlification: Drier conditions projected to accelerate dust storms in the U.S. Southwest,” *Climate Progress* (2011), <http://thinkprogress.org/climate/2011/04/07/207853/usgs-dust-bowl-storms-southwest/> and “My Nature Piece on Dust-Bowlification and the Grave Threat It Poses to Food Security,” *Climate Progress* (2012), <http://thinkprogress.org/climate/2012/05/24/478771/my-nature-piece-dust-bowlification-grave-threat-it-poses-to-food-security/>

24 On methane as a greenhouse gas, see: <http://www.epa.gov/methane/>

25 Johan Rockstrom et al., “A Safe Operating Space for Humanity,” *Nature* 461 (23 September 2009). 350 ppm is part of Rockstrom’s delineation of nine planetary boundaries. See also: A.P. Sokolov et al., “Probabilistic Forecast for Twenty-First-Century Climate Based on Uncertainties in Emissions (Without Policy) and Climate Parameters,” *Journal of Climate* 22, no. 19 (2009).

26 John Reilly and Ron Prinn, *2012 Energy and Climate Outlook* (MIT Joint Program on the Science and Policy of Global Change, 2012); Sokolov et al., “Probabilistic Forecast for Twenty-First-Century Climate Based on Uncertainties in Emissions (Without Policy) and Climate Parameters.” To explore MIT’s interactive Greenhouse Gamble wheels and trace their evolving calculations of probability over the past decade, see <http://globalchange.mit.edu/focus-areas/uncertainty/gamble>. In addition to offering a virtual spin, the Joint Program on the Science and Policy of Global Change provides links to underlying research and methodology.

27 Wicked problems are social policy challenges which by their nature (no indisputable, objective, definitive framework) elude scientific solutions — those for which, among other things, there is no testable or given alternative solution, and there is no common stakeholder worldview. The problem was first articulated by Horst Rittel and Melvin Webber in the early 1970s, and since elaborated by a variety of experts in planning and systems theory. More recent analysis suggests that climate change is “super wicked problem,” the superlative merited by looming deadlines and the central role of problem-solvers in creating the problem itself. See, e.g., Richard J. Lazarus, “Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future,” *Environmental Law Reporter* (2010). and Mary D. Nichols, “Comment on *Super Wicked Problems: Restraining the Present to Liberate the Future*” (paper presented at the Environmental Law and Policy Annual Review, Washington D.C., 2010).

28 This is roughly the temperature increase expected to accompany atmospheric CO₂ concentrations of 450ppm. Recently, however, James Hansen, director of the NASA Goddard Institute for Space Studies, has argued that the current international consensus on a 2-degree target is actually beyond a reasonable safety threshold, based on new analyses of the paleoclimate record, and better understanding of feedback loops that may be triggered by, e.g., catastrophic ice melt. Mark Fischetti, “2-Degree Global Warning Limit is Called a ‘Prescription for Disaster,’” Blog, *Scientific American Observations Blog* (2011), <http://blogs.scientificamerican.com/observations/2011/12/06/two-degree-global-warming-limit-is-called-a-prescription-for-disaster/>. For supporting data, as well as disturbing evidence that meeting even a 2-degree limit may already be out of reach, see Kevin Anderson and Alice Bows, “Beyond ‘dangerous’ climate change: emission scenarios for a new world,” *Philosophical Transactions of the Royal Society* 369 (2011).

29 This despite record global investments in renewables, increasing by 17 percent in 2011 to \$257B. United Nations Environment Programme, *Global Trends in Renewable Energy Investment 2012* (Frankfurt School, UNEP Collaborating Center for Climate & Sustainable Energy Finance and Bloomberg New Energy Finance, June 2012). Renewable energy, in fact, is the only on-target indicator of the 11 low-carbon sectors tracked by IEA (including, e.g., nuclear power, carbon capture and storage, and energy efficiency), which measures progress in technology performance, market creation, and technology penetration. Antonia Gawel and Cecilia Tam, *Tracking Clean Energy Progress: Energy Technology Perspectives 2012 excerpt as IEA input to the Clean Energy Ministerial* (International Energy Agency, 2012). Full report released June.

30 Rio+20, in June 2012, was an elaborate multilateral convening on sustainable development organized two decades after the 1992 UN Earth Summit — the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, 3- 14 June 1992. The 1992 Summit established the international Commission on Sustainable Development to guide the implementation of the meeting’s *Agenda 21* action plan, an early framework for the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change. See *Earth Summit Agenda 21: The United Nations Programme of Action from Rio* (April 1993), at <http://www.un.org/esa/dsd/agenda21/>; and the *Rio Declaration on Environment and Development* (12 August 1992), at <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>. While the tepid multilateral agreements that emerged from Rio+20 led many observers to throw up their hands, even going so far as to see in it “perhaps the greatest failure of collective leadership since the first world war,” (George Monbiot, “After Rio, we know Governments have given up on the planet,” *The Guardian*, June 25, 2012); others were heartened by the strong showing for civil society participants operating outside and alongside the formal negotiations, seeing in their vigor and organization a way forward.

31 Anthony D. Barnosky et al., “Approaching a state shift in Earth’s biosphere,” *Nature* 486, no. 7401 (2012).

32 Rockström et al., “A Safe Operating Space for Humanity.”

33 On this dynamic in the European context, see Ivan Krastev, “Europe’s Democracy Paradox,” *The American Interest*, March/April 2012. And Vladislav Inozemtsev, “The Cultural Contradictions of Democracy,” *The American Interest*, March/April 2012.

34 Francisco de Goya, Etching, “El sueño de la razón produce monstruos,” (Plate 43 of *Los Caprichos*, 1799). See <http://www.metmuseum.org/toah/works-of-art/18.64.43>

35 Related story and interview with Norfolk Mayor Paul Fraim available on video in: William Brangham, “Rising Tide in Norfolk, Va.,” *Need to Know on PBS - Climate Desk* (April 27, 2012), <http://www.pbs.org/wnet/need-to-know/environment/rising-tide-in-norfolk-va/13739/>. April 27 2012. See also Darryl Fears, “Built on sinking ground, Norfolk tries to hold back tide amid sea-level rise,” *The Washington Post* (June 17, 2012), http://www.washingtonpost.com/national/health-science/built-on-sinking-ground-norfolk-tries-to-hold-back-tide-amid-sea-level-rise/2012/06/17/gJQADUsxjV_print.html

- 36 John Muraski, "Senate approves law that challenges sea-level science," *The News & Observer* (June 13, 2012), <http://www.newsobserver.com/2012/06/12/2132216/senate-approves-law-that-challenges.html>
- 37 Rebecca Leber, "Virginia Lawmaker Says 'Sea Level Rise' Is A 'Left Wing Term,' Excises It From State Report On Coastal Flooding," Blog, *Climate Progress* (June 10, 2012), <http://thinkprogress.org/climate/2012/06/10/496982/virginia-lawmaker-says-sea-level-rise-is-a-left-wing-term-excises-it-from-state-report-on-coastal-flooding/>
- 38 Frank Ackerman and Elizabeth A. Stanton, *The Last Drop: Climate Change and the Southwest Water Crisis* (Stockholm Environment Institute, 2011).
- 39 As laid out in *Agenda 21*, 1992 (see n. 30). The bill was introduced as *An Act Prohibiting the State and its Political Subdivisions from Adopting or Implementing the United Nations Rio Declaration on Environment and Development*, Second Regular Session, State of Arizona Senate Bill 1507 (2012). On the related RNC/ICLEI controversy see: Maria Gallucci, "Bill to Ban Sustainability and Climate Change Action Fails in Arizona," *InsideClimate News* (May 11 2012), <http://insideclimatenews.org/news/20120511/bill-ban-united-nations-agenda-21-sustainability-climate-change-global-warming-iclei-john-birch-society-kansas>
- 40 Related bills in other states emerged after the January 2012 RNC Resolution warned about the "insidious nature" of the UN Agenda 21 "being covertly pushed into local communities" through "Green" and other projects, and asserting that the UN principles of sustainable development view "the American way of life of private property ownership, single family homes, private car ownership and individual travel choices, and privately owned farms; all as destructive to the environment." Republican National Committee, *Resolution Exposing United Nations Agenda 21*, (January 13, 2012).
- 41 Though 70 percent also believe that corporations and industry should be doing more to address global warming. Anthony Leiserowitz et al., *Climate Change in the American Mind: Public Support for Climate and Energy Policies in March 2012* (Yale University and George Mason University, 2012): 8.
- 42 This was echoed in a March 2012 Gallup poll, which found 70 percent of Americans in favor of establishing higher emissions standards for business and industry. Though analysts also report growing bipartisan gaps, with noted Republican decline in support for clean energy proposals, attributed to increasing concerns over federal spending. Frank Newport, "Americans Endorse Various Energy, Environmental Proposals," *Gallup Politics* (2012), <http://www.gallup.com/poll/153803/Americans-Endorse-Variou-Energy-Environment-Proposals.aspx>
- 43 Leiserowitz et al., *Climate Change in the American Mind*: 2, 10, 13.
- 44 The Pew Research Center for the People & the Press, *Partisan Polarization Surges in Bush, Obama Years: Trends in American Values: 1987-2012* (2012): 6, 104, 47. While observers point out that this is good news on the regulatory front [see Ruy Teixeira, *Public Opinion Snapshot: Public to Conservatives: Government Regulation Can Be Good!*, (Center for American Progress, June 11, 2012).] note that this is down from 90 percent support for environmental regulation 20 years ago, when a full 55 percent agreed *completely* with the idea of establishing stricter laws. And the polling on environmental regulation reveals, not surprisingly, a sharp partisan divide, with not even half of Republicans (47 percent) agreeing that "there needs to be stricter laws and regulations to protect the environment." According to Pew, this represents "a decline of 17 points since 2009 and a fall of nearly 40 points, from 86 percent, since 1992. The partisan gap over this measure was modest two decades ago. Today, roughly twice as many Democrats as Republicans say stricter environmental laws and regulations are needed (93 percent vs. 47 percent)."
- 45 Based on the National Survey of American Public Opinion on Climate Change (NSAPOCC), March-April 2012. Chris Borick and Barry Rabe, *Continued Rebound in American Belief in Climate Change: Spring 2012 NSAPOCC Findings* (Brookings, 2012).
- 46 Peter Dreier and Christopher R. Martin, *Job Killers' in the News: Allegations without Verification* (Occidental College and University of Northern Iowa, 2012).
- 47 Leiserowitz et al., *Climate Change*, 16.
- 48 We refer of course to the prescient leadership of labor in advocating for the Clean Air Act, and the Seattle WTO protests, where longshoremen closed the port, and environmental activists in sea turtle costumes — protesting WTO rejection of national endangered-species laws — marched alongside thousands of union members who took to the streets in defense of labor standards and domestic jobs. "Teamsters and Turtles" became a catchphrase indicating that at least some environmentalists and labor unions were no longer willing to accept that protecting the environment and jobs were mutually exclusive enterprises. Following the gulf war and the election debacle of the next decade, the Apollo Alliance & others brought community and industry to the table, and turned the jobs question into a nuanced conversation about energy independence, climate change and economic opportunity.
- 49 Joshua Cohen and Joel Rogers, *On Democracy: Toward a Transformation of American Society* (Penguin, 1983). 182-83.
- 50 This vision is perhaps best and most thoroughly articulated in the pre-Rio UN report on Resiliency, which addresses human capital, clean energy, and democratization. United Nations Secretary-General's High-level Panel on Global Sustainability, *Resilient People, Resilient Planet: A future worth choosing* (2012).
- 51 Heather Grady, *The Business of Climate Change: Adaptation and Resilience* (Opening remarks of Rockefeller Foundation hosted event, "The Business of Climate Change: Opportunities in Adaptation and Resilience Building, June 27, 2011)," <http://www.rockefellerfoundation.org/news/speeches-presentations/business-climate-change-adaptation>
- 52 Perhaps, given the imminence of rising seas, we should use marine rather than terrestrial metaphors. Resilience requires not rebuilding the public square and the high roads into it, but cooperatively constructing an ark — with adequate bulwarks, of course, to keep out the pirates and the looters.
- 53 The Clean Energy Ministerial, a global forum conceived at the 2009 United Nations Framework Convention on Climate Change conference of parties in Copenhagen and launched by the United States in 2010, has met three times, most recently in April 2012 (London), to develop coordinated policies for reduced carbon emissions. The Ministerial convenes cabinet-level government representatives from the 23 economies that account for 80 percent of GHG emissions and 90 percent of clean energy investment worldwide: Australia, Brazil, Canada, China, Denmark, the European Commission, Finland, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Norway, Russia, South Africa, Spain, Sweden, the United Arab Emirates, the United Kingdom, and the United States. See <http://www.cleanenergyministerial.org/>
- 54 Maria van der Hoeven, "We can have safe, sustainable energy," *The Guardian* April 24, 2012.
- 55 Gawel and Tam, *Tracking Clean Energy*, 63.

56 Ibid., 64.

57 Ibid., 5.

58 National Renewable Energy Laboratory, *Renewable Electricity Futures Study* (2012). While this impressive 4-volume report marshals vast amounts of data related to current and potential U.S. electricity generation, storage, transmission and demand, the stunning graphic summaries are perhaps most compelling. See, e.g., the dynamic visualization of a proposed 40-year transition from fossil and nuclear power to clean energy generation at <http://rpm.nrel.gov/refhighre/expansion/expansion.html>

59 *ibid.* The NREL study suggests that a clean future powered predominantly by renewable energy would not only be reliable (on a local hour-to-hour basis, thanks to a flexible grid with vastly improved transmission, storage and demand management capacity), but affordable: “The direct incremental cost associated with high renewable generation is comparable to published cost estimates of other clean energy scenarios.”

60 Amory B. Lovins, “A Farewell to Fossil Fuels: Answering the Energy Challenge,” *Foreign Affairs* 91, no. 2 (2012): 140.

61 Ibid., 142-43.

62 Considered as a whole, Europe was the 2011 world leader with \$100.2B clean energy investment. Angus McCrone, *Solar Surge Drives Record Clean Energy Investment in 2011*, (Bloomberg New Energy Finance, January 12, 2012). See also: *Who’s Winning the Clean Energy Race? 2011 Edition*, (The Pew Charitable Trusts, 2012).

63 Joel Makower, *State of Green Business 2012* (Green Biz Group, 2012): 12.

64 Collaborative Economics and Environmental Defense Fund, *Seven Growth Sectors*.

65 Muro, Rothwell, and Saha, *Sizing the Clean Economy*.

66 Introduced by Senator Jeff Bingaman (D-NM), Chair of the U.S. Senate Committee on Energy and Natural Resources, March 1, 2012. Bill and summary available online at <http://www.energy.senate.gov/public/index.cfm/2012/3/clean-energy-standard-act-of-2012>

67 Michael T. Klare, “The New Fossil Fuel Fever,” *The Nation* March 19, 2012.

68 Jad Mouawad, “Fuel to Burn: Now What?,” *The New York Times*, April 11, 2012.

69 International Energy Agency, *Are We Entering a Golden Age of Gas? World Energy Outlook 2011* (OECD/IEA, 2011). Offered early indications that natural gas was not a panacea for climate change, and would offer modest but inadequate reductions in GHG emissions. This had been starkly confirmed by N. Myhrvold and K. Caldeira, “Greenhouse gases, climate change and the transition from coal to low-carbon electricity,” *Environmental Research Letters* 7, no. 1 (January-March 2012). Which presents life-cycle analyses of energy technologies and related global warming outcomes. The conclusion: We don’t have time to switch from coal to gas. “Achieving substantial reductions in temperatures relative to the coal-based system will take the better part of a century, and will depend on rapid and massive deployment of some mix of conservation, wind, solar, and nuclear, and possibly carbon capture and storage.” For additional studies and a note on the public relations history of natural gas as a “bridge fuel,” starting with the American Gas Association in 1981, see Joe Romm’s April 19, 2012 *Climate Progress* blog, “Natural Gas Is A Bridge To Nowhere Absent A Carbon Price AND Strong Standards To Reduce Methane Leakage,” <http://thinkprogress.org/climate/2012/04/09/460384/natural-gas-is-a-bridge-to-nowhere-absent-a-carbon-price-and-strong-standards-to-reduce-methane-leakage/>

70 Robert Howarth, Renee Santoro, and Anthony Ingraffea, “Methane and the greenhouse-gas footprint of natural gas from shale formations,” *Climatic Change* 106, no. 4 (2011). Other factors, including efficiency of power generation and release of sulfur dioxide, further increase the warming effects of gas-fired energy production. See Tom Wigley, “Coal to gas: the influence of methane leakage,” *Climatic Change* 108, no. 3 (2011).

71 Wigley, “Coal to gas.”

72 Gordon’s blog post “Power for the people: Energy for the 99 percent,” *Grist*, November 9, 2011 (<http://grist.org/energy-policy/2011-11-08-power-for-the-people-energy-for-the-99-percent/>) envisions America in 2030. It’s a great example of the sort of positive but hype-free messaging around a possible greener future that we argue for above.

73 2010 figures. International Energy Agency, *IEA analysis of fossil-fuel subsidies. World Energy Outlook 2011* (OECD/IEA, 2011).

74 Adenike Adeyeye et al., *Estimating U.S. Government Subsidies to Energy Sources: 2002-2008* (Environmental Law Institute, September 2009). U.S. subsidies tracked by the Environmental Law Institute 2002-8 amounted to \$72.5B for fossil fuels, including CCS (\$2.3B), and \$29B to Renewables, more than half of which (\$16.8B) went to corn ethanol. Dollar figures include both tax breaks and direct spending. See the infographic at http://www.eli.org/pdf/Energy_Subsidies_Black_Not_Green.pdf

75 For a plain-English breakdown of oil and gas subsidies delivered via the U.S. tax code, see: Seth Hanlon, “Big Oil’s Misbegotten Tax Gusher: Why They Don’t Need \$70 Billion from Taxpayers Amid Record Profits,” Blog, (May 5, 2011), http://www.americanprogress.org/issues/2011/05/big_oil_tax_breaks.html. For more comprehensive and comparative data on consumer and producer subsidies by sector (oil, gas, coal), see: OECD, *Inventory of estimated budgetary support and tax expenditures for fossil fuels* (2011): 321-47.

76 On this and the negative value-add from related industries, where environmental externalities offset productive value, see, e.g., Nicholas Z. Muller, Robert Mendelsohn, and William Nordhaus, “Environmental Accounting for Pollution in the United States Economy,” *American Economic Review* 101, no. 5 (2011).

77 International Energy Agency et al., *Joint report by IEA, OPEC, OECD, and World Bank on fossil-fuel and other energy subsidies: An update of the G20 Pittsburgh and Toronto Commitments* (2011). See also OECD, *Inventory*, op cit, which presents per-country data on fossil fuel subsidies by sector, 2008-2010.

78 OECD, *Towards Green Growth* (2011): 35. The effort to reduce such subsidies was embraced by President Obama at the G20 Pittsburgh Summit in 2009, where world leaders agreed to “phase out and rationalize over the medium term inefficient fossil fuel subsidies while providing targeted support for the poorest.” *G20 Leaders Statement: The Pittsburgh Summit*, (September 24–25, 2009): 24. The Obama Administration’s proposed budgets for 2010 and 2011 included modest attempts to roll back some of those subsidies while increasing investment in clean energy research and development. These efforts foundered in the ongoing anti-green political drama described elsewhere in this report.

79 The “bill to eliminate certain subsidies for fossil-fuel production” was introduced as S.3080 May 10, 2012, and H.R. 5745 on May 15, 2012. Data and analysis of record profits in the oil industry can be found in Daniel J. Weiss, Jackie Weidman, and Rebecca Leber, *Big Oil’s Banner Year: Higher Prices, Record Profits, Less Oil*, (Center for American Progress, 2012).

80 International Energy Agency, *IEA analysis of fossil-fuel subsidies*.

81 The associated global action agenda aims to scale up promising practices in order to achieve SE4A goals by 2030. See: United Nations, *Sustainable Energy for All: A Global Action Agenda - Pathways for Concerted Action toward Sustainable Energy for All* (2012); Ban Ki-moon, *Sustainable Energy for All: A Vision Statement by Ban Ki-moon, Secretary-General of the United Nations*, (2011); U.S. Department of State, *U.S. Support for the Sustainable Energy for All Global Action Agenda*, (2012); *Clean Energy Ministerial and United Nations, Clean Energy Ministerial & Sustainable Energy for All Summary Fact Sheet*, (2012). More information available at: <http://www.sustainableenergyforall.org/>. SE4A was far from the centerpiece of the disappointing RIO+20 agreements, but observers suggest it garnered enough support at the summit to move ahead on its own momentum.

82 The most comprehensive cost-benefit analysis of mitigation in energy production is the 1000+ page IPCC tome, *Special Report on Renewable Energy Sources and Climate Change Mitigation*, prepared by Working Group III of the Intergovernmental Panel on Climate Change, O. Edenhofer, et al. (Cambridge University Press, 2011).

83 A good summary of the economic rationale for a clean energy future can be found in OECD, *Energy - OECD Green Growth Series* (2012). Of the voluminous literature on climate change impacts and economic costs, a handful of particularly accessible surveys includes: Economics of Climate Adaptation Working Group, *Shaping Climate-Resilient Development: a framework for decision-making* (2009); Richard S. J. Tol, “The Economic Effects of Climate Change,” *Journal of Economic Perspectives* 23, no. 2 (2009); Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, *Global Climate Change Impacts in the United States: A State of Knowledge Report* (U.S. Global Change Research Program, 2009); National Round Table on the Environment and the Economy, *Paying the Price: the Economic Impacts of Climate Change for Canada* (2011); Mattias Ruth, Dana Coelho, and Daria Karetnikov, *The US Economic Impacts of Climate Change and the Costs of Inaction: A Review and Assessment* (Center for Integrative Environmental Research - University of Maryland, 2007); Frank Ackerman and Elizabeth A. Stanton, *The Cost of Climate Change: What We’ll Pay if Global Warming Continues Unchecked* (Natural Resources Defence Council, 2008). Some of these explore specific costs and costing methodology, but most describe potential cross-sector impact in based on current understanding of global warming trends.

84 *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon* (Stockholm Environment Institute - U.S. Center, Tufts University; Economics for Equity and the Environment Network, 2011).

85 Unisys map at <http://capitalclimate.blogspot.com/2012/06/triple-digit-heat-reaches-mid.html>, accessed 6/30/12.

86 Dave Grossman, *Physical Risks from Climate Change: A guide for companies and investors on disclosure and management of climate impacts* (Calvert Investments, Ceres, Oxfam America, 2012). A useful summary by Mindy Lubber, CEO of CERES, together with charts from the Munich RE (a leading international re-insurer) natural catastrophe database, at Mindy S. Lubber, “Extreme Weather is the New Climate Reality,” *Climate Progress* (2012), <http://thinkprogress.org/climate/2012/06/06/495713/extreme-weather-is-the-new-climate-reality/>

87 See, e.g., Borick and Rabe, *Continued Rebound*, 3–5; Seth Borenstein, “This US summer is ‘what global warming looks like,’” (July 3, 2012), [http://hosted2.ap.org/APDE/FAULT/3d281c11a96b4ad082fe88aa0db04305/Article_2012-07-03-Weird%20Weather/id-5b045c95974544ec9a97b57ed4aa7b1b.](http://hosted2.ap.org/APDE/FAULT/3d281c11a96b4ad082fe88aa0db04305/Article_2012-07-03-Weird%20Weather/id-5b045c95974544ec9a97b57ed4aa7b1b;); and Stephen Saunders et al., *Doubled Trouble: More Midwestern Extreme Storms* (The Rocky Mountain Climate Organization, National Resources Defence Council, 2012).

88 For a more comprehensive global assessment for climate-related extreme weather see IPCC’s 2012 report: Christopher B. Field et al., *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* (Intergovernmental Panel on Climate Change, 2012).

89 Hurricane Katrina introduced the potential scale of this discrepancy — in real time — to shocked viewers across the country. Other stories, often narrated through public health records, are less well known. Heat-related mortality and upper respiratory disease disproportionately affect the elderly and the poor. See, e.g. Morello-Frosch et al., *The Climate Gap*; Dennis Andrulis, Nadia Siddiqui, and Maria Rascati Cooper, *Climate Change, Environmental Challenges and Vulnerable Communities: Assessing Legacies of the Past, Building Opportunities for the Future* (The Joint Center for Political and Economic Studies, 2012). On cross-sector economic impacts, including health, see Karl, Melillo, and Peterson, *Global Climate Change Impacts in the United States*.

90 On climate challenge as economic opportunity, even in a primarily extractive economy like Canada’s, see National Round Table on the Environment and the Economy, *Paying the Price*.

91 Internationally, “Decent work” is a term of art indicating what in the U.S. is often short-handed as “good jobs” — i.e., jobs with family-supporting wages, safe working conditions, benefits and protections (e.g. pensions, paid leave, health care, work-sharing, unemployment insurance, etc.), and respect for workers’ rights, including collective bargaining.

92 See, e.g., European Trade Union Confederation, *Climate change, the new industrial policies and ways out of the crisis* (ETUC, 2010); John Calvert and Marjorie Griffin Cohen, *Climate Change and the Canadian Energy Sector: Implications for Labour and Trade Unions* (Canadian Centre for Policy Alternatives, 2011); Andrea Buffa et al., *California’s Global Warming Solutions Act of 2006: A Background Paper for Labor Unions* (UC Berkeley Labor Center, August 2008).

93 As we discuss in the next chapter and is aptly summarized by the ILO in a recent report, the varied impacts of climate mitigation on labor markets will include: “(i) the net impact on employment (i.e. the balance between job gains and job losses resulting from green structural change); (ii) the movement of workers from declining to growing firms and sectors (labor re-allocation); and (iii) the transformation of jobs that are neither lost nor gained but are adapted to meet the requirements of a greener economy.” *Sustainable development, green growth and quality employment: Realizing the potential for mutually reinforcing policies. Background paper for the Meeting of G20 Labour and Employment Ministers, Guadalajara, 17-18 May 2012.*, (ILO/OECD, May 2012): 3.

94 Actual and potential growth in individual sectors is addressed below in chapter 4, and in numerous aggregate and industry-specific studies available on green and greening jobs in the U.S. We’ve talked elsewhere in this report about the Brookings and EDF/Collaborative Economics reports on the high performance of green sectors (see n.x), for example, and just as this report was going to print, BlueGreen Alliance released a study estimating that new fuel economy standards could generate 570,000 jobs (FTE) across the economy by 2030, with 50,000 in manufacturing: Blue-Green Alliance and American Council for an Energy-Efficient Economy, *Gearing Up: Smart Standards Create Good Jobs Building Cleaner Cars* (2012). Numerous economic analyses have credibly estimated potential job growth from green economic development, including, e.g., Robert Pollin et al., *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy* (Center for American Progress, Political Economy Research Institute, 2008). and Robert Pollin, Jeannette Wicks-Lim, and Heidi Garrett-Peltier, *Green Prosperity: How Clean-Energy Policies Can Fight Poverty and Raise Living Standards in the United States* (Political Economy Research Institute, the National Resources Defense Council, Green for All, 2009). Washington State has been the national leader in the systematic measurement of jobs in the green economy, starting with the green jobs, starting with Alan Hardcastle’s benchmark study, “2008 Green Economy Jobs in Washington State” (Washington State University, Extension Energy Program, January 2009), produced by the Washington State Employment Security Department, Labor Market and Economic Analysis;” and the U.S. Bureau of Labor Statistics has undertaken an ambitious effort to codify the same (see <http://www.bls.gov/green/>). Internationally, specific labor market projections and related challenges in agriculture, forestry, fisheries, energy, manufacturing, recycling, buildings, and transportation will be part of a major ILO study due later this year: “Working towards sustainable development: Opportunities for decent work and social inclusion in a green economy” (Geneva, forthcoming). For preliminary findings, see: *Sustainable development, green growth and quality employment*. Finally, for some of the most comprehensive recent modeling of the potential labor market impacts of economic and environmental policy, see: OECD, *The jobs potential of a shift towards a low-carbon economy* (Final Report for the European Commission, DG Employment, June 2012).

95 Analysis of related costs and policies in *Energy — Green Growth Series*.

96 OECD, *Towards Green Growth*, 92-93. For a more detailed analysis, see *The jobs potential of a shift towards a low-carbon economy*.

97 Most notably, the Regional Greenhouse Gas Initiative in the Northeast and Mid-Atlantic (<http://www.rggi.org>) and the cap-and-trade program emerging from California’s Global Warming Solutions Act (AB 32) (<http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>). It is beyond the scope of this paper to summarize, much less assess, the voluminous literature and fierce public debate on these and related market-based mechanisms for emissions reduction.

98 Hilary Rodham Clinton, Secretary of State, *Remarks on George Marshall and the Foundations of Smart Power*, (Virginia Military Institute, Lexington VA April 3, 2012).

99 On the cross-sectoral impact of lower water levels in the Great Lakes, for example, see Karl, Melillo, and Peterson, *Global Climate Change Impacts in the United States*, 120. For a summary of role of water in the green economy globally, see United Nations Environment Programme, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication — Water Chapter* (2011).

100 The use and impact of water in the energy sector, where “water is used to extract and produce energy; process and refine fuels; construct, operate, and maintain energy generation facilities; cool power plants; generate hydroelectricity; and dispose of energy-sector wastes” is analyzed in compelling detail by Heather Cooley, Julian Fulton, and Peter H. Gleick, *Water for Energy: Future Water Needs for Electricity in the Intermountain West* (Pacific Institute, 2011). The authors summarize the tremendous implications for both water supply and water quality, and the challenges of integrating energy and water policy. See also U.S. Department of Energy, *Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water* (Sandia National Laboratories, 2006); William Sarni and Joseph Stanislaw, *No water, no energy. No energy, no water.* (Deloitte Center for Energy Solutions, 2012).

101 An excellent review of these interconnected challenges in a water-scarce world where “meeting future energy needs depends on water availability — and meeting water needs depends on wise energy policy decisions” can be found in Diana Glassman et al., *The Water-Energy Nexus: Adding Water to the Energy Agenda* (World Policy Institute and EBG Capital, 2011).

102 T. Mai et al, “Exploration of High-Penetration Renewable Electricity Futures,” *Renewable Electricity Futures Study, Vol. I* (National Renewable Energy Laboratory, 2012).

103 See, e.g. Shiney Varghese, *Integrated Solutions to the Water, Agriculture and Climate Crises* (Institute for Agriculture and Trade Policy and Heinrich Boll Stiftung, 2009); Morgan Bazilian et al., “Considering the energy, water and food nexus: Towards an integrated modelling approach,” *Energy Policy* 39, no. 12 (2011); United Nations Environment Programme, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers* (2011); Holger Hoff, *Understanding the Nexus: Background Paper for the Bonn2011 Nexus Conference*, in *The Water, Energy, and Food Security Nexus* (Bonn, Germany 2011); Renee Martin-Nagle et al., *The Water, Energy and Food Security Nexus - Solutions for the Green Economy: Conference Synopsis*, in *The Water, Energy and Food Security Nexus* (Bonn, Germany 2012); *The Water, Energy and Food Security Nexus - Solutions for a Green Economy: Policy Recommendations from the Bonn2011 Nexus-Conference*, (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the German Federal Ministry for Economic Cooperation and Development 2012).

104 A recent NRDC study estimates that “climate change will have significant impacts on water supplies throughout the country in the coming decades, with over 1,100 counties facing greater risks of water shortages due to the effects of climate change.” Natural Resources Defense Council, *Climate Change, Water, and Risk: Current Water Demands are not Sustainable* (2010). See also Ben Chou and Jenna Schroeder, *Ready or Not: An Evaluation of State Climate and Water Preparedness Planning* (Natural Resources Defense Council, 2012). And Natural Resources Defense Council, *Climate Change and Water Resource Management: Adaptation Strategies for Protecting People and the Environment* (2010). See also Ackerman and Stanton, *The Last Drop*.

105 2030 Water Resources Group, *Charting Our Water Future: Economic Frameworks To Inform Decision-Making* (2009): 12.

106 Organizations that have been working on clean water issues for decades are now more fully engaged in the green economy movement. Fruitful partnerships include the recent efforts of American Rivers, Green For All, Economic Policy Institute, and Pacific Institute, whose joint report has dramatically expanded the vision of early green jobs advocates: Emily Gordon et al., *Water Works: Rebuilding Infrastructure, Creating Jobs, Greening the Environment* (Green For All, American Rivers, Economic Policy Institute and Pacific Institute, 2011). See also, Katherine Baer and Mark Dorfman, *Putting Green to Work: Economic Recovery Investments for Clean and Reliable Water* (American Rivers).

107 One indispensable introduction to the U.S. urban water sector is a recent study of Los Angeles that describes the specific regional employment and economic impacts of developing a sector as sprawling and cross-cutting (occupations and industries) as energy itself: Patrick Burns and Daniel Flaming, *Water Use Efficiency and Jobs* (Economic Roundtable, 2011). As the Milwaukee case demonstrates, one danger may be the assumption that there is a clear and growing set of “water” jobs, which, like “green” jobs, are actually a complex amalgam of traditional and greening occupations across a variety of industry sectors.

108 Though it’s worth pointing out, again, that the perceived “failure” of green jobs was in fact a direct result of the failure of business-as-usual, fossil-driven financial markets, and a climate-change-denying disinformation campaign that effectively shut down demand drivers — from the utter failure of cap and trade to the chronic under-investment in clean energy, the stone-age attempts to rollback EPA regulations, the constant threats to PTC, ITC, clean energy loan guarantees, etc. No, we are not writing to defend green jobs. We are writing to remind people of the original intent of “green jobs” — a term that signifies not a discrete set of occupations, but a larger vision of human capital and greening economies that integrates community resilience, industry transformation, and accessible skill delivery.

109 This vision is bigger than “green jobs,” however defined. But jobs nonetheless remain at its center — not only because of the current crisis of unemployment, but because the exceptionalism of the U.S. labor market means that basic worker supports, like access to health care, pensions, family leave and sick time, are largely dependent on an employee’s relationship to a given employer.

110 Because of the breadth of the term and its overuse in myriad contexts, we will refrain from simply substituting the vague “sustainable” for the equally vague “green.” They are in many ways the same: “Green,” to many advocates, has always connoted an approach to jobs and the economy that embodies something far greater than a taxonomic relationship to renewable energy and energy efficiency occupations. “Greener” suggests building on what we have — and there is much good work to start with — to develop more equitable communities and institutions that can deliver broad, shared prosperity without exceeding the carrying capacity of the planet.

111 *Embracing Change: Building Social, Economic and Environmental Resilience*. The Rockefeller Foundation First Centennial Series Convening, April 19, 2012, Washington, DC.

112 Rousseau’s classic statement on citizen education, *Emile* (1762) is part of the standard literature on democracy and human development that sits in the midst of a centuries-long conversation on the appropriate relationship between individual and community. We are of course less taken with its position on the schooling of girls than enchanted by its progressive commentary on lifelong learning by doing, education for the whole human, skill mastery as appropriate to the natural world as the economic or political, and the cultivation of individuals ready to productively engage in the creation of a more democratic society. *Emile* would know not only how to master a trade, but how to consciously organize a more organic community in a society dominated by commerce, and how to achieve human freedom in a polity rooted in inequality. Such an education inspires citizens to the pursuit of liberty and happiness, not power and wealth.

113 See, e.g., OECD, *The jobs potential of a shift towards a low-carbon economy*, 27. This report charts shifts in sectoral employment and value-added for an aggressive climate mitigation scenario in both the OECD and the EU. Because impacted industries account for a relatively small share of total employment, some of the apparently dramatic expansions and contractions do not translate into enormous job reallocations, nor entail large shifts in overall skill demand.

114 *Agenda, Rio+20 Social Pillar Stakeholder Consultations*.

115 John Schmitt and Janelle Jones, Union Membership Holds Steady in 2011 (CEPR, January 27, 2012), <http://www.cepr.net/index.php/data-bytes/union-membership-bytes/union-membership-holds-steady-in-2011>, accessed 07/07/12. On unionization rates by state, see John Schmitt and Marie-Eve Augier, *Size and Characteristics of States’ Union Workforces* (Center for Economic Policy and Research, May 2012). It is beyond the scope of this paper to explore the decline of unionization in the United States, which has dropped precipitously in recent decades (from 26 percent in 1975 to just 12 percent in 2011). Prospects of renewal have dimmed with the defeat of the Employee Free Choice Act (blocked by Senate Republicans in 2007), the Republican governors’ assaults on public sector workers that reached a crescendo in 2011, and the ongoing state battles over “right to work” legislation.

116 See, e.g., Jane McAlevey, “Unions and Environmentalists: Get it Together!,” *The Nation* (April 18, 2012), <http://www.thenation.com/article/167460/unions-and-environmentalists-get-it-together>

117 Personal Communication with Colin Gordon, Iowa Policy Project, June 6, 2012. See also: Ross Eisenbrey and Colin Gordon, “As unions decline, inequality rises,” *Economic Snapshot: Economic Inequality* (June 6, 2012), <http://www.epi.org/publication/unions-decline-inequality-rises/>

118 The OECD green growth model argues that “affected groups in society need to be part of the policy making process in the first instance. This process needs to be transparent and clearly articulate the justification for reform.” OECD, *Towards Green Growth*, 85.

119 The formal recognition of social partners and the facilitation of “social dialogue” between them is central to the structure of the European Union and written into policy as such. We are not of course arguing for an entirely new model of governance, but adopting and adapting some of the best practices, where appropriate, modeled in other countries. In this context, thinking about a European lesson for the U.S. means supporting new and existing labor or worker institutions, because there is no other organized power to counteract corporate political interests, reflected largely but not exclusively in the right. And it is these interests which have proved one of the greatest obstacles to a) advancing a worker-centered political agenda, and b) advancing climate change, clean energy, and other policies critical to green growth.

120 On the role of pre-apprenticeship and the value of nimble intermediaries, see Matt Helmer, Amy Blair, and Allison Gerber, *A Solid Foundation: Key Capacities of Construction Pre-Apprenticeship Programs* (Workforce Strategies Initiative — The Aspen Institute, 2012).

121 For these and related thoughts we are grateful to colleagues who gathered to discuss an early summary of this paper at a COWS convening in June (“Greener Reality: Resilience, Equity, and Skill Formation in a Cleaner U.S. Economy,” Economic Policy Institute, Washington DC, June 27 2012). Laura Chenven, Director of HCAP, prompted our thinking about “greening in place,” though we of course make no claims to represent her views here.

122 Schmitt, *Low-wage Lessons*.

123 Mishel, *Wedges*.

124 Richard Freeman, *The Great Doubling: The Challenge of the New Global Labor Market*, (2006).

125 Which brings us fully back to notions of sustainability. And engages in a larger and fraught international conversation about emerging economies and rights to development, standards of living, the legitimacy of growth, and planetary limits. Of the voluminous literature on related topics, two provocative pieces on consumption and growth seem particularly apropos: Sean Sweeney, “Earth to Labor: Economic Growth is No Salvation,” *New Labor Forum* (2012); Naomi Klein, “Capitalism vs. the Climate,” *The Nation*, November 28, 2011. Figure 10 illustrates the high ecological cost of a high standard of living, as currently conceived (the international comparison relies on per-capita measures but does not address subnational distribution or equity issues). It is based on a chart developed by the Global Footprint Network for *The Ecological Wealth of Nations: Earth’s Biocapacity as a New Framework for International Cooperation* (2010):13, and reprinted in the United Nations Environment Programme, *Towards a Green Economy* (2011): 4. The HDI data is from the United Nations Development Programme’s *Human Development Report 2009 – Overcoming Barriers: Human Mobility and Development* (UNDP, 2009).

126 In our current era of post-truth politics, opponents of the green economy can repeatedly make arguments and cite data no matter how many times such arguments and data have been debunked. A classic example of this dynamic is the study issued by King Juan Carlos University in Spain, which asserted that every renewable energy job in Spain “destroyed” 2.2 jobs in the broader economy. These results were repeated endlessly by Members of Congress, pundits, and in think tank publications, with no apparent slow down after analysts at the National Renewable Energy Laboratory concluded that the King Juan Carlos study “...represents a significant divergence from traditional methodologies used to estimate employment impacts from renewable energy. In fact, the methodology does not reflect an employment impact analysis. Accordingly, the primary conclusion made by the authors — policy support of renewable energy results in net jobs losses — is not supported by their work.” Gabriel Calzada Alvarez, *Study of the effects on employment of public aid to renewable energy sources* (Universidad Rey Juan Carlos and Instituto Juan de Mariana 2009); Eric Lantz and Suzanne Tegen, *NREL Response to the Report Study of the Effects on Employment of Public Aid to Renewable Energy Sources from King Juan Carlos University (Spain)* (National Renewable Energy Laboratory, 2009).

127 Muro, Rothwell, and Saha, *Sizing the Clean Economy*.

128 These are not new strategies. But many well-intentioned workforce practitioners and policy makers still do not fully understand how labor markets work. Lots of folks around the country, for example, are doing good and innovative work to build on-ramps — bridges for low-skilled workers to post-secondary educational credentials — but few are systematically connected to actual demand in industries and firms offering decent jobs. So we think there is still great value in reminding folks what successful human capital strategies look like, and emphasizing that such strategies work best when they are engaged as a system, rather than as an answer to the needs of either a particular population or a particular firm.

129 These deficits, including their history and potential remedy, are the subject of Sarah White, Laura Dresser, and Joel Rogers, *Greener Skills: How Credentials Create Value in the Clean Energy Economy* (Center on Wisconsin Strategy, 2010).

130 See e.g., Joel Rogers, *Seizing the Opportunity (for Climate, Jobs, and Equity) in Building Energy Efficiency* (COWS, 2007); Sarah White and Jason Walsh, *Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy* (Center on Wisconsin Strategy, The Workforce Alliance, The Apollo Alliance, 2008); Stacy Ho and Satya Rhodes-Conway, *A Short Guide to Setting Up a City-Scale Retrofit Program* (COWS and Green For All, 2009); Mark Fulton, Jake Baker, and Margot Brandenburg, *United States Building Energy Efficient Retrofits - Market Sizing and Financial Models* (Rockefeller Foundation and DB Climate Change Advisors, 2012). *Greener Pathways*, the first in the “Greener” series of which this paper is a part, attempted to summarize the voluminous literature on EE retrofits and related workforce policy; the field has benefited from an explosion of studies and analyses in the interim, particularly once the Obama Administration embraced “Recovery to Retrofit” and poured \$5 Billion into the low-income weatherization assistance program alone. We will not attempt to rehearse that literature here.

131 2010 data. On energy consumption, U.S. Energy Information Administration, *Annual Energy Review 2010* (U.S. Department of Energy, 2011): 38. Note that the total share of U.S. energy consumption for all buildings, not just those in the residential sector, is more than 42 percent, and may reasonably be calculated as high as 49 percent. Fulton, Baker, and Brandenburg, *Building Energy Efficient Retrofits*, 7. On CO₂ emissions (22 percent), see U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009 - Executive Summary* (2011): 8.

132 For details, see, e.g., White and Walsh, *Greener Pathways*; Jason Walsh et al., *Clean Energy Corps: Jobs, Service, and Equal Opportunity in America’s Clean Energy Economy* (Green for All, Center on Wisconsin Strategy, Center for Economic and Policy Research, Center for American Progress Action Fund, 2008); Pollin, Wicks-Lim, and Garrett-Peltier, *Green Prosperity*.

133 On the challenge of job quality, see: Elena Foshay and Mary Jo Connelly, *An Industry at the Crossroads: Energy Efficiency Employment in Massachusetts* (Apollo Alliance, Community Labor United, Green Justice Coalition, 2010). On the challenge of skills and credentials see White, Dresser, and Rogers, *Greener Skills*.

134 May 1, 2009 letter from Terrence M. O’Sullivan, General President, Laborer’s International Union of North America (LIUNA). Copy available online at <http://www.energycities.org/wp-content/uploads/072109/Laborers%20Letter%20to%20Governors0722.pdf>

135 Jason Walsh, Josh Bivens, and Ethan Pollack, *Rebuilding Green: The American Recovery and Reinvestment Act and the Green Economy* (BlueGreen Alliance and Economic Policy Institute, 2011): 22-23.

136 Interview with Dave Johnson, Laborers International Union of North America (LIUNA), November 17, 2011, and personal communication, May 29, 2012.

137 Final numbers have not yet been released for the entire grant period, which formally ended March 31, 2012. As of January 3, 2012, grantees reported 612,390 homes weatherized, with Q4 figures in some states still to be reconciled. That number leaps to 788,329 homes weatherized (CY 2009–November 2011) when annual program funding is included in addition to Recovery Act dollars. U.S. Department of Energy figures, January 3, 2012, <http://energy.gov/downloads/arra-homes-weatherized-grantee> (Accessed June 1, 2012).

The Oak Ridge National Laboratory (ORNL) is leading a major WAP ARRA-Period Evaluation, which will analyze energy and cost savings, non-energy impacts,

cost-effectiveness, and implementation, including labor force and training issues. Bruce Tonn et al., *Evaluation of the National Weatherization Assistance Program during Program Years 2009-2011 (American Reinvestment and Recovery Act Period)* (Oak Ridge National Laboratory, 2011).

138 Joel F. Eisenberg, *Weatherization Assistance Program Technical Memorandum: Background Data and Statistics* (Oak Ridge National Laboratory, 2010): 5, 7. The estimated annual average savings (\$436.64 per household for 2010) includes heating and cooling measures alone.

139 *Ibid.*, v. While these successes do not address the shortcomings in job creation and training, it is clear that WAP efforts have tremendous climate and equity pay-offs, given the relative energy burden faced by low-income households, the age and condition of their housing stock, and the negative financial and health impacts of both.

140 The Partnership for Working Families, *Green Construction Careers Programs: A Model for Workers, Communities, the Environment and a Better Construction Industry* (2011): 4. The Partnership for Working Families is an undisputed leader in articulating community benefits agreements, championing responsible contracting, and brokering related partnership development. This report summarizes community workforce agreements and offers a roundup of affiliated green construction careers programs across the country. For more information, see www.partnershipforworkingfamilies.org

141 Interview with Darlene Lombos, Community Labor United, 1/11/12.

142 *American Recovery and Reinvestment Act of 2009: Pathways Out of Poverty Grants* (U.S. Department of Labor Employment and Training Administration, January 13, 2010).

143 Interview with Geri Scott, Jobs for the Future (JFF), 12/7/11.

144 Interview with Domiana Carter, Detroiters Working for Environmental Justice, 1/3/12.

145 Personal communication with Geri Scott, JFF, June 7, 2012. Twenty-nine of 133 total enrollments were still in training at the time of this report. Under an extension, grant activity will continue through September 30, 2012; DWEJ is still actively working to find jobs for completers.

146 Statement of Secretary Hilda L. Solis, U.S. Department of Labor, before the Committee on Oversight and Government Reform, United States House of Representatives, September 22, 2011. http://www.dol.gov/_sec/media/congress/20110922_green_energy.htm. Final outcome metrics were not yet available at the time of this report.

147 The research was led by Carol Zabin and Karen Chapple at the Donald Vial Center on Employment in the Green Economy, Institute for Research on Labor and Employment, University of California, Berkeley. Full report and appendices are available online at <http://www.irl.berkeley.edu/vial/>

148 Carol Zabin et al., *California Workforce Education & Training Needs Assessment for Energy Efficiency, Distributed Generation, and Demand Response, Executive Summary* (Donald Vial Center on Employment in the Green Economy, University of California, Berkeley 2011).

149 Interview with Panama Bartholomey, CA Energy Commission, 1/10/12.

150 For a detailed discussion of this challenge and possible solutions, see White, Dresser, and Rogers, *Greener Skills*.

151 For more information, see http://www1.eere.energy.gov/wip/retrofit_guidelines_overview.html. Job task analyses and certification updates available at <http://www1.eere.energy.gov/wip/certifications.html#jta>

152 2012 DRAFT IREC Standard 14732: 2012 General Requirements for Renewable Energy and Energy Efficiency Certificate Programs, February 3, 2012. On the standard, see: <http://www.irecusa.org/irec-programs/credentialing/irec-standard-14732/>; on the accreditation partnership, see <https://www.ansica.org/wwwversion2/outside/ANRECgeneral.asp?menuID=229>. ANSI and IREC will follow the evaluation process outlined in the international standard ISO/IEC 17011, General Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies.

153 White, Dresser, and Rogers, *Greener Skills*, 27. An early chart laying out MC3 requirements and career-path flow is available online at: http://www.efficiencycities.us/062309/BCTD%20TriFold_v6.pdf. On the foundational relationship with the Emerald Cities Collaborative, see <http://www.emeraldcities.org/multi-craft>

154 See n.131. U.S. Energy Information Administration, *Annual Energy Review 2010*.

155 These figures do not include the industrial efficiency market. Fulton, Baker, and Brandenburg, *Building Energy Efficient Retrofits*, 7.

156 For a full list of current partners, nationally and locally, see www.EmeraldCities.org

157 A more thorough and nuanced articulation of this vision can be found in the Collaborative's founding memorandum: Gerry Hudson, Joel Rogers, and Phil Thompson, *Eyes on the Prize: Program Architecture of Emerald Cities*, (December 31, 2008).

158 Two classic examples, Washington State Skill Panels and the Wisconsin Regional Training Partnership, were featured in both Greener Pathways and Greener Skills; the latter is analyzed as a pre-apprenticeship leader in an excellent new study from Aspen: Helmer, Blair, and Gerber, *Strong Foundation*. One of the most thorough and thoughtful recent efforts to build a high-road partnership in the residential energy efficiency space is in Oregon, where Clean Energy Works Portland used EECBG monies to capitalize a revolving loan fund for its residential retrofit program, and brokered a community workforce agreement to govern implementation. See Green for All, *Clean Energy Works Portland: A National Model for Energy-Efficiency Retrofits* (2010). Other success stories include the work of California's Working Partnerships USA (<http://www.wpusa.org>) to build community pipelines into construction careers; and the Los Angeles construction career pathways forged through a decade of community workforce agreements between local government, labor, and community organizations, which cover \$26 Billion in construction projects, and have provided unprecedented opportunities for low-income workers. Sebrina Owens-Wilson, *Constructing Buildings & Building Careers: How Local Governments in Los Angeles are Creating Real Career Pathways for Local Residents* (The Partnership for Working Families, 2010).

159 Muro, Rothwell, and Saha, *Sizing the Clean Economy*.

- 160 American Wind Energy Association, *U.S. Wind Industry Annual Market Report (Year Ending 2010)*.
- 161 Emphasis added. Erich C. Dierdorff et al., *Greening of the World of Work: Implications for O*Net-SOC and New and Emerging Occupations* (National Center for O*Net Development, 2009): 11-12. Note that we made the same point first in *Greener Pathways*, before the national conversation squandered much of its energy in an essentially immaterial effort to define a green job, and later, more emphatically, in *Greener Skills*, after hundreds of training programs sprang up to deliver the elusive “green” know-how that might open the door to a clean energy job market decimated by political intransigence and economic collapse.
- 162 MSSC, “Overview of Green Production Module” (2011).
- 163 Interview with Jennifer McNelly, Manufacturing Institute, January 24, 2012.
- 164 Interview with Rebekah Hutton, Manufacturing Skill Standards Council (MSSC), December 17, 2011.
- 165 Interview with Kevin Celata, Communications Workers of America (CWA), January 24, 2012.
- 166 Personal communication with Kevin Celata, CWA, May 23, 2012. Employment outcome data does not indicate whether participants obtained jobs related to their training.
- 167 Personal communication with Rebekah Hutton, MSSC, 05/23/12.
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- 169 National Skills Coalition, *Toward Ensuring America’s Workers and Industries the Skills to Compete* (2009).
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- 172 Personal Communication with Patti Balacek, Western Technical College, June 19, 2012.
- 173 Personal communication with Raiana Mearns, Gateway Technical College, June 13, 2012; and Denine Rood, Waukesha County Technical College, June 27, 2012. A video describing the Gateway Program is available at <http://www.youtube.com/watch?v=oKOYC7VQqI&feature=relmfu>
- 174 U.S. Energy Information Administration, *Electric Power Monthly* (March 2012): 10-11; and personal communication with Larry Sherwood, Sherwood Associates. Because of the prevalence of distributed generation in the U.S. solar power industry, the share of solar in figure 12, based on EIA utility-scale data, is underestimated. If the data included small and medium residential and commercial installations, the figure for solar electricity generation would be about three times larger.
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- 176 Center for Energy Workforce Development, *Gaps in the Energy Workforce Pipeline: 2009 CEWD Survey Results - Executive Summary* (2009).
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- 180 Ibid., and Center for Energy Workforce Development, *Get into Energy: Career Pathways Credentialing*.
- 181 Interview with Ann Randazzo, Center for Energy Workforce Development, February 3, 2012.
- 182 *Greener Skills* (pp.28-29) featured the Center’s leadership in developing a wind technician skill standard (part of Washington’s Energy Industry Skills Standard Project), and, as in *Greener Pathways* (p. 8), highlighted the sectoral work distilled in WA Skill Panels.
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- 184 Interview with Mike Hansen, Avista Training, December 20, 2011.
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- 186 Personal Communication with Laura Chenven, HCAP, July 6, 2012, and Nancy DellaMattera, HCAP May 29, 2012.
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- 188 Ibid.

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- 194 Economic Development Research Group and Downstream Strategies, *Failure to Act: The Economic Impact of Current Investment Trends in Water and Wastewater Treatment Infrastructure* (American Society of Civil Engineers, 2011): iv.
- 195 See, e.g., Programme Office on Global Water Assessment - Division of Water Sciences, *WWDR4 - Background Information Brief: Global water resources under increasing pressure from rapidly growing demands and climate change, according to new UN World Water Development Report* (UNESCO, 2012).
- 196 Joan F. Kenny et al., *Estimated use of water in the United States in 2005: U.S. Geological Survey Circular 1344* (U.S. Department of the Interior - USGS, 2009).
- 197 Economic Development Research Group and Downstream Strategies, *Failure to Act*, v.
- 198 See, e.g., ASCE, *Failure to Act*, p.17. and Natural Resources Defense Council, *People and the Environment*.
- 199 Bill Clements, "Milwaukee searches for flood relief," *The Daily Reporter* (July 27, 2010), <http://dailyreporter.com/2010/07/27/milwaukee-searches-for-flood-relief/>
- 200 Gordon et al., *Water Works*, 1.
- 201 *Ibid.*, 13.
- 202 For details, see the Environmental Protection Agency's Green Infrastructure website at <http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm>
- 203 Personal Communication with Marge Wood, Wisconsin Technical College System (WTCS), June 12, 2012.
- 204 Gordon et al., *Water Works*, 24.
- 205 Milwaukee Water Council, <http://www.thewatercouncil.com/about/overviewhistory/>
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- 208 City of Milwaukee Green Team, *Building a Smarter City Through Sustainability: A Strategic Vision and Outline for Action* (June 2012), <http://city.milwaukee.gov/sustainability/SustainabilityPlanGreenTeam.htm>
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- 211 Sammis B. White and Brad Lenz, *Milwaukee 7 Water CEO Call Program Final Report* (Milwaukee Development Corporation, 2009): 23-24.
- 212 Interview with Dean Amhaus, Water Council (July 13, 2012).
- 213 Interview with Elizabeth Thelen, Water Council (July 2, 2012).
- 214 Mike Mortell, *Water Boundaries Project: Fact Sheet*, <http://www.milwaukee7-rwa.net/file/show/water-industry-talent-development-framework-3-10.ppt>
- 215 Personal Communication with Leslie Spencer-Herrera, Milwaukee Area Workforce Investment Board (MAWIB) June 12, 2012.
- 216 *Ibid.*
- 217 Personal Communication with Marge Wood, WTCS, June 12, 2012.
- 218 Much of the information on this project was gleaned through personal communications with MAWIB staff: Leslie Spencer-Herrera (May 31 and July 2, 2012), Jeffrey Hopton (June 1 and 12, 2012), and Sue Wile (June 14, 2012).
- 219 Milwaukee Regional Business Accelerator Project Abstract
- 220 RISE Curriculum Development Grant Final Report, Milwaukee Area Technical College — Green Technologies Certificate.
- 221 Milwaukee Area Technical College, *MATC RISE Green Technologies Certificate - Program Design Summary*, (June 10, 2011).

222 Milwaukee Metropolitan Sewerage District, *Workforce Development Training*, <http://w3.mmsd.com/workforcetraining.aspx>

223 See <http://sage.wi.gov/>

224 SAGE - Wisconsin's Sector Alliance for the Green Economy, *Registered Apprenticeship Program for Wastewater Treatment Plant Operator*, (October 2011).

225 Personal Communication with Marge Wood, WTCS (June 12, 2012)

226 The Solar Instructor Training Network (SITN), a U.S. Department of Energy initiative administered by the Interstate Renewable Energy Council (IREC), works with regional training consortia around the country to improve the quality of skill delivery for the solar industry. In an attempt to demonstrate the value and necessity of embedding "green" skills training into traditional occupational and professional education, SITN developed an interactive online career map exploring 36 occupations in four sectors (production, design, marketing, installation), most of which are not exclusively, or even primarily "solar" jobs. The map can be seen here: <http://www1.eere.energy.gov/solar/careermap/>. And the SITN/IREC Best Practices series includes a new report on integrating solar content into existing courses and programs: Jerry Ventre, *Solar Energy Education & Training Best Practices: Solar Content Integration* (Interstate Renewable Energy Council, Solar Instructor Training Network).

227 This concept, introduced in *Greener Pathways* and elaborated in *Greener Skills*, is by now fairly widely accepted, and is not inconsistent with the useful O*NET taxonomy of increased demand, enhanced skill, and new/emerging occupations. See Erich C. Dierdorff et al., *Greening of the World of Work: Revisiting Occupational Consequences* (National Center for O*Net Development, 2011).

228 White, Dresser, and Rogers, *Greener Skills*, 5. This particular version of the agenda, adapted here from the previous report in this series, was originally developed by Joel Rogers for Hudson, Rogers, and Thompson, *Eyes on the Prize*.

229 If this section piques your interest, we direct you to a number of key resources that offer greater detail and deeper thought on each element in our program: Julie Strawn, *Farther, Faster: Six Promising Programs Show How Career Pathway Bridges Help Basic Skills Students Earn Credentials That Matter* (CLASP Center for Postsecondary and Economic Success, August 2011); Evelyn Ganzglass, Keith Bird, and Heath Prince, *Giving Credit Where Credit Is Due: Creating a Competency-Based Qualifications Framework for Postsecondary Education and Training* (CLASP Center for Postsecondary and Economic Success, April 2011); Marcie Foster, Julie Strawn, and Amy Ellen Duke-Banfield, *Beyond Basic Skills: State Strategies to Connect Low-Skilled Students to an Employer-Valued Postsecondary Education* (CLASP Center for Postsecondary and Economic Success, March 2011); Mary Clagett and Ray Uhalde, *The Promise of Career Pathways Systems Change: What Role Should Workforce Investment Systems Play? What Benefits Will Result?* (Jobs for the Future, 2011); Maureen Conway, Amy Blair, and Matt Helmer, *Courses to Employment: Partnering to Create Paths to Education and Careers* (Workforce Strategies Initiative - The Aspen Institute, 2012); Helmer, Blair, and Gerber, *Strong Foundation*; Sheila Maguire et al., *Tuning In to Local Labor Markets: Findings From the Sectoral Employment Impact Study* (Public/Private Ventures, July 2010); Terry Grobe et al., *A Green Career Pathways Framework: Postsecondary and Employment Success for Low-Income, Disconnected Youth* (The Corps Network, 2011); Owens-Wilson, *Constructing Buildings*; The Partnership for Working Families, *Green Construction Careers*; Zabin et al., *California Workforce Education & Training Needs Assessment*; Daniel Villao et al., *Beyond Green Jobs: Building Lasting Opportunities in Energy Efficiency* (California Construction Academy, UCLA Center for Labor Research and Education, 2012). Finally, one of the best short statements of the rationale for federal policy reform on skill delivery is still: National Skills Coalition, *Toward Ensuring America's Workers and Industries the Skills to Compete: Partnerships, Pathways, Proportionate Investment* (2009). For a quick literature review of earlier but still valuable works on these topics, see White and Walsh, *Greener Pathways*.

230 The classic "Tipping Point" Study analyzed outcomes from the Washington State Community and Technical College System and found that shorter-term credentials did not pay off for adults who entered post-secondary education with a high school diploma or less. David Prince and Davis Jenkins, *Building Pathways to Success for Low-Skill Adult Students: Lessons for Community College Policy and Practice from a Longitudinal Student Tracking Study* (Community College Research Center, Teachers College, Columbia University, April 2005). A recent study from Georgetown suggests that shorter term certificates may in some cases have significant value in the labor market. See Anthony P. Carnevale, Stephen J. Rose, and Andrew R. Hanson, *Certificates: Gateway to Gainful Employment and College Degrees* (Georgetown Center on Education and the Workforce, 2012).

231 It is not in the scope of this paper to detail or even summarize the promising elements of these initiatives. For more information, see, e.g., <http://www.doleta.gov/pdf/GJIFOnePagersALL.pdf>; http://doleta.gov/taacct/pdf/TAACCCT_One_Pagers_All.pdf; http://hrd.apec.org/index.php/APEC_Symposium_on_Human_Capital_Policies_for_Green_Growth_and_Employment; http://www1.eere.energy.gov/wip/about_system.html

232 Again, there are too many good projects to list, and not enough space to include details for even a few. A starting place for further inquiry on those cited (many of which have now generated their own literature): <http://www.aspeninstitute.org/policy-work/aspenn-prize>; <http://www.theseedcenter.org>; <http://www.shifting-gears.org/>; www.nfcsolutions.org; www.communitybenefits.org; <http://nationalskillscoalition.org/>; <http://www.workingpoorfamilies.org/>; <http://www.workingforamerica.org/>.

This report was designed by Kristin Girvin Redman and Tracy Harris at Cricket Design Works in Madison, Wisconsin. Graphics and figures were created by the team at Cricket Design Works.

The text face is Miller Text Roman from Font Bureau. The fonts used for subheads and headers include Neutraface 2 Display Medium and Bold from House Industries.

The report was printed by Wells Printing and bound by Madison Bindery in Madison, Wisconsin. The paper stock is Accent® Opaque RE-30 text and cover from International Paper. This stock contains 30 percent post-consumer fiber.



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