

Electricity Committee

SMART MONEY:

***ASSESSING THE VALUE AND
PERFORMANCE OF INVESTMENTS IN
THE MODERN GRID***

NARUC  Summer
Policy Summit

Moderator:

- Hon. John Rosales, Illinois

Panelists:

- Erin Erben, EPRI
- Paul Alvarez, Wired Group
- Tim Woolf, Synapse Energy Economics

Benefit-Cost Analysis For Investments in the Modern Grid

**Recent trends in how to determine whether grid
modernization investments will deliver value to customers**

July 16, 2018

**Smart Money Panel
NARUC Summer Policy Summit
Scottsdale, Arizona**

**Tim Woolf
Synapse Energy Economics**

Overview

- Increasing demand for benefit-cost analysis (BCA):
 - Grid modernization
 - Distributed energy resources (DERs): energy efficiency, demand response, distributed solar, storage, electric vehicles, strategic electrification.
 - IRP, distribution planning, iDER assessments.
- Very different practices are being used:
 - Across technologies
 - Across states
- Benefit-cost analyses show very different results.
 - Creates challenges in how to interpret the results
- Some positive trends are emerging.
- Much more progress is needed.

California Standard Practice Manual

- The CA Manual has been universally used for energy efficiency
 - But most states apply it differently.
- Describes five standard cost-effectiveness tests:
 - Utility Cost test: impacts on the utility system
 - Total Resource Cost test: impacts on the utility system and program participants
 - Societal Cost test: impacts on society
 - Participant test: impacts on program participants
 - Rate Impact Measure test: impacts on rates
- These tests are increasingly being used to assess grid modernization, DERs, and related initiatives.
- But the CA Manual does not address current needs:
 - Does not address energy policy goals
 - Does not address rate impacts well
 - Has been interpreted inconsistently
 - Does not address some key DER issues

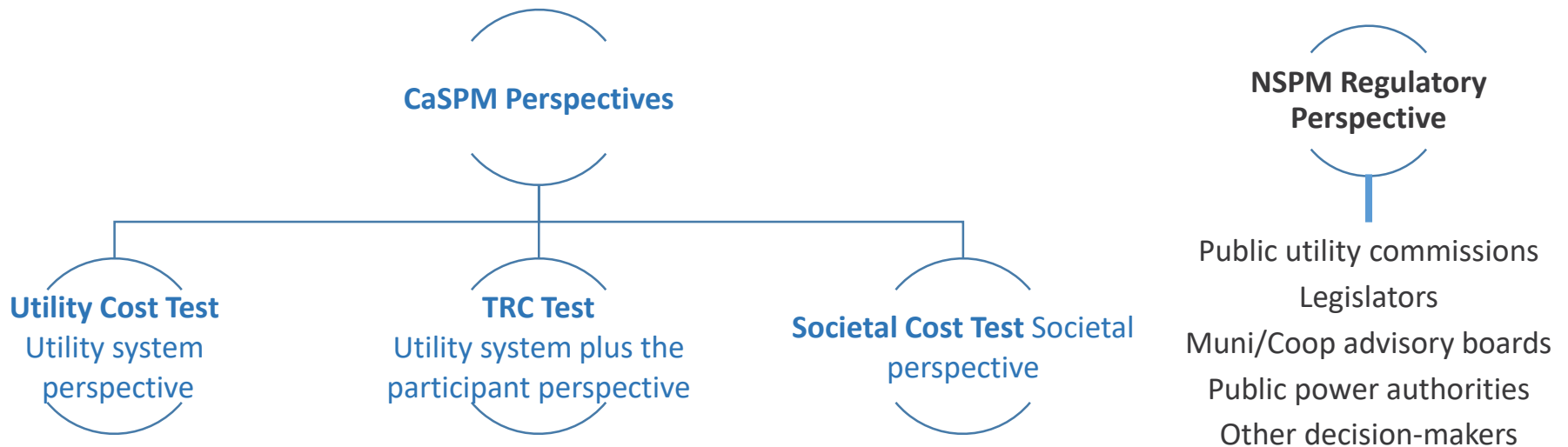
National Standard Practice Manual

- Designed to update, improve, and replace the CA SPM.
- Includes a set of fundamental BCA principles.
- Acknowledges the importance of policy goals in BCAs.
- Provides an framework for determining a state BCA test.
- Distinguishes between primary and secondary tests.
- Provides guidance on whether and how to include participant impacts.
- Provides guidance on key BCA inputs:
 - Discount rates
 - Avoided costs
 - Study period
 - End effects

NSPM: Principles

Efficiency as a Resource	EE is one of many resources that can be deployed to meet customers' needs and therefore should be compared with other energy resources (both supply-side and demand-side) in a consistent and comprehensive manner.
Policy Goals	A jurisdiction's primary cost-effectiveness test should account for its energy and other applicable policy goals and objectives. These goals and objectives may be articulated in legislation, commission orders, regulations, advisory board decisions, guidelines, etc., and are often dynamic and evolving.
Hard-to-Quantify Impacts	Cost-effectiveness practices should account for all relevant, substantive impacts (as identified based on policy goals,) even those that are difficult to quantify and monetize. Using best-available information, proxies, alternative thresholds, or qualitative considerations to approximate hard-to-monetize impacts is preferable to assuming those costs and benefits do not exist or have no value.
Symmetry	Cost-effectiveness practices should be symmetrical, where both costs and benefits are included for each relevant type of impact.
Forward-Looking Analysis	Analysis of the impacts of resource investments should be forward-looking, capturing the difference between costs and benefits that would occur over the life of the subject resources as compared to the costs and benefits that would occur absent the resource investments.
Transparency	Cost-effectiveness practices should be completely transparent and should fully document all relevant inputs, assumptions, methodologies, and results.

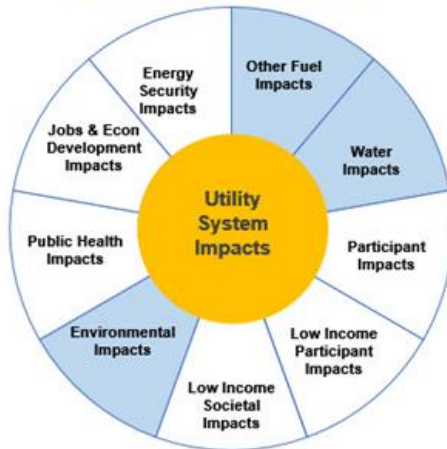
NSPM: Cost-Effectiveness Perspectives



- California Standard Practice Manual (CaSPM) – test perspectives are used to define the scope of impacts to include in the ‘traditional’ cost-effectiveness tests
- NPSM introduces the ‘regulatory’ perspective, which is guided by the jurisdiction’s energy and other applicable policy goals

NSPM: Relationship Of Different Tests

JURISDICTION 1: RVT



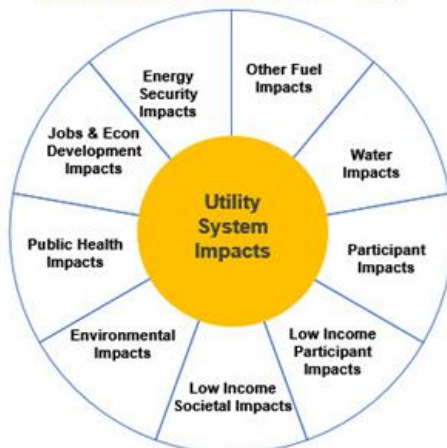
JURISDICTION 2: RVT



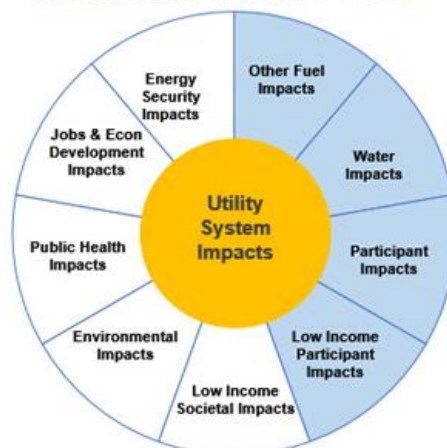
JURISDICTION 3: RVT



JURISDICTION 4: RVT = UCT



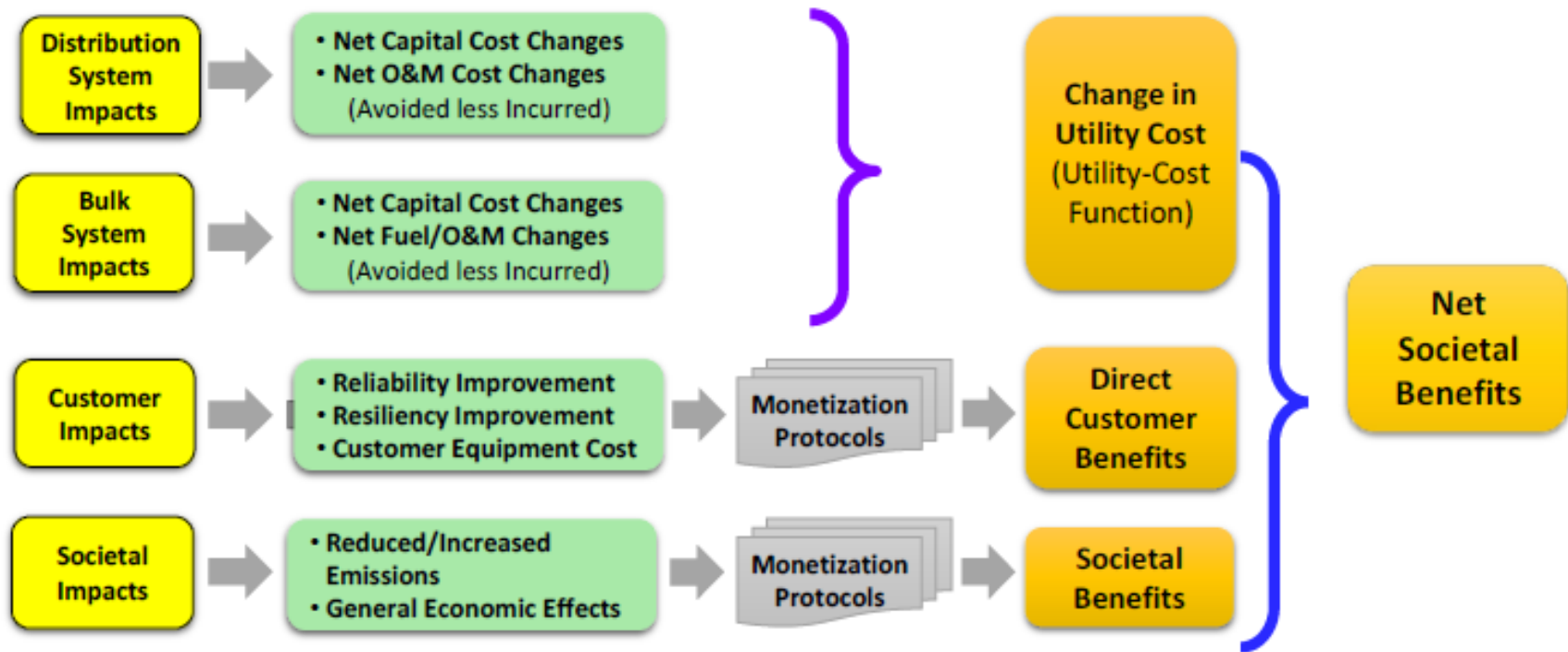
JURISDICTION 5: RVT = TRC



JURISDICTION 6: RVT = SCT



EPRI: Benefit-Cost Framework for the Integrated Grid



Source: Electric Power Research Institute, *The Integrated Grid: A Benefit-Cost Framework*, February 2015, page 9-3.

EPRI report explains the rationale for the utility and societal perspectives.
No mention of a Total Resource Cost test.
No mention of lost revenues or a RIM test.

General Trends in BCA for DERs

- Increased interest in accounting for policy goals.
- Increased flexibility in choice of tests/perspectives.
- General emphasis on:
 - Utility system impacts
 - Societal impacts
- Less emphasis on:
 - Participant impacts
 - The Rate Impact Measure test
- Lack of consistency
 - Different tests for different DERs
- Increased complexity
 - Especially for optimizing across DERs

U.S. Department of Energy: Modern Distribution Grid

DOE divides modern grid expenditures into four types:

1. Expenditures to replace aging infrastructure
 - Apply a least-cost/best-fit approach or the Utility Cost test
2. Expenditures to maintain reliable operations
 - Apply a least-cost/best-fit approach or the Utility Cost test
3. Expenditures to enable public policy or societal benefits
 - Apply the Societal Cost test
4. Expenditures that will be paid for by customers
 - No need to analyze because they do not require regulatory approval

Source: US Department of Energy, Modern Distributed Grid, Decision Guide, Volume III, June 8, 2017, pages 39-44.

No mention of a Total Resource Cost test.

No mention of lost revenues or a RIM test.

New York Reforming Energy Vision (REV) BCA Order

- The Societal Cost test should be the primary test.
- The Utility Cost test should play a subsidiary role.
- The RIM test should play a subsidiary role.
 - But a more sophisticated rate and bill impact analysis is needed
- The Societal Cost test should include environmental externalities.
 - Based on the EPA Social Cost of Carbon
- Non-energy benefits:
 - Should be monetized on a location-specific or project-specific basis, where possible
 - NEBs that cannot be monetized should be considered on a qualitative basis

California Trends

- Regarding energy efficiency cost-effectiveness
 - In 2017 commission staff proposed a partial societal cost test
 - Accounts for the benefits of reducing GHG emissions
 - Reflects aggressive state energy policy goals to reduce GHG emissions
- Regarding grid modernization

In 2017 commission staff proposed several options:

 - Option 1: develop a BCA methodology by individual technology
 - Option 2: develop a BCA methodology for grid modernization
 - Option 3: apply a least-cost/best-fit approach for grid modernization
 - Option 4: assess ratepayer benefits as a sensitivity in IRP optimization

Contact Information

Synapse Energy Economics is a research and consulting firm specializing in energy, economic, and environmental topics. Since its inception in 1996, Synapse has grown to become a leader in providing rigorous analysis of the electric power and natural gas sectors for public interest and governmental clients.

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CA Manual: Traditional Tests

Test	Perspective	Key Question Answered	Summary Approach
Utility Cost	The utility system	Will utility system costs be reduced?	Includes the costs and benefits experienced by the utility system
Total Resource Cost	The utility system plus participating customers	Will utility system costs plus program participants' costs be reduced?	Includes the costs and benefits experienced by the utility system, plus costs and benefits to program participants
Societal Cost	Society as a whole	Will total costs to society be reduced?	Includes the costs and benefits experienced by society as a whole
Participant Cost	Customers who participate in an efficiency program	Will program participants' costs be reduced?	Includes the costs and benefits experienced by the customers who participate in the program
Rate Impact Measure	Impact on rates paid by all customers	Will utility rates be reduced?	Includes the costs and benefits that will affect utility rates, including utility system costs and benefits plus lost revenues

California Manual:

Components of
the traditional
tests in the
California Standard
Practice Manual

	UCT	TRC Test	SCT	Participant Cost Test	RIM Test
EE Costs:					
Efficiency Program Costs	Yes	Yes	Yes	---	Yes
Efficiency Portfolio Costs	Yes	Yes	Yes	---	Yes
Financial Incentive Provided to Participant	Yes	Yes	Yes	---	Yes
Participant Financial Cost of Efficiency	---	Yes	Yes	Yes	---
Participant Non-Financial Cost of Efficiency	---	Yes	Yes	Yes	---
Participant Increased Resource Consumption	---	Yes	Yes	Yes	---
Societal costs (environmental, health, etc.)	---	---	Yes	---	---
Lost Revenues	---	---	---	---	Yes
EE Benefits:					
Avoided Energy Costs	Yes	Yes	Yes	---	Yes
Avoided Generation Capacity Costs	Yes	Yes	Yes	---	Yes
Avoided T&D Capacity Costs	Yes	Yes	Yes	---	Yes
Avoided T&D Losses	Yes	Yes	Yes	---	Yes
Wholesale Market Price Suppression Effects	Yes	Yes	If applicable	---	Yes
Avoided Environmental Compliance Costs	Yes	Yes	Yes	---	Yes
Avoided RPS Compliance Costs	Yes	Yes	Yes	---	Yes
Avoided Credit and Collection Costs	Yes	Yes	Yes	---	Yes
Participant Resource Savings (fuel, water)	---	Yes	Yes	Yes	---
Participant Non-Resource Benefits	---	Yes	Yes	Yes	---
Reduce Low-income Energy Burden	---	---	Yes	---	---
Environmental Benefits	---	---	Yes	---	---
Jobs and Economic Development Benefits	---	---	Yes	---	---
Societal Health Care Benefits	---	---	Yes	---	---
Increased energy security	---	---	Yes	---	---
Customer Bill Savings	---	---	---	Yes	---

Using Peer Comparisons in Distributor Performance Evaluation

Wired Group

Unleashing Latent Value in Distribution Utility Businesses

Electricity Committee “Smart Money” Panel

NARUC Summer Policy Meetings

July 16, 2018

Paul J. Alvarez, President, Wired Group

Wired Group Background

- Leading experts on grid modernization plans & performance for Advocates



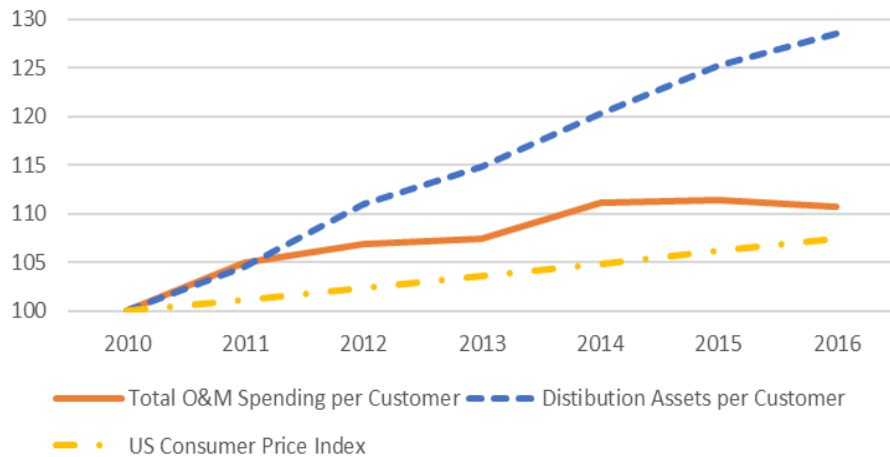
- Comprehensive, objective evaluations of smart grid deployments
 - SmartGridCity™ for Xcel Energy (2010)
 - Duke Energy Ohio for the Ohio PUC (2011)
 - (California DRA, Southern California Edison, smart meters only, 2012)
- Findings:
 - Securing benefits in excess of costs is extremely difficult and rare
 - Variation in post-deployment customer benefits is very high

What Are Customers Getting for Their Money?

Despite grid investment,
O&M spending is increasing

Selecte Data, All US IOUs, 2010 = 100

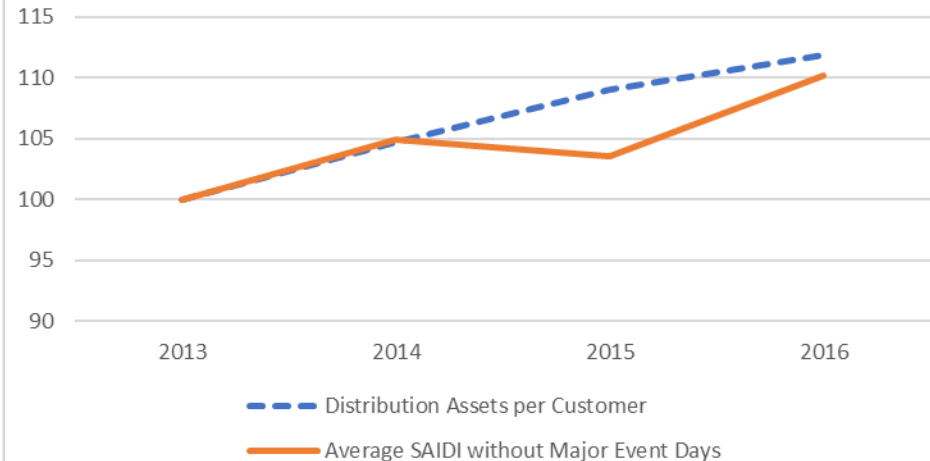
Data sources: FERC Form 1; EIA Form 861



Despite grid investment,
SAIDI is increasing

Selected Data, All US IOUs, 2013 = 100

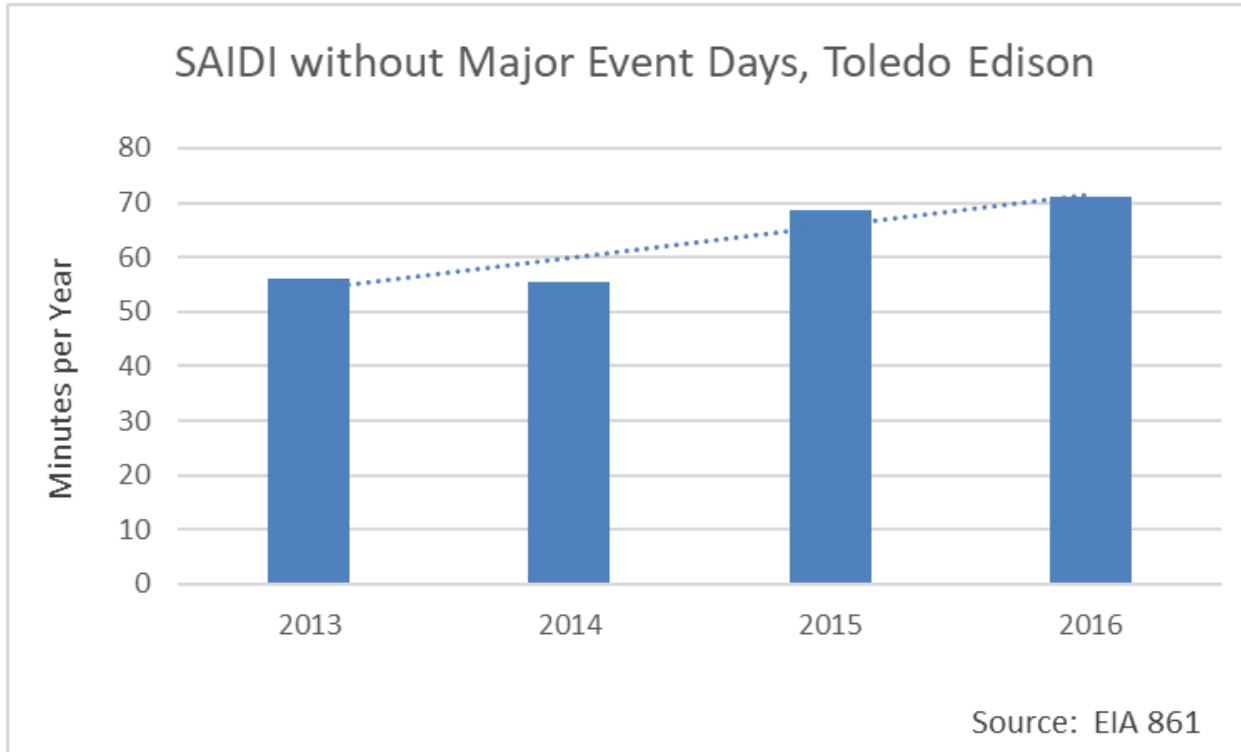
Data sources: FERC Form 1, EIA Form 861



*Performance measurement is essential to
securing benefits from grid investments*

Charts courtesy of the Utility Evaluator™.
For more information visit utilityevaluator.com.

Setting/Prioritizing Targets: Historical Comparison

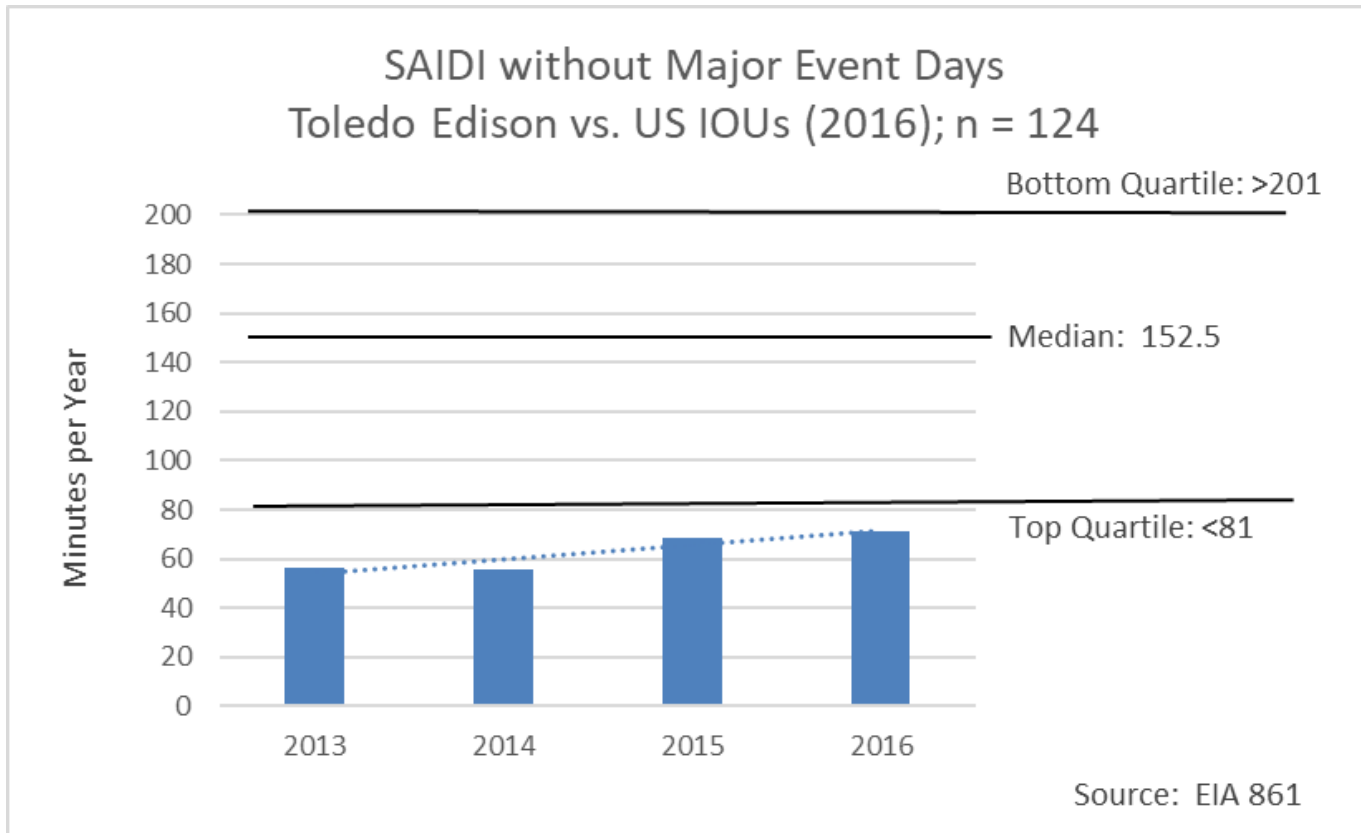


Optional metric:
“Achieve 60-
minute SAIDI by
2019”

*Is SAIDI performance problematic for
Toledo Edison?*

Chart courtesy of the Utility Evaluator™.
For more information visit utilityevaluator.com.

Setting/Prioritizing Targets: Peer Comparison

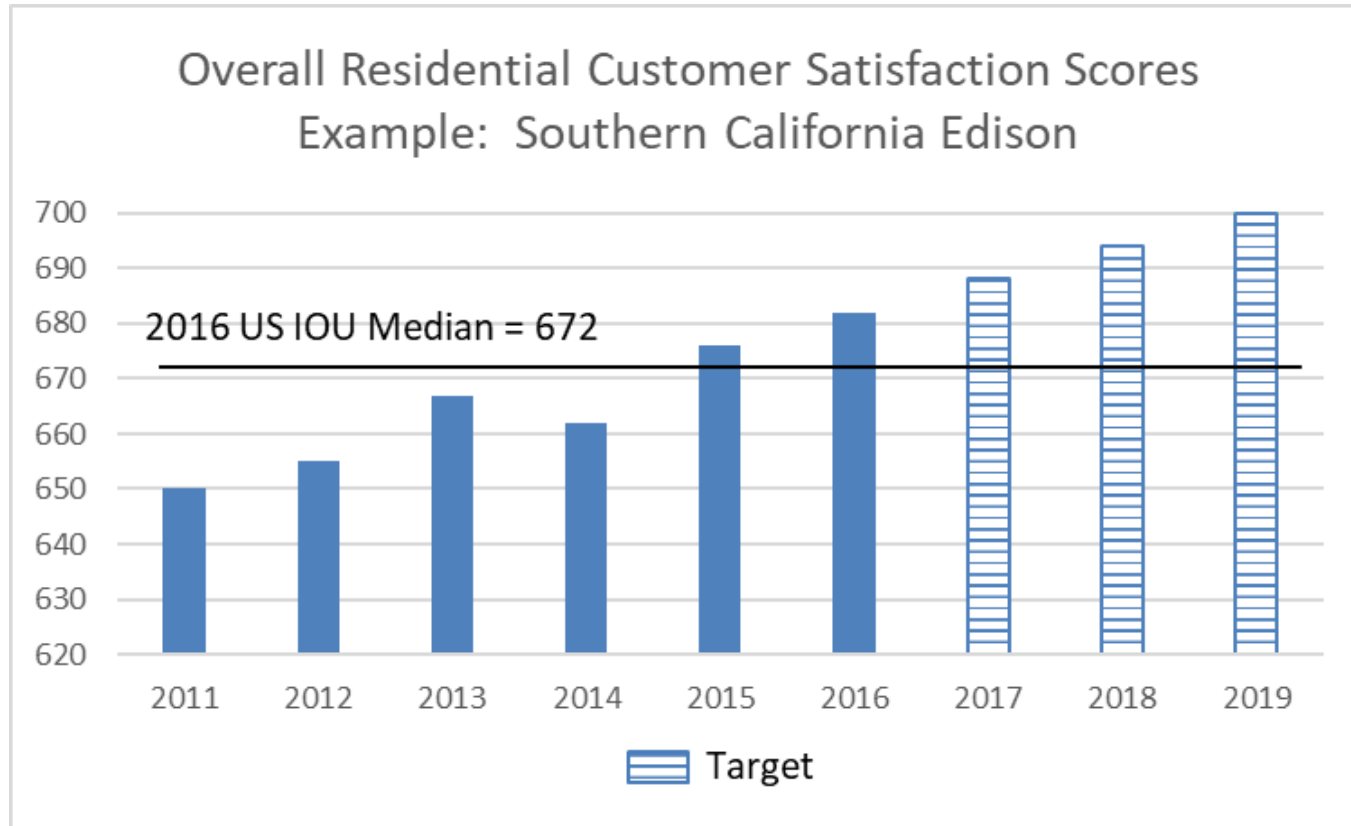


Better metric:
“Remain Top
Quartile in
SAIDI through
2019”

Is SAIDI problematic for Toledo Edison in light of peer performance?

Chart courtesy of the Utility Evaluator™.
For more information visit utilityevaluator.com.

History-based Targets: Do Not Remain Relevant in Changing Circumstances

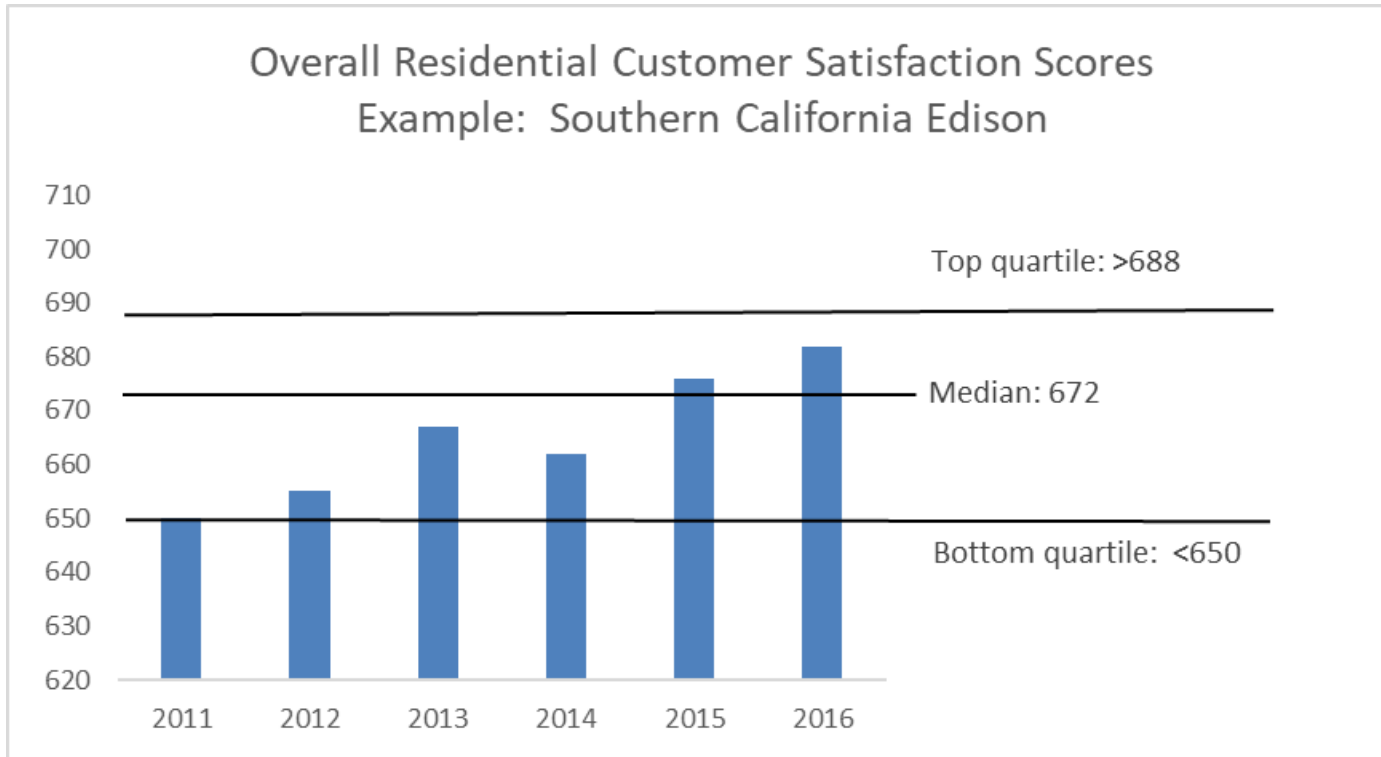


Optional metric:
“Achieve 700
JDPA
Satisfaction
Score by 2019”

Will a target score of 700 by 2019 remain relevant if Natural Gas prices double?

Chart courtesy of the Utility Evaluator™.
For more information visit utilityevaluator.com.

Peer-based Targets DO Remain Relevant in Changing Circumstances

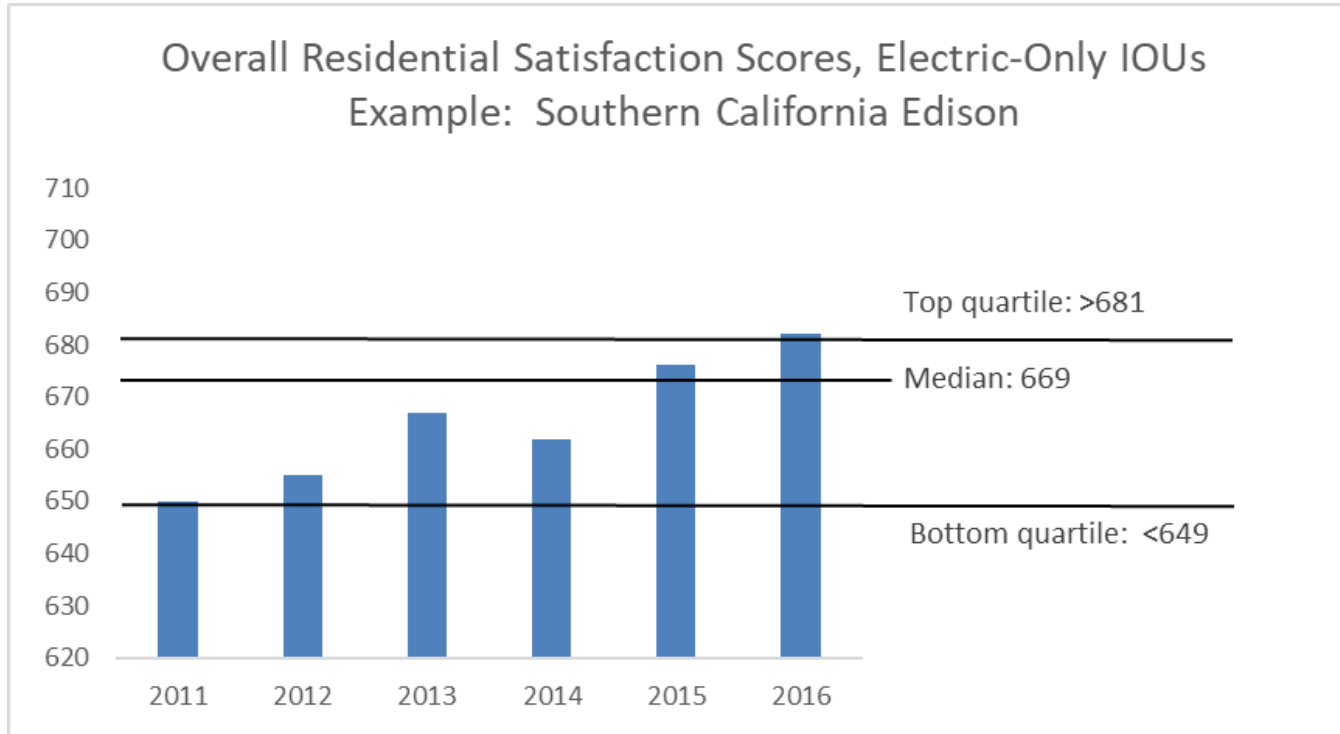


Better metric:
“Achieve Top
Quartile JDPA
Satisfaction
Score by 2019”

By expressing target as a quartile relative to peers, target will remain relevant even if Natural Gas prices double

Chart courtesy of the Utility Evaluator™.
For more information visit utilityevaluator.com.

Peer-Based Targets Can Accommodate Differences in IOU Characteristics



Even better metric:
“Maintain Top Quartile JDPA Satisfaction Score among Electric-only IOUs through 2019”

Using characteristics to define a peer group results in more relevant targets.

Chart courtesy of the Utility Evaluator™.
For more information visit utilityevaluator.com.

Other Benefits to Peer Comparisons for Setting Targets, Measuring Performance

- Reduces performance manipulation opportunities
- Improves administrative efficiency
- *Broad adoption will raise all IOU's performance over time in a manner similar to competition*

Sample Metrics for Peer Comparisons

Focus: affordable, reliable electricity

- Capital investment per customer
- Capital investment per distribution line mile
- O&M spending per customer (Dist, B&CS, A&G)
- Overall residential customer satisfaction (JD Power)
- CAIDI/SAIDI (with or without Major Event Days)
- CAIFI/SAIFI (with or without Major Event Days)
- Demand Response (MW) as % of system peak
- DR program admin \$ per MW of callable Demand

Utility Evaluator™ development plan: Natural Gas version; OSHA safety data.

Thank You!

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