Investing in Labor–Market Information (LMI): Insights from the Recovery Act LMI Grants

Final Report

September 17, 2012

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MATHEMATICA
Policy Research

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DISCLAIMER

This report was prepared for the U.S. Department of Labor (DOL), Employment and Training Administration, Office of Policy Development and Research by Mathematica Policy Research, Inc., under contract number DOLQ091A20941. The views expressed are those of the authors and should not be attributed to DOL, nor does mention of trade names, commercial products, organizations imply endorsement of same by the U.S. Government.

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CONTENTS

APPENDICES

TABLES

FIGURES

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ABSTRACT

Labor market information (LMI) plays a crucial role in ensuring a well-functioning labor market. In 2009, the American Recovery and Reinvestment Act (Recovery Act) expanded investment in states' LMI systems as part of an overall strategy to create new jobs, save existing ones, spur economic activity, and invest in long-term growth. As part of the Recovery Act funding for jobs in energy-efficiency and renewable-energy industries (also known as "green jobs"), the U.S. Department of Labor (DOL) awarded $50 million in state LMI improvement grants to 30 grantees, including 24 individual state workforce agencies (SWAs) and six consortia of SWAs. In September 2010, the DOL Employment and Training Administration (ETA) contracted with Mathematica Policy Research to examine the implementation of the LMI improvement grants, broadly document the activities of all grantees, and provide a detailed description of the activities and partnerships of a subset of grantees. In this report, we provide an in-depth description of the experiences of 9 selected grantees and present lessons that may inform future efforts. This report complements *Investing in Labor Market Information: A Summary of the State Labor Market Information Improvement Grants* that summarizes information about grantees' goals, definitions of green jobs, partners and stakeholders, activities, products, and dissemination strategies for the 30 LMI grantees.

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EXECUTIVE SUMMARY

In February 2009, President Obama signed the American Recovery and Reinvestment Act (Recovery Act) into law to address the employment challenges facing America's workforce. With a total value of $787 billion, the Recovery Act's purposes include preserving and creating jobs, assisting people most affected by the recession, and promoting economic efficiency and long-term economic benefits (U.S. Congress 2009). Among other investments, the Recovery Act provided $750 million for a program of competitive grants to train workers in high-growth industries, of which $500 million went to support jobs (also known as "green jobs") in the energy-efficiency and renewable-energy industries.

While 90 percent of the U.S. Department of Labor's (DOL) Recovery Act green jobs funding went to support training programs for workers, $50 million was reserved for grants to state workforce agencies to improve labor market information (LMI) on green jobs and enhance the labor exchange infrastructure that connects workers to jobs. LMI plays a crucial role in ensuring a well-functioning labor market (Woods and O'Leary 2007; Reamer 2010). LMI includes information on which occupations are growing and what skills are required for them. LMI can affect the education and training decisions of workers; the investment decisions of employers; and the economic development strategies of local, state, and federal government agencies.

In December 2009, DOL awarded approximately $50 million in State LMI Improvement grants (LMI grants) to 24 individual state workforce agencies (SWAs) and six consortia of SWAs. Grantees used these LMI grants, which ranged from approximately $750,000 to $4 million, to collect, analyze, and disseminate LMI and enhance the labor-exchange infrastructure for jobs and careers within the energy-efficiency and renewable-energy industries. Each SWA or consortium was required to form multiple partnerships to help facilitate efforts to improve LMI in the state. Grantees' activities included efforts to understand green jobs, connect workers to jobs, and enhance LMI labor exchange infrastructure for jobs and careers in the energy efficiency and renewable energy industries. Grantees' activities were expected to benefit job seekers, businesses, educational institutions, and the overall economy in their states or regions.

In September 2010, ETA contracted with Mathematica Policy Research to evaluate the extent to which the State LMI Improvement grant program was achieving its stated purposes. Mathematica was asked to broadly document the activities of all 30 grantees, provide a detailed description of the activities and partnerships of a subset of grantees, and identify grantees' challenges and promising practices. In this report, we provide an in-depth description of the experiences of 9 selected grantees and present lessons that may inform future efforts and complement the broader assessment provided in the *Investing in Labor Market Information (LMI): A Summary of State LMI Improvement Grants*, hereafter referred to as the Grantee Summary Report (Laird et al. 2012).

State Labor Market Information Improvement Grants

In June 2009, Secretary of Labor Hilda Solis announced the availability of the State Labor Market Information Improvement grants with grant applications due less than two months later. State workforce agencies were eligible to apply, and applications from consortia of states were

encouraged. Consistent with the goals of the Recovery Act, the grants had short 18-month periods of performance.

The initial grant announcement required applicants to propose strategies and approaches in four focus areas of activity: (1) data collection and estimation related to green industries, occupations, and skill requirements; (2) data dissemination; (3) related research; and (4) labor exchange.

The LMI grants awards were announced in November 2009. The LMI grants were awarded to state workforce agencies and more specifically, the state workforce information departments. State workforce information departments, often referred to as "LMI shops," play a central role in the production and dissemination of labor market information.

LMI grantees were encouraged to coordinate their efforts with the recipients of other Recovery Act green jobs grants. In practice, the coordination between the LMI grants and the State Energy Partnership Sector (SESP) Grants was particularly strong, likely because the SESP grants were also awarded at the state level.

Overview of the Evaluation

Seven key research topics guided this evaluation:

- **Goals.** What were the grantees' main goals? How did grantees arrive at these goals? In particular, did they consult with stakeholders or use existing research? Did the goals change during the grant period and, if so, how and why?
- **Partnerships.** Which key partners and stakeholders helped to implement or are expected to benefit from the grantees' efforts? What were the roles and responsibilities of partners? What successes and challenges did grantees experience in forming partnerships? Did grantees perceive these partnerships as important for their success?
- **Definition of Green Jobs.** How did grantees define green? Were grantees influenced by definitions developed by BLS and O*NET? Did grantees use consistent definitions of green across their various activities and products? How did the definitions of green vary?
- **Activities and Products.** What activities did they undertake to understand green jobs? Did grantees develop career tools to connect workers to jobs? What steps did grantees take to enhance their LMI infrastructure? Did grantees use real-time LMI?
- **Dissemination.** What were the primary dissemination goals? What were the grantees' outreach and dissemination activities? What media did grantees use (e.g., existing websites, print publications, new electronic tools, real-time products, partner sites, and publications)? To what extent did grantees develop or use electronic tools and social media technologies?
- **Grant Management.** What grantee experiences and practices would be useful to highlight for the information of others? What challenges did grantees face in grant planning and implementation?

- **Sustainability.** Will the LMI grants have a lasting impact? How did grantees plan for sustainability? Which activities will grantees sustain after the grant funding ends? Did grant-funded activities inform other ongoing efforts in the state?

To answer these questions, the evaluation draws upon three key data sources: (1) grantees' responses to the LMI Improvement grants solicitation and quarterly progress reports, (2) in-depth site visits to 9 selected sites, and (3) document review. The data collected during site visits include qualitative interviews with a total of 89 individuals across the 9 sites, including staff from the LMI shops, grant partners, and stakeholders. Seven of the nine site visits were conducted after the grant ended; the other two visits were conducted during the grantee's final month.

The nine grantees listed in Table 1 were selected for the study from the full list of 30 LMI grantees. The selected sites were identified in consultation with ETA and were selected to ensure diversity in grant type, grantee activities, and target populations.

Table 1. Sites Selected for In–Depth Study

Grant Recipient	Project Name	Award Amount	DOL Region	States in Consortia
Consortia				
Indiana Department of Workforce Development (MIINOH)	Driving Change	$4,000,000	5	Michigan, Indiana, Ohio
Maryland Department of Labor, Licensing and Regulation (Mid-Atlantic Regional Collaborative (MARC) Green Consortium)	MARC	$4,000,000	2	Maryland, Virginia, DC
Vermont Department of Labor (Northeast Consortium)	Northeast Consortium	$3,999,923	1	Vermont, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island
Individual States				
Alaska Department of Labor and Workforce Development	Alaska	$800,000	6	
Iowa Workforce Development (IWD)	Iowa	$1,172,614	5	
New Jersey Department of Labor and Workforce Development	New Jersey	$1,249,995	1	
New Mexico Department of Workforce Solutions	New Mexico	$1,250,000	4	
State of Oregon Employment Department	Oregon	$1,250,000	6	
Commonwealth of Pennsylvania, Department of Labor and Industry	Pennsylvania	$1,250,000	2	

Planning for the LMI Grant

The planning period for the LMI grant was relatively short. The grant announcement was released in June 2009, with applications due less than two months later. The initial grant announcement encouraged "collaborative approaches, whereby states apply as a consortium to conduct research that may potentially have a multi-state or national impact" (DOL 2009). Interviews with consortia members indicated that the two key factors driving the decision to apply as a consortium were personal relationships between LMI directors and shared goals.

The decision to apply for the LMI grant did not necessarily begin in the LMI shops. Twenty nine grantees focused on developing products or conducting activities to further their understanding of the green economy. The goals and work plans of the nine sites were broadly reflective of the goals of the 30 LMI grantees (Laird et al. 2012). The funding available from the LMI grants allowed states to develop comprehensive lists of research projects. Grantees generated these lists through discussions within the LMI shops and conversations with stakeholders and partners. One grantee described this process as being built from the "bottom up as opposed to the top down." Individuals working on the LMI grant applications also coordinated with those preparing the SESP applications to prevent duplication of efforts and ensure that the LMI projects would meet the needs of the SESP program. The types of additional research activities in which states engaged depended in part on the state's prior work on green employment. State-level expertise also affected the proposed list of research goals.

Creating Partnerships

Grantees developed a wide variety of partnerships to realize grant goals including partnerships with other state agencies; educational institutions, such as universities and community colleges; researcher organizations; and nonprofit organizations. LMI shops had to identify partners relatively quickly, having less than two months between the grant solicitation and the submission deadline, and states reported using existing relationships and networks to identify appropriate partners. Through the LMI grant, many grantees strengthened existing partnerships or created new ones that partners expected to continue beyond the life of the grant.

LMI shops reported that partnerships added real value to the grants. Partnering provided grantees with options to streamline contracts and payments, expand staffing, and improve information dissemination. Partners also brought specialized expertise that aided grantee activities. The involvement of research organizations and universities added methodological and technical expertise. Grantees' partnerships with community colleges offered information on available training programs and assistance in developing career pathways. Partnerships with state and local Workforce Investment Boards (WIBs) provided grantees with direction and feedback on grant activities.

Defining Green Jobs and Skills

At the time of the LMI solicitation, and throughout the grant period, the relatively new concept of what constituted a "green job" was evolving. No national definition of green employment was set at the time grant applications were submitted. In fact, the solicitation stated that DOL was "interested in applicants contributing to [their] understanding of green industries

and jobs that clean and enhance our environment" (DOL 2009). At the same time, defining green was a necessary precursor to many of the recommended grant activities.

To develop definitions, grantees incorporated content from prior work they had completed, consulted preliminary work done by the Bureau of Labor Statistics (BLS) and the Occupational Information Network (O*NET)[1], and customized their efforts to align with their particular project aims and state or regional economies. Local customization of green jobs definitions permitted grantees to include state- or region-specific industries, but limited comparability across states.

Collecting Primary Data on the Green Economy

Grantees collected information on green jobs and employers both to expand LMI and influence the direction of grantee products. Data collection purposes included (1) counting the number of green jobs or employers; (2) describing the characteristics of those jobs, including skill requirements; and (3) developing a better understanding of training needs to inform LMI efforts. To serve these purposes, grantees utilized three main data collection techniques: (1) conducting interviews or "listening sessions" with employers and other stakeholders, (2) conducting skills research for the purpose of developing occupational skills profiles, and (3) administering green jobs surveys.

Grantees took different approaches to measuring green in their surveys. Most surveyed employers by (1) asking whether their company was involved in green, such as by "producing green goods or providing green services" or "being involved in a green-related category"; (2) supporting the employer's ability to answer by listing core areas of green work and providing examples; and (3) asking employers to identify the number of employees working in those areas. While some grantees' data collection approaches clearly were linked to their conceptual definition of green—such as those implementing the preliminary BLS definition by listing BLS categories—others were somewhat less so.

Despite challenges defining green and the differences across grantees, both site visits and document reviews indicated that grantees found value in collecting this new LMI. Surveys allowed grantees to develop a basic understanding of green in their states and influenced a variety of other LMI and SESP grant activities. But, the lack of a standard definition of green jobs eliminated the ability to make reliable comparisons across states.

Analyzing Real–Time Data on the Green Economy

To supplement traditional LMI data collection methods, grantees analyzed real-time data on the green economy. Real-time LMI analysis uses web-scraped job postings to make inferences about the labor market.[2] Grantees sought to use real-time LMI to identify labor demand

[1] The Occupational Information Network (O*NET) is a project funded by ETA that provides online access to an updated and searchable database of occupations in the U.S.

[2] Web-scraped job postings are online job postings collected from a variety of sources including online job banks, company websites, and classified advertisements.

(specifically for green jobs and more broadly for all occupations), determine skill requirements, create projections, and determine locations of available and future jobs.

Grantees' efforts to use real-time LMI revealed the limitations inherent in real-time data. Only the Northeast Consortium's agreement with Burning Glass permitted project staff to work with and analyze the underlying raw data. Based on its analysis of real-time data, the Northeast Consortium concluded that "real time LMI always needs to be linked to traditional sources of LMI" to provide context, but the Consortium did highlight the ability of real-time LMI to "describe skills, experience, and educational requirements that cannot be found through traditional sources. It may prove to be the best source of data on certain credentials (e.g., industry-based certifications) that are not captured in current surveys" (Northeast Consortium 2012). In particular, real-time data allowed the Consortium to understand the skills required in the emerging sector of green jobs.

Linking Workers to Green Careers

LMI shops produced a variety of tools to help job seekers, workforce professionals, and educators understand the labor market and options for career development. To help job seekers understand the skills required for specific occupations and the greening of those occupations, grantees created informational brochures, developed occupational profiles, and produced videos. The exact information contained in each product varied, but the goal was to help job seekers appreciate the nature of the work, the education and experience requirements, and the expected wages. LMI grantees also developed tools to help dislocated and other mid-career workers consider how their existing skills could be used in emerging green occupations. LMI shops used grant funds to assist workers by compiling inventories of available training programs and, in the case of Oregon, creating comprehensive career pathways.

In addition to investments in career tools, states used the LMI grants to enhance their infrastructures to collect and disseminate LMI, and connect workers to jobs. In many cases, these infrastructure enhancements included a green component—such as the ability to flag green jobs in the labor exchange—but other infrastructure investments were not focused solely on green. Grantees designed new labor exchanges, added mapping capabilities to labor exchanges, purchased new software to enhance coding of job announcements, and added capabilities to match worker resumes to job openings. Some of these infrastructure improvements had been desired for a long time, and the grant provided an opportunity to make the needed investments.

Dissemination

Grantees recognized that a 'one size fits all' approach to dissemination would not meet their needs and aimed for dissemination strategies tailored to meet the needs of the targeted audiences. The grantees sought to inform several key audiences. The federal guidance highlighted a large number of potential "end users," including job seekers; educational institutions; community-based organizations that offer training and support services; and labor, economic development, and industry organizations. Grantees used green web portals and widespread public outreach campaigns to reach job seekers. They disseminated products to frontline workforce staffing by making presentations to local WIBs, visiting American Job Centers, and inviting workforce staff to grant conferences. Two grantees organized conferences to bring different stakeholders

together and disseminate grant findings. LMI shops were also committed to disseminating their work to other researchers, including LMI shops in other states.

Timing constraints, a lack of planning regarding dissemination, decentralized partnerships, and changes in state administration all posed challenges to grantees' efforts to disseminate their products. All nine of the study sites noted that the 18-month time frame made it difficult to fully realize the goals of the grant. Additionally, grantees did not always design their reports with sufficient thought to their projects' dissemination goals. Many of the grant products are lengthy technical reports not easily accessible by wide audiences. Changes in state administrations during the grant period also contributed to delays in grantees' dissemination plans.

Grant Management and Sustainability

For state labor market agencies, the LMI improvement grants presented an opportunity to expand their work, particularly in green occupations, but also brought with it significant challenges. All grantees reported challenges with a slow start-up. Since the majority of grantees relied on their partners or subcontractors to complete at least some of their grant tasks, they had to procure their services, and procurements took longer than expected. This slow start-up was particularly challenging with a short 18-month grant.

In addition to facing the short grant period and other start-up issues, eight of the nine grantees were challenged by changes in political leadership during the grant period. These shifts in administration resulted in leadership changes throughout the state agencies, resulting in many of the LMI shops being led by acting directors. The political transitions also affected the priorities of state departments of labor, including their interest in green jobs, and thus had implications for the LMI grant.

Respondents from LMI shops and grant partners did identify some management practices as beneficial. These included initial decisions about the management structure—using an experienced grant manager and making a strategic choice for consortium lead—as well as ongoing management practices—taking advantage of partner flexibility in hiring and using a dashboard tool to track progress.

One of the key challenges to the long-term impact of the grants is that LMI must be current to be useful. Interviews with stakeholders of the nine grantees identified two key concerns regarding the sustainability of the LMI grants efforts. First, many of the infrastructure enhancements initiated under this grant have ongoing maintenance and subscription costs. Second, since partners and subcontractors completed much of the work, respondents expressed concern that the LMI shops may not have sufficient staff time or expertise to maintain and update grant products.

Reflections on the LMI Grants

The Recovery Act posed a new and exciting opportunity for state LMI agencies. In an era of tight funding, the LMI grants provided an infusion of funds and an opportunity to conduct primary research on green jobs and make long-awaited LMI infrastructure enhancements.

Creating and modifying existing guidance to create the definition of green gave grantees the opportunity to engage local employers and green-jobs experts, and work to determine the relevance of green in their local economies. The absence of a standard definition of green also created significant challenges. As BLS demonstrated early in the grant period, defining green is conceptually very difficult and measuring it was also challenging. Many of the LMI grantees, including seven of the nine examined in this report, made significant efforts to count the number of green jobs in their states and collect other LMI to help understand the skills required for green jobs, and how demand for them is likely to change in the future. While grantees gathered useful information in these surveys, the variation in the definitions of green, survey instruments, and survey methods prevented a real comparison of results.

Although this grant provided an opportunity for states to collect LMI on green jobs, during site visits, stakeholders suggested the value of integrating green LMI into the existing infrastructure. Workers accessing LMI want to compare across possible occupations and may not be interested in pursuing a separate search for green jobs. Additionally, many states reported that green is not necessarily a binary concept—jobs may have "layers" of green. Integrating green LMI with other LMI also increases the likelihood that such information will be updated in the future.

Partially by design—the grant solicitation required strategic partnerships—and partially by necessity—many states had hiring restrictions and were unable to hire grant-funded staff—partnerships played a critical role in the implementation of the LMI improvement grant. The experience of the LMI grantees illustrates that partnerships have the potential to add value at each step in the process. Across the LMI grantees, there were examples of strong partner involvement in formulating grant goals and developing the initial proposal, conducting key grant activities, facilitating stakeholder review of products, and disseminating research findings and career tools.

In the three years since the LMI grant announcement was released, much has changed. BLS has finalized its green-jobs definition, conducted Green Goods and Services (GGS) and Green Technologies and Practices (GTP) surveys, and implemented supplements to the Occupational Employment Statistics (OES) survey to provide occupational data on green goods and services employment. Funding for the LMI grant was a one-time infusion through the Recovery Act. As such, the future of state efforts to collect green LMI is unclear. The infrastructure enhancements funded by the grants likely will persist, although some of these investments do have ongoing subscription fees or maintenance costs. LMI shops may need to demonstrate the effectiveness of career tools and enhanced labor exchanges to ensure future funding. The recently awarded Workforce Innovation Fund grants include funding to rigorously test the employment impact of enhanced labor exchanges.

I. INTRODUCTION

In February 2009, President Obama signed the American Recovery and Reinvestment Act (Recovery Act) into law to address the employment challenges facing America's workforce. With a total value of $787 billion, the Recovery Act's purposes include preserving and creating jobs, assisting people most affected by the recession, and promoting economic efficiency and long-term economic benefits (U.S. Congress 2009). Among other investments, the Recovery Act provided $750 million for a program of competitive grants to train workers in high-growth industries, of which $500 million went to support jobs in the energy-efficiency and renewable-energy industries (also known as "green jobs").

While 90 percent of the U.S. Department of Labor's (DOL) Recovery Act green jobs funding went to support training programs for workers, $50 million was reserved for grants to state workforce agencies to improve labor market information (LMI) on green jobs and enhance the labor exchange infrastructure that connects workers to jobs. LMI plays a crucial role in ensuring a well-functioning labor market (Woods and O'Leary 2007; Reamer 2010). LMI includes information on which occupations are growing and what skills are required for these occupations. LMI can affect the education and training decisions of workers; the investment decisions of employers; and the economic development strategies of local, state, and federal government agencies. DOL—specifically the Bureau of Labor Statistics (BLS) and the Employment and Training Administration (ETA)—collects a great deal of public LMI from across the country. State employment agencies also help collect LMI in cooperation with BLS, perform analysis and research on state and local labor market issues, and disseminate state and local information to customers through publications and other dissemination efforts.

In December 2009, DOL awarded approximately $50 million in State LMI Improvement grants (LMI grants) to 24 individual state workforce agencies (SWAs) and six consortia of SWAs. Grantees used these LMI grants, which ranged from approximately $750,000 to $4 million, to collect, analyze, and disseminate LMI and enhance the labor-exchange infrastructure for jobs and careers within the energy-efficiency and renewable-energy industries. Each SWA or consortium was required to form multiple partnerships to help facilitate efforts to improve LMI in the state. Grantees' activities included efforts to understand green jobs, connect workers to jobs, and enhance LMI infrastructure. Grantees' activities were expected to benefit job seekers, businesses, educational institutions, and the overall economy in their states or regions.

The LMI grants built on an increasing national interest in green jobs. For example, the first meeting of the White House Task Force on the Middle Class focused on the potential of green jobs as a pathway to middle-class status (White House 2009). President Obama placed significant emphasis on clean-energy jobs in his 2010 State of the Union address (Obama 2010). While Recovery Act grants were being allocated to develop worker trainings for green jobs and disseminate information about the green economy, BLS received funding in the 2010 Consolidated Appropriations Act to identify green economic activity and produce data on associated green jobs.

In September 2010, ETA contracted with Mathematica Policy Research to evaluate the extent to which the State LMI Improvement grant program was achieving its stated purposes. Mathematica was asked to broadly document the activities of all 30 grantees, provide a detailed

description of the activities and partnerships of a subset of grantees, and identify grantees' challenges and promising practices. In this report, we provide an in-depth description of the experiences of 9 selected grantees and present lessons that may inform future efforts and complement the broader assessment provided in the Grantee Summary Report (Laird et al. 2012).

A. Context of LMI Grants

The LMI grants included in the Recovery Act were awarded during a period of high unemployment. There was a strong interest in understanding what industries were growing and how workers should prepare for in-demand occupations. Green jobs were identified as an area in which there was potential for growth in "good" jobs.[3]

In the years preceding the Recovery Act, growing interest in green jobs had become increasingly evident in state policy. Some states intensified activities designed to promote a clean energy economy. A report by Pew Charitable Trusts found that by 2009, 46 states offered tax incentives to encourage corporations or individuals to use renewable energy or adopt energy-efficient systems, 29 states and the District of Columbia required energy providers to supply a minimum amount of power from renewable sources, 19 states established energy-efficiency standards, and 23 states were participating in regional clean energy initiatives (Pew Charitable Trusts 2009).

Additionally, some states had already initiated efforts to understand and promote the green economy. In New Mexico, for example, Governor Bill Richardson created a Green Jobs Cabinet. This group included members from the state departments of economic development, energy, the environment, public education, higher education, and workforce, and its first charge was to prepare a report describing opportunities in New Mexico's green economy (New Mexico 2009). In Oregon, the governor signed legislation defining "green" and requiring the Oregon Workforce Investment Board to develop a strategic plan to promote green job growth, analyze growth factors, and create employment projections for green jobs in forest production industries (Oregon Legislative Assembly 2009, 2012). Washington, Oregon, Michigan, and California all had conducted surveys of employers to gain a better understanding of the supply of green jobs in their states (Washington 2008; Oregon 2009; Michigan 2009; California 2010).

At the federal level, BLS and ETA also were working to develop a better understanding of green jobs. The Occupational Information Network (O*NET), a project funded by ETA, released a report, *Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations*, that summarized research on the impact of green economic activities and technologies on occupational requirements, and identified new and emerging green occupations (Dierdorff et al. 2009).[4] The Workforce Information Council established a Green Jobs Study Group to begin considering how to define and measure green employment. BLS served on that group and the agency soon began working to operationalize a definition of green jobs—which

[3] By "good" jobs, we mean jobs offering family-sustaining wages and opportunities for advancement.

[4] The Occupational Information Network (O*NET) is a project funded by ETA that provides online access to an updated and searchable database of occupations in the U.S.

evolved to a measure of green goods and services (GGS), the output approach, and a measure of green technologies and processes (GTP), the process approach. BLS released its final definition of green jobs in September 2010, 10 months into the 18-month LMI grant period (BLS 2010). In the final BLS definition, green jobs are either: (1) jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources, or (2) jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources. (See Box III.1).

BLS recently released findings from its initial efforts to collect information on green jobs (BLS 2012a, 2012b). The GGS survey, a planned recurring data collection, provided an estimate of green employment in industries producing green goods and services. The Green Technologies and Practices (GTP) survey collected establishment-level information on the use of GTP and the occupations of workers who spend more than half of their time involved in GTP.

Federal investment in green jobs was expanded significantly by the Recovery Act, under which DOL received $500 million reserved for competitive grant projects to prepare workers for careers in the energy-efficiency and renewable-energy industries. On June 24, 2009, DOL announced five grant competitions: (1) Energy Training Partnership Grants, (2) Pathways Out of Poverty Grants, (3) State Energy Partnership Sector (SESP) Grants, (4) Green Capacity Building Grants, and (5) State Labor Market Information Improvement Grants. The LMI grants were seen as support grants that could inform the training grants and help develop infrastructure that would aid workers in choosing training programs and finding post-training employment. While the four training grant programs all focused on green industries, they differed by providing funding to different types of grantees (Table I.1). They also had different target populations, such as workers who are unemployed and in need of basic skills development, workers dislocated from other failing industries, or those who are already in high-growth and emerging industries but in need of updated skills. Another key difference in the Recovery Act grants is their duration. While the LMI grants had duration of only 18 months, the grants for new training programs (all except the Green Capacity Building Grants) had a duration of at least 24 months, and the SESP grant had a 36-month period of performance.

Table I.1. Overview of Recovery Act Green Jobs Training Grants

Grant Name	Entities Eligible for Grants	Number and Amount of Grants	Duration
Energy Training Partnership Grants	Private nonprofit organizations that are either (1) national labor management organizations with a local network or (2) statewide or local partnerships	25 grants awarded; about $100 million total	24 months
Pathways out of Poverty Grants	National nonprofit entities or local entities	38 grants awarded; about $148 million in total	24 months
State Energy Partnership Grants	State Workforce Investment Boards (WIBs)	34 grants awarded; about $187 million in total	36 months
Green Capacity Building Grants	Existing DOL grantees	62 grants awarded; about $6 million in total	12 months
State Labor Market Improvement Grants	State workforce agencies or consortia of state workforce agencies	30 grants awarded; about $50 million in total	18 months

B. State Labor Market Improvement Grants

In June 2009, Secretary of Labor Hilda Solis announced the availability of the State Labor Market Improvement grants with grant applications due less than two months later. State workforce agencies were eligible to apply, and applications from consortia of states were encouraged. Consistent with the goals of the Recovery Act, the grant had a short 18-month period of performance.

The initial grant announcement required grantees to propose strategies and approaches in four focus areas of activity:

- **Data collection and estimation activities related to green industries, occupations, and skill requirements**. Grantees could propose methods to count green jobs, assess skill requirements, and assess occupational requirements.
- **Data dissemination activities**. Grantees were required to disseminate the research and data produced to multiple stakeholders, including the public workforce system, educational institutions, and economic development agencies. DOL strongly encouraged grantees to include career information and guidance for job seekers.
- **Related research activities**. Grantees could also propose related research, including state-specific summaries of regulations, educational resources, or career pathways. Grantees could also estimate the supply of human capital for green jobs.
- **Labor exchange activities**. Applicants were urged to develop strategies for posting job openings to online job banks that would be clearly highlighted as green jobs. Grantees could also use tools to data mine online job postings (real-time LMI) to collect information on green jobs.

The LMI grants awards were announced on November 19, 2009. The full list of grant recipients is included in Appendix Table A.1.

The LMI grants were awarded to state workforce agencies and more specifically, the state workforce information departments. State workforce information departments, often referred to as "LMI shops," play a central role in the production and dissemination of labor market information. They participate in cooperative data collection efforts with BLS and also receive other federal funding, including formula funding from ETA's Workforce Information Grants program. The size of LMI shops varies across states and is dependent on the additional funding that the LMI shop receives from state appropriations, user fees, foundations, and other sources. Regardless of the size of a state's LMI shop, the LMI grant program represented a significant increase in funding. In PY 2010, the Workforce Information Grant program awarded $32 million in formula funding across the 50 states, District of Columbia, Guam, and the Virgin Islands. The LMI grants totaled almost $50 million and were spread across fewer states. Additionally, unlike the formula funding received from BLS and ETA, the LMI grants were fully dedicated to discretionary research projects and infrastructure improvements.

C. Overview of the Evaluation

This evaluation's objective was to examine and report on how the LMI grantees used this funding opportunity to collect new LMI on green jobs and enhance the overall LMI infrastructure. To meet these objectives, the study team conducted several parallel activities.

During the grant period, the team developed a comparative description of all 30 grantees' planned and implemented activities and included them in the Grantee Summary Report (GSR). An initial GSR was prepared early in the evaluation; it was updated at the conclusion of the grant period (Laird et al. 2012). In parallel, the team conducted an in-depth study of 9 grantees chosen in collaboration with ETA. The results of the in-depth study are reported here. Finally, the team identified several promising practices to be highlighted in forthcoming LMI Practitioner Briefs.

1. Research Questions

In consultation with ETA, the study team identified seven research topics that were key to the study. Data were collected about grantee activities across these dimensions and across the three evaluation activities.

- **Goals.** What were the grantees' main goals? How did grantees arrive at these goals? In particular, did they consult with stakeholders or use existing research? Did the goals change during the grant period and, if so, how and why?
- **Partnerships.** Which key partners and stakeholders helped to implement or are expected to benefit from the grantees' efforts? What were the roles and responsibilities of partners? What successes and challenges did grantees experience in forming partnerships? Did grantees perceive these partnerships as important for their success?
- **Definition of Green Jobs.** How did grantees define green? Were grantees influenced by definitions developed by BLS and O*NET? Did grantees use consistent definitions of green across their various activities and products? How did the definitions of green vary?
- **Activities and Products.** What activities did they undertake to understand green jobs? Did grantees develop career tools to connect workers to jobs? What steps did grantees take to enhance their LMI infrastructure? Did grantees use real-time LMI?
- **Dissemination.** What were the primary dissemination goals? What were the grantees' publicity and dissemination activities? What media did grantees use (e.g., existing websites, print publications, new electronic tools, real-time products, partner sites, and publications)? To what extent did grantees develop or use electronic tools and social media technologies?
- **Grant Management.** What grantee experiences and practices would be useful to highlight for the information of others? What challenges did grantees face in grant planning and implementation?
- **Sustainability.** Will the LMI grants have a lasting impact? How did grantees plan for sustainability? Which activities will grantees sustain after the grant funding ends? Did grant-funded activities inform other ongoing efforts in the state?

2. Selection of Sites for In-Depth Study

To gain a deeper understanding of how grant funds were used, nine grantees were selected for in-depth data collection and analysis. Efforts to identify study sites began in January 2011, 13 months into the grant period.

The study team identified the sites using a three-step process. First, as part of the preparation of the initial GSR, the study team reviewed grantee work plans and quarterly progress reports, categorizing planned activities into the following typologies: goals to be pursued, definition of green to be used, planned activities and data collection methods, intended products, anticipated partnerships, and expected approaches to dissemination. Second, to ensure collection of data across multiple dimensions, we recommended to ETA a set of grantees—nine primary and six alternate—that represented single states and consortia, most DOL regions, and broad approaches and efforts targeted at specific populations.[5] Finally, in consultation with ETA, the study team chose three consortia and six single-state grantees. The study team contacted these nine sites and all agreed to be included in the study. Table I.2 lists the sites, including the official grant recipients and the project names we use throughout this report.

Table I.2. Sites Selected for In-Depth Study

Grant Recipient	Project Name	Award Amount	DOL Region	States in Consortia
Consortia				
Indiana Department of Workforce Development (MIINOH)	Driving Change	$4,000,000	5	Michigan, Indiana, Ohio
Maryland Department of Labor, Licensing and Regulation (Mid-Atlantic Regional Collaborative (MARC) Green Consortium)	MARC	$4,000,000	2	Maryland, Virginia, DC
Vermont Department of Labor (Northeast Consortium)	Northeast Consortium	$3,999,923	1	Vermont, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island
Individual States				
Alaska Department of Labor and Workforce Development	Alaska	$800,000	6	
Iowa Workforce Development (IWD)	Iowa	$1,172,614	5	
New Jersey Department of Labor and Workforce Development	New Jersey	$1,249,995	1	
New Mexico Department of Workforce Solutions	New Mexico	$1,250,000	4	
State of Oregon Employment Department	Oregon	$1,250,000	6	
Commonwealth of Pennsylvania, Department of Labor and Industry	Pennsylvania	$1,250,000	2	

[5] Initially we had selected grantees in all DOL regions, but Alabama, our Region 3 grantee, was replaced because the state was dealing with the aftermath of substantial tornado damage.

3. Data Sources

Data for the study were gathered from three primary data sources: (1) grantees' responses to solicitation and quarterly progress reports, (2) in-depth site visits, and (3) document review.

Grantee Statements of Work and Quarterly Reports. As part of the application process, grant applicants submitted a statement of work (SOW) that outlined the grantee's plans. Throughout the grant period, grantees were required to submit quarterly progress reports on their partnerships and contracts, their successes, and any challenges or delays they identified. The study team used the SOW and quarterly reports to document the planned activities, inform study site selection, and customize site-visit protocols.

Site Visits. Using semistructured protocols, the study team conducted in-person interviews with respondents across the nine study sites. While the study team used a semistructured protocol, it also adapted specific questions for each site to account for the diversity of grantees' activities. Most visits were conducted by two members of the study team and lasted an average of two days. Two included follow-up phone interviews.

The study team interviewed key project staff, grantee partners, grantee subcontractors, and grantee stakeholders. In each site, the list of respondents reflected the key grant activities and included respondents from community colleges and universities, non-profit and for-profit agencies, American Job Center staff, and state and local WIBs. In total, the study team interviewed 89 respondents.

Site visits were timed to balance two considerations: (1) a desire to visit toward the end of the grant or just after it had ended, to gather as much information as possible about grant activities; and (2) a need to ensure that any grant-funded staff and subcontractors were still available for interviews. Since the grantees received extensions ranging from 0–6 months, the timing of the visit varied by site (Table I.3). Seven of the nine site visits were conducted after the grant ended; the other two visits were conducted during the grantee's final month.

Table I.3. Timing of Site Visits

Project Name	Date Grant Ended	Date of the Site Visit
Alaska	September 30, 2011	September 12–13, 2011
Driving Change	June 30, 2011	August 1–2, 2011
Iowa	May 31, 2011	August 9–10, 2011
MARC	May 31, 2011	May 20, 2011
Northeast Consortium	December 31, 2011	January 19, 2012
New Jersey	August 31, 2011	October 25–26, 2011
New Mexico	August 31, 2011	September 20–21, 2011
Oregon	September 30, 2011	October 17–18, 2011
Pennsylvania	May 31, 2011	July 5–6, 2011

Document Review. Information obtained through interviews was supplemented by project-related documents. Reviewed documents included survey instruments, research reports, and other grantee products, including websites and career tools.

4. Background on Selected Sites

As detailed throughout the report, the nine sites selected for in-depth study pursued many of the same activities as the broader set of LMI grantees. Profiles of the grantee are included in Appendix B. Driving Change was unique for its focus on workers dislocated from the auto industry. The Northeast Consortium was unique for the strength of its focus on exploring the potential of generating real-time LMI from the data mining of online job postings.

In all nine sites, the focal LMI grant was not the only Recovery Act green jobs grant that the state had received (Table I.4). The rules of the LMI grant announcement allowed states to apply both as a single state and as a member of one or more consortia. Four of the nine grantees had at least one state participating in multiple LMI grants. Additionally, the State LMI grant was one of several competitive DOL grant programs focused on the green economy, and the grant announcement explicitly encouraged applicants to connect their efforts with other Recovery Act grants. In practice, the connections between the LMI grants and the SESP grants were particularly strong, likely because the SESP grants also were awarded at the state level. All nine sites had some involvement with the SESP grant, although in the case of the consortia, not all states received SESPs.

Table I.4. Other Recovery Act Grants

Project Name	Other State LMI Improvement Grants	Received SESP Grant
Alaska	NA	Yes
Driving Change	OH had a state grant	Yes for IN, MI, and OH
Iowa	IA was in the Rocky Mountain Consortium	Yes
MARC	NA	Yes for MD
Northeast Consortium	NJ and NY had state grants; NY was in the Nevada Consortium	Yes for CT, MA, and NJ
New Jersey	NJ was in the Northeast Consortium	Yes
New Mexico	NA	Yes
Oregon	NA	Yes
Pennsylvania	NA	Yes

5. Limitations of the In-Depth Study

Several limitations of the in-depth study should be considered when interpreting the results presented here. First, the descriptive nature of the study, coupled with the diversity of grantee activities, substantially limited the ability to make cross-grantee comparisons about detailed activities. The Grantee Summary Report provides the most systematic perspective, offering broad comparisons for all 30 grantees across several typologies. Second, even though the majority of the site visits occurred after the grant period, few sites had fully implemented their planned dissemination activities at the time of the visit. Grantees were still completing some final deliverables or waiting for approval to publish. As a result, dissemination activities may not be described fully. Third, the timing of the study limited the team's ability to interview stakeholders, in particular job seekers and American Job Center staff, about the perceived value of grant-funded products and activities.

D. Organization of the Report

In the remainder of this report, we describe the grantees selected for the in-depth study and their experiences with the LMI grants. In Chapter II, we describe grantees' goals and the partnerships they established to achieve them. In Chapter III, we discuss grantee efforts to define green jobs and skills, collect primary data, and analyze real-time data on the green economy. In Chapter IV, we describe grantee efforts to link workers to careers. In Chapter V, we describe the grantee efforts to disseminate the new LMI, and in Chapter VI we discuss grant management and look ahead to consider the sustainability of grantee efforts. In the final chapter, we offer some reflections on the LMI grants.

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II. DEFINING GOALS AND CREATING PARTNERSHIPS

Responding to DOL's solicitation for the LMI grant required state workforce agencies to make a series of important decisions. Each had to determine whether to apply as a single state and/or as part of a consortium of states. States also had to decide what activities they would propose to meet the relatively broad requirements in the initial solicitation. Finally, they had to consider what role partners would play in the efforts and how best to maximize their capacity to take advantage of this grant opportunity.

A. Planning for the LMI Grant

The planning period for the LMI grant was relatively short. The grant announcement was released on June 24, 2009, and the closing date for applications was August 14, 2009. In less than two months, states had to determine whether or not to form consortia and develop a SOW.

1. Grantees Formed Consortia

The initial grant announcement encouraged "collaborative approaches, whereby states apply as a consortium to conduct research that may potentially have a multi-state or national impact" (DOL 2009). Consortia were eligible to receive larger grants (consortium awards ranged from $2 million to $4 million, compared to $750,000 to $1.25 million for individual states) and received preference in the grant scoring. Six consortia were included in the final list of 30 grant recipients, and our evaluation study included site visits to three—MARC, Driving Change, and the Northeast Consortium.

Interviews with consortia members indicated that the two key factors driving the decision to apply as a consortium were personal relationships between LMI directors and shared goals. MARC was actually an existing consortium that had formed in 2008 at the suggestion of an ETA regional administrator in response to the Base Realignment and Closure Commission (BRAC). MARC then received National Emergency Grant funding that it used for start-up and operation costs. MARC saw the LMI grant as a "perfect storm" opportunity to strengthen the regional workforce community.

For Driving Change, the former Indiana LMI director approached the LMI directors in Ohio and Michigan and proposed applying as a consortium. These three states had been impacted significantly by restructuring in the automotive industry and saw this grant as an opportunity to gain a greater understanding of the restructuring and greening of that industry and develop tools to help auto workers prepare for green careers. Like the LMI directors in the Driving Change consortium, the LMI directors in the states of the Northeast Consortium had existing relationships developed through regional DOL meetings. The charge to form the Northeast Consortium was led by the former LMI director of Maine. He perceived the LMI grant as an opportunity to enhance the real-time LMI capabilities of states in Region 1.

2. Grantees Established Project Goals

The decision to apply for the LMI grant did not necessarily begin in the LMI shops. In New Mexico, the decision to apply came from the Governor's Green Job Cabinet. The cabinet viewed the LMI grant as supporting the SESP grant and as a means to collect baseline information about the state's green economy. In both Alaska and Pennsylvania, the decision to apply came from senior department officials.

Nearly all grantees focused on developing products or conducting activities to further their understanding of the green economy. The goals and work plans of the nine sites were broadly reflective of the goals of the 30 LMI grantees (Laird et al. 2012). The funding available from the LMI grants allowed states to develop comprehensive lists of research projects. Grantees generated these lists through discussions within the LMI shops and conversations with stakeholders and partners. One grantee described this process as being built from the "bottom up as opposed to the top down." Individuals working on the LMI grant applications also coordinated with those preparing the SESP applications to prevent duplication of efforts and ensure that the LMI projects would meet the needs of the SESP program.

The types of additional research activities in which states engaged depended in part on the state's prior work on green employment. Pennsylvania, Michigan, and Oregon already had conducted significant research on green jobs, so their SOWs built on this experience. In previous research, the LMI shop in Pennsylvania had defined green jobs and identified a list of green jobs and occupations (Pennsylvania 2010). This work helped Pennsylvania craft a list of follow-up research questions for the LMI grant. From Oregon's existing green jobs research, its LMI shop was aware that green jobs represented a relatively small share of Oregon's economy, so the state wanted to ensure that investments made under the grant would have broader impacts.

State-level expertise and available resources also affected the proposed list of research goals. New Jersey was a leader in working with real-time LMI, so the proposals for New Jersey and the Northeast Consortium looked to advance this work. Alaska has access to rich state-level administrative data, so it proposed projects to leverage these data.

B. Creating Strategic Partnerships to Realize Grant Goals

In its grant solicitation, ETA required grantees to demonstrate that they had incorporated strategic partnerships into their projects. The solicitation listed state labor market information and research entities, state WIBs, and employers and industry leaders as examples of "robust" strategic partners (DOL 2009). In addition, the solicitation broadly outlined the roles these partners could play, from advising on presentation formats to providing information on the user perspective.

Grantees developed a wide variety of partnerships to realize grant goals. Most partnerships were established before submitting the SOW. Partnerships enhanced grantee capabilities and allowed them to address staffing and contracting constraints. Through the LMI grant, many grantees strengthened existing partnerships or created new ones that partners expected to continue beyond the life of the grant.

1. Grantees Formed Multiple Partnerships

Grantees formed partnerships with a variety of state agencies; educational institutions, such as universities and community colleges; researchers; and nonprofit organizations. Table II.1 presents information on the different types of organizations that grantees included in their SOWs as partners. The number of partners identified in the original SOWs ranged from 5 to 31. The Driving Change consortium was an outlier, with 31 identified partners; the other grantees listed 10 or fewer.

Table II.1. Grantee Partners

Grantee	State Agencies	Research Organizations and Universities	Community Colleges	State & Local WIBs	Chambers of Commerce	National Workforce Development Organizations
Alaska	X	X				X
Driving Change	X	X		X		
Iowa		X	X			
MARC	X	X	X	X	X	
New Jersey	X	X		X		
New Mexico		X	X	X	X	
Northeast Consortium	X	X				
Oregon	X	X	X	X		X
Pennsylvania		X		X		

LMI shops had to identify partners relatively quickly, having less than two months between the grant solicitation and the submission deadline, and states reported using existing relationships and networks to identify appropriate partners. In some cases, the states determined the grant's goals and activities and then searched for appropriate partners. In other cases, partners were identified first and then helped shape the grant goals. Oregon, for example, contacted potential partners during the grant proposal stage and held a conference call to present potential projects. Oregon and its partners came to a consensus on projects and funding levels during the conference call.

The extent of partner involvement varied widely across and within the grantees. Some grantees and partners worked in tandem on all grant activities and products. In these types of partnerships, the decisions were made jointly. Other grantees had their partners serve in an advisory capacity, providing advice as a stakeholder group. Another group of grantees had partners perform specific tasks, managed through a contracting arrangement.

Partners serving in an advisory capacity typically were stakeholders of the activities or products developed by the grant. Although not responsible or contracted to perform certain tasks, these partners offered information that shaped grant goals or provided advice. For many of these grantees, the state and local WIBs provided advice but did not have a direct role in grant activities. For example, Driving Change consulted the WIBs in all three states, but the boards did not receive grant funds for specified tasks. Oregon consulted with and presented to the state WIB; however, the WIB was not actively involved in grant activities.

Grantees also identified subcontractors as grant partners. These subcontractors received set funds to complete tasks designed by the LMI shop or other partners. MARC considered Geographic Solutions, the vendor for Maryland's new labor exchange, to be a partner in the grant. Other grantees reported those organizations responsible for survey administration as grant partners.

The grant solicitation encouraged grantees to coordinate with other green jobs grant programs funded by the Recovery Act, and many of the partnerships with other state agencies reflect this coordination. The relationship between the LMI and SESP grants was particularly strong, perhaps since both were awarded at the state level (LMI grants were awarded to state workforce agencies; SESP grants to state WIBs). All nine sites had involvement with the SESP grant (see Table I.4). In some states, officials viewed the LMI and SESP grants as a single package. New Mexico, for example, developed a common branding for the grants, a joint website, and common dissemination activities and resources (see Box II.1).

Box II.1. New Mexico's Linkages Between the LMI and SESP Grants

During the planning phase of the LMI and SESP grants, New Mexico conceptually viewed the two funding opportunities as a single opportunity to improve the information on and training programs for green jobs. Several New Mexico LMI staff members stated that the LMI grant allowed them to collect information on green jobs that would inform the design and implementation of the SESP grant. Thus, the LMI shop designed activities and produced products that would be used to further the goals of both grants.

All of the key activities of the LMI grant—surveys, an E3 (Employers, Educators, Employees) Green Jobs Forum, and town hall meetings—collected information that could be shared by both grants. The surveys identified green jobs and industries that SESP grant administrators targeted for training programs. SESP grant administrators stated that the data from the surveys showed them the greatest concentration of green jobs in different industries and allowed them to design training programs that would meet future demand. The E3 forum and later town hall meetings opened a dialogue between employers and educators to identify skills gaps and potential training programs. Administrators of both grants worked together to disseminate their products, which included survey findings, occupational profiles, and training inventories (see Chapter V).

2. Partnerships Provided Real Value to the Grant

Partnering provided grantees with options to streamline contracts and payments, expand staffing, add expertise, and improve information dissemination. As described further in Chapter VI, MARC used its partnership with the Maryland Workforce Corporation (MWC) to streamline the consortium's contracting and payment processes. According to consortium and partner staff, MWC could contract with additional partners more easily by not having to navigate each of the three jurisdiction's procurement procedures.

LMI shops also used partnerships to expand capacity. Due to hiring freezes and contractual limitations, LMI shops found it difficult to hire staff to meet the increased workload demands of the LMI grant. As a result, these grantees used partner staff to complete tasks or, in some cases, had partners hire temporary staff members to complete the work. New Jersey, for example, had a hiring freeze at the time of grant award and was prohibited from adding new staff to work on grant activities. To meet its staffing needs, New Jersey contracted with a local research firm to conduct some work on the state's behalf.

Partners also brought specialized expertise that aided grantee activities. All of the grantees chose to partner with a research organization or university. These partners added methodological and technical expertise. The Northeast Consortium relied on the expertise of researchers at Georgetown University to lead its investigation of real-time LMI. New Mexico, MARC, Driving Change, and New Jersey used academic partners to conduct green-jobs or green-training program surveys. Grantees' partnerships with community colleges offered information on available training programs and assistance in developing career pathways. Partnerships with state and local WIBs provided grantees with direction and feedback on grant activities. Grantees used WIBs to review data collection instruments, provide employer connections, and test career tools.

Grantees' dissemination efforts also benefited from their partners' networks and relationships with stakeholders. For example, Oregon's partnership with community colleges brought buy-in on key project activities, such as the Career Pathways project and training inventories. Driving Change also relied on partners to enhance dissemination to stakeholders, including employers and auto worker unions, and to take advantage of their greater dissemination flexibility.

3. Grantees Expected Partnerships to Continue Beyond the Grant Period

For several grantees, respondents expected partnerships from the LMI grant to extend beyond the grant period. The relationships that developed through the grant opened opportunities for further collaboration on projects and grants. For some grantees, new partnerships become permanent collaborative relationships, such as a new interagency partnership in Alaska. Other grantees, such as MARC, strengthened existing relationships and have moved on to more partnering opportunities because of the grant.

As part of its work on the LMI grant, Alaska created an intra-agency partnership of multiple divisions within its Department of Labor and Workforce Development—the Central Data Group. This group met regularly to discuss labor exchange infrastructure improvements and the impact of these improvements across the different programs the department administers. Although changes to the data systems previously had impacted multiple programs, Alaska had no formal mechanism to communicate these changes. The partnership formed under the LMI grant has fostered more coordination and opportunities for future cross-department collaboration on uses and presentation of data.

As a pre-existing regional consortium, MARC used the LMI grant to build its reputation in workforce development. The LMI grant afforded MARC the opportunity to establish a regionally connected labor exchange platform—helping the consortium to realize its goal of acting as a regional entity. Building from the experiences of the LMI grant, MARC has been working to recruit additional mid-Atlantic states and administer other regional grants.

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III. UNDERSTANDING GREEN JOBS

At the time of the LMI solicitation, and throughout the grant period, the relatively new concept of what constituted a "green job" was evolving. No national definition of green employment was set at the time grant applications were submitted. In fact, the solicitation stated that DOL was "interested in applicants contributing to [their] understanding of green industries and jobs that clean and enhance our environment" (DOL 2009). At the same time, defining green was a necessary precursor to many of the recommended grant activities. Once definitions were developed, grantees operationalized them in focus group protocols, survey questions, occupational profiling processes, and other activities. Grantees also explored using online job postings as a new source of data. Defining and then collecting information about green became core challenges for the grantees. In this chapter, we describe the evolution of a national green jobs definition, grantees' efforts to define and measure green, and the results and uses of data gathering activities.

A. Defining Green Jobs and Skills

To develop definitions, grantees incorporated content from prior work they had completed, consulted preliminary work done by BLS and O*NET, and customized their efforts to align with their particular project aims and state or regional economies. Local customization of green jobs definitions permitted grantees to include state- or region-specific industries, but limited comparability across states.

1. Green Jobs Still Were Being Defined at the Beginning of the Grant Period

DOL released its grant solicitation in June 2009, citing a need for research in seven energy efficiency and renewable energy industries, as defined in the Workforce Investment Act (WIA). The solicitation cited O*NET's February 2009 report, *Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations,* which provided a first classification system for green skills (Dierdorff 2009). The report categorized occupations affected by green economic activities and technologies into three categories: (1) green increased demand occupations, (2) green enhanced skills occupations, and (3) green new and emerging occupations. The solicitation did not recommend that grantees use a particular green definition for their planned activities.

In March 2010, a few months into the grant period, BLS proposed a preliminary green jobs definition in the Federal Register. The notice stated that the purpose of its green jobs initiative was to develop information on (1) the number of and trend over time in green jobs; (2) the industrial, occupational, and geographic distribution of the jobs; and (3) the wages of the workers in these jobs. The notice described proposed categories of green jobs and a planned method to measure green jobs and services. It cited green jobs as "those in…seven economic activities that help protect or restore the environment or conserve natural resources: renewable energy; energy efficiency; greenhouse gas reduction; pollution reduction and cleanup; recycling and waste reductions; agriculture and natural resources; and education, compliance, public awareness, and training." BLS revised and published a final definition of green jobs in September 2010, 10 months into the LMI grant period. The final definition had two parts, each requiring measurement—an output-based measure of jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources and a process-based measure

of jobs in which workers use environmentally friendly processes. Box III.1 provides detailed O*NET, and preliminary and final BLS definitions of green jobs.

Box III.1. Green Jobs Definitions

O*NET Green Jobs Definition (2009)

The green economy encompasses the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy. Green economy activities and technologies may have different effects on different occupations. A prudent approach is to focus on the "greening" of occupations, which is defined in this report as follows: The "greening" of occupations refers to the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements.

This definition lends itself to three general occupational categories, each describing the differential consequences of green economy activities and technologies on occupational performance.

Green Increased Demand Occupations. The impact of green economy activities and technologies is an increase in the employment demand for an existing occupation. However, this impact does not entail significant changes in the work and worker requirements of the occupation. The work context may change, but the tasks themselves do not.

Green Enhanced Skills Occupations. The impact of green economy activities and technologies results in a significant change to the work and worker requirements of an existing O*NET-SOC occupation. This impact may or may not result in an increase in employment demand for the occupation. The essential purposes of the occupation remain the same, but tasks, skills, knowledge, and external elements, such as credentials, have been altered.

Green New and Emerging (N&E) Occupations. The impact of green economy activities and technologies is sufficient to create the need for unique work and worker requirements, which results in the generation of a new occupation relative to the O*NET taxonomy. This new occupation could be entirely novel or "born" from an existing occupation.

BLS Definition (Preliminary, March 2010)

Broadly defined, green jobs are jobs involved in economic activities that help protect or restore the environment or conserve natural resources. These economic activities generally fall into the following categories:

- **Renewable energy**. Research on and development, production, storage, and distribution of energy (electricity, heat, and fuel) from renewable sources, including hydropower, wind, biomass (including biofuels and biogas), geothermal, solar energy, tidal energy, hydrogen fuel cells, and other renewable sources.
- **Energy efficiency**. Research on and development and implementation of energy conservation technologies and practices, including production of energy-efficient products, cogeneration, and increasing the energy efficiency of production processes, distribution, construction, installation, and maintenance.
- **Greenhouse gas reduction**. Research on and development and implementation of technologies and practices to reduce greenhouse gas emissions through approaches other than renewable energy generation and energy conservation. Includes generation of electricity from nuclear sources and reduction of greenhouse gas emissions in electricity generation from fossil fuels.
- **Pollution reduction and cleanup**. Research on and development and implementation of technologies and practices to reduce the emission of pollutants and remove pollutants and hazardous waste from the environment.
- **Recycling and waste reduction**. Research on and development and implementation of technologies and practices to collect and recycle materials and waste water.
- **Agricultural and natural resources conservation**. Research on and development and implementation of technologies and practices to reduce the environmental impact of agricultural production and improve natural resources conservation, including reducing use of chemical fertilizers and pesticides, soil and water conservation, sustainable forestry, land management, and wildlife conservation.

- **Education, compliance, public awareness, and training**. Activities to increase public awareness of environmental issues; activities to develop and enforce environmental regulations; and providing training in the application of ‘‘green’’ technologies and practices.

BLS Definition (Final, September 2010)

BLS developed this definition of green jobs for use in data collection in the GGS and GTP surveys. Green jobs are either:

A. Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources.

B. Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.

The BLS approach to identifying each type of green job for measurement purposes is described in more detail below. The BLS surveys may identify and count some jobs twice.

A. *Jobs in businesses that produce goods and provide services that benefit the environment or conserve natural resources.* These goods and services are sold to customers, and include research and development, installation, and maintenance services. This definition is used in the BLS survey of establishments in industries that produce green goods and services (GGS). Green goods and services fall into one or more of five groups:

1. *Energy from renewable sources.* Electricity, heat, or fuel generated from renewable sources. These energy sources include wind, biomass, geothermal, solar, ocean, hydropower, and landfill gas and municipal solid waste.
2. *Energy efficiency.* Products and services that improve energy efficiency. Included in this group are energy-efficient equipment, appliances, buildings, and vehicles, as well as products and services that improve the energy efficiency of buildings and the efficiency of energy storage and distribution, such as Smart Grid technologies.
3. *Pollution reduction and removal, greenhouse gas reduction, and recycling and reuse*. These are products and services that:
   - Reduce or eliminate the creation or release of pollutants or toxic compounds, or remove pollutants or hazardous waste from the environment.
   - Reduce greenhouse gas emissions through methods other than renewable energy generation and energy efficiency, such as electricity generated from nuclear sources.
   - Reduce or eliminate the creation of waste materials; collect, reuse, remanufacture, recycle, or compost waste materials or wastewater.
4. *Natural resources conservation.* Products and services that conserve natural resources. Included in this group are products and services related to organic agriculture and sustainable forestry; land management; soil, water, or wildlife conservation; and stormwater management.
5. *Environmental compliance, education and training, and public awareness.* These are products and services that:
   - Enforce environmental regulations.
   - Provide education and training related to green technologies and practices.
   - Increase public awareness of environmental issues.

B. Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources. These workers research, develop, or use technologies and practices to lessen the environmental impact of their establishment, or train the establishment's workers or contractors in these technologies and practices. This definition is used in the BLS survey of establishments—the Green Technologies and Practices Survey (GTP)--across all industries to identify jobs related to green technologies and practices used within the establishment.

These technologies and practices fall into one or more of four groups:

1. *Energy from renewable sources.* Generating electricity, heat, or fuel from renewable sources primarily for use within the establishment. These energy sources include wind, biomass, geothermal, solar, ocean, hydropower, and landfill gas and municipal solid waste.
2. *Energy efficiency.* Using technologies and practices to improve energy efficiency within the establishment. Included in this group is cogeneration (combined heat and power).
3. *Pollution reduction and removal, greenhouse gas reduction, and recycling and reuse.* Using technologies and practices within the establishment to:
   - Reduce or eliminate the creation or release of pollutants or toxic compounds, or remove pollutants or hazardous waste from the environment.
   - Reduce greenhouse gas emissions through methods other than renewable energy generation and energy efficiency.
   - Reduce or eliminate the creation of waste materials; collect, reuse, remanufacture, recycle, or compost waste materials or wastewater.
4. *Natural resources conservation.* Using technologies and practices within the establishment to conserve natural resources. Included in this group are technologies and practices related to organic agriculture and sustainable forestry; land management; soil, water, or wildlife conservation; and stormwater management.

2. Green Jobs Definitions Varied Across Grantees, Reflecting Different Goals and Prior Activities

Although work to define green was progressing at the time the grant began, a national definition of green industries and occupations was not set. The 9 grantees visited for this study approached the task of defining green in several ways. Three used the preliminary or final versions provided by BLS, with or without customization for their states or consortia. Two adopted prior state-determined definitions and four developed new state-specific definitions. In each case, a grantee's definition enabled measurement of the number of green jobs held by employees in a state, the number of employers that had green jobs, or both. The diversity of this group was similar to that seen across all 30 grantees—the exception being that 2 of the other 21 grantees (Puerto Rico and Arizona) started relatively later in the grant period and used the BLS final definition for grant products. Appendix Table C.1 provides a table that includes grantees' detailed definitions of green jobs.

Two of the nine grantees—Oregon and Driving Change—reused green jobs definitions that had been developed for previous work on the green economy. Oregon had developed a definition for a statewide survey conducted in 2009. Following the definition's development, the Oregon legislature codified it and required that all future state activities and products related to green jobs use it (Oregon Legislative Assembly 2009). Thus, Oregon's LMI grant followed this directive for its activities and products. The Driving Change consortium relied on a definition developed by Michigan, one of its members. Michigan had developed a definition of green jobs as part of a governor's green-jobs initiative before the LMI grant. The state used this definition in the work it had conducted on the green economy in the context of the automotive industry. The Driving Change consortium adopted this definition because of its similar focus on the automotive industry (Michigan 2009). The use of a single definition also ensured measurement consistency across consortium partners. This early work by some grantees was useful to others as

well. Staff from four grantees noted that they reviewed definitions produced by Oregon, Michigan, and Washington to inform the development of their state-specific plans. The existing definitions and research provided starting points; however, none of the grantees adopted others' definitions in their entirety. Iowa, for example, conducted research into other states' green jobs definitions and reviewed the O*NET green jobs definition before developing its grantee-specific definition.

Some grantees used the LMI grant to develop a new, grantee-specific green-jobs definition to enable them to understand the local green economy and support the activities they planned to undertake. For example, New Mexico worked with the Governor's Green Jobs Cabinet,[6] major employers, and green economy advocates to develop a definition of green jobs that incorporated their understanding of existing green industries in New Mexico. Although it had conducted previous strategic thinking and planning related to green employment, the state had not developed a formal definition of green jobs. Through the LMI grant, New Mexico established a definition of green that it intends to use for future projects and other grants related to green jobs (New Mexico 2011). The Northeast Consortium, rather than developing a conceptual definition, created an evolving list of green terms that it determined had a direct impact on "preserving, restoring, or enhancing environmental quality (Northeast Consortium 2012)." Pennsylvania used a different approach, drafting a grantee-specific definition which it then had reviewed by employers before finalization.

Other grantees based their definitions on preliminary national definitions, hoping that this would enable comparisons to national measures. Although BLS had not released a definition at the time of grant solicitation, it had begun preliminary work to understand the green economy. BLS reached out to LMI grantees at the start of the grant to assist in the development of a preliminary green jobs definition and reported on progress toward developing a definition at an LMI grantee conference in December 2010. MARC key project staff said that they opted to use the preliminary BLS definition after those discussions and set a goal of providing baseline data that would be comparable to future BLS work. Alaska also adopted the preliminary definition after key project staff attended LMI grant meetings and saw that its use would ensure consistency with future BLS work. The state further clarified the definition, adding a state-specific context by providing specific examples of professions in Alaska that should and should not be included in the measure. Only one grantee, New Jersey, modified its working definition of green to align closely with the final BLS definition released in late 2010. This grantee was able to adjust its definition since the bulk of grant activities occurred toward the end of the grant period and it did not field a green jobs survey.

[6] Former New Mexico Governor Bill Richardson created the Green Jobs Cabinet by executive order on January 21, 2009, with membership consisting of the Secretary of the Economic Development Department; the Secretary of the Energy, Minerals and Natural Resources Department; the Secretary of the Department of Workforce Solutions; the Secretary of the Higher Education Department; the Secretary of the Public Education Department; the Secretary of the Environment Department; the Secretary of the Department of Agriculture; the State Investment Officer; and the Governor's Advisor on Energy and Environment. The primary responsibility of this cabinet was to prepare a statewide strategic plan for clean energy and clean technology economic development and job creation. The cabinet played an active role in early grant activities, including setting the goals, defining green, and providing input on the survey instrument.

3. Some Activities and Products Required Alternative Green Jobs Definitions

Although grantees developed or adopted a primary green-jobs definition, they used alternative definitions for some of their activities and products. For ease and efficiency, several states purchased real-time software packages, which had green definitions embedded in the program. For products that combined data across consortia members or states, it was important to choose a common definition rather than try to produce an activity or product that accounted for all of the state-specific definitions. Many grantees used or linked to information collected by O*NET, such as occupational profiles, which relied on O*NET definitions to identify green occupations and skills and did not necessarily map to their definitions of green jobs. For example, MARC staff reported that their definition of green jobs yielded a list of green occupations that was more extensive than those defined by O*NET. For its occupational profile work, however, MARC chose to link to the O*NET information. To "green" occupational information in the national Career Information System (CIS), Alaska and its partners used a broad O*NET definition for the joint product. Oregon also linked to the CIS content, thus producing information about jobs in the state using multiple definitions.

4. Definitions Enabled Product Customization but Limited Comparability

The ability to define green jobs locally produced some advantages for the grantees. The selection of a state-based or modified BLS definition enabled grantees to make comparisons to prior state studies and customize measurement to local economic characteristics. For instance, Driving Change used Michigan's green-jobs definition, which emphasized the automotive industry for some of its activities, as its objective was to target its work to dislocated auto workers.

Most grantees did not use definitions comparable to one another, essentially eliminating their ability to make comparisons of green employment across states. While grantees chose their definitions for logical and strategic reasons related to the grants, several were concerned that their research would not provide meaningful baseline data against which to compare future BLS estimates. They also noted that updates to the body of research they developed based on their selected definitions would require modification to conform to the BLS definition, should that be desired or required.

B. Collecting Primary Data on the Green Economy

Grantees collected information on green jobs and employers both to expand LMI and influence the direction of grantee products. Data collection purposes included (1) counting the number of green jobs or employers; (2) describing the characteristics of those jobs, including skill requirements; and (3) developing a better understanding of training needs to inform LMI efforts. To serve these purposes, 28 of the 30 grantees utilized one or more of the following data collection techniques: (1) conducting interviews or "listening sessions" with employers and other stakeholders, (2) conducting skills research for the purpose of developing occupational skills profiles, and (3) administering green jobs surveys (See Table III.1 for information on the 9 grantees visited). We describe each of these efforts in more detail below.

Table III.1. Types of Data Collection Grantees Performed

Grantees	Conducted Interviews or Focus Groups	Focus Group Participants	Conducted Surveys
Alaska	X	Employees	X
Iowa	X	Employers	X
MARC			X
Northeast Consortium			
New Jersey	X	Employers, Educators	
New Mexico			X
Oregon	X	Employers	X
Driving Change			X
Pennsylvania	X	Employers, Educators	X

1. Interviews and Listening Sessions with Employers and Educators Informed Grantee Activities

Five of the nine grantees conducted one-on-one interviews or listening sessions (focus groups) with employers, employees, and stakeholders to collect information about the green economy. Interviews with employers focused on identifying the broad skill sets needed in green occupations and the specific skills they looked for in job applicants. Data collected informed grantees about participants' perceptions of the demand for green jobs, the skills needed for them, the supply of workers with those skills, relevant existing training programs, and predictions about future employment trends. This information influenced some grantees' definitions of green and informed subsequent grant activities—primarily reports on these subjects targeted to employers, training providers, and policymakers.

Several grantees used interviews with other respondent groups to collect information related to developing workers for green jobs. New Jersey, for example, conducted interviews with staff from colleges and unions to learn about training programs they provided related to green careers. These interviews helped inform a report assessing the capacity of the state's training programs to meet the needs of green job employers (New Jersey 2011). Another grantee, Alaska, interviewed employees about the greening of their occupations, using the information to update CIS, a career resource for students and entry-level job seekers. Driving Change coupled information on employer needs for these skills with information about available training programs and produced a report, targeted to policymakers, LMI practitioners, and researchers, describing green labor needs and offering suggestions for transitioning auto workers to these occupations (Driving Change 2011).

Rather than conducting one-on-one interviews, two grantees conducted "listening sessions" with groups of employers, employees, and educators. Iowa conducted sessions with employees holding various positions in the construction industry, generating a dialogue about the different competencies and training needs for different positions. This information fed into the grantee's development of career lattices for the education and training sectors. The sessions also connected and engaged training providers and employers. Pennsylvania conducted listening sessions with educators and employees to solicit input on their definitions of green and gather information about needed skills for green jobs and employer perceptions of the current and future green economy (see Box III.2).

Box III.2. Pennsylvania Engaged Educators and Employers in Listening Sessions

One of Pennsylvania's partners, PA Partners, coordinated seven listening sessions with employers and educators. The purpose of the sessions was to capture the perspectives of employers and educators regarding emerging green industry sectors and green workforce needs and challenges. Pennsylvania sought to learn about stakeholder perceptions regarding the current and future green economy, and learn about green occupations, potential skill shortages, and available training. The lessons learned from these early conversations informed subsequent grant activities. PA Partners hired four subcontractors to facilitate the sessions, develop the facilitator guide, and conduct a facilitator training session to ensure consistency across the groups. Participants answered questions that aligned with the following research questions Pennsylvania planned to address through the LMI grant:

- Who are Pennsylvania's green employers now and in two years?
- What jobs are green and where is the demand?
- What are the skills needed for in-demand green occupations?
- Does Pennsylvania have the capacity to meet employer demand?
- What career pathway models link the job seeker to green in-demand occupations?

The listening sessions took place in six regions of the state, each consisting of several local workforce investment areas. In total, 263 employers, educators, and other participants (such as education support providers) were involved. A diverse set of employers, largely identified through their prior involvement with the local WIBs, was recruited, with a preference for those that met one or more of the following conditions:

(1) Membership in an industry partnership that already delivered green training

(2) Participation in one of the five green sectors identified in the state

(3) Experience in hiring for green jobs

(4) Plans to enter the green market in the near future

Educators were recruited from high schools, career and vocational education institutions, community colleges, a joint labor-management training program, four-year institutions, and private schools, as well as private educators specializing in energy efficiency. The sessions, convened early in the grant, influenced Pennsylvania's definition of green jobs, provided important information to share with training providers, and engaged employers in the work of the LMI shop. The findings from these sessions were included in a report intended for policymakers, employers, training providers, and workforce development professionals (Pennsylvania 2010).

2. Grantees Conducted Skills Research to Profile Green Occupations

To further understand the skills necessary to succeed in the green economy, some grantees completed systematic skills research. These efforts took different forms across grantees, and included collecting and reviewing job descriptions and profiles, conducting in-depth worker interviews, and drafting questions about skills for inclusion in green-job surveys (discussed below).

Oregon was particularly committed to skills research. Project staff consulted the existing content of the state's skills database, O*NET job descriptions, employee handbooks, and professional association information. Oregon also used grant funds to conduct WorkKeys Job Profiling for 10 occupations, identified through the state's previous green-jobs survey.[7] This

[7] WorkKeys Job Profiling is an occupational profiling tool developed and administered by ACT. To complete WorkKeys Job Profiling, organizations must hire or train an ACT-authorized job profiler. Job profiling training teaches profilers to collect information on the tasks and skills necessary for a particular job. WorkKeys Job profiling

multistep process included in-depth interviews with incumbent workers and resulted in profiles providing detailed skills requirements for relevant jobs. Oregon profiled both green and traditional employers in a given occupation. By profiling both types of employers, Oregon sought to understand the tasks and skills required for a given job to be considered green.

3. Grantees Conducted Surveys of Employers to Count Green Jobs and Assess Skills Requirements

To be responsive to the grant solicitation, which encouraged measuring green jobs at the state and sub-state level, and to provide valuable information for future comparisons, seven of nine grantees conducted surveys that established a baseline understanding of the green economy in their states and consortia.[8] All of these surveyed employers and one (Iowa) surveyed individuals. Despite the range of grantee definitions of green, the surveys largely fulfilled their primary purposes—to count the number of green jobs or employers with green jobs (or both) in the state and describe the characteristics of those jobs. In addition, some surveys enabled grantees to report on barriers employers faced in recruiting or retraining workers for green jobs, methods of credentialing for green jobs, and forecasts of future green employment. In this section, we describe how the surveys were conducted, the green employment measures that resulted, and grantees' uses of the data.

Survey populations reflected grant goals. Grantees chose to survey specific groups of employers to align with their research goals and leverage available samples. MARC's goal was to create an understanding of the green economy in the Washington DC area and inform an LMI system to serve local job seekers. Thus, the consortium cast a broad net, conducting a survey of private, public, and nonprofit employers in the region. In contrast, Oregon sought both to fill a gap in information about the agricultural industry in the state and measure green job growth over time. As a result, it conducted one survey of selected agricultural industries—crop production, animal production, forestry, hunting and fishing, and agriculture—and repeated a broader survey of private, state, and local government organizations.

Through both employer and employee surveys, Iowa determined the skills necessary for green occupations. The state's employee survey asked respondents if their jobs required additional training or certifications, which types of training were required, and what green activities their jobs entailed, as well as wages and work hours.

(continued)

consists of four steps: the creation of an initial task list, task analysis, skill analysis, and documentation. Profilers develop job task lists by analyzing company-provided job details and completing a job site tour. Current employees in the relevant job then review the task list. During this review process, employees revise the list with the profiler and assess the importance of tasks and the time spent on them. This process results in a final task list (see http://www.act.org/workkeys/profiling/index.html).

[8] Although not the focus of Mathematica's site visit, we found that states in the Northeast Consortium also used grant funds to conduct independent activities, including an employer survey in New Hampshire.

Employer survey universes had some similarities. The most common universe for the employer surveys was establishments with at least one or two employees covered by Unemployment Insurance. The universe was generally then stratified by industry, using NAICS codes and/or firm size. Some states, such as Pennsylvania and New Mexico chose to focus on industries that were presumed to have a higher concentration of green. Weighting was done in a variety of ways. For example, Alaska weighted and benchmarked to Quarterly Census of Employment and Wages (QCEW) data.

Methods for asking about green varied. Grantees took different approaches to measuring green in their surveys. Most surveyed employers by (1) asking whether their company was involved in green, such as by "producing green goods or providing green services" or "being involved in a green-related category"; (2) supporting the employer's ability to answer by listing core areas of green work and providing examples; and (3) asking employers to identify the number of employees working in those areas. While some grantees' data collection approaches clearly were linked to their conceptual definition of green—such as those implementing the preliminary BLS definition by listing BLS categories—others were somewhat less so. New Mexico's conceptual definition involved a "focus on environmental quality, energy and resource efficiency, and sustainable practices." Their surveys asked about work in "renewable energy, clear manufacturing, energy efficiency and research and development and administration." Appendix Table C.1 compares grantees' conceptual definitions to their green survey questions. Despite explicit examples listed in many of the survey instruments, grantees reported that respondents had many questions about the definitions and as a result often expressed hesitancy about responding.

The process for classifying employees as holding green jobs or employers as having green jobs also differed. MARC, for example, counted an employee as holding a green job if he or she did any of the core green activities listed. Driving Change, by comparison, counted only those who were working in "direct" green jobs—that is, those whose "primary function" was the production of green-related products or services. In the GGS survey, BLS collected the share of revenue that was from the sale of green goods and services, and used that revenue share to compute the number of green jobs.[9] Grantee instruments and reports were not always clear about how the "greenness" of a job was measured. When a specific degree or type of involvement ways not explicitly stated, it is assumed that employers would have noted any involvement. This was the most common scenario. Some asked about employees whose green work was essential to their jobs while others asked about employees who did work in the green core areas. A few surveys combined two of these classifications (see Appendix Table C.1).

Survey methods and response rates varied across grantees. Grantees took a number of steps to maximize response to their surveys (See Table III.2). To provide sample members an opportunity to respond in a convenient method, all of the grantees offered multiple modes; these included various combinations of mail/paper, web, telephone, and fax modes. Grantees also sought expert help in designing and conducting their surveys. Some consulted BLS for assistance

[9] Establishments that had no revenue, such as non-profit organizations or government agencies, were asked to provide a share of employment involved in the production of green goods or services.

in design and sampling, for example, and five grantees contracted with external partners having statistical and survey capabilities to assist with design and/or implementation. Iowa and Alaska conducted the surveys using experienced in-house staff.

Table III.2. Characteristics of Grantees' and BLS Employer and Employee Green Jobs Surveys

Grantee/BLS	Survey Name	Respondents	Subject[a]	Mode	Response Rate[b]	Findings
Alaska	Alaska Green Jobs Survey	Private and local government employers[c]	Green employment Training and education Job openings Hiring changes and barriers	Mail Web Fax Email Telephone	61.7%	1.7% of Alaska's jobs green; 9.4% of employers had green jobs
Alaska	Alaska State Employee Survey	State employees	Green employment	Email Web	19.0%	57% said jobs were green
Iowa	Green Jobs Employer Survey	Private sector employers	Green employment Time spent on green work Recruitment plans and barriers Wages Training and education	Mail Fax Telephone	35.9%	14.9% of employers reported jobs in green-related areas
Iowa	Laborshed Survey	Individuals ages 18–64	Green employment in natural resources Training and education, including barriers	Mail Telephone	Not reported	9.8% of individuals worked in green jobs
MARC[d]	MARC Regional Employer Survey	Public (federal, state, and local), private, and nonprofit employers	Green employment Training and education Recruitment plans	Mail Web Telephone	28.3%	Ranged from 2–4.8% of jobs green in MARC states; 8–9% of employers had green jobs

Grantee/BLS	Survey Name	Respondents	Subject[a]	Mode	Response Rate[b]	Findings
New Mexico	Green Jobs Survey (Private)	Private employers in 27 industries likely to have a high green concentration	Green employment Training and education Recruitment methods ARRA fund receipt	Mail Web Fax Telephone	35.2% to baseline survey	5.9% of private sector jobs were green
New Mexico	Green Jobs Survey (Public)	Public employers	Green employment Recruitment plans	Mail Web Fax Telephone	15.8%	9.6% of employees were in green jobs
Oregon	Natural Resource Jobs	Covered and non-covered employers in agriculture, forestry, fishing, and hunting industries	Green employment, full-year and seasonal Training Forecast Tools and technologies	Mail Web Fax Telephone	62.0%	15% of natural resource jobs were green
Oregon	Oregon Green Jobs Survey	Private employers, state, and local governments	Green employment, Training and education Forecast Wages	Mail Web	45.0%	3% of Oregon's private, state, and local jobs were green
Driving Change	State of Indiana Green Jobs Survey	Private and public employers	Green employment Training and education Job openings Recruitment plans	Mail Web Fax Telephone	50.9%	1.7% of Indiana's jobs were green
Driving Change	Ohio Department of Job and Family Services Green Jobs Survey	Census of Ohio businesses	Green employment Training and education Job openings Recruitment plans	Mail Web Fax Telephone	52.0%	No final rate reported

Grantee/BLS	Survey Name	Respondents	Subject[a]	Mode	Response Rate[b]	Findings
Pennsylvania	Commonwealth of Pennsylvania Green Skills Survey	Public and private employers	Green employment Training and education Recruitment plans	Mail Telephone	64.7%	3.4% of Pennsylvania's jobs were green; 20.6% of employers had green jobs
BLS	Green Goods and Services Survey (output approach)	Establishments in 333 industries, representing 20 percent of employment	Green employment	Mail Fax Telephone	70.6%	Green Goods and Services jobs accounted for 2.4 percent of total employment
BLS	Green Technologies and Practices Survey (process approach)	35,000 private sector establishments and local, state, and federal governments	Employment and wages by occupation of workers who spent more than half their time in green technologies and practices	Mail Fax Web Email Telephone	70.0%	75% of businesses used at least one green technology or practice. About 0.7% of jobs are held by workers who spent more than half of their time involved in green technology or practice

Note: Driving Change conducted a national survey of auto suppliers that did not include green jobs information data collection. Michigan also conducted a green jobs survey, but it was completed prior to the LMI grant. The Northeast Consortium also used grant funds to conduct independent activities, including an employer survey in New Hampshire.

[a]"Green employment" refers to the number of green jobs and to occupation and industry measures.

[b]There was some variation in how grantees computed response rates. Most divided the total number of survey completes by the total sample or attempted cases. This is a more conservative measure (producing lower rates) than that recommended by the American Association for Public Opinion Research. The standard (AAPOR-3) rate also removes cases of known ineligibility from the denominator, generally leading to somewhat higher estimates. BLS computed its response rate as the number of usable responses divided by the number of sample units less out of scope and out of business sample units.

[c]Excluded fishing and military industries; excluded federal government.

[d]Response rate is for DC, Maryland, and Virginia combined (total completes for all three areas divided by total sample for all three areas).

Ultimately, response rates varied considerably. Only 16 percent of those sampled for New Mexico's survey of public employers and 35 percent of sampled private employers responded, compared with 65 percent for Pennsylvania's employer surveys—a rate in line with many federal survey efforts. Many factors likely affected survey response rates, including the accuracy of contact information on sample frames, the salience of materials requesting participation, respondent comprehension of questions and, in the case of administered interviews, interviewer quality (Groves and Peytcheva 2008). Some respondents reported problems in finding businesses or individuals, despite having recent lists of employers in the state. A majority of grantees reported that the lack of a clear national definition and questions about the uses of green jobs measures posed challenges to obtaining employer buy-in for grantee activities.

Higher numbers of completed surveys reduce the variance on survey estimates, and high response rates are often correlated with data quality. However, surveys with low response rates may still produce representative estimates. Specifically, if sample members who did not respond would have responded similarly to those that did, representativeness of the data would be unaffected by nonresponse. Because none of the grantees evaluated the extent of nonresponse bias in their surveys, it is not possible to evaluate whether their green jobs estimates are biased upward or downward due to which firms or individuals responded.

Quantifying green employment produced a range of estimates. Differences in conceptual definitions, sample populations, survey questions, and which workers counted as holding green jobs led to a range of estimates of green employment.[10]

- Surveys including both private and public employers indicated that the **proportion of jobs that counted as green** ranged from less than 2 percent in Driving Change consortium states to 4.8 percent in Maryland. New Mexico's surveys, which surveyed private and public sector employees separately, indicated that 5.9 percent of private sector jobs and 9.6 percent of public sector jobs were green. In Oregon, a survey restricted to natural resource employers identified about 15 percent of jobs in the industry as green. These estimates varied significantly and compared to a BLS 2010 estimate of jobs producing green goods and services of 2.4 percent of total employment (BLS 2012). The BLS survey also found variation in green jobs measures across states that reflected the states' different industry mixes.
- The **proportion of employers with green jobs** ranged from about 9 percent in Alaska, Iowa, and MARC to more than 20 percent in Pennsylvania.
- Iowa, the only grantee that interviewed employed individuals, estimated that **9.8 percent of employed persons worked in a green job**.

Grantees generally reported the distribution of green employers or jobs by core areas listed in their definitions, such as renewable energy or energy efficiency. To describe occupation and industry counts, they consistently used Standard Occupational Classification (SOC) and North

[10] There were also differences in estimating methods, including weighting. For more information, consult individual grantee reports.

American Industry Classification System (NAICS) codes. Estimates were provided at various levels of aggregation. Many grantees pointed to relatively high proportions of green employment occurring in manufacturing and construction industries and production-related occupations. Findings clearly reflected local economies—for example, there were many green tour operator jobs in Alaska and very few green manufacturing jobs in the District of Columbia. Of the 9 grantees, Iowa estimated wages for green jobs by asking workers to report them on the Laborshed survey. Two other grantees computed wages through analyzing administrative data.

Grantees also used their surveys to learn about training related to green employment and other subjects and then used the information to inform other LMI products. MARC asked about the types of training employers offered to prepare workers to work in green jobs and services. Driving Change included questions about whether training would be formal or informal, and Pennsylvania asked questions regarding what types of training resources employers currently used or would consider using in the future. Oregon asked agricultural and related employers about special certifications preferred in those industries. Several grantees asked employers about recruitment plans or if they predicted growth in green industries.

Grantees found value in quantifying green jobs. Despite challenges defining green and the differences across grantees, both site visits and document reviews indicated that grantees found value in collecting this new LMI. They applied the survey interview and survey findings in a number of ways, including the following:

- **Developing a basic understanding of green in their states.** Grantees that developed green employment estimates used the results to quantify and publish estimates of current green jobs in their states. Some identified industries and occupations likely to grow or used estimates as an input into projections of future employment. These measures can provide important context for policy discussions in the state.
- **Influencing LMI products.** Data were used in a variety of LMI products. Alaska used survey results to inform the development of green career ladders and lattices, identifying which industries were green and what skills, certifications, or licenses were required to perform green-related work in related occupations. Pennsylvania used the results to develop Geographic Information Systems (GIS) maps of green employment to inform job seekers and possibly assist employers with business location decisions.
- **Identifying training needs.** Survey data provided insight into the training needed to prepare workers for green jobs. Iowa, for example, used the results from two surveys to identify gaps in the labor market. For some states that were also recipients of SESP grants, survey results were used to provide evidence to support the use of SESP funding for new training programs.
- **Creating baseline measures for comparison with future surveys**. Several states used the surveys to establish a baseline for tracking industry and job growth over time. Oregon used grant funds to compare green jobs in 2008 and 2010. One grantee—Iowa—had clear plans to continue collecting green jobs information in its annual Laborshed survey.

In summary, grantees collected information about green employment from employers, employees, educators, and others using both qualitative and survey measures. They did so using a range of green definitions that reflected a combination of leveraging prior efforts, customizing questions for their states and populations of interest, and drawing on concurrent work done by O*NET and BLS. These efforts provided insight into the green economies in their states and consortia, and informed LMI products and directions for future investments, such as training workers for green jobs. The lack of a standard definition of green jobs precluded the ability to make reliable comparisons across states.

C. Analyzing Real-Time Data on the Green Economy

To supplement traditional LMI data collection methods, grantees also analyzed real-time data on the green economy. Real-time LMI analysis uses web-scraped job postings to make inferences about the labor market.[11] The Brookings Institution LMI Forum defined real-time LMI as "labor market intelligence derived from the analysis of job postings and resumes placed into public and private labor exchanges. It is real time because it can be based on data pulled from the Internet on a daily basis. It is labor market intelligence because it can provide indications of supply and demand trends, emerging occupations, current and emerging skill requirements, and market-based demand for education and certifications" (Vollman 2012).

1. Grantees Set Goals for Use of Real-Time LMI Data

Grantees set specific goals around the potential use of real-time LMI in understanding the green economy and increasing their ability to provide information on the current labor market. Grantees sought to use real-time LMI to identify labor demand (specifically for more green jobs and more broadly for all occupations), create projections, and determine locations of available and future jobs. Driving Change purchased software to understand labor demand for specific occupations in its member states. The Northeast Consortium used real-time job postings to refine its definition of green. The consortium defined green using an evolving list of keywords that was constantly updated based on the success of the list at identifying green jobs. Analysis of real-time data also provides another approach to determining the skill requirements of green jobs. By looking at skill, education, and certification requirements in green-jobs listings, LMI shops can provide better information to job seekers and training providers.

2. Grantees Selected Different Software Packages to Facilitate Real-Time Analyses

To access real-time LMI, grantees purchased different software packages. Two grantees purchased The Conference Board's Help Wanted Online (HWOL) data for real-time analysis. HWOL collects real-time job postings from the Internet and produces a summary of the local hiring landscape, measuring job vacancies and workforce trends. Pennsylvania used this software to measure employer demand. The job postings were assigned NAICS and SOC codes and counted by specific occupations and industries, including green jobs. One of the Driving Change members took HWOL data to gauge the strength of employer demand by matching the job

[11] Web-scraped job postings are online job postings collected from a variety of sources including online job banks, company websites, and classified advertisements.

postings to average 2009 employment. The analysis determined the postings-to-employment ratio for green auto occupations.

MARC used Geographic Solutions to produce real-time data for its green jobs portal. Two of the MARC jurisdictions—Virginia and the District of Columbia—had real-time capabilities prior to the grant through the Geographic Solutions labor exchange software. Maryland gained real-time capabilities when Geographic Solutions redesigned its labor exchange as part of grant activities. In addition to the work on Maryland's labor exchange, Geographic Solutions enhanced the real-time data analyses of all three jurisdictions for green jobs. Geographic Solutions analyzes the web-scraped online job postings and presents information on wages, selected geographic areas, industries, and occupations for each jurisdiction (analyses are not available for the region as a whole). For example, the real-time analyses by occupation include education requirements, work experience requirements, employer data, and wage data from the advertised jobs. Key project staff stated that these data provide users with current information, rather than information relying on historical data or older projections. Geographic Solutions, rather than the jurisdictions' LMI shops, conducts all of the real-time analyses and data filtering.

The Northeast Consortium chose to contract with Burning Glass because it could gain access to the raw data behind real-time LMI. The Consortium used the raw data to refine its identification of green jobs and explore the quality of the data. The Consortium worked collaboratively with its vendor to refine the list of "green key phrases" used to identify green jobs, and by the end of the grant, the list had grown to nearly 900 key phrases.

3. Limitations of Real-Time LMI

Grantees' efforts to use real-time LMI in meaningful ways revealed the limitations inherent in its data. As stated previously, to access real-time data, grantees purchased products from different companies. However, not all of the real-time data providers allowed the grantees to access the underlying LMI data. Only the Northeast Consortium's agreement with Burning Glass permitted project staff to work with and analyze these data. Consequently, the Consortium's thorough, real-time data analysis, coupled with other grantees' real-time challenges, revealed the various limitations of real-time LMI.

Because the Northeast Consortium analyzed the raw real-time data, project staff were able to evaluate the data's reliability. Through their analysis, Northeast Consortium project staff uncovered many quality issues intrinsic to real-time data. One of the primary issues with real-time data is that they rely upon information not intended for research purposes. While real-time postings do contain information about underlying economic conditions, the challenge for analysts is to maximize the signal-to-noise ratio. The following were data limitations the Northeast Consortium documented as part of its real-time analysis work:

- **False positives.** Real-time data produce a large number of false positives from multiple sources. For instance, real-time data examine job postings rather than actual jobs. Many companies submit postings so they have a constant pool of applicants even when they have no available positions; this leads to false positives in real-time data. These data also include a large number of duplicate observations. Postings could include words flagged as green, but green words may be added to job postings irrelevantly so that the postings appear more often in search results.

- **Real-time data errors from missing industries.** The Consortium estimated that 60 to 65 percent of job vacancies are posted online. Real-time data missed certain industries, like food service, in which most vacancies are not posted online. In addition, contract and union positions were not captured consistently by real-time data. Thus, real-time data and any calculations using them were likely skewed in favor of certain industries and not representative of employment opportunities in others.

- **Unit of analysis.** Real-time data included zip codes, but using these to produce localized projections or reports could be misleading, as job postings may be tagged based on the location of the corporate headquarters and not the location of the actual job. Also, small geographic areas would produce large variations from period to period, making it difficult to analyze data at this level.

Based on its analysis of real-time data, the Northeast Consortium concluded that "real time LMI always needs to be linked to traditional sources of LMI" to provide context, but the Consortium did highlight the ability of real-time LMI to "describe skills, experience, and educational requirements that cannot be found through traditional sources. It may prove to be the best source of data on certain credentials (e.g., industry-based certifications) that are not captured in current surveys" (Northeast Consortium 2012). In particular, real-time allowed the Consortium to understand the skills required in the emerging sector of green jobs.

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IV. LINKING WORKERS TO GREEN JOBS AND CAREERS

After defining green and collecting information to understand green jobs, grantees needed to translate these data into tools that could help workers understand these jobs, the necessary skill requirements, and possible sources of training. Grantees also invested in enhancing the infrastructure that job seekers use to find employment. These investments ensured that job seekers would be able to identify green jobs in state labor exchanges. Other infrastructure investments went beyond green to improve the overall efficiency of the labor exchange, an investment that should benefit job seekers regardless of their interest in green jobs.

A. Providing Information on Green Careers

LMI shops produced a variety of tools to help job seekers, workforce professionals, and educators understand the labor market and options for career development. These tools included informational brochures, occupational profiles, career ladders, and career pathways. The site visits also provided an opportunity to understand how grantees defined these terms. Since concepts like "career pathways" can be interpreted in drastically different ways, an in-depth examination of the 9 grantees allowed for a clearer picture of how they operationalized these concepts.

1. Grantees Created Green Career Products

To help job seekers understand the skills required for specific occupations and the greening of those occupations, grantees created informational brochures, developed occupational profiles, and produced videos. Seventeen of the 30 LMI grantees developed products that provided information on green careers (Laird et al. 2012). The exact information contained in each product varied, but the goal was to help job seekers appreciate the nature of the work, the education and experience requirements, and the expected wages. New Jersey produced a four-page brochure, "Understanding Green Jobs in New Jersey," that defined green jobs and reported information on three green sectors in the state. New Mexico created a similar brochure that also included information on the geographic distribution of green jobs within the state and some basic information on skill requirements and average wages.

Occupational profiles. Grantees also used the LMI grant to update formal occupational profiles. As occupations become increasingly green, profiles for job seekers need to be updated to remain relevant. One common source for occupational profiles is the University of Oregon's national Career Information System (CIS). The site was created to provide career searching and planning information for students and entry-level job seekers. This subscription-based site is commonly used in high schools, community colleges, and American Job Centers. As part of the LMI grant, Alaska funded green updates to the national CIS, and Oregon made updates to its state-level CIS.

Alaska funded green enhancements to the CIS site in conjunction with three other LMI grant recipients: Montana, Hawaii, and Idaho. To ensure consistency across the participating states, which had adopted different green jobs definitions, CIS used O*NET's definition. Specific LMI-funded enhancements included the addition of an overview describing green jobs and a list of common job tasks considered green. To make the content more concrete and to reach students

and entry-level job seekers effectively, enhancements also included 52 interviews with employers and employees that explored different occupations and addressed the greening of those occupations. Six videos examined how more occupations are incorporating green skills and tasks. CIS intended to continue to update the green content developed through the LMI grant after the end of the grant period.

Oregon used grant funding to augment the Oregon CIS website with green jobs information. Through the LMI grant, rather than creating separate green categories, Oregon incorporated green content into 29 existing occupational profiles. According to grantee staff, this approach helps to show that green skills are required by many occupations often not considered green. For instance, the profile for "Electronics Engineering Technologists" now includes, as part of its standard framework, information about the required technology and work activities for measuring energy efficiency. In addition, embedding the content into standard profiles ensures that it will be updated at the same time as other content, enabling users to make up-to-date comparisons of required skills across green and traditional occupations.

WorkKeys profiles. Oregon also used the LMI grant to conduct WorkKeys profiling (as discussed in Chapter III) to create comprehensive reports on 10 occupations. Unlike the profiles developed by other grantees, WorkKeys profiles rely on extensive data collection activities to provide users with a real-world understanding of the occupations profiled. Profiles include task lists, task analyses, skills analyses, and appendices documenting LMI. Oregon chose its 10 focus occupations strategically, to determine whether meaningful differences exist between green and traditional occupations. The resulting profiles were broken down by task and compared the differences between green and traditional positions at the task level. In the profile of carpentry, for example, Oregon found that the same carpentry tasks are performed in traditional and green carpentry jobs, but that a green position might require additional knowledge and training to work with different materials.

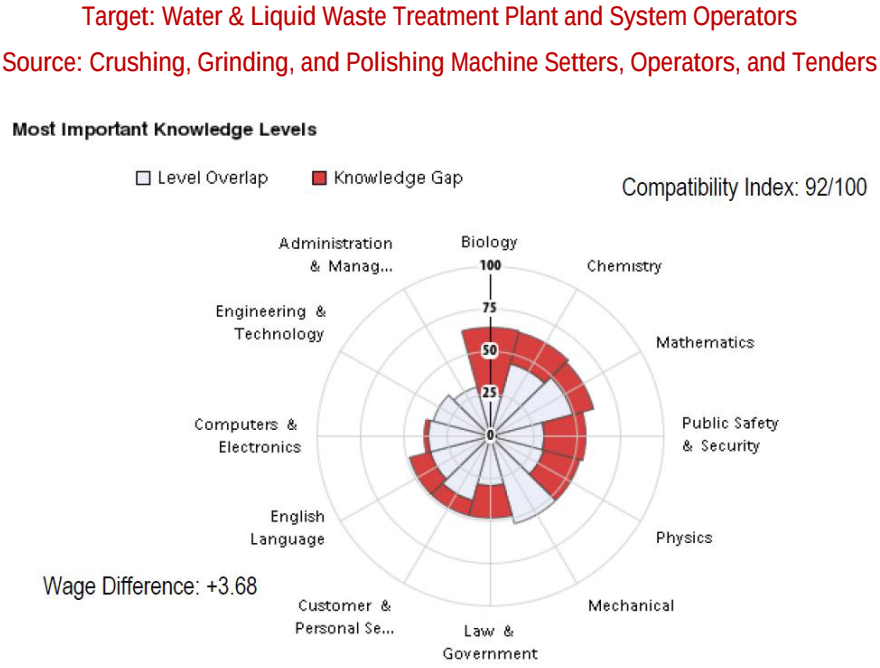
2. Grantees Considered Skills Transferability

The Recovery Act green jobs grant programs had a strong focus on displaced workers, and LMI grantees were encouraged to develop tools to help dislocated and other mid-career workers consider how their existing skills could be used in emerging green fields. One option available for grantees was to use grant funding to purchase access to existing skills transferability tools, such as TORQ. TORQ uses information from the O*NET database to calculate how easy it would be for a worker to transfer occupations, based on the knowledge, skills, and abilities required for that worker's previous and intended occupations. New Mexico used a portion of its LMI grant to purchase a subscription to TORQ.

Another approach, adopted by MARC, was to use information collected in the green jobs survey to examine opportunities for dislocated workers to move from slow-growth occupations into faster-growing green jobs. MARC focused on green occupations experiencing rapid growth or having a limited supply of qualified workers, mapping traditional occupations to them and identifying areas in which a worker would need additional training. For example, in Maryland, MARC identified "water and liquid waste treatment plant systems operator" as a target green occupation and considered crushing, grinding, and polishing machine setters to be a source occupation (see Figure IV.1). The knowledge gap map suggested a need for additional training in biology, chemistry, mathematics, and physics for the latter. Although MARC referred to these

maps as "career pathways," they were illustrative maps that did not include specific information about training programs. MARC's analysis of skills transferability was not comprehensive, but it offered as an example of how the approach could be used to identify areas that community colleges could target with appropriate skills training.

Figure IV.1. MARC Career Map



Source: MARC 2011, p. 52.

Alaska and Driving Change actually created new career tools aimed directly at dislocated and other mid-career workers. For Alaska, the new tool was an extension of the Career Ladders tool it developed in 2008. Career Ladders helped workers understand how to enter and advance in a given career field. Since then, the tool has received more traffic than any other feature on the state's Research and Analysis website. Alaska used the LMI grant to expand Career Ladders into Career Lattices that illustrate lateral career moves and could be used by mid-career workers looking to make a lateral career transition (see Box IV.1).

Box IV.1. Creating Career Lattices

To create Career Lattices, project staff used administrative data to analyze Alaskans' actual occupation transitions to determine common routes to advancement. To determine potential lateral career movements, staff also analyzed correlations between knowledge, skills, and abilities, based upon O*NET data. Alaska also examined BLS wage data to ensure that seemingly similar occupations were also at the same relative wage level. Because Alaska's Career Lattices are based upon actual data rather than anecdotal evidence, they span across industries, reinforcing the nature of actual career transitions (Mosher 2011).[12] Alaska developed step-by-step tutorials to guide users' use of Career Lattices.

In addition to their development, Alaska used the LMI grant to fund green enhancements to Career Lattices. The grantee added icons—green leaves—to Career Lattices to indicate transitions to potentially green jobs (see Figure IV.2). Users can either select an occupation from a list with green occupations indicated by a green leaf, or limit the search to green occupations. They can also search the Career Lattice list based on other criteria, such as health care and science, technology, engineering, and mathematics (STEM) occupations.

[12] Alaska's detailed Career Lattice methodology is publicly available at http://laborstats.alaska.gov/trends/dec11art2.pdf.

Figure IV.2. Alaska's Career Lattice for Environmental Engineering Technicians

Focus Occupation: **Environmental Engineering Technicians (17-3025)**

Focus occupation: Environmental Engineering Technicians	
Employment and Growth	289/ 16.1%
Ave. Monthly Wage	$4,708
Education/Experience	Associate degree

Advance FROM Focus Occupation

Occupation	Rung	Employment/ Growth	Education/Experience	Similarity
Architectural and Engineering Managers (11-9041)	6	462/ 8.5%	BA/5 plus yrs	75
Chemical Engineers (17-2041)	5	n/a	BA	75
Environmental Engineers (17-2081)	4	284/ 15.0%	BA	87
Agricultural Engineers (17-2021)	3	n/a	BA	70
Hydrologists (19-2043)	3	n/a	MA	76
Environmental Scientists and Specialists, Including Health (19-2041)	2	677/ 13.8%	BA	75
Conservation Scientists (19-1031)	1	231/ 10.0%	BA	73
Geological and Petroleum Technicians (19-4041)	1	683/ 10.9%	AA	71

Transfer TO and FROM Focus Occupation

Occupation	Rung	Employment/ Growth	Education/Experience	Similarity
Civil Engineering Technicians (17-3022)	0	512/ 14.0%	AA	74
Environmental Science and Protection Technicians, Including Health (19-4091)	0	220/ 16.4%	AA	74

Advance TO Focus Occupation

Occupation	Rung	Employment/ Growth	Education/Experience	Similarity
Biological Technicians (19-4021)	-1	540/ 12.5%	BA	72
Water and Wastewater Treatment Plant and System Operators (51-8031)	-1	615/ 12.2%	HS	70
Agricultural and Food Science Technicians (19-4011)	-2	n/a	AA	71
Hazardous Materials Removal Workers (47-4041)	-2	350/ 13.6%	HS	71
Forest and Conservation Technicians (19-4093)	-3	n/a	AA	75

Important note: A worker does not necessarily have to traverse every rung to advance to or from the focus occupation. Occupations above and below the focus occupation are directly related to the focus occupation, but they are not necessarily directly related to each other. For example, actors and athletes are both related to agents of artists, performers, and athletes, but actors and athletes are not directly related to each other.

Analysis and development of the career lattice is by the Alaska Department of Labor and Workforce Development, Research and Analysis Section.

Data sources used for research and analysis: O*NET (Occupation Information Network), Alaska Occupational Data Base (ODB), Standard Occupational Classification Manual, North American Industry Classification System manual, Bureau of Labor Statistics Occupational Employer Survey (OES) wage estimates.

Source: http://live.laborstats.alaska.gov/cl/cl.cfm?fo=173025, accessed August 14, 2012.

Driving Change also used grant funds to develop Trip Time, a career tool for mid-career workers. Trip Time aims to take existing career planning tools that link job seekers to potential occupations based on experience and skills (such as TORQ and MySkills MyFuture[13]) a step further by quantifying the time needed to transition to a new occupation. Search results show users' potential occupations, the remaining "trip time" to the new occupation, starting salary, median salary, and a "head start" percentage—the percentage of required skills and training the job seeker already possesses (see Box IV.2). Users then can view additional details about potential new occupations. Driving Change created Trip Time to include information on all occupations rather than only potentially green occupations, but the results highlight green occupations. Driving Change staff described Trip Time as a tool for sophisticated users, such as professional career counselors. At the time of the site visit, the tool had not been launched, but Driving Change had plans to train career center staff in each of the states on the specifics of Trip Time and how to use it effectively with customers.

Box IV.2 Driving Change's Trip Time Tool

To create Trip Time, project staff first formed seven career clusters, using O*NET's occupation description to generate categories of occupations with similar worker requirements, worker traits, and occupational requirements, rather than by industries or functions. By examining clusters, Driving Change exposed dislocated auto workers, as well as job seekers in general, to a range of promising and potentially, green occupations. According to project staff, movements within a given cluster are easier and usually require less time than movements across clusters. This analysis informed the times represented in the Trip Time tool, but also resulted in lists of occupations in each cluster published on the consortium's website.

In addition to the cluster analysis, Driving Change completed a skills gap analysis to construct the Trip Time database. This analysis involved assessing the amount of time required to move between occupations based on O*NET's five job zone categories.[14] Project staff estimated the education and training hours required for different occupations but also adjusted those hours based on the assumption that some education and training would occur concurrently. The resulting trip times represent the longest sequence of education or training necessary to meet a specific occupation's knowledge and skills requirements, assuming two hours of outside work for every one hour spent in class.

3. Grantees Explored Potential Education and Training Programs

After a worker has researched possible green careers and identified areas for skills enhancement, the next step is to find a training program. LMI shops used grant funds to assist workers by compiling inventories of available training programs and, in the case of Oregon, creating comprehensive career pathways. Creating inventories of training programs was a common activity of LMI grantees with 16 of the 30 grantees exploring the training options available to job seekers (Laird et al. 2012).

[13] Developed by DOL, MySkills MyFuture provides job seekers information on transferable skills between different occupations.

[14] O*NET defines five job zones based on the level of education, experience, and on-the-job training required for the occupation. Zone 1 occupations require little or no preparation; zone 2 occupations require some preparation; zone 3 occupations require medium preparation; zone 4 occupations need considerable preparation; and zone 5 occupations require extensive preparation.

Course Inventories. To help connect job seekers and understand the supply of training programs, six of the nine grantees developed course inventories, which synthesized data from many different training providers, including community colleges, universities, and apprenticeship programs (see Table IV.1). Grantees utilized different approaches to create these tools, such as surveys and the collection of existing educational records. Although most grantees focused only on green training inventories, one grantee included non-green training programs. Course inventory efforts are summarized in Table IV.1.

Table IV.1. Grantee Course Inventories Data Collection Methods, Green Focus, and Training Providers

Grantee	Data Collection Method	Green Focus	Training Providers
Iowa	Surveys	Green Only	Community Colleges and Apprenticeship Programs
New Jersey	Surveys and Extant Data	Green Only	Community Colleges and Vocational Technical Schools
MARC	Surveys	Green Only	Community Colleges, Four-Year Universities, Secondary Schools, Public and Private Training Programs, and Apprenticeship Programs
New Mexico	Extant Data	Green Only	Community Colleges, Four-Year Universities, Labor Programs, and Apprenticeship Programs
Driving Change	Extant Data	Green and Non-Green	Public and Private Postsecondary Education
Oregon	Surveys and Extant Data	Green Only	Community Colleges

Grantees populated their course inventories by surveying training providers and reviewing other data sources. Both New Jersey and MARC surveyed training providers to collect data about their programs. MARC surveyed training providers to identify current green training programs, the methods used, the skills developed, and program requirements. New Jersey also used extant data from previous surveys, state training databases, and course catalogs of community colleges and vocational-technical schools to create its course inventory.

Inventories were disseminated to job seekers through multiple methods. Iowa partnered with a community college association to collect training program data and create a website with green energy education and training resources provided by Iowa and other Midwest community colleges. This website enabled job seekers to find courses related to their fields of interest. Course inventory data were used to compile a list of training courses in 11 green sectors and identify gaps between supply and demand in green jobs (see Box IV.3). Iowa also connected job seekers to apprenticeships by producing a brochure as a resource for understanding the significant effect of green jobs and apprenticeship training on their wages. Although many of the grantees targeted their course inventories at job seekers, Oregon developed an inventory for

community colleges and workforce development. This inventory of green courses and programs offered from 2008 to the present helped to identify training programs available to job seekers and enable analysis of enrollment patterns to inform future programming.

Box IV.3. Iowa Focused on Developing Partnerships with Community Colleges and Universities to Provide Green Training to Students

To train job seekers for the green economy, Iowa partnered with community colleges and universities. Partnerships with three different schools and the Iowa Association for Community College Trustees (IACCT), the coordination point and policy center for all 15 community colleges in Iowa, allowed the state to understand the current training programs available, as well as develop new training curricula.

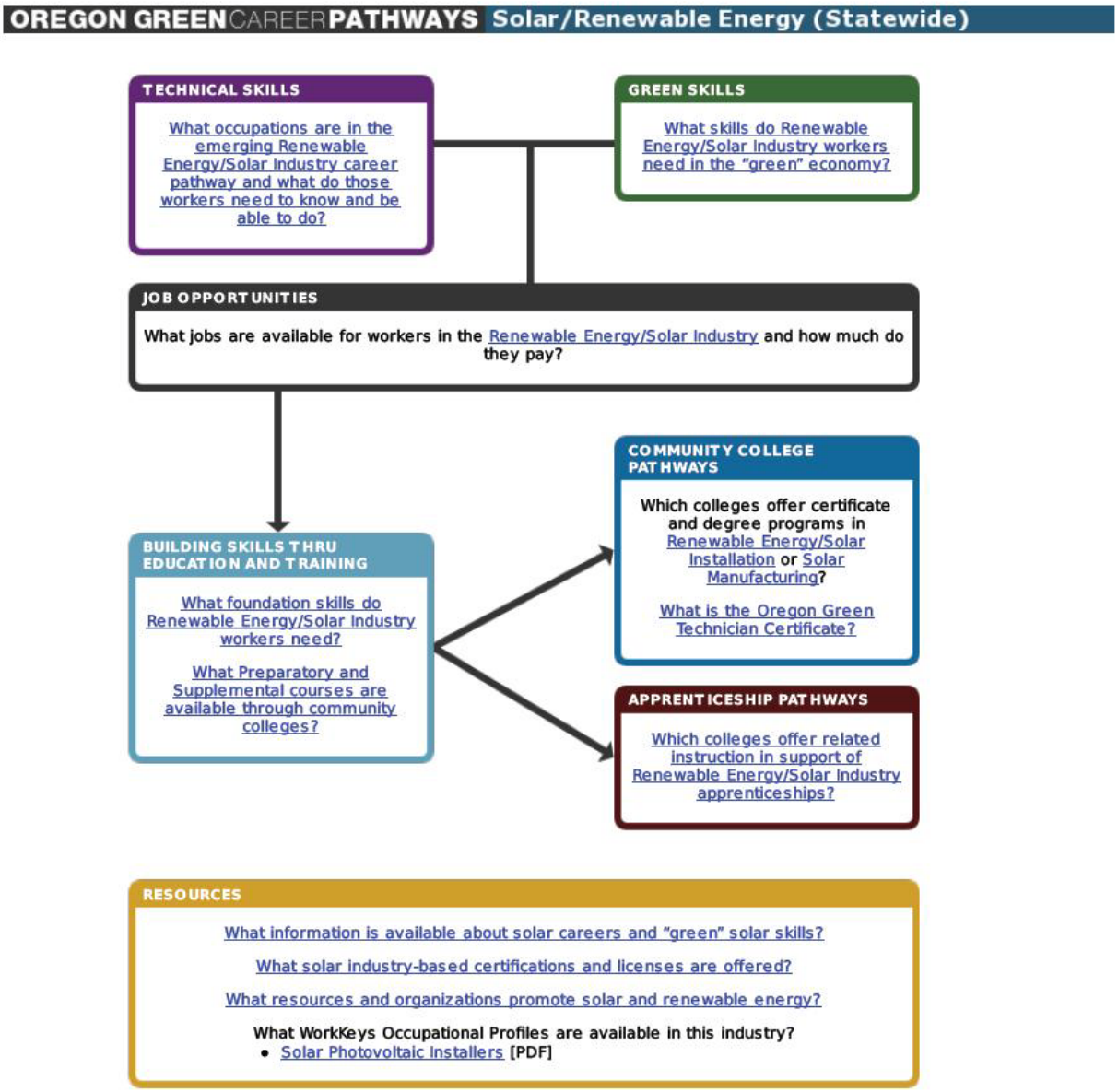
Iowa contracted with Des Moines Area Community College (DMACC) to develop the Midwest PowerSkills website, which hosts the Midwest Power Skills Green Education Catalog, a searchable catalog of green job education and training resources throughout Iowa and the Midwest. Using this website, as well as other sources of data, IACCT then conducted a gap analysis of training courses and jobs in six green economic sectors. IACCT also developed a list of courses available in Iowa related to green economic sectors.

Through the grant, Iowa went beyond training program inventories and actually created curricula to training workers for green jobs. A skills gap analysis in Iowa demonstrated the need for additional training programs in sustainability and deconstruction and material reuse. The University of Iowa Office of Sustainability developed course curricula for students studying environmental sustainability. The Iowa Central Community College (ICCC) and Center on Sustainable Communities (COSC) partnered to focus on building deconstruction—the dismantling of a structure in an effort to reuse or recycle valuable materials for use in other buildings or products. With assistance from the Building Materials Reuse Association (BMRA), Iowa developed a curriculum to train workers in deconstruction and recycling skills. SESP grant recipients also used the deconstruction and recycling curriculum for training.

Career Pathways. A career pathway is a framework designed to streamline the career planning process. A career pathways program is a series of connected education and training programs and student support services that enable individuals to find a job or achieve career advancement in a growing industry or occupation. Many of the LMI grantees used the term more broadly—using "career pathways" to describe lists of related occupations, basic career ladders, and the analysis of related occupations. Oregon was the only grantee in the in-depth study that created career pathways that linked community college and apprenticeship training programs and green employment.

Oregon used the LMI grant to create statewide Career Pathway Roadmaps for seven green careers to supplement its existing community college-specific career pathways. Oregon's roadmaps provided visual career pathways at the state level, linking users to information regarding technical skills, green skills, job opportunities, education and training needs, community college options, and apprenticeship pathways (see Figure IV.3). While all of the roadmaps developed under the grant included green skills, two focused on emerging, green occupations in the solar and renewable energy and wind energy fields, and the other five pathways were for traditional occupations including construction and manufacturing. Additional resources, such as available training programs, occupational profiles, and career videos, were incorporated in the roadmaps. Many of these resources were created using LMI grant funds. For example, some roadmaps linked users to WorkKeys occupational profiles created through the grant. The resources include videos profiling green careers resulting from the grant-funded updates to CIS.

Figure IV.3. Oregon's Statewide Career Pathway for Solar/Renewable Energy



Source: http://www.oregongreenpathways.org/1347/solar-renewable-energy-statewide, accessed August 14, 2012.

B. Enhancing the Labor Exchange

One of the central functions of LMI is to link workers and employers efficiently. In previous sections, we summarized grantee efforts to create career tools to help workers understand possible occupations, the necessary education requirements, and available training programs. The next step for grantees was to provide tools to help workers find jobs. Grantees used the LMI grants to make various improvements to their labor exchanges. Twenty-five of the 30 LMI grantees highlighted green jobs through developing green jobs portals, flagging green jobs with

icons or other features, or developing search functions that included green categories (Laird et al. 2012). Sixteen of the 30 grantees viewed the LMI grant as an opportunity to make long-term improvements to labor exchanges that they otherwise could not fund.

1. Grantees Emphasized Green Jobs Through Labor Exchange Enhancements

As part of the initial grant announcement, grantees were urged to develop strategies for posting green jobs openings to online jobs banks. Additionally, DOL requested online tools and other approaches that would encourage job seekers to prepare for and apply for jobs being created in their local areas. Grantees responded by incorporating in their labor exchanges a variety of enhancements specific to green jobs.

Green Portals. Four grantees designed portals specific to green jobs that housed information such as occupational profiles and training program inventories, and presented real-time LMI on green jobs. Several grantees stated that a green jobs portal provided job seekers with a single access point for such jobs. MARC, representing Maryland, Virginia, and the District of Columbia, developed a regional green jobs portal that connected the three jurisdictions' labor exchanges (see Figure IV.4). Portal users can search for green jobs on the main portal page by keyword, zip code, and radius; the search results display job postings across the region, each one linking back to the relevant state labor exchange. Key project staff said they designed the portal with the average job seeker as the intended audience.

Figure IV.4. MARC's Regional Green Jobs Web Portal

Source: https://www.marcgreenworks.com/, accessed August 13, 2012.

Flagging Green Jobs. To highlight available green jobs, seven grantees flagged green jobs in their jobs postings databases and websites. Grantees used different approaches to flagging a job as green. Jobs can be identified based on industry, occupation, or keywords contained in the job listing. Some grantees purchased software upgrades that allowed them to flag jobs as green. Grantees that selected to use off-the-shelf software to flag green jobs usually had to use the software program's definition of green. For example, New Mexico and MARC both added "green job flagging" to their labor exchange contract with Geographic Solutions, which identifies green jobs using the O*NET- identified green NAICS and SOC codes. As a result, the definition of green used to identify jobs in the labor exchange may not fully align with the definition of green used in survey data collection or other products.

Other grantees programmed software in house to flag green jobs, enabling them to customize the criteria used to identify them. In addition, this provided grantees with the flexibility to make future updates and revisions to their classifications according to state needs or other influences. Iowa, for example, added a green jobs flag to IWORKS, its labor exchange, using its state-specific definition. Similarly, New Jersey used the Northeast Consortium's list of green keywords to program its labor exchange in house to show green occupations.

The key challenge in flagging green jobs was developing an approach that minimized the number of false positives. The Northeast Consortium worked throughout the grant period to

refine its parsing of online job ads. It reported that in the final iteration, it had "limited the false positives (flagging a job as green when no green words or phrases were present) to under 20 percent and had limited the number of false negatives (not flagging a job as green when green words or phrases were present) to under 5 percent" (Northeast Consortium 2012). By comparison, the consortium found that only 20 percent of jobs identified as belonging to green occupations using the O*NET list had contained green words or phrases.

2. Labor Exchange Enhancements Extended Beyond Green to Make Long-Term Infrastructure Improvements

Several grantees viewed the LMI funds as an opportunity to make long-term investments in their LMI infrastructure, thus extending the reach of the LMI grant beyond green jobs. Grantees approached the use of the LMI grant differently, with some funding long-standing priorities that had lacked resources, and others investing in new technologies to improve the information available to users. Infrastructure improvements ranged from developing a completely new labor exchange platform to updating the occupation codes in state labor exchanges.

Redesigned labor exchange. MARC made creating a regional labor exchange one of the main goals of the LMI grant. To achieve this goal, all three jurisdictions—Maryland, Virginia, and the District of Columbia—needed compatible labor exchanges to build a shared green portal. Virginia and the District used the same vendor to maintain the labor exchange websites that house their LMI, real-time job postings and case management services. To place Maryland on a comparable platform, MARC funded a complete redesign of the Maryland Workforce Exchange (MWE) through the LMI grant. For a decade prior to the grant, Maryland had considered replacing its outdated labor exchange system but did not have the resources. Maryland leveraged LMI and other Recovery Act grants to implement a new labor exchange and case management system. The redesigned MWE enabled Geographic Solutions to create a regional green jobs portal, consolidating opportunities and subsequently linking users to the labor exchange corresponding to their locations. MARC key project staff stated that this aspect of the LMI grant was a "win-win for all involved" because it provided Maryland with a new labor exchange and enabled regional linkages.

Functional updates to labor exchanges. Rather than create a new labor exchange, most grantees used the grant as a means to update the functionality of their existing labor exchanges. All of these changes, although not necessarily noticeable to users, improved the functionality of existing labor exchanges.

- **Autocoder**. New Mexico and Oregon purchased Autocoder, a commercially available product that expands search functions beyond industry and occupation, allowing users to search for job postings using keywords. Autocoder searches the entire job posting to find the best possible matches to the keywords entered. With LMI funds, New Mexico purchased an Autocoder license for the life of the grant and used it as the search function on its green jobs website. After the end of the grant, the state plans to continue to pay the licensure fee and add Autocoder to its Unemployment Insurance (UI) claimant website as well. For Oregon, Autocoder was one in a series of improvements to the state labor exchange (see Box IV.1)

Box IV.4. Oregon Made Long-Awaited Infrastructure Investments

Oregon key project staff remarked that although they had a list of infrastructure improvements slated for the labor exchange before the LMI grant, funding was not available and other projects took priority. The LMI grant supported three of Oregon's updates to its labor exchange: installing Autocoder, programming a green jobs extractor, and converting occupations to SOC 2010. Oregon completed all of these tasks using in-house staff. Implementing Autocoder in the state labor exchange placed an increased emphasis on skills. Oregon's Autocoder replaced the previous keyword system, enabling users to view occupations based either on job titles or descriptions. Oregon designed a green jobs extractor within Autocoder, setting thresholds to determine when a job was to be considered green. The programmers developed an algorithm that uses the state's definition of green and produces a score of 0 to 1—from "not green" to "dark green." Jobs deemed light green or greater are assigned as green jobs in the labor exchange. Although not directly related to green jobs, Oregon converted all of its historical data into SOC 2010 codes, which created consistency between the labor exchange and UI system. Oregon key project staff stated that the changes were seamless for labor exchange users while providing necessary internal consistency and streamlined processes.

- **Specialized search functions.** At the outset of the grant, Alaska set a goal of making labor exchange infrastructure improvements that would extend beyond green jobs. Alaska made updates to its labor exchange to flag green jobs but approached this update with other "economic areas of interest" in mind. ALEXsys programming, completed through the LMI grant, now allows the state to more easily flag jobs in health care, STEM, and fishing, without expending significant resources to make additional modifications.

- **Mapping functions.** New Mexico purchased GIS mapping software upgrades from its long-term labor exchange vendor to increase the information available to users. New Mexico added the GIS mapping function on its green jobs page, allowing users to map and compare job postings in selected geographic areas. This function also extended into its state labor exchange, thus enhancing both websites.

- **Web-scraped job postings.** Three grantees introduced or enhanced the availability of web-scraped jobs on their labor exchanges. These job postings are collected from popular job-search websites, such as Monster.com, and more traditional sites, such as government job banks. One of the MARC jurisdictions indicated that the new technology increased the number of job postings available on the labor exchange from an average of 10,000 per day to more than 100,000.

  Although web scraping increased the number of job postings available to job seekers on the labor exchanges, several grantees noted the challenges involved in relying on this software, which gathers postings without direct input from employers. One grantee instituted a 24-hour delay on job postings so it could apply filters to remove duplicates. Another grantee retained duplicates because they indicated the level of employers' efforts to advertise the opening. Several grantees remarked that web-scraped job postings included more erroneous information than postings entered by employers. In addition, web scraping reduced the control grantees had on the types of jobs posted. One grantee said that web-scraped jobs had postings from some types of employers that otherwise would not be allowed on the labor exchange (such as contract positions) and thus chose not to include web-scraped postings.

- **Matching resumes and job postings.** Prior to the LMI grant, New Jersey took advantage of the spidering capabilities available in the Burning Glass software it used to include web-scraped job openings in OnRamp, the state's labor exchange. New Jersey used the LMI grant funds to enhance its labor exchange by purchasing new software—the Burning Glass "Focus/Career" software suite—which facilitates matches between job postings and workers. The updated OnRamp allows job seekers to upload or create a resume, use resume-enhancing tools to improve their resumes, search job opportunities, and receive email job alerts from real-time job posting matched to key words from their resumes. In addition, the system sends an email about registering in OnRamp to all new UI claimants, with biweekly reminders. To supplement the real-time job postings, New Jersey recently launched an employer component of NJ OnRamp that allows employers to post job openings and search resumes.

V. DISSEMINATION

The grant solicitation required the grantees to design and implement a strategy to disseminate the LMI grant products so as to inform the public workforce system (Federal Register 2009). To educate different stakeholders, the guidance also emphasized flexibility as an important element in dissemination plans and encouraged grantees to disseminate information in multiple modes and formats for different audiences.

Grantee SOWs and progress reports indicated that all 30 LMI grantees developed a dissemination plan with multiple dissemination methods. The most common approach was posting products online (Laird et al. 2012). Grantees also reported using social media, distributing research reports on flash drives, making presentations, and hosting conferences. The dissemination plans of the 9 site visit grantees generally were similar to the dissemination plans pursued by all grantees.

The site visits allowed us to document some of the challenges of implementation. Although the site visits occurred near the end of the grant, many of the grantees had not yet fully executed their dissemination plans. With grant products still in development or waiting approval for release, grantees were limited in their ability to disseminate their findings. Additionally, grantees struggled with the right strategies for disseminating lengthy research reports.

Below, we describe how grantees used targeted dissemination strategies, highlight practices that grantees identified as unusually innovative or effective, and describe challenges that may have limited the success of some dissemination efforts.

A. Targeted Dissemination Activities

Grantees recognized that a 'one size fits all' approach to dissemination would not meet their needs and aimed for dissemination strategies tailored to meet the needs of the targeted audiences. The grantees sought to inform several key audiences. The federal guidance highlighted a large number of potential "end users," including job seekers; educational institutions; community-based organizations that offer training and support services; and labor, economic development, and industry organizations.

Grantees used green portals and widespread public outreach campaigns to reach job seekers. As described in Chapter IV, four grantees created green web portals to serve as central points for job seekers interested in green jobs. These portals include information on green careers, training programs, and job listings. To ensure that job seekers would use the portals and other new career tools, two grantees had public buses painted or "wrapped" with their website addresses. MARC advertised its web address for the green-jobs portal on public buses throughout Maryland. Four grantees produced easily replicated brochures and/or posters to direct job seekers to useful resources. New Mexico, for example, produced posters targeted at job seekers and/or career changers. The posters encouraged job seekers to learn more about green jobs and directed them to the project's website and green-jobs portal.

Grantees disseminated products to frontline workforce staff by making presentations to local WIBs, visiting American Job Centers, and inviting workforce staff to grant conferences. Seven grantees made presentations to local WIB directors and/or American Job Center staff, who were viewed by many grantees as key end users of LMI grant products. New Jersey, for instance, trained all of the state's American Job Center staff on its updated OnRamp tool to ensure that they could use the tool to assist job seekers. Other grantees reached out to WIB directors to share key products or tools. Driving Change presented the projects' findings, as well as the Trip Time tool, to Ohio's WIB directors. MARC provided information to WIB directors in Maryland, who in turn distributed and disseminated the materials to American Job Center staff.

New Mexico and Driving Change organized conferences to bring different stakeholders together and disseminate grant findings. The Driving Change conference attendees included auto industry leaders, unions, educators, and workforce development professionals, and provided the auto industry with a forum to showcase its greening efforts. Conference topics included the greening of automotive technology, an overview of auto manufacturing and technology jobs, the emergence of new green employers in the auto industry, and presentations from project staff on career tools for dislocated workers. Similarly, New Mexico used its E3 (employers, educators, employees) Green Jobs Forum to present survey results, but also as an opportunity to bring three diverse stakeholders together for a discussion on green jobs, skills, and training.

LMI shops were committed to disseminating their work to other researchers, including LMI shops in other states. Grantees presented at conferences and in webinars hosted on Workforce[3] One. Grantees shared survey methodology, findings on real-time LMI, and information on green jobs and career tools. The Northeast Consortium developed two user guides—one aimed at the general public and the other at LMI analysts. These guides describe the characteristics of real-time data and their potential pitfalls and uses. Box V.1 presents more detailed information on the Northeast Consortium's user guides.

Box V.1. The Northeast Consortium Developed Real-Time User Guides

Northeast Consortium's in-depth analyses of real-time data through its partnership with Burning Glass led to the identification of several potential data uses and limitations. The Northeast Consortium developed two guides for users that provide information on how to use real-time data and explore the limits of their use.

The first, a "Guide for Public Usage of Real-Time Data," was intended for an audience interested in real-time data, but not necessarily expert users. The guide defines real-time data, including key data elements. It also describes caveats associated with each of these data elements and capabilities.

The second, a "Guide to Using Real-Time Data for LMI Analysts," was developed to present the strengths and weaknesses of real-time data as indicators of current job demand for LMI analysts. This guide includes detailed information on how real-time data are used for LMI analyses. In addition, it describes the potential issues in greater detail and makes suggestions about what users should and should not do with the data.

Grantees also used press releases and newsletters to disseminate green LMI to existing LMI consumers. For instance, Pennsylvania published information and data collected as part of the grant in its publication, *Fast Facts*. This monthly newsletter provides updated information on the unemployment compensation program, as well as statewide and industry-specific employment. In addition to the more active dissemination strategies, all grantees made their products available

on websites. While not all of the websites targeted the average job seeker, existing consumers of LMI could find information on green jobs and skills.

B. Notable Dissemination Practices

With grantee dissemination efforts only recently completed or still underway at the time of data collection, we were not able to assess the effectiveness of grantee dissemination strategies. Respondents did highlight the following five dissemination practices they believed were effective and/or innovative:

- **Branding the products.** To associate specific products with the LMI grant, and to unify the products produced by the grant, several grantees "branded" the products. The Driving Change consortium developed all of its products under a specific color scheme and/or logo. MARC, New Mexico, Pennsylvania, and Oregon also did this. "Branding" of the projects' products helped to ensure that all of their products were associated with one another and the LMI grant.
- **Using social media.** Social media, such as Twitter and blog postings, allowed Oregon to address young job seekers/career changers. The Research Division of the Oregon Employment Department has a blog and tweets almost daily. Oregon used Twitter to disseminate findings from the green-jobs data collection with tweets such as "Green jobs? Oregon has more than 43,000 of them." In this way, the state was able to provide links to project reports (Employment Economist 2012).
- **Taking the message on the road.** To address the geographic isolation of specific communities and promote green jobs, New Mexico purchased a mobile workforce unit. Grantee staff drove the mobile unit to job fairs, conferences, American Job Centers, and other locations in rural parts of the state to present information on green jobs. At the mobile workforce unit, job seekers can access the green-jobs portal, get copies of green- jobs reports, take skills assessments, and search for green jobs. The mobile workforce unit is equipped with laptop computer work stations, two presentation spaces, and TV/DVD viewing areas. Fueled primarily by solar and wind power, the unit's exterior is branded with the state green-jobs logo "Fuel New Mexico."
- **Relying on partners.** Grantees relied on their project partners to disseminate the findings in two ways. First, grantees leveraged their partners to reach other stakeholders. Partners were varied and inevitably worked in different professional arenas. For instance, in Iowa, partnering with community colleges enabled the grantee staff to work with a diverse set of stakeholders associated with those institutions. In addition, grantees used partners to gain flexibility in their dissemination efforts. The Driving Change consortium tasked a university-based business research organization with the majority of its dissemination efforts. According to grantee staff, this decision was made because the organization was outside of the control of state policies or press secretaries and so could avoid some of the hurdles associated with state politics. The organization worked with all of the states within the consortium to ensure that dissemination strategies were consistent across its members.

- **Mandating participation.** In an effort to get New Jersey job seekers back to work, the LMI project staff partnered with New Jersey's Office of Income Security to make OnRamp a key component of the department's reemployment efforts. By sending regular notifications via email beginning shortly after their initial registration for benefits, the office strongly encouraged all individuals receiving unemployment insurance to register with the OnRamp re-employment tool. By sending these notifications about a tool produced by the grant, the grantee effectively disseminated knowledge of the tool to the targeted community.

C. Dissemination Challenges

Timing constraints, a lack of planning regarding dissemination, decentralized partnerships, and changes in state administration all posed challenges to grantees' efforts to disseminate their products. All nine of the study sites noted that the 18-month time frame made it difficult to fully realize the goals of the grant. As this report has highlighted, the scope of work in which many grantees engaged was substantial. Grantees may have been overly ambitious regarding their planned activities. This factor, combined with the procurement delays many grantees faced, meant that 20 of the 30 LMI grantees received extensions from ETA. Site visits to the grantees suggested that the six grantees who received extensions were focused primarily on completing their projects rather than disseminating the findings. Grantees had plans to continue dissemination after the grant. Driving Change, for example, had hosted a conference and shown previews of the Trip Time tool but had not yet made the tool "live." Respondents had plans for a more thorough roll-out to American Job Center staff after the launch.

Grantees did not always design their reports with sufficient thought to their projects' dissemination goals. Many of the grant products are lengthy technical reports not easily accessible by wide audiences. Respondents on site talked about the challenges of disseminating large reports. Key project staff in Pennsylvania acknowledged that translating the findings of a large report into a more accessible document was a priority. Another grantee noted that, while it was pleased with the result of its report, in its current format, readers would struggle to understand its key messages.

While partnerships provided advantages in dissemination, they also created challenges. Some grantees' decentralized approaches to their partnerships hampered dissemination. As noted in Chapter II, grantees approached partnerships in several ways. One grantee collaborated with multiple partners, with each partner producing an associated product. For this grantee, consistent communication among partners was not a high priority. The products developed were so different that a unified dissemination approach was challenging. Grant products were not branded, and partners were not necessarily aware of work completed by other partners. Other grantees mentioned dissemination challenges resulting from working with partners that really were subcontractors. These subcontractors were less committed to dissemination, particularly after the grant ended.

Changes in state administrations during the grant period also contributed to delays in grantees' dissemination plans. As discussed in more detail in Chapter VI, changes in political leadership created vacancies in key positions and also affected political commitment to green jobs. For example, a product of one grantee was finalized under the previous administration but had not yet been released under the new administration.

VI. GRANT MANAGEMENT AND SUSTAINABILITY

For state labor market agencies, the LMI improvement grants presented an opportunity to expand their work, particularly in the green field, but also brought with it significant challenges. The grant funding was generous, but it was a one-time funding opportunity and had to be invested in an 18-month period. Most of the LMI shops had little experience in applying for or managing competitive discretionary grants, and to successfully accomplish the grant goals, grantees needed to manage funds, develop partnerships, and coordinate efforts across multiple organizations and, in some cases, states. To maximize the long-term impact of grant funding, the grantees also needed to consider how the work could be sustained after the grant period ended.

A. Managing the Grants

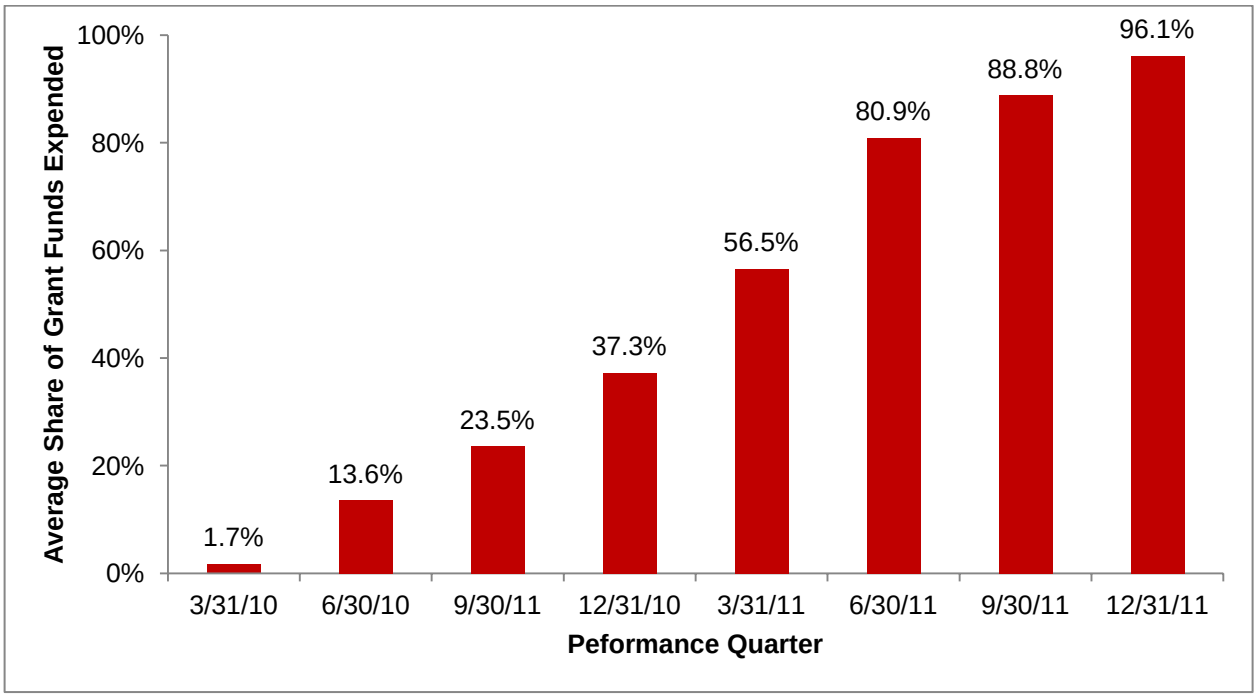
Site visits to the 9 study sites provided an opportunity to further understand the grant management challenges commonly reported by the 30 LMI grantees in their quarterly progress reports. These included hiring staff and procuring equipment and services efficiently – both important for achieving ambitious grant product goals. The site visits also provided an opportunity to document management strategies that grantees reported to be beneficial.

1. Grantees Faced Start-Up Challenges

Analysis of grantee financial data indicates that grantees were slow to start spending grant funds. At the end of 2010, more than halfway through the grant period, which started in December 2009, the nine grantees had expended an average of 37 percent of their grant funds (see Figure VI.1). By the end of June 2011, after the original end of the grant period, grantees had spent an average of 81 percent of funds.

Procurement took longer than expected. LMI shop and partner staff offered a number of explanations for this slow start-up period. Many of the LMI grantees were new to competitive discretionary grants and unfamiliar with state procurement systems. Since the majority of grantees relied on their partners or subcontractors to complete at least some of their grant tasks, they had to procure their services. In some cases, these were competitive procurements that required issuing statements of work and reviewing multiple responses. Once decisions were made, grantees took additional time to execute contracts for the work. LMI shop staff reported that every step took longer than they had expected, and respondents from partner organizations and subcontractors expressed frustration with the lengthy processes. Consortia faced additional challenges because they often had to navigate the contract and procurement systems for multiple states.

Figure VI.1. Average Share of Grant Funds Spent, by Quarter



Source: Grantee quarterly financial reports to DOL.

Hiring staff was difficult. Grantees reported being unable to hire staff, either because of a hiring freeze within the state or rules preventing temporary hires. As a result, most grantees relied heavily on partners or subcontractors to complete project deliverables. The need to contract out work generally was anticipated in the original SOW, but some states, like New Jersey, intended to hire staff with grant funds and later discovered that they needed to contract out work due to statewide hiring freezes. Alaska and New Mexico did hire temporary staff, and Oregon was able to use LMI grant funding to add a new permanent green economist position.

2. Start-Up Challenges Were Hard to Overcome Because of the Short Grant Period

All of the grantees described frustration with the limited grant period. They agreed that eighteen months was a short period of time to accomplish all of the goals described in the solicitation and clarified in their proposals. Grantees that proposed conducting a survey had to develop or refine their definition of green jobs or green employers, draft a survey instrument, draw a survey sample, potentially procure a survey organization, conduct the survey and follow-up, and analyze the data. To complicate matters further, the 18-month period for executing activities was effectively shortened by procurement challenges that delayed the start of partner activity.

Six of the nine sites selected for in-depth study requested and received no-cost extensions, ranging in length from one to six months. Grantees expressed some frustration regarding the uncertainty about the availability and possible length of extensions. Some grantees reported hearing about the availability of extensions from federal project officers, while others heard about the possibility, through word of mouth, very late in the grant period. Respondents wished that the availability of extensions had been communicated more clearly early in the grant period.

3. Grantees Were Challenged by Political Transitions

In addition to facing the short grant period and other start-up issues, eight of the nine grantees were challenged by changes in political leadership during the grant period. Governorships in four of the six single-state grantees changed from one political party to another during the grant period, and the other two grantees had changes in governors but not political parties. Consortia also were affected by political transitions. In both Driving Change and MARC, one state had a political party transition. These shifts in administration resulted in leadership changes throughout the state agencies, resulting in many of the LMI shops being led by acting directors.

The political transitions also affected the priorities of state departments of labor, including their interest in green jobs, and thus meant implications for the LMI grant. The timing of the transitions mattered. In states, the political transition occurred in January 2011. In these states, most grant activity either was complete or underway but, as discussed in Chapter V, the change in administration affected and sometimes delayed dissemination efforts. As of the summer of 2012, some products were still awaiting approval.

4. Grantees Reported Some Successful Management Practices

All grantees faced management challenges due to the short grant period and ARRA reporting requirements. Grants that involved 2 or more states faced additional challenges. Individual state laws, regulations and procedures had to be acknowledged, respected and addressed. These requirements required additional planning and lead time. During site visits, Respondents from LMI shops and grant partners identified some management practices they found to be beneficial. These included making thoughtful decisions about the management structure, for example, using an experienced grant manager, and making a strategic choice for consortium lead. It was also beneficial to use ongoing management practices such as taking advantage of partner flexibility in hiring and using a dashboard tool to track progress.

Use of an experienced grant manager. Since the majority of LMI shops had little experience with competitive grants, they did not necessarily have established practices for grant management. Vermont, the fiscal agent of the Northeast Consortium, used an experienced grants manager in the state DOL instead of a staff member from the LMI shop. While this grant manager was responsible for oversight on more than 100 grants, he reported few challenges managing the LMI grant, while another grantee's dedicated project manager who was new to grants management reported significant challenges. Another single-state grantee that had research staff manage the grant expressed regret that it had not used a dedicated project manager with more grant management experience.

Strategic choice of consortium lead. One important decision for consortia in the grant application phase was the designation of the grant lead. The LMI grant was awarded to one entity, which had the responsibility of disseminating the grant funds and overseeing the project. Indiana became the lead of the Driving Change consortium because it had taken the lead on bringing the consortium together and submitting the grant application. The other two consortia used different strategies to select their leads. In the Northeast Consortium, Vermont took on the role of grant lead, even though Maine had been the state responsible for bringing the consortium together, because Vermont's procurement system was easier to navigate. For MARC, Maryland

was selected as the consortium lead, in anticipation of the successful formation of the Maryland Workforce Corporation (MWC). While Maryland continued to serve as the grant lead, the MWC served as a fiscal intermediary and allowed MARC to avoid the challenges of navigating the procurement and contracting challenges of three different jurisdictions (see Box VI.1).

Box VI.1. MARC Used a Fiscal Intermediary

MARC used MWC as a fiscal intermediary. The MWC was created as an act of the Maryland legislature (HB 1529, 2009 Session) and signed into law by the governor in May 2009. The MWC became fully operational on July 1, 2010. It formed in response to the need for a regional fiscal intermediary for MARC, both for the LMI grant and future collaborations. Using a nonprofit as the key fiscal entity provided MARC with additional flexibility, streamlining the traditional contractual issues of multiple-jurisdiction membership.

MARC's fiscal infrastructure decreased the time required to contract with partners. Several partners stated that they were able to perform their tasks on time because they did not have to follow the procurement procedures of all three jurisdictions. MARC was one of the grantees that did not require an extension to complete grant deliverables. The member jurisdictions and partners identified the MWC and fiscal organization of the project as a "major strength" that "improved overall efficiency."

Taking advantage of partner flexibility in hiring. Since many of the states were operating under a hiring freeze, grantees partnered with organizations that could either hire or reallocate the necessary staff to complete the grant projects. Eight of the nine grantees reported using partnering as a necessary strategy for completing the planned work during the short grant time period.

Using online tools to track progress. The LMI grantees were managing multiple parallel and interconnected activities. As described in previous chapters, most grantees implemented multiple ongoing data collection efforts, resulting in a large number of products. At the same time, grantees were investing in LMI infrastructure improvements. In most states, a large number of players were involved in these efforts. To manage this workflow, some grantees developed online tools to track the progress of these efforts and coordinate work products. Oregon used a web-based tool to ensure product version control and manage updates from multiple partners. It also developed a Dashboard progress accountability system to monitor partner progress and facilitate communication (see Box VI.2).

Box VI.2. Oregon Partner Communication

Oregon viewed the LMI grant as an opportunity to collaborate and develop stronger relationships with its partners. Throughout the grant, Oregon facilitated open communication between the three grant partners. It held monthly check-in calls and quarterly in-person meetings to discuss grant activities. Partners presented on the status of their projects and explored ways that the various projects might connect or benefit the others. Those partners interviewed maintained that these meetings gave them information on other projects and fostered collaboration between the various projects. For example, the contractor responsible for developing career pathways learned about the CIS green information during an LMI grant meeting and then integrated the information into the pathways.

In addition, Oregon maintained an online Dashboard progress accountability system. Based on meetings, partners' monthly reports, and self-assessments, Oregon assigned each grant project a red, yellow, or green light, standing for "significant issues," "potential problems," and "on target," respectively. This system allowed Oregon and partner staff to be aware of the status of every project funded by the grant and identify potential issues early.

B. Planning for Sustainability

One of the key challenges to the long-term impact of the grants, according to grantees, is that LMI must be current to be useful. LMI helps workers to decide what jobs are in demand and what skills are necessary to obtain them. In certain fields, this information may be relatively stable over time, but for emerging fields, like green jobs, the LMI can reasonably be expected to evolve.

Interviews with stakeholders of the nine grantees identified two key concerns regarding the sustainability of the LMI grants efforts. First, many of the infrastructure enhancements initiated under this grant have ongoing maintenance and subscription costs. For example, MARC's green jobs portal is hosted by an outside vendor and will require ongoing subscription fees from the three participating states. Similarly, the enhancements that New Mexico made to its labor exchange will increase New Mexico's fees in the future. Second, since partners and subcontractors completed much of the work, respondents expressed concern that the LMI shops may not have sufficient staff time or expertise to maintain and update grant products.

Grantees engaged in three efforts to continue at least some grant activities by (1) incorporating green LMI into existing data collection efforts; (2) using grant funds to pre-pay fees; and (3) connecting the work under the LMI grant to ongoing efforts, including the SESP grant.

Incorporating Green in existing LMI. For grantees that adapted their existing LMI infrastructure to incorporate green jobs, the information on these jobs will be updated as part of the normal routine. Oregon, for example, will update the green occupational profiles when it updates profiles for other occupations in the CIS. It is more difficult for states to find funding to continue separate green-jobs data collection. The only state with definite plans to continue was Iowa, which chose to add a green-jobs question to its existing Laborshed survey. By folding a green-jobs question into an existing data collection, Iowa insured the sustainability of its effort. Oregon and Michigan also hope to repeat their surveys, but these states had managed to fund a green-jobs survey prior to the LMI grant.

Pre-paying Fees. New Jersey used its grants funds to buy multiple years of access to the OnRamp software, ensuring access after the end of the grant period. Similarly, Driving Change pre-paid for five years of web hosting for the consortium website.

Coordinating with SESP Grants. Grantees were able to leverage the SESP grant to continue promoting LMI products. All nine grantees included in the in-depth study also received an SESP grant,[15] which had a 36-month period of performance. In New Mexico, for example, the SESP grant assumed responsibility for the mobile unit purchased with LMI grant funds, and SESP grant staff were planning to use the unit to provide green training in remote areas.

[15] In the Driving Change consortium, all states received SESP grants. In the MARC consortium, Maryland received an SESP grant. In the Northeast Consortium, Connecticut, Massachusetts, and New Jersey received grants.

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VII. REFLECTIONS ON THE LMI IMPROVEMENT GRANTS

The Recovery Act posed a new and exciting opportunity for state LMI agencies. In an era of tight funding, the LMI grants provided an infusion of funds and an opportunity to conduct primary research on green jobs and make long-awaited LMI infrastructure enhancements. The 30 LMI grantees were active during the grant period, reporting significant accomplishments as well as some important challenges. This evaluation report has documented the experiences of 9 of the grantees. Drawing information from this in-depth study, as well as from an inventory of progress across all grantees, this final chapter distills the main findings.

A. Understanding Green

When DOL released the solicitation for the LMI grants in June 2009, no single national definition of green jobs existed. This absence forced grantees to create local definitions of green. Our review of the definitions used by the 30 LMI grantees found that nearly every one defined green uniquely or added context and examples to preliminary national definitions of green (Laird et al. 2012). A few states reused definitions developed in previous state efforts, while most of the others built on preliminary definitions from O*NET and BLS.

During our in-depth visits, we confirmed that the process of defining green presented both opportunities and significant challenges. Creating and modifying the definition of green gave grantees the opportunity to engage local employers and green-jobs experts, and work to determine the relevance of green in their local economies. States used these conversations to shape their definition of green and the examples they presented to explain categories of green jobs. The subset of grantees visited for this study suggested that this process may have resulted in survey instruments that were likely more relevant to local employers. For some grantees, the process of defining green was also an opportunity to build relationships with stakeholders in education and business.

The absence of a national definition of green also created significant challenges. As BLS demonstrated early in the grant, defining green is conceptually very difficult and measuring it is also challenging. Some grantees reported that the process of doing so took substantial time and energy. In some areas, the process also was politically charged, as certain local industries sought to be classified as green and others were skeptical about the value of measuring green. Without a standard definition, grantees encountered challenges as they attempted to collaborate across states and organizations or integrate their work with existing O*NET research or commercial products. These challenges forced grantees to use multiple definitions of green jobs across grant products.

Many of the LMI grantees, including seven of the nine examined in this report, made significant efforts to count the number of green jobs in their states and collect other LMI to help understand the skills required for green jobs, and how demand for them is likely to change in the future. While grantees gathered useful information in these surveys, the variation in the definitions of green, survey instruments, and survey methods prevented a real comparison of results. In some states, grantees found that green jobs accounted for less than 2 percent of jobs; other grantees found that 5 percent of jobs were green. None of the measures were strictly comparable to the BLS survey results finding that GGS jobs account for 2.4 percent of total U.S.

covered employment. The variation in state estimates in part reflected differences in industry composition across states. For example, the GGS indicated that green employment ranged from 4.4 percent in Vermont to 1.3 percent in Florida. Variation is also likely due to differences in definitions and data collection methods as well as potential bias due to non-response.

Although this grant provided an opportunity for states to collect LMI on green jobs, during site visits, stakeholders suggested the value of integrating green LMI into the existing infrastructure. Workers accessing LMI want to compare across possible occupations and may not be interested in pursuing a separate search for green jobs. Additionally, many states reported that green is not necessarily a binary concept—jobs may have "layers" of green. Integrating green LMI with other LMI also increases the likelihood that such information will be updated in the future. Iowa, for example, added a question on green jobs to its regular Laborshed survey, ensuring that the green jobs LMI will be updated with each survey iteration. Similarly, states that added green occupational profiles to their systems intend to update these profiles on the same schedule as their other non-green occupational profiles.

B. Building Infrastructure

In addition to investments in understanding green, states used the LMI grants to enhance their infrastructures to collect and disseminate LMI, and connect workers to jobs. In many cases, these infrastructure enhancements included a green component—such as the ability to flag green jobs in the labor exchange—but other infrastructure investments were not focused on green. Grantees designed new labor exchanges, added mapping capabilities to labor exchanges, purchased new software to enhance coding of job announcements, and added capabilities to match worker resumes to job openings. Some of these infrastructure improvements had been desired for a long time, and the grant provided an opportunity to make the needed investments.

Grantees also designed new career tools to help workers investigate careers and their training requirements. Some of these career tools were designed for use within the state. For example, while individuals from out of state may consult Oregon's career pathways when considering education and training, the links between the career pathway and Oregon's community colleges make the product more local. Several grantees designed tools, such as Alaska's Career Lattices and Driving Change's Trip Time, for potential national adoption, although the grantees' dissemination plans did not necessarily extend beyond the state or consortium states.

States also used the LMI grant funds to explore the potential of real-time LMI to supplement traditional LMI data collection methods. The Northeast Consortium dedicated its efforts to exploring the strengths and limitations of real-time LMI. The Consortium findings highlighted the potential of real-time LMI to provide information on skills, education, and experience requirements of emerging occupations, but also the numerous complications that resulted from using online job postings as a source of LMI. The work of the consortium confirmed the belief of one LMI researcher, who explained, "real time is not going to solve it all."

C. Developing and Enhancing Partnerships

Partially by design—the grant solicitation required strategic partnerships—and partially by necessity—many states had hiring restrictions and were unable to hire grant-funded staff—partnerships played a critical role in the implementation of the LMI improvement grant. The experience of the LMI grantees illustrates that partnerships have the potential to add value at each step in the process. Across the LMI grantees, there were examples of strong partner involvement in formulating grant goals and developing the initial proposal, conducting key grant activities, facilitating stakeholder review of products, and disseminating research findings and career tools.

Interestingly, some of the new partnerships of which LMI staffs were most proud were those with other state departments or offices. As one researcher in an LMI shop explained, the LMI grant "allowed us to work outside of our bubble." This sentiment was echoed in site visit interviews with several LMI shop and partner agency staff. One of the factors motivating strong internal state partnerships was the SESP grant, which created a clear purpose for partnering—SESP grantees wanted to use LMI on green jobs to inform their training plans.

D. Looking Beyond the LMI Improvement Grants

In the three years since the LMI grant announcement was released, much has changed. BLS has finalized its green-jobs definition and has started to conduct annual GGS surveys. Funding for the LMI grant was a one-time infusion through the Recovery Act. As such, the future of state efforts to collect green LMI is unclear. Iowa and Oregon have plans to continue their data collection efforts, but other states seemed uncertain about their interest in or funding for future iterations of the green-jobs surveys. In some states, interest in green jobs appeared to wane during the grant period, as states experienced changes in political administration and job growth was weak across industries.

The infrastructure enhancements funded by the grants likely will persist, although some of these investments do have ongoing subscription fees or maintenance costs. LMI shops may need to demonstrate the effectiveness of career tools and enhanced labor exchanges to ensure future funding. The recently awarded Workforce Innovation Fund grants include funding to rigorously test the employment impact of enhancement exchanges, as well as funds to test career pathways programs.

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GLOSSARY

Career Ladder/Lattice

Career ladders and lattices consist of a group of related jobs that comprise a career. They often include a pictorial representation of job progression in a career as well as detailed descriptions of the jobs and the experiences that facilitate movement between jobs. Career ladder/lattices are not necessarily organization-specific; they frequently span multiple organizations because movement within one organization may not be possible. Career ladders display only vertical movement between jobs. In contrast, career lattices contain both vertical and lateral movement between jobs and may reflect more closely the career paths of today's work environment.[16]

Career Pathway

Career pathways articulate the learning requirements, across educational and training levels, through which a student can prepare for skilled employment in a specific industry cluster and, from there, to continued education and career progression. Career pathways are developed through partnerships among secondary and postsecondary education, employers, and community agencies. Career pathways serve the emerging and incumbent workforce, from high school students to unemployed and underemployed adults. [17]

Labor Exchange

Labor exchanges are interactive websites designed to assist job seekers and employers to find industry and occupation information in their local area.

North American Industry Classification System

Standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.[18]

Occupational Profile

Under O*NET's framework, occupational profiles include worker characteristics, worker requirements, experience requirements, occupation-specific information, workforce characteristics, and occupational requirements.[19]

[16] http://www.careeronestop.org/competencymodel/careerpathway/CPWCllInstructions.aspx

[17] http://lwd.dol.state.nj.us/labor/lpa/lbrdmand/GlossaryOfTerms.html

[18] http://www.census.gov/eos/www/naics/

[19] http://www.onetcenter.org/content.html

O*NET

Occupational Information Network. The O*NET program is the nation's primary source of occupational information. Central to the project is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. The database, which is available to the public at no cost, is continually updated by surveying a broad range of workers from each occupation. Information from this database forms the heart of O*NET OnLine, an interactive application for exploring and searching occupations. The database also provides the basis for our Career Exploration Tools, a set of valuable assessment instruments for workers and students looking to find or change careers. The Occupational Information Network (O*NET) is being developed under the sponsorship of the **US Department of Labor/Employment and Training Administration** (USDOL/ETA) through a grant to the North Carolina Employment Security Commission.

Real Time LMI

The Brookings Institution LMI Forum defined real-time LMI as "labor market intelligence derived from the analysis of job postings and resumes placed into public and private labor exchanges. It is real time because it can be based on data pulled from the Internet on a daily basis. It is labor market intelligence because it can provide indications of supply and demand trends, emerging occupations, current and emerging skill requirements, and market-based demand for education and certifications."[20]

Skills Transferability Tools

Skills Transferability Tools help dislocated workers use pre-existing skills to transition into a high-growth, high-demand occupation. Include information on required knowledge, skills, and abilities, wage differentials, training requirements, and credentials.

Standard Occupational Classification Code

The Standard Occupational Classification (SOC) code system is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into detailed occupations according to their occupational definition.[21]

Web Portal

Websites used to house grantee products, disseminated information, and connect users to LMI tools.

Web Scraping

Web Scraping/Spidering often used synonymously, refer to software that aggregate online job postings from various sources and code the job postings based on NAICS and SOC codes.

[20] http://www.brookings.edu/~/media/research/files/speeches/2010/9/27%20labor%20statistics%20reamer/0927_labor_statistics_vollman

[21] http://lwd.dol.state.nj.us/labor/lpa/lbrdmand/GlossaryOfTerms.html

APPENDIX A

LIST OF GRANT RECIPIENTS

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Table A.1. Summary of Grantee Projects

Grant Recipient	Project Name	Award Amount	DOL Region	States in Consortia
Consortia				
Indiana Department of Workforce Development (MIINOH)	Driving Change*	$4,000,000	5	Michigan, Indiana, Ohio
State of Louisiana Office of Occupational Information Services, Research and Statistics Division (Gulf Coast Green Jobs Consortium)	Gulf Coast Green Jobs Consortium	$2,279,393	3, 4	Louisiana, Mississippi
Maryland Department of Labor, Licensing and Regulation (Mid-Atlantic Regional Collaborative (MARC) Green Consortium)	MARC*	$4,000,000	2	Maryland, Virginia, DC
Montana Department of Labor and Industry (Northern Plains and Rocky Mountain Consortium)	Northern Plains - Rocky Mountain Consortium	$3,877,949	4,5	Montana, Iowa, Nebraska, South Dakota, Utah, Wyoming
Nevada Department of Employment, Training and Rehabilitation (Projections Improvement Consortium)	Projections Improvement Consortium	$3,753,000	1, 3, 4, 5, 6	Nevada, Colorado, Florida, Illinois, New York, North Carolina, Texas, Utah
Vermont Department of Labor (Northeast Consortium)	Northeast Consortium*	$3,999,923	1	Vermont, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island
Individual States				
Alabama Department of Industrial Relations	Alabama	$1,145,210	3	
Alaska Department of Labor and Workforce Development	Alaska*	$800,000	6	
Arizona Department of Economic Security	Arizona	$1,211,045	6	
State of California Employment Development Department	California	$1,250,000	6	
Delaware Department of Labor	Delaware	$ 889,404	2	
Florida Agency for Workforce Innovation	Florida	$1,250,000	3	
Georgia Department of Labor	Georgia	$1,177,975	3	

Grant Recipient	Project Name	Award Amount	DOL Region	States in Consortia
Hawaii Department of Labor and Industrial Relations	Hawaii	$1,247,393	6	
State of Idaho Department of Labor	Idaho	$1,250,000	6	
Iowa Workforce Development (IWD)	Iowa*	$1,172,614	5	
Kentucky Education and Workforce Development Cabinet	Kentucky	$1,250,000	3	
Minnesota Department of Employment and Economic Development	Minnesota	$1,155,488	5	
Missouri Department of Economic Development	Missouri	$1,227,192	5	
New Jersey Department of Labor and Workforce Development	New Jersey*	$1,249,995	1	
New Mexico Department of Workforce Solutions	New Mexico*	$1,250,000	4	
New York State Department of Labor	New York	$1,112,207	1	
Employment Security Commission of North Carolina	North Carolina	$ 946,034	3	
Ohio Department of Job and Family Services	Ohio	$1,015,700	5	
State of Oregon Employment Department	Oregon*	$1,250,000	6	
Commonwealth of Pennsylvania, Department of Labor and Industry	Pennsylvania*	$1,250,000	2	
Puerto Rico Department of Labor and Human Resources	Puerto Rico	$1,248,388	1	
South Carolina Department of Commerce	South Carolina	$ 763,175	3	
Tennessee Department of Labor and Workforce Development	Tennessee	$ 765,340	3	
Washington State Employment Security Department	Washington	$1,060,910	6	

*In-depth site-visit completed

APPENDIX B

GRANT PROFILES

ALASKA PROFILE

Grantee

Alaska Department of Labor and Workforce Development (DOLWD),
Research and Analysis Section

Type of Grant

Single state

Award Amount, End of Grant Period

$800,000; September 30, 2011

Key Partners

Alaska DOLWD
intoCareers
Alaska Commission of Postsecondary Education

Definition of Green

Alaska used the preliminary definition from the Bureau of Labor Statistics (BLS), with Alaska-specific occupations added as examples for clarity. BLS defined a green job as "one where workers provided a good or service in at least one of seven categories: renewable energy; energy efficiency; greenhouse gas reduction; pollution prevention, reduction, and cleanup; recycling and waste reduction; agricultural and natural resources conservation; and education, compliance, public awareness, and training."

Goals

- Collect new data and conduct special research
- Disseminate this information
- Enhance labor-exchange tools

Key Activities

- **Conducted Survey.** Alaska conducted an employer survey to identify and quantify green jobs in the private sector and in state and local governments. The survey also included information on training and certifications required for green jobs. The state used a separate instrument for state-government employees.
- **Improved Infrastructure.** Alaska used LMI grant funds to update the state's labor exchange, ALEXsys. Alaska formed the Central Data Group, composed of representatives from different DOLWD divisions, to discuss and design the improvements to the labor exchange. The group decided to add a "special projects" feature to the website, which allows the state to easily filter jobs in economic areas of interest, such as jobs in green; health care; and science, technology, engineering, and mathematics (STEM) fields.

Key Products

- **Career Lattices.** Alaska expanded a pre-existing career ladders program to include career lattices. The state used multiple data sources to calculate correlations between skills in related occupations and to map how different occupations lead to others. Featured on the website, the career lattices provide career counselors with information on skills, education, and employment to assist job seekers exploring career pathways.
- **Greening Career Information System (CIS).** Alaska collaborated with Hawaii, Montana, and Idaho to green into Career's CIS. The enhancements included a green overview and tasks lists for green occupations, interviews with workers (including questions about the greening of their occupations to update occupation content), six videos about the greening of the work world, search filters and green leaf icons for green occupations, and a green module on the website.
- **Green Jobs Report.** This report contains information collected by the state green jobs survey. The state disseminated the information in the DOL newsletter and houses the report on the website.

Highlights

- Labor-exchange infrastructure improvements go beyond facilitating access to green jobs
- Career lattices capitalize on rich data sources
- In-house management and implementation provides a means for sustainability

Alaska Highlights

This section provides additional information on the site highlights listed above.

Labor-Exchange Infrastructure Improvements Go Beyond Facilitating Access to Green Jobs

From the outset of the grant, Alaska intended to make improvements to the labor-exchange infrastructure that would extend beyond improving access to green jobs. Several divisions within Alaska DOLWD had previously used the data underlying the state's labor exchange, ALEXsys, but the divisions had never coordinated their modifications or updates to the system. For the LMI grant-infrastructure improvements, DOLWD formed the Central Data Group, composed of representatives from multiple DOLWD divisions with an interest in the labor exchange. The Central Data Group met weekly to discuss and prioritize updates to ALEXsys.

Using data from the Alaska green-jobs survey, the group decided to flag green jobs and add a search function for these jobs to ALEXsys. The Central Data Group approached the incorporation of green-jobs updates into ALEXsys as a way to update the system so that other occupations of interest could be highlighted in the future. For example, ALEXsys programming completed through the LMI grant now allows for the state to more easily flag jobs in health care; STEM; and fishing, without expending significant resources to make additional modifications. In addition, the Central Data Group developed a process for standardizing data updates, rather than having each division separately modify its area in ALEXsys.

Career Lattices Capitalize on Rich Data Sources

Alaska used the LMI grant to expand its online Alaska Career Ladder tool into career ladders and lattices. Unveiled in 2009, the Alaska Career Ladder was designed to assist workforce-development professionals and job seekers in identifying opportunities for, and requirements of, career advancement from a current occupation to a goal occupation. Staff of the Alaska DOLWD Research and Analysis Section (R&A) noted that the career-ladder webpage received the majority of traffic on the R&A webpage. By expanding the ladder into career lattices, DOLWD provided an online tool that could help unemployed or underemployed job seekers find new occupations that require little to no education or training beyond what they currently have.

Alaska developed a data-driven career tool that allows job seekers to explore various occupations with similar skill sets. The state used multiple data sources to determine the occupations to include in the lattices. R&A used the Alaska Occupation Data Base (ODB), which provides quarterly wage and Alaska-mandated occupation codes derived from unemployment insurance records, and Occupational Employment Statistics (OES) wage estimates. From this information, the state calculated transition ratios between pairs of occupations and made adjustments for seasonality and highly transitional occupations. Career lattices also used O*NET data for each occupation, including knowledge, skills, and abilities; detailed work activities;

tools and technologies tables; and education, training, and experience tables. R&A staff calculated similarity scores for occupations, using standardized O*NET importance and level scores for knowledge, skills, and abilities. Staff then derived an additional similarity score for common work activities between the occupations. The career lattices are built through analysis of these scores to find similar occupations for lateral changes.

Alaska disseminated information through multiple modes by adding a new navigation page for career lattices to the R&A website and by providing a tutorial on how to use the tool. Each occupation, including some green jobs, has its own webpage. The "focus occupation" page includes a box indicating wage information, employment and growth projections, and required education/training for each job. The tutorial provides illustrated examples of how to use the new tool. R&A published an article in *Alaska Economic Trends*, presented the tool at a regional LMI conference, and discussed the tool with job-service agencies and career counselors.

In-House Management and Work Provides a Means for Sustainability

Alaska managed and produced most of the LMI grant activities and products within DOLWD. By using existing staff and resources, DOLWD ensured continued sustainability of most activities and products. The Central Data Group intends to hold regular meetings to discuss future projects and data modifications. The DOLWD divisions that make up the data group had not worked together previously, but through the grant, they created a permanent working group that will maintain common data and coordinate decision making.

Alaska used the grant funding to incorporate green features into its existing products and tools, while also making important updates that are not limited to the green concept. For example, the Central Data Group considered sustainability in the design and implementation of changes to ALEXsys. The ALEXsys special projects feature coding can be easily adapted to any new federal or state area of economic interest, with minimal programming. Any future changes to ALEXsys will also be reviewed by the Central Data Group to make comprehensive improvements to the labor exchange, rather than changes that are beneficial to one program but potentially harmful to another.

The Alaska Career Lattices program will receive updates and additional occupations in the future. DOLWD staff stated that although the LMI grant provided initial funding, activities would not cease simply because the funding period ended. The Alaska career lattices will be incorporated into the regular duties of the permanent staff person who worked on the project. The in-house staff will continue to update the products as necessary.

DRIVING CHANGE PROFILE

Grantee

Indiana Department of Workforce Development (DWD)

Type of Grant

Consortium (Indiana, Michigan, Ohio)

Award Amount, End of Grant Period

$4 million; September 30, 2011

Key Partners

Michigan Department of Energy, Labor, and Economic Growth
Ohio Department of Jobs and Family Services
Indiana Business Research Center (IBRC)
Center for Automotive Research (CAR)
Case Western Reserve University

Definition of Green

Driving Change research team defined the green economy as industries that provide products or services related to five core green areas. Those "core areas" are: renewable energy, increased energy efficiency, clean transportation and fuels, agriculture and natural resource conservation, and pollution prevention and environmental cleanup.

Goals

- Determine how the auto industry is greening itself
- Determine which auto suppliers survived the economic downturn and how they did so
- Establish the range of career options available to dislocated auto workers and determine how these workers fit into transforming the auto industry
- Use real-time LMI to connect job postings to each state's green-jobs survey

Key Activities

- **Conducted Surveys.** Ohio and Indiana conducted green-jobs surveys. Case Western also conducted a survey of firms in the auto supply chain. Michigan served as a resource for green-jobs surveys.
- **Performed Interviews.** Susan Helper of Case Western conducted 30 pre and post interviews of auto industry suppliers to identify firms that survived the downturn. Michigan and CAR interviewed employers and unions regarding auto-industry transformation.
- **Driving Workforce Change Conference.** The consortium hosted a conference to showcase its work. The conference also brought together people from the education, workforce, and auto fields to demonstrate how the auto industry is greening and changing.

Key Products

- **Trip Time Database.** In conjunction with IBRC, DWD developed the Trip Time tool to provide dislocated auto workers with an estimate of how much seat time, meaning the amount of time spent in classroom training, it would take them to move to a new occupation. This tool is available on the Driving Change website.
- **Training Database.** IBRC created a training program database that includes training programs available in Indiana, Michigan, and Ohio. Training programs for green occupations are flagged with a green leaf.
- **Reports.** The consortium produced the Auto Industry Transformation report, which includes results from the Indiana and Ohio green-jobs survey. CAR and Ohio produced the Supply Chain Transformation Report. Additional reports were produced covering different aspects of auto-industry transformation.
- **Website.** IBRC produced the Driving Workforce Change website to house the consortium's research as well as Trip Time, the training database, and other dissemination tools.

Highlights
• Focused efforts on the auto industry
• Created a tool that showcases a new way to conceptualize career transitions
• Disseminated branded products via a conference and a resource-rich website
• Managed partnerships by making each state responsible for one academic partner

Driving Change Highlights

This section provides additional information on the site highlights listed above.

Focused Efforts on the Auto Industry

The Driving Change consortium saw the LMI grant as a way to address the needs of auto workers who are dislocated or at risk of losing their jobs in Indiana, Michigan, and Ohio. Driving Change also used the grant to determine how the auto industry is transforming and how states can help prepare and train workers for the "new" auto industry. Each consortium state saw large increases in the number of dislocated auto workers due to the economic downturn. These states wanted to better understand how the auto industry is changing and how dislocated workers fit into the changing industry.

Created a Tool That Showcases a New Way to Conceptualize Career Transitions

Indiana DWD, in conjunction with IBRC, created the Trip Time tool to help dislocated auto workers transition into new and potentially green careers. Due to the dramatic increase in dislocated auto workers in each state, the Driving Change consortium believed that existing career-planning tools could not sufficiently meet the needs of this population. Trip Time was therefore created to determine the range of career options available to these workers while also quantifying how long it would take to obtain a new career.

Trip Time takes tools like TORQ and MySkills MyFuture a step further by determining the amount of time it takes to transition from one career to another as well as by identifying similarities between careers. To determine transition times, DWD and IBRC first looked at O*NET job categories. Closely related worker traits were excluded from their analyses, and the categories were further compressed. They then conducted a correlation analysis of the compressed categories. Once they established the correlations, they looked to align worker characteristics with knowledge, skills, and abilities. Finally, they used the correlations to develop seven occupational clusters, with jobs grouped in the same cluster having the shortest transition time. The time needed to transition was largely determined by the knowledge gap between two occupations—that is, the hours of formal education and class preparation required to move from one occupation to another. DWD and IBRC viewed Trip Time as a key tool for staff at American Job Centers to use when working with dislocated auto workers. In particular, Trip Time will allow staff to create better-structured On-the-Job Training (OJT) contracts.

Disseminated Branded Products via a Conference and a Resource-Rich Website

Driving Change used product branding, a resource-rich website, and a widely attended conference to effectively disseminate its products and work. IBRC created and manages the Driving Change website (http://drivingworkforcechange.org/), which bears the consortium's branding seen on all of its products. By creating its own site rather than using a state-hosted website, the consortium was able to make frequent updates and to maintain greater control over content. The website includes a wide array of content, including reports, the Trip Time tool, the Tri-State Training Program Database, and conference presentations.

The Driving Change Conference served as the consortium's other key dissemination activity. The conference gave the consortium and its stakeholders, including auto firms, an opportunity to present and demonstrate their work. By hosting a conference, Driving Change was able to foster collaboration between the grant's key stakeholders and distribute its work directly to industry leaders, unions, educators, and workforce-development professionals.

Managed Partnerships by Making Each State Responsible for One Academic Partner

To successfully manage grant work across states and partnerships, each consortium state worked with an academic partner located in the state. Indiana worked with IBRC to create the Trip Time tool and to conduct its survey. Ohio oversaw the Supply Chain Transformation report, which was completed by Susan Helper and her team at Case Western Reserve University. Michigan partnered with CAR to write the Auto Industry Transformation report and to organize the Driving Change Conference. Managing partnerships in this way allowed each state to develop a close relationship with an academic partner and allowed the consortium as a whole to capitalize on the strengths of each state. The division of work between states and partners also allowed each state to manage a key piece of the grant work.

IOWA PROFILE

Grantee

Iowa Workforce and Development (IWD)

Type of Grant

Single state and member of Rocky Mountain Consortium

Award Amount, End of Grant Period

$1.2 million; May 31, 2011

Key Partners

Iowa Registered Apprenticeships
University of Northern Iowa's (UNI's) Institute for Decision Making
Iowa Association for Community College Trustees (IACCT)
Iowa State University
Institute for Work & the Economy
Des Moines Area Community College (DMACC)
University of Iowa Office of Sustainability
Master Builders of Iowa
Iowa Central Community College (ICCC) and Center on Sustainable Communities (COSC)
Council for Community and Economic Research

Definition of Green

Iowa defined the green economy as "the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy."

Goals

- Inform state agency stakeholders regarding Iowa's use of training dollars to support workers in the green economy
- Guide efforts to maximize job creation

Key Activities

- **Conducted Employer Surveys**. In collaboration with the Rocky Mountain Consortium, IWD conducted the Green Jobs Business Survey, which asked employers about green occupations and activities within their businesses.
- **Conducted Individual Surveys**. IWD modified their annual Laborshed Survey by asking respondents to identify green occupations and industries. The Laborshed Survey provides data on demographics, industries, occupations, education, training, wages, benefits, commutes, and likelihood of changing employment.
- **Modified IWORKS**. IWD staff modified their pre-existing real-time tools to create a separate labor-exchange website to search green jobs. IWD technical staff modified the site through backend configuration of jobs listed based on identified occupational codes.
- **Conducted Employer Interviews**. Iowa's partners conducted interviews and focus groups with employers to inform the development of many products.
- **Attended Green Training**. IWD staff attended a training session on the green job market, given by the Labor Market Information Institute, to better understand the meaning of green jobs when analyzing the labor market.

Key Products

- **Supply-and-Demand Reports**. Iowa reported the results of the Green Jobs Business and Laborshed surveys which included both the demographics of the workers in green occupations as well as the trends for supply and demand for green occupations. UNI's Institute for Decision Making analyzed the results of the two surveys and the gap between the supply and demand of jobs in the green economy.
- **Curricula**. ICCC, COSC, and the University of Iowa Office of Sustainability a developed curriculum on "deconstruction" and other sustainability efforts for community-college courses.

Key Products
• **Catalog of Green Courses**. IACCT catalogued course offerings in green careers from community colleges and all postsecondary institutions in Iowa. Using grant funds, DMACC also designed the Midwest Powerskill website, a searchable inventory of associated "green" training courses offered throughout the Midwest at two- and four-year universities. • **Career Lattices**. IACCT developed 11 career lattices for the green education and training sectors based on the results of employer interviews. These lattices are for incumbent and dislocated workers. • **Legislative Paper**. Iowa State University produced a paper identifying the gaps between energy regulations and incentives offered by the state of Iowa. • **Green Jobs Portal**. This portal contains links to all products created under the LMI improvement grant, including Iowa WORKS.
Highlights
• Focused on developing partnerships with community colleges and universities to provide green training to students • Partnered with many organizations to meet the wide variety of needs in the state • Maintained a strong focus on the green economy

Iowa Highlights

This section provides additional information on the site highlights listed above.

Focused on Developing Partnerships with Community Colleges and Universities to Provide Green Training to Students

To train job seekers for the green economy, IWD partnered with community colleges and universities. The partnerships with three schools and IACCT, the coordination point and policy center for all 15 community colleges in Iowa, allowed IWD to understand the current training programs available and to develop new curricula.

Through the LMI grant, DMACC was given funds to develop the Midwest PowerSkills website. This website hosts the Midwest PowerSkills Green Education Catalog, a searchable directory of green-job education and training resources available throughout Iowa and the Midwest. IACCT worked with DMACC to update and collect more information from the Midwest PowerSkills website. Using the website as well as other sources of data, IACCT conducted a gap analysis of training courses and jobs in six green economic sectors. IACCT also developed 11 career lattices and a list of courses available in Iowa related to green economic sectors.

The University of Iowa Office of Sustainability also worked with DMACC and IACCT in developing the Iowa Green Economy Human Capital Inventory. The inventory included a gap analysis of training programs in Iowa from the perspective of postsecondary institutions instead of from a labor-force perspective. The data for the analysis were drawn from interviews, surveys, and classroom assignments from Iowa-based community colleges and the University of Iowa.

Through the grant, Iowa developed two distinct course curricula. First, the University of Iowa Office of Sustainability developed course curricula for students studying sustainability. Second, ICCC and COSC partnered to focus on deconstruction. One product included an inventory of state projects that needed to be deconstructed. This demonstrated a strong need for deconstruction in the state. To address this, ICCC and COSC reached out to the Building

Materials Reuse Association (BMRA) and developed a curriculum to train workers in deconstruction and recycling skills.

Partnered with Many Organizations to Meet the Wide Variety of Needs in the State

IWD had a long list of activities and products they wished to complete for the grant, but the timeframe of the grant was too short to complete all work in-house. IWD chose not to hire new employees for the grant because they would have to let them go after the grant period ended. Instead, IWD leveraged numerous partners and contracted the work out. IWD networked through its current partners to identify appropriate experts for the grant.

Each partner worked on a different aspect of the grant; IWD described this arrangement as everyone having a "piece of the pie." This approach allowed IWD to accomplish a great deal of work in a short time. LMI staff reported that it also increased efficiency because IWD assigned each piece of the grant to those best able to do the work.

Maintained a Strong Focus on the Green Economy

Iowa had a strong commitment to green before the grant and maintained this commitment throughout the grant process. According to IWD staff, the state administration in place during the grant (as well as the previous administration) was supportive of job development and investments in green industries. Iowa has federal and state tax incentives in place that support green-job development. Due to the state's focus on green, the activities and products of the grant were all related to the green economy.

Although there have been previous green initiatives in Iowa, IWD did not have a clear definition of green when entering into the grant but was able to develop one over time. IWD began to define green by examining what constitutes a green industry and then "funneled" its definition down to the function of the job. IWD decided that a green job needs to be green in practice, not just in context, and that a welder making wind turbines was not any more green than a welder working on diesel engines.

According to the leadership at IWD, stakeholders were interested in growing the green economy. Via surveys from both the supply and demand side, Iowa was able to conduct a gap analysis of green jobs in the state. To help create these jobs, IWD focused on (1) connecting job seekers to green training programs and (2) developing green courses and curricula. IWD also brought the green economy into its LMI tools by adding green-related questions to its annual Laborshed Surveys and by modifying its labor-exchange website to allow for green-job searches. This work will be sustained after the grant ends.

MARC PROFILE

Grantee

Mid-Atlantic Regional Collaborative (MARC)

Type of Grant

Consortium (Maryland, District of Columbia, Virginia)

Award Amount, End of Grant Period

$4 million; May 31, 2011

Key Partners

Maryland Department of Labor, Licensing, and Regulation (DLLR)
Maryland Workforce Commission (MWC)
Virginia Employment Commission (VEC)
District of Columbia Department of Employment Services (DOES)
Geographic Solutions
ICF/Macro International

Definition of Green

MARC defined green jobs as "those that involve any amount of time spent in providing services or producing products in one of the following seven core areas: (1) renewable energy and alternative fuels; (2) energy efficiency and energy conservation; (3) greenhouse gas reduction; (4) pollution reduction and cleanup; (5) recycling and waste reduction; (6) sustainable agriculture and natural resource conservation; and (7) education, compliance, public awareness, and training related to green jobs."

Goals

- Conduct an employer survey and other research to develop estimates of the skills required for and characteristics of green jobs at local, state, and regional levels
- Estimate the impact of green technologies and investments on regional job creation
- Conduct workforce gap analysis and develop an approach for matching dislocated and underemployed workers with emerging green employment opportunities
- Disseminate research and data to inform stakeholders of the occupational skills and growing needs of the energy efficiency and renewable energy industries
- Publish data—including information on careers, competency models, and job guidance—through multiple models and formats for various target audiences
- Create a regional labor market exchange system for green jobs, education, and training

Key Activities

- **Conducted Regional Green-Jobs Survey.** MARC conducted a survey of public and private employers in Maryland, DC, and Virginia to determine if their employees performed any green job activities.
- **Developed Real-Time LMI Capabilities.** MARC worked with a partner to integrate real-time LMI capabilities into the three jurisdictions' labor exchanges and created a regional green-jobs portal.
- **Improved Infrastructure.** MARC improved the infrastructure of all three jurisdictions' labor exchanges to allow for a regional green-jobs portal. Maryland replaced its previous labor exchange with new software, and DC and Virginia upgraded their existing exchanges.
- **Outreach efforts.** MARC disseminated information across the District of Columbia, Maryland, and Virginia through press releases; news articles; conference presentations; green business events; national and regional webinars; posters for America Jobs Centers and college career centers; and newspaper and bus advertisements.

Key Products
• **Regional Green-Jobs Portal.** MARC developed a green-jobs portal that houses all products developed using funds from this grant. The portal also contains a green news section and provides a real-time search function for regional green jobs. • **Gap Analysis, Occupational Profiles, and Economic Impact Study.** MARC completed reports on related research activities, including a gap analysis, occupational profiles, and a study of the green economy's impact on the region. All reports were posted on the green-jobs portal. • **Inventory of Green-Related Training Programs.** MARC catalogued green training programs in Maryland, DC, and Virginia and created a separate navigation page for these programs on the green-jobs portal. The portal contains a search tool that allows users to find education and training programs by jurisdiction, key word, classification, qualification, cost, and type. MARC targeted this tool toward job seekers, career counselors, and American Jobs Center staff.
Highlights
• Regional job-search capabilities give users access to interconnected labor market • Strong fiscal infrastructure facilitates collaboration • MWC plans to expand MARC based on LMI grant experiences

MARC Highlights

This section provides additional information on the site highlights listed above.

Regional Job-Search Capabilities Give Users Access to Interconnected Labor Market

The LMI grant provided MARC with the opportunity to regionalize job searches in Maryland's, DC's, and Virginia's labor exchanges. Before the grant, the labor exchanges in these jurisdictions lacked the functionality to search for jobs beyond state borders. In addition, the labor-exchange software packages in the jurisdictions were incompatible.

MARC used grant funds to update and, in one case, replace members' labor exchanges. Before the grant, Virginia and DC used the same vendor (Geographic Solutions), but their labor exchanges did not search across borders. Maryland's labor exchange, which had been designed in-house, also lacked cross-border search functions. The grant allowed Virginia and DC to upgrade their systems, while Maryland received a new Geographic Solutions exchange. According to MARC leaders, bringing "everyone onto the same playing field" allowed Geographic Solutions to create a regional green-jobs portal and add cross-border search capabilities to the exchanges.

The DC-area labor market is regional, extending beyond the defined jurisdictional borders, with employees frequently living and working in different states. Through the enhancements made possible by the LMI grant, job seekers can search for jobs by distance and are no longer limited to a single state or district.

Strong Fiscal Infrastructure Facilitates Collaboration

MARC benefited from the use of a public-private partnership to address the traditional contractual issues of multiple-jurisdiction membership. MWC served as MARC's fiscal agent, streamlining the procurement and payment processes to grant partners. MWC staff said that they saw MARC as the means to collaborate across the region but understood the contractual issues of different jurisdictions' policies and procedures. MWC had more flexibility as it did not have to comply with all three jurisdictions' procurement procedures.

MARC's fiscal infrastructure decreased the time required to contract with partners. Several partners stated that they were able to perform their tasks on time because they did not have to follow the procurement procedures of all three jurisdictions. The member jurisdictions and partners identified MWC and fiscal organization of the project as a "major strength" that "improved overall efficiency."

MWC Plans to Expand MARC Based on LMI Grant Experiences

MARC was created under the Base Realignment and Closure Commission (BRAC) in 2007 to help coordinate BRAC efforts across the region. The collaborative has since been funded solely through grants. In 2010, MARC came under the newly established public-private partnership MWC. MWC staff members stated that MARC serves the interests of all jurisdictions in the mid-Atlantic area, with a regional perspective that many of those interests require. The LMI grant enabled MARC to execute a $4 million grant and to meet member-identified goals. In addition, MWC staff members said that the LMI grant has given more exposure to MARC as a regional consortium. MARC intends to capitalize on the relationships developed via the grant to expand in the mid-Atlantic region; the collaborative is currently discussing membership with other mid-Atlantic states and is pursuing additional grant opportunities.

NEW JERSEY PROFILE

Grantee

New Jersey Department of Labor and Workforce Development
Labor Planning and Analysis Division

Type of Grant

Single state and member of Northeast Consortium

Award Amount, End of Grant Period

$1.25 million; August 31, 2011

Key Partners

The John J. Heldrich Center for Workforce Development, Rutgers University
State Employment and Training Commission (SETC)
NJ Workforce Development
Middlesex County Workforce Investment Board's (WIB's) Regional Economic Development Initiative

Definition of Green

New Jersey derived its definition of green from the Bureau of Labor Statistics (BLS), which defines green jobs as those "in businesses that produce goods or provide services that benefit the environment or conserve natural resources." The state recognizes three green industries: (1) green energy production/renewable energy (2) energy efficiency (green building/construction/ design); and (3) environmental remediation/waste-reduction. New Jersey also believes that "most 'green jobs' are actually traditional jobs that may require a 'green layer' of skills or additional training."

Goals

- Gather and analyze data to define and identify green jobs and training programs
- Enhance the display and search capacity of Real-Time Jobs in Demand and other tools
- Create a rapid re-employment and retraining system by integrating Real-Time Jobs in Demand into the Unemployment Insurance (UI) system
- Disseminate products throughout the workforce and higher education system in New Jersey and beyond

Key Activities

- **Modified LMI tools.** New Jersey modified the interfaces of two Real-Time LMI tools to make them customizable and to allow users to search for green jobs. The state also developed the OnRamp tool, which matches users to jobs based on their skills. OnRamp is linked to New Jersey's UI system.
- **Disseminated products.** New Jersey attempted to widely disseminate all finished products and created a website (Jobs4Jersey.com) specifically for this purpose. The state organized a promotional campaign for the site; sent career brochures to all state workforce investment boards, high schools, and community colleges; and presented findings at conferences.
- **Conducted surveys and interviews.** The Heldrich Center conducted surveys and interviews with employers and school staff.

Key Products

- **New Jersey OnRamp.** Via this Real-Time LMI tool, job seekers can create or upload a resume, use resume-enhancing tools, search for jobs, and receive personalized job alerts via email. Employers can use the tool to upload job postings and to search resumes. The OnRamp is located at Jobs4Jersey.com.
- **Career Brochures.** The Heldrich Center produced two brochures discussing green jobs and training programs. The brochures also described top industries in New Jersey and provided advice on finding training.
- **Searchable Inventory.** The Heldrich Center compiled a searchable inventory of green training programs.
- **Web Portal.** New Jersey created a website to disseminate grant-related products. The site lists other state department sites as resources.

Highlights
• Viewed the grant as an opportunity to build on strategic partnerships • Used data produced via the grant to inform the training plans for the State Energy-Sector Partnership (SESP) grant project • Partnered with New Jersey Workforce Development to produce a Real-Time LMI tool focusing on matching job seekers to jobs based on their skills

New Jersey Highlights

This section provides additional information on the site highlights listed above.

Viewed the Grant as an Opportunity to Build on Strategic Partnerships

As the administrator of the SESP grant, SETC views the information produced by the LMI project as critical to making decisions regarding industry investment strategies. In particular, SETC relied on estimates of green employment demand produced under the LMI grant.

New Jersey partnered with the New Jersey Workforce Development agency and the American Job Centers to inform the creation of New Jersey OnRamp. The American Job Centers and the clients who use their services will be the primary users of this product. New Jersey held focus groups with these potential users to understand what they would want from the OnRamp tool.

The state also partnered with the Regional Economic Development Initiative (REDI), which is led by the Middlesex County WIB. REDI's goal was to build a county-level clearinghouse of green jobs and training opportunities. This tool was then used by the Heldrich Center grantee's partner to populate the searchable inventory database of green training programs for the rest of the state.

These statewide partnerships led to several key outcomes. First, they allowed New Jersey to move beyond the development of LMI tools and into training and workforce-development tools as well. Second, the partnerships generated discussion between divisions and agencies in New Jersey. According to respondents, before the LMI grant, many of the state agencies operated in "silos" and did not interact with other agencies. Third, because the respondents found the partnerships to be effective, many will be sustained after the grant ends.

Used Data Produced via the Grant to Inform the SESP Grant Project

New Jersey's SETC, which is the state WIB, received an SESP grant that focuses on training opportunities. The initial partnership between New Jersey Labor and Workforce Development and SETC focused on modifying the SESP grant to best meet the training needs of job seekers.

Before requesting the grant modification, SETC needed accurate data on the need for training for unemployed and incumbent workers. SETC approached LMI staff to obtain accurate data for their grant modification and to make their request as strategic as possible. An LMI staff member also serves on the SESP grant-application review panel and provides feedback on grant applications from training providers.

Partnered with New Jersey Workforce Development to Produce a Real-Time LMI Tool Focusing on Matching Job Seekers to Jobs Based on Their Skills

Before the grant, New Jersey was already using two Real-Time LMI tools: In-Demand and Real-Time Jobs in Demand. These tools gave New Jersey access to web scrape and spider job postings. But state leaders knew they wanted to further their development of such tools, using the LMI grant to not only create LMI tools but workforce-development tools. They partnered with the leaders of New Jersey Workforce Development to conduct focus groups with American Job Center staff, job seekers, employers, and professional-service networking groups to learn what each respondent would want in a "real-time" product. The result of this partnership was the New Jersey OnRamp tool. Using LMI funds, New Jersey used the Burning Glass "Focus/Career" software suite, a talent-matching/smart-resume/case-management system, to create OnRamp.

New Jersey OnRamp matches resumes to job postings by skills, not just by occupation titles. The system does this by matching job postings found through web scraping and spidering to resumes uploaded by job seekers. OnRamp includes a resume builder for users who need a resume and also recommends improvements to existing resumes. In addition, there is an employer component of New Jersey OnRamp that allows employers to post job openings and to search resumes.

By linking this job-seeking tool to the UI case-management system, OnRamp has allowed New Jersey to reach people who have submitted UI claims. All UI claimants are mandatory users of the system. Registered claimants receive daily emails of job postings for which they qualify based on the skill set presented in their resume.

NEW MEXICO PROFILE

Grantee

New Mexico Department of Workforce Solutions, Economic Research and Analysis Bureau

Type of Grant

Single state

Award Amount, End of Grant Period

$1.25 million; August 31, 2011

Key Partners

Arrowhead Center at New Mexico State University
New Mexico Green Chamber of Commerce
New Mexico local workforce investment boards (WIBs)

Definition of Green

New Mexico defined green business activity as that which "provides goods or services in one or more of four identified green economy core areas. A green job produces/supplies those green goods or services." The four core areas are "energy efficiency; clean manufacturing; renewable energy; and research, development, and administration."

Goals

- Identify green jobs in New Mexico
- Develop an inventory of green jobs-related training programs and educational opportunities
- Connect employers and educators to help identify skills-training gaps for green jobs
- Develop a green-jobs portal with the ability to flag green jobs
- Disseminate green-jobs information across the state (including to the most rural areas)

Key Activities

- **Conducted Surveys.** New Mexico contracted a partner to conduct two surveys—one private sector and one public sector—to collect information on wages, educational and skill requirements, and trainings for green jobs.
- **Held E3 Forum (Employers, Educators, Employees).** This green-jobs forum was held in spring 2011 to connect educators and employers to help determine if green-job training and education programs were providing employer-required skills.
- **Organized and Conducted Regional Town Hall Meetings.** At town hall meetings, employers and educators had the opportunity to network and identify green-jobs educational opportunities. This activity was connected to the State Energy-Sector Partnership (SESP) grant.
- **Purchased a Mobile Workforce Unit.** New Mexico purchased a mobile workforce unit to disseminate information and potentially serve as a mobile training unit.

Key Products

- **Green-Jobs Portal.** The portal houses products developed under the LMI and SESP grants and features real-time postings of green jobs.
- **Green-Jobs Reports.** New Mexico produced two reports with survey results, one on private employers and the other on public employers. The reports included information on survey methodology and results, findings from an impact analysis, and a discussion of the future of the green economy.
- **Education Inventory.** New Mexico used extant educational data and identified green-jobs training programs across the state.

Highlights

- Identified linkages between the LMI and SESP grants
- Disseminated information via the mobile workforce unit

New Mexico Highlights

This section provides additional information on the site highlights listed above.

Identified Linkages Between the LMI and SESP Grants

During the planning phase of the grant, New Mexico viewed the LMI grant and the SESP grant as a single opportunity to improve information on, and training programs for, green jobs. Several staff members of the New Mexico Department of Workforce Solutions (DWS) stated that the LMI grant allowed them to collect information on green jobs that would inform the design and implementation of the SESP grant. The state therefore designed activities and created products intended to further the goals of both grants.

All of the key activities—the surveys, E3 forum, and town hall meetings—collected information to be shared by both grants. The survey identified green jobs and industries that SESP grant administrators targeted for training programs. The E3 forum and town hall meetings opened a dialog between employers and educators to identify skills gaps and potential training programs. Several local WIB stakeholders also contended that these forums allowed them to establish new relationships with universities, community colleges, and training providers.

To ensure that all products created under the LMI and SESP grants were easily identifiable, the state decided to brand them the same way. The green-jobs portal illustrated the connection between the grants, housing both LMI and SESP products and transitioning operating costs from the LMI grant to the SESP grant. DWS staff said that using the same website for both grants broadened the audience for the products and reinforced the link between the grants.

New Mexico designed the mobile workforce unit to both disseminate information and potentially serve as a training tool. After the LMI grant ends, DWS and SESP grant administrators will continue to share the operating cost of the mobile unit. SESP grant administrators have used the mobile unit at training events and to share information on grant activities; future uses may include transforming the mobile unit into an SESP training facility to target rural areas.

Disseminated Information via the Mobile Workforce Unit

To provide rural populations with information on green jobs, the state procured a 39-foot coach bus to serve as a traveling American Job Center. Through this mobile unit, New Mexico could connect rural citizens to job-related resources not otherwise available in their communities. This approach increased the number of people receiving information developed via the LMI grant and, eventually, the SESP grant.

The mobile workforce unit is equipped with laptop workstations, two presentation spaces, and TV/DVD-viewing areas. Fueled primarily by solar and wind power, the unit is branded with the state green-jobs logo and motto, “Fuel New Mexico.” Visitors to the unit can access the green-jobs portal, get copies of green-jobs reports, take skills assessments, and search for green jobs.

DWS staff traveled across the state in the mobile unit, presenting at job fairs, conferences, and American Job Centers. At these events, staff provided information and distributed products developed under the LMI grant. Event organizers requested the mobile unit's presence, and the state also advertised the unit in the DWS newsletter.

The LMI grant paid for the operation of the mobile unit. At the end of the LMI grant period, DWS and the SESP grant assumed the operating costs.

NORTHEAST CONSORTIUM PROFILE

Grantee

Vermont Department of Labor

Type of Grant

Consortium (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont)

Award Amount, End of Grant Period

$4 million; December 31, 2011

Key Partners

Jim Vollman
Georgetown University Center on Education and the Workforce
The Conference Board
Job Central/Direct Employers Association
Burning Glass
Help Wanted Online
Jean O'Donoghue
O*Net
National Association of State Workforce Agencies (NASWA)
Northeast Energy Efficiency Partnerships
New England Clean Energy Council

Definition of Green

Rather than creating a constant definition of green jobs, the Northeast Consortium defined green using an evolving list of terms associated with jobs that had a direct impact on preserving, restoring, or enhancing environmental quality.

Goals

- Identify green firms
- Enhance traditional LMI metrics
- Develop real-time LMI processes

Key Activities

- **Real–Time LMI.** The Northeast Consortium contracted with Burning Glass to obtain the raw data behind real–time LMI in order to investigate data quality and complete an analysis for member states and the public.
- **Other State–Led Activities.** Although not the focus of Mathematica's site visit, we found that states in the Northeast Consortium also used grant funds to conduct independent activities, including an employer survey in New Hampshire.

Key Products

- **Real–Time LMI Guide for Analysts.** The Northeast Consortium developed a guide for LMI analysts using real–time LMI.
- **Guide for Public Usage of Real–Time LMI.** To provide a context for understanding real–time LMI, the Northeast Consortium produced a guide to help the public understand and consume real-time LMI produced using the consortium's online reports.
- **Real–Time LMI Portal.** The Northeast Consortium created an online portal to disseminate real–time LMI to the public and to consortium state agencies. The portal provides access to real-time LMI reports addressing topics such as green employment demand and overall employment demand. Consortium states can also use the portal to create customized real–time LMI reports.

Highlights

- Advanced the real-time LMI field
- Collaborated with an academic partner

Northeast Consortium Highlights

This section provides additional information on the site highlights listed above.

Advanced the Real-Time LMI Field

Under the LMI grant, the Northeast Consortium conducted in-depth analyses of real-time LMI data. The consortium gained access to raw, real-time data on job postings so that project staff could assess the strengths and weaknesses of these data before disseminating to policymakers and the public. Because the consortium analyzed the actual real-time data, project staff members were able to examine reliability, and they uncovered a number of quality-related issues intrinsic to these data. One of the primary issues is that web-scraped data rely on other data that are not intended for research purposes. The Northeast Consortium uncovered the following issues: (1) false positives from multiple sources, such as duplicate postings and geographic misclassifications; (2) projection errors from industries, such as food service, that do not post jobs online; and (3) difficulty establishing the proper geographic unit of analysis. Staff summarized their findings as the classic "signal to noise" problem—real-time job postings contain important signals about underlying economic conditions, but these signals are mixed with irrelevant or inaccurate information.

In response to the need for more information on real-time data, the consortium developed two user guides—one aimed at the general public and the other at LMI analysts. These guides describe the characteristics of real-time data, their potential pitfalls, and their uses. By creating these guides, the Northeast Consortium was able to document best practices for other entities looking to implement real-time data and provided stakeholders with a context for consuming such data.

Collaborated with an Academic Partner

The Northeast Consortium engaged the Georgetown University Center on Education and the Workforce as a key partner, primarily because it believed Georgetown researchers would (1) furnish a level of expertise typically not in abundance within state LMI shops and (2) provide a different perspective on this kind of work. Georgetown staff provided sharp analytic skills that led to a nuanced understanding of the limitations and strengths of real-time data. This led to the development of detailed data-quality procedures, which in turn informed the analyst guide for using real-time LMI.

OREGON PROFILE

Grantee

Oregon Employment Department (OED)

Type of Grant

Single state

Award Amount, End of Grant Period

$1.25 million; September 30, 2011

Key Partners

Oregon Department of Community Colleges and Workforce Development (CCWD)
Oregon Career Information System (Oregon CIS)
Oregon's 17 community colleges

Definition of Green

In 2009, Oregon statutorily defined a green job as "a job that provides a service or produces a product that (1) increases energy efficiency; (2) produces renewable energy; (3) prevents, reduces, or mitigates environmental degradation; (4) cleans up and restores the natural environment or provides education, consultation, policy promotion accreditation, trading and offsets, or similar supporting services for any of the activities identified in this subsection (categories 1–4)."

Goals

- Collect detailed information on the green economy, building on the first green-jobs survey
- Provide information that is usable for training programs and career planning
- Invest in sustainable LMI infrastructure improvements

Key Activities

- **Conducted Surveys.** Oregon conducted two surveys under the LMI grant—an agriculture green-jobs survey and a green-jobs survey 2.0 that used the same methodology as its 2009 survey.
- **Performed Skills Research.** Oregon reviewed skills databases and interviewed employers to determine the skills employees would need for specified green occupations.
- **Improved Infrastructure.** Oregon made three key infrastructure improvements: (1) converted occupations to Standard Occupational Classification (SOC) 2010 codes, (2) installed Autocoder, and (3) included a green-jobs extractor as a job-search function.
- **Updated the Oregon CIS.** Oregon updated its CIS website with green information, including career articles, curriculum units, and information for 29 occupational profiles.

Key Products

- **Career Pathways.** With the assistance of the community colleges, Oregon developed seven statewide green occupation career pathways.
- **Green Training Performance System.** Oregon reviewed community college curricula, scanning for green content and applying a green score to represent the number of hours of green training students received in a particular program.
- **WorkKeys Profiles.** To enhance the information available on required skill sets, Oregon completed WorkKeys profiles for five green occupations: solar-panel installer, wind-turbine tech, civil engineer, urban planner, and landscaper.
- **Reports.** Oregon produced reports on survey data and articles on information collected under the LMI grant.

Highlights

- Collaborated with partners and subcontractors
- Used a measured approach to focus on green jobs
- Expanded career pathways
- Developed and disseminated numerous products

Oregon Highlights

This section provides additional information on the site highlights listed above.

Collaborated with Partners and Subcontractors

OED viewed the LMI grant as an opportunity to collaborate with partners to fund important projects. During the grant proposal stage, OED contacted potential partners and held a conference call to present potential projects. OED, CCWD, and other partners reached a consensus on the projects and funding levels during the conference call. OED and partner staff stated that the process was very collaborative, with partners adjusting their scopes of work and funding requests to accommodate other projects.

Throughout the life of the grant, OED facilitated open communication between all grant partners. OED held monthly check-in calls and quarterly in-person meetings to discuss grant activities. All partners presented on the status of their projects and explored ways that the various projects might connect or benefit the others. In addition, OED maintained a Dashboard progress accountability system. Based on conversations, reports, and self-assessments, OED assigned each grant project a red, yellow, or green light indicating that the project had significant issues, had potential problems, or was on target, respectively. This system kept OED and partner staff informed on the status of every project and helped them identify potential issues early. Partners said that these meetings gave them information on other projects and fostered collaboration. For example, the career-pathways contractor learned of the CIS green information during an LMI grant meeting and was able to integrate the information into the pathways.

Used a Measured Approach to Focus on Green Jobs

Based on findings from prior research, Oregon staff members decided to take a measured approach to focusing on green jobs under the LMI grant. Oregon completed its first green-jobs survey in 2009 and found that only 3 percent of the Oregon economy was engaged in green jobs according to the state definition. OED staff decided that overly emphasizing green jobs would be "biased" because they only represented a small proportion of Oregon's current and projected jobs. Thus, when considering goals and projects for the LMI grant, OED stressed the importance of sustainable activities that would benefit the LMI system beyond the green economy. Staff members contended that they did not want to mislead the workforce community and future job seekers by presenting the green economy as larger than it is.

Expanded Career Pathways

In partnership with OED and Oregon's 17 community colleges, CCWD has invested in a career-pathways program to help students and new job seekers plan for education and career advancement. Oregon began this initiative in 2004 with 5 community colleges, expanding to all 17 in 2007. These career pathways led to the development of roadmaps for students pursuing specific programs at particular community colleges. The roadmaps, although similar, were not transferrable between the different community colleges.

Oregon viewed the LMI grant as an opportunity to expand the career-pathways program, making the roadmaps applicable statewide and including apprenticeship information. Through the grant, CCWD (in partnership with OED) contracted a career-pathways expert to develop the following statewide career pathway roadmaps: solar/renewable energy; wind energy; construction/carpentry; heating, ventilation, air conditioning, and refrigeration; manufacturing/production; utilities/lineworker; and water/water waste.

OED and CCWD created a team of advisors, including green leaders from each community college and staff from the apprenticeship office housed in the Bureau of Labor and Industries. The advisors helped design the template for the state-level pathways, and they had access to a test website to provide feedback as the pathways were being developed. The pathways on the website are linked to the state LMI webpage and to O*NET. The roadmaps on the site link to CIS's green-career video, which was produced using LMI grant funds from Alaska, Idaho, Hawaii, and Montana.

Developed and Disseminated Numerous Products

Oregon produced and disseminated over 80 products targeting various stakeholder groups. These products ranged from posters aimed at high school students to brochures with occupational information. Oregon developed a multipronged dissemination strategy to share information collected via the LMI grant, including the LMI website, social media, print media, electronic communications, and presentations. The state LMI website, Qualityinfo.org, housed all reports and articles written for the grant. In addition, OED created a blog and twitter feed aimed at reaching a younger audience. OED communicated with workforce-development professionals, other agencies, and community organizations through a monthly "What's New" email to share new products and information. Print media, such as the *Oregon Labor Trend Magazine*, and stand-alone reports were used to distribute LMI grant information and products to a large audience. Finally, OED staff presented information at conferences, workforce investment board meetings, community colleges, regional meetings, and LMI conferences.

PENNSYLVANIA PROFILE

Grantee

Pennsylvania Department of Labor and Industry, Center for Workforce Information and Analysis

Type of Grant

Single state

Award Amount, End of Grant Period

$1.25 million; May 31, 2011

Key Partners

Washington State Employment Security Department
Economic Modeling Specialists
PA Partners

Definition of Green

Pennsylvania defined green jobs as "jobs that employ workers in producing or offering products or services that (1) promote energy efficiency; (2) contribute to the sustainable use of resources; (3) prevent pollution; (4) clean up the environment; and (5) promote the reduction of harmful emissions.

Goals

- Identify Pennsylvania's green employers and work to predict where the jobs will be in two years
- Identify which jobs are green and where the demand is for green jobs
- Identify the skills needed for in-demand green occupations
- Assess the state's capacity to meet employer demand
- Develop career-pathway models to link job seekers to in-demand green occupations

Key Activities

- **Conducted Listening Sessions/Focus Groups.** The goal of these sessions was to gather information on employers' and educators' perceptions about the current and future green economy. The sessions also focused on green occupations, potential skills shortages, and training.
- **Conducted Two Employer Surveys**. The first survey of employers focused on the number of green employers, green jobs, and in-demand green jobs in the state. The second survey, sent to the same employers, asked them to describe the associated skill sets and training needs for workers employed in green industries and occupations.
- **Funded the Creation of a Real-Time LMI Tool Interface.** The interface allows job seekers to assess information about wages, training programs, and available jobs.

Key Products

- **Green-Jobs Survey Report**. The primary goals of the survey were to identify the number of green jobs in the state and to establish a baseline measure that can be used to track industry and job growth over time.
- **Green-Jobs and Occupational Competency Report**. The report provides an overview of occupations and skills associated with Pennsylvania's green economy and the potential of its workforce and education providers to meet these new demands. There are also 13 profiles in the report providing information on careers and career pathways.
- **Findings from Pennsylvania's Listening Sessions**. This report provides an overview of information gathered from employers and educators regarding their perceptions of the green economy, now and in the future, and about green occupations, potential skills shortages, and training.
- **Green Jobs Report Part 2**. This high-level report summarizes Pennsylvania's main findings under the grant. It has not yet been released.
- **Green Career Tool**. This online resource will connect job seekers with real-time LMI data and job postings as well as information about jobs and career pathways. It has not yet been released.

Highlights

- Engaged educators and the business community in listening sessions
- Developed career profiles designed to help job seekers transition to green occupations
- Partnered with key State Energy Sector Partnership grant staff

Pennsylvania Highlights

This section provides additional information on the site highlights listed above.

Engaged Educators and the Business Community in Listening Sessions

From February to April 2010, one of the Center for Workforce Information and Analysis's partners, PA Partners, coordinated six listening sessions with employers and educators. PA Partners developed a facilitator guide and conducted a training so that all questions asked of the participants were standard. They hired four subcontractors to facilitate the sessions: the Hill group, Keystone Research, Corporation for a Skilled Workforce, and Pennsylvania State University staff members.

The purpose of the listening sessions was to capture the perspectives of employers and educators regarding emerging green industry sectors and green workforce needs and challenges. The Center wanted to capture stakeholder perceptions of the green economy, now and in the future, and learn about green occupations, potential skill shortages, and trainings. The listening sessions took place in six regions of the state, with each region consisting of several local workforce investment areas. Altogether, 263 employers, educators, and other participants were involved.

Developed Career Profiles Designed to Help Job Seekers Transition to Green Occupations

Pennsylvania's career profiles are designed to help workers match their qualifications to relevant occupations and to identify trainings they may need to transition into higher-paying occupations. The profiles, included in the Green-Jobs and Occupational Competency Report, show career pathways or maps that a person can follow. Each of the 13 profiles includes detailed information on the employment levels in the state in 2010, the expected change in employment in the next five years, the annual demand, the average earnings, and the typical education level of workers in that occupation. The profiles also include the types of knowledge and skills a person should have before transitioning to the new occupation.

Coordinated with Key SESP Staff

The key activities and products of the LMI grant affected the goals of the SESP grant as well. SESP staff used the definition of green developed by the LMI grant to inform their training programs. Respondents noted that using a standard definition of green throughout the state was critical to communicating clearly with stakeholders. In addition, SESP staff were able to sit in on the LMI listening sessions, which gave them a better understanding of the employer markets. SESP staff also advised on and reviewed LMI products. The Center for Workforce Information and Analysis was able to use this advice to inform the design and implementation of key products.

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APPENDIX C

GREEN JOBS DEFINITIONS AND CORE SURVEY QUESTIONS

Table C.1. Green Jobs Definitions and Core Survey Questions

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Alaska	Alaska Green Jobs Survey	**Renewable energy** Research, development and implementation of technologies and practices for the production of energy (electricity, heat and fuel) from resources replaced by a natural process at a rate greater than its rate of consumption. ***Examples to Include:*** *Hydrokinetic, wind turbine, biomass (including biofuels and biogas), geothermal and solar energy.* ***Examples to Exclude:*** *Production of high voltage lines or distributing energy* **Energy efficiency** Research, development and implementation of technologies and practices which use less energy to provide the same level of energy service. ***Examples to Include:*** *Energy efficient home retrofitting, increasing energy efficiency of production processes, power cogeneration.* ***Examples to Exclude:*** *Workers at firms where the firm has become more energy efficient with more energy efficient bulbs or reducing thermostat temperatures* **Greenhouse gas reduction** Research, development and implementation of technologies and practices to reduce greenhouse gas emissions. ***Examples to Include:*** *Reduction of greenhouse gas emissions from fossil fuels, carbon capture and sequestration, carbon pricing and trading.* ***Examples to Exclude:*** *Workers driving electric cars or fuel efficient vehicles, telecommuting or carpooling* **Pollution prevention, reduction and cleanup** Research, development and implementation of technologies and practices to reduce or prevent the emission of contaminants into the ecosystem at the source of their creation; and remove pollutants and hazardous substances from the environment. ***Examples to Include:*** *Oil cleanup, hazardous waste removal, installation of stack scrubbers, mass transit administration.* ***Examples to Exclude:*** *Recycling programs, workplace adopt-a-highway/street programs or community cleanup day*	1. Do you employ workers who provide goods and services in any of the green-related categories listed below? Please check all of the green categories in which one or more of your employees work and indicate the relative importance of green activities to their total work. a. Renewable energy b. Energy efficiency c. Greenhouse gas reduction d. Pollution, prevention, reduction and cleanup e. Recycling and waste reduction f. Agricultural and natural resource conservation g. Education, compliance, public awareness, and training 2. Have you added additional workers because of increased demand for green products or services? 3. Have you added new occupations because of increased demand for green products or services? 4. Have you sent workers for green jobs training?	Any of their time

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
		Recycling and waste reduction Research, development and implementation of technologies and practices to recycle, reduce and reuse unwanted or unusable materials and waste water. ***Examples to Include:*** *Recycling plant equipment operator, business waste reduction consulting.* ***Examples to Exclude:*** *Firms with a paperless office policy, work recycling programs (unless an employee's job is to manage the program)* **Agricultural and natural resources conservation** Research, development and implementation of technologies and practices involved in sustainable agriculture, fish and seafood harvesting, forestry, land management and wildlife conservation. ***Examples to Include:*** *Harvesting in a sustainable fishery, organic farming, wild game management, sustainable logging.* ***Examples to Exclude:*** *Fish processing operations* **Education, compliance, public awareness and training** Activities to develop, permit and enforce environmental regulations; provide education and training in the application of sustainable technologies and practices; and increase public awareness of sustainability concepts. ***Examples to Include:*** *Park staff, naturalists, policy analysis, environment sciences research, energy auditing, environmental related licensing or certification*. ***Examples to Exclude:*** *Administrative staff or secretarial services* (Alaska 2011 21)		

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Driving Change	State of Indiana Green Jobs Survey and State of Ohio Green Jobs Survey	Driving Change research team defined the green economy as industries that provide products or services related to five core green areas. Those "core areas" are: renewable energy, increased energy efficiency, clean transportation and fuels, agriculture and natural resource conservation, and pollution prevention and environmental cleanup. (Driving Change 2011 34)	1. Did any of your staff work to provide goods or services in any of the above five core green-related areas in 2009? (yes/no) a. Producing renewable energy b. increasing energy efficiency c. Clean transportation and fuels d. Agriculture and natural resource conservation e. Pollution prevention and environmental cleanup 2. Please enter the average number of workers in 2009 for each job title and the core area they worked in. 3. Please estimate how many employees had one of the five core areas as their primary focus. Choose only one core area per employee. For employees responsible for more than one core area, choose the one that accounted for the most time on the job. Exclude consultants, outside contractors, vendors, and others not considered employees of your organization.	Any involvement. Also collected primary focus.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Iowa	Laborshed Survey	The “green economy” can be defined as the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy. (Iowa 2011 5)	1. Would you consider your job to be a green job? – A green job is one in which the work is essential to products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability. If yes: 2. What green activities does your job entail? a. Renewable energy & alternative fuels b. Energy efficiency & conservation c. Pollution, waste, & greenhouse gas management, prevention, & reduction d. Recycling materials e. Developing renewable sources of energy f. Maintaining & installing Alternative energy generation equipment (Ex. g. Geothermal, Solar, Wind Turbines, Methane Collection Systems) h. Manufacturing green products or parts i. Other	Work is essential to products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Iowa	Green Jobs Employer Survey	The “green economy” can be defined as the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy. (Iowa 2011 5)	1. Your company may be involved in one or more of the green categories below, but please check the box that most closely corresponds to the primary green category within your business. a. Renewable energy and alternative fuels b. Energy efficiency and conservation c. Pollution, waste, & greenhouse gas management, prevention, & reduction d. Environmental cleanup and restoration and waste cleanup and mitigation e. Education, regulation, compliance, public awareness, and training and energy trading f. Sustainable agriculture and natural resource conservation g. None of the above 2. How many employees at this location perform green-related activities?	Directly performing green related activities as part of job duties.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
MARC[2]	District of Columbia Jobs Survey Maryland Jobs Survey Commonwealth of Virginia Jobs Survey	Defined green jobs as those that involve any amount of time spent in providing services or producing products in one of the following 7 core areas: • Renewable energy and alternative fuels • Energy efficiency and energy conservation • Greenhouse gas reduction • Pollution reduction and cleanup • Recycling and waste reduction • Sustainable agriculture and natural resource conservation • Education, compliance, public awareness and • training related to green jobs (MARC 2011 8)	1. Of the employees at your sites in [DC, Maryland, Virginia], about how many have worked to produce any 'green' products or supply and 'green' services (in one of more of the seven categories of green jobs)? -Number of full time (work 35 hours or more per week) employees doing any 'green' work: -Number of part time (work less than 35 hours per week) employees doing any 'green' work: 2. For the new employees at any of your sites in [DC, Maryland, Virginia], what is your estimate of how many will work to produce 'green' products or provide 'green' services? - full time (work 35 hours or more per week) employees doing any 'green' work to be hired: -part time (work less than 35 hours per week) employees doing any 'green' work to be hired: 3. Next, we would like you to report on the jobs in which employees spend any of their time on one of more of the following 'green' activities for your site in [DC, Maryland, Virginia]. For employees responsible for doing work in more than one 'green' job category, choose the one that accounts for the most time on the job. Do not include information for locations outside of DC:	Any time on any green work

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
			List job titles related to green job categories, the number of employees employed in the following core areas, and how many positions are currently open for each title: a. Renewable energy and alternative fuels b. Energy efficiency and energy conservation c. Greenhouse gas reduction d. Recycling and waste reduction e. Sustainable agriculture and natural resource conservation f. Education, compliance, public awareness, and training directly related to green jobs 4. Does your organization use the following methods at your sites in [DC, Maryland, Virginia] to prepare current workers to produce 'green' products or services? (yes/no) a. In-house classroom b. On-the job training c. Online training d. Trade apprenticeship programs e. Community college course f. We hire only workers who are already training g. Other (please specify)	

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
			5. Over the next two years, how difficult do you anticipate the following will be of the 'green' jobs and openings at your sites in [DC, Maryland, Virginia]? (not at all difficult/ somewhat difficult/very difficult] a. Recruiting entry-level 'green" employees with appropriate training and education? b. Recruiting experienced 'green' employees with adequate skills? c. Retaining valuable 'green' employees who could be hire by competitors? d. Providing 'green' training opportunities for advancement of current employees e. Other recruiting/retaining activities (please specify) f. Other training activities (please specify)	

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
New Mexico	Green Jobs Employer Survey	Green business activity was defined as business activity that provides goods or services in one or more of four identified green economy core areas. A green job produces/supplies those green goods or services. The four green economy core areas include: • Renewable Energy • Clean Manufacturing • Energy Efficiency • Research, Development, and Administration (New Mexico 2011 5)	1. Does your business provide goods or services in any of the four core areas in the green economy? If yes, in which areas? Please check the appropriate box(es). a. Core Areas b. Renewable Energy c. Clean Manufacturing d. Energy Efficiency e. Research & Development and Administration 2. Please list the total number of employees for each position. Please note if the position falls within any of the four core areas listed above. If the position is considered to fall within more than one area, please account for the core area in which an employee in this position would spend the majority of his or her time. 3. (Position title; total number employees; certificate, licensure, special training; core area) 4. Which percentage of all the business activities performed by your organization are environmentally driven tasks? a. 0% b. <49% c. >50% d. 100%	Any involvement Core area where the majority of time is spent.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
New Mexico	Green Jobs Public Sector Survey	Green business activity was defined as business activity that provides goods or services in one or more of four identified green economy core areas. A green job produces/supplies those green goods or services. The four green economy core areas include: • Renewable Energy • Clean Manufacturing • Energy Efficiency • Research, Development, and Administration (New Mexico 2011 5)	1. How many of these employees are engaged in business functions related to "green" business activities? 2. Does your entity provide goods or services in any of the four core areas in the green economy? 3. Please list only the total number for Green Jobs positions using the descriptions for the four core areas above. If the position is considered to fall within more than one core area, please account for the position in the core area in which the employee spends the majority of his or her time. 4. During the next twelve months, do you expect your entity's "green" practices to decrease, remain the same, or increase? 5. What is the total number of workers you expect to employ in green-related occupations in two years (by the year 2013)? 6. Do you anticipate labor shortages of future qualified workers for your green-related occupations?	Any involvement. Core area where the majority of time is spent.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Oregon	Agriculture, Forest, and Fishing Employment Survey	Defined a "green job" as a job that provides a service or produces a product that: • Increases energy efficiency; • Produces renewable energy; • Prevents, reduces or mitigates environmental degradation; • Cleans up and restores the natural environment; or • Provides education, consultation, policy promotion, accreditation, trading and offsets, or similar supporting services for any of the activities identified in this subsection. (Oregon 2011 11)	Report the total number of year round and seasonal workers in 2009 for all occupations listed. If any of your workers' essential job functions meet one or more of the "Green" job requirements listed below, regardless of the amount of time he or she spends on that duty, report them a second time in the "Green" workers in 2009 section. What is a "Green" Worker? They do at least one of the following: • Increase energy efficiency • Produce renewable energy • Prevent, reduce, or mitigate, environmental degradation • Clean up and restore the natural environment • Educate, consult, or provide another service to support one of the above actions.	Any essential job duties meet green job require-ments, regardless of how much time is spent on them.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Oregon	Oregon Green Jobs Survey	Defined a "green job" as a job that provides a service or produces a product that: • Increases energy efficiency; • Produces renewable energy; • Prevents, reduces or mitigates environmental degradation; • Cleans up and restores the natural environment; or • Provides education, consultation, policy promotion, accreditation, trading and offsets, or similar supporting services for any of the activities identified in this subsection. (Oregon 2012 5)	1. List the job title and briefly describe any major job duties related to green activities. Only list categories where work in green categories was essential to the job in 2008. 2. List any required special licenses, certificates, or other training. 3. Number of green workers in selected wage ranges. Report all workers according to an hourly rate. 4. Total number of jobs that worked in green areas in 2008. 5. Estimate the number of jobs you expect to have working in green areas in 2010.	Work in green categories was essential to the job.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
Pennsylvania	Commonwealth of Pennsylvania Green Jobs Survey	Green jobs are jobs that employ workers in producing or offering products or services that: • Promote energy efficiency • Contribute to the sustainable use of resources or renewable energy • Prevent pollution • Clean up the environment • Promote the reduction of harmful emissions • Provide green education/training, awareness or compliance (Pennsylvania 2010 1)	Pennsylvania defines green jobs as jobs that employ workers in producing or offering products or services that: • Promote energy efficiency; • Contribute to the sustainable use of resources or renewable energy; • Prevent pollution; • Clean up the environment; • Promote the reduction of harmful emissions; and • Provide green education/training, awareness, or compliance 1. Did you provide goods or services in any of the six core areas as listed above? 2. Enter total number of employees for each job title and the main core area in which they work. Choose only one core area per employee. 3. Please estimate how many employees will work in the six core areas as their primary focus two years from now?	Presently in a job related to a core area. Projections of employees primarily focused on each core area in two years.

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
BLS	Green Goods and Services Survey	Jobs in businesses that produce goods and provide services that benefit the environment or conserve natural resources. These goods and services are sold to customers, and include research and development, installation, and maintenance services. This definition will be used in the BLS survey of establishments in industries that produce green goods and services. Green goods and services fall into one or more of five groups: • Energy from renewable sources. Electricity, heat, or fuel generated from renewable sources. These energy sources include wind, biomass, geothermal, solar, ocean, hydropower, landfill gas, and municipal solid waste. • Energy efficiency. Products and services that improve energy efficiency. Included in this group are energy-efficient equipment, appliances, buildings, and vehicles, as well as products and services that improve the energy efficiency of buildings and the efficiency of energy storage and distribution, such as Smart Grid technologies. • Pollution reduction and removal, greenhouse gas reduction, and recycling and reuse. These are products and services that: - Reduce or eliminate the creation or release of pollutants or toxic compounds, or remove pollutants or hazardous waste from the environment. - Reduce greenhouse gas emissions through methods other than renewable energy generation and energy efficiency, such as electricity generated from nuclear sources. - Reduce or eliminate the creation of waste materials; collect, reuse, remanufacture, recycle, or compost waste materials or wastewater.	Your establishment is classified within the following sector: [sector]. Does this worksite produce goods or services that fall into one or more of the following goods and services categories? Please indicate yes or no. [*Please consider the goods and services you product for sale or for transfer within your company. Do not consider internal green practices. If none of the examples match your green product or you are classified under the wrong industry, please explain your green product or service in the 'other' section.]* a. Renewable energy b. Energy efficiency c. Greenhouse gas reduction d. Pollution reduction and cleanup e. Recycling and waste reduction f. Agricultural and natural resource conservation g. Education, compliance, public awareness, and training	Primary

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
		• Natural resources conservation. Products and services that conserve natural resources. Included in this group are products and services related to organic agriculture and sustainable forestry; land management; soil, water, or wildlife conservation; and stormwater management. • Environmental compliance, education and training, and public awareness. These are products and services that: - Enforce environmental regulations. - Provide education and training related to green technologies and practices. - Increase public awareness of environmental issues.		

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
BLS	Green Technologies and Practices	• Energy efficiency. Using technologies and practices to improve energy efficiency within the establishment. Included in this group is cogeneration (combined heat and power). • Pollution reduction and removal, greenhouse gas reduction, and recycling and reuse. Using technologies and practices within the establishment to: - Reduce or eliminate the creation or release of pollutants or toxic compounds, or remove pollutants or hazardous waste from the environment. - Reduce greenhouse gas emissions through methods other than renewable energy generation and energy efficiency. - Reduce or eliminate the creation of waste materials; collect, reuse, remanufacture, recycle, or compost waste materials or wastewater. • Natural resources conservation. Using technologies and practices within the establishment to conserve natural resources. Included in this group are technologies and practices related to organic agriculture and sustainable forestry; land management; soil, water, or wildlife conservation; and stormwater management.	1. Did your location use any of the following green technologies or practices? If yes: 2. Did any of your employees spend any of their time researching, developing, maintaining, using, or installing technologies or practices to lessen the environmental impact of their establishment, or training the establishment's workers in these technologies or practices? a. Generate electricity, heat or fuel from renewable sources primarily for use within your establishment? b. Use technologies or practices to improve energy efficiency within you establishment? c. Use technologies or practices in you operations to reduce greenhouse ga emissions through methods other than those listed in Items 1 and 2, above?	Any of their time

Grantee/BLS	Survey Name	Definition	Core Green Jobs Question(s)	Degree of Involvement
			d. Use technologies or practices to either reduce the creation or release of pollutants or toxic compounds as result of operations, or to remove pollutants or hazardous waste from the environment?	
			e. Use technologies or practices to reduce or eliminate the creation of waste materials as a result of your operations?	
			f. Use technologies or practices in you operations to conserve natural resources? Please do not include using recycled inputs in your production processes.	
			3. Please provide the total number of employees who spent more than hal of their time involved in the green technologies or practices reported in Question 4 in the pay period includin August 12, 2011.	
			4. What are the occupations and wages of the employees in Question 5 who spent more than half of their time involved in green technologies and practices?	

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