White Certificates:
Mechanisms and Experiences

Edward Vine

Lawrence Berkeley National Laboratory
&
California Institute for Energy and Environment

Seminar on White Certificates:
An Expert Exploration for California Policy Makers

California Energy Commission
Sacramento, CA
September 19, 2007

Nomenclature

- White certificates
- Energy saving certificates
- Energy efficiency certificates
- White tags

The Potential of Energy Saving Certificates (ESC) as a Major Tool in Greenhouse Gas Reduction Programs

March 29, 2007

Jan Hamrin, Center for Resource Solutions
Edward Vine, LBNL
www.resource-solutions.org

Center for RESOURCE SOLUTIONS

Topics

- Purpose of White Paper & Definitions
- Uses of ESCs & Principles for Use
- Experience to Date
  - International (Italy)
  - U.S. (Connecticut)
- EM&V Issues
- Reporting, Tracking & Accounting
- Technical Opportunities
- Potential ESC Policy Opportunities
- Issues and Solutions: Roadmap
- ESCs for California?

Purpose of White Paper

- Report on current status of ESCs
- Assess evaluation, measurement & verification (EM&V) issues
- Explore reporting, tracking and accounting
- Special technical opportunities
- Potential policy opportunities
- Issues & barriers
- Possible roadmap

Definitions

- Energy Savings Certificate (ESC) – an instrument issued by an authorized body guaranteeing that a specified amount of energy savings has been achieved.*
- Energy Efficiency Portfolio Standard (EEPS) – a market-based mechanism that sets a specific target for energy savings to encourage more efficient generation, transmission, and use of electricity and natural gas.

* ESCs-a tool that can be used with a variety of programs

Uses

Four primary uses for ESCs:

- To verify compliance with energy savings target (e.g.,. EEPS)
- As a trading device for meeting energy savings (GHG) obligation
- To demonstrate eligibility for tax incentives, subsidies or carbon offset programs
- All of the above within a larger allowance, certificate, or project credit trading regime where the ESC benefits equal or exceed their incremental cost

Principles for Use of ESC (1)

Programs that use ESCs should:

- Have transparent rules & procedures
- Information available to public
- Designed so program does not:
  - Exacerbate lost opportunities
  - Undermine special needs
  - Undermine longer payback measures

Principles for Use of ESC (2)

Programs that use ESCs should (cont.):

- Have technical provisions that ensure real, measurable, verifiable and beyond BAU (i.e., additional) energy savings
- Have a mechanism for independent verification
- Be inclusive and support environmental equity

Experience to Date

Italy – has most extensive experience

- France – most recent program using ESCs
- New South Wales (Australia) – first program started (GHG reduction program)
- UK (EEC-2, 2005-2008) – next best experience

International Drivers

- EU compulsory national primary energy savings targets
  - Goals: National security
  - Meeting GHG reduction targets
  - Reducing burdens to the poor
- New South Wales
  - Established to meet GHG reduction goals

Approaches Used Internationally

- Fund energy savings in own customer's dwellings
- Contract with appliance retailers who increase EE goods in exchange for $$ from energy supplier
- Use energy service companies
  - Key area of emphasis: how to get the private sector more involved in promoting energy efficiency??
  - Non-energy benefit: economic development (more jobs)

Italy (1)

- Goal: reduce energy intensity (energy use per domestic product) by 2% / year until 2015 - then 2.5% / year until 2030
- 2001: gas and electricity distribution companies with more than 100,000 customers in 2001 must achieve annual energy savings targets during a five-year period (2005-2009). Program became operational in 2005.
- Targets are for savings achieved each year; future expected savings not included.

Year	***Target (Mtoe/yr)***	
	Electricity distributors	*Gas distributors*
2005	0,1	0,1
2006	0,2	0,2
2007	0,4	0,4
2008	0,8	0,7
2009	1,6	1,3

Italy (2)

- ESCOs can earn credits and sell them to distribution companies
- Distribution companies reduce energy use by:
  - Implementing EE programs for their own customers or for customers of other distributors
  - Jointly operate programs with ESCOs, product manufacturers, installers, or financial institutions
  - Buy ESCs from third parties
- If obligated parties fall short of targets, there is a penalty for non-compliance
  - Shortfall may be made up in subsequent years
- Projects in all end-use sectors are eligible
- Maximum lifetime of projects: 5 years (exceptions for some measures - 8 years)

Italy (3)

- ESCs can be traded (bilaterally or through an organized, official market) or banked, but not borrowed
  - Registry: records certificates bought and sold (supported by registration and trading fees)
  - ESCs are issued to all distributors, ESCOs, and energy service providers
  - Any interested party can participate in the spot market
- ESCs are valid for up to 5 years
- EM&V - 3 tiered approach [later slide]

Italy (4)

- Results so far (since Jan. 1, 2005):
  - 1,100 energy saving projects
    - ▲ 60% performed by ESCOs
    - ▲ 40% by electricity and gas distributors
  - Popular measures:
    - ▲ Cogeneration, district heating improvements, and public lighting
  - Reliable but simplified energy savings calculation techniques and verification rules were used:
    - ▲ 75% used default savings estimates
    - ▲ 21% used engineering estimates with some metering
    - ▲ 4% used monitored savings
  - Overall energy savings target for first year achieved - surplus ESCs were banked

Italy (5)

- Update (Sept. 4, 2007):
  - The second year target (2006) has been reached
  - The number of certificates issued so far is almost double the targets of the first two years of implementation
  - As a result of the supply surplus, together with the lack of targets for the post-2009 period, the price of certificates has dropped
  - Next steps to increase demand and provide certainty to investors:
    - Approve targets for the post-2009 period
    - Lower the threshold that identifies obligated distributors
    - Publicize "deemed savings" for those technologies that have attracted the most attention and/or whose markets have been particularly dynamic

U.S. Experience

Primarily associated with EEPS:

- CA – IOUs have specific energy and demand savings goals
- CO – Part of settlement agreement with PSCO
- CT – RPS - includes EE
- Hawaii – RPS - includes EE
- NV – RPS - includes EE
- PA – Alternative energy portfolio standard - includes EE
- TX – Set energy goals as % of forecasted load growth
- VT – Sets energy & demand goals for overall public benefits program

Connecticut - Leading State

- EE is part of state RPS (as amended in 2005)
- Electricity suppliers must procure % of electricity supply from EE & CHP:
  - 1% -- 2007
  - 2% -- 2008
  - 3% -- 2009
  - 4% -- 2010
- Only for commercial /industrial facilities
  - Residential customers excluded

Connecticut - Only U.S. State Using ESC (1)

- Utilities seek additional energy savings:
  - Expand existing programs
  - Purchase verified energy savings from third parties (ESCOs)
  - Buy energy savings certificates directly from the state

Connecticut - Only U.S. State Using ESC (2)

- Estimated savings based on deemed values
- Impact evaluations later verify and true-up savings
- Administered by Energy Conservation Management Board
  - Reports to DPUC
  - Has fairly strong role though
  - Utilities implement evaluation

Sterling Planet

- Trademarked “White Tags”
- One of four main business areas
- Using computer-based technology for M&V
  - Set baseline for building
  - Verify measure(s) actually installed & operating
  - Collect recent billing & weather data (to calculate current energy use in building)
  - Calculate savings (baseline energy use minus current energy use)
  - Only applicable to commercial/industrial customers
- Experience to date -- just started in 2007

EM&V Issues (1)

- Italy – three approaches:
  - Deemed Savings
  - Engineering Approach (with some field measurement)
  - Energy Monitoring
- Most projects to date based on deemed savings & engineering approach
- Additionality
  - When deemed savings calculation or engineering evaluation algorithm are used:
    - ▲ Measures are additional if they exceed the average technology sold at the national level

EM&V Issues (2)

- Italy Additionality (cont.)
  - When energy monitoring is used:
    - ▲ Additionality must be demonstrated, and must exceed market trends and those legislatively required
  - Italy has the only ESC scheme that looks at free riders in analysis of energy savings
- New South Wales
  - First establish BAU baseline
  - All eligible projects must be additional

Reporting, Tracking & Accounting

- Can use same electronic tracking systems as RECs for all purposes:
  - Establish property rights
  - Avoid double counting / selling
  - Prove compliance
  - Can integrate voluntary and compliance markets
  - Primary issues: Verification of data and entry into system
    - ▲ Both a technical & economic issue
    - ▲ Goals of special purpose programs can be accommodated

Technical Opportunities

- Behind-the-meter (BTM) & thermal technologies:
  - BTM renewable electricity generation (PV, wind, small biomass)
  - Solar water heating
  - Geothermal and air source heat pumps
  - Renewable thermal power (e.g. waste heat)
  - Smart Communities and mini-grids
  - Combined heat & power (cogen)
- These often fall between the cracks (Supply? Demand?)
  - But many allowed in Italy, Great Britain, and France
- No unique EM&V issues

Potential ESC Policy Opportunities

- For GHG reduction policies
  - Integrate as part of cap & trade programs (can be bought, sold & traded)
- For separate EE programs:
  - RPS
  - EEPS
  - Voluntary markets
- Use to encourage aggregation
  - By local governments
  - By private marketers

Designing & Implementing an ESC Program (1)

- Key activities :
  - Program administration
  - Program marketing
  - Monitoring and evaluating projects
  - Setting energy savings targets
  - Setting baselines
  - Choosing eligible technologies
  - Establishing a process for issuing and tracking certificates
  - Verifying the data that are the basis for issuing certificates
  - Certifying certificates
  - Establishing a trading system for certificates
  - Detecting noncompliance

Designing & Implementing an ESC Program (2)

- Activities specific to use of ESCs:
  - Choosing eligible technologies (EM&V and additionality issues)
  - Verifying data that are basis of issuing certificates
  - Certifying certificates
  - Establishing a trading system

Key Issues

- Balancing and reducing transaction costs
- EM&V
  - Protocols; tiered approach (Italy)
- Eligible projects & cream skimming
  - Lost opportunities; free riders
- ESCs & emissions trading
  - Integration?
- Savings targets
- Integrating RECs and ESCs
- Ownership of ESCs
- Double counting / selling

Where to Use ESCs?

- Where there is a hard target
  - Energy savings target or
  - Carbon reduction target
- Where there is a significant penalty for non-compliance
- Where the program is large enough to justify the incremental costs of ESCs
- In the voluntary market where energy savings credibility is an absolute necessity

Where Are ESCs Not Recommended?

- EE measures & programs that could be considered BAU (not additional)
- Existing state and utility EE programs that are operating fine as they are
- Smaller EE programs where transactional costs cannot be justified
- Special purpose programs – unless specifically designed to use ESCs as financing incentive

Elements for a Successful ESC Program

- Transparent rules & procedures
- Information available to public
- M&V system that ensures real, measurable, verifiable and additional energy savings
- Independent third-party verification system
- A process for issuing & tracking certificates
- A system for detecting noncompliance including significant penalties

End of Report

An ESC Program for California?

- Look at energy savings potential
- Look at reported energy savings versus goals
- Look at evaluated energy savings
- Climate change driver for energy efficiency: AB 32
- Conclusion: Need for additional strategies for promoting energy efficiency

2006 CA Potential Study

(Source: Jean Shelton, Itron, May 3, 2007)

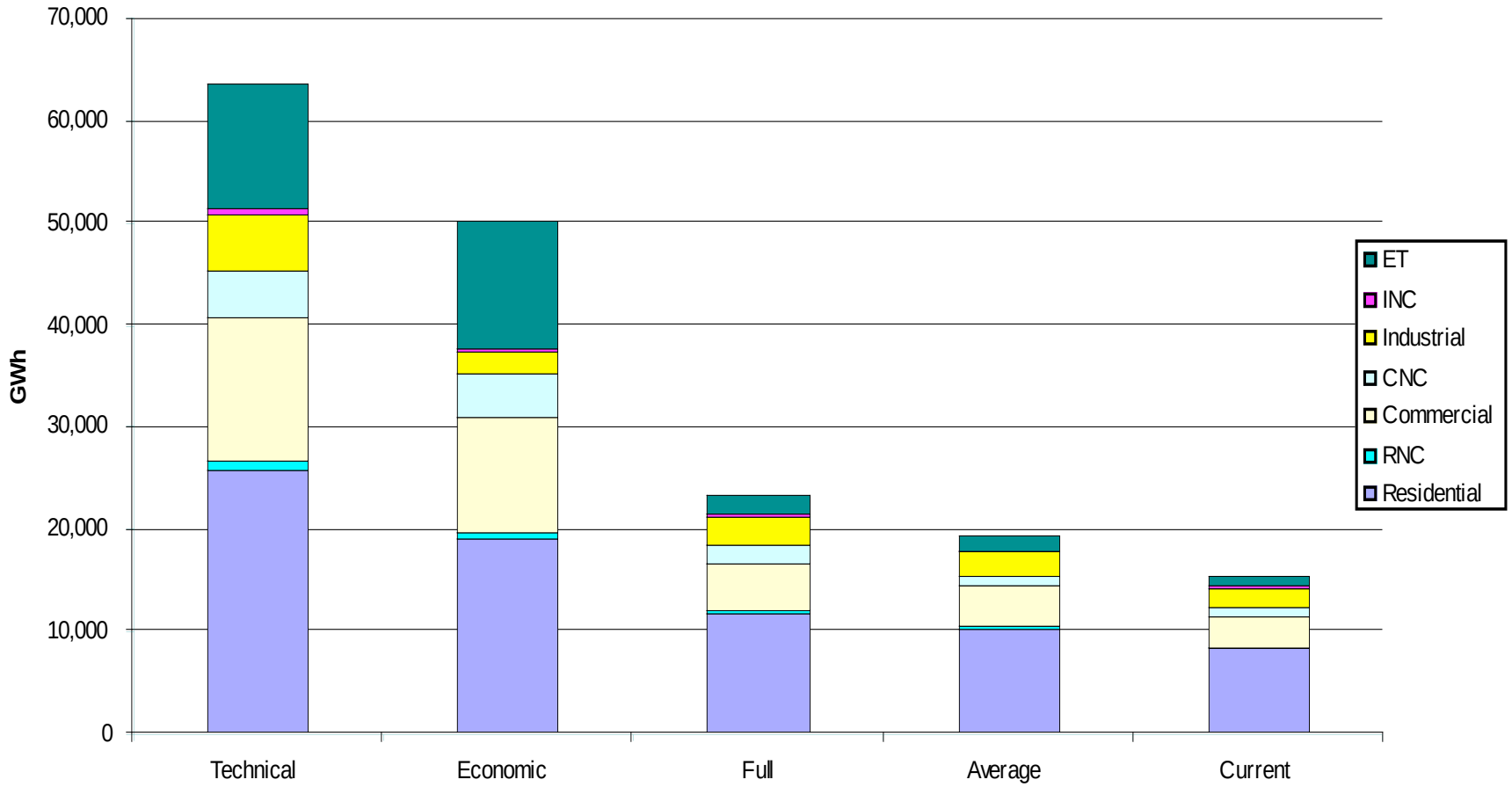
- 2006 CA Potential Study used the recent CEUS, RASS, and DEER databases to estimate the energy savings potential for the 4 IOUs.
- Focused on measures currently in the IOU programs.
- Designed to estimate the remaining potential by sector, segment, climate zone and technology to help the IOUs focus their program offerings.
- Sectors included Existing Residential, RNC, Existing Commercial, CNC, Existing Industrial, INC, and Emerging Technology.

Scenarios for the 2006 Analysis

(Source: Jean Shelton, Itron, May 3, 2007)

- **Technical Potential:** The most efficient technology option is selected subject to applicability, feasibility, and availability.
- **Economic Potential:** The most efficient cost effective technology option is selected subject to applicability, feasibility, and availability.
- **Current Market Potential:** A market simulation of the current utility programs assuming the continuation of current rebates. Restricted to measures currently in IOU programs.
- **Average Market Potential:** A market simulation of the current utility programs assuming a rebate half way between current rebates and incremental cost. Includes measures not currently in IOU programs.
- **Full Market Potential:** A market simulation of the current utility programs assuming a rebate equal to incremental cost. Includes measures not currently in IOU programs.

2006 Study Gross Electric Energy Potential in 2016
(13-year forecast)
(Source: Jean Shelton, Itron, May 3, 2007)



2006 Study Gross Electric Energy Potential in 2016

(13-year forecast, GWh)

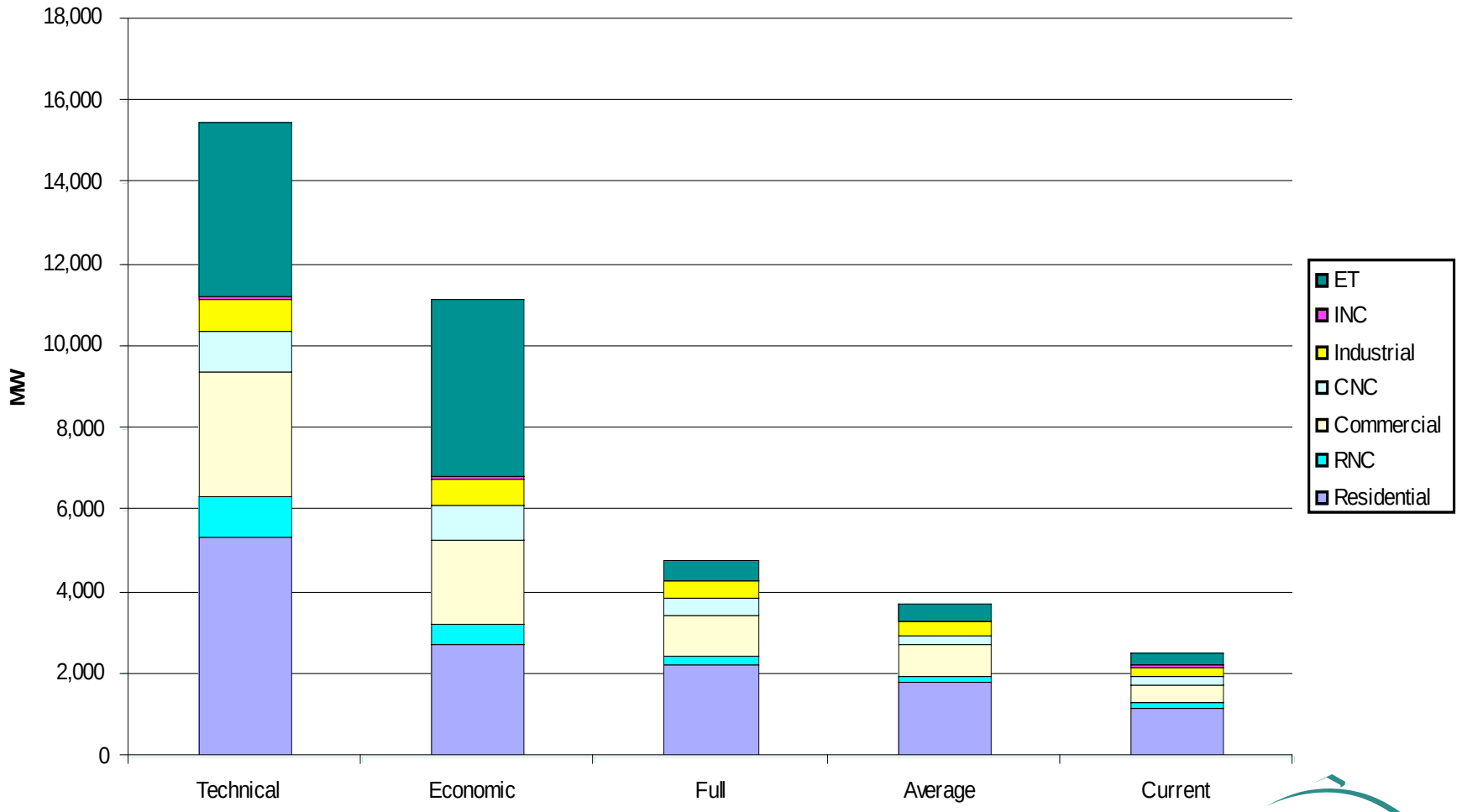
(Source: Jean Shelton, Itron, May 3, 2007)

Scenario	Res	RNC	Com	CNC	Industrial	INC	ET	Total
Technical	25,807	1,099	13,932	4,553	5,485	457	12,481	63,814
Economic	19,226	635	11,290	4,093	2,200	452	12,481	50,377
Full	11,757	255	4,720	1,938	2,748	261	1,663	23,342
Average	10,309	147	4,104	978	2,284	243	1,369	19,434
Current	8,445	147	3,000	978	1,706	243	1,075	15,594

2006 Study Gross Demand Potential in 2016

(13-year forecast)

(Source: Jean Shelton, Itron, May 3, 2007)



2006 Study Gross Demand Potential in 2016

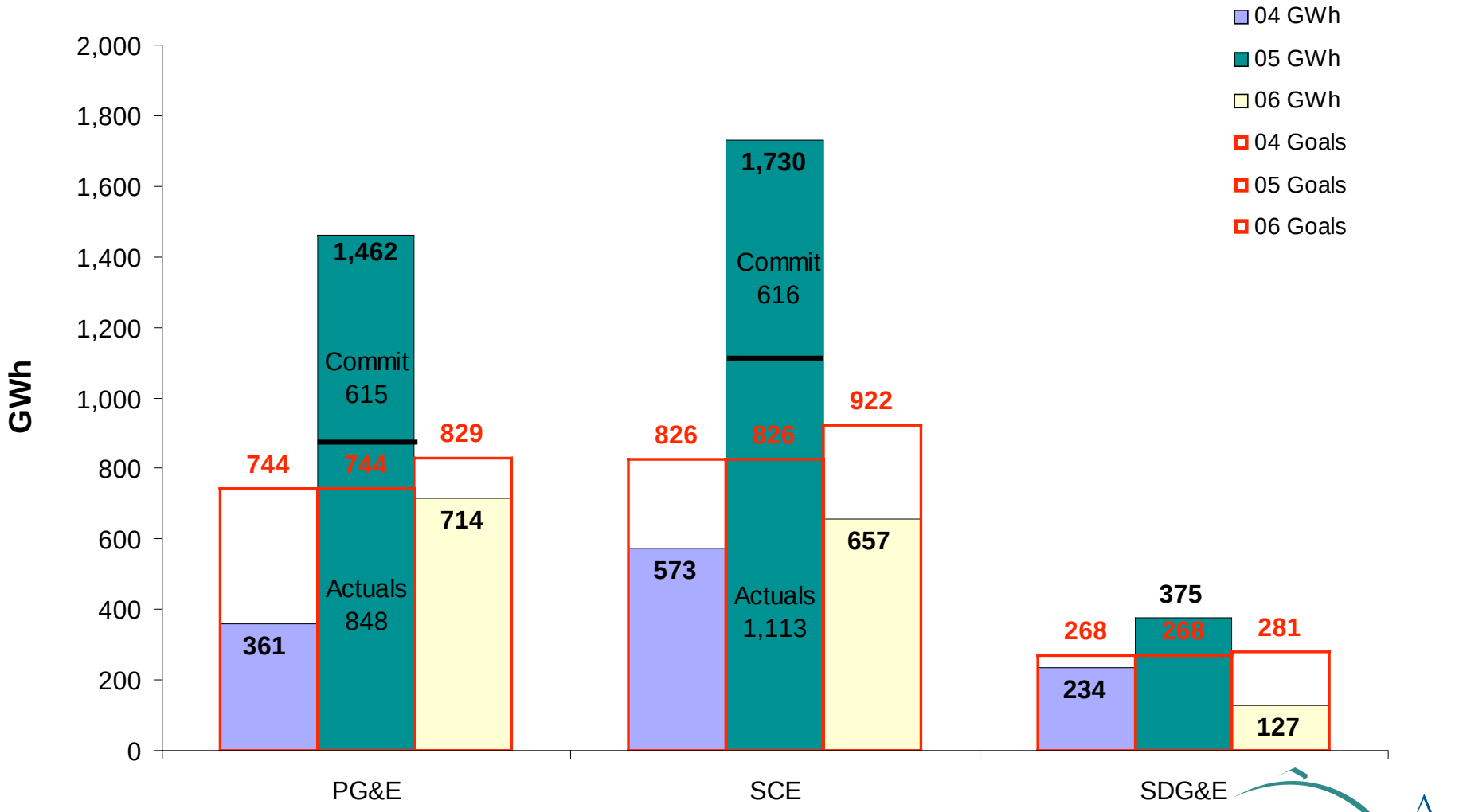
(13-year forecast, GW)

(Source: Jean Shelton, Itron, May 3, 2007)

MW	Res	RNC	Com	CNC	Industrial	INC	ET	Total
Technical	5,365	948	3,096	961	755	70	4,288	15,483
Economic	2,729	533	1,996	879	657	69	4,288	11,151
Full	2,233	255	982	436	378	41	494	4,819
Average	1,827	142	787	215	301	39	392	3,703
Current	1,161	142	461	215	216	39	291	2,525

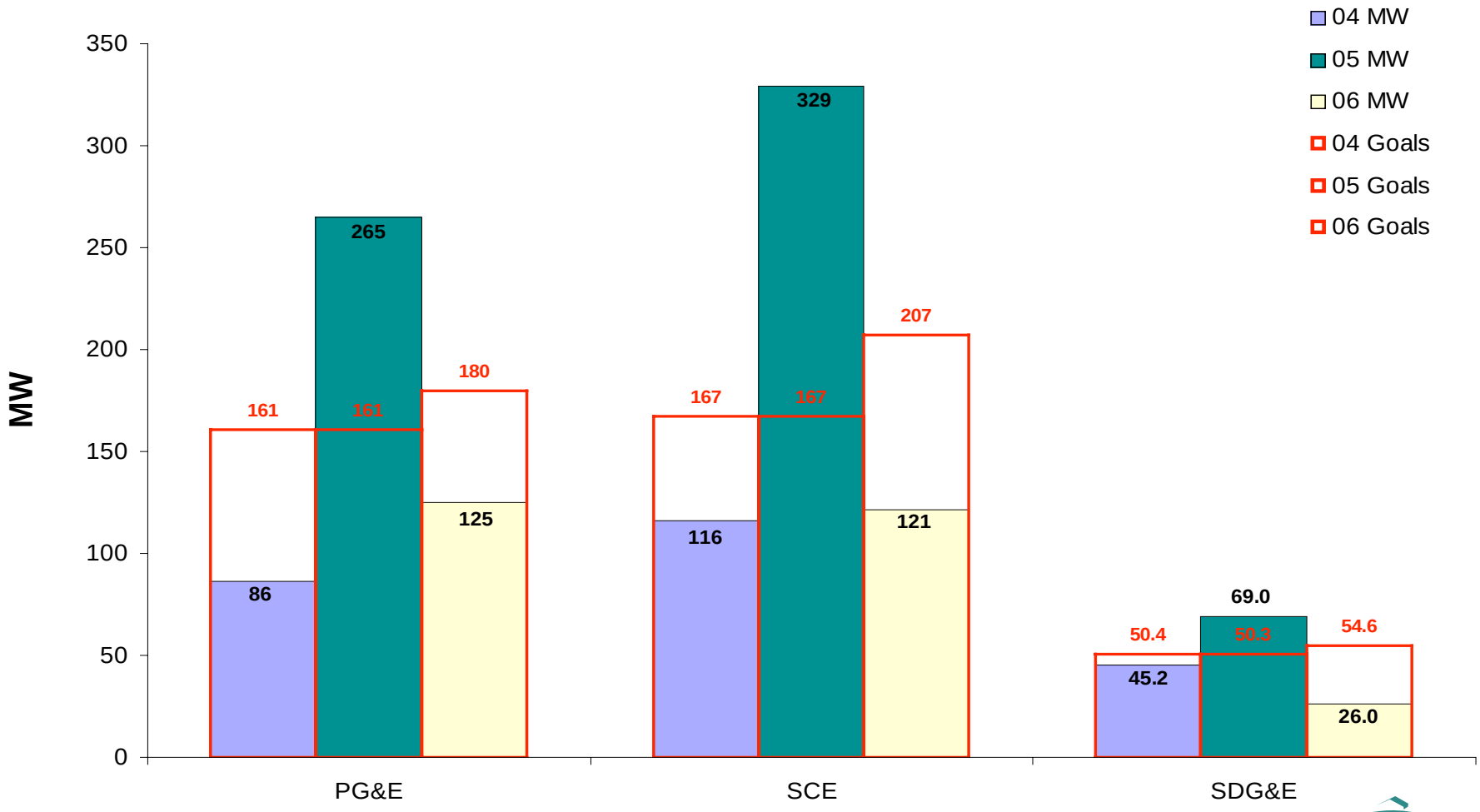
CPUC Goals Compared to Reported Net GWh Savings

(Source: Rachel Harcharik, Itron, May 3, 2007)



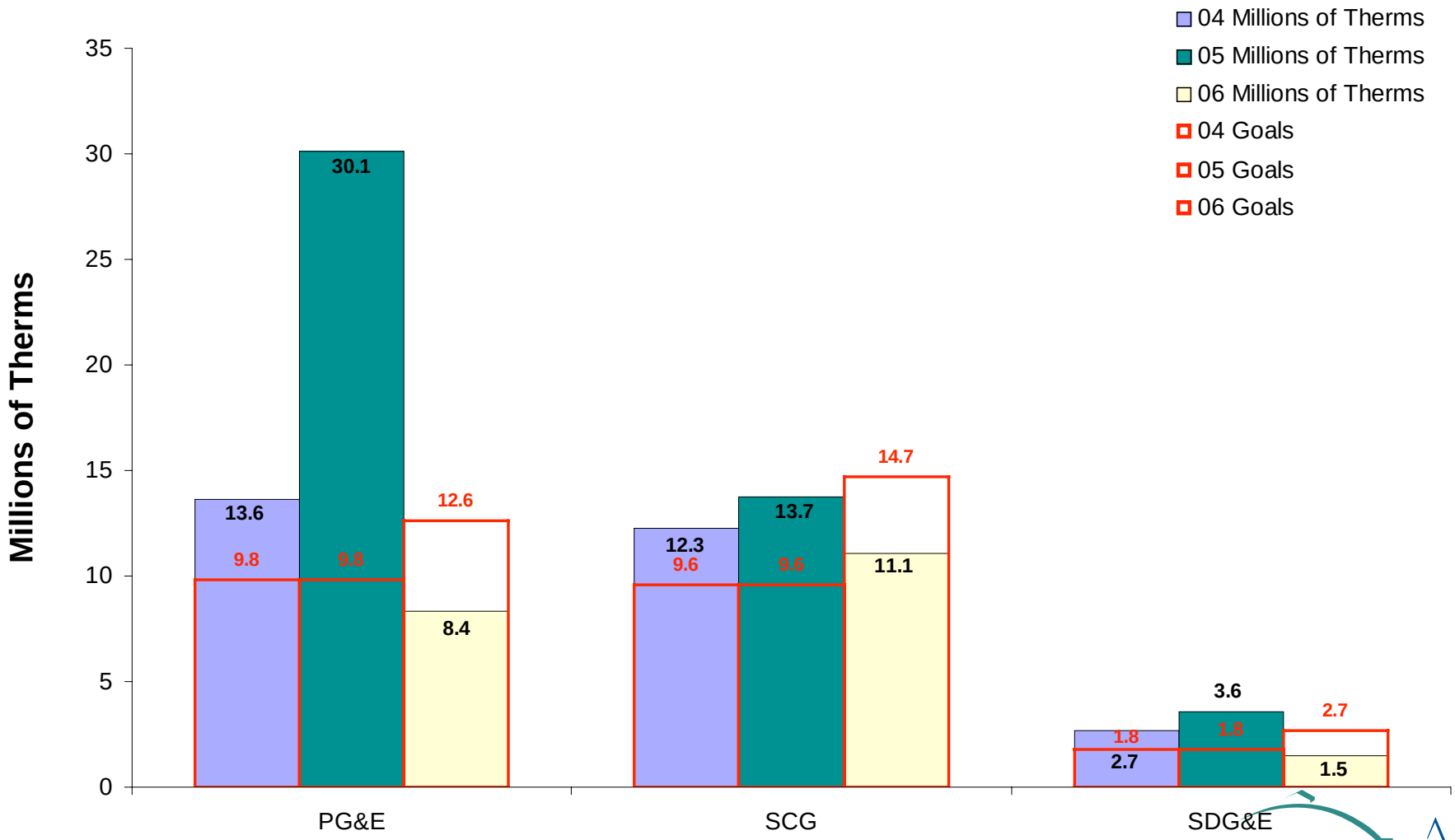
CPUC Goals Compared to Reported Net MW Savings

(Source: Rachel Harcharik, Itron, May 3, 2007)



CPUC Goals Compared to Reported Net Therm Savings

(Source: Rachel Harcharik, Itron, May 3, 2007)



Preliminary Findings on 2004-05 IOU Programs

(Source: Carmen Best and Nick Hall, TecMarket Works, May 3, 2007)

- 33 of 63 (50%) expected impact evaluations completed
  - 16% of portfolio kWh annual goals
  - 39% of portfolio therm goals
- Portfolio goals are concentrated in statewide programs; only one statewide evaluation has been finalized (Multifamily Energy Efficiency Rebates)
- Non-Statewide program types (Local IOU, Governmental, and Third Party) are well represented in the data.
  - 79 % of kWh goals for non-statewide programs
  - 89% of therm goals for non-statewide programs

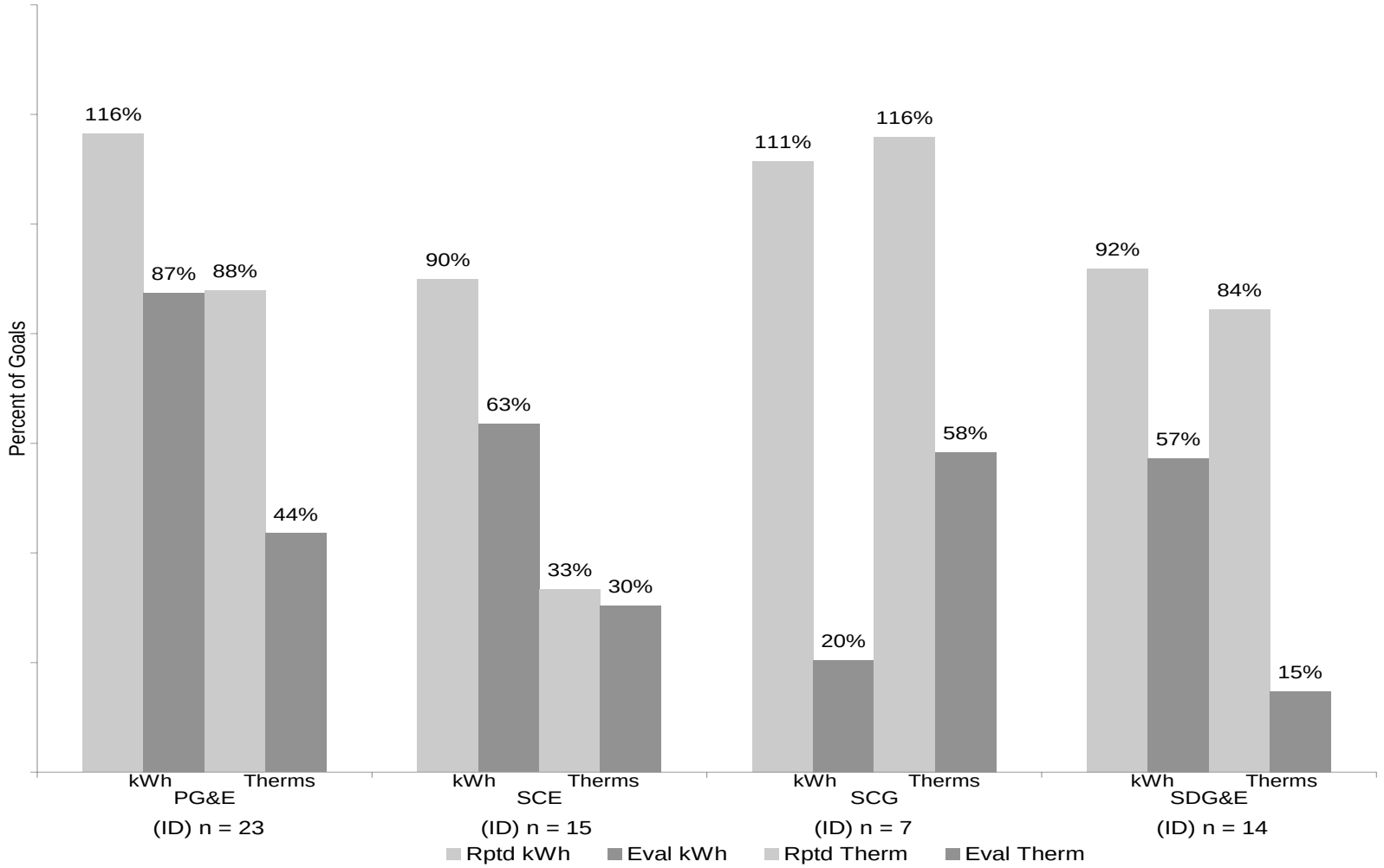
What types of impact evaluation methods were used for these programs?

(Source: Carmen Best and Nick Hall, TecMarket Works, May 3, 2007)

- 97% of savings evaluated included measure verification
- 91% of savings evaluated included additional field information to inform adjustments to savings assumptions
  - 37% evaluated with metering
  - 31% evaluated with billing data
  - 20% evaluated with survey information
- Survey-based freeridership analysis was done for just over half (55%) of the savings evaluated

Preliminary Findings on 2004-05 IOU Programs

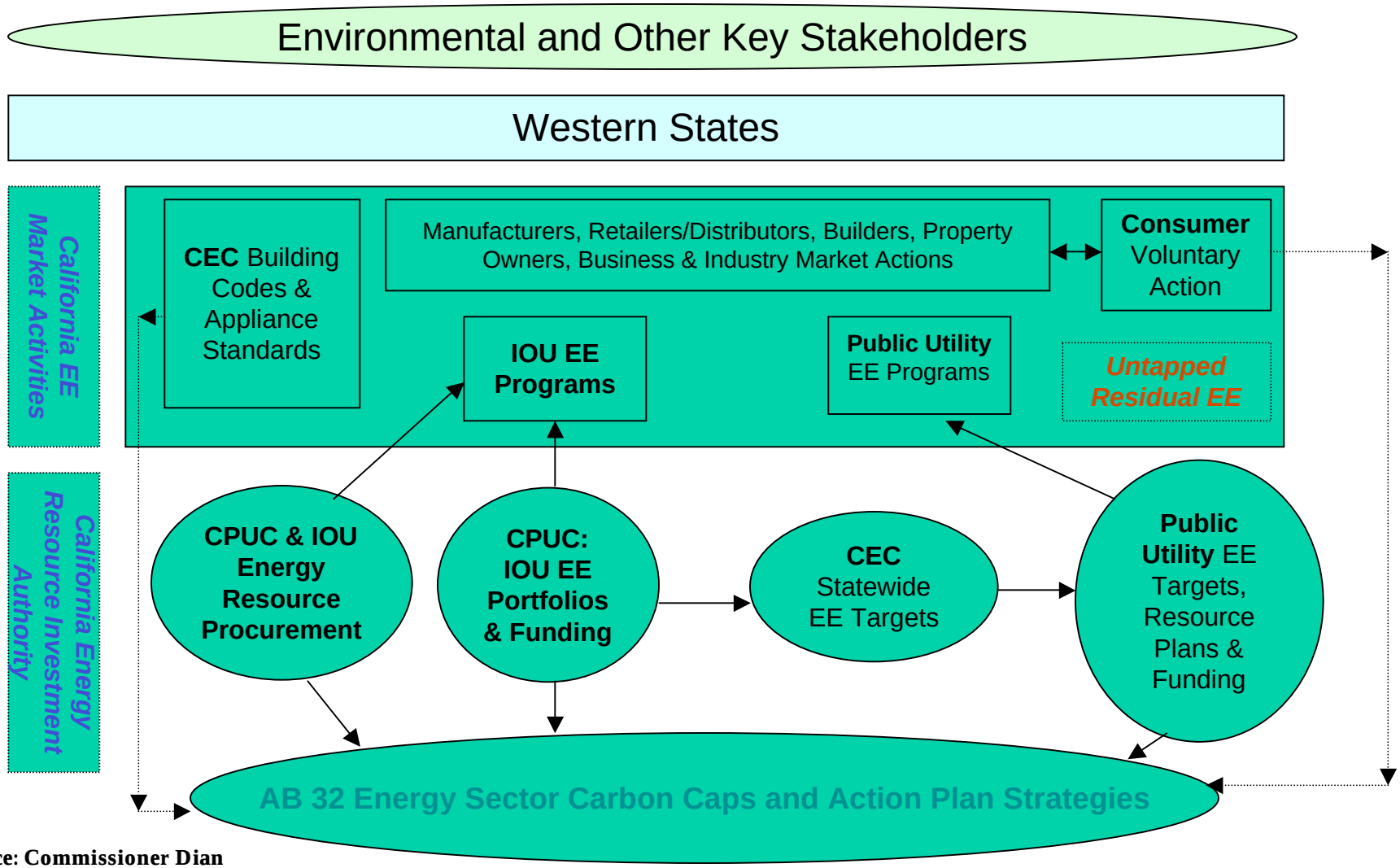
(Source: Carmen Best and Nick Hall, TecMarket Works, May 3, 2007)



AB 32 (Núñez-Pavley): Global Warming Solutions Act of 2006

Establishes the goal of reducing GHG emissions by 25% below levels now projected for 2020

Conceptual View: *How to Tap "All Cost-Effective Energy Efficiency" Potential?*



Source: Commissioner Dian Grueneich, CPUC, May 14, 2007

New York Proposal

- NYDPS - Staff Preliminary Proposal for EE Program Design and Delivery (August 28, 2007)
  - "Independent EE program providers can play a significant role in achieving the NY Energy Portfolio Standard (EPS) goals"
  - "Creating a third-party 'white tags' market that taps private-sector investment more effectively than traditional program designs should also be considered."

One Final Thought

- Make sure we do not create perverse incentives
  - An incentive that has unintended and negative consequences

Contact

Edward Vine

LBNL & CIEE

510/486-6047

Elvine@lbl.gov

Edward.Vine@ucop.edu

CRS report:

http://www.resource-solutions.org/lib/allpubs.htm

Time for Questions