



# *How Green Are Green Jobs and Who Is Hiring?*

*Green California Community Colleges Summit*

October 17, 2011



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# Centers of Excellence



**Inform** – community college and workforce community through regional labor market research and data

**Connect** – business and industry with community colleges and workforce organizations that are committed to developing an outstanding workforce

**Advance** – economic competitiveness in a region by partnering with employers, education and economic developers



# Where are the COE located?

San Francisco Bay/  
Silicon Valley

Los Angeles/ Orange

Desert & San  
Diego/ Imperial

Central Valley & South  
Central

Greater Sacramento



# Today's Presentation



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What industries are driving growth in “green” employment?



What “green” skills and knowledge do employers look for?



Where should community colleges invest resources?

# Today's Presentation



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What industries are driving growth in “green” employment?



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Where should community colleges invest resources?

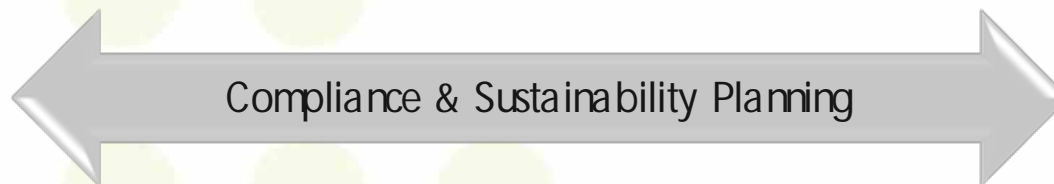
# What industries are driving growth in green employment?



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— Center of Excellence Methodology —

# What industries are driving growth?

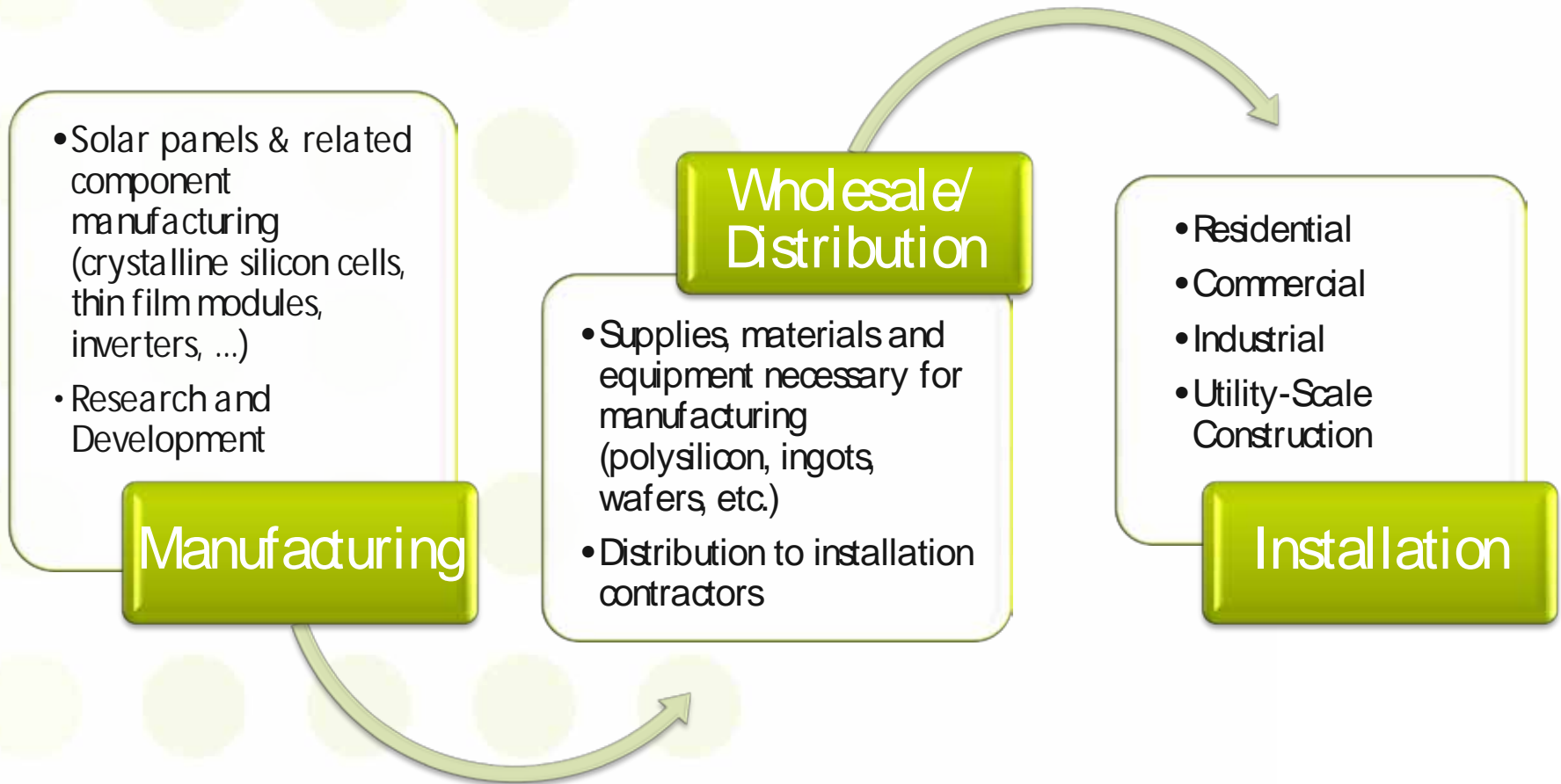
## Solar Energy



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What industries are driving growth?

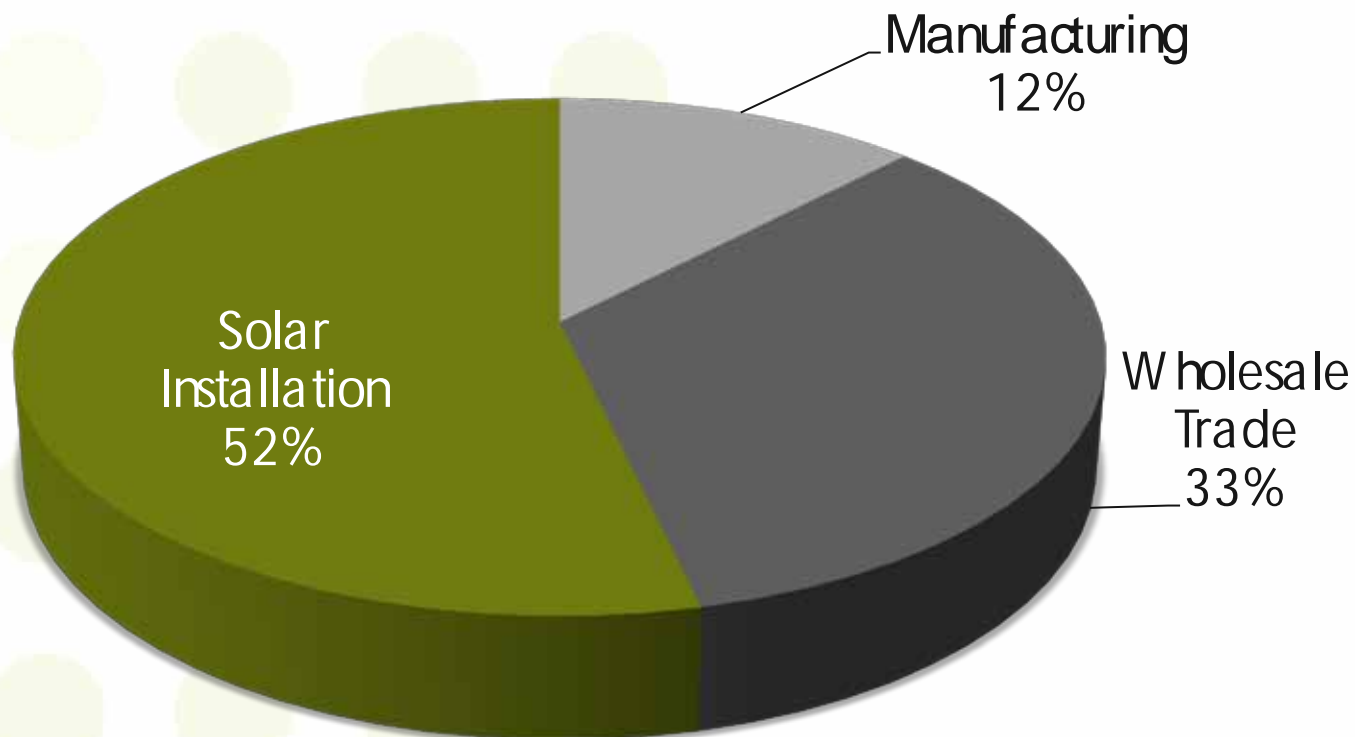
## Solar Energy: Industry Distribution



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# What industries are driving growth?

## Solar Energy: Occupations



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Installation Occupations	Current Employment	Est. 12-Month Growth	Difficulty Hiring
Solar water or pool heating installers/ technicians	2,369	51.0%	53.1%
Solar PV installers or technicians	4,570	51.6%	50.9%
Sales representatives or estimators	2,443	53.3%	56.1%
Solar designers or engineers	1,814	16.1%	46.1%
Solar installation managers or project foremen	3,220	22.1%	50.9%

# What industries are driving growth?

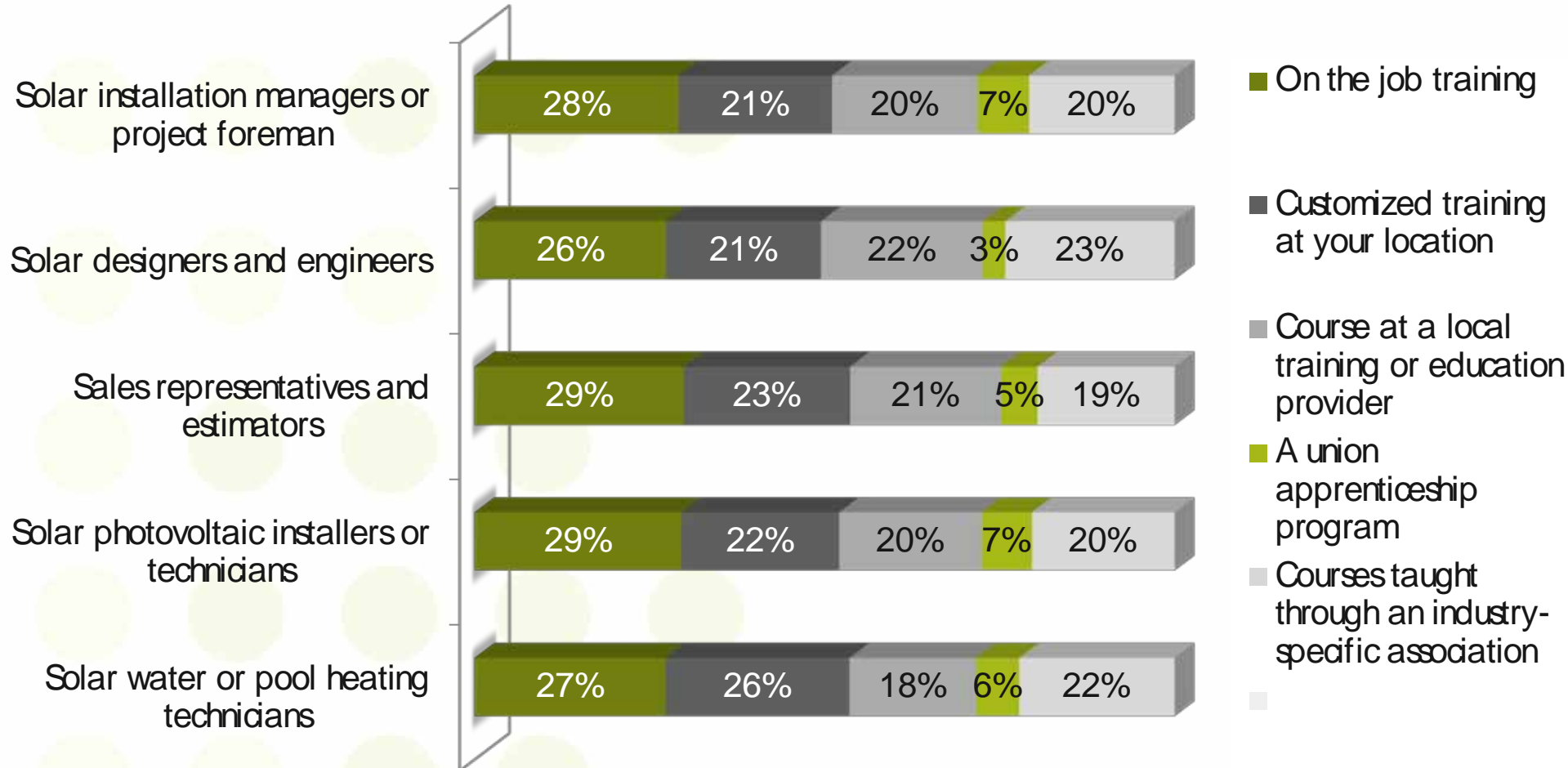
## Solar Energy: Occupations



<b>Manufacturing &amp; Trade Occupations</b>	<b>Current Employment</b>	<b>Est. 12-Month Growth</b>	<b>Difficulty Hiring</b>
Production and operating workers	2,048	43.2%	53.7%
Supervisors/ managers of production and operating workers	1,049	38.8%	58.9%
Accountants and accounting clerks or finance staff	811	45.5%	29.1%
Engineers	4,868	32.5%	52.0%
Sales and marketing occupations	1,391	55.0%	63.0%

# What industries are driving growth?

## Training Preferences: Solar Installation



# What industries are driving growth?

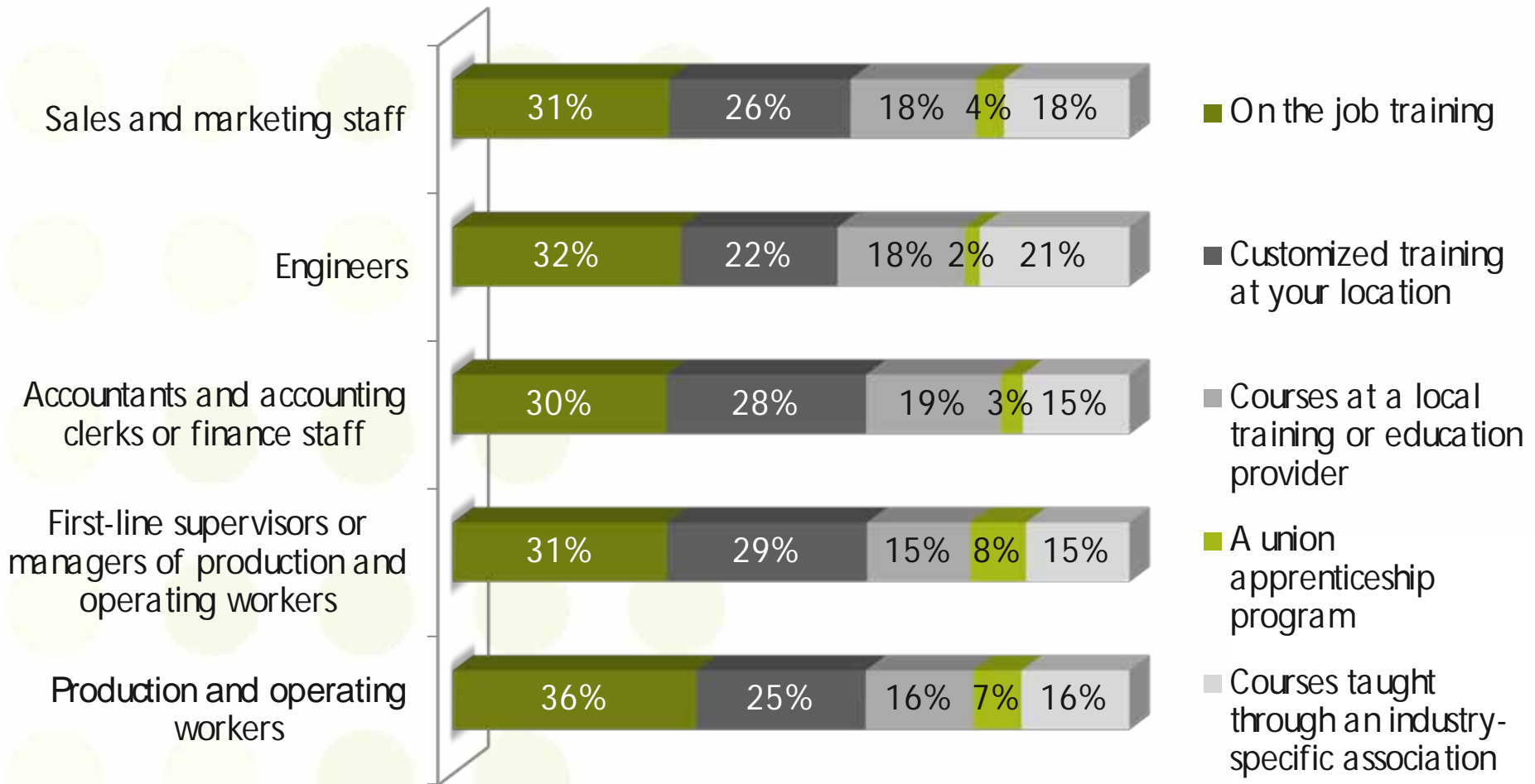


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## Training Preferences: Solar Manufacturing & Trade



What industries are driving growth?

## Solar Energy: Utility-scale



70 projects are planned in CA, most in the Inland Southern California and Central Valley regions

### *Key findings:*

- Local construction impacts are few; no need in additional training
- Technologies differ; the trend is towards low-maintenance PV
- Labor intensity is lower than distributed generation solar
- Significant deficiencies of **power plant operator and manager skills**, not only for solar but for all energy
- **Skills needed:** Communication, Basics of energy and power systems, Basics of power plant management, and Basics of solar technology
- Lack of interest in power generation careers among youth

# What industries are driving growth?

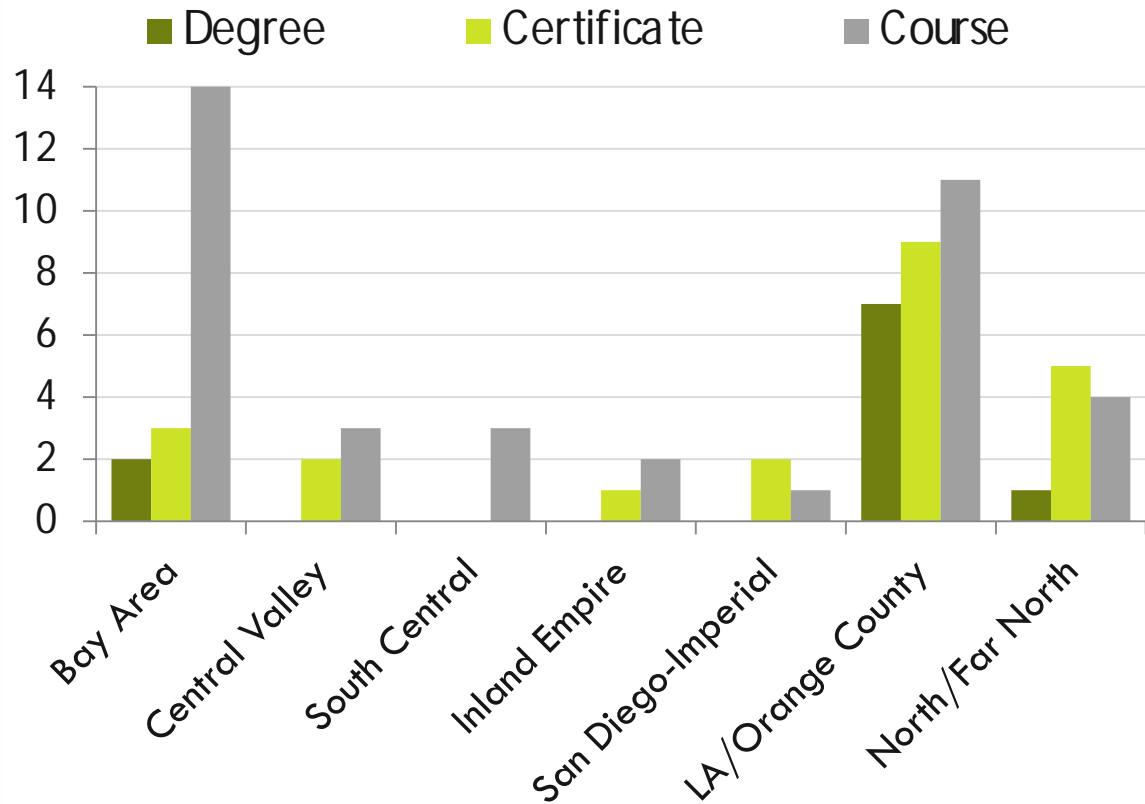
## Solar Energy: College Response



55 community colleges in CA offer solar programs or courses:

- A.S. Degrees: 10
- Certificates: 22
- Individual Courses: 38 (when no solar degree is offered)

### Number of programs & courses by region



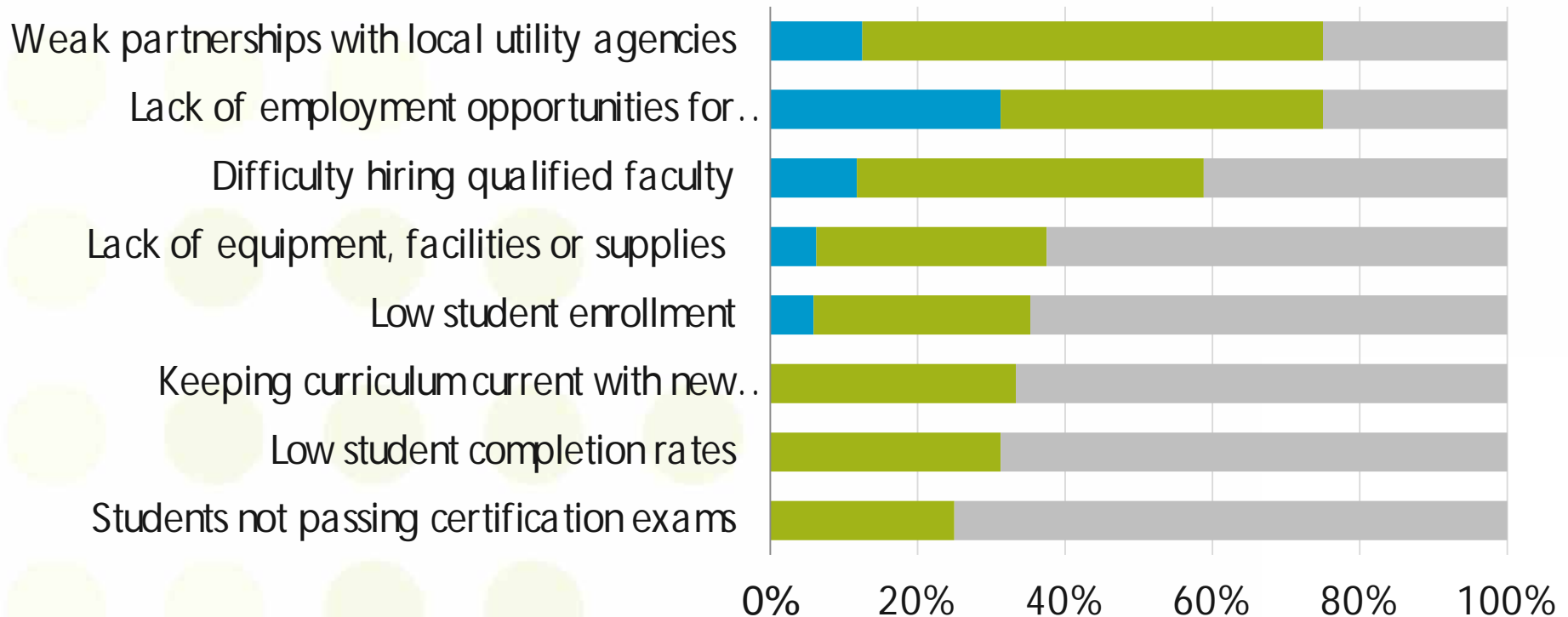
# What industries are driving growth?

## Solar Energy: College Response



### Program Challenges (n=17)

■ Significant Challenge   ■ Some challenge   ■ Not an issue



# What industries are driving growth?



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## Solar Energy: Key Findings

- The need for PV installers has been met. No need to create new programs
- There is a disconnect between the college programs for Sales reps/ estimators and industry requirements as employers are still having high difficulty hiring. Colleges should explore this in detail and possibly adjust/ create courses to address the need.
- Develop a course on the basics of energy production, power plant management, and solar technologies, together with modules focused on communication and problem-solving skills.  
*Relevant for colleges in Inland So Cal and Central Valley.*

What industries are driving growth?

# Wind Energy: California Resources



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Wind farms in California are located in 5 distinct regions.



# What industries are driving growth?

## Wind Turbine Technicians



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Traditional Skills	New Skills
Good physical condition for ladder climbing and occasional heavy lifting	Understanding advances in technologies and turbine designs, computer software and computer diagnostic systems
Ability to work comfortably at heights up to 350 feet	Electricity (technicians need to understand control systems, and how power is generated and connected to the power grid)
Experience using hand and power tools	
Basic engineering skills	Technicians should be knowledgeable in mechanics and hydraulics (these systems control the pitch of the blade)
Electrical; mechanical, hydraulic, and electrical maintenance repair and troubleshooting experience	
Meteorology and basic math	Testing equipment and schematics
Safety certification	

What industries are driving growth?

## Wind Energy Outlook



- Wind Turbine Technicians can be calculated per:
  - Megawatt: 10-20 Wind Technicians needed per 100 Megawatts
  - Turbine: 1 technician per 15 turbines
- California's future wind industry will require anywhere between 200 – 877 technicians in total (not annually), depending upon a number of variables
- Many jobs are out of state

Source: Wind Energy Industry in California, California Community Colleges Centers of Excellence, 2009.  
[www.coecc.net/wind](http://www.coecc.net/wind)

What industries are driving growth?

## Wind Energy: Workforce Challenges

Employers offered many suggestions on how community colleges can assist in providing a skilled workforce for the wind industry:

- Develop curriculum with high schools that teaches conservation and renewable energy
- Train more engineers and engineering technicians
- Offer job readiness and work maturity skill training to workers

What industries are driving growth?

## Energy Efficiency & Green Building

Occupational Employment & Growth, 2009

- As many as 36,000 new jobs are estimated to be created statewide between 2009-2012.
- 7,500 building performance or retrofitting specialists (46% growth)
- 5,500 HVAC mechanics and technicians (28% growth)

*2/3 of all direct EE jobs are in in traditional construction trades*

*1/5 – in engineering, and a small number in new specialized “green” jobs*

*— UC Berkeley/CPUC Study*



# What industries are driving growth?

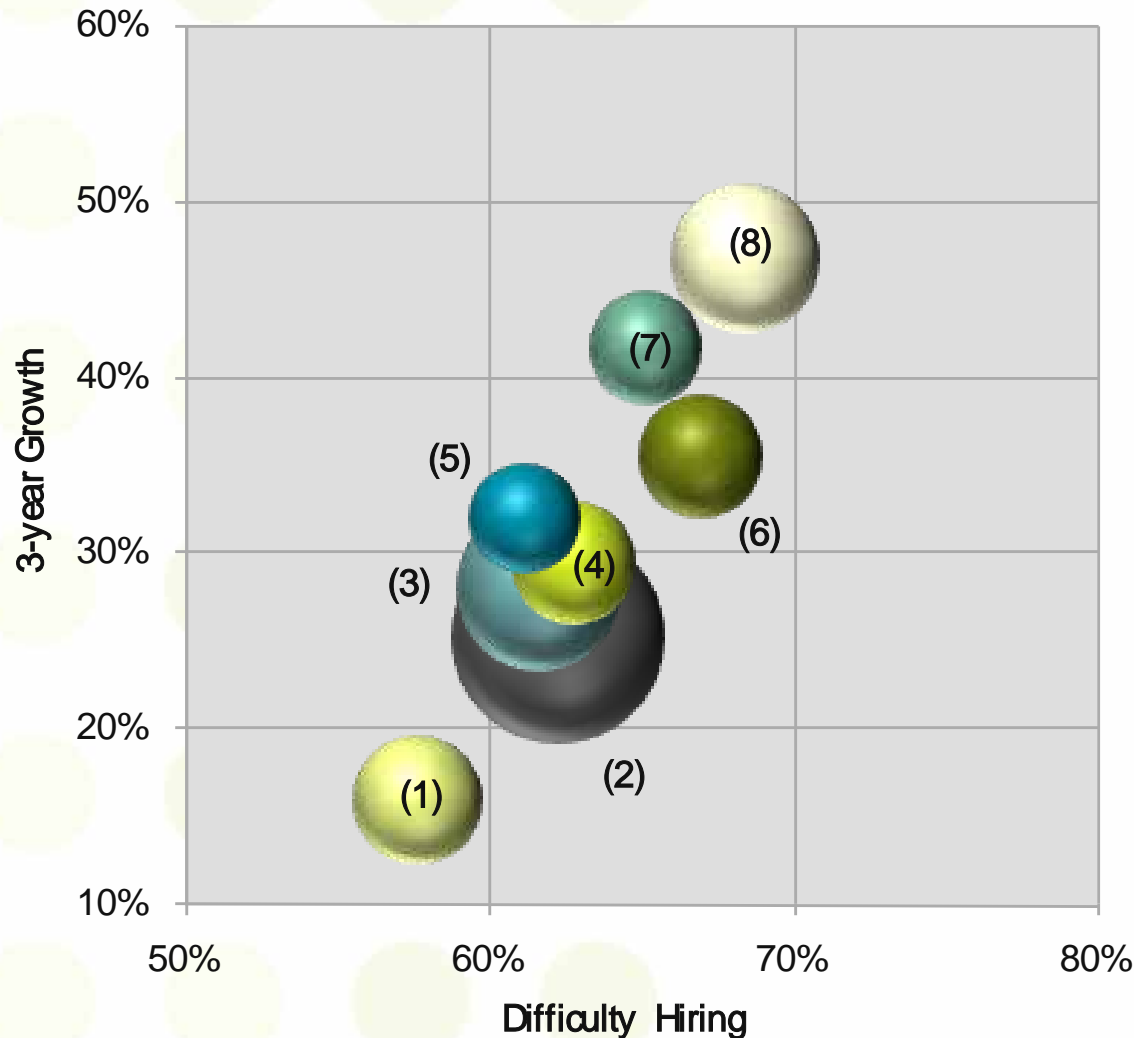
## Energy Efficiency: Occupations



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- (1) Building operators / engineers
- (2) Project managers for construction or design work
- (3) HVAC mechanics, technicians or installers
- (4) Resource conservation managers
- (5) Compliance analysts or energy regulation specialists
- (6) Building controls systems technicians
- (7) Energy auditors or home energy raters
- (8) Building performance or retrofitting specialists

What industries are driving growth?

## Energy Efficiency: Top Skills



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### Employers' Top 3 Most Important Knowledge and Skill Areas

- Ability to communicate with customers, in writing and in person.
- Understanding of local and state energy efficiency requirements and incentives for new and existing buildings.
- General understanding of the mechanics and engineering of energy systems, including HVAC, lighting, and renewable energy systems.

# What industries are driving growth?

## Water & Wastewater



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So Cal (2011):  
7-county region  
~350 employers  
71 completed the survey



Bay Area (2009):  
6-county region  
77 employers identified  
45 completed the survey

# What industries are driving growth?

## Water & Wastewater: Southern CA



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Water & Wastewater Occupations	2011 Employment	3-year Growth Rate (new jobs)	New Job Growth	Eligible to Retire in 3 years (replacement rate)	Replacement Jobs
Water Treatment Operator	2,630	4%	100	18%	480
Water Distribution Operator	4,060	7%	280	19%	770
Wastewater Treatment Operator	3,400	3%	100	17%	570
Wastewater Collections Operator	2,550	7%	180	12%	310
Mechanic/Machinist	3,120	6%	190	24%	740
Electrician/Electrician Technician	1,340	6%	80	33%	440
Electronic Maintenance Technician/Instrument Technician	1,260	8%	110	25%	320
<b>Total</b>	<b>18,360</b>	<b>6%</b>	<b>1,025</b>	<b>20%</b>	<b>3,625</b>

What industries are driving growth?

## Water & Wastewater: Southern CA



- So Cal water/ wastewater agencies are estimated to employ 18,360 workers in the seven mission critical occupations.
- 4,640 new and replacement jobs are estimated to be created in 3 years; 20%
- Water distribution operator is the largest occupation, with more than 4,000 workers in 2011.
- Retirement eligibility for water distribution operators may be as high as 19% over the next 3 years.



# What industries are driving growth?

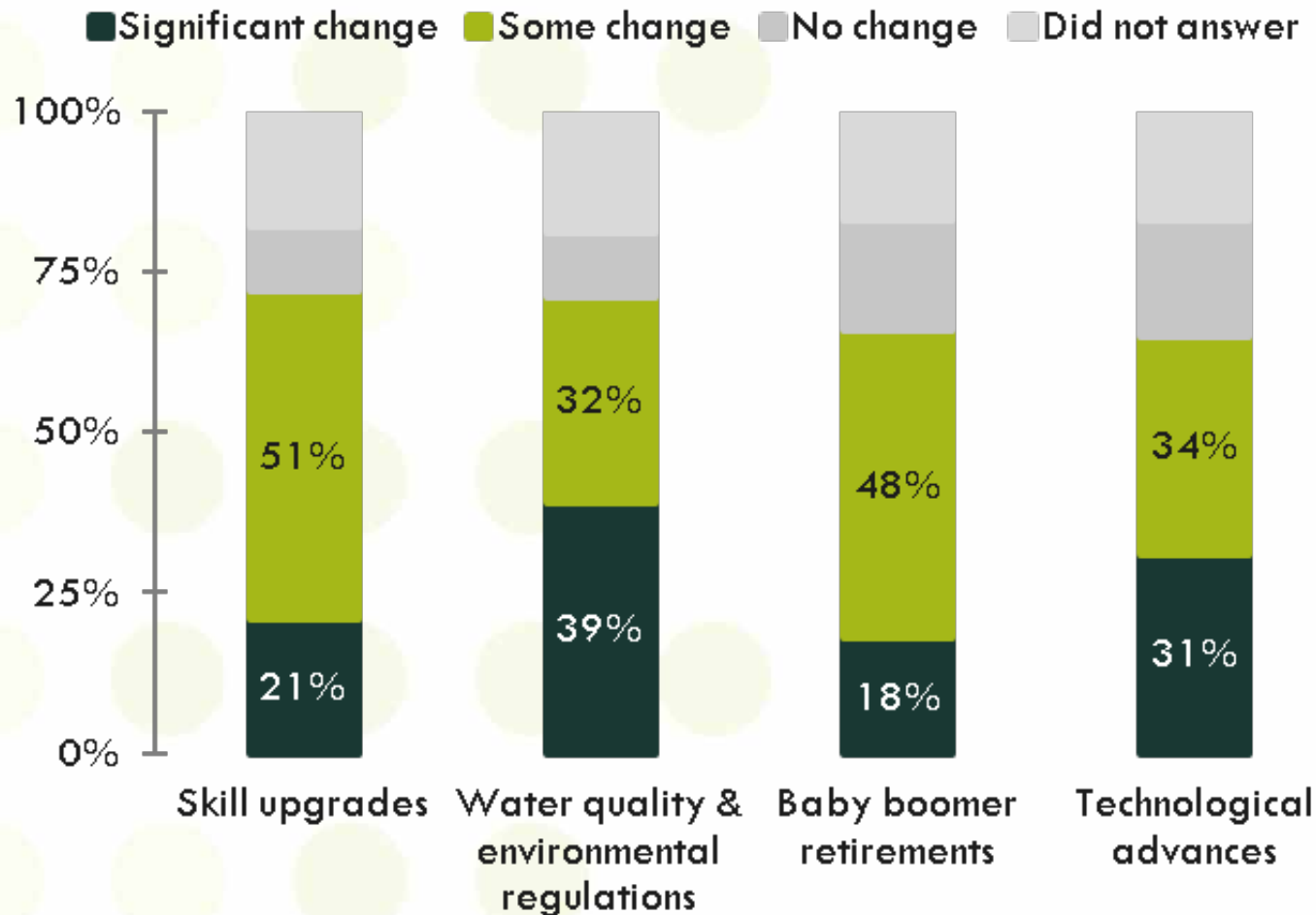


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## Workplace Challenges: Southern CA



What industries are driving growth?

## Education & Training



- A majority of employers expressed interest in community college programs and incumbent worker training
- The highest level of interest was for *wastewater treatment operator* and *wastewater collections operator* training
- 12 community colleges in So Cal offer water/ wastewater programs; majority of them are focused on training water and wastewater operators

# What industries are driving growth?



## Bio-Energy

- Biomass energy is derived from five distinct energy sources: garbage, wood, waste, landfill gases, and alcohol fuels.
- Biofuels are a wide range of fuels which are in some way derived from biomass. The term covers solid biomass, liquid fuels and various biogases

### **Agriculture, forestry, fishing and hunting**

Farming, timber, forestry

### **Manufacturing**

Processing, refining, fiber,  
chemical & machinery  
manufacturing

### **Professional, scientific, & technical services**

Engineering, laboratories,  
consulting, research &  
development

### **Public administration**

Conservation programs,  
public works

### **Utilities**

Power generation,  
distribution & transmission

# What industries are driving growth?

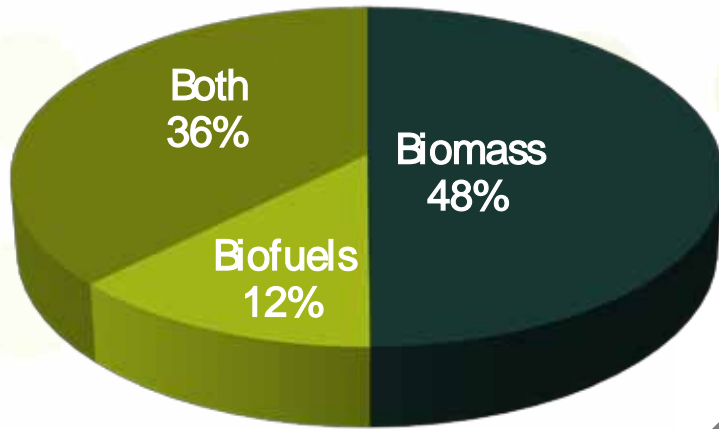
## Bio-Energy Employers



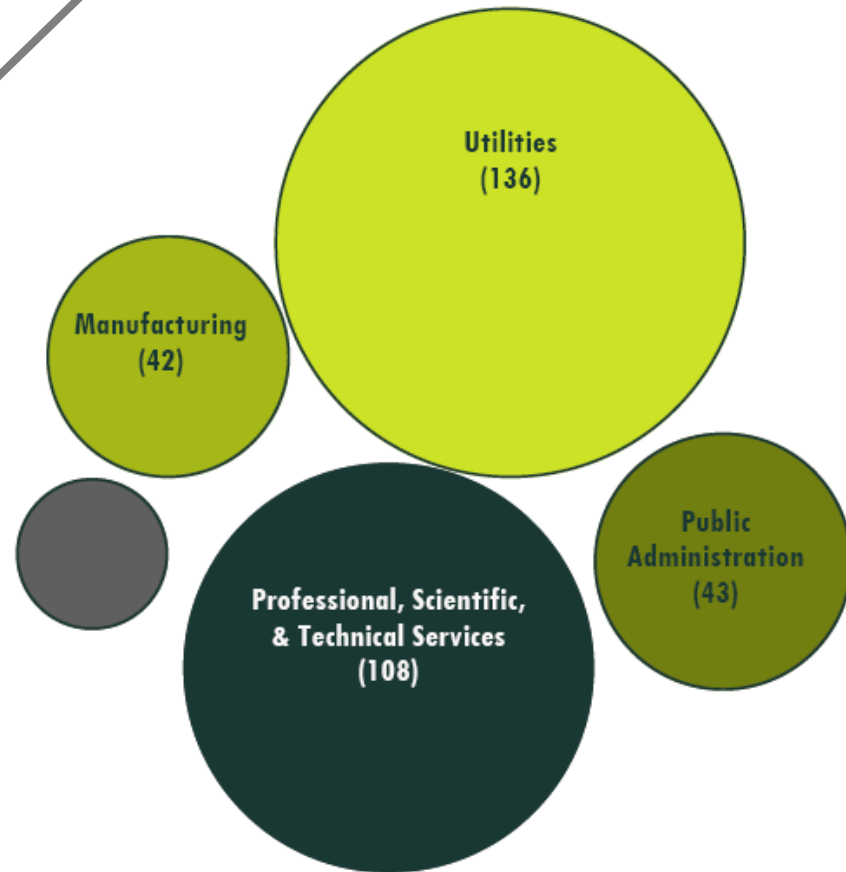
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Agriculture, Forestry,  
Fishing & Hunting  
(15)



# What industries are driving growth?

## Bio-Energy Employment Outlook



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Bio-Energy Occupation	2010 Employment Estimate (Ca)	12-mo Projected Growth	Growth Rate	3-year Projected Growth	Growth Rate
Bio-energy manager/supervisor	105	0	0%	0	0%
Biomass plant technician	455	0	0%	35	8%
Bioenergy engineering technician	525	0	0%	0	0%
Bioenergy Instrument & controls technician/operator	595	0	0%	35	6%
Methane/Landfill gas generation system technician/operator	420	70	17%	140 ★	33%
Bio-energy research assistant/analyst	70	35	50%	105 ★	150%
Biofuels processing technician	875	0	0%	35	4%
<b>Totals</b>	<b>3,045</b>	<b>105</b>	<b>3%</b>	<b>350</b>	<b>11%</b>

# What industries are driving growth?

## Bio-Energy



- Employers indicate they are most comfortable with community college training for three of the seven occupations: (1) biofuels processing technicians, (2) bio-energy instrument and controls technicians and operators, (3) methane/ landfill gas generation system technicians and operators. These three occupations account for 210 of the 350 projected new jobs.
- Review the following considerations for the development of bio-energy programs:
  - geographic proximity to employers;
  - employment need;
  - leverage existing programs.
- Monitor state and federal policy and legislation that may support the growth and development of bio-energy in California.

# What industries are driving growth?

## Alternative Transportation



- Developing technology, manufacturing, and servicing for alternative fuel vehicles and advanced transportation systems
- Driving demand:
  - Individual consumers, commercial and residential
  - Legislation/ Regulation: Assembly Bill 118, Air Quality Management Districts' incentives
  - Replacing/ adding alternative fuel vehicles to **fleet inventories**
    - A recent survey of transit employers found that alternative fuel vehicles made up close to 21% of their fleet
    - Looking forward, employers indicated a preference for CNG and gas-hybrid vehicles in the short-term (next two years), followed by all-electric vehicles.

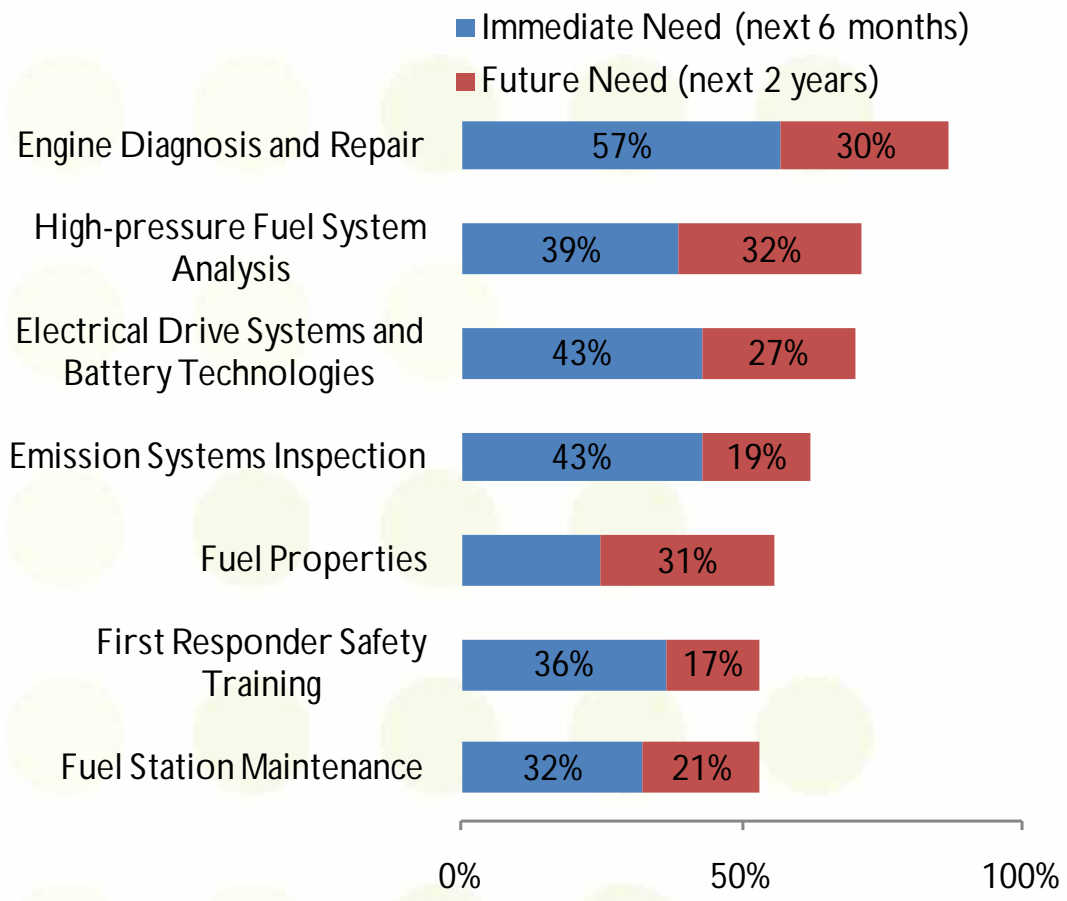
What industries are driving growth?

## Transportation Employment

Employer Type	Sample Employment (n=93)	Employees working with Alternative Fuels and/ or Vehicles
City/ County Government Fleets	10,838	3,507
Auto & Truck Repair/ Maintenance Vendors	4,308	3,645
Alternative Fuel Vendors	3,423	212
Transit Agency	3,144	1,860
Private Company Fleets	2,453	770
School Bus Fleets	617	207
State Government Fleets	414	70
<b>Total</b>	<b>25,197</b>	<b>10,271</b>

# What industries are driving growth?

## Future Training Needs



- ### Employers' Top 5 Most Useful Training Topics
- Alternative Fuels Diagnosis and Troubleshooting
  - Site Safety Considerations
  - CNG, LNG or Hydrogen Cylinder Inspection
  - Drive Train Components for Hybrid/ Electric Vehicles
  - AC and/ or DC Control Circuits (Electric)

What industries are driving growth?

## Compliance & Sustainability

- Policy, management and business application that involve reducing negative environmental impacts ...
- According to EDD, the “green” education, compliance and awareness sector employs an estimated 72,000 people across California
- Occupations still evolving; job titles vary

ü Urban planners

ü Sustainable dev't  
specialists

ü Policy analysts

AB 32

LEED

CAL  
Green

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# Today's Presentation



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What industries are driving growth in “green” employment?



What “green” skills and knowledge do employers look for?



Where should community colleges invest resources?

What skills and knowledge do employers look for?



## Green Occupations: Project Summary

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- Partnership with the Employment Development Department to conduct occupational research of the green aspects of 34 occupations.
- Key research questions:
  - What green tasks do workers in these professions perform?
  - What skills and knowledge are needed to accomplish these tasks?
  - What training and education is necessary to get a job in the industry?

What skills and knowledge do employers look for?



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## Research Process

- Conducted 70 interviews with industry and faculty.
- Conducted 4 online occupational surveys.
  - Recruited and partnered with 19 California industry and professional associations to promote surveys to more than 70,000 of their members.
- Facilitated focus group in the Silicon Valley.

What skills and knowledge do employers look for?



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## Architects: Sustainable Tasks

- Surveyed architects about the tasks and job functions required to work in three areas: environmental impact, energy conservation, and water conservation.
- Some of the commonly cited tasks for sustainable architects:
  - Educate and inform clients of the importance of environmentally sustainable practices
  - Design/ plan communities that are sustainable and follow smart growth principles
  - Outreach to community/ neighborhood groups to build client and community awareness
  - Advocate for sustainable building policies and regulations that impact the construction sector

What skills and knowledge do employers look for?



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## Architects: Green Certifications

- Most firms do not have any green certification requirements for applicants.
- Yet, 40% of the firms surveyed prefer to hire architects with a green certification, such as LEED.
- Only 13% of the firms stated that a green certification would lead to better than average wages.

What skills and knowledge do employers look for?

## Electricians: Working with Smart Grid Tech

- Install utility smart grid technologies in substations and the distribution system
- Install energy management systems on commercial and industrial facilities
- Maintain and repair Smart Meters\*
- Connect Smart Meters to the Home Area Network\*
- Connect appliances to the Home Area Network\*
- Connect renewable energy sources to the Smart Grid
- Install distribution automation equipment
- Trouble shoot installation problems of Residential Smart Meters

What skills and knowledge do employers look for?

## Electricians: Working on Electric Ports

- Install a shoreside cold-ironing infrastructure
- Maintain shoreside electrical power facilities
- Repair shoreside electrical power equipment
- Connect & disconnect cables from ships to shore outlets
- Pull wires, splice conductors, install conduits, and assemble switchgear
- Determine existing arc flash hazards

What skills and knowledge do employers look for?

## **Electricians: Electric Charging Stations**

- Install electric charging stations in homes or communities
- Conduct site assessments for electric vehicle charging station installations to determine the mounting location, electrical and any special installation requirements
- Safely install electric car charging stations according to the manufacturer's specifications
- Conduct installation and calibration of submeters

What skills and knowledge do employers look for?



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## Electricians: Career Pathways

- Electricians with green skills may advance in their careers in a variety of ways:
  - Commercial electricians that understand energy management system operation, programming to maximize time of use savings, demand management, and demand response may progress to high level support, supervision, or sales positions.
  - Residential electricians that are dispatched for 2nd tier trouble response for smart grid systems may progress to supervision or training positions.

# What skills and knowledge do employers look for?

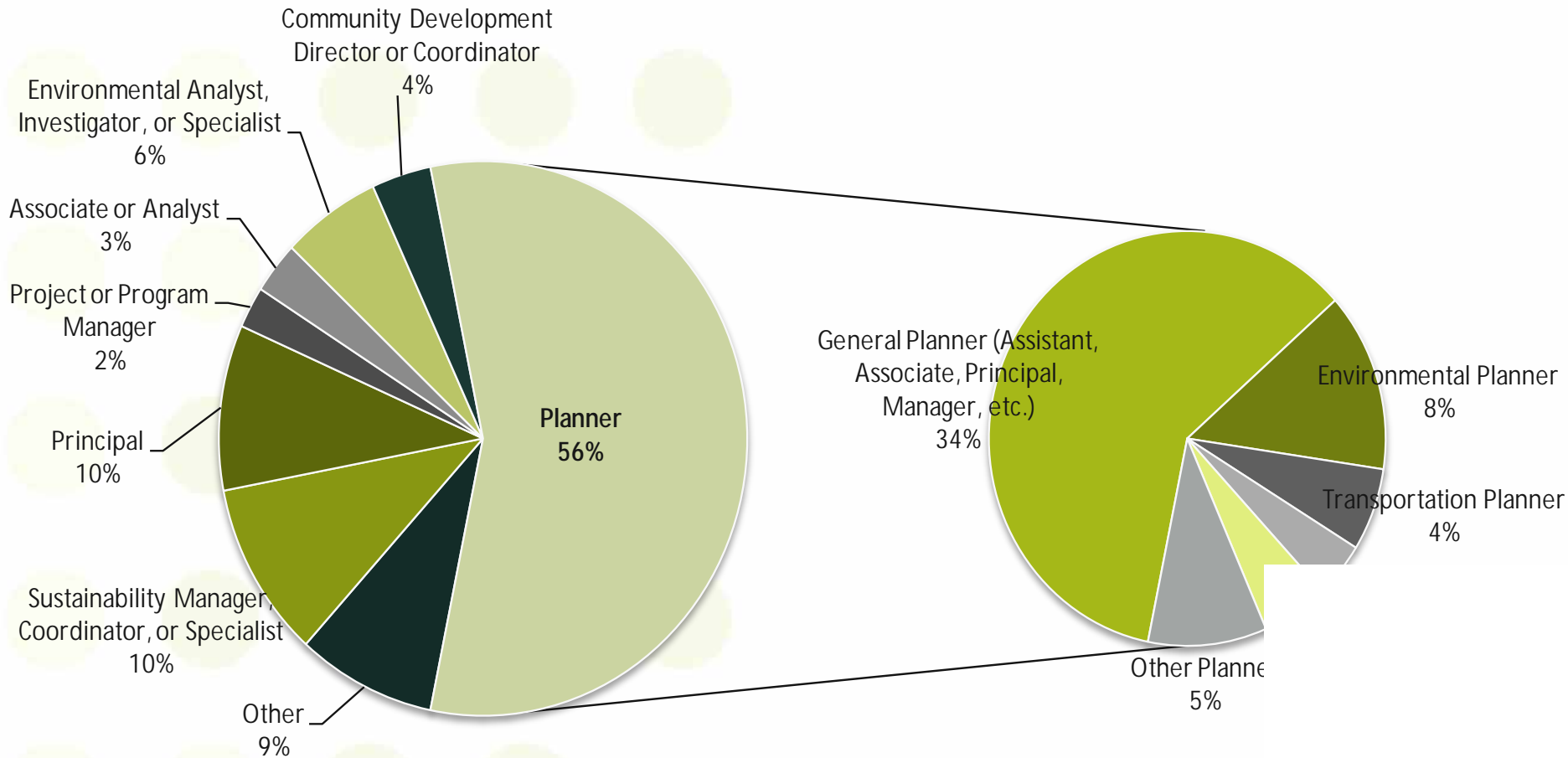
## Sustainable Occupations



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# What skills and knowledge do employers look for?

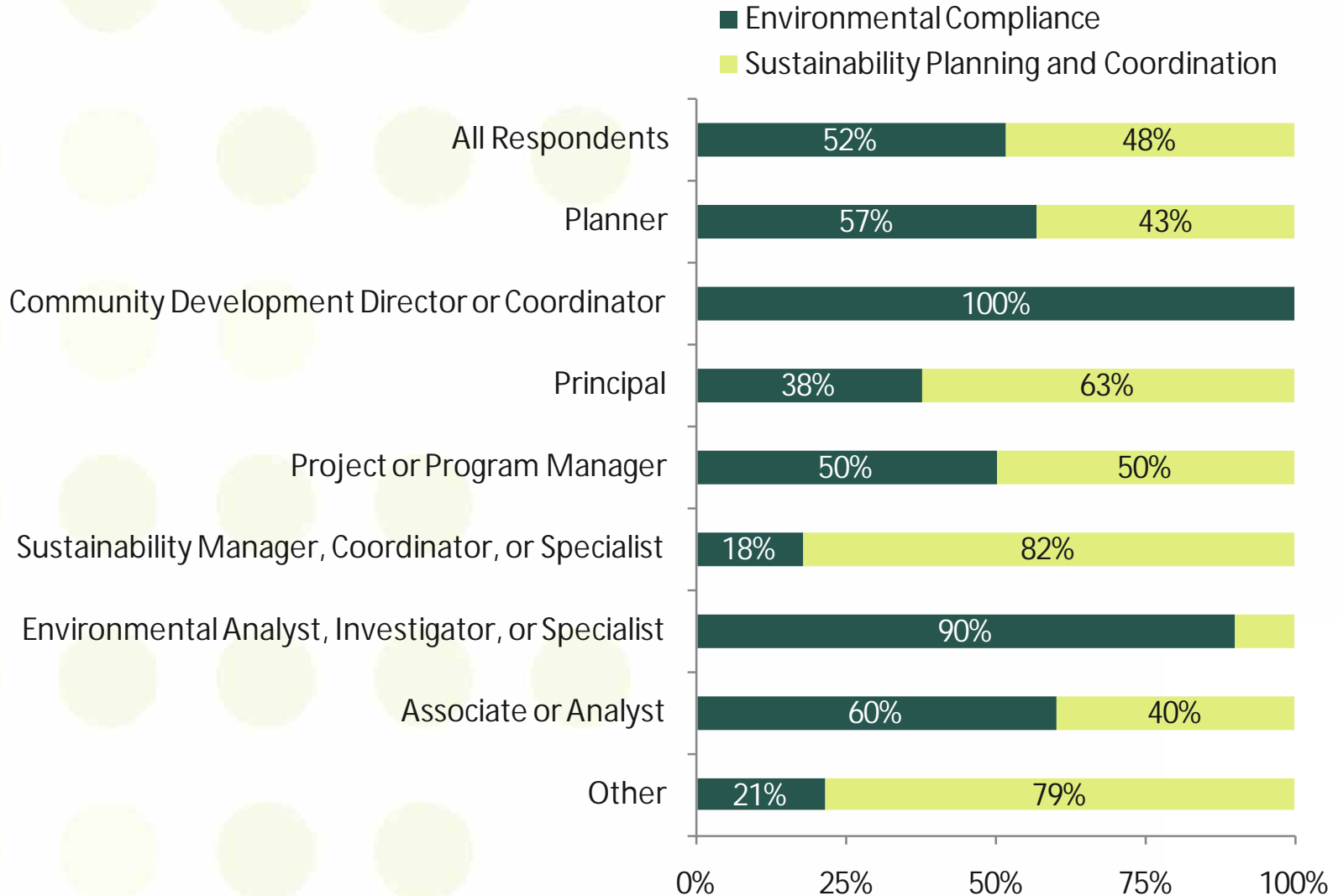


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## Work Experience Preferences



# What skills and knowledge do employers look for?



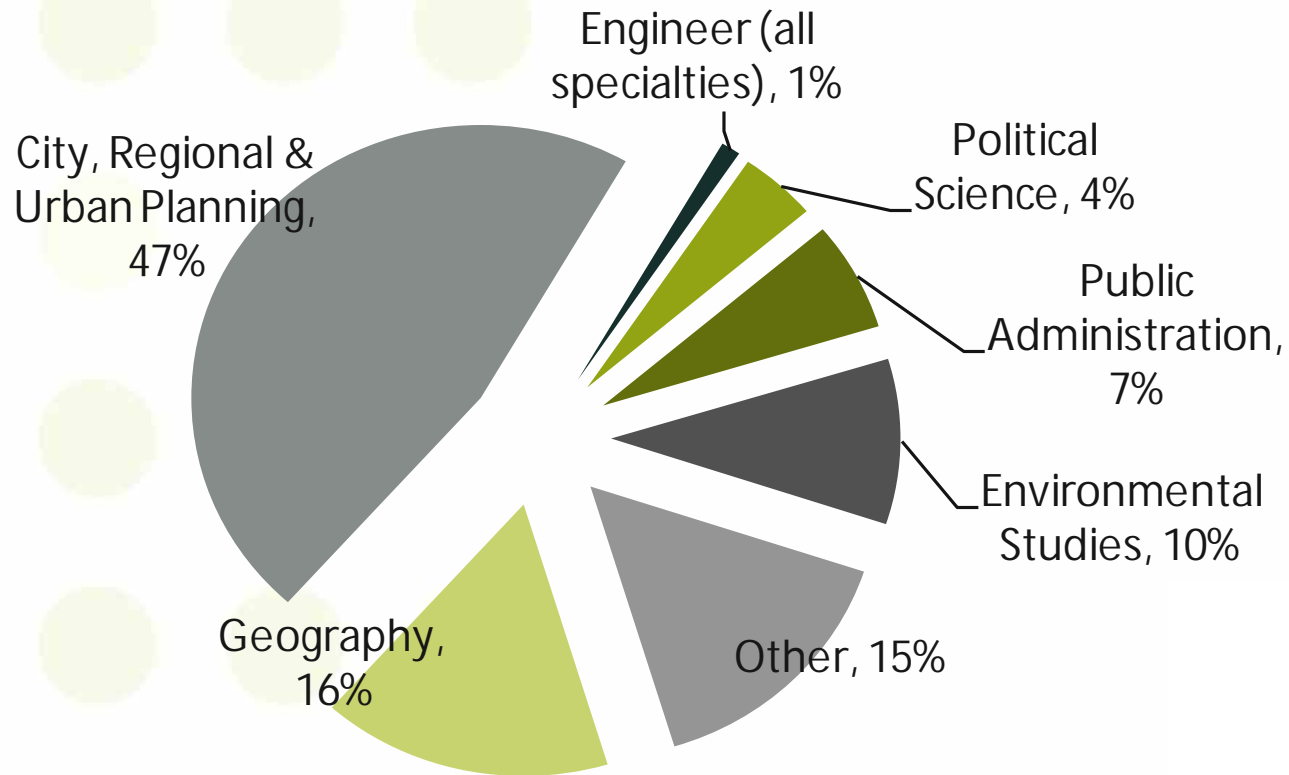
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## Planners: Education

*Exhibit 3: Education Majors for Planners*



What skills and knowledge do employers look for?



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## Planners: Typical Work Day

### Time Spent on Sustainability or Environmental Compliance Issues on a Typical Workday

Percentage of Workday	% of Respondents (# of Respondents)
76% - 100% of Workday	18% (17)
51% - 75% of Workday	9% (8)
26% - 49% of Workday	20% (19)
16% - 25% of Workday	19% (18)
Less than 15%	33% (31)

# What skills and knowledge do employers look for?



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## Planners: Tasks

- Apply for grants to develop and implement sustainability plans, programs and staffing
- Assist with the development of local sustainable land use and transportation policies
- Participate in regional policy-making related to sustainability
- Prepare ordinances to increase sustainability in municipalities
- Review and comment on environmental (CEQA/ NEPA) documents
- Review and issue Building Permits for green development (e.g. solar panels, LEED certified projects, etc.)

# What skills and knowledge do employers look for?



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## Planners: Employment Options



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What industries are driving growth in “green” employment?



What “green” skills and knowledge do employers look for?



Where should community colleges invest resources?

# Where should colleges invest resources?

## Green Job Opportunities



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Industry	Key Finding/Challenge	Recommendation
Solar	Sufficient supply of programs and courses	Most successful when teaching to industry certificate standards
Wind	Limited applications for colleges	Partnerships with employers near community college facilities; embed wind turbine technician training programs within existing programs
Energy Efficiency	2/3 of jobs are traditional occupations	Investment of new content into existing course material; relationship building; pipeline and apprenticeships, teaching to industry certification standards
Bio-energy	Slow industry growth means low employment	Monitor state and federal policy and legislation that may support the industry in California.
Alternative Transportation	Look to large fleets for local application.	Embed content into existing electrical and automotive programs.
Compliance & Sustainability	Application across industries, both private and public.	Most needed: knowledge of regulations and policy.

Where should colleges invest resources?

## Green Occupations: Applications



- Findings from these studies were used to update LMID's occupational profiles:  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)
- This information will help career counselors and workforce developers prepare students and job seekers for a variety of careers that have been impacted by the green economy.



# For More Info:



## Available now from the COE

- Solar Reports @ [www.coeccc.net/solar](http://www.coeccc.net/solar)
- Water & Wastewater Reports @ [www.coeccc.net/water](http://www.coeccc.net/water)
- Wind, Bio-energy, and more @ [www.coeccc.net](http://www.coeccc.net)

## Coming Soon from the COE

- Updated solar research – November 2011
- Mobile Media Study – November 2011
- Southern California Water & Wastewater study – November 2011



# Thank You!



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