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<th><strong>Docket Number:</strong></th>
<th>16-OIR-02</th>
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<tr>
<td><strong>Project Title:</strong></td>
<td>SB 350 Barriers Report</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>A Workforce for SB 350: Integral to Achieving Clean Energy &amp; Carbon Reduction Mandates</td>
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<tr>
<td><strong>Description:</strong></td>
<td>Presentation by Jim Caldwell - slides looking at workforce development needs for SB 350, and the role California Community Colleges can play in meeting them.</td>
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<td><strong>Filer:</strong></td>
<td>Chris Wymer</td>
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<td><strong>Organization:</strong></td>
<td>Jim Caldwell</td>
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A Workforce for California SB 350

Integral to Achieving Clean Energy & Carbon Reduction Mandates

March 2016
Key Questions

What workforce is required to implement SB 350 EE?

✓ What does the EE workforce look like today?
✓ What development is needed?
✓ How do we get it done?
✓ What role is envisioned for Stakeholders?
What does the workforce look like today?
EE Dominates California Advanced Energy Employment

- Building Energy Efficiency (303,117)
- Advanced Electricity Generation (94,873)
- Advanced Fuels (10,707)
- Advanced Grid Technologies (8,583)
- Advanced Transportation (14,554)

Job Growth versus Workforce Quality

- 2015 Advanced Energy job growth estimated at 17%\(^1\)
  - Versus the state’s 1% overall growth
  - Total Advanced Energy jobs estimated at 500,000

- Workforce competencies for SB 350 are undefined
  - Across the value chain?
  - Entry-level worker pipeline?
  - Incumbent workers?

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\(^1\) California Advanced Energy Employment Survey 2014, BW Research Partnership and Advanced Energy Economy
California EE Employment in the Trades

2015 California Employment

- Carpenters
- Electricians
- Plumbers, Pipefitters, and Steamfitters
- HVACR Mechanics and Installers
- Sheet Metal Workers
- Stationary Engineers and Boiler Operators

278,000 Workers
Economic Modeling Specialists International 2015
HVACR as a Leading Indicator For Workforce Change
HVACR Worker Growth Outpaces Forecasts

Combined Total of Sheet Metal Workers, HVAC Technicians, and Stationary Engineers
Economic Modeling Specialists International 2015
Entry-level HVACR Workers Are Unprepared

Based on 2013-15 workforce data

Workers failing to complete accredited programs: 8,712
Workers completing accredited programs: 4,403

Sources: EMSI Data 2015, Community Colleges Datamart, and SoCal Survey of Regional Training Programs
The HVACR Incumbent Worker Challenge

A very large percentage of 48,000 HVACR workers need new skills:

The need: determine feasibility, and type of required certification for providers of building code compliance and utility incentive programs, organized by building type and building sector.1

More than 150 industry-recognized, standards-based, and accredited HVACR credentials competencies are available to document worker capabilities.2

Only 33% of the state’s 48,000 HVACR workers hold an industry certification of any kind.3

It’s not clear that HVACR employers actually value industry certifications. A study of 284 HVACR job postings in the San Francisco Bay Area and Los Angeles County showed that NONE of the 150 industry-recognized certifications were listed as required or desirable qualifications for the job.

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1 California’s Existing Buildings Energy Efficiency Action Plan September 2015
2 Western HVAC Performance Alliance, WHPA Credentials List 2012
3 Western HVAC Performance Alliance, Census of Technicians and Contractors 2013
4 California Community Colleges Centers of Excellence, HVACR Labor Market Analysis Using Burning Glass Data 2013
The HVACR Training Gap: Persisting through 2025

Annual Training Analysis 2016-25

Statewide training gap persists above 4,000 completers through 2025

Sum of entry-level worker training and incumbent worker upskilling
- Includes community colleges plus estimate of Apprenticeships & private training institutions


Estimated Training Requirement  Statewide Training Capacity

Assumes: Continuation of 2012-15 growth rate through 2020 (at underforecasted attrition rate)
Incremental annual increases in accredited education capacity = 5% 2016-20; 10% 2021-25)
HVACR is Foundational to Multiple EE Careers

- Corporate Manager
- Owner/Contractor
- Product Manager
- Senior Engineer
- Energy Manager
- Trainer
- Construction Manager
- Sales Representative
- Engineer
- Commissioning Agent
- Facility Manager
- Project Manager
- Acceptance Tester
- Energy Auditor
- Energy Analyst
- Plan Checker
- Entry-level Engineer
- Refrigeration Specialist
- High Performance Building Operator
- Control Systems Technician
- HVAC Service Technician
- Building Operator
- HVAC Installation Technician

SoCal HVACR Collaborative December 2014
HVACR Industry Structural Challenges

The industry is poorly aligned with California’s EE Goals:

Few contractors and technicians are highly skilled and qualified to perform quality performance work.

Contractors who comply with HVAC code provisions incur higher costs that are difficult to pass onto customers in a highly competitive market.

Local building officials may not have the resources or knowledge to establish streamlined permitting systems to support quality HVAC installations or penalize contractors who do not comply.

Up to 50% of new HVAC systems and up to 85% of replacement systems are not installed and maintained to a quality level of specification.

Western HVAC Performance Alliance, Goal 2.3 & 2.4 WHPA Commercial QI/QM Working Group Gaps Report, December 2013
What development is needed?
Alignment and Synchronization

**HVACR Challenges Inform All Trades**

A synchronized industry solution is needed:\(^1\):

Lack of continuity and coordination characterizes building design, construction, installation, maintenance, and service.

Benchmarking will drive labor market demand:\(^1\):

Most buildings do not have a baseline measurement of current HVAC performance or energy consumption to compare against for the impact of efficiency improvements.

Synchronized workforce development is required:\(^2\):

Efforts are needed across all levels in the building industry on both the incumbent workforce that comprises the vast majority of building sector workers today, as well as those newly entering the industry and moving up.

---

\(^1\) Western HVAC Performance Alliance, *Goal 2.3 & 2.4 WHPA Commercial QI/QM Working Group Gaps Report*, December 2013

\(^2\) California's Existing Buildings Energy Efficiency Action Plan September 2015
Stronger Equity and Inclusion Initiatives

Community Colleges focus on inclusion

- Open enrollment is the statewide policy
- Majority of students receive free tuition, other financial aid provided
- New metrics for Equity now standard statewide
- Student success policies reflect strong support for inclusion

More needs to be done

- Broader industry engagement for inclusion
- Inclusion and Equity integral to all initiatives
- Enrollment strategies linking to community EE goals
- Completion strategies that leverage the full suite of student support strategies
ZeroNetReady Workforce:

A Synchronized EE Industry Initiative

Facilitated by the California Community Colleges
In support of the BOMA International ZeroNetReady Challenge
And California Zero Net Energy Goals
Alliances that Work

ZeroNetReady™ Partnership
Industry Participation
Professional Services Alliance
Apprenticeships Collaboration
Behavioral Analysis Research

Executive Institute for Energy Efficiency, ZNR endorsed by BOMA International
Collaboration with IOUs, WHPA, CALCTP, IFMA, CABEC, and others
Infusion of leading edge knowledge and skills
By ASWB Engineering and Energy Solutions
Joint program development with SMWIA, IBEW, and UA
UC Davis EE Center Research into student success, employment, curriculum alignment, new market trends

California Community Colleges 2.1M Students 113 Colleges 18
Major Influencers

California Community Colleges  2.1M Students  113 Colleges
ZNR: A Paradigm Shift

- Industry alignment on common goals
  - ZeroNetReady buildings; ZeroNetReady workforce
  - Clear linkages between SB 350 EE mandates and workforce outcomes

- Measurability
  - Common metrics: K-12 thru employment, lifelong learning
  - Equity and diversity metrics across all community colleges

- Accountability
  - Industry steering committee
  - Indexed to SB 350 EE mandates

- Scalability
  - Evidence-based program planning
  - Replicable programs for statewide adoption

... Facilitated by the California Community Colleges
A Systematic Approach

- **Deep Industry Engagement**
  - Driving leading-edge education and training
  - Linking a ZeroNetReady workforce to market actor priorities
  - Coupling workforce competencies to actual EE achievement

- **Strategic Workforce Development**
  - Collaboration between Community Colleges and Apprenticeship Programs
  - Research and experimentation with evidence-based models
  - Faculty networks driving innovation
  - Scaling across a statewide network

- **Sustainable Workforce Advancement**
  - Leveraged/braided funding from multiple sources
  - Standard metrics for reporting and refinement
Active Programs Now Underway

Value Chain

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<tr>
<th>Purchasers</th>
<th>Building Owners and Managers</th>
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<tbody>
<tr>
<td></td>
<td>Facilities Managers</td>
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<tr>
<td></td>
<td>Energy Managers</td>
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<tr>
<td>Specifiers</td>
<td>Architects</td>
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<td>Engineers</td>
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<td>Sales</td>
<td>Sales and Distribution</td>
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<td>Installation</td>
<td>Building Contractors</td>
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<tr>
<td></td>
<td>Installers</td>
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<td>HVAC Technicians</td>
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<td>Sheet Metal Workers</td>
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<td>Building Inspectors</td>
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<tr>
<td>Operations &amp; Maintenance</td>
<td>Building Operators</td>
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<tr>
<td></td>
<td>Building Operations &amp; Maintenance Contractors</td>
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<tr>
<td></td>
<td>HVAC Maintenance Technicians</td>
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Program Delivery Model

Rapid Prototyping and Statewide Scaling

- Strategic College and Apprenticeship Partnerships
- Scaling Mechanisms
- Local / Regional Implementation by Colleges & Apprenticeships
- Sustainability
- Expert Networks
  - HVAC
  - Lighting
  - Auditing & Analysis
  - Building Science
- Program Development
- Professional Development
- Strategic Industry Partnerships

California Community Colleges 2.1M Students 113 Colleges
Developing the Evidence

- Research Partnerships
  - UC Davis Energy Efficiency Center -- HVAC & Lighting workforce
  - Energy Marketing Innovations -- Industry-valued Credentials
  - RP Group -- Attracting students with high probability of success in EE
  - Centers of Excellence -- Labor market analysis
  - BOMA International -- ZeroNetReady Challenge data collection & analysis
  - WestEd -- Community College LaunchBoard metrics & reporting

- Experimentation
  - Program development with partner colleges & Apprenticeships
  - Statewide program scaling through Faculty Expert Networks
  - Industry engagement in regional collaboratives
  - Faculty professional development in codes, standards, and technology
  - Technology-enabled learning models
  - Communications strategies -- deep stakeholder engagement
Current Structure

Industry Alliance
Statewide Council of Advisors

Regional Collaboratives’ Advisory Councils

Programmatic Guidance

Regional Collaboratives

Strategic Guidance

Community Colleges
ECU Sector Team Facilitation

Research

Experimentation

Faculty Expert Networks

Execution

Regional Programs

Feedback and Refinement

California Community Colleges 2.1M Students 113 Colleges
Proposed Structure: 2018

Industry Alliance
Statewide Council of Advisors

Regional Collaboratives
Regional Collaboratives' Advisory Councils

Programmatic Guidance

Strategic Guidance

Energy, Construction & Utilities Institute
NEW in 2018

Research
Experimentation
Faculty Expert Networks

Execution

Feedback and Refinement

Community Colleges
ECU Sector Team Facilitation

California Community Colleges  2.1M Students  113 Colleges
Longer Term Vision

Clean Energy & Pollution Reduction
Workforce Institute

Energy Efficiency

Renewables

Transportation

Community Colleges
ECU Sector Team
Facilitation

Industry Alliance
Statewide Council of Advisors

Regional Collaboratives:
Advisory Councils

Programmatic Guidance

Community Colleges
ATRE Sector Team
Facilitation

NEW in 2018

Energy Construction
& Utilities Institute

Research

Execution

Faculty Expert
Networks

Regional Programs

California Community Colleges
2.1M Students
113 Colleges
What Role is Envisioned For Stakeholders?
How shall we engage?

- Providing input to SB 350 deliverables?
- Leveraging Federal resources?
- Developing EE workforce initiatives?
- Creating inclusionary opportunities?
- Expanding industry participation?
- Addressing new funding sources?
- Formalizing reporting and accountability?
- Data sharing?
Thank You

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