TRIO ROUNDTABLE:

THE IMPORTANCE AND ROLE OF COST EFFECTIVENESS IN UTILITY PROGRAMS

September 26, 2013
Cal Poly Pomona

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

Pacific Gas and Electric Company

Southern California Gas Company
A Sempra Energy utility

SDGE
A Sempra Energy utility

SAFETY MESSAGE

- In Case of Emergency

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WELCOME AND BIG PICTURE

Speaker:

Robyn Zander: Senior Program Manager

Emerging Products/New Programs Delivery & Launch | SCE

TODAY'S OBJECTIVES AND AGENDA:

- The goal of today's TRIO program is to educate the participants on:

1. The regulated environment
2. The importance of cost effectiveness
3. How to measure cost effectiveness
4. Tools the utilities use to measure cost effectiveness
5. Successful cost effective programs

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WHAT IS TRIO?

- The Technology Research Incubation and Outreach (TRIO) is an initiative within the California Statewide Emerging Technologies Program
- TRIO is utilized by the CA Utilities to engage with Energy Efficiency and Demand Response product developers prior to commercialization
- TRIO is how we share the utility story
- How the utilities outreach to educate future implementers of utility programs
  - Diversified Business Enterprises (DBE)

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WHY TRIO?

- The US, and especially California, is known for it's innovation
- Utility companies have limited to no product development and rely on the university venture and corporate innovators to provide energy efficiency and demand response solutions
- Improving vendor knowledge of utilities' needs and perception of customer needs is a valuable development catalyst
- Reducing our energy requirements is not only good for our environment, but it saves money!

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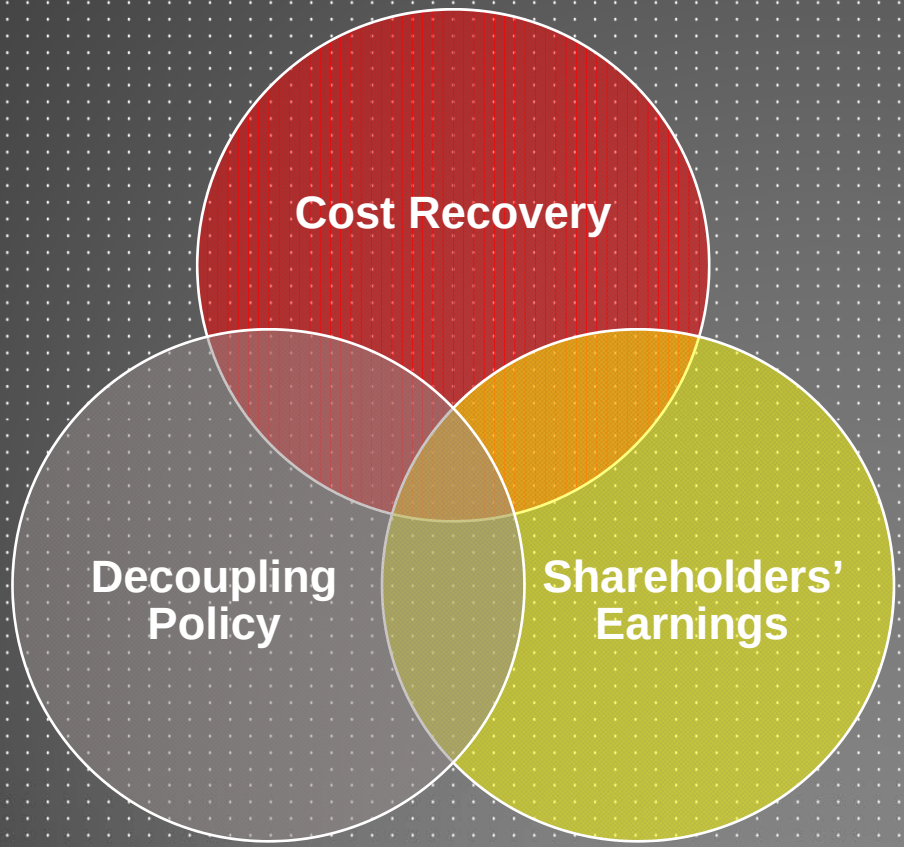
California's Progressive Utility Regulatory Model



California's Investor Owned Utilities have no incentive to sell more electricity

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"Decoupled" Business Model

- Under California's decoupling framework:
- Revenue is "decoupled" from earnings
- Regulated utilities collect only "authorized" revenues to run their business and provide a fair return on invested capital to investors
  - If sales rise above forecast levels, rates are adjusted downward
  - If sales fall below forecast levels, rates are adjusted upward

Decoupling removes the incentive to sell more

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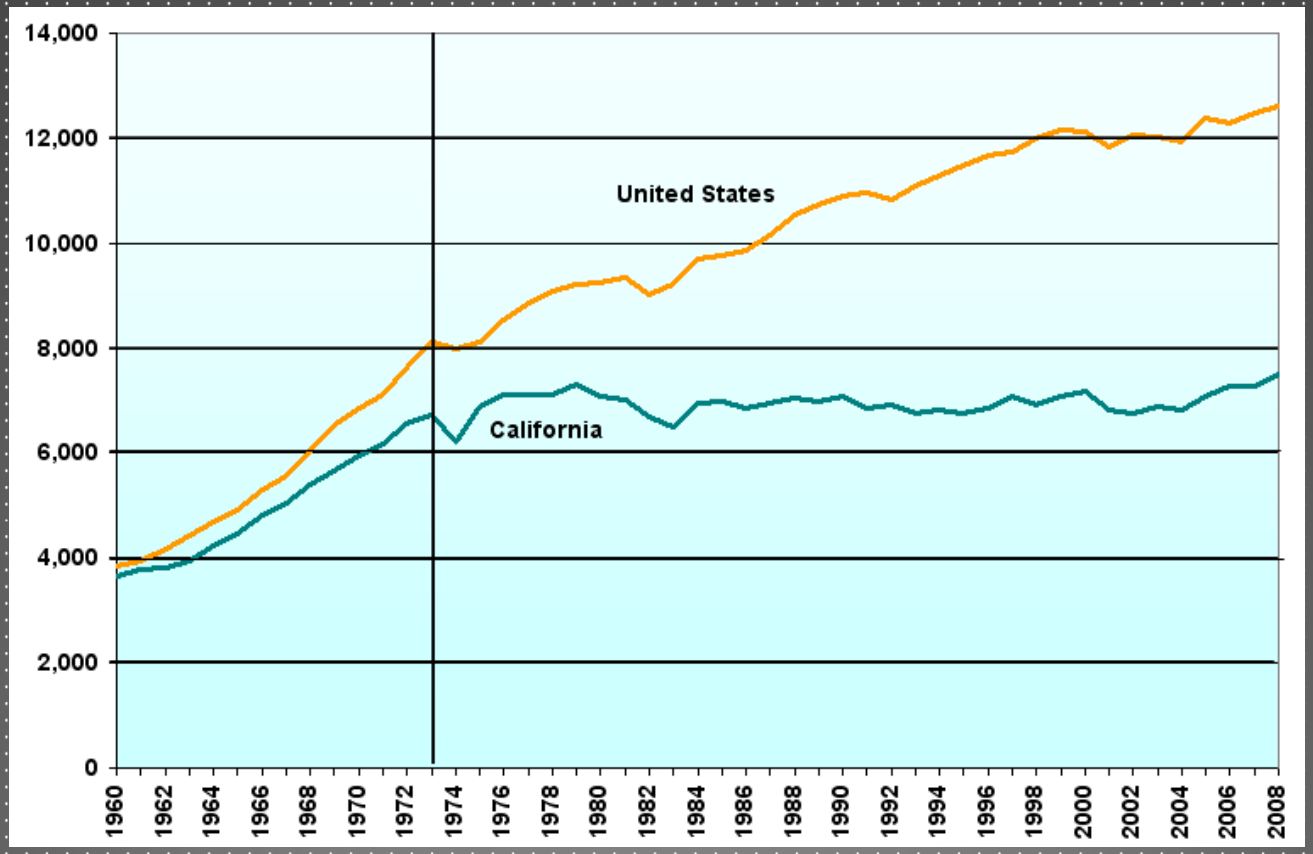
LEGACY OF ENERGY LEADERSHIP



California per capita energy use has remained relatively flat, compared to the 50% increase in U.S. per capita energy use since 1974.

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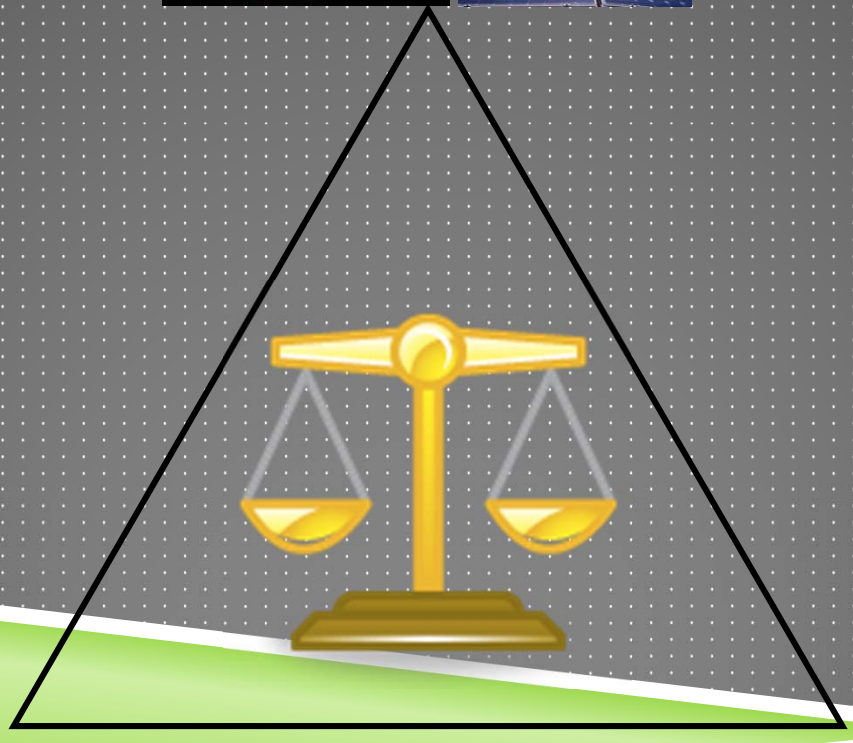
BALANCING COMPETING PRIORITIES

Environmental Sustainability

Reliable Service



Reasonable Cost

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UTILITY IMPERATIVE: BALANCE THE GRID

- Electricity cannot yet be stored easily or cheaply at scale; it must be generated as it is consumed
- Need to maintain instantaneous balance between electric demand and supply on the grid
- Traditionally, utilities have maintained balance by ramping up and down supply to match demand

CALIFORNIA HAS CREATED A LONG TERM STRATEGIC PLAN FOR ENERGY EFFICIENCY

- 12 Areas
  - Residential, Agricultural, Industrial, Commercial, HVAC, C&S, IDSM, WE&T, ME&O, Research and Technology, Local Governments, Lighting
- Four Big, Bold Strategies

1. All new residential construction in California will be zero net energy by 2020
2. All new commercial construction in California will be zero net energy by 2030
3. Heating, Ventilation and Air Conditioning (HVAC) will be transformed to ensure that its energy performance is optimal for California ‘s climate
4. All eligible low-income customers will be given the opportunity to participate in the low income energy efficiency program by 2020.

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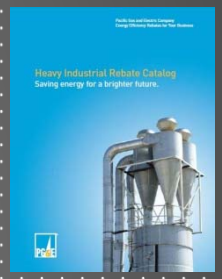
CA SUCCESS WITH ENERGY EFFICIENCY

California has **saved more than 60,000 GWh** and more than **15,000 MW** of supply-side resources through past and present demand-side programs:

- Avoided need for **thirty 500-MW power plants**



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Energy Efficiency Evolution

Early Years

Today

Forward Trends

Energy Audits

Energy Saving Tips

Standard Rebates

Robust data tools and Home Energy Reports

Partnerships

Market interventions: retail, distribution, wholesale

Deeper savings

Zero net energy

Big Data

Whole Building

Water-Energy Nexus

Financing solutions

Project Cost	$100,000
Rebates and/or Incentives	$25,000
Loan Amount	$75,000
Estimated Monthly Savings from Retrofit	$3,000
Loan Term (months)	60
Monthly Loan Installment on your PG&E Bill	$1,250
Monthly Savings	$1,750

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TWO APPROACHES TO MOTIVATING ENERGY EFFICIENT CHOICES

- Rebates
- Large volume
- Standard systems
- Similar performance

Deemed

Standard energy savings attributed when measure deployed

- Incentives
- Small volume
- Custom systems
- Unique performance

Calculated

Manual calculation of energy savings when measure deployed

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Product Lifecycle Management

Emerging Technologies → Programs → Codes and Standards

Zero Net Energy

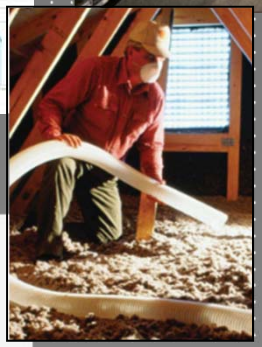
LED Lighting

HVAC

Home Energy Report

EE Rebates

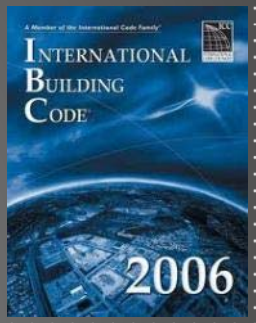
Retail and Manufacturer Strategy



Contractor Training and outreach

Appliance Standards

Building Codes



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Importance of Cost-Effectiveness

Katie Wu

Regulatory Analyst

California Public Utilities Commission

September 26, 2013

Regulatory Background

- Public Utilities Code mandates that utilities first meet their unmet electricity and natural gas resource needs through all available energy efficiency and demand reduction that are “cost-effective, reliable, and feasible.”
- Code also mandates that goals are set based on “all potentially achievable cost-effective electricity [and natural gas] efficiency savings…”
- The Energy Efficiency Policy Manual (V5) requires cost-effectiveness analyses to be performed in accordance with the Standard Practice Manual, with clarifications indicated in Commission decisions.
- The Standard Practice Manual describes the costs and benefits of saving energy from different perspectives.

Cost-Effectiveness Overview

- Standard Practice Manual tests cover various perspectives:
  - Program Administrator Cost (PAC) – Program Administrators
  - Total Resource Cost (TRC) – Program Administrators and Participants
  - Ratepayer Impact Measure (RIM) – Ratepayers
  - Participant Cost Test (PCT) – Program Participants
- CPUC primarily relies on TRC and PAC.

COSTS AND BENEFITS	TRC	PAC
Administrative costs	COST	COST
Avoided costs of supplying electricity	BENEFIT	BENEFIT
Measure costs	COST	
Environmental benefits (GHG only)	BENEFIT	BENEFIT
Incentives paid		COST

Cost-effectiveness Analyses and the CPUC

- At the EE level, the TRC and PAC tests are used for approval purposes.
- At the program and measure level, the TRC and PAC are reported and tracked for review and design purposes.
- The E3 Calculator is one tool used to understand a program's costs, benefits, and net present value.
- Non-DEER workpaper values are inputs in an E3 Calculator that are subject to change if Commission staff conducts a workpaper review that results in modifications to workpaper values.
- Custom project and measure values are estimated in E3 Calculators and validated through the ex ante custom project review process.

Why Cost-effectiveness Analysis Matters

- Assesses CPUC stewardship of ratepayer money.
  - High cost-effectiveness results suggest that money invested in EE programs is avoiding supply side procurement.
  - Low cost-effectiveness results suggest that program design may need to be altered or that investment in the program be reduced.
- Comparison of test results provides a sense of who benefits most from investing ratepayer money into EE programs.
- Auditing and Devaluation: The CPUC Utility Audit, Finance and Compliance Branch has the authority to disallow energy savings or incentives paid in an EE program that did not deliver expected results, thereby reducing the IOUs' program and portfolio level cost-effectiveness.

Measuring Cost Effectiveness

Speaker:

Brian O'Keefe: Engineer, DSM Engineering Analysis & Support | SCE

Goals/Agenda

- Define a deemed/prescriptive measure
- Review DEER and it's use
- Overview the non-DEER workpapers
- Define a few key gross and gross adjustment savings values
- Define a custom measure
- Review the requirements of custom projects
- Pros and Cons of deemed versus custom

Deemed Measures

- Deemed Energy Efficiency Measure
  - An energy using appliance, equipment, control system, or practice whose installation or implementation results in reduced energy use (purchased from the distribution utility) while maintaining a comparable or higher level of energy service as perceived by the customer.
- Measure Examples
  - 10 Watt LED A-Lamp
  - Variable Speed Pool Pump
- Deemed Measure Sources for Reporting
  - Currently approved DEER, DEER2011 www.deeresources.com
  - Statewide ED approved non-DEER workpapers

DEER

- DEER – Database for Energy Efficiency Resources
  - State funded database of measures and methodologies for use in energy efficiency
  - DEER is the first source of data for EE measures
  - DEER contains UES values, cost, effective useful lives, net-to-gross, etc…
- Current Version
  - DEER2011
  - Use READi tool to view DEER data
- Demo www.deeresources.com
- Demo READi Tool

Non-DEER Workpapers

- Workpapers are used to supplement the DEER
- Workpapers contain the information necessary to evaluate a measures cost effectiveness, there is a standard template
  - kWh, kW, therms, EUL, NTG, IR, Measure Cost, Delivery method, etc…
- Where applicable DEER calculation methodologies and assumptions must be used as the foundation for workpaper calculations
- Typically submitted at the initiation of a program cycle with the program application
- Workpapers submitted during the program cycle go through the ED Phase 2 Workpaper Submission Process

Gross Savings Definitions

- kWh
  - Is the energy saved of an EE measure over the course of one year between the measure energy consumption and an established baseline.
- kW
  - kW for EE is the DEER defined peak reduction period. The DEER definition is the delta kW of the measure and an established baseline averaged over a 9 hour period from 2PM to 5 PM on the three consecutive hottest days in the months of June through September. This definition must be used when calculating EE peak kW reduction.

Gross Savings Adjustments

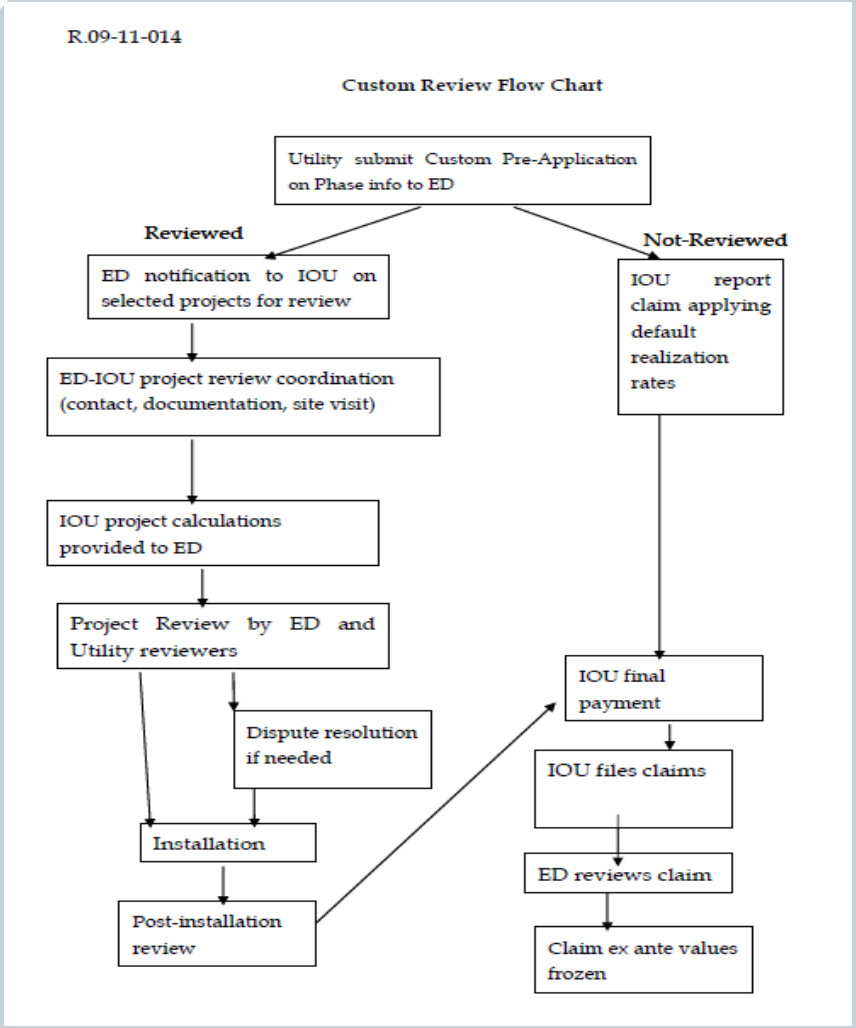
- Net-to-Gross (Deemed and Custom)
  - Percentage of people who are participating in an EE program because of the programs influence.
  - Also known as “free ridership”
  - Source www.deeresources
- Installation Rate (Deemed Only)
  - Percentage of measures actually installed versus quantity claimed
- Gross Realization Rate (Custom Only)
  - Adjustment factor applied to custom calculations based on previous ex-post evaluations. Currently 0.9

Custom Measures

- Custom Measures/projects
  - A energy efficiency measure uses site specific information because the installation and/or technology does not fit into a prescriptive savings approach.
- Calculation Requirements
  - Were applicable calculation methodologies must use DEER methodologies or the most recent reviewed and approved IOU non-DEER workpapers
  - IOUs need to maintain a calculation tool archive (CTA) available to the ED for review
- ED Notification
  - IOUs need to maintain and supply to ED (at a minimum bi-weekly) an up-to-date custom project list to allow ED to select projects to review.

Custom Review Flow Chart

- Intended to allow parallel review
- Typical documentation required
  - Support for baseline determination
  - System descriptions; operating status, capacities (pre and post)
  - Pre/Post inspection reports
  - Proposed modifications
  - Preliminary savings calculations
  - Equipment cut sheets
  - HVAC interactive effects values
  - Measure interactions
  - Billing history, one-year pre-installation
  - M&V plans, reports, etc...
  - EUL/RUL analysis
- Default gross realization rate (GRR)
  - 0.9 for non-reviewed projects.
  - Appendix E: Custom Project Review Process
    - http://www.cpuc.ca.gov/NR/rdonlyres/7E3A4773-6D35-4D21-A7A2-9895C1E04A01/0/EEPolicyManualV5forPDF.pdf



Deemed vs. Custom

Deemed

Pro

- Preapproved Savings
- Easy application process

Con

- Finite list of measures
- New Deemed measures take time to be approved

Custom

Pro

- Not limited to deemed list

Con

- Subject to Custom Review Process
- Burden of savings proof left to program

Questions

Fire Away

?

NETWORKING BREAK

Energy+Environmental Economics

E3 Calculator 2013 v1c5

Brian Horii

September 2013

Agenda

- **Overview of inputs and outputs**
- **Simple walkthrough**
  - Dual Baseline and other additions
- **Questions**

Overview

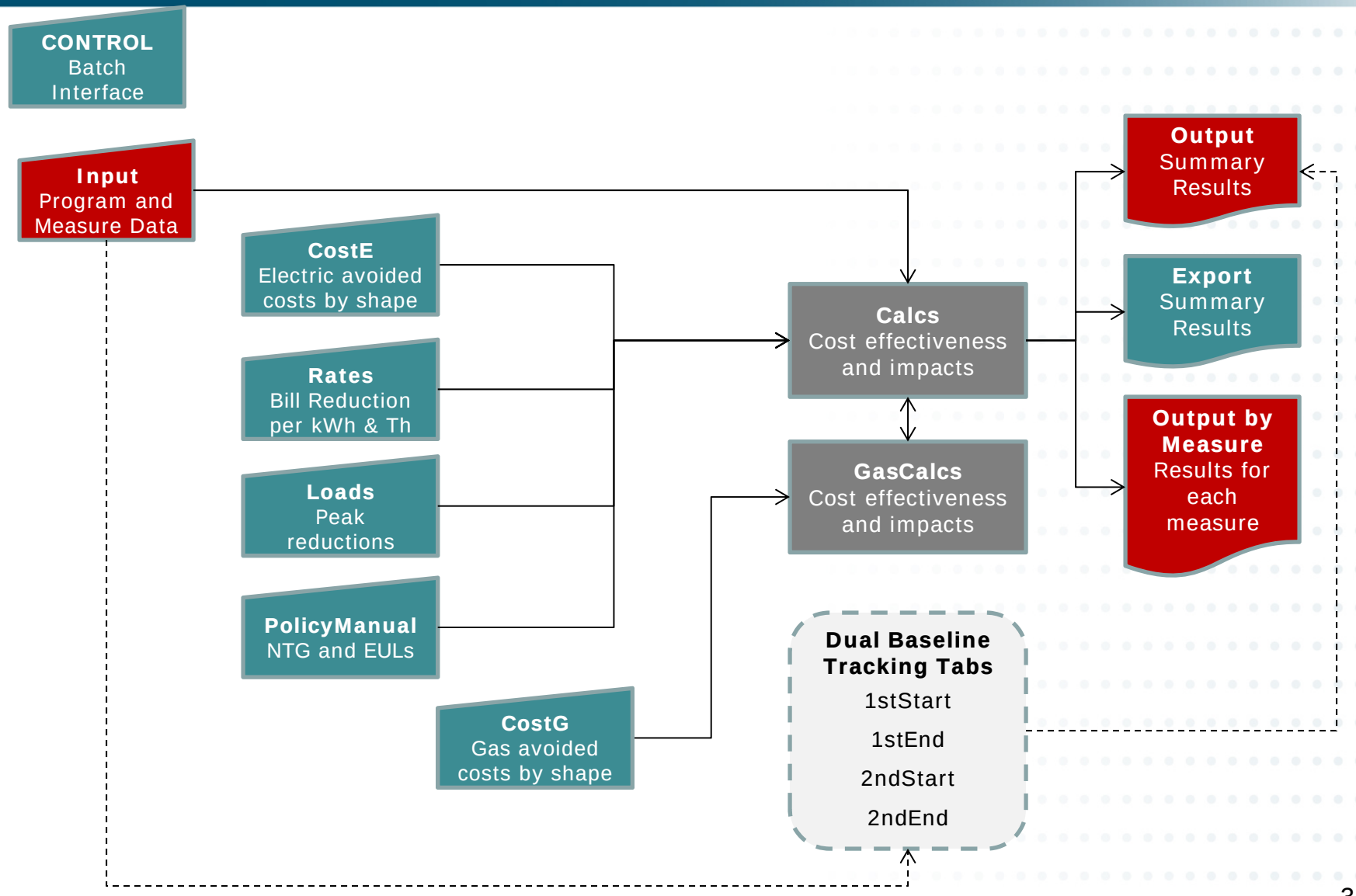
+ Role of the E3 Calculator

- Cost effectiveness valuation of EE
- Valuation for regulatory purposes
  - Uniform structure for all IOUs
  - Limited user inputs to aid review and auditing
  - I/O options to allow use of master E3 Calculator

+ Timeline

- Original model from 2006
- Revisions in 2008 and 2010 for updated avoided costs and shapes
- 2013 version incorporates substantial enhancements

The Basic Model Structure



Basic Inputs

+ Input tab: Program Level

- Program level inputs at the top
- Inputs are in nominal dollars
- Input cells are white

	B	C	D	E	F	G	H	I	J
1	**SCE 2013 v1c5-Draft.xls**			Process Files	**Program Budget ($)**				
2					a. Administrative Costs	2013	2014	2015	NPV
3	**Proposer General Information**				a.i. Overhead and G&A				$0
4	Proposer Name				a.ii. Other Admin costs				$0
5	Program Name				b. Marketing/Outreach				$0
6	Service Territory			SCE	c. Direct Implementation (non incentive)				
7	**First Year of Program Implementation**			2013	c.i. Activity				$0
8	**Contact Information**				c.ii. Installation				$0
9	Name				c.iii. Hardware & Materials				$0
10	Address				c.iv. Rebate Processing and Inspection				$0
11	ZIP code				d. Total Incentives and Rebates	$ -	$ -	$ -	$ -
12	Telephone				e. EM&V				$0
13	Email				**Total**	**$ -**	**$ -**	**$ -**	**$ -**
14									
15	**Program Inputs**								

Basic Inputs

+ Input tab: Measure information

- Starts at Row 17
- Enter from left to right
- Select a Climate Zone --- “System” will yield the lowest value.
- Select RES or NON_RES target sectors for DEER shapes

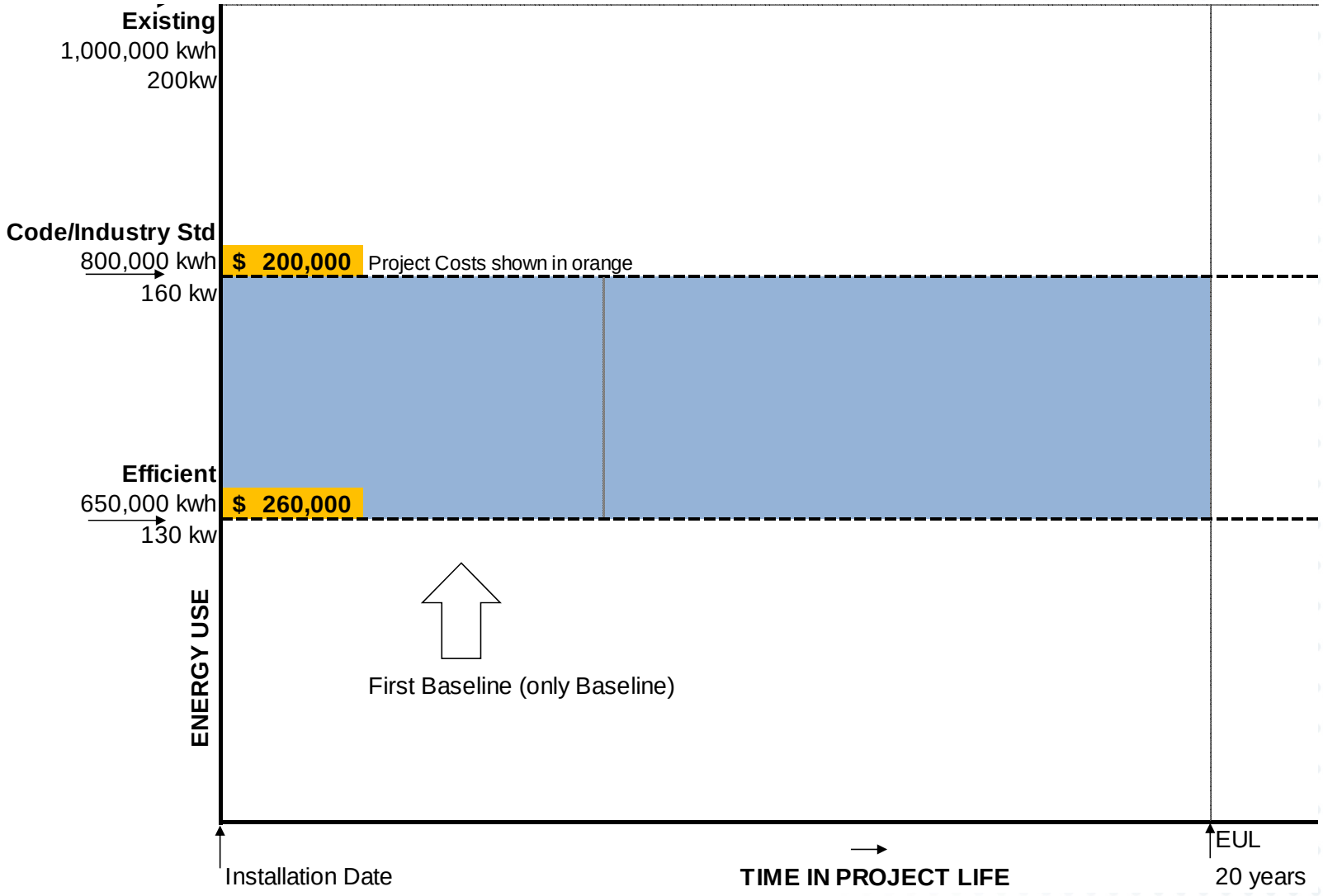
	B	C	D	E	F	G
16	Measure Name	DEER RunID	Climate Zone	Target sector	Measure Electric End Use Shape	CZ, Sector, Measure combination found?
17	AC Example	10001	9	RES	DEER:Indoor_CFL_Ltg	TRUE
18	AC Example	10001	9	Small_Office	DEER:Indoor_CFL_Ltg	FALSE

Inputs (con't)

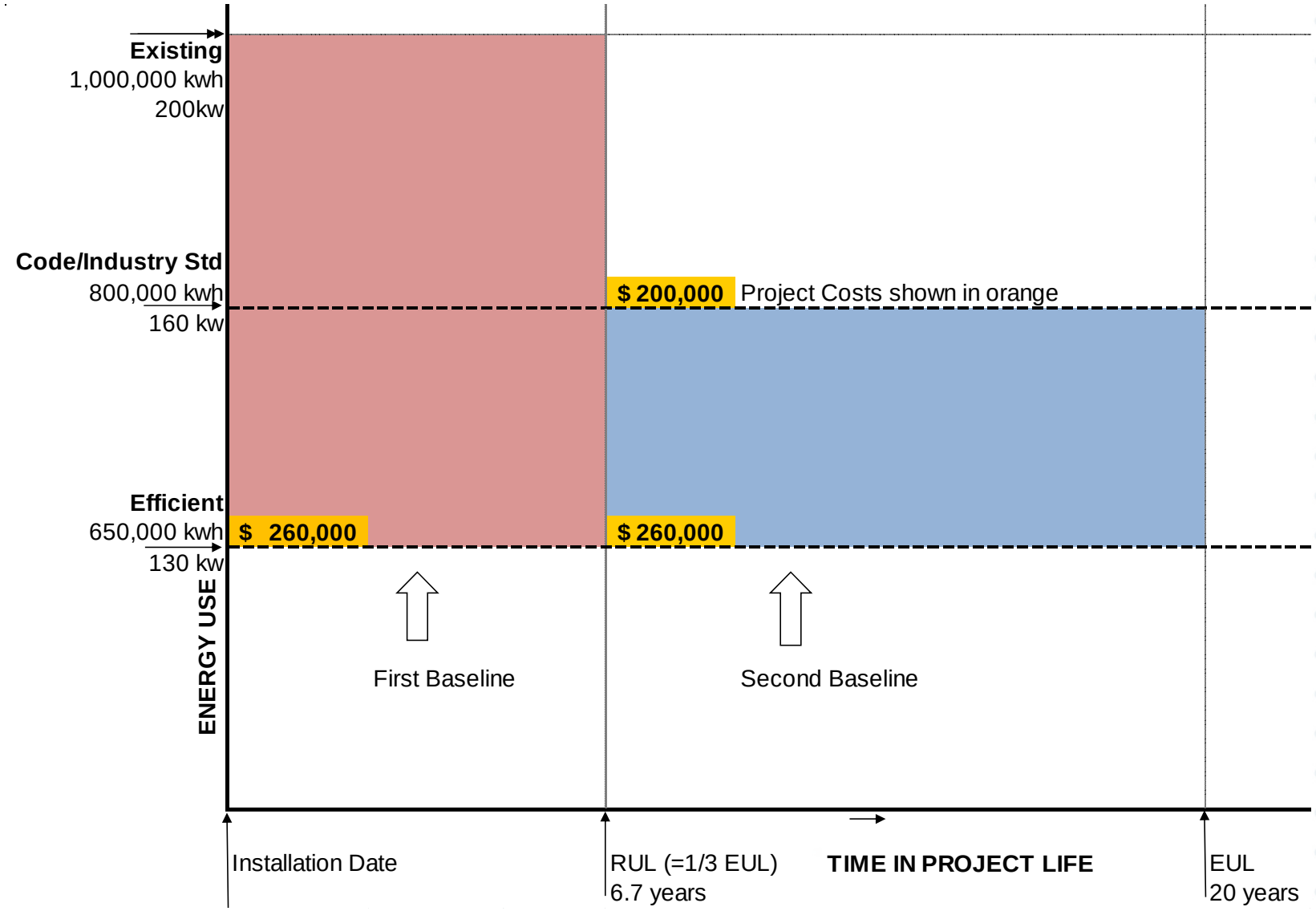
- **Top line is normal program, second line is a dual baseline case. Same Equipment**
  - Calif standard is RUL is 1/3rd of EUL
  - For ROB program, Col L is the incremental cost
  - For dual baseline (retrofit), Col L is the full Gross cost

	H	I	J	K	L	M	N	O	P
16	Expected Useful Life for New/ROB, RUL for retrofit. (yrs)	Program Type (To look up Net-to-gross Ratio)	Unit Definition (e.g. homes)	Program Type (NEW/ROB or Early Repl(RET))	Gross Measure Cost (Total Cost for Retrofit, Incr Cost for New/ROB) ($/unit)	Rebate to end use customer or its assignee ($/unit)	Incentives to entities other than the end use customer or its assignee($/unit)	Direct Install Labor ($/unit)	Direct Install Material ($/unit)
17	15.0	0.8		ROB	100	$ 50.00			
18	5.0	0.8		RET	1,000	$ 500.00			

New or Replace-on-Burnout



Dual Baseline for Retrofit or Early Replacement



Performance Inputs

- Savings are for a full year of operation
- Rate schedule is only used for RIM test
- kW savings are coincident with SCE system peak (detailed definition in DEER/workpapers)
- Gas impacts can also be entered when applicable

	Q	R	S	T	U	V
16	Gross Participant Cost ($/unit)	Gross Unit Annual Electricity Savings (kwh/unit)	Electric Rate Schedule	Demand Scaler	User Entered kW Savings per unit (kW/unit)	Gross Unit Annual Gas Savings (therm/unit)
17	$ 50.00	200	System	kWh	0.05	
18	$ 500.00	1000	System	kWh	0.25	

Dual Baseline Inputs

- **Dual Baseline inputs are for early retirement or retrofit measures**
- **Second baseline is for the period after the RUL of the replaced equipment**
- **Second baseline inputs are generally the same as for a NEW or Replace-on-burnout measure.**

	Z	AA	AB	AC	AD	AE
15	Second Baseline (For savings after the RUL)					
16	Total Life. Can be left blank for single baseline measures (Yrs)	Incremental Cost (relative to standard efficiency default device) ($/unit)	Measure Cost Inflation (%/year escalation)	Early retrofit incremental kWh savings (kWh/unit)	Early retrofit incremental kW savings (kW/unit)	Early retrofit incremental Th savings (Th/unit)
17						
18	15.0	100	0.0%	200	0.05	

Often Unused Inputs

- **NTG for kW, Therms, and Costs.**
  - If left blank they default to the kWh NTG value from Col I.

	AJ	AK	AL	AM	AN
15				**Benefits Adj Factors**	
16	Net-to-Gross Ratio - kW	Net-to-Gross Ratio - Therms	Net-to-Gross Ratio - Costs	Installation Rate (Blank gets 100%) (IR)	Gross Realization Rate (Blank gets 100%) (GRR)
17					
18					

- **Market Effects Adjustments**
  - Leave blank.

	S	T	U
3	**Market Effects Adjustments**		
4	Adjustment type		Uniform
5			
6	Uniform Factors to apply to all measures		
7		Benefit Adj	Cost Adj
8	Participant Inside		
9	Participant Outside		
10	Non-participant		
11	Total Factor	0.0%	0.0%
12			

Output Tab

- **TRC B/C Ratio is the dominant metric**
- **"Wtd" annual savings are a weighted average blend of first baseline and second baseline savings. They are not "first year" savings.**

	B	C	D	E	F	G	H	I	J
1	**Program Summary**		**Nominal**			**Present Value**	**Performance Earnings Basis**		
2	**Proposer Name**		0				Resource Benefit, net.	$	146,240
3	**Program Name**		0				Incr Measure Cost, net.	$	(11,899)
4	**Total Program Budget ($)**		$ 152,500			$ 137,610	Program Incentive Cost	$	123,651
5							Program Admin Cost	$	13,959
6	**Net Participant Cost ($)**					$ (11,899)	Performance Earnings Basis	$	98,996
7									
8	**Program Impacts**								
9		Wtd Annual Net kWh	Lifecycle Net kWh	Wtd Annual Net Therms	Lifecycle Net Therms	Wtd Net Jul-Sept Pk** (kW)	Wtd Net Dec-Feb Pk** (kW)		Wtd User Entered kW
10	**2013**	48,000	720,000	-	-	7	7		12
11	**2014**	48,000	720,000	-	-	7	7		12
12	**2013-2014**	96,000	1,440,000	-	-	13	13		23
13									
14	**Cost Effectiveness (Lifecycle Present Value Dollars)**								
15			**Benefits**			Benefit - Cost			
16		Cost	Electric	Gas	Incentives	NPV	B/C Ratio	Notes	
17	**Program TRC ($)**	$ 125,711	$146,240	$0	NA	$20,529	1.16	*1	
18	**Program PAC ($)**	$ 137,610	$146,240	$0	NA	$8,629	1.06	*1,2	
19	**Program RIM ($)**	$ 334,090	$146,240	$0	NA	($187,851)	0.44	*1	
20	*1 B/C Ratio is an approximation because any supply cost increases are treated as negative benefits rather than as a cost as in the Standard Practice Manual								
21	*2 PAC benefits include environmental costs. This is to be consistent with the TRC benefits, but is not strictly consistent with the Standard Practice Manual.								

Output by Measure Tab

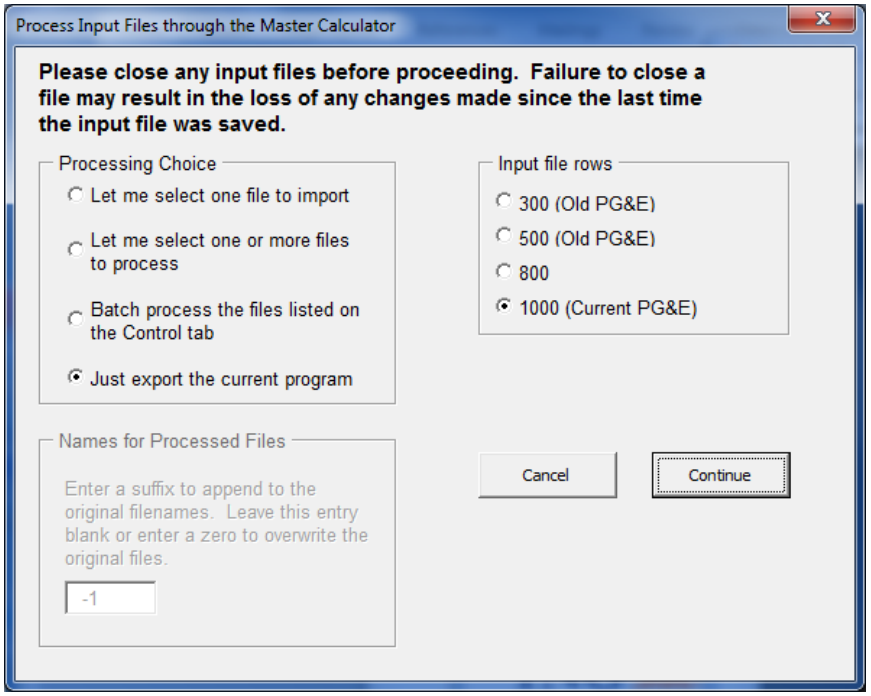
- **Provides detailed measure-by-measure cost effectiveness results.**

	A	B	C	D	E	F	G	H	I
13	SCE								
14	**Net Impacts by Measure**								
15		Wtd Avg Net Avg Jul-Sep (kW)	Wtd Avg Net Dec-Feb Pk (kW)		Wtd Avg Net User Entered kW	Wtd Avg Annual kWh adj for Net to gross	Wtd Avg Lifecycle kWh (Annual * Measure Life)	Wtd Avg Annual Therms	Wtd Avg Lifecycle Therms
16	***Total or Averag***	16.36	16.55		29.33	120,000	1,800,000	-	-
17	AC Example	5.45	5.52		10	40,000	600,000	-	-
18	AC Example	10.90	11.03		19	80,000	1,200,000	-	-

	J	K	L	M	N	O	P	Q	R	S	T	U
13	**Levelized Benefits less Costs (TRC)**				**Levelized Benefits less Costs (PAC)**				**Benefit Cost Ratios**			
14	No Allocated Admin		w/ Allocated Admin		No Allocated Admin		w/ Allocated Admin		No Allocated Admin		w/ Allocated Admin	
15	Electric ($/kWh)	Gas ($/Th)	Electric ($/kWh)	Gas ($/Th)	Electric ($/kWh)	Gas ($/Th)	Electric ($/kWh)	Gas ($/Th)	TRC	PAC	TRC	PAC
16	0.02852	#DIV/0!	0.016976	#DIV/0!	0.0186799	#DIV/0!	0.0071361	#DIV/0!				
17	0.0720	-	0.0594	-	0.0985	-	0.0860	-	2.20	3.97	1.82	2.88
18	0.0116	-	0.0005	-	(0.0124)	-	(0.0235)	-	1.11	0.90	1.00	0.83

Calculator Review

- **Use the Output by Measure tab to identify anomalous B/C ratios or Excel errors (#REF etc)**
- **Common errors**
  - Check Col G for FALSE indicators.
  - Make sure that blanks are NOT space characters
  - Keep a pristine E3 Calculator and re-import your case. (Process Files button on Input tab)



Detailed Slides

- The remainder of the deck provides more dtailed explanations of the changes implemented in the 2013 E3 Calculators.

Summary of Changes for 2013-2014 Version 1c4

- Add Implementation Rate (IR) and Gross Realization Rate (GRR) adjustments. (v1b)
- Implement "single row" evaluation of dual baseline measures (v1b)
- Add Incentive Cost Adjustment to ensure that incentives to others and Direct Install costs that are in excess of the Measure Cost, are fully captured in the TRC cost. (v1c) Extend enhancement to dual baseline measures (v1c4)
- Add Market Effect Adjustments (v1c) and apply the cost market effect adjustment to (Measure Costs + Excess incentives) (v1c2)
- Update NTG Tables for DEER 2011 values. (v1c)
- Add Goal Attainment table (v1c3)
- Revise main Output table to show results for 2013, 2014, and 2013+2014 (v1c3)

IR and GRR

- **Net Avoided Costs have been revised to include adjustments for Installation Rate (IR) and Gross Realization Rate (GRR)**
- **Installation Rate**
  - IR = percent of incented units that are installed during the program cycle.
  - IR (0-100%) can vary for each measure, but does not vary by year.
- **Gross Realization Rate**
  - GRR = Actual savings / Expected savings (per unit installed)
  - Can vary for each measure

IR and GRR implementation

- **IR and GRR are used to adjust impacts and benefits, but not costs.**
- **e.g.:**
  - Gross Annual kWh = Annual kWh * IR * GRR
  - Net Annual kWh = Gross Annual kWh * NTG
  - Gross Benefit = Avoided Cost * IR * GRR
  - Net Benefit = Gross Benefit * NTG
- **If IR or GRR inputs are left blank, then the default is 100%.**

Dual Baselines

- **New fields used to allow dual baseline measures to be modeled on one line.**
- **Early replacement / accelerated Retrofit measures are examples of dual baselines**
  - First baseline
    - Savings are relative to original existing poor efficiency device
    - Cost is the full measure cost plus installation
  - Second baseline
    - Savings are relative to a new standard efficiency device that would have been installed at the end of the original device Remaining Useful Life (RUL).
    - Cost is a credit for the standard device that would have otherwise been installed at the end of the RUL.

Dual Baseline Savings

- **Program savings (kWh, kW, Therms, Co2 etc) are re-expressed as the weighted average savings to reflect dual baseline measures.**
- **A simple weighted average is used, with no adjustment for the time-value of the savings (in other words, no discount rates are used)**

A	B	C	D	E	F	G	H
	First Baseline		Second Baseline		Wtd Avg kWh		
	EUL or RUL (yrs)	Annual Savings (kWh)	Total EUL (yrs)	Annual Savings (kWh)	*C or (B*C+(D-B)*E)/D*	NTG Ratio	Wtd Avg Net kWh (F * G)
Measure A	10	100			100	0.8	80
Measure B	5	100	15	10	40	0.8	32

Dual Baseline Measure Cost

- **Measure cost = full cost of the initial installation, less the discounted cost of the standard measure at the end of RUL.**
- **Since the standard measure cost = Full Cost – Incremental Cost, the formula is:**

$$Meas\$ = FullCost - (\text{FullCost} - \text{IncrCost})\left(\frac{1+\frac{i}{4}}{1+\frac{d}{4}}\right)^{RUL*4}$$

A	B	C	D	E	F	G	H
	First Baseline		Second Baseline				Cost
	EUL or RUL (yrs)	Cost ($)	Total EUL (yrs)	Incremental Cost	Inflation Rate	Discount Rate	*C or C-(C-E)*((1+F/4)/(1+G/4))^(B*4)*
Measure A	10	100					100.00
Measure B	5	500	15	100	2%	8.79%	213.86

Dual Baseline Generation Benefits

- **Avoided cost benefits use the reductions corresponding to the 1st or 2nd baselines**

	1st Baseline	2nd Baseline
RUL | EUL (yrs)	2	6
Savings (kWh)	100	10
Discount Rate	2.198%	
(Quarterly)		

Qtr	Avoided Cost ($/Annual kWh)	Annual kWh	Quarterly Savings ($)	Gross NPV ($)
1	$ 0.02056	100	$ 2.06	$33.85
2	$ 0.11075	100	$ 11.08	
3	$ 0.00971	100	$ 0.97	
4	$ 0.00642	100	$ 0.64	
5	$ 0.02220	100	$ 2.22	
6	$ 0.12279	100	$ 12.28	
7	$ 0.01039	100	$ 1.04	
8	$ 0.00673	100	$ 0.67	
9	$ 0.02353	10	$ 0.24	
10	$ 0.13395	10	$ 1.34	
11	$ 0.01090	10	$ 0.11	
12	$ 0.00729	10	$ 0.07	
13	$ 0.02558	10	$ 0.26	
14	$ 0.14664	10	$ 1.47	
15	$ 0.01177	10	$ 0.12	
16	$ 0.00756	10	$ 0.08	
17	$ 0.02681	10	$ 0.27	
18	$ 0.15761	10	$ 1.58	
19	$ 0.01223	10	$ 0.12	
20	$ 0.00786	10	$ 0.08	
21	$ 0.02775	10	$ 0.28	
22	$ 0.16115	10	$ 1.61	
23	$ 0.01271	10	$ 0.13	
24	$ 0.00815	10	$ 0.08	
25	$ 0.02870	0	$ -	

Dual Baseline T&D Benefits

- **Same method as for Generation.**
- **This example uses a DEER shape so Annual kWh is the determinant**

	1st Baseline	2nd Baseline
RUL | EUL (yrs)	2	6
Savings (kWh)	100	10
Discount Rate	2.198%	
(Quarterly)		

Qtr	Avoided Cost ($/Annual kWh)	Annual kWh	Quarterly Savings ($)	Gross NPV ($)
1	$ 0.01241	100	$ 1.24	$14.76
2	$ 0.05577	100	$ 5.58	
3	$ -	100	$ -	
4	$ -	100	$ -	
5	$ 0.01266	100	$ 1.27	
6	$ 0.05688	100	$ 5.69	
7	$ -	100	$ -	
8	$ -	100	$ -	
9	$ 0.01291	10	$ 0.13	
10	$ 0.05802	10	$ 0.58	
11	$ -	10	$ -	
12	$ -	10	$ -	
13	$ 0.01317	10	$ 0.13	
14	$ 0.05918	10	$ 0.59	
15	$ -	10	$ -	
16	$ -	10	$ -	
17	$ 0.01343	10	$ 0.13	
18	$ 0.06036	10	$ 0.60	
19	$ -	10	$ -	
20	$ -	10	$ -	
21	$ 0.01370	10	$ 0.14	
22	$ 0.06157	10	$ 0.62	
23	$ -	10	$ -	
24	$ -	10	$ -	
25	$ 0.01398	0	$ -	

Excess Incentive Cost Adjustment

- **The incentive cost adjustment is needed to address the unlikely case that Incentives to others + Direct Install labor + Direct Install materials are greater than the Measure Cost (Col N + Col O + Col P > Col L)**
- **Previously only (1-NTG) of the incentives in excess of Measure cost would be captured in the TRC costs.**
- **Now, the full excess incentive cost is added to the TRC cost (it was already fully captured in the PAC cost)**
- **This does not apply to Rebates directly to the end user.**
- **Participant Cost is reformulated**
  - Was: Meas$ - Rebate – Incent to Others – DI
  - Now: Meas$ + Excess incentive - Rebate - Incent to Others – DI where Excess Incentive = Max(0, Incent to Others + DI – Meas$)

Note that Meas$ will be likely be far smaller than the FullCost for a dual baseline measure (see Slide 7). Large incentives to others or DI contributions could result in Excess Incentive.

Market Effect Adjustments

- **Three types of market effect adjustments**
  - Participant Inside (ME_{PI})
  - Participant Outside (ME_{PO})
  - Non-Participant (ME_{NP})
- **Total effect is the sum of each adjustment**
  Market Effect Factor = $(1 + ME_{PI} + ME_{PO} + ME_{NP})$
- **One set of factors for benefits, and one for costs**
- **If the market effects are left blank or set to zero, there is no effect.**

Market Effect Implementation

+ Three options:

- None : no market effect adjustments used
- Uniform: One set of benefit and cost adjustments are applied to all measures
- Custom: Adjustment factors are entered individually for each measure.

+ Market Effect implementation

- Benefits : Add effect to NTG Ratio. NTG + ME Factor.
  - Benefit ME Factor is applied to NTG – kWH, NTG – Therms, and NTG – kW.
- Costs: Add ME Factor * (Measure cost + Excess Incentives) to Net Participant Cost and TRC costs.

New Input Fields – NTG Lookup Table

- PolicyManual Tab updated with 2011 DEER NTG Table
- NTG lookup ID's selected in Input tab column I (same as before)
- 2011 DEER Table can contain values for NTG-kWh and NTG-Therms, so new column AI added in the input tab to report the NTG-Therms values.
- The NTG-therms value can be overridden by entries into column AK.
- All of the lookup and override values are prior to any market effect adjustments.

Goal Attainment

- KWh, kW, and Therms tracked in new tables on Output tab, and added to bottom of export tab
- Full annual savings credited to measures in the year installed, regardless of when installed in the year. (*Annual savings will be adjusted downward if the RUL or EUL is less than one year*)
- Savings decay subtracted when measures reach the end of their RUL or EUL. Annual savings for a measure are assumed to be reduced by 25% for each quarter past the RUL or EUL, up to 100% reduction. RUL and EUL are applied to quarterly installation schedules. The RUL and EUL are rounded to the nearest quarter.
- Second baseline savings are assumed to start in the first quarter after the RUL.

New Inputs to the E3 Calculators

E3 Calculator New Input Fields – Dual Baseline, IR and GRR

Col H: Continue to enter EULs for new or ROB measures. For dual baseline measures, enter the remaining useful life (RUL) here.

Col Z: The total EUL for a dual baseline measure. Can be left blank for single baseline measures, but do not enter zero.

Col AA: Cost of Efficient Measure – Cost of standard code compliant measure. Costs are before rebates or incentives.

Col AB: Percent annual incremental cost escalation. Applied to Col AA for the RUL number of years.

Col AC-AE: Savings of the efficient measure relative to the standard efficiency device that would have otherwise been installed at the end of the original device's RUL. Annual kWh savings.

Col AM: Percent of incented measures that are installed. Default = 100%.

Col AN: Percent of estimated savings that are achieved per installed measure. Default = 100%.

	F	G	H	I
16	Measure Electric End Use Shape	CZ, Sector, Measure combination found?	Expected Useful Life for New/ROB, RUL for retrofit. (yrs)	Program Type (To look up Net-to-gross Ratio)
17	DEER:HVAC_Eff_AC	TRUE	4	0.8
18	DEER:HVAC_Eff_AC	TRUE	2	0.8

	Z	AA	AB	AC	AD	AE
15	Second Baseline (For savings after the RUL)					
16	Total Life. Can be left blank for single baseline measures (Yrs)	Incremental Cost (relative to standard efficiency default device) ($/unit)	Measure Cost Inflation (%/year escalation)	Early retrofit incremental kWh savings (kWh/unit)	Early retrofit incremental kW savings (kW/unit)	Early retrofit incremental Th savings (Th/unit)
17						
18	4.0	100.0	2.0%	10.0	0.1	1.0

	AM	AN
15	**Benefits Adj Factors**	
16	Installation Rate (Blank gets 100%) (IR)	Gross Realization Rate (Blank gets 100%) (GRR)
17		

New Input Fields – Market Effects

+ Adjustment type can be set to

- None
- Uniform (same inputs for all measures)

	S	T	U
3	**Market Effects Adjustments**		
4	Adjustment type		Uniform
5	Enter Custom values in columns AO through AT		
6	Uniform Factors to apply to all measures		
7		Benefit Adj	Cost Adj
8	Participant Inside		
9	Participant Outside		
10	Non-participant		
11	Total Factor	0.0%	0.0%

- Custom (user inputs for each measure)

	AO	AP	AQ	AR	AS	AT	AU	AV
15	**Market Effects Adjustments**							
16	Benefits - Participants Inside	Benefits - Participants Outside	Benefits- Non-participants	Costs - Participants Inside	Costs - Participants Outside	Costs- Non-participants	Total Benefits Factor	Total Cost Factor
17							0.0%	0.0%
18							0.0%	0.0%
19							0.0%	0.0%
20							0.0%	0.0%
21							0.0%	0.0%
22							0.0%	0.0%

TRC Cost Formula Derivations

TRC Cost – Original Formulation

Original formulation (versions prior to v1c)

(1) TRC Cost = Admin + NTG * (Meas$) + (1-NTG) (Rebate + Incent) (from Decision)

Expanding (1) gives

(2) TRC Cost = Admin + NTG * Meas$ + Rebate + Incent - NTG*Rebate – NTG*Incent

Rearranging (2) gives

(3) TRC Cost = Admin + Rebate + Incent +NTG*(Meas$ - Rebate - Incent)

Since Participant cost = PartCost = Meas$– Rebate – Incent, (3) can be re-expressed as:

(4) TRC Cost = Admin + Rebate + Incent + NTG*PartCost (form used in E3 Calculator)

TRC Cost – New Formulation

2013-2014 Modifications

Excess incentives

The 2013-2014 calculators have been revised to prevent Participant Costs from becoming negative due to incentives to others or direct install labor or materials costs. While this is an unlikely situation, it is possible for an erroneously low grow measure cost to cause a negative Participant Cost. The problem is addressed through the addition of an "excess incentive cost" that essentially increases the Gross Measure cost. (Note that the E3 Calculator will continue to allow negative Participant Costs due to direct rebates to end use customers or their assignees. No adjustment is needed for Rebate costs)

(5) Excess incentive cost = Excess = Max(0,Meas$-Rebate-Incent)

(6) PartCost = Meas$ +Excess –Rebate –Incent

Recognizing this revised definition of participant cost, results in this modification to equation (3):

(7) TRC Cost = Admin + Rebate + Incent +NTG*(Meas$+Excess - Rebate - Incent)

Carrying the change back to equation (1) would results in a Decision-style formula of:

(8) TRC Cost = Admin + NTG * (Meas$ + Excess) + (1-NTG) (Rebate + Incent)

TRC Cost – New Formulation (continued)

Market Effect Adjustments

The new E3 Calculators include the ability to separately adjust measure benefits and measure TRC costs for market effects such as spillover. Market effects for benefits are applied to all benefit components. Market effects for costs, however, are applied only to (Meas$ + Excess). They are not applied to Rebates or Incentives. This modifies equation (8) into the following:

(9) **TRC Cost = Admin + (NTG +ME_C)* (Meas$ + Excess) + (1-NTG) (Rebate + Incent)**

where ME_C = Market Effects adjustment for costs.

Equation (9) is revised "Decision-style" formulation of the TRC cost. The E3 Calculator, as mentioned above, uses an equivalent, but different, formulation that focuses on Participant Cost. Rearranging terms in (9) yields:

(10) TRC Cost = Admin + Rebate + Incent +NTG*(Meas$+Excess-Rebate – Incent) + ME_C*(Meas$+Excess).

Replacing (6) into (10) gives us the final E3 Calculator formula:

(11) **TRC Cost = Admin + Rebate + Incent +NTG*PartCost + ME_C*(Meas$+Excess)**

Successful Programs

Speaker:

Robert Wright: Manager, Distributed Generation Customer Solutions| SCE

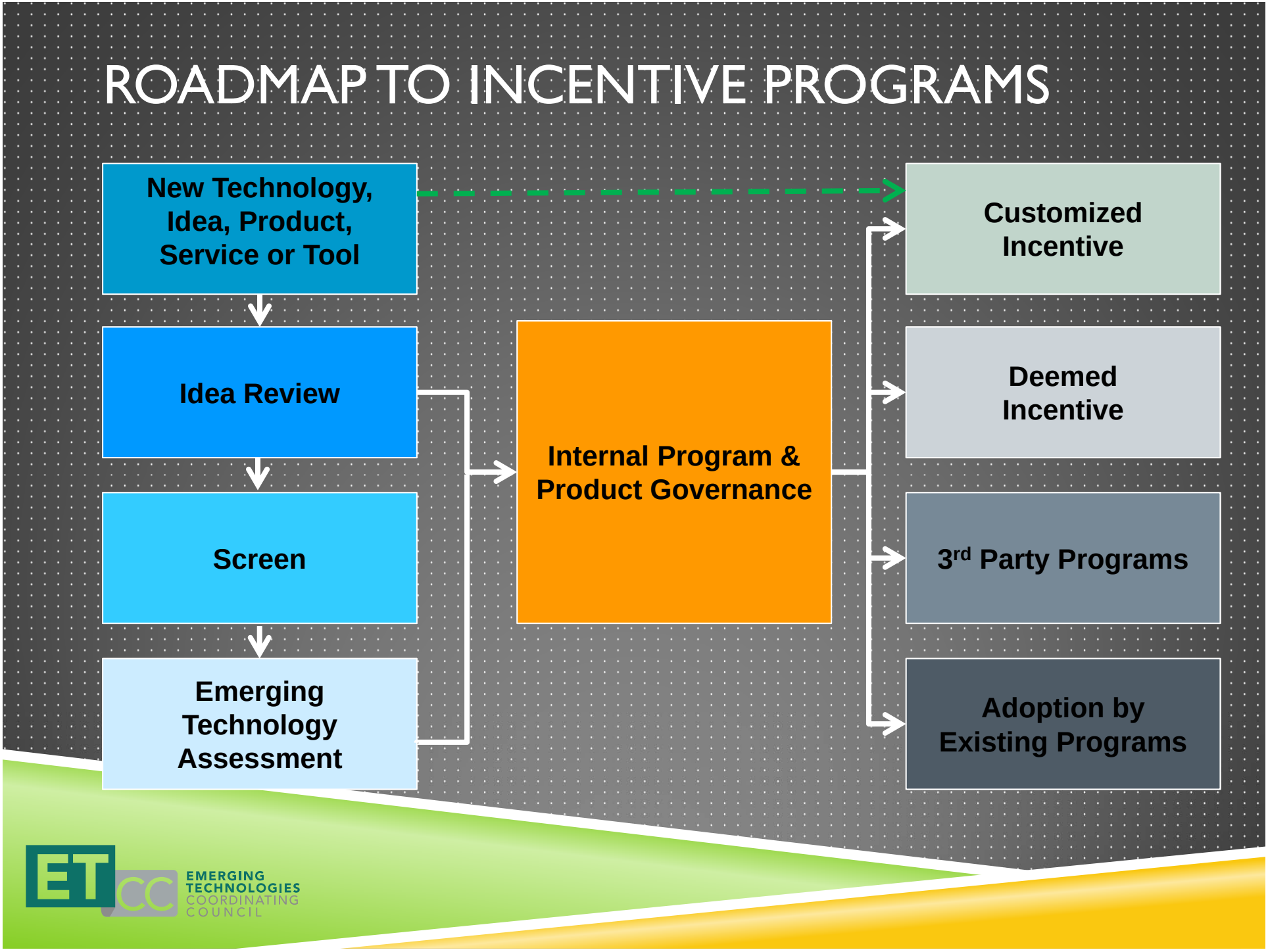
Wrap-Up

Speaker:

Robyn Zander: Senior Program Manager Emerging Products | SCE

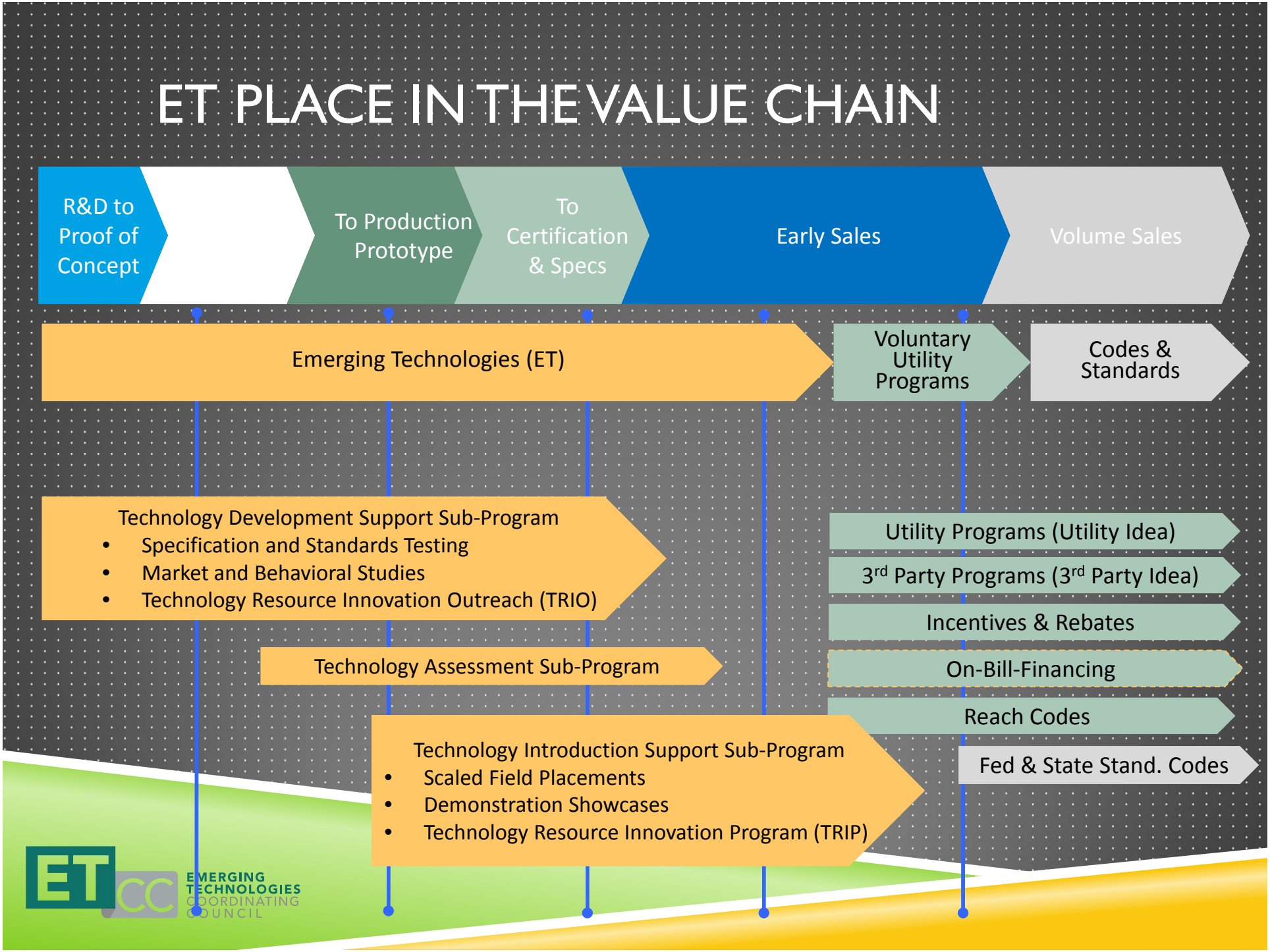
Please Complete Evaluation Forms

ROADMAP TO INCENTIVE PROGRAMS



ETCC EMERGING TECHNOLOGIES COORDINATING COUNCIL

ET PLACE IN THE VALUE CHAIN



TECHNOLOGY STAGES / ACTIONS

Stage 1: Unverified / Unavailable	Stage 2: Unverified / Available	Stage 3: Verified / Available
Concept, Alpha or Beta Product.	May be sales, but not part of existing CA utility programs.	Similar products on market already being sold in the market.
Upstream ET Program	**ET Program**	**Existing Programs or 3rd Party Implementers**
TRIO workshops	TRIO workshops	TRIO Workshops
Technical review	Idea Card	ET Assessment
Lab testing	ET Assessment (Field/Lab)	3rd Party Programs
Identify specifications	Open Forum	Incentives
	Certifications	Customized Program
		Solution Codes
		Future Codes & Standards

ETCC EMERGING TECHNOLOGIES COORDINATING COUNCIL

EMERGING TECHNOLOGIES COORDINATING COUNCIL

- The Emerging Technologies Coordinating Council (ETCC) provides a means to coordinate its members energy efficiency work to facilitate the assessment of promising energy efficient emerging technologies that will benefit California customers.

- Members include:

Pacific Gas and Electric Company

Southern California Edison — An Edison International Company

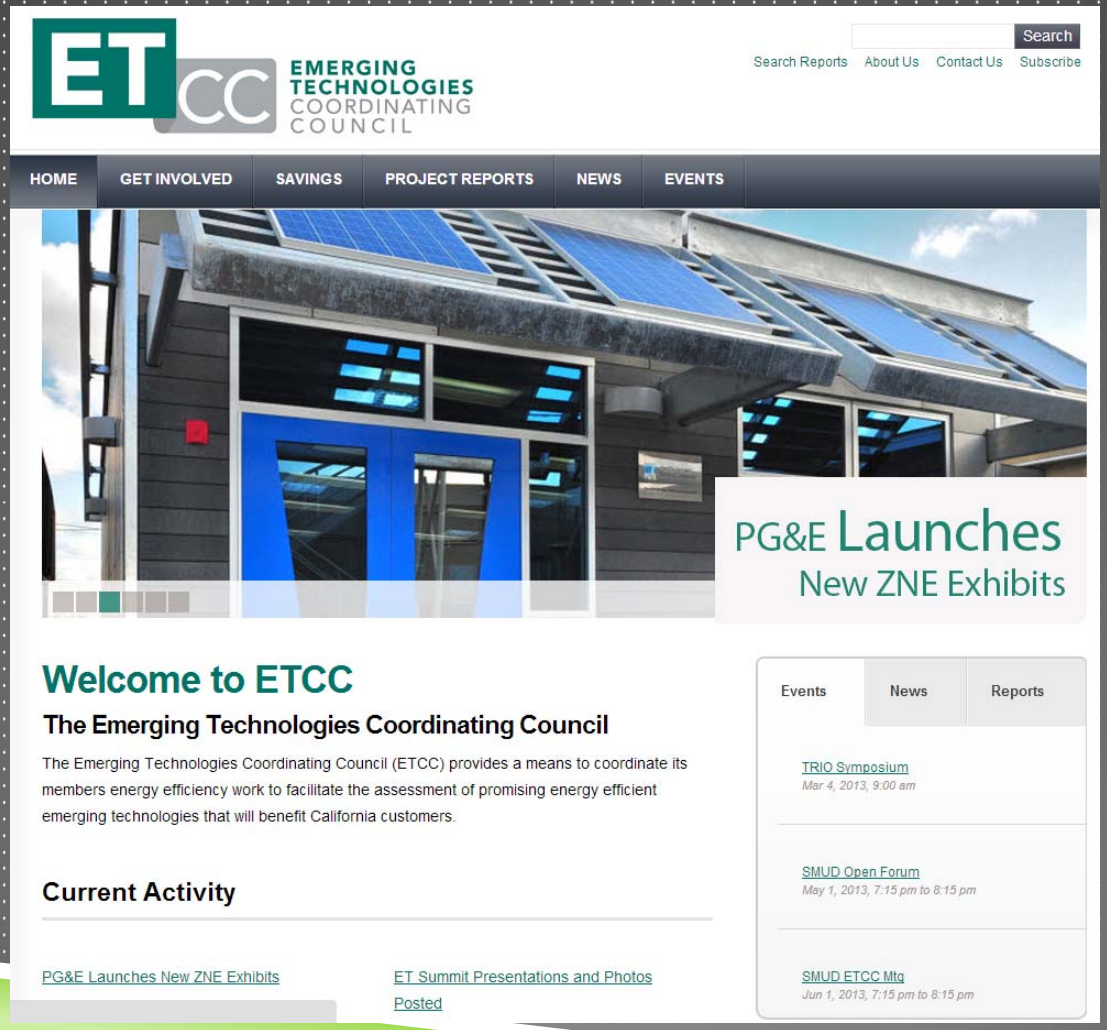
SMUD — Sacramento Municipal Utility District — The Power To Do More.

SDGE — A Sempra Energy utility

Southern California Gas Company — A Sempra Energy utility

ETCC Emerging Technologies Coordinating Council

ONLINE RESOURCES



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http://www.etcc-ca.com/

NETWORKING LUNCH

THANK YOU

PLEASE COMPLETE EVALUATION FORMS