

Utility Sector Workforce Development in the Los Angeles Region

Executive Summary

Background

The utility sector has for decades experienced labor market stability due to its strong internal labor markets that assured career mobility by paying strong middle class earnings. As a consequence, it has had little need to revamp its hiring practices, especially for entry level workers who formed the pool of those promoted internally to more advanced, skilled and often management positions. However, the stability of this employment model is presently being challenged by demographic and technological changes in the industry.

The LABC conducted analysis of the growing challenges faced by utility employers in the Los Angeles region. It did so by conducting interviews with representatives of a variety of stakeholders in the utility sector in the Los Angeles region, including among others, employers, secondary schools, and community colleges, and by examining best practices in workforce development. Based on evidence gathered from this research, this report provides further overview of current workforce challenges facing the utility industry and, importantly, proposes solutions based on best practices in the workforce development field as well as on an assessment of the workforce training landscape in the Los Angeles region.

Main Findings

The results of the analysis confirm that changes in the demographic profile of utility sector workers as well as in new technological deployment are challenging the stability of the utility sector's employment model. A rising share of utility workers, especially those with long tenures in many management positions who possess sector specific knowledge not easily transferred, are retirement eligible. To the extent that these workers begin to retire in greater numbers, the utility sector will be increasingly challenged in finding qualified workers to promote to these positions.

At the same time, the analysis shows that the increasing deployment of smart technology will be changing, if not eliminating, traditional utility sector positions that have been important gateway, entry level jobs. Recent reports indicate that nearly 35 percent of jobs in the utility sector will face major impact from smart-grid implementation, meaning these positions will experience more than 50 percent redefinition or elimination of their job duties or responsibilities in the coming years. As a consequence, a potentially growing skills gap of those hired at the entry level, what is required for increasingly more technologically oriented jobs and what is required for promotion to more skilled positions could ensue, putting further pressure on the sector's traditional employment model.

Recommendations

To increase the pipeline of skill ready workers to meet the changing job requirements and realities of utility employers, the findings of the report indicate that educational and training

institutions, utility employers themselves and other labor market and governmental intermediaries must collaborate and network based on mutual benefit. In particular, utility employers should establish stronger links to community colleges, career type high school academies, and to labor market and governmental intermediaries, and additional funding should be secured or made available to help facilitate these efforts.

Utility employers and community colleges should further strengthen their partnerships to successfully impact the work trajectories of low-skilled workers and to meet the growing demand for workers in these sectors. Community colleges share many of the characteristics that have been identified as best practices in the workforce development field, including employer links and relevant and timely skills training. Moreover, many have degree and certification programs in these areas and thus have the capacity to go to scale for this type of training because of their classroom space, buildings, instructor access, and knowledge of state standards.

Link to Community Colleges

Los Angeles Trade Technical College (LATTC) is uniquely positioned to build mutually beneficial partnerships with the utility sector. LATTC's activities and programs regarding utility sector skill training utilize best practice elements. However, LATTC faces capacity constraints in expanding its program to meet student demand and industry needs. These constraints include faculty shortage and lack of funds to buy new, expensive but needed equipment as well as more fixed constraints such as available classroom space and land on which to house skills based practice activities. Additional funding from state or local support could help ease many of these constraints such as by hiring more faculty or providing more physical infrastructure.

However, changes in design or programs within community colleges could help increase the performance and pipeline of potential utility sector workers. Increasing curricular flexibility could allow community colleges to respond more quickly to changing skill demands in the sector and thereby increase relevance of skills acquired in educational programs. Engaging more with employers to promote more relevant externships for teachers could help in this regard as well. Re-evaluating teacher credentials required for instructor employment could provide greater talent pools of relevant and effective teachers to instruct high demand skill based classes such as powerline mechanics. Enhancing student tracking to evaluate completion rates and employment placement and successes of its former students could generate important information about program effectiveness and resource allocation.

Many of these challenges however represent opportunities for LATTC to enhance its programs and outcomes through further employer engagement. To expand relevant programs, LATTC could benefit from utility employers through provision of up-to-date job classifications with an outline of their hierarchy of positions, job descriptions, titles, entry points and training requirements. Utility employers could also assist LATTC by donating used equipment to various training programs, sponsor internships, actively advise on curricular questions, participate in career days, host shadow days, and providing mentorship and externships.

Connect with Career Type High Schools

Utility employers could also benefit in meeting the demand for appropriately trained workers by connecting with local area high schools that are successfully educating workers for technical careers. These career type academies are schools within schools that link students with peers, teachers, and community partners, including employers, to foster skill development and academic success. This is accomplished through small learning communities, a college-preparatory curriculum with a career theme, and partnerships with local employers.

The Los Angeles Unified School District's (LAUSD) version of career type academics is Linked Learning. In it, students select a pathway based on their career interests and graduate from high school prepared to enter a two- or four-year college or university, an apprenticeship, or formal job training. The pathways reflect California's largest economic industry sectors, including Building and Construction Trades and Energy, and Environment and Utilities. Moreover, among others, LAUSD's Linked Learning schools at the Los Angeles River High School and Carson High School (Program in Environmental Science, Engineering and Technology) are in a unique position to forge stronger partnerships with utility employers.

There are opportunities for the utility industry to partner with such schools too. The utilities should target pilot and magnet schools focused on this curricular path and enhance their public image.

The utility sector's presence in such schools is limited, and thus many students have no exposure to the kind of work or type of careers found in the utilities. The high demand and popularity surrounding STEM (Science, Technology, Engineering and Math) education is a unique opportunity to bring the utility sector to light.

Scaling up these programs is well needed but challenging partly because state funding may not be enough. State funding should be increased to help support these efforts (though difficult because of the budget climate) and at the same time an additional way to improve funding availability and grow such programs through increasing capacity is to network with relevant intermediaries in the field, such as the Center for Powerful Public Schools, which serves to incubate such Linked Learning schools.

Establish Networks with Labor Market and Government Intermediaries and Programs

The analysis also finds that connecting with relevant labor market and governmental intermediaries could also be productive in increasing the pipeline of skill ready workers for the utility industry. In particular, broad-based coalitions of leaders from the utilities, business, academia, education, labor, and the non-profit sector could be forged in order to develop specific actions plans to spur such training in region. Such efforts could also lead to coordination of funding programs for workforce training (from private sector organizations, non-profits, private foundations and governments) to better focus and leverage resources for training and to increase the amount of available funding.

Such a network could also serve as an advocate for policy change at the local level. For example, the network could influence sector initiatives at the local Workforce Investment Board (WIB) by leveraging and combining training resources (with those from community colleges for example).

It could also lead to better coordination of training efforts between the city of Los Angeles WIB and CDD Workforce Development Division. This could include efforts that link activities of the Promise Zone initiatives in combination with workforce training activities that will emanate from the newly authorized Federal workforce development act, the Workforce Innovation and Opportunity Act (WIOA).

Workforce Development and the Utility Sector in Los Angeles

Introduction:

The utility industry has experienced long term success in the workforce arena due strong internal labor markets that assured career upward mobility. Historically, entry level employees often recruited out of high school had opportunities to move into more skilled and management positions. In many instances, union contracts reinforced these ladders as utility employers agreed to give preference to their internal network of employees before recruiting externally.

Due to this stability and career advancement opportunities, utility sector employers have boasted a loyal workforce for decades and thus had minimal need for revamping hiring practices. As a result, retention rates for employees across specific companies has been and continues to be high, although turnover and attrition for some positions remain concerns as employees are promoted or relocate to other company sites.

Boasting this stable workforce that provided secure employment paying solid middle class wages for decades, the utility sector now faces several workforce challenges in the coming years related to demographic and technological change. Increasingly, long term, retirement eligible workers, who possess many years of industry knowledge, experience, and strong loyalty, will be leaving the utility workforce, thus presenting a need to fill many important positions. The importance of filling these positions is heightened because, as noted, the utility sector still retains strong internal labor markets such that many middle and senior positions, including many in management, are eventually filled by those once hired at the entry level.

At the same time, hiring at the entry level for many in the utility sector is increasingly challenging partly as a result of technological change. The increasing deployment of smart technology will be changing, if not eliminating, traditional utility sector positions that have been important gateway jobs to long term careers in the sector. Recent reports indicate that nearly 35 percent of jobs in the utility sector will face major impact from smart-grid implementation, meaning these positions will experience more than 50 percent redefinition or elimination of their job duties or responsibilities in the coming years. These changes will result in the disarticulation of traditional internal labor markets and a potentially growing skills gap between those hired at the entry level and what is required for promotion to more skilled positions.

Moreover, many regions, including Los Angeles, do not have a fully mature workforce development system geared towards training a supply of skill ready workers to meet the needs of utility employers. As a consequence, there is no clear pipeline producing a readily available pool of applicants with training in both the "hard" and "soft" skills required to be successful in the industry. In response, employers often must scramble and turn to more ad hoc recruiting and hiring practices or internal procedures that prove more costly because of losses in time and efficiency. This may entail designing, managing and staffing basic on-the-job training for entry level workers such as in the use of general technologies or of hand held tools that in turn pull resources from the utility's core mission.

This report is intended to provide an overview of current workforce challenges facing the utility industry, to propose solutions based on best practices in the workforce development field as well as to provide an assessment of the workforce training landscape in the Los Angeles region broadly. The report examines the demographic and technological challenges facing this sector in meeting its workforce needs, as well as potential solutions to increase the pool of readily identifiable and skill qualified workers to fill employment needs.

In an effort to better understand these challenges and opportunities and to map the current landscape of workforce training programs designed to supply entry level workers to the utility industry, research on best practices in workforce development was conducted including interviews with representatives of a variety of stakeholders in the utility sector in the Los Angeles region. These stakeholders include the following key entities, among others: 1) Employers; 2) Secondary Schools, and 3) Community Colleges.¹ In doing so, the overarching successes, challenges, and opportunities are identified to build bridges and create a stronger and sustainable pipeline of workers.

Based on interviews with key stakeholders in the utility industry, the results confirm that changes in the demographic profile of utility sector workers as well as in new technological deployment are presenting new challenges to the stability of its employment model. A rising share of utility workers are retirement eligible, presenting challenges in finding enough qualified workers to promote to these more senior, skilled positions. Moreover, the increasing deployment of smart technology is changing traditional utility sector entry level positions that have been important gateway jobs to career growth in the sector, resulting in a potentially growing skills gap of those hired at the entry level and what is required for increasingly more technologically oriented jobs.

Utility employers have responded to the challenges internally by increasing in house training through on the job training, apprenticeship programs, and the like. This response however is not sustainable since it is extremely costly to employers with respect to time and resources. Such training requires enormous time to locate and recruit individuals with the appropriate skill capacity and train up their specific and general problem solving skills. This also requires dedicated support staff, resources in practice that are shifted from, or that could be freed up to achieve, the utility's core mission.

These challenges in the changing requirements and realities of utility employment can be met by bringing utility sector stakeholders together to address the barriers to employment facing potential utility workers. To increase the pipeline of skill ready workers to meet the changing job requirements and realities of utility employers, the findings of the report indicate that educational and training institutions, utility employers themselves and other labor market and governmental intermediaries must collaborate and network by forming partnerships and networks based on mutual benefit. In particular, utility employers should establish stronger links to community colleges, career type high school academies, and to labor market and governmental intermediaries.

A Call to Action:

As key suppliers of energy and water in the state and as a key employer in the Los Angeles region, utility employers and other workforce development stakeholders in the region should take action in crafting a workforce approach to ensure the training and recruitment of skilled entry level workers able to meet the changing requirements and realities of utility employment. To most effectively prepare for an adequately trained future workforce from which utilities can successfully recruit, utility sector stakeholders must work together to address the biggest barriers facing potential workers in upgrading their skills.

This is challenging however since in the Los Angeles region there exists no well integrated or articulated workforce development approach to address these concerns. This outcome results partly because, on the demand side of the labor market, the utility sector had little need for investing in elaborate workforce development programs designed to recruit and retain as a result of historically high employee retention along with well-functioning internal labor markets.

This reality is not unique to Southern California. A national survey of the utility sector but focusing on water, conducted by the Water Research Foundation, shows that the majority of utilities are not addressing their workforce issues from a strategic and programmatic approach and have not allocated significant dollars towards these issues since before the 1990s.²

Moreover, on the supply-side of the labor market, potential workers may have found it difficult to gather information about the employment and income benefits of the working in the utility sector since advertisement has not been widely shared – for good reason since from the employer perspective there was little need. As a consequence, such workers may have found it difficult to know what skills are in demand by employers and therefore what skills they should invest in through education or training. Finally, even if this was known, navigating the educational or workforce development institutions to gain these skills may have proven difficult, for a variety of reasons including that there are no clear pathways to support training and career advancement in the utilities sector.

To increase the pipeline of skill ready workers to meet the changing job requirements of utility employers, educational and training institutions, utility employers themselves and other labor market and governmental intermediaries need to collaborate and network by forming partnerships and networks based on mutual benefit. This would entail utility employers establishing links to community colleges, career type high school academies, and to labor market and governmental intermediaries.

Before programmatic solutions to meet the challenges of hiring entry level workers in the utility sector are examined in more detail, the utility sector is explored including its definition as well as a discussion of the current and pending challenges facing it in meeting its employment demand.

The Utility Sector: Some Background

The utility sector encompasses various individual industries and companies involved in energy and water. Formally, the federal government through its North American Industry Classification System (NAICS) documented by the Bureau of Labor Statistics defines the sector as:

1. Electric Power Generation, Transmission and Distribution (NAICS 221100)
2. Natural Gas Distribution (NAICS 221200)
3. Water, Sewage and other Systems (NAICS 221300).³

In California, the sector specifically consists of six Investor-Owned Utilities, twenty-two Electricity Service Providers, forty-six Publicly Owned Utilities, four Rural Electricity Cooperatives, and three Community Choice Aggregators. Southern California and in particular the Los Angeles region is of particular interest as it is home to the four of the largest utility companies in the state as measured by total electricity consumption (in 2014). For example, of the top four utility companies in California, two are located in the Los Angeles region, which is not surprising since it is also home to the state's largest population center:

1. Southern California Edison Company (SCE) with 82,849 million kilowatt- hours;
2. Pacific Gas and Electric Company (PG&E) - 82,840 million kilowatt-hours;
3. Los Angeles Department of Water and Power (LADWP) with 27,628 million kilowatt-hours use;
4. San Diego Gas & Electric (SDG&E) with 17,670 million kilowatt-hours use.⁴

Additionally, in both the energy efficiency and utilities clusters, the Los Angeles region outpaces all other regions in the state, accounting for about one-third of the businesses. This region also places high in the list for number of employees (133,000) and sales revenues (\$33.8 billion). Other regions with a large number of businesses related to the energy-efficiency sector are San Diego, the Imperial Counties and the Inland Empire.⁵

In total, the utility sector employs 552,900 members nationally - a number increasingly facing challenges to maintain as retirement, attrition, skill gaps and new technology affect the traditional workforce.

Workforce Challenges:

Shifting Demographics

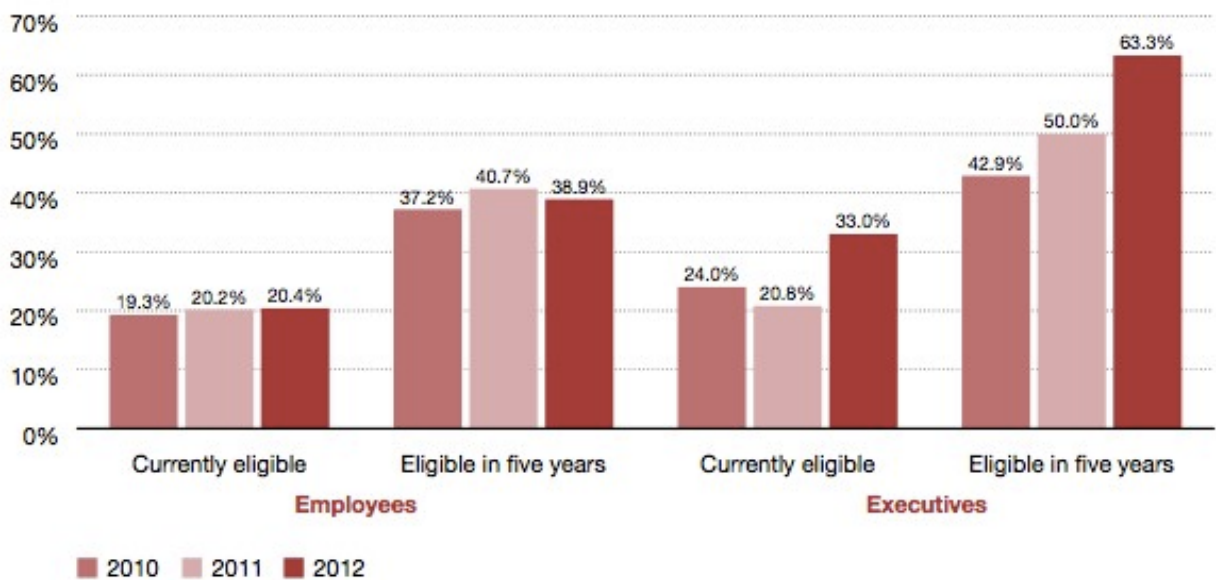
The utilities sector workforce is increasingly composed of decades-long incumbent workers who have acquired a wealth of knowledge and experience. As of 2010, the average utility worker nationally was 46 years old or older.⁶ Further, retiring workers average 24 years of tenure at the same utility.⁷ Finally, a 2011 representative survey of utility employers from Center for Workforce Development (CEWD) demonstrates that between 2006 and 2010 the number of employees age 53 and above has increased, while workers between ages of 18 and 27 have declined.

These changes in the age distribution are driven by many factors including older workers postponing retirement due the 2008 Great Recession along with a lack of available skill ready young, new entrants. However, as economic conditions nationally and in California continue to improve, an increasing share of this workforce is set to retire. More recent national survey results suggest that utilities will need to replace 46 percent of skilled technician positions currently because of retirement or attrition. Approximately 50 percent of the utility engineering

workforce and 40 percent of all utility transmission and distribution workers will be eligible to retire by 2015.⁸

A recent PricewaterhouseCoopers (PwC) report confirms these results as shown in Figure 1. PwC's findings indicate nearly 40% of employees are eligible to retire by 2015. Even more staggering is the rapidly increasing number of qualified executives eligible to retire, reaching about 63.3% by 2017.⁹

Figure 1: Retirement Rates



Source: PwC's Power and Utilities Changing Workforce.

The water sector faces similar challenges of pending high retirement rates. Reports indicate that, nationally, 37 percent of water utility workers and 31 percent of wastewater utility workers will retire over the next decade.¹⁰ This finding affirms those of others, who anticipate that water utilities will lose 30 to 50 percent of their workforce within the next decade.¹¹

These coming demographic workforce changes create a turning point for utility companies precisely because they have had many decades of employment stability. With increasing turnover, particularly among engineers, managers and other employees with specialized skills that are in high demand in other industries, the potential loss of institutional knowledge is deeply concerning.¹²

Replacing these workers will undoubtedly be challenging for the utility industry. Roughly 36% of the U.S. workforce is comprised of millennials, who are least likely and expect not to work at one organization for their entire careers- marking a huge culture change for utility companies.¹³ Other industries have tended to experience higher turnover on a regular basis, so they are more experienced and better equipped in terms of talent acquisition and retention. Utilities, by contrast, will have to rethink human resource approaches to recruitment and retention as they

confront the increasing turnover of newer and high performers, as well as the accelerating loss of executive level employees.

New Technology Deployment:

Changes in technology and their consequences on the type and kind of employment will compound the demographic challenges facing the utility sector. As technology evolves in all sectors, the utility sector is rapidly automating with its introduction of smart grid technologies, potentially requiring a more technically inclined workforce as labor intensive jobs are replaced. Grid technologies are not new, as they emerged from earlier attempts at using electronic control, metering, and monitoring. In the 1980s, automatic meter reading was used for monitoring loads from large customers, and evolved into the Advanced Metering Infrastructure of the 1990s, whose meters could store how electricity was used at different times of the day.¹⁴ Now, smart grid technology, such as smart meters, adds continuous communications so that monitoring can be done in real time.¹⁵

In summary, the current grids will be enhanced with digital processing and communications, making data flow and information management central to the electricity distribution. The digital technology that allows for two-way communication between the utility and its customers is expected to help avoid redundant capital investment in an aging grid infrastructure, reduce costs of electrical disturbances and outages, help achieve goals for greenhouse gas reductions, and drive new economic growth across multiple industry sectors.

The utility industry will thus face three key transformational changes in the near term: improvement of infrastructure; introduction of the digital components - the essence of the *smart grid*; and transformation of business process, necessary to capitalize on the investments in smart technology. The U.S. Department of Energy calculates that internal modernization of US grids with smart grid capabilities would save between 46 and 117 billion dollars over the next 20 years due to the more efficient transmission, operation and management of electricity distribution.¹⁶ In 2009, the US smart grid industry was valued at about \$21.4 billion – by 2014, it will exceed at least \$42.8 billion. Given the success of the smart grids in the U.S., the world market is expected to grow at a faster rate, surging from \$69.3 billion in 2009 to \$171.4 billion by 2014.¹⁷

As a consequence, "smart-grid" related job classifications are increasingly emerging in the utility sector. In particular, the Illinois Institute of Technology conducted an intensive study, evaluating hundreds of Standard Occupational Classifications (SOCs) under the Bureau of Labor Statistics.¹⁸ It classified 104 SOC jobs based on the impact (i.e., major, moderate, or minor) that smart grid technologies will have on typical daily job functions in the utility sector. Of these, they identified over 35 utility related and other jobs (Table 1) facing major impact from smart-grid implementation, meaning these positions will experience more than 50 percent redefinition or elimination of their job duties or responsibilities. In particular, as the smart grid grows more intelligent, the changes in skill sets required relate to both advances in current technologies and development of new applications. The newly emerging systems and technologies allow for remote feedback and control of devices and deliver decision support information for operator action. As a result, the smart grid will create more customer information and choices, requiring

additional systems and skills to facilitate and manage new relationships, including more skilled customer and marketing resources.¹⁹

Table 1: Smart Grid Jobs with Major Impact

Source: Illinois Institute of Technology

SOC	Organizational/Department Job Classifications w/Major Impact (23)
	Managers/Supervisors
11-1021	General and operations managers (includes facility managers)
11-2020	Marketing and sales managers
11-3021	Computer and information systems managers
11-9041	Engineering managers
11-3031	Financial managers
	Field Employees
47-1011	First-line supervisors/managers of construction trades and extraction workers
33-1000	First-line supervisors/managers, protective service workers
43-5041	Meter readers, utilities
47-2111	Electricians
47-4011	Construction and building inspectors
49-2094	Electrical and electronics repairers, commercial and industrial equipment
49-2095	Electrical and electronics repairers, powerhouse, substation, and relay
49-9051	Electrical power-line installers and repairers
49-9052	Telecommunications line installers and repairers
49-9099	Installation, maintenance, and repair workers, all other
51-8012	Power distributors and dispatchers (include system dispatchers)
	Customer Service/Marketing
41-4011	Sales representatives, wholesale and manufacturing, technical and scientific products
43-4051	Customer Sales Representatives
	Business & Support Specialists
13-1111	Management analysts
15-2031	Operations research analysts
	Legal & Regulatory
11-9199.01	Regulatory Affairs managers
13-1041.07	Regulatory Affairs specialists
	Communication & PR
27-3031	Public relations specialists

SOC	Functional Expert Classifications Job Classifications w/ Major Impact (12)
	Engineers
17-2070	Electrical and electronics engineers
17-2071	Electrical engineers
17-2072	Electronics engineers, except computer (includes telecommunications engineer)
	IT/Telecom/Cyber security/Interoperability
15-1061	Database administrators
15-1071	Network and computer systems administrators
15-1081	Network systems and data communications analysts
15-1099.02	IT systems architecture (Computer Systems Engineers/Architects)
15-1030	Computer software engineers
15-1031	Computer software engineers, applications
15-1032	Computer software engineers, systems software
	Architects/Manufacturing/Building Design
17-1011	Architects
17-3011.01	Architectural drafters (include GIS mappers)

Interviews conducted with representatives from the Los Angeles region's utility companies confirm that these changes are already underway in Southern California. In late 2012, they along with many other gas companies began the Advanced Meter Installation Project that consists of upgrading over 6 million gas meters with the new Advanced Meter communication devices in Southern California.

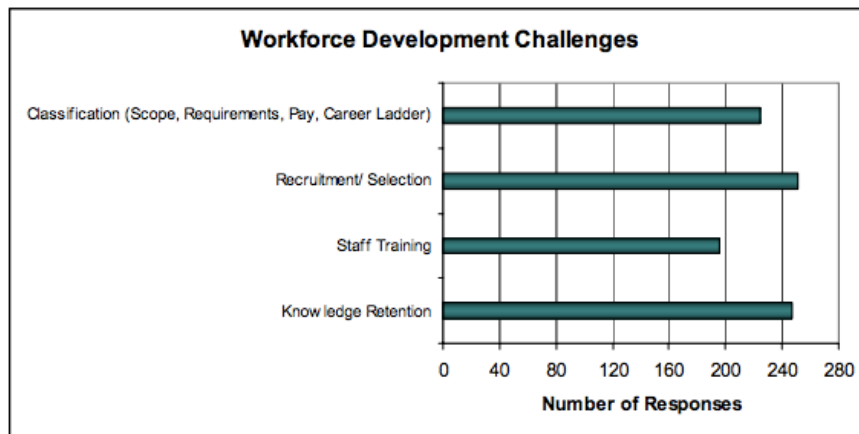
The “smart grid” is also expected to make its way into the water industry. Water services face a similar set of challenges with the need to reduce operating costs, improve service delivery, increase revenue protection, incorporate new sources of information to improve system operations, and optimize information sharing between departments – all of which can be highly mitigated with smart technology.

Skill Gaps & Needs Identified by Utility Employers:

The current and emerging demographic and technological changes facing utility companies will challenge their ability to meet their employment needs. With retiring incumbents and the consequential loss of sector knowledge and experience along with new technological infrastructure upgrades, the utility sector faces a potentially huge shortage of increasingly skilled employees.

Indeed, a national survey of water utility employers about their workforce development challenges bears this out. It reports in Figure 2 that recruitment and selection and knowledge retention are two of the sectors’ major employment concerns.²⁰

Figure 2: Workforce Development Challenges



Source: Water Research Foundation

The employment challenges resulting from demographic and technical change were reoccurring themes in interviews with utility employers in the Los Angeles region. In almost all instances, these shifts result in needs to hire more skilled entry level workers relative to those hired in the past.

The resulting elimination of entry level meter readers as a consequence of smart meter installations, for example - the most prominent entry level positions to the gas utility that require only basic skills, results in a greater need to hire from more highly skilled labor pools. That is, meter readers were truly entry level positions suitable for high school recruits, requiring little prior aptitude or knowledge. With the position displaced, utility employers seek to recruit for the next lowest position such as construction tech - a position requiring more basic knowledge of

construction and handheld tools. Because pre-requisite skills are now more demanding, utilities must often transition employee recruitment to different sometime external sources, which can increase costs through losses in recruitment efficiency. That is, it is more challenging and therefore more costly to find applicants with good mechanical and hand held tool skills. Yet, such skills are increasing in demand.

Recruiting new workers with the right technical and managerial skills is not the only issue utilities face. In addition to the shortage in the number of workers to recruit and the need for updated recruiting methods, interviews with utility employers also indicate that the increasing risk of critical knowledge loss from retiring employees or other exits is a serious concern. There is a high possibility that exiting workers will take a wealth of institutional knowledge with them into retirement, resulting in a potential double loss - loss of employees and “what they know.”

Somewhat more troubling is that these replacements are for newly emerging entry level positions and do not account for newly emerging positions created by automation and new technology deployment such as grid-modernization. KEMA, for example, estimates that close to 140,000 permanent new jobs will be created post Smart Grid Deployment, many requiring advanced skills and degrees.²¹

Paradoxically, “soft skills” – those “extra” skills in addition to hard skills embedded in workers such as, among others, the ability to get along with others, communicate, or understand and execute workplace culture broadly defined - will also be of concern to utility employers despite the increasing demand for more technical skills. Interviews with utility employers in the Los Angeles region also revealed that “soft skills,” or the lack thereof in many recruits and applicants, were of serious concern and limited employers ability to hire, even if applicants possessed an acceptable level of technical aptitude. While some employers did reveal cognitive ability testing as a hurdle in hiring entry level workers, many cited “soft skill” deficit concerns over resume and interview presentation and performance including professional appearance, interpersonal interactions skills, and unfamiliarity with workplace norms and customs as barriers to employment.

Below, promising training and education approaches that are addressing many of these skill challenges facing utility employers are identified and examined. Before doing so, it is also worthy to note that utility employers identified other workforce challenges that go beyond the problems of skill training and performance concerns. The first relates to the potential loss of gender diversity as a consequence of skill shifts. Employers cite the real quandary of losing female worker as a consequence of disappearing historic gateway entry level positions – for example, in the gas company shifts from meter readers to construction techs. Historically, meter readers had greater female representation whereas over ninety percent of those with construction tech credentials are male.

The other includes being located in one of the most expensive housing markets in the country. With the soaring cost of living in Los Angeles, low and mid-tier employees hired in Los Angeles proper often apply for relocation (within the same utility) to suburban locations where the cost of housing is cheaper. While these employees stay with the company and thus do not affect company retention rates, filling high turnover entry level positions in the Los Angeles proper area

becomes challenging and therefore costly. While this concern is beyond the scope of the current report, LABC is currently engaged in a number of projects and activities aimed at directly addressing these housing affordability issues.

Building a Workforce Development Network for Utility Employment:

1) Connecting to Community Colleges

As many utility employers begin recruiting more skilled (than in the past) employees externally, it would be beneficial to connect with community colleges to partly fulfill their hiring needs. In addition, expanding the role of community colleges (and other workforce development networks in the region that connect with these institutions) will be key to successfully training workers for utility sector jobs. This is partly because community colleges have the capacity to go to scale to train the increasing number of workers that will be needed to successfully impact the work trajectories of low-skilled workers and to meet the growing demand for workers in these sectors. Many already have degree and certification programs in these areas, and they have the classroom space, buildings, instructor access, and knowledge of state standards to ramp up fairly quickly to meet the growing demand for workers in these sectors.

This is also partly because community colleges share many of the characteristics that have been identified as best practices in the workforce development field. These best practices include employer links, relevant and timely skills training, and ability to network and collaborate with other, complimentary training institutions. All of the most successful training programs share all or most of these characteristics. The two that are most relevant to community colleges include the ability to successfully incorporate employer input, and to successfully train for relevant and timely skills.

Employer Links

Workforce development programs with links to employers have shown more success in raising employment, retention and earnings levels than those programs without such connections (Bliss, 2000; Melendez and Harrison, 1998).²² The greater success of these training programs is likely attributable to a number of factors. First, training providers or educators such as community colleges with employer involvement are more likely to have current information on work standards, skill requirements and state-of-the-art technologies of jobs, and therefore more likely to meet employers' skill needs.

Second, such programs provide employers with incentives to hire program participants. Employers involved in training programs are likely to reduce their search and training costs because of greater access to an appropriately trained labor supply.²³ Thus, all of these factors are likely to lead to greater placement and employment rates, wages, and retention for participants trained in programs with employer involvement. At the same time, firms that participate in external training programs also benefit through increased productivity, increased profits through lower search and training costs, and greater retention of employees.²⁴

Relevant and Timely Skills Training

Given the rising skill requirements of jobs, and state standards and certificates that are and will be required for many utility jobs, relevant and timely skills training seems mandatory to successfully link entry level workers to jobs. But actual training in relevant skills has historically been absent in previous employment and training models. In many ways, employer involvement in training will help agencies overcome this absence and accomplish relevant and timely training.

The establishment of standardized curricula for various skills sets is another way to effectively train workers in relevant skills. Mature occupations are usually defined by skills standards, which are used to establish consistent information about the set of skills required for particular jobs. The National Skills Standards Board defines these standards as “performance specifications that identify the knowledge, skills and abilities an individual needs to succeed in the workplace.”²⁵ Hence, standards allow employers, trainers, and educational institutions to determine the exact skill requirements of jobs. Once established, standards allow job trainers to develop curricula to train workers in specific skills, and by definition such training should produce somewhat consistent skill outcomes across different training sites.

This consistency of training allows programs to certify their program graduates, which plays two roles. It provides employers certainty about the bundle of skills that the potential worker possesses and it also provides the potential worker with a marketable credential.

The timing of skills training is also an important factor to consider. The literature indicates that training in “hard,” in addition to “soft,” skills before job placement produces the greatest positive effect on job retention.²⁶ Presumably, training before placement in employment or internships led to greater familiarity with the computer skills and components, which in turn led to greater confidence and ability on the subsequent job.

Los Angeles Trade Tech College: An Exemplar

The research identified Los Angeles Trade Tech College and its programs as embodying many of these best practices in workforce development, and utility employers should continue to build partnerships with it to ensure a steady pool of well qualified potential applicants. Founded in 1925, Los Angeles Trade-Technical College (LATTC) is the oldest of the public two-year colleges in the Los Angeles Community College District. It offers academic courses towards four year colleges and numerous vocational programs including associate degree and certificate programs. The college is unique in that approximately two-thirds of its instructional facilities are devoted to career education.

LATTC programs related to the utility sector include: *Building Construction Techniques, Electrical Construction & Maintenance, Electrical Lineman, Engineer-Operation/Maintenance, Plumbing, Refrigeration & Air Conditioning Mechanics, Mechanics, Solid Waste Management Technology, Street Maintenance, Supply Water Technology, Wastewater Technology, Welding Gas and Electric*. Of these programs, the Electrical Lineman apprenticeship programs appears modestly successful, because it is industry-aligned and provides a consistent pipeline of well-trained students from which local municipal utility companies hire. The apprenticeship allow students to earn and learn simultaneously, mandating an employer-sponsored job component.

The apprenticeship program is best deployed when there is an intensive on the job requirement and it helps alleviate the need for intensive in-house employer training programs.

Trade technical colleges appear to have programmatic, funding, human resource and student background challenges that limit their effectiveness in producing skill ready workers for the utility industry. Trade Technical colleges, such as LATTC, do have the advantage of much more flexibility and leniency in terms of curriculum and courses offered as compared to high schools and four year universities. One of the more successful policies is the state requirement to have employer-advisory committees for any career technical/non-academic program to ensure the training provided is industry relevant. LATTC actively invites all utility sector employers to participate in these committees to enact curricular changes as skill demand changes in the industry. Moreover, changing curriculums is much more feasible than creating a whole new degree or certificate programs, which for a variety of reasons can take up to two years to finalize (with the risk of being obsolete in the near future). Still, because skill demands and job requirements are changing rapidly in the utility sector, more curricular flexibility will allow community colleges to respond more quickly to these changes, thereby enhancing curricular relevance. So too would engaging more with employers to provide teachers with externships to update current knowledge of the field.

LATCC appears to also face a capacity constraint in expanding its program to meet student demand and industry needs. These constraints include faculty shortage and lack of funds to buy expensive, new equipment as well as more fixed constraints such as available classroom space and actual electric poles that are used for training. Additional state funding could help alleviate these constraints but such funding increases are uncertain in the current budgetary environment.

In additions, students' socio-economic backgrounds limit the extent to which they can enroll or finish well regarded apprenticeship programs. Apprenticeships are high in demand by students because they make learning much more relevant and applicable to the students. Students in solely academic certificate programs often drop out of their programs to take on full-time work due to economic hardship, family struggles, etc. Moreover, when the economy is strong and positions in the utility sector are more available, they may decide to leave school early to capitalize on such opportunities, whether or not in the long run such decision payoff economically. LATTC's Earn & Learn program, which allows students to earn money on apprenticeships as they matriculate through the degree/certificate program, helps mitigate this concern by providing financial means to continue their coursework as well.

Academic preparedness and adequate funding streams appear to influence LATTC's effectiveness. LATTC's ability to successfully train students in these skill sets is limited by the core competencies that students bring to community colleges more generally. Because students are not required to have a GED or high school diploma to enroll in trade-technical college courses, the schools receive students from a wide range of educational backgrounds. Consequently, it is a challenge to adequately gauge and teach certain core competencies including critical thinking, communication, reading and writing that traditionally are taught through a systematic twelve year curriculum. Trade-technical colleges often struggle to successfully incorporate such skills into their coursework because it is beyond their educational mission.²⁷

The limited ability of many trade-technical colleges such as LATTC, to systematically track their students post-enrollment also limits their ability to evaluate the effectiveness of their program and gather information about what programmatic changes are needed to insure success. It would be extremely beneficial to know what industries and companies students are going on to work for and for how long, and whether they were adequately trained. Moreover, there are no alumni associations or resources dedicated to acquiring this information.

Trade technical colleges receive limited funding from public and state sources and external grants come and go, so steady streams of funding sources to upkeep or expand current capacity are consistently needed. The challenge lies in finding reliable local dollars and investments from foundations and businesses that are willing to view community colleges as a guaranteed return on investment for future workers. Meanwhile, as alluded to, employers' investment in external training programs can often mitigate or counterbalance their search, recruitment and training costs.

Despite these challenges, there are opportunities to enhance LATTC programs through further employer engagement. Community colleges, such as LATTC, would like to see clear job classifications from employers, with an outline of their hierarchy of positions, job descriptions, and training requirements. This allows trade-technical programs to direct their students to the different positions and careers they can pursue upon completion of various courses or to enhance curriculum as needed.

Moreover, a key constraint in expanding programs to meet the student and employer demand is the cost of buying the latest technology and equipment. To expand the available workforce, it could be helpful for utility employers to donate used equipment to various training programs at both the college and high school level. Finally, employers could further invest in high school and community college education by sponsoring internships, actively advising on curriculum relevance, participating in career days, hosting shadow days, and providing mentorship. In doing so, LATTC and other community colleges can forge partnerships that place graduates directly into entry level positions at the utilities thereby reducing employers search costs and increasing returns on LATTC's return on investment.

These benefits can be clearly seen from an examination of LATTC's Powerline Mechanics Training program. This program teaches basic skills needed to be successful trainees for electrical-related career ladders. These skills include: overall safety considerations, power pole climbing skills, knowledge of the basic tools and materials involved with the electrical line crafts, general construction standards, basic rigging principles, and basic electrical theory that is specific to this trade. A 175 hour power pole-climbing certificate of completion is granted to students who successfully complete the course.

The Powerline Mechanics Program has had much success in training and placing workers in entry level jobs across utilities because of its hands on training and direct links with industry employers. In addition, this success can be attributable to the qualities of the instructor. Instructors who have had long careers in the utility industry and therefore have strong ties to

potential hiring pipelines are in a unique position to forge these educational-employer partnerships.

The success of this program in training and placing workers occurs even though program recruits are oftentimes relatively recent high school students with minimal experience in mechanics. Interviews with the instructor of the program reveals that this is challenging because very few high schools offer auto shop or other mechanical courses and students are not supplementing this knowledge elsewhere (i.e., home), especially in more urban areas. As a result, students are not aware of the physically demanding nature of the powerline training course. Somewhat more problematic is that increasingly people in their thirties and forties are looking to enter the utilities sector at the entry level through these programs, but the labor intensity of the training deter them from either completing programs or exiting the utility industry prior to being promoted to management levels.

Raising awareness in high schools could help mitigate these concerns. Career pathway programs in high schools should be provided more awareness and instruction in regards to requirements, physical intensity, and workplace culture of utility jobs. This will help recruit students who are more confident and committed and prepared to enter the career pathway.

While such programs have demonstrated some success, challenges remain. Among them is a shortage of qualified faculty. As mentioned, community college administration boards have increased eligibility requirements for instructors to teach such courses. Many community colleges including increasingly LATTC require at least an Associate's degree and oftentimes a four year degree or more, thereby screening out many potentially effective instructors. Many industry employees could be good candidates to teach such classes but do not possess an advanced degree. Such instructors may have long tenures within the utility industry resulting in deep knowledge about job requirements and industry standards, but were hired at the time when advanced two or four year degrees were not required.

Community colleges at LATTC and elsewhere will need to find qualified and experienced faculty to teach such courses. Considering the current shortage of candidates with degrees, it may be beneficial to allow certain exemptions for college credentials and as an alternative consider use of equivalent criteria such as such as years of industry experience or depth of knowledge could be useful in expanding the field of potential instructors.

LATTC is one of the few community colleges in the Los Angeles region poised to expand training and education of students with requisite skills for the utilities industry. Previously, the Verdugo Power Academy located at Glendale Community College (GCC) also provided a steady pool of trained workers from which many regional utilities recruited. The Verdugo Academy however was unique as it emerged as a result of grant funding under the Obama Administration through the U.S. Department of Energy (DOE). As part of its grant making for the Smart Grid in the Recovery Act, \$100 million was designated for workforce training.

Out of this grant, with matching funds from the Glendale Department of Water and Power, the GCC received funding to train in three curricular areas leading to an Electric Utility certificate. A 600-hour training program for utility workers was developed and its curriculum was one of the

few Workforce Investment Board (WIB) sponsored and community college-developed utility training programs in the country. The WIB recruited unemployed workers and provided job placement while GCC provided the educational training.²⁸

Increasing the number of quality degree/apprenticeship programs like that at LATTC and other community colleges would add to the pipeline of well trained workers for the utilities industry. However, it is difficult for other community colleges to duplicate LATTC's successful programs in this regard due to a number of barriers including large financial investments, land availability to replicate working in the field (e.g., erecting electrical poles), finding qualified faculty, and navigating curriculums, among others. Much more should be done at the state, community college district levels and at the colleges themselves to reduce these barriers to entry in developing and providing degree or apprentice programs that meet the growing demand for skills in the utility sector.

2) Connecting to Career Type High School Academies

Utility employers could also benefit in meeting the demand for appropriately trained workers by connecting with local area high schools that are successfully educating workers for more technical careers. In interviews, many utility employers in the Los Angeles region indicated that they had little to no formal relations with any high schools, in part because there was little need. However, with new requirements for mechanical expertise and behavioral excellence in the workplace, such partnerships could prove mutually productive.

Career type academies are a prime example of the career technical programs that reflect promising alternatives to address these new skill realities in labor markets that could help utility employers meet the demand for rising skills in the industry. Career type academies are schools within schools that link students with peers, teachers, and community partners, including employers, to foster skill development and academic success. This is accomplished through small learning communities, a college-preparatory curriculum with a career theme, and partnerships with local employers.²⁹ In career type academies, groups of students typically take the same classes together in each grade, and stay with the same group of teachers for at least two years.³⁰ Thus, career academies can be thought of as a relatively intensive version of school-to-work programs, taking more seriously both integration with the workplace and work-based learning, compared with intermittent programs in comprehensive schools.

The evidence points to some beneficial effects of career academies, and suggests that there is rather compelling evidence that participation increases education and employment. This approach is growing in California as it has been moving towards a "multiple pathway" approach to high school curriculums that features career type academies. That is, schools must prepare students to be adaptable within a changing labor market that increasingly relies on problem-solving skills, and also prepare students academically and qualify them for higher education. This approach can engage students and keep them in school by providing concrete links between schooling and career options.

Academies can prepare students for multiple trajectories and changes in skills in the changing labor market in part through an experiential learning curriculum that allows for reflection and

problem solving in the classroom. Moreover, if designed appropriately, career type academies can provide incentives and the institutional structure for students to move seamlessly in and out of training and school over a career lifetime. The design features that are most relevant include the ability to successfully link to appropriate employer networks, and to successfully train in relevant and timely skills.

An industry exemplar for the utility sector that is creating a stronger pathway from high school to a vocational career is the health sector. Employment in the health sector is increasing regulated by state certificates that provide clear job descriptions and skill sets required to perform tasks. Internal job ladders are also increasingly well specified so that workers can move vertically seamlessly up the industry ranks. As a result of this, career type academics have emerged that successfully trains students for these industry skills, including creating links to community colleges to further training. The most noteworthy of these is the Palmdale High School Health Careers Academy, which serves mostly low-income, at-risk students. Its success is tied to its combination of academic focus with clinical instruction. Its program integrates medicine and technology into common core subjects such as English, Science, etc, while involving students in advanced learning projects, job shadowing, and internships. Students graduate with a-g course requirements fulfilled and thus meet qualifications for entrance into CSU and UC. The success of the clinical side of the program is tied to its success in building bridges with local employers in the health field.

California is a leader in this regard and helps fund these academies through its California Career Pathway Trust Fund, which provides funds to school districts on a competitive basis to set up career technical information to be infused into curriculums through sector alignment with current industry standards. Passed in 2007-08, Assembly Bill 2855 directs the Superintendent of Public Instruction to issue grants (about 155 per year) that establish partnership academies in high demand/growing industry sectors in each of the states' nine economic regions.

There are funds available from the State of California for planning tech career academies through the California Partnership Academies (CPA) out of the California Department of Education. The state of California has committed approximately \$2 billion to help schools and regions establish and expand the career technical pathways. This has resulted in growth in the number of school districts across California that are offering or planning these academies. In the Los Angeles school district, career type academies have taken the form of Linked Learning. The recent increase in investments has allowed for a few pilot schools to emerge and these schools will provide the gateway for future investments depending on outcomes and success of these models.

The Linked Learning program is a framework designed to create a personally relevant and engaging experience for the students by bringing together "*strong academics, demanding career technical education, real-world experience and integrated student support systems.*"³¹ The curriculum used in Linked Learning takes a different approach from traditional high school curricula. Students select a pathway based on their career interests and graduate from high school prepared to enter a two- or four-year college or university, an apprenticeship, or formal job training. The pathways reflect California's largest economic industry sectors, including Building and Construction Trades and Energy, and Environment and Utilities.

That is, it is built on a combination of academic focus with clinical instruction. Students in Linked learning programs graduate with a-g course requirements fulfilled and thus meet qualifications for entrance into CSU and UC, and thus they graduate with the full range of post-secondary educational options including two to four year universities, apprenticeships and certification programs. Moreover, the success of the clinical side of the program is tied to its success in building skill sets that meet the demand from employers in fields growing in importance and opportunity.

Los Angeles River High School: Learning Academies Helping Meet the Demand

The Los Angeles River High School is a good example of a Linked Learning school in LAUSD that has potential to increase the pipeline of well trained workers for the utility industry. The Los Angeles River High School is an environmental science school on the campus of Sonia Sotomayor Learning Academies in Northeast Los Angeles. The school strives to offer an engaging and rigorous education that includes strong academic focus, career preparation and focused Environmental Science, Sustainable Agriculture and Visual Arts programs. In cooperation with business partners, community agencies, colleges and families, LA River High School's goal is to foster in students a deep understanding of the challenges facing the environment and helps students acquire the intellectual and practical skills to go out and act as community builders and stewards of the environment.

The River High School is built on the Small Learning Community (SLC) model. This model converts large high schools into several subdivisions, focused around a particular topic area or career path and/or become autonomous schools with their own administration and budget- thus loosening the bureaucracy for change to occur.

The Linked Learning curriculum, which includes input from many partnerships with community organizations and local industries, has provided many real-world, project-based opportunities for its students. Students work directly on developing projects, researching careers and colleges, observing business meetings, and participating in internships, among other activities. This integrated curriculum begins in the first year where students are exposed to industry through career days and field trips. In the sophomore year, students spend time job shadowing real workers in the field, and in their junior years they apply and complete for internships. By their senior year, many are defining project based work that is ultimately demonstrated through portfolio building. Along each step, students have experienced mentors, counselors, and coaches, many whom are recruited from industry to assist in this regard.

Securing industry opportunities and forming a pathway reflective of the four linked learning elements (awareness, exploration, preparation and training) has been more successful in some industries than in others. While many SLC high schools have formed pathways and academies dedicated to engineering and the environment, their curriculum and projects incorporate very little knowledge about the utility sector. Community gardening, robotics and other national buzzwords have received the most momentum and interest, while the utility sector's relevance and career opportunities continue to be underrepresented.

While SLC schools are on the rise and desired by many educators, the capacity to scale up this approach and transition the many high schools in the urban and suburban areas will continue to be a challenge. Because SLC schools are primarily located in residential zone districts that do not offer zones of choice, many students in the Los Angeles region are left at a disadvantage regarding access. Additionally, successful career academies embed all elements of awareness, exploration, preparation and training to best prepare students for the workforce. A simple career day is not enough, and thus incorporating all four aspects along with garnering the necessary financial investments, qualified teachers and community organizations necessary to scale up the SLC approach will continue to be a challenge.

Going forward, there will be opportunities for the utility industry to partner with such schools. For a variety of reasons, the utility sector lacks a significant presence in the high schools, with most students having no exposure to the kind of work or type of careers found in the utilities. The high demand and popularity surrounding STEM (Science, Technology, Engineering and Math) education is a unique opportunity to bring the utility sector to light. By aligning themselves with the STEM/STEAM movement, utilities could be able to target pilot and magnet schools focused on this curricular path and enhance their public image from an unknown industry to a challenging, problem solving one of opportunity.

Scaling up these programs may be challenging however. State funding may not be enough to sustain or expand SLC schools in the region and local investments will be necessary to continue widespread impact. One way to improve funding availability and grow such programs through increasing capacity is to network with relevant intermediaries in the field. Intermediaries may include local educational non-profit organizations that research and track student outcomes or train teachers, science and technology companies who will sponsor internships, and/or private foundations and charities that will donate money for necessary equipment.

One way to move this work forward is to identify the regional non-profits in this area and begin a series of convening and planning meetings/workshops that might help high schools and other interested parties compete for state funds with utility training in mind. This convening function could also help fuel the network of those institutions interested in building career tech academies that will push the current work forward in utility training to more closely tie in to employer needs in the utility industry.³²

The Center for Powerful Public Schools: Incubating Career Tech Schools

The Center for Powerful Public Schools (The Center) seems positioned to help play this role. It is an education-focused non-profit intermediary located in Los Angeles that provides services to develop, implement and sustain personalized, high-performing schools that advance public education and ensure student success. The Center has partnered with the Los Angeles Unified School District to aid in the planning and implementation of their Linked Learning programs. It does so by capturing additional grants and then directing that money to the schools, granting them a larger reservoir of funding. They also use their networks with industry to recruit experts that assist with developing curriculum, and to help staff many important positions required by the Linking Learning communities such as coaches and mentors, who in turn help identify and build a portfolio of potential internships that students must experience and complete.

The Center also provides resources to public schools that they are often not able to receive including certain external grants, and the capacity for research and lobbying to improve education outcomes. It thus acts to incubate the Linked Learning academies until they are able gain self sufficiency. Given state funding to help schools and regions establish these pathways, the Center thus represents a potential partner and intermediary that can help bridge gaps between schools and industry.

One exemplar of the Center's work is found at Carson High School, an LAUSD school with a focus on Environmental Science, Engineering, and Technology. The goal of this Linked Learning program is to provide career and continuing education through collaboration with industry. It seeks to prepare students in technical training and academics for competitive workforce in STEM related fields through its applied academic curriculum. Carson High School will be a valuable resource in recruiting appropriately trained workers for the utility industry becoming part because of its sheer size, having almost 400 students graduate from the program annually. However, the challenges that the Center faces in incubating the program until it achieves independence is that it suffers from shortfalls in staffing capacity that prevents it from successfully providing work readiness programs for all students.

Utility companies could play a beneficial role in helping schools like Carson (and also the Center) meet these staffing challenges in ways that could be a win-win for the utilities and for the schools. They could offer high school internships to fill this need. On the one hand, this would supply the utilities with a consistent pipeline of well trained workers from which to recruit if such internships are successful. On the other hand, the high schools would benefit by easing staffing requirements to do such work readiness on site.

In doing its work, the Center has identified a number of challenges in building utility related career curriculums. While utilities represent one of the 15 industry area foci, very few schools have formed pathways and curricula dedicated to the specific needs of the utility sector. School projects and involvements are still highly focused around the environment, engineering and robotics realm, especially in the Los Angeles area.

In their experience, LAUSD has faced challenges in securing engineer-related internships, as local municipal companies have limited positions suitable for students. This is in spite of the view that internships have been key for students to apply the material learned in classrooms to the real world, and as a place to understand what the industry culture is really like. Internships have often been essential in solidifying students' career paths.

Similar to concerns among community college experiences, The Center also notes that including course or project work that address "soft" skills is challenging. While the Linked Learning framework is structured differently for each grade level, the curriculum faces a challenge in terms of where in the pipeline softer skills and core competencies such as writing a resume, interview skills, behavior in the workplace, among others, should be placed. These skills are difficult to incorporate and test in a classroom setting, particularly since it is often up to each teacher's discretion. Because much must be taught in the curriculum regarding academic and

more technically specific skill sets, such training often gets low priority. Finally, gender diversity remains elusive for STEM related pathways.

For both community colleges and high schools, the best practice literature indicates that soft skill development can be incorporated into the curriculum through “student engagement” – a student’s activity level in the learning process. The role of student engagement activities is to integrate soft skills development in the classroom and campus life through the practice and feedback of specific skills such as: communication, teamwork, reliability, and discipline. Some of this can be accomplished through students demonstrating their knowledge related to course outcomes in any number of ways, including presentations, leading discussions, writing papers, taking exams, or group projects. Moreover, there are effective programs to teach faculty how to incorporate soft skills into the classroom through their lesson plans that can be adopted.³³

Still, The Center and others like it can and do play an important role in transforming high schools and incubating career tech programs. Many high schools, especially those in the Linked Learning framework, are realizing the importance of having industry relevant curriculums. They thus have incorporated an advisory role for employers, but they could be strengthened to maximize effectiveness. However, as The Center indicates, the advisory roles are not highly influential, and so it is important to strengthen this relationship by having a wide variety of sectors, including the utilities represented. Employers should be able to make relevant and impactful changes to curriculum and the layers of bureaucratic roles need to encourage and embrace these changes.

Career type academies could thus play an important role in building the pipeline of well trained workers from which utility employer recruit. And even if that recruitment is not fully successful, they will still play an instrumental role. This is partly because most of the community college and workforce development programs require applicants to have at least a high school degree (especially in those jobs that are more technical) or its equivalent. Thus, raising high school completion rates, especially for vulnerable populations, will be particularly vital to significantly improving their attachment to jobs in these targeted industries.

3) Connecting to Relevant Labor Market and Governmental Intermediaries

Connecting with relevant labor market and governmental intermediaries could be productive as well in increasing the pipeline of skill ready workers for the utility industry. This is because there will be many potential applicants for utility focused training programs or employment that will fall outside the system of high school career type academies and community colleges. Many will not have the requisite academic credentials to access many of these training programs in utility jobs nor will they have the skills to successfully compete even in the low to moderate skill job market. For these workers, additional training support must be addressed in addition to the skills challenges described above.

The literature and interviews with utility employers indicate that in addition to improving hard, job specific skills, there are other important dimensions that must be addressed including soft skills. These factors serve as “extra” barriers to work and if not addressed will limit current and future employability of those groups about which we are most concerned.

Networking and Collaboration among Training Providers

As already noted, the best practice literature in workforce development indicates such programs should include employer links and relevant and timely skills training. It is also important that they expand the networks of collaborators in the areas for which institutions and programs are training. This is because no single organization, such as a community college or high school, has the internal capacity (size, resources, equipment, facilities, access to clients, expertise, among other factors) to complete the training process from beginning to end, and thus collaboration is important for training success.

Moreover, collaboration may be effective when organizations appear to be encroaching on other's "territory," either in geographic or program area (Harrison and Weiss, 2000). Indeed, recent evidence supports the hypothesis that networking makes a positive difference for organizational and participant outcomes, though networks with other job development intermediaries seem more effective than collaborations with government or social service agencies.³⁴

There are a number of national examples that illustrate these points. For jobs initiative employment programs in both the St. Louis and New Orleans, community based organizations (CBOs) and community colleges partnered to accomplish their training goals. In both initiatives, community colleges conducted the "hard" skills training because often the CBOs did not have the expertise, capacity or the resources and equipment to conduct the training themselves. However, the community colleges gained from these partnerships as well because they benefited from the additional participants received from referrals from these CBOs, which usually have deep roots in disadvantaged communities, and from the additional "soft" skills training that CBOs conducted.³⁵

Another way to accomplish this is to contract with other training agencies that have proven track records of successfully training workers in relevant and timely skills. For example, in the Casey Foundation's St. Louis Jobs Initiative, the Better Family Life (BFL) community based organization CBO, which was responsible for coordinating training efforts as part of this initiative, approached the local St. Louis Community College to conduct its training because of their success in doing so in the past and their larger facilities and better equipment. This led to the creation of the WorkLink program, whereby BFL concentrates on "soft" skill and other pre-employment training, while the community college trains the "hard" skills set.³⁶

Another approach could be to collaborate with unions. In other sectors, such as the green job section, unions are increasingly providing workforce training. In the Los Angeles area, the International Brotherhood of Electrical Workers (IBEW) Local 11 operates a 144,000 square foot training center in the city of Commerce where they train a steady state of about 500 people for jobs in the green sector.

This is a five year apprenticeship program that specializes in the secure building trades, and their training is geared towards general electrical skills that can applied and adapted to current and changing skill demands in the green economy. This includes technologies related to solar, wind

and geothermal installations as well as general electrical skills, pipe fitting and water heater installation skills. Trainees spend about 8,000 hours in on the job training and class room training, and if successfully completed earn the equivalent of an AA degree along with a state license for the electrical trades. Thus, successful candidates are also eligible to transfer to 4 year colleges and universities if they so choose.

The issue for IBEW Local 11 is that they do not have enough capacity (i.e., training slots) to meet demand (i.e., interested applicants), and because of changing technologies in the green sector, they need assistance in training for the technical side of the program too. About 100-150 potential applicants line up every week to apply for the program but only a few of them are selected for the training program. To be admitted, applicants must take and successfully pass a basic exam, and must have a high school diploma (or GED), a California driver's license, and at least one year of high school algebra. These requirements insure that candidates will successfully complete the program, and mimic what job tasks trainees will likely encounter while working in the technical greens sector economy.

Training is geared towards both general and specific skills and is focused on training workers for the changing technologies that characterize jobs in these sectors. For example, while workers are trained for such things as solar panel installation, they are also trained for roof installation. The reason being is that industry experts predict that within five years, roofing materials will include solar panel receptors thus making solar panel installation a thing of the increasing past.

One way that local community colleges and utility employers can expand their capacity and enhance the range of state certificates they train for is to build collaborations with local unions for all the reasons mentioned above. This could spur developments of training program that meet specific state certification standards for specific utility industry jobs.

These kinds of partnerships were beneficial to the success of community technology centers (CTCs) whose concept emerged a decade or so ago to close socio-economic gaps in access to digital information. Many CTCs moved into more formal technical job training by partnering with larger training institutions, such as community colleges, because of their size and expertise.³⁷ As these programs evolved, and as the goals for their training programs grew to include "soft" skills training, many CTCs looked to partner with other non-profits that had expertise in conducting such training.

Collaboration will thus play an important role in moving the work forward of building a pipeline of well trained workers for the utility industry. This will entail building networks of community college and high school career type academy providers and programs, and other institutions doing such training or with access to workers who may demand such training, such as unions and relevant community based, non-profit organizations. This would involve doing more work to identify the other stakeholders in the areas of training for utility jobs and to provide support to facilitate the growth and functioning of these networks.

This effort could likely reap huge rewards since funds could be leveraged in the most cost effective way. Funds could go to organizing and network activities in addition to the training itself. Training is already being provided by a number of entities, but lack of coordination and

collaboration with complimentary partners limits the impact of this training. Small investment in maximizing this coordination could thus have big payoffs and be highly cost-effective. This could entail convening conferences or funding of staff within growing networks who could then be charged with bringing partners together to grow the number of training programs at community college that focus on utility jobs.

The Obama Administration has to some extent understood the importance of these factors in preparing workers, especially disadvantaged workers, for jobs of the future more broadly. As part of this recognition, under the ARRA, it provided up to \$750 million towards job training efforts in high demand sector training through its Pathways Out of Poverty grant. These grants ranged from \$3 to 6 million for national grantees and \$2 to 4 million for local grantees. In Los Angeles, both the United Way and the Los Angeles Trade Tech community college were successful grantees and focused on green jobs training, of which utility jobs were considered.

More recently, the Obama Administration awarded two Los Angeles neighborhoods (the Hollywood area and now South LA) with Promise Zone grants, which pairs Federal government partners with local leaders to streamline resources access agencies to deliver comprehensive support in achieving broad improvements in social and economic outcomes. With over twenty million dollars in support from the Federal government, activities are being organized that support academic and college readiness including how to build non-cognitive skills, reduce barriers to employment and higher wage jobs particularly training for sector specific opportunities. Los Angeles' Promise Zone efforts could include targeting education and training efforts towards utility jobs as part of this effort to increase the supply of skill ready workers for the utility industry.

So too have the California State Investor Owned Utilities understood the importance of preparing workers for this sector. In particular, Edison had awarded in the past grants to UC Berkeley's Institute for Labor and Employment to study how to recruit and train workers for growing green and utility jobs, in particular how to increase the recruitment and involvement of minority participants in this sector.

In Los Angeles, collaborations could be developed through partnerships of key stakeholders to reach the utility training objectives. In particular, broad-based coalitions of leaders from utilities and business, academia, education, labor, and the non-profit sector could be forged in order to develop specific actions plans to spur such training in region.³⁸ Such efforts could also lead to coordination of funding programs for workforce training (from private sector organizations, non-profits, private foundations and governments) to better focus and leverage resources for training and increase the amount of available funding. In this regard, this network could also work with many leading nonprofits, such as the United Way of Greater Los Angeles, to encourage participation of local foundations and philanthropies in joint funding of this approach to training.

Such a network could also serve as an advocate for policy change at the local level that could enhance such training. For example, the network could work to influence sector initiatives at the local Workforce Investment Board's (WIB) by leveraging and combining training resources (with those from community colleges for example). It could also lead to better coordination of training efforts between the city of Los Angeles WIB and CDD Workforce Development

Division. This could include efforts that link activities of the Promise Zone initiatives in combination with workforce training activities that will emanate from the newly authorized Federal workforce development act, the Workforce Innovation and Opportunity Act (WIOA). WIOAA was created to provide state and local flexibility to collaborate across systems in an effort to better address the employment and skills needs of current employees, jobseekers, and employers. Since WIOA keeps in place WIBS and One Stop Centers, new discussions could place among the key stakeholders about including sector specific training to the utility industry during this period of transition.

Finally, such a network could also improve the public image of utility jobs. The utilities are often seen as an antiquated and obsolete industry rather than one with relevance and a lasting impact. Stakeholders in the utility sector need to enhance their public image, emphasizing the new and innovative industry it is becoming.

Conclusion:

Going forward it is clear that demographic and technological changes will continue to challenge the longstanding stability of the utility sector's employment model. A rising share of utility workers, especially those with long tenures in many management positions who possess sector specific knowledge not easily transferred, are retirement eligible. To the extent that these workers begin to retire in greater numbers, utility sector will be increasingly challenged in finding qualified workers to promote to these positions.

At the same time, the increasing deployment of smart technology will be changing, if not eliminating, traditional utility sector positions that have been important gateway, entry level jobs. As a consequence, a potentially growing skills gap of those hired at the entry level, what is required for increasingly more technologically oriented jobs and what is required for promotion to more skilled positions could ensue, putting further pressure on its traditional employment model.

These changes imply very strongly that in order for the utility sector to continue to experience labor market stability that has assured over the long haul career mobility by paying strong middle class earnings, it will need to revamp its hiring practices, especially for entry level workers who form the pool of those promoted internally to more advanced, skilled and often management positions.

To increase the pipeline of skill ready workers to meet the changing job requirements and realities of utility employers, educational and training institutions, utility employers themselves and other labor market and governmental intermediaries must collaborate and network based on mutual benefit. In particular, utility employers should establish stronger links to community colleges, career type high school academies, and to labor market and governmental intermediaries.

Link to Community Colleges

Los Angeles Trade Technical College is uniquely positioned to further partnership in this regard. Its activities and programs regarding utility sector skill training share all of the best practice elements. However, LATCC does face some capacity constraints in expanding its program to meet student demand and industry needs. These constraints include faculty shortage and lack of funds to buy expensive, new but needed equipment as well as more fixed constraints such as available classroom space and land on which to house skills based practice activities.

These challenges however represent opportunities to enhance LATTC program through further utility employer engagement. To expand relevant programs, LATCC could benefit from utility employers through provision of up-to-date and clear job classifications with an outline of their hierarchy of positions, job descriptions, and training requirements. Utility employers could donate used equipment to various training programs, sponsor internships, actively advise on curricular questions, participate in career days, host shadow days, provide mentorship and help identify qualified and willing candidates to teach in relevant classes where shortages exist.

Connect with Career Type High Schools

Utility employers could also benefit in meeting the demand for appropriately trained workers by connecting with local area high schools that are successfully educating workers for technical careers. These career type academies are schools within schools that link students with peers, teachers, and community partners, including employers, to foster skill development and academic success. This is accomplished through small learning communities, a college-preparatory curriculum with a career theme, and partnerships with local employers.

The Los Angeles Unified School District's (LAUSD) Linked Learning is the ideal program to partner. In it, students select a pathway based on their career interests and graduate from high school prepared to enter a two- or four-year college or university, an apprenticeship, or formal job training. The pathways reflect California's largest economic industry sectors, including Building and Construction Trades and Energy, and Environment and Utilities. Moreover, among others, LAUSD's Linked Learning schools at the Los Angeles River High School and Carson High School (Program in Environmental Science, Engineering and Technology) are in a unique position to forge stronger partnerships with utility employers. The utilities should target pilot and magnet schools focused on this curricular path and enhance their public image.

The utility sector's presence in such schools is limited, and thus many students have no exposure to the kind of work or type of careers found in the utilities. The high demand and popularity surrounding STEM (Science, Technology, Engineering and Math) education is a unique opportunity to bring the utility sector to light.

Scaling up these programs is well needed but challenging partly because state funding may not be enough and is not expected to increase because of the state budgetary environment. One way to improve funding availability and grow such programs through increasing capacity is to network with relevant intermediaries in the field, such as the Center for Powerful Public Schools, which serves to incubate such Linked Learning schools.

Establish Networks with Labor Market and Government Intermediaries and Programs

Connecting with relevant labor market and governmental intermediaries could also be productive in increasing the pipeline of skill ready workers for the utility industry. In particular, broad-based coalitions of leaders from the utilities and business, academia, education, labor, and the non-profit sector could be forged in order to develop specific actions plans to spur such training in region. Such efforts could also lead to coordination of funding programs for workforce training (from private sector organizations, non-profits, private foundations and governments) to better focus and leverage resources for training and to increase the amount of available funding.

Such a network could also serve as an advocate for policy change at the local level. For example, the network could influence sector initiatives at the local Workforce Investment Board (WIB) by leveraging and combining training resources (with those from community colleges for example). It could also lead to better coordination of training efforts between the city of Los Angeles WIB and CDD Workforce Development Division. This could include efforts that link activities of the Promise Zone initiatives in combination with workforce training activities that will emanate from the newly authorized Federal workforce development act, the Workforce Innovation and Opportunity Act (WIOA).

APPENDIX:

List of Entities in Face to Face interviews:

Southern California Gas Company

Los Angeles Department of Water and Power

Glendale Department of Water and Power

Los Angeles Trade Technical College - Administration and Instructors

Los Angeles Unified School District

Center for Powerful Public Schools

International Brotherhood and Electrical Workers Union

List of Entities Participating in Written Questionnaire:

Metropolitan Water District

Southern California Gas Company

Los Angeles Department of Water and Power

Southern California Edison

Glendale Department of Water and Power

ENDNOTES

¹ The information used in this report were partly collected as part of this research effort through face to face interviews and written questionnaires. In the appendix a list of entities whose representatives were either interviewed face to face or who filled out written questions or both are presented.

² *Water Research Foundation*, 2010, "Water Sector Workforce Sustainability Initiative," accessed at: <http://www.waterrf.org/PublicReportLibrary/4206.pdf>, June 2016.

³ "About the Utilities Sector." *U.S. Bureau of Labor Statistics*. accessed at: <http://www.bls.gov/iag/tgs/iag40.htm>, June 2016.

⁴ "California Electricity Producers." *California Energy Commission*. Web. 2016.

⁵ "Sector Profile: Energy & Utilities." Publication. *Economic and Workforce Development*. Print.

⁶ "Gaps in the Energy Workforce Pipeline: 2011 CEWD Survey Results." *Center for Energy Workforce Development*. Web. June 2016.

⁷ Olstein, Myron, et al., 2005, *Succession planning for a vital workforce in the information age*, *American Water Works Association*.

⁸ See again Olstein, Myron, et al., 2005.

⁹ "Power and Utilities changing workforce." *Pricewaterhouse Coopers*, 2013, accessed at: <http://www.pwc.com/us/en/power-and-utilities/publications/assets/pwc-power-utilities-changing-workforce.pdf>.

¹⁰ "Water Sector Workforce." *Environmental Protection Agency*. Web. (March 2016)

¹¹ "Water Sector Workforce Sustainability Initiative," 2010, *Water Research Foundation*, accessed at: <http://www.waterrf.org/PublicReportLibrary/4206.pdf>, June 2016.

¹² See again, Olstein, Myron, et al., 2005.

¹³ Brack, Jessica, 2012, "Maximizing millennials in the workplace," *UNC Executive Development*.

¹⁴ Guérard, Guillaume, Soufian Ben Amor, and Alain Bui, 2012, "Survey on smart grid modelling." *International Journal of Systems, Control and Communications*.

¹⁵ The first official definition of Smart Grid was provided by the Energy Independence and Security Act of 2007 (EISA-2007), which was approved by the US Congress in 2007. Title XIII of this bill provides a description, with ten characteristics, that can be considered a definition for Smart Grid, as follows: "It is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth and to achieve each of the following, which together characterize a Smart Grid:

(1) Increased use of digital information and controls technology to improve reliability, security, and efficiency of the electric grid.

(2) Dynamic optimization of grid operations and resources, with full cyber-security.

(3) Deployment and integration of distributed resources and generation, including renewable resources.

(4) Development and incorporation of demand response, demand-side resources, and energy-efficiency resources.

(5) Deployment of 'smart' technologies (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices) for metering, communications concerning grid operations and status, and distribution automation.

(6) Integration of 'smart' appliances and consumer devices.

(7) Deployment and integration of advanced electricity storage and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal storage air conditioning.

(8) Provision to consumers of timely information and control options.

(9) Development of standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid.

(10) Identification and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services." See "Security Act of 2007." *Energy Independence: Public law 110.140 (2007)*: 19.

¹⁶ Kinter-Meyer, L. D., M. C. Chassin, and D. P. Kannberg, 2003, "GridWiseTM: The Benefits of a Transformed Energy System," *Pacific Northwest National Laboratory, PNNL-14396*.

¹⁷ Pusung, Fernan F., 2012, *Smart Grid*, PediaPress.

¹⁸ "The Smart Grid Workforce of the Future: Job Impacts, Skill needs, and Training Opportunities," 2011, West Monroe Partners, LLC and Illinois Institute of Technology, page 14, access at: <http://www.iitmicrogrid.net/galvincenter.aspx#prettyPhoto/1/>

¹⁹ See again, "The Smart Grid Workforce of the Future: Job Impacts, Skill needs, and Training Opportunities," 2011, West Monroe Partners, LLC and Illinois Institute of Technology.

²⁰ Water Research Foundation, 2010, "Water Workforce Sustainability Initiative," page. 13, accessed at: <http://www.waterrf.org/PublicReportLibrary/4206.pdf>.

²¹ KEMA, Inc., 2009, The U.S. Smart Grid Revolution: KEMA's Perspectives for Job Creation, accessed at: https://www.smartgrid.gov/files/The_US_Smart_Grid_Revolution_KEMA_Perspectives_for_Job_Cre_200907.pdf

²² See Blisss, Steven, 2000, *San Francisco Works: Toward an Employer-Led Approach to Welfare Reform and Workforce Development*, New York, NY: Manpower Demonstration Research Corporation; and, Melendez, Edwin, and Bennett Harrison, 1998, "Matching the Disadvantaged to Job Opportunities: Structural Explanations for the Past Successes of the Center for Employment Training," *Economic Development Quarterly* 12: pp. 3-11.

²³ Employers spend a nontrivial amount of money to keep any one low-skill job filled, particularly when one factors in the high turnover rates that are characteristic of these jobs. Research indicates that employers' search costs for low- to semi-skilled workers are on average between \$300 and \$1,500, depending on how difficult it is to find appropriate labor, and that training costs for these workers range from \$700 to \$3,000, depending on the type of training required (see Frazis, H., M. Gittleman, M. Horrigan, and M. Jovce, 1998, "Results from the 1995 Survey of Employer-Provided Training," *Monthly Labor Review* 121: 3-13; and Bishop, John, 1994, "The Incidence of and Payoff to Employer Training," Working Paper 94-17, Cornell University, Center for Advanced Human Resource Studies).

²⁴ See U.S. Department of Labor (DOL), 1995, *What's Working (and What's Not): A Summary of Research in the Economic Impacts of Employment Training Programs*, Washington, DC: DOL.

²⁵ See Northwest Center for Emerging Technologies (NWCET), 1999, *Building a Foundation for Tomorrow: Skill Standards for Information Technology*, Bellevue, WA: NWCET.

Oakes, J., 1985, *Keeping Track: How Schools Structure Inequality*, New Haven: Yale University Press, pp. 4.

²⁶ See Blisss, Steven, 2000, *San Francisco Works: Toward an Employer-Led Approach to Welfare Reform and Workforce Development*, New York, NY: Manpower Demonstration Research Corporation.

²⁷ Currently, many trade-technical colleges such as LATTTC, have no systematic means to track its students post-enrollment. This makes it difficult to capture their long-term impact and retention rate; it would be beneficial to know what industries and companies students are going on to work for and for how long. Primarily, are students directly working in a field they received their LATTTC certification in or are they going on to work on other fields and if so, why. Currently, there are no alumni associations or resources dedicated to acquiring this information.

²⁸ "Southern California Utility Initiative," 2013, *US Department of Energy*. Web. (2013).

²⁹ See David Stern and Roman Stearns, 2006, "Combining Academic and Career-Technical Courses to Make College an Option for More Students: Evidence and Challenges," *Multiple Perspectives on Multiple Pathways*, Cambridge, MA: Harvard Education Press.

³⁰ See Stern, David, Christopher Wu, Charles Dayton, and Andrew Maul, 2007, "Learning by Doing Career Academies," in David Neumark, ed., *Improving School-to-Work Transitions*, New York: Russell Sage Foundation, pp. 134-68.

³¹ Los Angeles Unified School District Linked Learning Website, <http://achieve.lausd.net/linkedlearning>, accessed on September 20, 2016.

³² See Appendix D for a list of "Green Academies" in California. This list is taken from "Green Technology: Resources for Serving Females and Special Populations," prepared by the Joint Special Populations Advisory Committee, 2010 by Tammy Montgomery, accessed online on April 7, 2009 at: http://jspac.org/repository/Green_Technology_Resources3.doc.

³³ For more details on these practices see, Jennifer Pritchard, 2013, *The Importance of Soft Skills in Entry-Level Employment and Postsecondary Success: Perspectives from Employers and Community Colleges*, Seattle Jobs Initiative, accessed at: http://www.seattlejobsinitiative.com/wp-content/uploads/SJI_SoftSkillsReport_vFINAL_1.17.13.pdf.

³⁴ Falcon, Luis, Edwin Melendez, and Alexandra de Montrichard, 2003, "The Role of Partnerships and Collaborations for Workforce Development Providers Serving the Disadvantaged in Boston," Paper prepared for the Networking and Best Practices in Workforce Development Conference, June, New York, NY: Ford Foundation.

³⁵ See Annie E. Casey Foundation, 2000, *Stronger Links: New Ways to Connect Low-Skill Workers to Better Jobs*, Baltimore, MD: Annie E. Casey Foundation.

³⁶ See Annie E. Casey Foundation, 2000, *Stronger Links: New Ways to Connect Low-Skill Workers to Better Jobs*, Baltimore, MD: Annie E. Casey Foundation.

³⁷ See Chapple, Karen, Matthew Zook, Radhida Kunamneni, AnnaLee Sazanian, Steven Weber, and Beverly Crawford, 2000, *From Promising Practices to Promising Futures: Job Training in Information Technology*, New York, NY and Oakland, CA: Ford Foundation and PolicyLink.

³⁸ Indeed, JP Morgan Chase recommends a similar approach of regional partnerships to address building skills for a middle-skill workforce in the Los Angeles region. See JP Morgan Chase & Co., "Strengthening Los Angeles: Building a Middle-Skill Workforce to Sustain Economic Growth and Expand Opportunity," June 2015.