CONSULTANT REPORT

The National Center for a Clean Energy Workforce: A Scoping Study

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ABSTRACT

This report researched several options for the development of a National Center for the Clean Energy Workforce (NCCEW) in California. The goal of the NCCEW is to help strengthen the capacity of California and other states to build a clean energy economy rooted in a skilled workforce with broad access to good green jobs, which focus on three broad sectors: renewable energy, energy efficiency, and clean energy vehicles. The report outlines three possible options for the focus of the center, discusses specific possible functions of the center, and lays out choices related to the structure and institutional home of the center. These options are:

- Option 1 is an NCCEW whose starting point would be labor supply. Its primary audience would be the workforce development community, including the community colleges, apprenticeship programs, and other training and education institutions. Its mission would be to build the capacity of these organizations to help workers prepare themselves for new careers in the clean energy economy.
- Option 2 is an NCCEW whose starting point would be labor demand. Its primary audience would be the clean energy community—both public sector and private employers involved in renewable energy, energy efficiency, and clean energy vehicles. Its mission would be to build their capacity to identify the skills they need, to communicate those needs more effectively to training providers, and to recruit and retain a workforce with the appropriate skills to achieve their objectives.
- Option 3 is an NCCEW whose starting point would be labor demand *and* labor supply. It would bring together the energy and workforce communities to address both clean energy and workforce development goals simultaneously. The focus would be on building a "high-road clean energy economic development strategy"—a strategy focused on promoting quality, performance, and innovation so that businesses compete by investing in a committed workforce that is both highly skilled and rewarded for those skills.

The results of this research will be used by the California and national workforce communities to assess if the next steps should be taken to begin the necessary actions required to form one or more centers in California and the throughout the nation.

Keywords: California Energy Commission, clean energy, clean energy economic development, clean energy vehicles, energy efficiency, green jobs, high-road economic development strategy, National Center for the Clean Energy Workforce, renewable energy, workforce development

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report outlines options for the development of a National Center for the Clean Energy Workforce (NCCEW). The NCCEW would help strengthen the capacity of California and other states to build a clean energy economy rooted in a skilled workforce with broad access to good green jobs, focusing on three broad sectors: renewable energy, energy efficiency, and clean energy vehicles. The report lays out three possible options for the focus of the center, discusses specific possible functions of the center, and presents choices related to the structure and institutional home of the center.

Focus

The report lays out three possible options for a focus of the center:

- Option 1 is an NCCEW whose starting point would be labor supply. Its primary audience would be the workforce development community, including the community colleges, apprenticeship programs, and other training and education institutions. Its mission would be to build the capacity of these organizations to help workers prepare themselves for new careers in the clean energy economy.
- Option 2 is an NCCEW whose starting point would be labor demand. Its primary audience would be the clean energy community—both public sector and private employers involved in renewable energy, energy efficiency, and clean energy vehicles. Its mission would be to build their capacity to identify the skills they need, to communicate those needs more effectively to training providers, and to recruit and retain a workforce with the appropriate skills to achieve their objectives.
- Option 3 is an NCCEW whose starting point would be labor demand *and* labor supply. It would bring together the energy and workforce communities to address both clean energy and workforce development goals simultaneously. The focus would be on a building a 'high-road clean energy economic development strategy"—a strategy focused on promoting quality, performance, and innovation so that businesses compete by investing in a committed workforce that is both highly skilled and rewarded for those skills.

The authors recommend Option 3 because their examination of the panorama of clean energy workforce efforts, in California as well as the rest of the country, suggests that a specific focus on the high-road would address the interests of both the energy and the workforce communities, fill a needed niche, and add value to the many efforts that are already occurring.

Function

An NCCEW could potentially be involved in five specific functions:

- Research. The research function includes potentially compiling existing research, organizing that research, evaluating it, and engaging in primary research where gaps are identified. Though there were wide-ranging research needs expressed by both the energy and the workforce communities, the central focus for Option 3 research would be on mapping, assessing, and evaluating the effectiveness of skill standards, certification processes, and other mechanisms being used or

promoted in the clean energy sectors for achieving both clean energy and workforce development goals.

- Clearinghouse and Communications. This function includes being a repository for information on model practices as well as ensuring that the information is effectively communicated to key targeted audiences. For Option 3 the focus would be on building communication between the workforce development and clean energy communities, to assist them in their collective work on building a high-road clean energy economy.
- Technical assistance. The technical assistance function would focus on translating information about good models into real changes in practice on the ground. For Option 3, a main focus of technical assistance would be to build states' capacity to align their incentives, regulations, contracts, and other policies to promote consistent skill standards. Another major focus would be to work with education and training programs to ensure there are on-ramps and stackable and portable credentials aligned with the standards.
- Public policy. Through this function the NCCEW would provide independent analysis of policy initiatives, especially the workforce development implications of energy policy design. For Option 3, an important function could be stakeholder engagement for policy development that builds from areas of common concern to the energy and workforce development communities;
- Funding workforce development projects, to support effective training and education in clean energy sectors.

In the research team's review of other initiatives in the field, the authors recommend a primary focus the research, clearinghouse and communications, and technical assistance functions. In regard to research, there is more of a need to compile, evaluate, synthesize, and disseminate information about research being done by other entities than to engage initially in primary research, which would likely result in duplication of effort. The clearinghouse and communications function and the technical assistance function are critical for engaging stakeholders and helping the workforce and energy actors work together and align their programs and practices.

The authors recommend that the center should have some engagement in public policy initiatives, primarily as an independent evaluator of policy initiatives. Engagement of energy and workforce stakeholders for policy development on areas of mutual interest can also be fruitful, though it would need to stop short of advocacy. The authors recommend against the center getting involved in distributing funding directly, since this fundamentally changes the nature of the relationship between the center and potential stakeholders.

Structure

Here the authors report on the areas of broad consensus and the areas where there are more specific choices that will need to be made. The authors then present two main options of how to build the NCCEW and discuss the choices for institutional home and organization-building process that go with each of them.

There was broad consensus in the research team's interviews that the center should:

- Build partnerships across multiple constituencies, possibly including the federal government, other state governments, California state agencies, utilities, renewable energy industry associations, building trades unions, community colleges and other workforce development providers, regulators, certification entities, and university-based research centers.
- Have a governance structure that gives it some independence from government and provides opportunities for stakeholders to be directly involved in strategic directions of the center.
- Be structured in some kind of networked or hub-and-spoke structure with more than one physical location, to take advantage of expertise in multiple locations and avoid being seen as being 'captured' by a single region or place.

The main decision the California Energy Commission (Energy Commission) faces is whether to launch a multistate NCCEW in the hope of securing American Recovery and Reinvestment Act (ARRA) funding, or to start with a California based NCCEW that could become truly national over time.

1) Multistate launch of the NCCEW: This would require an Energy Commission led process that brings together leaders of state energy and workforce agencies from selected states to develop a proposal for federal funding based on the collective interests of participants.

2) A California-focused Center: This center would be launched in California but with an eye to becoming truly national over time. A key opportunity for California-focused would be to work with the emerging clean energy technologies centers in University of California (UC) and the California national labs, and to develop within these centers a focus on workforce issues. Building off the nationally recognized CALCTP program, a NCCEW could insert research and development of skill standards and incorporate workforce development planning into technology deployment initiatives.

The authors believe that the first option is better but recognize that it will require a heavy lift by the Energy Commission, given the disparate perspectives and needs in other states, and the limited time frame to pursue ARRA funds. The second option could start at a smaller scale and build credibility over time, expanding its geographic reach through collaborations with other institutions and states. A center focused on California would have the advantage of being quicker to set up, with the potential for a more concentrated impact, but with disadvantages related to potentially being less involved in Federal policy or national standards. A nationally focused center could have the ability to leverage more resources and have a larger impact, but with potential disadvantages associated with more complex politics and diffusion of efforts.

The type of institutional home that best serves the NCCEW depends on whether it is launched as a multistate or California initiative. However, in neither case do the authors see any existing organization as being the ideal home for a new NCCEW. It is important that the center being fully embraced by a wide-range of existing stakeholders, and handing it to a sole existing organization would inevitably create immediate prejudices.

For a multistate initiative, the authors recommend either a new nonprofit organization or a new initiative of an existing nonprofit organization, or a university consortium. Possible existing nonprofits

include the Center for State Innovation, Clean States Energy Alliance, the National Governors Association Best Practice Center, and the Interstate Renewable Energy Consortium, and we present the pros and cons of each.

For a California launch, in addition to the possibilities mentioned above, an option that is close to state government—but not of it-- is to create a quasi-public entity, or a joint powers agreement among multiple agencies, but with an independent Board of Directors. A second option would be to affiliate to a university but through a separate but nonprofit structure. If a focus on energy technologies is chosen, a close link to the UC network of technology centers may be the most effective and the easiest to launch quickly.

Conclusion

In conducting the research for this report, the authors heard some skepticism and concern from some of their informants about the idea of a new National Center for the Clean Energy Workforce. With all the multiple clean energy and green job initiatives going on around the country, some people expressed concern about duplication of effort, increased competition, and the potential for heightening political tensions.

Nonetheless, the authors also heard significant excitement about the potential role such a center could play, if developed in the right way. There was real enthusiasm for the Energy Commission's initiative in this area from many stakeholders and a willingness to work closely with the Commission in ensuring the success of a future center.

The authors believe a strong focus on promoting high-road clean energy economic development strategies that can simultaneously meet both workforce and economic development needs is the best way to build on existing work and provide real value-added contributions to the field.

Chapter 1: Introduction

The purpose of this report is to flesh out options for the development of a National Center for the Clean Energy Workforce (NCCEW). The goal of the NCCEW is to help strengthen the capacity of California and other states to build a clean energy economy rooted in a skilled workforce with broad access to good green jobs. In particular, the center focuses on workforce development issues affecting the following sectors: renewable energy, energy efficiency, and clean energy vehicles. The report is based on information and perspectives gathered in 109 interviews conducted by the UC research team for the California Energy Center. For a list of interviewees, please see Appendix A.

We interviewed key experts and practitioners in two communities critical to the NCCEW project: the "energy community" and the "workforce development community." The energy community comprises agencies and organizations involved in promoting the transition to a clean energy economy. It includes government actors responsible for clean energy public policies and programs, clean energy researchers and technology developers, environmental advocates, and private sector businesses and associations in the clean energy sectors. These actors mainly influence the demand side of the labor market. The workforce development community comprises state and federal workforce training agencies as well as public and non-governmental educational institutions. It includes Workforce Investment Boards, community colleges, apprenticeship programs, community-based organizations, workforce and low-income advocacy organizations, local government workforce agencies, and proprietary training providers. These actors influence the supply side of the labor market.

The interviewees in the energy community were overall keenly aware of the importance of workforce issues. They expressed concerns that once economic recovery takes hold, future shortages of qualified workers in key occupations could slow development of the sectors. They also expressed concerns that insufficiently trained workers can lower the quality of work, leading to poor performance outcomes in clean energy services, ultimately affecting the consumer satisfaction needed for widespread and rapid adoption of energy efficiency measures and clean energy sources. Mark Sinclair, executive director of the Clean Energy States Alliance (CESA), reflected:

> Right now a lot of public dollars are going into solar, small- and mid-scale wind. But the status and quality of installation is all over the map. The American public by and large doesn't believe that these technologies work, that they are ready at an industrial scale. To win that confidence, we have to have people who are in place who can reliably produce and install the technology. Massachusetts spent a lot on small wind, and most of the wind turbines are performing horribly. So certification and standard installation and quality control is huge.

A smaller number of interviewees from the energy community highlighted the importance of equity, realizing the value of increasing access for workers of all backgrounds to good green jobs. "Especially with this area of renewable energy and in particular energy efficiency, it's not a group that appreciates that equity model is the best model for efficiency," said Ezra Auerbach of the North American Board of Certified Energy Practitioners (NABCEP). He added "There is no way for the Energy Commission to

get where it wants to go without equity being the pathway." Many did recognize that few organizations in the energy community have in-house expertise on workforce issues. Because of this, it is quite common for them to underestimate their own role in shaping labor market outcomes, and the opportunities they have to influence work quality, skills, job access, and job quality. Thus, in many cases, the drivers don't know they are in the driver's seat with respect to workforce development.

The interviewees in the workforce development community clearly see the potential of green jobs as the next major growth sector, and many are rapidly gearing up to respond to it. The workforce development community has, over time, forged a consensus about what successful workforce development looks like and what reforms need to be put in place to improve the country's workforce system. These include the importance of serving the needs of *both* job seekers and employers, and focusing on sector-based needs, rather than the needs of individual firms or occupations in isolation. However, the interviewees recognized that the workforce development community is not in a position to drive labor demand and labor market conditions. Given the uncertainty about actual job growth and skill needs, the competing skill standards of lack there of, and the atomization of the workforce and education organizations, organizations in the workforce community find themselves chasing after limited workforce development dollars and scarce jobs. There was general recognition among interviewees that the rapid creation of new programs spawned by the infusion of American Recovery and Reinvestment Act (ARRA) dollars, the cuts to education occurring in many states, and the "hype" surrounding green together threaten to create more chaos in an already cluttered workforce development system.

Those most knowledgeable about the clean energy workforce concur on a number of points that help ground this analysis of what the NCCEW should focus on. Interviewees emphasized that the need for understanding and addressing workforce challenges is greatest in the "mid-skill" range, which involves education or training beyond high school but below the level of a four-year degree. Most clean energy jobs will require some technical knowledge—"mechanics, tolerances, limits, precision, things like that" in the words of Amy Glasmeier of the Massachusetts Institute of Technology—putting them beyond most high school graduates. On the other hand, jobs requiring a four-year degree such as engineering involve enough value-added that there are well-developed professional skill standards and well-financed training programs. Though there is still a need to develop specialties within the professions that specifically address clean energy, the basic labor market infrastructure is generally in place.

Many interviewees with knowledge of the clean energy sectors agree that "a lot of [the conversion to clean energy] is adapting existing jobs, so 80 percent of the job stays the same but there's 20 percent that needs to be retrained in because they are using different equipment, different technology or different processes," as Mark Troppe of the National Institute for Standards and Technology (NIST) stated. Interviewees from Joan Fitzgerald of Northeastern University to Bernie Kotlier of the IBEW-NECA partnership to Dan Luria of the Michigan Manufacturing Technology Center (MMTC) also agree that broad occupational training rather than narrow skill provision is a win-win for employees (who have greater mobility options) and, in the long run at least, employers (who get workers able to cope with varied and unforeseen situations). However, competition based on cost rather than quality pushes away from this ideal. According to Case Van Dam of the California Wind Energy Collaborative, for

wind power installers "a two-year program is probably the most effective [but] now there is pressure to shorten the programs to six months or one year."

The idea of creating the NCCEW elicited a wide variety of responses in both the energy and workforce development community, and underscored the complexity of this terrain and the difficulties of creating a value-added institution in this crowded and somewhat chaotic arena. Quite a few interviewees did not see a need for the NCCEW, and amongst those that did, many different visions were offered for what it should do. Jane Weissman, Executive Director of the Interstate Renewable Energy Council, argued that it is important "to avoid creating another clearinghouse that might be duplicative of the work being done by other centers—one-stop shopping for the whole country might not be feasible or necessary." Part of the ambivalence is due to the existence of a number of resource centers devoted to specific components of the overarching mission of the NCCEW. These are focused on particular subsectors of the industry (wind, solar, energy efficiency, etc.), regions (the Midwest, New England, etc.), or functions (research, clearinghouse activities, etc.). Practitioners in the different clean energy sub-segments rely on the resource centers that match their own needs. Pat Colburn of the California Building Performance Contractors Association expressed some skepticism: "My first reaction is that it seems duplicative and I don't know for sure if there's an agency out there that does a lot of this but I do know that there's these agencies that do this and this and this," he said, then acknowledging, "So I do understand your concept about bringing it under one roof."

The energy agencies tasked with promoting clean energy in other states that we interviewed, a key group that would need to be involved in building a national center, vary widely in their involvement in and approach to workforce, their perceived needs, and their current partners. Joining California's effort to create the NCCEW did not resonate immediately with most of the state agencies we interviewed. Adele Ferranti of New York State Energy Research and Development Authority (NYSERDA), for example, expressed that they are pretty far down the road and not sure what a national center could add, while John Baldus of the Wisconsin Office of Energy Independence cautioned against duplication and redundancy.

Even given this complex terrain, we have concluded that, if implemented properly, an NCCEW could add value, and over time could become a recognized national center that could advance the clean energy and workforce fields in important ways. Our research showed that most existing resource centers are deeply rooted in either the energy community or the workforce development community, but not in both. As a consequence, very few resource centers give equal weight to the goal of spurring the transition to clean energy and the goal of preparing students and workers of all backgrounds for good jobs with career paths in clean energy sectors. And very few have necessary expertise in *both* workforce development and the clean energy sectors. This situation provides an important opportunity to build a resource center that addresses both workforce and economic development goals.

A critical catalyst to the NCCEW is the strong action being taken by federal, state, and local governments to promote the development of the clean energy sectors. The confluence of federal, state, and local clean energy initiatives, together with the focus on clean energy as a key economic recovery strategy, create a unique historical moment that will shape the nation's long-term success in meeting these two goals. Because government policy is playing such a key role in these sectors, governmental action has tremendous influence over the ways in which these sectors will develop. The high degree of

focus and attention combined with the deep level of intervention create a tremendous opportunity to shape the development of these industries, including the types of jobs that are created and the way in which human capital is prepared, deployed, and rewarded.

Below we present three options that address these goals of linking workforce and economic development in clean energy sectors.. Option 1 is an NCCEW whose starting point would be labor supply. Its primary audience would be the workforce development community and its mission would be to build the capacity of educational institutions and training organizations to more effectively prepare workers for jobs in the clean energy economy. Option 2 is an NCCEW whose starting point would be labor demand. Its primary audience would be the clean energy community—both public sector and private employers involved in renewable energy, energy efficiency, and clean energy vehicles. Its mission would be to build their capacity to identify the skills they need, to communicate those needs more effectively to training providers, and to recruit and retain a workforce with the appropriate skills to achieve their objectives.

Option 3 is our preferred option. It combines Option 1 and Option 2 by addressing both labor demand and labor supply, and brings together the energy and workforce communities to address both the clean energy goals and the workforce development goals simultaneously. We use the language of building a "high-road clean energy economic development strategy" to describe Option 3. A high-road strategy focuses on quality and innovation, so that businesses compete by investing in a committed workforce that is both highly skilled and rewarded for those skills. Option 3 would build on the opportunity created by government influence to steer these sectors onto a high-road and to create appropriate labor demand to achieve quality and high performance, while helping the workforce community respond to this demand. Option 3 thus is both more focused *and* more ambitious than either Option 1 or Option 2. It is more ambitious because it addresses both labor supply and demand, while it works simultaneously with both the energy and workforce development communities. And it is more focused because it emphasizes skill standards, certification processes, and other mechanisms for promoting the high quality work that is needed to grow these industries to scale. Our examination of the panorama of clean energy workforce efforts in California and the rest of the country suggests that a specific focus on the high-road would fill a niche that needs to be filled and would add value to the many efforts that are already occurring. We describe the three options in more detail below.

Option 1: Building the capacity of the workforce development community to maximize opportunities in the clean energy sectors

Option 1 emphasizes the supply side of the labor market, focusing on the workforce development community as it builds or modifies its programs to address the particular needs of the clean energy sectors. Option 1 would help the workforce development community by providing them with research, up-to-date information, technical assistance, peer learning opportunities, and best practice dissemination. These activities could help them serve their job-seeking clientele more effectively by better preparing them for the job market. Given that middle skilled jobs will form the bulk of new jobs as well as jobs that need upskilling, the main focus of Option 1 would be to support the design and implementation of educational pathways and programs to train and place unemployed, low-wage and dislocated workers, as well as community college and high school graduates, into green careers.

A focus on labor supply does not mean neglecting employers, since achieving positive outcomes for workers requires engagement with employers as well. There is an emerging consensus among experts and policy makers, embodied in the strategies of workforce development leaders like the National Fund for Workforce Solutions,[1] on "what works" in the field of workforce development for middle skills occupations. Our interviews supported this growing body of evidence that points to the promise of "sector-based strategies." Sector-based strategies address the needs of both employers and workers within a particular industry through collaborative partnerships among educational and training organizations, employers, community-based agencies, labor, and public agencies. Sector-based strategies have had great success in training, placing, retaining, and creating career ladders for workers in jobs that do not require college or post-graduate degrees (P/PV, 2009, Conway et al., 2007, Giloth 2000). Though sector initiatives take different forms depending on the sector and the region of the country, they all require deep engagement with workers to provide career matching, screening, and supports, as well as integrated skills training including both technical job-specific training and job readiness in each sector. Sector initiatives also require industry-specific expertise to develop training programs that build career ladders through portable and stackable[2] credentials. Though we found many workforce development resource centers that already had extensive experience in supporting sector initiatives, far fewer had the industry expertise in the clean energy sectors.

In Option 1, the NCCEW could help the workforce community develop its capacity to meet the specific needs of the clean energy sector. The NCCEW could carry out research to support the development of successful clean energy workforce development programs, pool forecasts for hiring and skill demands, be a repository for curricula, disseminate best practices and models, create learning communities and networking opportunities for practitioners of workforce development, and provide technical assistance to existing and new workforce development programs.

This primary focus on the supply side, however, has several disadvantages. First, there are a number of resource centers in specific regions of the country and in specific sectors that are already doing important parts of this-- for instance, the US Partnership for Education for Sustainable Development of the American Association of Community Colleges is currently engaged in archiving green jobs curricula from across the country, and there are a number of other groups creating training program inventories. It would be difficult for the NCCEW to carve out a niche that would clearly add to, rather than compete with, these centers. Second, and more importantly, the supply-side focus, because it is simply responsive to labor market demand, is unable to resolve the confusing array of signals sent by energy agencies about what skills to train for and what credentials to create. In a number of the clean energy sectors, there are a myriad of quality assurance mechanisms, including contractor and worker certifications, licensing requirements, performance ratings, and the like, and they have an impact on the kinds of jobs created and the kinds of skill requirements sought by employers. The lack of alignment by state, federal, local, and utility-based programs sends very confusing signals to employers and to the workforce development community. Until these are aligned, it will be very difficult for rationalization of training programs to occur, and duplication and competition inevitably

[1] http://www.nfwsolutions.org/

[2] Portable credentials are those that are recognized across employers and regions; stackable credentials are those that allow workers to get recognition for on-going skills development by connecting and aligning credentials in a cumulative way.

will continue. According to Charles Segerstrom of PG&E, the greatest need is for "a center that can develop or help develop consistent standards at all levels whether they're city, county, utility, or federal energy efficiency programs." Such a focus on developing consistent standards would require direct attention to the labor demand side.

Option 2: Rationalizing the demand side of the clean energy labor market: quality assurance mechanisms and skill standards

Option 2 focuses on the demand side of the labor market and addresses the issues of quality and performance that are of concern to government policy makers, consumers, and high-road employers. Our interviews revealed concern about quality in many of the clean energy sectors, particularly those that require significant construction-related work. In the building retrofit market, quality issues were of concern for gaining consumer confidence, for safety, and for realizing the energy savings potential of energy efficiency equipment. For solar, quality concerns were voiced around safety and reliability. We surmise that performance and quality issues are important in other clean energy sectors as well, though they vary from sector to sector, and may be more critical in some than in others. Developing quality standards is also important for ensuring that training providers are providing quality training. As Ezra Auerbach of NABCEP said, "we need to be able to establish standards to prevent low-quality, for-profit training providers from confusing the market."

Option 2 takes advantage of the powerful lever that state energy agencies, public utilities commissions, municipal retrofit agencies, and others have over the nature of the jobs created. One clear area of work for Option 2 would be a focus on skill standards and accompanying certification initiatives. At present, policy initiatives at different levels of government are not necessarily aligned, creating much uncertainty for employers. For example, in residential retrofit programs in California, the state is currently grappling with how to align quality assurance approaches in the Property-Assessed Clean Energy (PACE) districts, the utility programs, and the federal Home Star initiative. Such alignment will provide contractors with clear guidance on what they need to do, and on the skills and certifications workers need to have. This is necessary to attract a pool of contractors and qualified workers who can build this industry.

The area of quality assurance, skill standards, and certification has clear interest from the U.S. Department of Energy (DOE) and various state agencies, relevance across sectors and regions, and a lot of activity on the ground. The DOE is making substantial investments in the formal development of skill standards, starting with solar and residential retrofit. As Ben Goldstein of DOE summed it up, "The federal government is investing in technical standards for solar PV installation and solar thermal installation, and quality assurance, maintenance, etc. Simultaneously they're embarking on a process to invest in standards for (residential) energy efficiency retrofits to help facilitate an industry-led process in developing robust technical skill standards for energy efficiency retrofit...." Skill standards and certifications are now being embedded in many ARRA funding opportunities, municipal retrofit programs, and utility incentive programs, and are a common feature in large unionized utilities with internal labor markets. Yet analysis of the impact of alternative quality standards, especially those impacting workers, is still minimal. There is a clear need for evaluation, technical assistance, or cross-region and cross-sector learning in this area.

One potential problem with a primary focus on the labor demand side is that the field is already crowded, for example with the expansion of IREC (certifying trainers) and NABCEP (certifying trainees) beyond solar installation to other areas of renewable energy. A second problem is that rationalization of quality assurance, skill standards, and certification, though clearly necessary, is not sufficient to address the workforce goals of the NCCEW. For example, certifications can be exclusionary if on-ramps and training ladders are not in place. And though in some circumstances certifications bring higher compensation, this is by no means guaranteed. Yet from the workforce perspective we clearly want to correlate higher skills with higher compensation so that workers move up not just a skill ladder, but an economic ladder as well. "The fact is that many green jobs are bad jobs," said Bruce Herman of the New York State Department of Labor, "and tying skills acquisition to higher compensation is critical." Thus, if the NCCEW addressed only the demand side it would miss an important opportunity to better align government promotion of the clean energy sectors with the goals of both cleaner energy and better outcomes for workers.

Option 3: Building the high-road in clean energy sectors

Option 3 encompasses both Option 1 and Option 2, and addresses labor demand and labor supply in a coordinated fashion. We believe the NCCEW's most important strategic opportunity is to be found in bringing the clean energy community and the workforce development community together to build capacity to develop a "high-road" economic development path in the clean energy sectors. According to the business and economic development literature (Parker and Rogers 2001; Bernhardt et al. 2004; Luria et al. 1999; Schweke 2006), a high-road economic development strategy is one in which businesses compete by investing in a committed workforce that is both highly skilled and rewarded for those skills "The 'high-road' to competitiveness is based on the cultivation of employee commitment and an exchange of high wages for high productivity," as JRank.org's online *Encyclopedia of Business Management*[3] puts it. A high-road in clean energy thus weds the interests of the energy community in achieving its clean energy goals, and the interests of the workforce development community in creating opportunities for workers to acquire skills and obtain good jobs tied to career pathways. Option 3 would involve an NCCEW that assists policy makers in supporting high-road development by aligning quality assurance mechanisms in their incentives, contracts, funding opportunities and other interventions, to that clear and appropriate standards can be set to guide skill development.. Simultaneously, in Option 3 NCCEW would focus its workforce-side capacity-building on being responsive to these demand-driven standards while incorporating mechanisms to build appropriate on-ramps and stackable and portable credentials for workers. We believe both are necessary in order to create the conditions to deploy appropriately skilled workers throughout the occupational panorama, who are capable of producing quality work and quickly adapting to technological changes, and who are rewarded commensurately. Green for All's Jeremy Hays echoes this approach: "We need smart policies that will create the demand for workers that will create more domestic jobs in the U.S. that are family-supporting. Society needs to go beyond energy policy and beyond workforce development policy."

Option 3 would particularly focus on skill standards and certification initiatives, as in Option 2—but would emphasize aligning these with the creation of stackable and portable credentials that provide on-ramps and career ladders for workers. In this way it would bring together both those concerned

[3] http://www.jrank.org/business/pages/734/high-road.html

with clean energy goals and those concerned with workforce goals. For employers, skill standards provide assurance that job applicants have the skills they need. For public agencies promoting the clean energy economy, and for consumers, this provides critical assurances about the quality of work they can expect. Finally, for workers it may provide mobility, bargaining power, and higher returns in the labor market.

We believe that the NCCEW could play a leadership role in catalyzing the development of skill standards and certification processes that meet both the workforce needs on the one hand, and the needs of industry and economic development on the other. For industry, skill standards and accompanying certifications must build processes to incorporate rapidly changing technologies. For the workforce development community, they must result in both skill and wage ladders, avoiding obstacles like third party certifications that price low-income groups out. The project of building skill standards and certification structures is in its infancy in the clean energy sectors. The NCCEW could carry out research to evaluate alternative approaches and highlight best practices, provide technical assistance to both the energy and the workforce communities, create learning networks, and provide a clearinghouse for these promising efforts.

Option 3 would also allow for the exploration of the effectiveness of tools other than standards and certification that are being used to shape labor demand and supply in a coordinated fashion. These tools include mechanisms to ensure high quality work, including quality assurance programs, project labor agreements, and contractor licensing, as well as mechanisms to achieve good jobs goals, including community benefits agreements, local hire ordinances, and prevailing and living wages.

Any of Options 1, 2, or 3 would serve needs identified by both the clean energy community and the workforce development community. Our argument for Option 3 rests on the synergies and complementarities of a combined supply-side/demand-side approach. The remainder of our report consists of three sections. First we discuss the functional areas of activity of a NCCEW: laying out the main potential functions identified by our expert interviewees, exploring what priorities Options 1-3 would imply, and examining some finer-grained choices and tradeoffs as well. A second section conducts the same exercise for the structure and geographic and institutional location of a NCCEW. We then close with very brief conclusions.

Chapter 2:
Functions of a NCCEW

The National Center for the Clean Energy Workforce could have five major functions:

1. Research
2. Clearinghouse and communications
3. Technical assistance
4. Public policy
5. Funding distribution

We consider each one in turn, examining its importance, the arguments for and against engaging in each activity, and options for how to engage in each.

1. Research

Our interviews revealed that there is a significant overlap with the stated research and information needs of the workforce development and the clean energy communities. However the people in the energy community were often not knowledgeable about existing research on workforce development and vice versa, so there is a need to disseminate existing research already in use by one community to the other.

The following research questions were identified repeatedly by interviewees:

1. What are the most important sources of labor demand in the clean energy sectors, what new jobs will be created, and how will existing jobs change? What are likely future trends in labor demand?

2. How many workers are currently available to fill this demand, will there be skill shortages, and what resources are available to fill these shortages?

3. How do employers access workers; what skills and prerequisites do they look for in entry-level workers? What are existing or potential career ladders?

4. What skill standards, credentials and certifications, and other workforce-related criteria and incentives are used by employers and/or required by publicly-funded federal, state, and local energy programs? Which are most appropriate and useful to help workers get good jobs and move up career ladders? Are there on-ramps to help workers from disadvantaged communities obtain certifications and credentials?

5. Which skill standards, certifications and related requirements are most appropriate and useful for assuring quality and performance?

6. What tools do policy makers and those who implement clean energy programs have to encourage the adoption of skill standards? Which have resulted in broad industry adoption?

7. What are the characteristics of training programs that are most effective in achieving quality work and performance for entry-level and incumbent workers?

8. What curricula and pedagogical models exist? What particular education and training approaches are most effective in helping workers get good jobs and move up career ladders?

Despite some convergence in opinion on what information is most useful for exploring labor demand issues, overall, opinions varied significantly on the question of what research is truly needed or useful. A fair number of interviewees in the workforce development world and in advocacy coalitions (e.g., Blue-Green Alliance, Green for All) emphasized the need for research to gauge and forecast the demand for clean energy-related skills. Some of these interviewees pointed to the need for labor demand research that is immediately useful for workforce development program designers. Marcy Drummond of the LA Community College District and Larry Frank, City of Los Angeles Deputy Mayor of Workforce Development, argued that while research on national trends is abundant, information at the regional level is sparse and badly needed. Linda Collins of the Career Ladders Project associated with the California Community Colleges Foundation, Joan Fitzgerald of Northeastern University, and Rick McGahey of the Ford Foundation all argued for more research on labor market dynamics, including profiling employers in a specific subsector and mapping of long-term job trajectories and potential career ladders. Barbara Halsey of the California Workforce Investment Board suggested, "There's plenty of research; what's needed is analysis and extrapolation."

Other interviewees stated that there is already a lot of research on labor demand. Van Ton Quinlivan of PG&E asserted that additional research would be "redundant," adding, "Lots of groups do that." A number of interviewees argued that the BLS and state labor market information agencies are beginning to produce useful data on green sectors and that these institutions should play the central role in providing basic labor demand trends.

Interviewees from both the energy and workforce development communities agreed that there is insufficient research into the ways emerging technology will impact work processes and associated skills. Tom Holsman of California Associated General Contractors stated, "Research is needed on the way that new technology will drive training needs." A model effort in this regard, mentioned by several interviewees, is the collaboration between UC Davis, the California Investor owned utilities (IOUs), the IBEW and others. In this case, applied research on emerging advanced lighting control technology was integrated with investigation into the changing skill requirements of workers in this growing field. This has evolved into the California Advanced Lighting Controls Training Program (CALCTP), a flagship collaboration to train electricians in advanced lighting processes.

In terms of research on labor supply and workforce development, experts in the workforce development field saw no further need to analyze best practices in workforce development programs, because of the solid research and wide agreement about the effectiveness of sector strategies. But they

did see great need to disseminate sector strategies to broaden adoption of this approach. Sarah White of Center on Wisconsin Strategies (COWS) argued that, "There are a lot of people collecting best practices," and that in her view the key was not to search for best practices in clean energy in particular, but to bring into the clean energy field the best practices already identified in workforce development more generally.

At the same time, energy agencies that have recently started to fund workforce initiatives saw the need to analyze what works. Adele Ferranti of NYSERDA said that "there is a need for research to see if people are getting good jobs and if there are career paths." Many interviewees pointed to the need to evaluate the workforce outcomes of ARRA programs, not just in terms of the number of jobs created, but also the job quality and career trajectories of workers in ARRA-funded jobs. Though much of this evaluation will be done by state and federal agencies, the need to cut across the siloed perspectives of DOE and DOL were mentioned by several interviewees, as well as the need to compare different approaches taken across states.

For Option 3, the arena of skill standards, certifications, and other quality assurance and labor standards is the clear focus for research. Many interviewees talked about the confusing array of standards on employers, workers, work performed, compensation, etc., all of which affect both the quality of work performed and outcomes for workers. Very little research has gone into mapping current standards (see COWS, 2010) and their use, much less evaluating which approaches work. This research would evaluate alternative types of standards, compare and assess different approaches by public agencies to encourage industry adoption of standards, and analyze the impact of different standards on achieving both clean energy and workforce development goals.

We believe the NCCEW's research should be closely tied to the core missions of communication and technical assistance—to which we now turn.

2. Clearinghouse and communications

The notion of the NCCEW as a clearinghouse was perhaps the most common suggestion by interviewees. Dozens of interviewees called for a clearinghouse for training programs, certifications, state programs, best practices of many kinds, research, and/or other information. Many also advocated for the creation of a "learning community" or "community of practice," a forum for those wrestling with workforce issues in the clean energy sector. "Research without communication doesn't get used," declared the Ford Foundation's McGahey, and LA Deputy Mayor Larry Frank expressed the similar sentiment that "the primary challenge seems to be information exchange." But again, some of the respondents with the strongest overview of the national clean energy sector expressed ambivalence. White of COWS commented, "We need someone who can convene a broad discussion, but we don't really need another institution—the field is already cluttered."

A number of our respondents commented that what was really needed was not so much compiling information as determining what in this deluge of information was useful and making that information accessible to practitioners. "People are inundated by information!" as Mark Sinclair of the Clean Energy States Alliance (CESA) put it. "What's really valuable, how do you make that information useable so that they can plug it into their programs?" This is a question of organizing and selecting information, moving away from a shotgun "Google" approach toward a much more targeted one. "People are

building the pieces, but haven't figured out how they connect or not," said Bob Giloth of the Annie E. Casey Foundation, one of the main funders of the National Fund for Workforce Solutions. "A center could do some of that mapping and collecting."

Providing a useful clearinghouse requires compiling, selecting, and presenting complex information to specific audiences. A good example of this is the Database of State Incentives for Renewables and Efficiency (DSIRE), accessible on the IREC website http://www.irecusa.org/irec-programs/dsire/. But the most valuable clearinghouses do not simply organize and present information, but also provide a communications channel for those around the country who are trying to solve similar problems. Thus, for example, Sinclair at CESA touts the fact that their 18 member organizations exchange information about program design directly through the CESA network. So the clearinghouse function bleeds into the communications function. But communication also includes more broadly organized activities, including both highly structured educational activities (webinars, workshops) and forums for information-sharing and deliberation. Where possible, NCCEW should partner with other organizations for educational activities within existing conferences and other gatherings rather than organizing still more meetings and conferences.

Options 1, 2, and 3 yield distinct implications for the targeting of the clearinghouse function. Option 1 emphasizes a supply-side audience, and Option 2 a demand-side one. Option 3, in turn, emphasizes *communication between* these two constituencies. Importantly, to our way of thinking Option 3 neither advocates for simply getting the main parties together and seeing what results, nor for seeking a least common denominator. In our view, attempts to organize discussion absent a strong framework are not likely to be productive, and risk rapidly running out of steam. For this reason we propose targeting the discussion around high-road goals, with various forms of standard-setting as the main tools.

Two other points about targeting in the communications and clearinghouse functions are relevant here:

1. Within the demand side (key to Options 2 and 3), it makes sense to target much of the NCCEW's clearinghouse and communications activities to state and local government agencies, notably including agencies with a clean energy mandate. The argument for this focus is twofold. First, these are the actors that will be directly shaping demand for clean energy goods and services with policies and incentives, subsidies, and penalties. Second, the Energy Commission and its close allies are particularly well positioned to reach out to and help convene these actors. This agency-targeted communications work would include diffusing best models of workforce-related content for statutes and ordinances, Requests for Proposals (RFPs), regulations, and the like. It would also include facilitating direct communication between state and local agencies. This would be similar to the role that the CESA plays in facilitating learning across states.

2. Within all three options, it will be necessary to seed (with distilled information and analysis) and broker broad discussions of workforce-related standards and certification, including certification for individual workers, trainers and training organizations, and contractors. In each case, important discussions must take place *within* key constituencies to overcome existing fragmentation. For example, within the workforce development universe, there is often scant

communication between community colleges, apprenticeship programs, and community-based nonprofit programs. Barbara Halsey of the California Workforce Investment Board observed, "The challenge now with what makes up the workforce system is that we don't coordinate as effectively as we should and tend to replicate functions within separate organizations." Nor is business immune to such fragmentation: as Barbara Hins-Turner of Centralia College (Washington) pointed out, the U.S. probably has 300 different certifications for boiler operation. In solar installation skill certification, NABCEP, the IBEW-NECA apprenticeship program, the Electronics Technicians Association, and others compete for primacy. So bridge-building is much needed within as well as across key constituencies. Still, by far the most difficult and important connection to make is "helping workforce side and industry side communicate," as Marybeth Campbell of the Massachusetts Clean Energy Center put it. Timothy Franklin of Pennsylvania State University's Office of Economic and Workforce Development added, "One thing we don't have enough of is in building capacity to build interaction between organizations, between multiple institutions. The more interactions, the more people will be able to be responsive to change." In order to balance the key goals of industry, labor, workforce developers, and government, participation from all these groups is needed. This is true even in Options 1 and 2—in each case, the protagonist needs to understand how the other key actors view the problem. But it is particularly central to Option 3.

3. Technical assistance

Just as Ford Foundation's McGahey pointed out that research only has an impact when accompanied by dissemination, a number of interviewees pointed out that successful dissemination requires technical assistance. "A technical assistance function follows immediately from a dissemination function," remarked Bruce Herman of the New York State Department of Labor. "I envision that folks at the local or regional level who learn about a best practice through the center will immediately want to call and say, 'How can we do this here?'"

Technical assistance means providing advice, assistance, and training to, as well as sharing skills and knowledge with, a variety of stakeholders in order to help them find solutions to the challenges they face. Technical assistance has to be targeted and specific if it is to be effective. As Andy Van Kleunen with the National Skills Coalition expressed, "If you want to provide technical assistance you'd have to choose where your expertise will be. You can't be an expert in all the sectors as the Energy Commission NCCEW description suggests. If they want to be specific they'll have to choose specialties." Some interviewees, such as consultant Baran, emphasized the need for technical assistance for employers; others, such as Kevin Doyle of the New England Clean Energy Center and Franklin of Penn State, stressed technical assistance for trainers; Patch Garcia of audit and retrofit contractor Recurve highlighted public agencies' need for technical assistance. This points to the importance of aligning technical assistance with whichever option is chosen for the focus of the NCCEW.

For Option 1, technical assistance would be directed primarily at the workforce development community. Key activities would be to expand their knowledge of the needs of the clean energy sector and build their capacity to create responsive and appropriate training and support mechanisms for entry level and incumbent workers. This would include TA around the different accreditations, credentials, certifications, etc., for the different clean energy sectors.

In addition, a number of interviewees expressed the need for support of the development and planning activities necessary to build regional sector-based training partnerships. Barbara Halsey of the California Workforce Investment Board stated, "In general good data-driven planning hasn't been resourced. Once you've done that, how do you structure shared leadership around results of that planning ... and then it gets to governance of regional partnerships in addition to management of industry specific training projects." Virginia Hamilton of the California Workforce Association commented, "If you want good workforce development and relationships with employers you need money and time to understand the sector and build relationships…." At the same time, she and a number of others cautioned against the NCCEW leading regional training partnerships. Instead, its role should be supporting leaders that are embedded in local and regional institutions, be they community colleges or other labor market intermediaries.

For Option 2, technical assistance would primarily be directed to state and local agencies promoting clean energy programs as well as private sector employers. Energy programs now require or incentivize an array of disparate contractor and workers certifications and licenses that send confusing signals to the workforce development community. Working with federal, state, and local agencies to align these is an important area of technical assistance.

Another area of technical assistance under Option 2 is to build the capacity of clean energy employers to understand how the workforce system works, what it can do for them, and how a trained workforce can add value to their firm. As Barbara Baran suggested, "Work with employers to change their internal practices. Listen to employers and try to help them fix some of the barriers they come up against in HR, with training, etc. Work with them to develop better career paths, to better skill workers at 'front end,' and then help them hold on to these new skills. Coach the site to begin to coach the employers."

A very promising element of the technical assistance function is to "provide technical assistance to the technical assisters." This means helping Small Business Development Centers (SBDCs), Manufacturing Extension Programs (MEPs), and kindred programs that assist small businesses, in understanding clean energy workforce needs and principles. This could be an important means of expanding the clean energy community by exposing new businesses to opportunities in renewables and energy efficiency. The California Workforce Association's Virginia Hamilton highlighted the importance of working with SBDCs; Mark Troppe of NIST's MEP program and Dan Luria of the MEP-affiliated MMTC particularly emphasized the important role of MEPs, a subset of which "in recent years…have started to get pulled into trying to make companies go green," according to Luria. Cesar Diaz of the California State Building and Construction Trades Council highlighted the importance of educating their signatory contractors about new market opportunities in green sectors.

Technical assistance for Option 3 would integrate elements described above and focus on building the capacity to design, select, refine, implement, and comply with skill and labor standards. It would work with the energy community, particularly state actors, to help them align their standards, promote industry adoption of the standards, and then communicate these standards to the workforce and education communities. This technical assistance could be provided to groups involved in developing and deploying emerging technologies, helping them to insert skill analysis and workforce planning

early in the process, like the very successful CALCTP project. The NCCEW could also help rationalize standards by disseminating its research on what works in this arena.

Having said all this about the importance of technical assistance, it is necessary to point out that technical assistance is (1) localized, (2) resource-intensive, and (3) based on relationships. So we should expect the NCCEW, at least initially, to play a somewhat limited role in such assistance. A reasonable model would be to start with localized demonstration projects based on existing relationships, or replicating promising models like the CALCTP. Technical assistance could then be scaled up based on collaboration with other institutions with cumulatively greater reach, and/or via infusion of significant additional funds from federal sources.

4. Public policy

There are two possible components to the NCCEW's public policy agenda:

1. Provide research and disseminate information about relevant federal, state, and local policies. For example, examine questions such as: What are the federal policies that are shaping the context for the clean energy workforce? What best practices and templates are being developed by states and localities for RFPs, regulations, contracts, and the like?
2. Promote policy discussion and deliberation The first activity, gathering and disseminating information about existing policies, is an uncontroversial extension of the Clearinghouse and Communications functions. The second is more controversial. Some interviewees recommended steering clear of a policy role. "There are enough policy groups," said John Baldus of the Wisconsin Office of Energy Independence. "Again, it goes back to competing interests. There needs to be common ground that industry says, 'Yes, we can,' instead of turf battles." Along the same lines, Thomas O'Brien of the CSU-Long Beach METRANS transportation research center, Barbara Halsey of the California WIB, and others spoke of the need for a "neutral" organization.

But a wide range of others, including workforce expert Barbara Baran, Diane Factor of SEIU, LA Deputy Mayor Larry Frank, DOE consultant Mark Frickel, Bruce Herman of the NY State DOL, the Ford Foundation's Rick McGahey, Jack Mills of the National Network of Sector Partnerships (NNSP), Beth Sommers of the Michigan Department of Energy, Labor, and Economic Growth, and Jane Weissman of IREC (we include this long list precisely because the point is controversial!) insisted that entering the policy discussion is absolutely necessary. Deborah Rowe of the American Association of Community Colleges expressed this viewpoint succinctly: "Focus on policy – you can't do workforce development when the business models aren't working because the policy is not in place. There is a difference between lobbying and informing about legislation that is going to impact the health of the green economy." We concur. Identifying best practices in terms of RFPs, laws, and regulations cannot be a purely "technical" exercise; it implies setting some policy priorities through informed discussion and negotiation. There is a delicate line to walk here and the NCCEW should steer clear of direct advocacy and lobbying, but it may be in a unique position to create forums for policy discussion and development.

We have argued throughout that the most promising set of policy priorities combines high quality goods and services with high quality jobs. Again, this is a tricky balance: while we do not see the

NCCEW advocating for a particular policy approach, we are urging a particular focus for policy discussions.

If the decision is made to step onto the delicate ground of policy discussion, this militates strongly for Option 3. A resource center that convenes primarily the workforce development community (Option 1) or the clean energy community (Option 2), but not both, risks losing credibility in policy discussions. One that airs both sets of voices (Option 3) can more plausibly claim to be searching for the "common ground."

5. Funding

With regard to funding distribution as an activity, we once again encountered conflicting views in our interviews. A number of respondents, especially those whose organizations distribute funding, emphasized the virtue of that activity. Halsey of the California WIB, which dispenses federal training funds, noted the value of using funding as a carrot to help induce partnerships. Campbell of the Massachusetts Clean Energy Center, Bob Giloth of the Annie E. Casey Foundation, the Commonwealth Corporation's Lashman, and others spoke of the value of competitive funding to drive a variety of activities. Indeed, Herzenberg of the Keystone Research Center emphasized the value of Pennsylvania's approach, where the Center for Green Careers is housed within the Department of Labor & Industry, enabling priorities identified by the center to be directly linked with L&I's funding for high priority occupations and industry partnerships. But COWS's White argued, "The last thing we need is another layer of intermediaries between funders and the people doing the work."

However, we found particularly convincing the advice from Mills of the NNSP, Jeremy Hays of Green for All, and others that distributing funding alters relationships with key constituencies, potentially undermining the communications and technical assistance roles we have defined as core. "Funding does change your relationship to folks, you have to dedicate a lot of capacities when you're funding," Hays warned. Mills offered more extended reflections:

> If the center becomes a major source of funding it would have a different role in relationship to its customers/constituents than otherwise. The moment you give people any substantial money, you have to hold them accountable. No longer is your role to be their advocate, or at least it's very confusing. Because now you're also in the role of policing. You can imagine that there's a lot of money from a variety of sources so whether you want to be in a role of managing that since you're not in the role of operating, that's a question you need to answer. Do you want to play that intermediary role around the funding?

For these reasons, we believe it unwise for the NCCEW to get involved in re-granting in any major way.

Chapter 3:
Structure of an NCCEW

In considering the institutional and geographic home of the NCCEW, there are a number of issues on which there was widespread consensus amongst the people we interviewed, primarily related to the importance of the center being able to build partnerships across multiple constituencies, have the active involvement of a number of key stakeholders (i.e. not be seen as the sole initiative of only one agency), and to be able to function effectively in multiple geographies. At the same time, our interviews revealed some clear choices that need to be made. In this section of our report, we lay out first the areas of broad consensus that seemed to emerge from our interviews. We then delve into the question of whether the center should focus on the needs of California, or the needs of the nation. Finally, we discuss the institutional home possibilities within each of these two geographic focus options, and organization building processes that go along with the various institutional home options.

Consensus

Building partnerships across multiple constituencies

The challenges we face in promoting high quality work and good jobs in clean energy sectors are complex and require collaborations across multiple constituencies. It is now standard practice in workforce development programs to promote collaborations between employers and training providers, particularly through sector-specific and industry-led partnerships. Though this is typically hard to make effective in practice, the goal of "connecting training directly to demand" in the words of Maureen Conway from the Aspen Institute, is now widely accepted in the field.

The clean energy sector is particularly complicated in the types and number of entities besides employers and education and training providers that play an important role in shaping workforce development. Energy is a highly regulated industry, and the ways in which the needs of a clean energy workforce evolve are heavily influenced by government policies and regulations. Thus, government agencies, particularly the Federal DOE and state energy agencies, but also utility regulatory bodies and to a certain extent local authorities, are critical stakeholders in shaping workforce needs. In part because of the large government role, public interest nonprofits, ranging from certification entities to community-based programs, loom large. Similarly unions play an important role in core sectors that are central to growth of clean energy workforce, including utilities, construction and auto manufacturing. In addition, Unions already provide valuable classroom and on-the-job training through apprenticeship programs in key related sectors. Utilities, as highly regulated companies expected to operate in the public interest, are important because they are responsible for implementing key energy policies such as renewable energy and energy efficiency incentive programs. Finally, because technology is still changing so rapidly in this field, the involvement of universities and federal research labs was also seen by our interviewers as important. As Case van Dam from the Wind Energy Collaborative explains, being linked with research is important because, "technology on the electrical side, sensor side, and computer systems side is constantly being developed and improved…and you have to update curriculum as technology changes. So these key components need to have agile

curriculums to keep with the pace. Being able to perceive upcoming maintenance issues before they become a problem takes a comprehensive knowledge of the technology".

While there was broad agreement about the importance of a role for cross-constituency partnerships in the center, respondents differed somewhat in the specific entities they mentioned as critical partners. Indeed, given the flourishing of interest in clean energy, the list of potential partners is potentially quite long. Nonetheless, there were a number of specific stakeholders that were mentioned frequently in our interviews, including the following:

- Federal Government: Department of Energy, Department of Labor, and potentially the Economic Development Administration in the Department of Commerce as well.
- Others states' governments, particularly state energy agencies and utility regulatory bodies.
- California state government: California Energy Commission, California Public Utilities Commission.
- California Utilities.
- Renewable Energy and construction industry associations: Green Building Council, CWEA (wind), CalSEIA, Solar Alliance (national solar state-policy advocacy), Large Scale Solar Associations (national, utility-scale solar installation), Green Builders Alliance, NECA, SMACNA etc.
- Building and construction trade unions, both the Building and Construction Trades Councils (federations that include most trades) and individual trade unions such as Electricians (IBEW), plumbers and pipefitters (UA), (sheet-metal workers) SMWIA, laborers (LIUNA), etc.
- State workforce development agencies, including the state's Employment Development Department, Workforce Investment Board, Employment Training Panel, Department of Apprenticeship Standards.
- Educations institutions, including community college system, colleges and universities
- Certifying entities, including at least possibly the following entities: NABCEP; Association of Energy Engineers; Electronics Technicians Association; Building Performance Institute, Residential Energy Services Network; North American Technician Excellence, Northwest Energy Efficiency Council; Green Building Certification Institute, and certification bodies associated with unions.
- University-based technology research centers: California Institute for Energy and Environment and its family of Centers such as the Renewable Energy Collaboratives (solar, wind, bio-mass, geo-thermal), Energy Efficiency Center, California Lighting Technology Center, and Western Cooling Efficiency Center.
- University-based workforce and economic development research centers (of which there are far fewer than university-based technology research center) such as COWS, the Don Vial Center on Employment in the Green Economy.

Governance and Stakeholder involvement

In addition to the consensus that the NCCEW needs to build effective cross-constituency partnerships, there was also broad agreement that there does not exist, at the moment, a single entity that currently could effectively house the center. Rick McGahey of the Ford Foundation warned that a NCCEW would need to avoid "capture by any one institutional player. The players need enough self-interest to stay engaged, but without capturing. Workforce development is a fragmented world. No player has all of the pieces you want." Our respondents broadly agreed that a new center is needed and should have a governance structure in which multiple critical stakeholders have an advising and/or decision-making role. If it has a strong workforce component to it, then it needs to have community colleges involved in decision making. If it has a strong research component, then universities should be similarly involved. "The energy sector is heavily labor based, so labor organizations must be involved. There would have to be multiple partners. It must be intercollegiate and intersegmental, and have industry involved." According to Marcy Drummond of the Los Angeles Trade Technical College). Jeremy Hayes of Green for All stated that employers need to be involved, but "they need to understand that by getting a skilled workforce that's supported by public dollars they need to provide good jobs and good wages. Don't put them so much at the center that they start driving you toward a low-road strategy".

Obviously, given the long list of potential key partners listed above, having them all on a single board of directors of a new center would likely prove impractical. Our interviewees generally advocated the value of having a much smaller board of directors, made up of highly active stakeholders who would have legal and statutory authority in the overall running and governance of the center, with an additional advisory board that would provide advise and recommendations. The specific make-up of such a board would depend on decisions made about the geographic focus, institutional home, and process for establishment of the center. The original Energy Commission two-page concept paper for an NCCEW envisioned the possibility of three key committees as part of its governing structure: A stakeholder committee, which is essentially the same as the advisory board we describe here; a Governing Board that serves as the organizations boards of directors; and an additional Steering Committee made up of members of the governing board, partner institutions, and external experts. At this point, we no longer see the value of a third committee, the steering committee, since the key functions of providing ad hoc review of NCCEW activities and deliberating on key strategic directions of the center can be provided by an stakeholder committee, without the potential of an unnecessarily unwieldy governance structure. The choice between Options 1, 2, and 3 would of course greatly influence the appropriate balance of representation on the Governing Board and Stakeholder Committee.

Networked Organizational Structure

There was also broad consensus that a new center would be most effective if it wasn't confined to a single physical location. Instead, our respondents generally talked about the value of having a networked organizational structure or a hub & spoke or network model. Michigan's Luria suggested that "a model in which there's a national hub with four or five regional spokes makes sense". Kevin Doyle of the New England Clean Energy Center argued, "Having a *national* clean energy workforce center doesn't make sense unless they're going to set up regional centers. Maybe a small administrative staff for the national center, and the real work is done through the designated regional centers."

Regional offices could focus on different areas of expertise either by sector (for example, clean manufacturing in the Midwest, energy efficiency in the West etc.), or by region. Barbara Hins-Turner, of Centralia Community College (Washington), noted, "The states are all very different from each other -- what California needs is very different from what Washington needs."

Regardless of how duties are distributed, the different offices would have to function tightly together as a single entity, requiring regular in-depth communication. The center would be well served by state-of-the-art video conference facilities to ensure effective tele-presence while minimizing substantial green-house gas inducing travel between offices. "You could have a virtual center" says Doug Payne from Solar Tech, "Utilizing video conference technology would allow this model to be feasible and would allow each region to focus on core competencies." The possibility of approaching private industry for assistance in this should be explored.[4]

Options for Geographic Scope and Institutional Home

A central decision facing the Energy Commission is whether to initially launch the NCCEW as a multi-state partnership, seeking ARRA funding from the DOE, or to start in California and expand to a national center over time. The multi-state partnership is preferred but may not be achievable within the short window of ARRA funding. A California-based center could become a national Center over time, adding satellites as it builds. These choices can work for any of Options 1 through 3. We discuss these choices and their implications for institutional home below.

Multi-state Launch of National Center for the Clean Energy Workforce

With a decision for a multi-state NCCEW, California would take the lead in convening a limited group of states to establish the center as a joint effort of these states' energy commissions, in partnership with state workforce agencies. This could ultimately result in the creation of a new legal entity, or a new program within an existing entity (see institutional options below). We would suggest that the best way to pursue this effort would be to convene a meeting of top-level representatives of the energy commissions and workforce agencies of a number of the selected key states (see process options below), along with appropriate representatives from the Federal Departments of Energy and Labor and others if appropriate. Prior to convening of this meeting, it would be useful for Energy Commission leadership to discuss the NCCEW with their counterparts in each of the selected states in order to understand their real interests and concerns; we were not in a position to have this kind of conversation. The Energy Commission may also want to develop a detailed draft proposal that incorporates the interests of the partner states and that outlines the proposed functions, structure, and budget for a new NCCEW, which would be the basis for discussions at the convening.

A multi-state launch would lead to the creation of a truly national center that both meets the needs of, and draws on the expertise and experience of, multiple states. There is potential for such a center to garner substantial resources, and to have a substantial impact on clean energy workforce practices around the country. In particular, with a critical mass of population and of policy momentum around clean energy, a multi-state unit would have greater influence on national standards, credentials, and

[4] E.g. see Cisco TelePresence (http://www.cisco.com/en/US/products/ps7060/index.html) or Teliris Telepresence (http://www.teliris.com/)

certifications. It would also jump-start the formation of a learning community by bringing together some of the most thoughtful and progressive policy-makers in the nation.

However, this approach also has substantial disadvantages. First it would likely take significantly more time and consultation for a national center to get established and operational than it would for a California-focused effort. Second, the politics of establishing a national center are more complicated, with a need to ensure effective engagement from a critical number of states and the Federal Government. Our interviews revealed wide variation among states in vision and approach to clean energy challenges, as well as ambivalence towards the idea of an NCCEW. Finally, such an approach would require careful attention to ensuring the center was also meeting the clean energy workforce needs of California, while it was also focusing on its national work.

Which states to start out with?

A strategic decision would need to be made about which states to involve in the initial launch. Some potential options include:

- Choose a set of states with both a strong commitment to clean energy and those with strong, sector-focused workforce development policy. From our interviews, such states include (but are not limited to): Colorado, Massachusetts, Maryland, Wisconsin, Oregon, Michigan, New York, Pennsylvania, and Washington. The advantage of such an approach is that, by pulling together parallel institutions in multiple states who clearly have a similar focus on these critical workforce issues, it will help the center avoid getting sidelined or distracted by other institutional or organizational agendas.
- Work with states that have already formed networks on energy issues such as the network of states that are part of the Clean Energy States Alliance (CESA[5]) or the National Governor's Association and our regional body, the Western Governor's Association (WGA[6]). CESA members are primarily 'clean energy funds' or 'state funds' whose objective is building markets for renewable energy and clean energy resources. The WGA states currently work in partnership in a number of strategic initiatives related closely to clean energy workforce issues, including: Climate Change & Adaptation, Energy and Transmission, Regional Biomass Energy program, Transportation Fuels for the Future, and a Regional Transmission Energy Project.

Institutional home for a multi-state NCCEW

A multi-state NCCEW based on a partnership amongst a selected group of states would need to develop an institutional home that reflects this partnership and could expand as more states join. Here are the possibilities we came up with:

New Nonprofit Organization: One path would be to establish an entirely new nonprofit organization. This has the advantage of being specifically devoted to the purpose of the center, with the ability to start from scratch in creating by-laws, governing structure, and a Board of Directors. It has the

[5] http://www.westgov.org/index.php
[6] http://www.cleanenergystates.org

flexibility and the "neutral ground" status to attract participation from a wide range of actors from both the supply and the demand side of the clean energy workforce equation. A number of interviewees touted these benefits.

The disadvantage, of course, is that it takes six months to a year to establish a 501(c)(3) organization, and time pressures on accessing ARRA or other time-limited resources may preclude this option. Linda Collins of the Career Ladders Project, advised," Try to find some place that is already set up and ready to go and further along than starting something from scratch. It's a tremendous amount of work to establish a national center, it's huge."

Existing Multi-state Organization: Another option is to work with an existing nonprofit organization to house the center, either permanently as an integral part of their mission, or temporarily as a sponsored project until a new nonprofit organization could be set up. This could greatly speed-up launch time. We see the most likely national nonprofits for such a match as the following:

- Clean States Energy Alliance[7]: As mentioned above, one of the real strengths of this organization is its existing network of states focused on promoting clean energy technology. However, it is not clear how close a fit this is for a clean energy workforce center. The Clean States Energy Alliance's main objective is to increase the quality and quantity of clean energy projects to expand the clean energy market. It pays less attention to energy efficiency. The particular states in this network also have very different approaches to the workforce policy, regulatory, and skill issues that are central to the NCCEW's mission. The fit would be particularly strained in the case of Option 3, organized around high-road workforce partnerships.
- Center for State Innovation[8]: This is an independent, nonprofit organization devoted to working with Governors and state executives to promote "bold, innovative, progressive leadership." It provides policy and message development and technical assistance related to policy development, implementation and evaluation. Sustainable economic development, with a focus on energy and the environment, is one of its core policy areas, and it has a track record of promoting high-road workforce strategies. It is closely connected with the University of Wisconsin-Madison, and the COWS, but also has a strong network of partner organizations across the country. Perhaps one disadvantage of the CSI is that it is not solely focused on clean energy issues, being involved in a wider range of state policy areas.
- National Governors Association's Best Practices Center. This has the advantage of the reach and credibility of the NGA, and the Best Practice Center has started to provide states with research, technical assistance and clearinghouse activities in the Green arena. It is not clear, however, whether working through the NGA is an appropriate institutional channel. Fred Dedrick of the National Fund for Workforce Solutions commented, "The trouble with putting it in something like NGA is that they have to be so 'balanced' and 'neutral' in how they approach issues. I wouldn't take them off the table, but you could have some political trouble."

[7] http://www.cleanenergystates.org/

[8] http://www.stateinnovation.org/

- Interstate Renewable Energy Council (IREC)[9]: IREC is a national resource center for current information, education, credentialing and best practices regarding renewable energy. Its focus on creating programs and policies targeted at ensuring adoption of uniform guidelines, standards, and quality assessment in renewable energy fields makes it an invaluable partner and stakeholder for the NCCEW. Furthermore, IREC has been working closely with the Department of Energy in certifying training providers in solar installation, and maintains a detailed Database of State Incentives for Renewables and Efficiency (DSIRE), which contains information on over 2,000 renewable energy and energy efficiency programs around the country. That said, some of interviewees expressed concern that IREC's process of certification is undermining existing credentialing processes, particularly in solar. The critique we heard is that IREC has less concerns about workforce outcomes than would be ideal for the NCCEW, and has a pattern of providing stand-alone certifications that don't truly lead to decent career paths or create on-ramps for workers from disadvantaged communities.
- Apollo Alliance, Green for All, or Policy Link: These three national nonprofits headquartered in California all work together on a variety of clean energy projects. They play an important role as clearinghouses and learning communities, and in providing technical assistance to their constituencies. They may be too advocacy-oriented to be appropriate institutional homes for the NCCEW.
- University Consortium: Another possibility is the creation of a new University consortium that has national reach and prestige. Along with the University of California, key partners could include COWS and other "think and do" tanks involved in the nexus of clean energy and workforce and economic development.

Develop an RFP process to choose institutional home and partners

The final option would be for the Energy Commission, in partnership with any additional funding agencies that could be secured (such as the Department of Energy), to develop a detailed request for proposals. Presumably a core aspect of this RFP would be that applicants would have to be either collaborations between different organizations, or a single lead applicant who would have to demonstrate sufficient partnerships with other organizations to be able to achieve the broad partnership goals of the center. The terms of the specific RFP would have to be developed, but could include enough scope that a variety of different potential institutional homes might emerge from the applicant pool.

California launch of the NCCEW

In this option, the NCCEW would launch in California with state funding and seek to grow to into a truly national center with offices in other states over time. This option would address some of the concerns expressed about the potential for an NCCEW duplicating other efforts already underway. "I would think California would have its hands full just with California" says DOE's Mark Frickel. "If California wants to be a repository of information which others could consult…host workforce development conferences…and essentially be really helpful, that is fine. But I think they are going to

[9] http://www.irecusa.org/

run into a problem if they want to do workforce development on behalf of other states….I'd be a little concerned if this proposed center starts duplicating efforts."

In a California-focused approach, the Board of Directors of the center would be made up primarily of California-based stakeholders, though it would be important to also have a broader Stakeholder Committee that would include Federal agencies, and national industry associations and certification bodies.

There are a number of advantages to a California focus. First and foremost is the fact that California is already a very large economy (8th largest in the world if it were a country by itself), and the clean energy workforce needs of the State are certainly large and substantial enough that it could easily fill the capacity of the center.

The focus on California would facilitate developing policy recommendations that are focused on state and local government. It would help ensure that investments from the Energy Commission would go directly to helping build California as a world leader in the clean energy economy.

Finally, Option 3 may be easier to carry out within California, and success in California could build momentum for the nation. The necessary connections and working relationships between the energy community and the workforce community have already been seeded in the state, through the Green Collar Jobs Council and the cross-agency cooperation in ARRA projects.

There are, however, some significant disadvantages of only a California focus. First and foremost is that many of the issues related to promoting high quality skilled work in clean energy fields are not unique to California, but in fact are common across much of the country. There is much to gain from cross-state analysis of lessons learned as states innovate to address similar challenges and interpret federal direction in different ways. While there are certainly many possibilities for local and state level strategies to promote effective high quality clean energy workforce development, certain solutions are much better pursued at a national level. Many respondents did believe there is a need for some kind of national center that could act as a clearinghouse and convener on critical clean energy workforce needs. Focusing on California would not fill that need, and would likely forgo, at least in the near term, substantial national resources (and potentially those from other states) in supporting a NCCEW. Furthermore it might make it harder to leverage Federal policy to support its efforts.

We see a significant opportunity in California to focus Option 3 on emerging technologies, inserting skill standards and workforce planning into the front end of the development of clean energy technologies. The CALCTP program is a nationally recognized model in this regard and could be replicated in other sectors. The technology development centers in UC, (most seeded by Energy Commission funding), and the presence of the national energy labs provide a network of organizations already heavily involved in the development of the clean energy economy. Yet CALCTP is the only program we found with a clear focus and intent to integrate investigation into the workforce and skills implications of new technologies. A new Center that explicitly helps this network of technology centers to address workforce issues would add tremendous value and fill a unique niche.

We want to note that if Lawrence Berkeley National Lab's proposal for the Energy Regional Innovation Cluster (E-RIC) hub is approved by the DOE, there would be an immediate opportunity to insert workforce issues into a major initiative for technology development and deployment in an important subset of the clean energy field. The E-RIC proposal development began the process of building links between the energy community and the workforce community among both the researchers and local government actors, specifically on energy efficiency in the greater Bay Area-Sacramento region.

A focus on emerging technologies would favor an institutional home that is closely linked to the network of University technology centers across the state. However, there are a number of other possibilities, which we outline below.

Institutional home for a California CCEW

A California-based NCCEW needs to develop an institutional home that engages California stakeholders but looks outward so that it can become truly national over time. In addition to the options already described for the multi-state NCCEW *(new nonprofit, existing nonprofit, and RFP process*), a California-based NCCEW has the following additional possibilities:

- *Quasi-Public Institution:* In this model, the center would be affiliated to the State of California, most likely directly to the Energy Commission, but incorporated separately with an independent Board of Directors made up of diverse constituencies, including private sector, labor, and workforce development entities as well as other government agencies. One model for this is the Commonwealth Corporation in Massachusetts.[10] This was established through state statutes identifying specific functions. It carries out work for the state, but is incorporated as an independent organization, with an independent board of directors, president and CEO. The Workforce Board of Florida has a similar quasi-public structure, accountable to the state through a MOU but sufficiently independent to seek foundation funding and engage in agile experimentation.[11] Employees of the Commonwealth Corporation are not state employees. This type of structure provides the advantage of being closely linked with state priorities and functions. Yet is also provides the flexibility of an independent agency, allowing it to be somewhat buffered from state politics, able to pursue additional sources of funding (including philanthropic and private sector funding), and able to change programmatic focus as needed. Comments from a number of well-connected interviewees bolstered this approach. "There should be a separate 501-c-3, but attach it to the Energy Commission and energy departments in every other state," said Virginia Hamilton of the California Workforce Association. "You need the Energy Commission as the mother ship." Bruce Herman, NY State DOL advised, "An organization that is connected to government, but not of it, is the best bet. If you are not connected to government you are operating outside the decisions that are being made, but if you are in government you are constrained by the bureaucracy and politics." But there was also concern expressed about this model. Sarah White from COWS, for instance, argued that being in a state governmental office or agency might hobble the organization, and make it difficult to overcome difficulties of working within a state agency.

[10] http://www.commcorp.org/index.html

[11] http://www.workforceflorida.com/

- *Joint Powers Authority:* A Joint Powers Authority (JPA) is an independent legal entity formed by public agencies under the Joint Exercise of Powers Act of the California Government Code (Cal. Gov't Code, §§ 6500 et seq.). Through such an entity, two or more public agencies are able to pool resources and share authority. It might be possible to set up the Center for a Clean Energy Workforce as a JPA that brings together some combination of the California Energy Commission, the Public Utilities Commission, the Employment Development Department, and some combination of research and education institutions, including the University of California, the California State University (CSU), and California Community Colleges. A JPA could also link agencies across multiple states, as Bonnie Graybill of the California Economic Development Department pointed out. As a separate legal entity, a JPA would be permitted to set their own procedures and rules, and the governing body could in fact be made up of any combination of individuals, not necessarily just public officials or members of the sponsoring authorities. In fact, a JPA could be one specific mechanism for establishing the 'quasi-public' institution discussed above. One implication of pursuing this option is that JPAs are subject to California's open meeting laws, public records disclosure laws and conflicts of interest laws as public agencies, which is a different set of obligations than if the center were housed in a nonprofit organization. Also, as we understand it, the employees of JPAs are generally public employees, though some JPAs are structured in such a way that while the work is overseen in some way by the public agencies entering into the agreement, all services are provided through contracts to private individuals and firms, providing significant flexibility in hiring practices.
- *California University-Affiliated Nonprofit:* In this model, the center would be incorporated as a 501(c)(3) organization, but affiliated with the University of California and/or possibly the CSU system as well[12]. One goal of such a model is its direct ties to the University, which provides access to current research on new technologies, and to the expertise of Faculty and graduate student researchers. The center would gain a real advantage of being close to emerging technology and how these changes affect workforce and skills needs. At the same time, the independent nonprofit structure would mean that there would be an independent Board of Directors (rather than the UC Board of Regents) that would directly oversee the operations of

[12] There are a number of models for such a structure from around the country, including:

- The Institute for Advanced Learning and Research (ialr.org), which is directly affiliated with Virginia Tech, Averett University and Danville Community College, but incorporated as an independent nonprofit organization
- Mathematical Sciences Research Institute (msri.org), which was established in Berkeley in 1982 as an independent, nonprofit, research institute with close ties to University Faculty, but now sponsored by more than 90 Universities and institutions around the world, and since its founding, has been the single largest project of the National Science Foundation's Division of Mathematical Sciences.
- University Research Foundations, which are typically structured as private, nonprofit organizations with a mission of supporting the scientific mission of their affiliated University. Examples include: the Wisconsin Alumni Research Foundation (warf.org), San Jose State University Research Foundation (sjsufoundation.org), Colorado State University Research Foundation (csurf.org), and the Purdue Research Foundation (prf.org). In the case of the San Jose State University Research Foundation, its description explicitly says it is "…a 501(c)3 nonprofit corporation, which provides an entrepreneurial management structure through which the campus carries out essential specialized instructional and service activities not normally support by the state budget, while also eliminating undue governmental, budgetary, procurement, and other state fiscal restrictions."

the center. Further, the center would be eligible to collect tax-deductible grants and contributions. People as diverse as Bob Giloth from the Annie E. Casey Foundation, Case van Dam from the UC Davis Wind Energy Collaborative, Ava Blake from Youth Build and Debra Rowe from the U.S. Partnership for Education for Sustainable Development all spoke about these potential advantages of a University-linked but autonomous center, though some also expressed concern about the competitive and territorial nature of a lot of education institutions. Specific entities in the University of California system that have expressed some willingness in at least exploring the possibility of this kind of affiliation include the following:

- UC Davis Energy Institute: This is the umbrella body that coordinates all the energy-related research and activities on campus. There also may be a unique opportunity for collaboration with Los Rios Community College in their new site at the UC Davis West Village Development. This is the first instance of a Community College facility being located on a UC site. This collaboration, along with West Village's plans for being a 'zero net energy' community, incorporating both cutting edge energy efficiency and renewable energy technologies, provides direct links to research, implementation, and workforce training related to clean energy.
- California Institute for Energy and Environment: This is a UC system-wide partnership. The CIEE's network of technology development and deployment centers can provide an opportunity to incorporate workforce skill standards research and development into initiatives to promote market adoption of new technologies, modeled after the very successful CALCTP program development.
- Don Vial Center for Employment and the Green Economy: This new Center is the only UC Center explicitly focused on workforce issues in the Clean Energy Sector. They are now carrying out a California wide workforce development needs assessment for the California Public Utility Center for energy efficiency and demand response, which may provide a model of applied research useful to both energy program designers and workforce development planners.

It also, of course, is possible to be directly affiliated with the University of California, as a Center or Institute.

A university-linked NCCEW could enjoy a few advantages. One is universities' strength in research. "The Center's key role is research," argued Giloth of the Annie E. Casey Foundation. "So that means a university has a comparative advantage [with a] pipeline of faculty and students." A university base also would put more distance between the NCCEW and the Energy Commission, which might in fact increase some government-shy constituencies more willing to collaborate with the Center. On the other hand, some interviewees voiced concerns. "We don't have a lot of faith in universities," said CESA's Sinclair. "Investment in clean energy is entrepreneurial. It's not about R&D, it's about deployment." One UC-based researcher expressed some of the downsides of being in a University, despite the overall benefits: "the cons are the heavy amount of bureaucracy, compounding multipliers of inefficiencies… we need to operate like a start-up and get business done, so being located in a University that cares less about bottom-line and being nimble is hard." Furthermore, in general, the University of California has been hesitant to pursue such affiliated nonprofit entities, apparently with some concern about multiple small nonprofit research centers being set-up by faculty as a way of avoiding University overhead or regulations.

Chapter 4: Conclusion

The creation of a NCCEW presents a strategic opportunity to advance our nation's efforts to make the transition to a clean energy economy in a way that also expands opportunities for our work force. Given the crowded field of organizations addressing pieces of the clean energy workforce puzzle, but the continued need for practical strategies that integrate clean energy and workforce goals, we recommend a focus on both the demand-side and the supply-side of the labor market, as described in our Option 3.

Option 3 envisions a NCCEW that brings together the energy and workforce communities to focus building a 'high-road clean energy economic development strategy"—a strategy focused on promoting quality, performance, and innovation so that business compete by investing in a committed workforce that is both highly skilled and rewarded for those skills. This would mean a main focus on the set of skill standards, certification, and other tools that can help achieve quality work and quality jobs.

Again, we recommend Option 3 because our examination of the panorama of clean energy workforce efforts, both in California and the rest of the country, suggests that a specific focus on the high-road would fill a needed niche and add value to the many efforts that are already occurring. However, Option 1 (focusing on the workforce development community) and Option 2 (focusing on the clean energy community) are also viable and worth considering seriously.

In closing

In conducting the research for this report, we heard some skepticism and concern from some of our informants about the idea of a new National Center for the Clean Energy Workforce. With the many clean energy and green job initiatives going on around the country, some people expressed concern about duplication of effort and increased competition among institutions, potentially adding to rather than reducing, the amount of chaos in this field.

Nonetheless, we also heard significant excitement about the potential role such a center could play, if developed in the right way. There was real enthusiasm for the Energy Commission's initiative in this area among many stakeholders and a willingness to work closely with the Energy Commission in ensuring the success of a future Center.

We believe a strong focus on promoting high-road clean energy economic development strategies that can simultaneously meet both workforce and economic development needs is the best way to build on existing work and provide real value-added contributions to the field.

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APPENDIX A

NCCEW Interview List, UC Team, June 1, 2010
Completed Interviews

Clean Energy Community

Greg Albright	CA Business, Transportation and Housing	CA	Government
John Baldus	Wisconsin Office of Energy Independence	WI	Government
Amy Butler	Michigan Energy Office	MI	Government
D.Payne, J. Bradley	SolarTech	CA	Private sector
Marybeth Campbell	Massachusetts Clean Energy Center	MA	Government
Case van Damne	California Wind Energy Collaborative	CA	Private sector
Kevin Doyle	Green Economy	MA	Private sector
Adele Ferranti, et al	NYSERDA	NY	Government
Ben Finkelor	UC Davis Energy Efficiency Center	CA	Education
Dennis Fitz	UC Riverside Energy Center	CA	Education
Mark Frikel	U. S. Dept. of Energy	WA	Government
Amy Glasmeier	Pennsylvania State University	PA	Education
Jeff Grabelsky	Cornell University Construction Industry Program	NY	Education
Dian Gruenich	California Public Utilities Commission	CA	Government
Barbara Hins-Turner	Center of Excellence for Energy Technology, Centralia Community College	WA	Education
Greg Hribar	SMUD	CA	Government
Bryan Jenkins	UC Davis Energy Institute - Biomass	CA	Education
Sue Kateley	California Solar Energy Industry Association	CA	Private sector
George Kopf	Rising Sun Energy Center	CA	Education
Bernie Kotlier	IBEW-NECA	CA	Labor
Emir Macari	CSU-Sacramento Smart Grid Center	CA	Education
Kristine Mazzei	Green Capital Alliance	CA	Private sector
Doug Payne	SOLAR Tech	CA	Private sector
Michael Peevey	California Public Utilities Commission	CA	Government
Paul Phillips	California Public Utilities Commission	CA	Government
Bob Pleasure	Building & Construction Trades Department	CA	Labor
Seth Portner	Colorado Energy Office	CO	Government
Van Ton-Quinlivan	Pacific Gas & Electric	CA	Private sector
Nancy Rader	California Wind Energy Association	CA	Private sector
H. Rahai, T. O'brien	METRANS Transportation Center (CSULB & USC)	CA	Education
Ann Randazzo	Center for Energy Workforce Development	US	Private sector
Debra Rowe	US Partnership for Education for Sustainable Development	US	Government
Michael Siminovitch	UC Davis Lighting Technology Center	CA	Education
Mark Sinclair	Clean Energy States Alliance	VT	Private sector
Charles Segerstrom	PG&E Energy Centers	CA	Private sector
Eric Seleznow	Maryland Workforce Administration	MD	Government
Beth Sommer	Michigan Department of Energy, Bureau of Workforce Transformation	MI	Government
Linda Sorrento	U. S. Green Building Council	WA	Private sector
Dan Sperling	UC Davis Sustainable Transportation Energy Pathways	CA	Education
Neil Struthers	Santa Clara & San Benito Counties Building & Construction Trades Council	CA	Labor
Mark Troppe	Manufacturing Extension Partnership	US	Government
Tom Turrentine	UC Davis Plug-in Hybrid Electric Vehicle Research Center	CA	Education
Jason Walsh	Blue-Green Alliance	US	Advocacy
Jane Weissman	Interstate Renewable Energy Council	US	Private sector

Workforce Development Community

Ezra Auerbach	North American Board of Certified Energy Practitioners	US	Private sector
Renee Bacchini	Division of Apprenticeship Standards	CA	Government
Barbara Baran	California Budget Project	CA	Advocacy
Angela Blackwell, Ruben Lizardo	PolicyLink	CA	Advocacy
Deborah Blue, Lourdes Sampayo	Contra Costa Community College District Green Building Retraining Partnership	CA	Education
Jim Caldwell	Workforce Incubator	CA	Consultant
Pat Colburn	California Building Performance Contractors Association	CA	Private sector
Linda Collins	Career Ladders Project - Community College Foundation	CA	Education
Maureen Conway	Aspen Institute	US	Consultant
Fred Dedrick	National Fund for Workforce Solutions	MA	Funder
Marcy Drummond	Los Angeles Trade Technical College	CA	Education
Diane Factor	Worker Education and Resource Center	CA	Labor
Joan Fitzgerald	Northeastern University	MA	Education
Larry Frank	City of Los Angeles, Deputy Mayor of Workforce Devel.	CA	Government
Timothy Franklin	Pennsylvania State University Workforce Development Support	PA	Education
Elaine Gaertner	California Community Colleges Centers of Excellence	CA	Education
Patch Garcia	Recurve	CA	Private sector
Bob Giloth	Annie E Casey Foundation	US	Funder
Bonnie Graybill	Labor Market Information Division, CA-EDD	CA	Government
Barbara Halsey	California Workforce Investment Board	CA	Government
Virginia Hamilton	California Workforce Association	CA	Advocacy
Jay Hansen	State Building and Construction Trades Council	CA	Labor
Jeremy Hayes	Green for All	CA	Advocacy
Bruce Herman	New York Labor Commission	US	Government
Steve Hertzenberg	Keystone Research Center	PA	Consultant
Tom Holsman	Association of General Contractors	CA	Private sector
Luther Jackson	NOVA Works	CA	Government
Andy Van Kleunen	National Skills Coalition	US	Advocacy
Stuart Knox	Northern Rural Training and Employment Consortium	CA	Government
John Ladd	US Department of Labor Office of Apprenticeship	US	Government
Rebekah Lashman	Bay State Skills Corporation	MA	Government
Darrell Lawrence	California Apprenticeship Coordinators Association	CA	Labor
Dan Luria	Michigan Manufacturing Technology Center	MI	Government
Barry Maciak	Duquesne University Workforce Center	PA	Education
Rick McGahey	Ford Foundation	NY	Funder
Brian McMahon	California Employment Training Partnership	CA	Government
Jack Mills	National Network of Sector Partners	US	Advocacy
Catherine Merschel	Build it Green	CA	Private sector
Mark Modera	UC Davis Western Cooling Efficiency Center	CA	Education
Steve Nadal	American Council for an Energy-Efficient Economy	US	Advocacy
Jane Oates	US Department of Labor-ETA	US	Government
Jessica Pitt	Bay Area Workforce Funding Collaborative	CA	Funder
Robin Purdy	Sacramento Employment and Training Agency	CA	Funder
Tim Rainey	California Labor Federation	CA	Labor
Laura Rank	County of Los Angeles	CA	Government
Jeff Rickert	Working for America Institute, AFL-CIO	US	Labor
Marianna Rivera	California State University Sacramento, MESA	CA	Education
Yolanda Rivera	Hartford Jobs Funnel	CT	Government
Larry Rosenstock	High Tech High School	CA	Education
Jerry Rubin	Jewish Vocational Services of Greater Boston	MA	Education
Ron Ruggiero	Apollo Alliance	US	Advocacy
B. Siegel, D. Winey	Mt. Auburn Associates	MA	Consultant
Richard Slawson	Los Angeles Orange County Building Trades	CA	Labor

Cheryl Slobodian, Jim Watson	Manufacturing Extension Program, Southern California Center	CA	Private sector
Darlene Spoor	Grossmont-Cuyamaca Community College District	CA	Education
C. Techico, R. Tidball	ICF, International	US	Consultant
Dan Throgmorton	Los Rios Community College District	CA	Education
Jason Wiener	California EDGE	CA	Advocacy
Anette Williams	BEST Academy at the Sustainable South Bronx	NY	Education
Robert Zardeneta	LA CAUSA: Youthbuild Los Angeles	CA	CBO