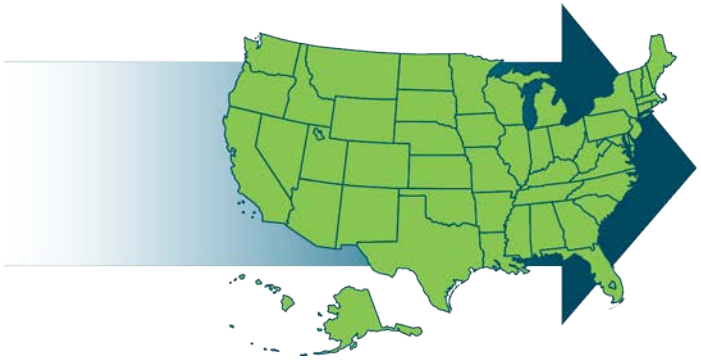

SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

SEE Action Webinar: Using Integrated Resource Planning (IRP) to Encourage Investment in Cost-Effective Energy Efficiency Measures

September 26, 2013

Moderator: Johanna Zetterberg, DOE

Speakers: Larry Mansueti, DOE

John Shenot, Regulatory Assistance Project

Michael Harrington & Ronny Sandoval, Consolidated Edison

About SEE Action

- Network of 200+ leaders and professionals, led by state and local policymakers, bringing energy efficiency to scale
- Support on energy efficiency policy and program decision making for:
  - Utility regulators, utilities and consumer advocates
  - Legislators, governors, mayors, county officials
  - Air and energy office directors, and others
- Facilitated by DOE and EPA; successor to the National Action Plan for Energy Efficiency

The SEE Action Network is active in the largest areas of challenge and opportunity to advance energy efficiency

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The State and Local Energy Efficiency Action Network (SEE Action) is a state- and local-led effort facilitated by the U.S. Department of Energy and the U.S. Environmental Protection Agency to take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020. SEE Action offers publications, events, and technical assistance to state and local decision makers as they provide low-cost, reliable energy to their communities through energy efficiency.

SEE Action Working Groups »

- Existing Commercial Buildings
- Industrial Energy Efficiency and Combined Heat and Power
- Customer Information and Behavior
- Evaluation, Measurement and Verification
- Building Energy Codes
- Driving Ratepayer-Funded Efficiency through Regulatory Policies
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» A New Paradigm for EM&V Will Help Us Cut Energy Waste in Half (at the 2013 ACEEE Energy Efficiency as a Resource Conference)
September 23, 2013

» Industrial Energy Efficiency Roadmap - A Guide to Effective Programs for Industrial Customers (at the 2013 ACEEE Energy Efficiency as a Resource Conference)
September 23, 2013

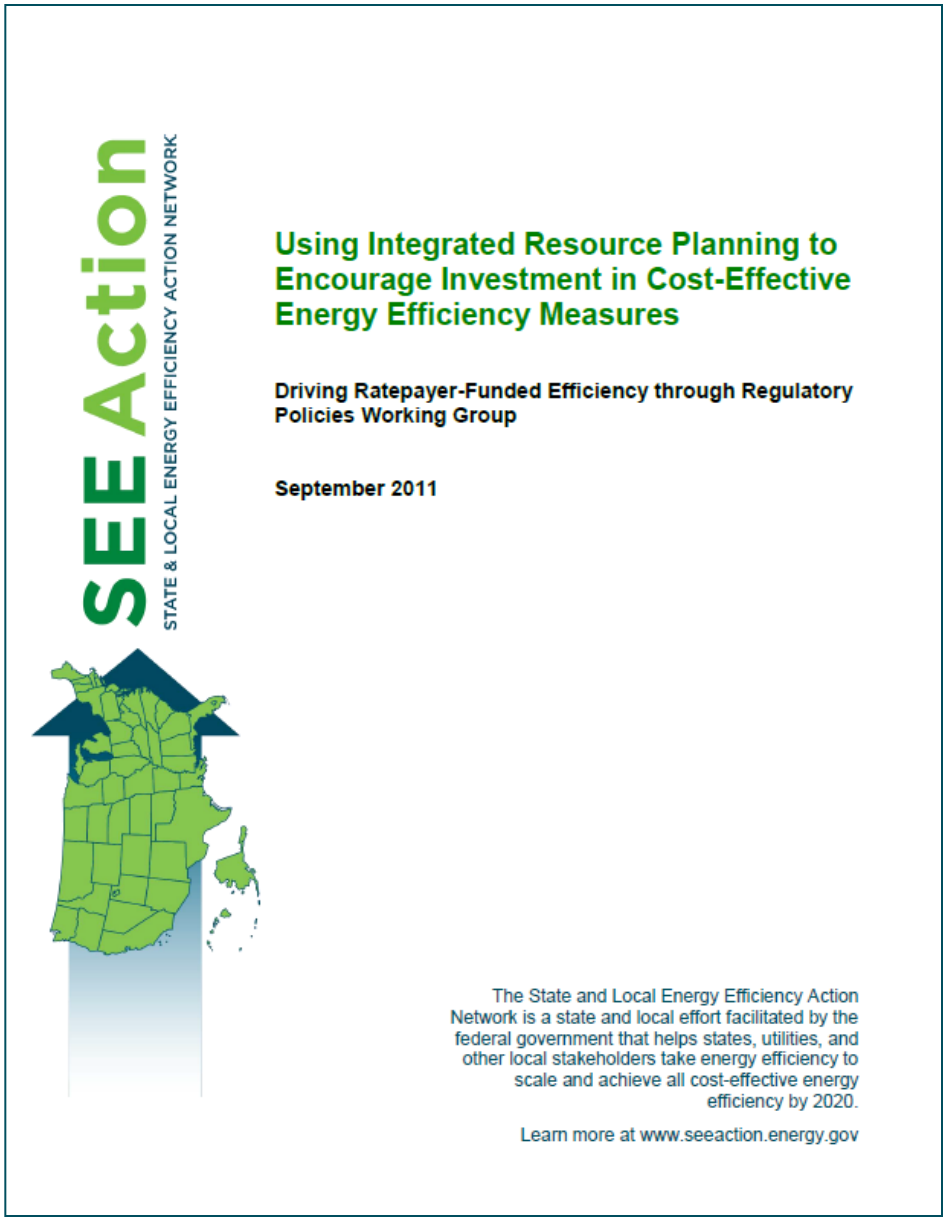
» Webinar: Using Integrated Resource Planning to Encourage Investment in Cost-Effective Energy Efficiency Measures
September 26, 2013

See all SEE Action events

Publications »

The Guide explains:

- The purpose and use of IRP
- Recommendations for successful IRP to encourage use of energy efficiency as an energy resource
- Alternatives to IRP in states with competitive retail markets
- Examples of successful IRP efforts
- How IRP interacts with other energy efficiency policies and programs



Working Group lead: Kit Kennedy, NRDC

Primary Author: John Shenot, RAP

Driving Ratepayer-Funded Efficiency through Regulatory Policies
Working Group Members

Co-Chairs

Jennifer Easler
Iowa Office of Consumer Advocate

Commissioner co-chair
vacant

Federal Facilitators

Katrina Pielli, Larry Mansueti
US DOE

Joe Bryson
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Marsha Smith	Idaho Public Utilities Commission
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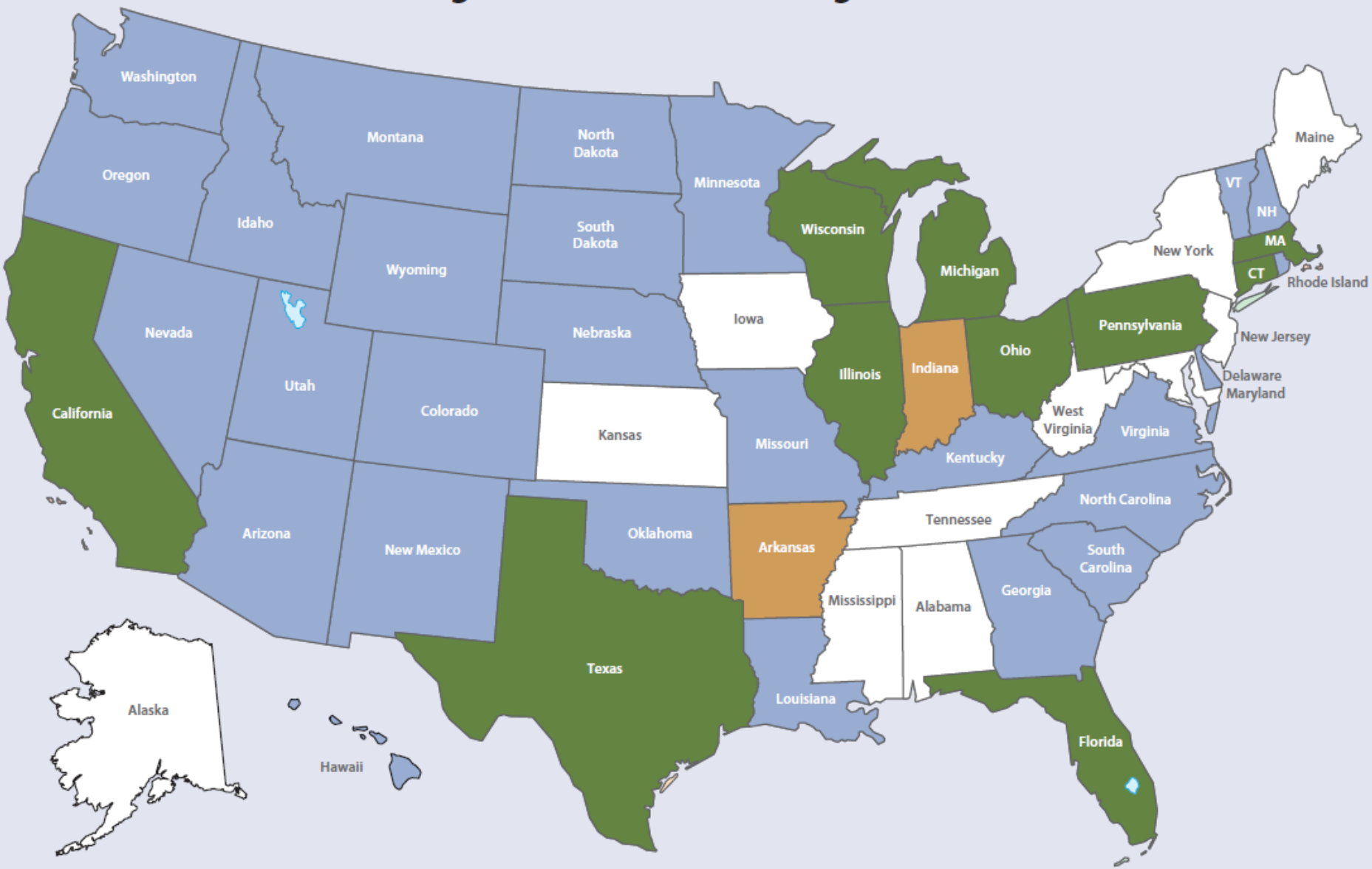
Bob Nelson	Montana Consumer Counsel
Wilson Gonzalez	Ohio Consumers' Counsel
Practitioners/Utilities	
Janet Besser	Formerly of National Grid
Rebecca Craft	Con Edison
Dena DeLucca	New Hampshire Electric Cooperative
Jared Lawrence	Duke Energy
Anne-Marie Peracchio	New Jersey Natural Gas
Diane Munns	MidAmerican Energy
Sheldon Switzer	Baltimore Gas and Electric
Non-Government Organizations	
Kit Kennedy	Natural Resources Defense Council
Derek Murrow	Environment Northeast
Steve Nadel	American Council for an Energy-Efficient Economy
John Sibley	Southface
Lisa Wood	Institute for Electric Efficiency
Observing Coordination Organizations	
Jeff Genzer	National Association of State Energy Officials
Don Gilligan	National Association of Energy Service Companies
Keith Dennis	National Rural Electric Cooperative Association
Miles Keogh	National Association of Regulatory Utility Commissioners
Elizabeth Noll	American Gas Association
Rick Tempchin	Edison Electric Institute
Aliza Wasserman	National Governors Association
Working Group Advisors	
Rich Sedano, Janine Migden-Ostrander	Regulatory Assistance Project
Tim Woolf	Synapse Energy Economics, Inc.

Purpose and Use of IRP

- Purpose: identify the mix of supply-side & demand-side resources that will minimize future energy system costs while ensuring safe & reliable system operation
- In most cases, an IRP is developed by a utility based on the needs of its service territory
  - Common for electric utilities
  - Much less common or gas utilities
- In some states, utilities are required to file IRPs with the public utility commission (PUC)
  - Serves as blueprint for future resource acquisitions
  - Filing may or may not be subject to PUC approval

States with Integrated Resource Planning or Similar Processes



State has an IRP rule and filing requirement

State has a filing requirement for long-term plans

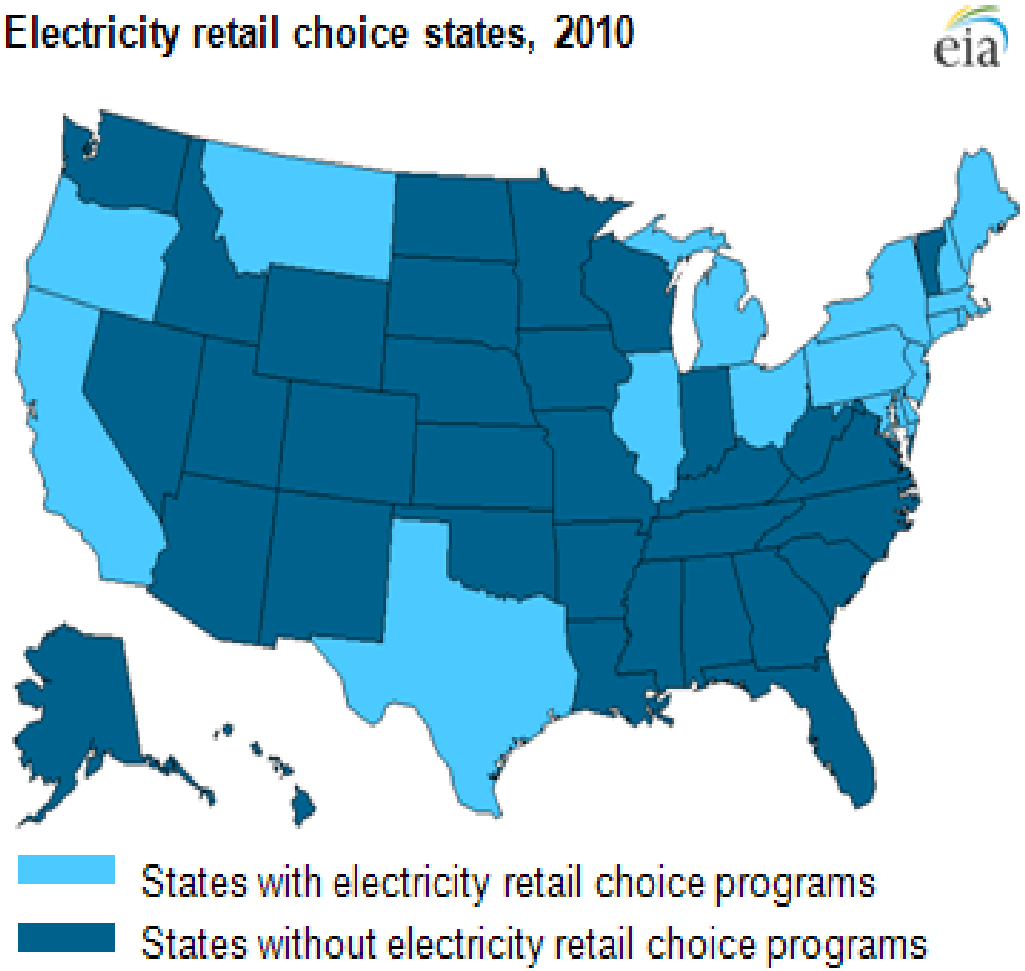
State is developing or revising an IRP rule and filing requirement

State does not have filing requirements for long-term plans

Source: *Best Practices in Electric Utility Integrated Resource Planning*, Synapse (2013)

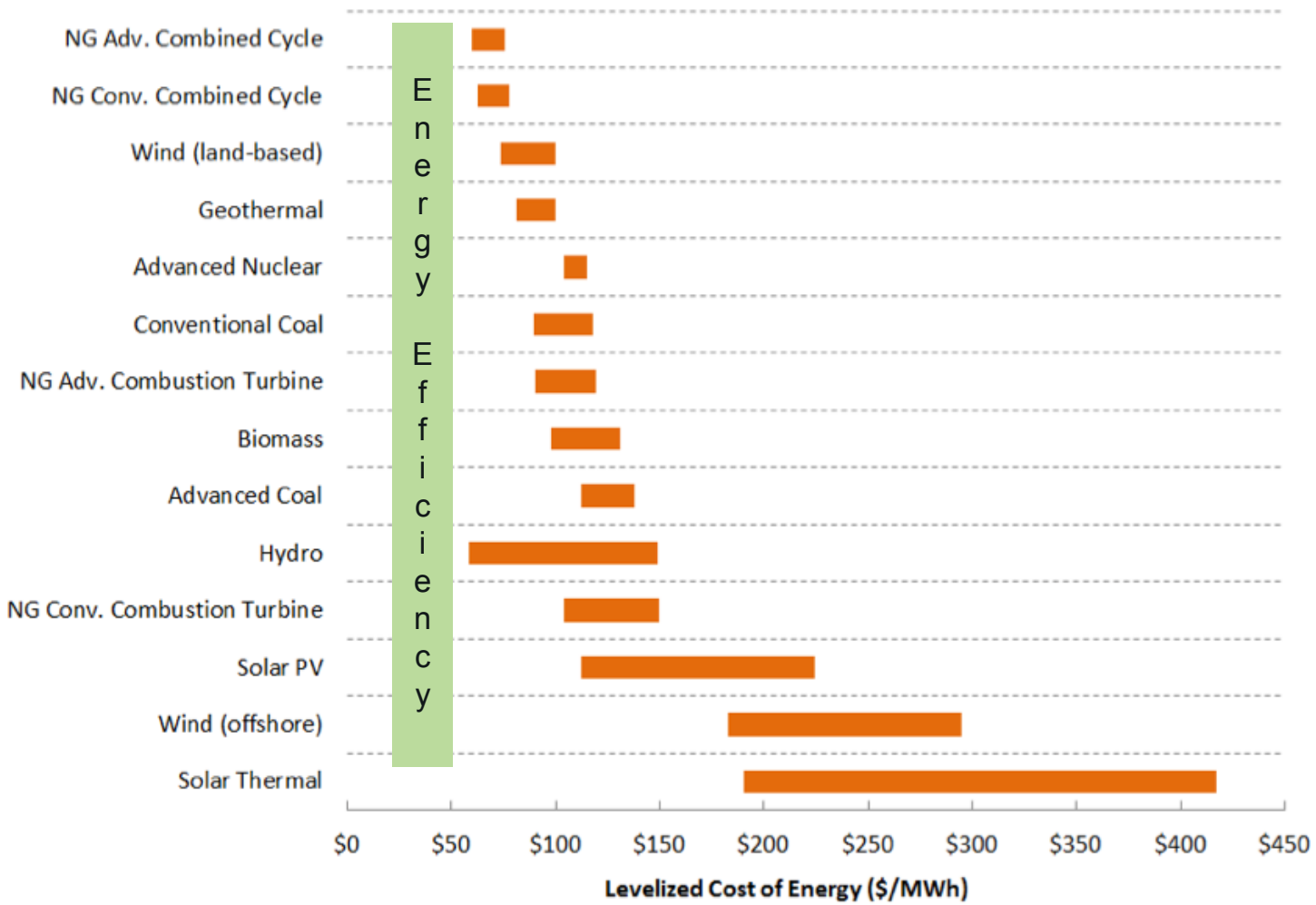
Alternatives to IRP in Competitive Retail Markets

- In retail choice states, customer chooses electricity supplier
- Distribution utility is responsible for *delivery* of electricity to all customers, and (except in Texas) for "default" service
- Comprehensive IRP not appropriate for the more limited role of these utilities, but "integrated" approach can still add value to:
  - Portfolio Management for default service
  - T&D planning



Source: U.S. Energy Information Administration

How IRP Can Promote Energy Efficiency (EE)



Data Source: *EIA, Annual Energy Outlook, 2013*

Prerequisites for Successful IRPs

1. Credible load forecasts
2. Credible information about costs and availability of resources
3. Fair and equal consideration of a resources

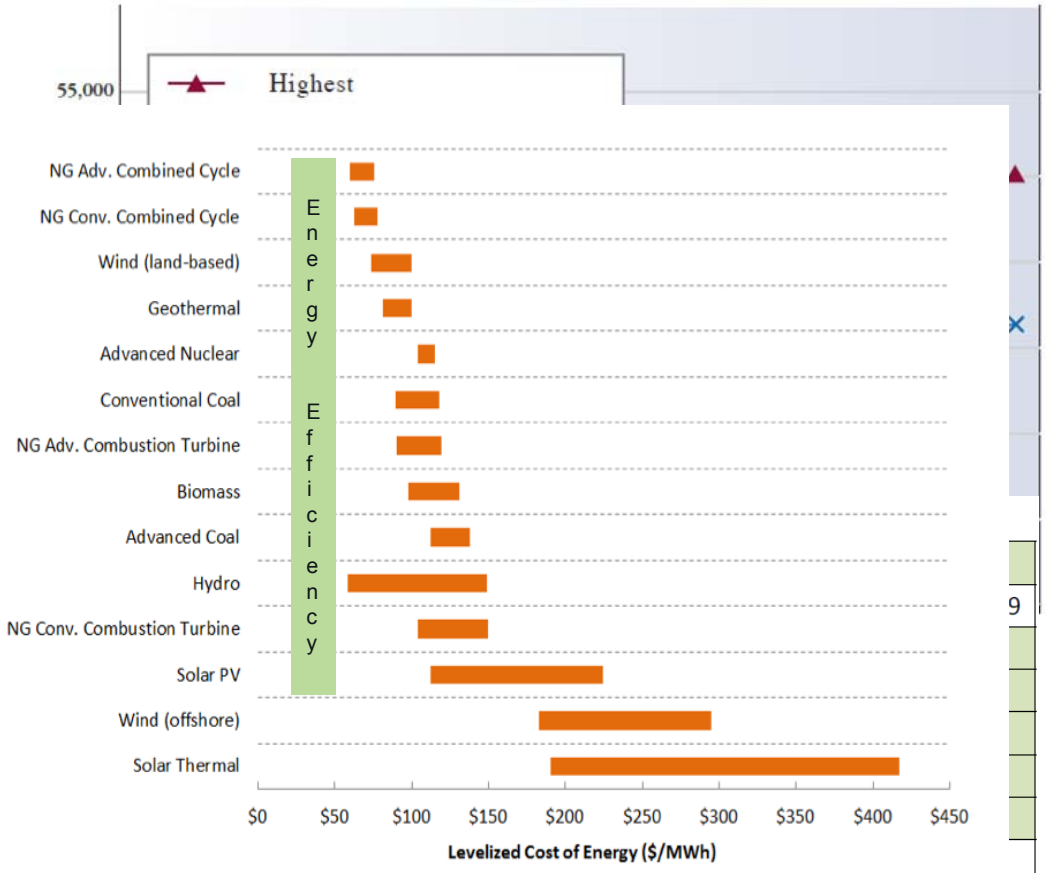
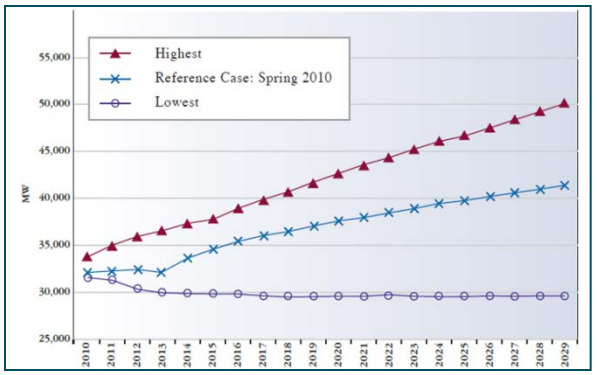


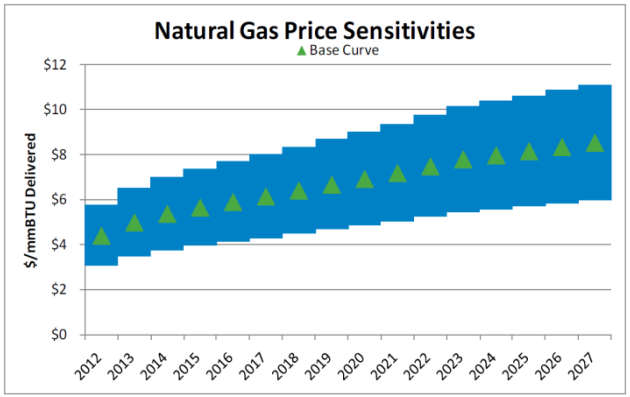
Table 6-1

Baseline Foreca					9
Energy Savings					
Achievable - Low					
Achievable - Hig					
Economic					
Technical					
Energy Savings					
Achievable - Low	0.6%	2.2%	5.1%	8.0%	10.6%
Achievable - High	1.7%	5.0%	9.8%	15.1%	19.8%
Economic	3.1%	8.4%	13.9%	19.8%	24.8%
Technical	3.7%	10.3%	17.6%	25.6%	31.6%

Best Practices in IRP

1. **Load**: model a range of possible load forecasts, not just the "reference case"
2. **Generation Resources**: model a range of possible costs for each supply-side technology, considering uncertainties
3. **T&D Resources**: consider new transmission lines as a possible resource, but also consider distribution system improvements as a way to reduce line losses and reduce the need for generation

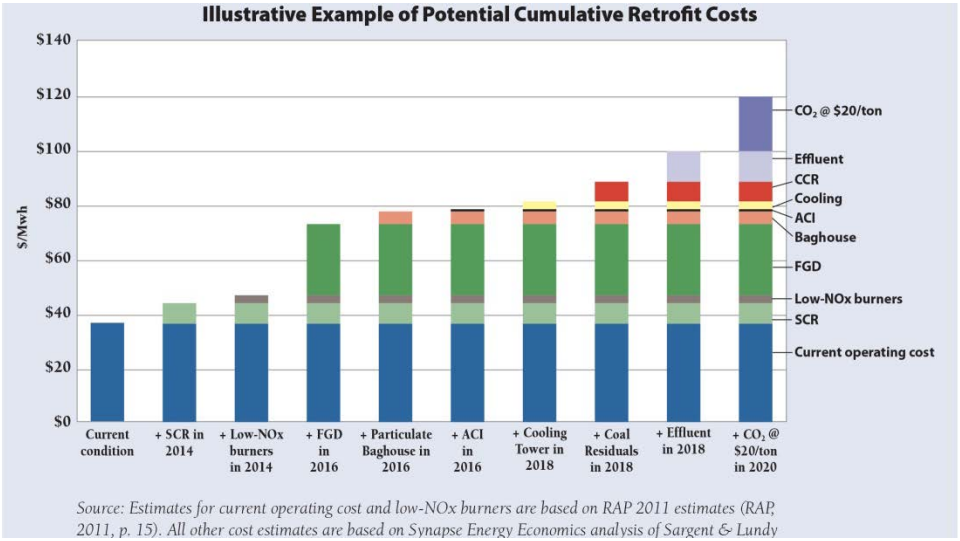




Best Practices in IRP (continued)

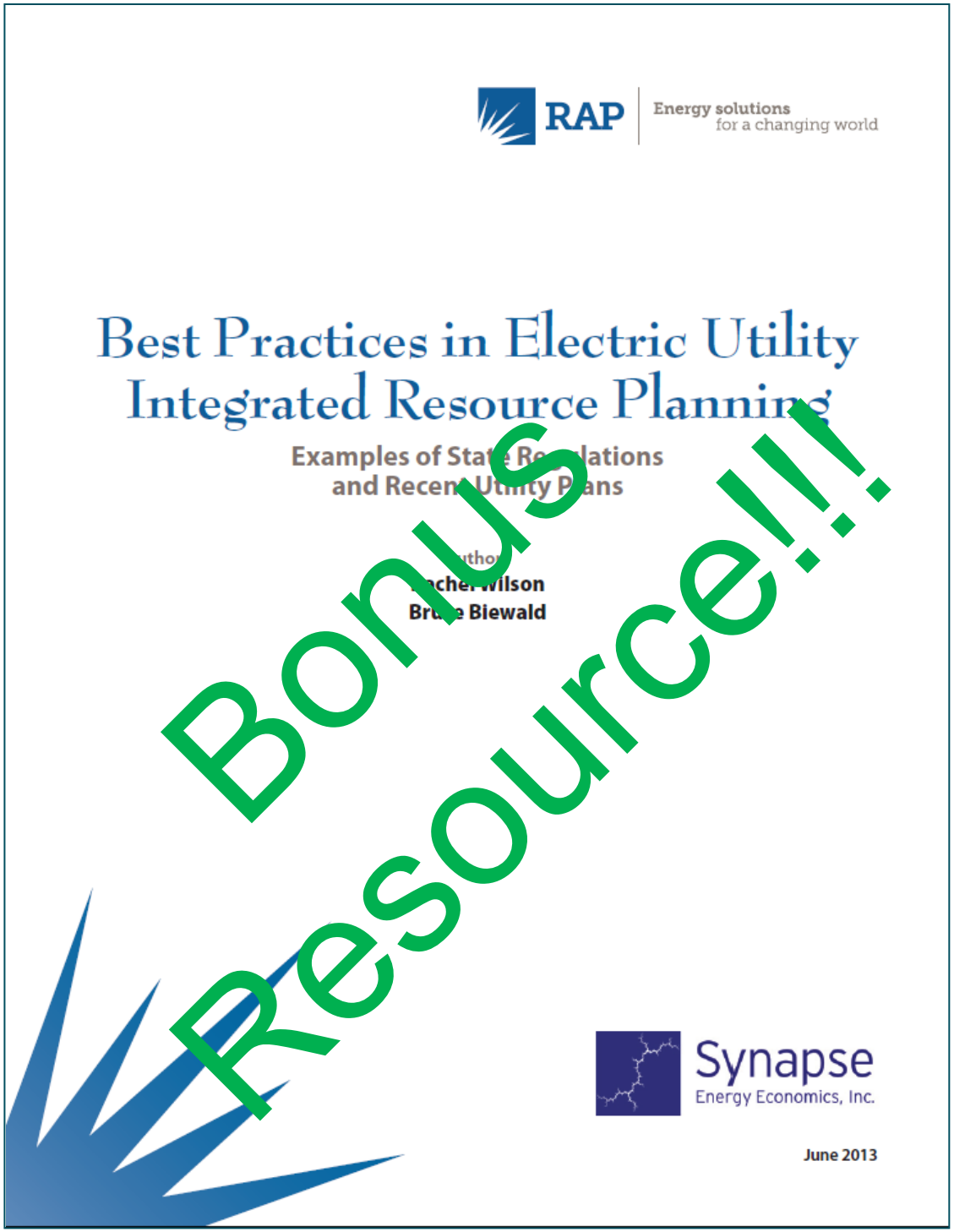
4. **EE and other Demand-Side Resources**: create levelized cost curves and allow the model to choose optimum investment level

5. **Environmental Regulations**: Consider the compliance costs associated with a range of possible future regulations



Best Practices in IRP (continued)

6. **Modeling**: evaluate cost *and risk* of multiple portfolios under a wide range of future scenarios; choose a "robust" portfolio
7. **Stakeholder Participation**: provide opportunities for consumer advocates and other stakeholders to review the modeling assumptions and the list of scenarios to be modeled and suggest changes or additions; also provide them the chance to review modeling results before the IRP is finalized
8. **Scale**: acknowledge the existence of regional electricity grid and model at a regional scale, if feasible



Available at http://www.raponline.org/document/download/id/6608

Examples of Best Practices

- From SEE Action Report:
  - Northwest Power and Conservation Council for Bonneville Power Administration (4 states)
  - PacifiCorp (6 states)
  - Con Edison (NY)

- Additional from Synapse Report for RAP:
  - Arizona Public Service (AZ)
  - Public Service Company of Colorado/Xcel (CO)

RAP | Energy solutions for a changing world

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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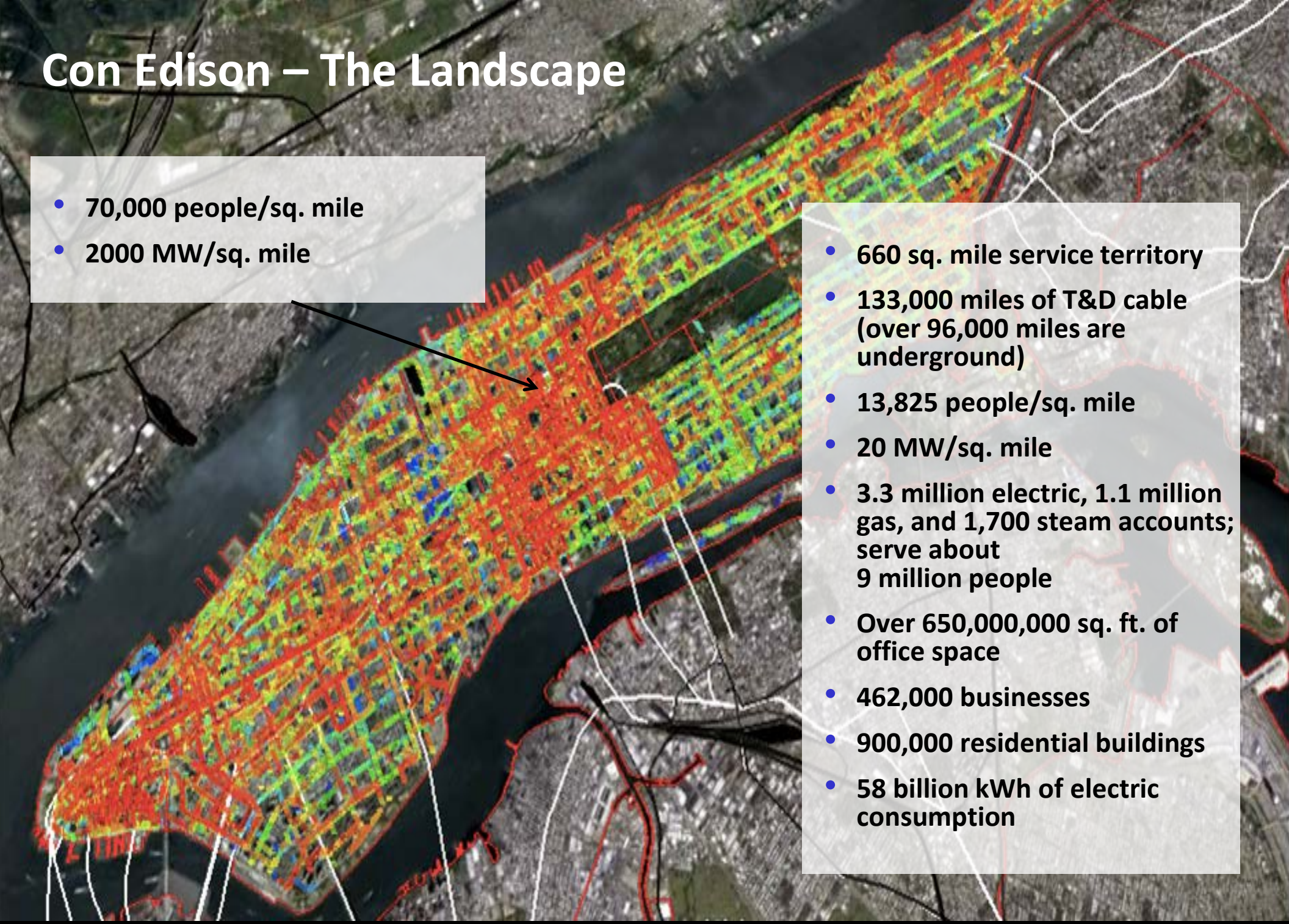
Integrated Resource Planning & Targeted DSM

Michael Harrington
Ronny Sandoval
Energy Efficiency and Demand Management Programs

Agenda

- Current Landscape & Evolution
- Integration of DSM into System Planning
- Targeted DSM Deep Dive

Con Edison – The Landscape



- 70,000 people/sq. mile
- 2000 MW/sq. mile

- 660 sq. mile service territory
- 133,000 miles of T&D cable (over 96,000 miles are underground)
- 13,825 people/sq. mile
- 20 MW/sq. mile
- 3.3 million electric, 1.1 million gas, and 1,700 steam accounts; serve about 9 million people
- Over 650,000,000 sq. ft. of office space
- 462,000 businesses
- 900,000 residential buildings
- 58 billion kWh of electric consumption

Capturing Value from Energy Efficiency

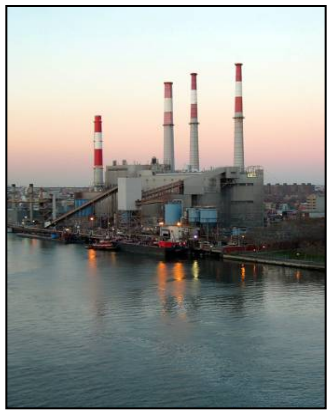
Energy Savings

T&D Savings

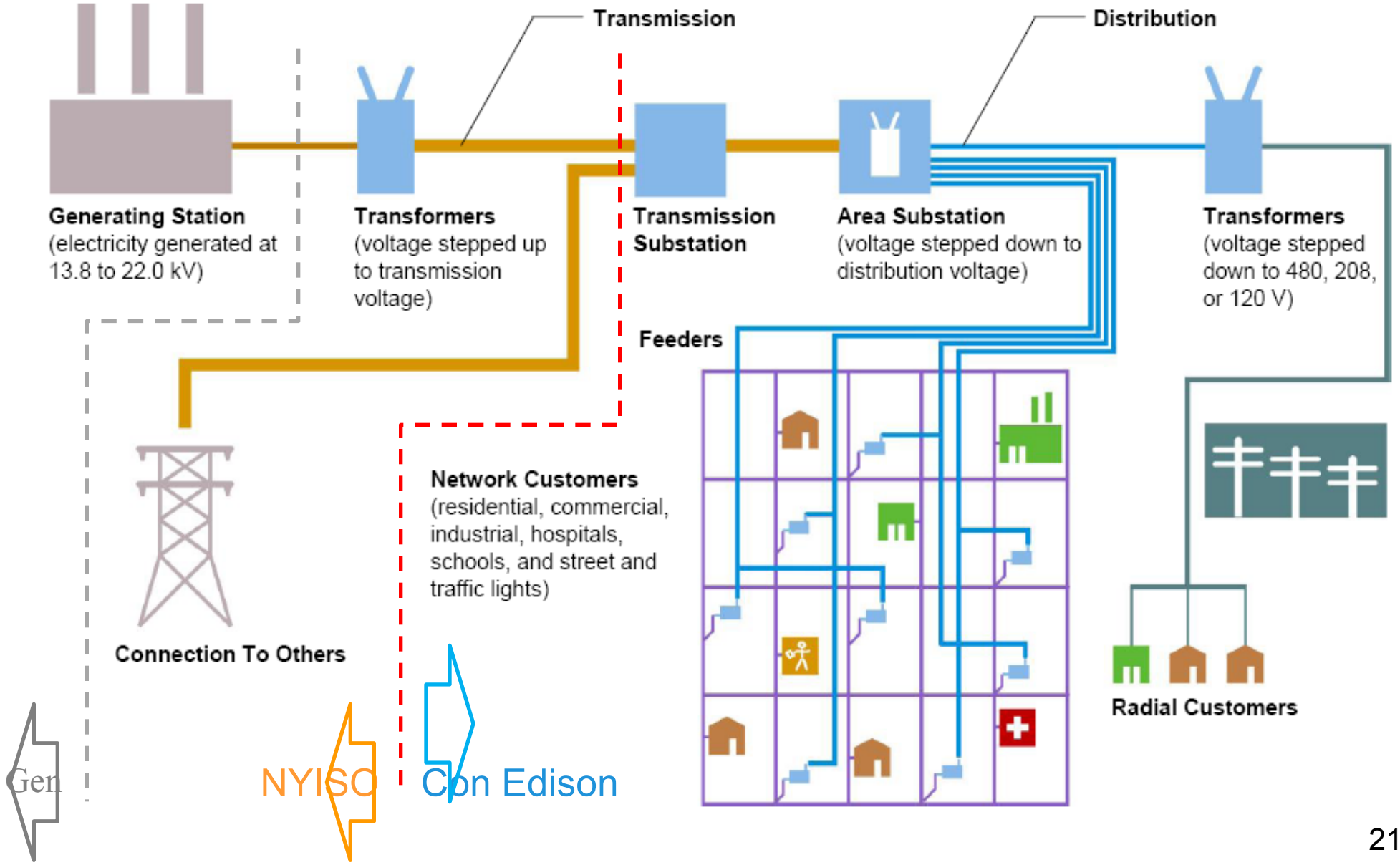
Line Loss Savings

Capacity Savings

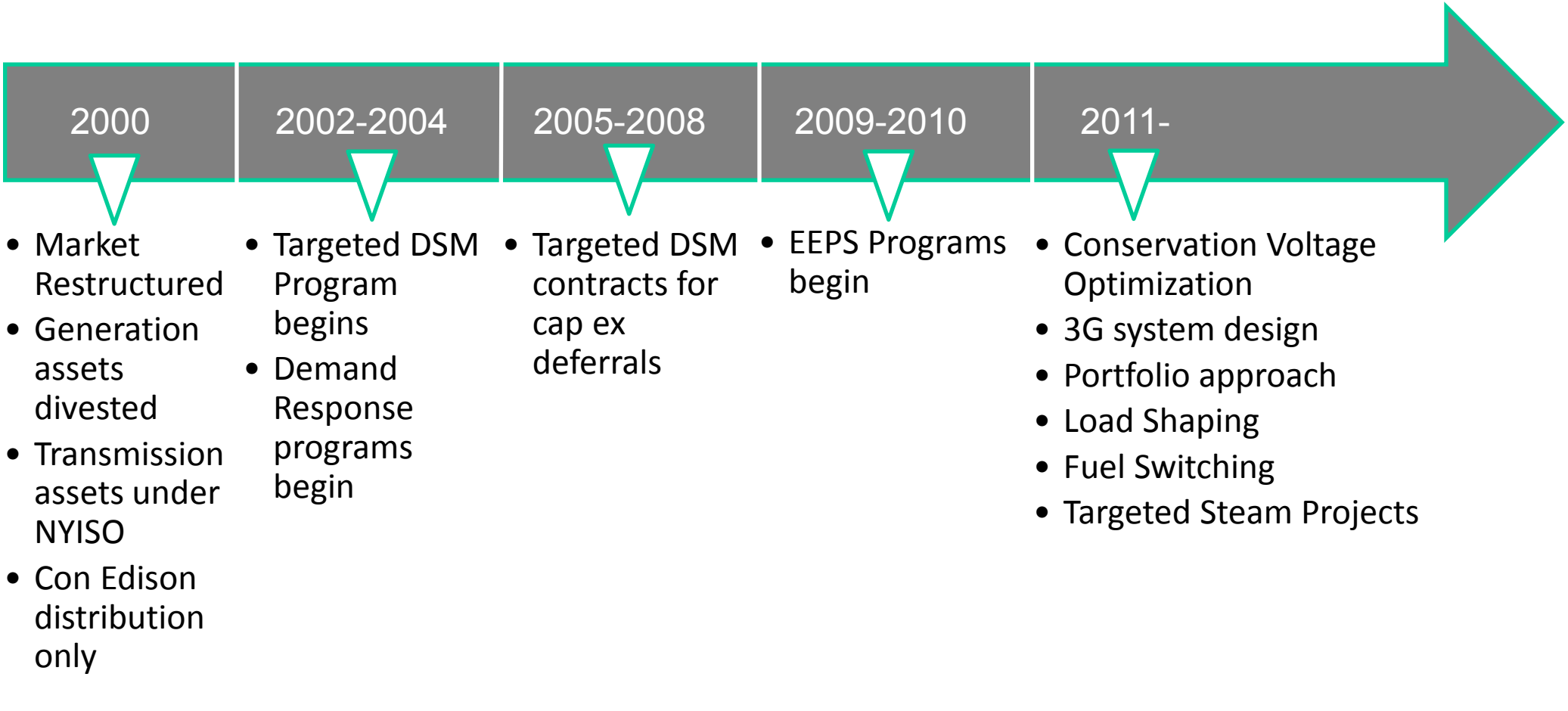
Environmental Benefits



The Electric System - Restructured

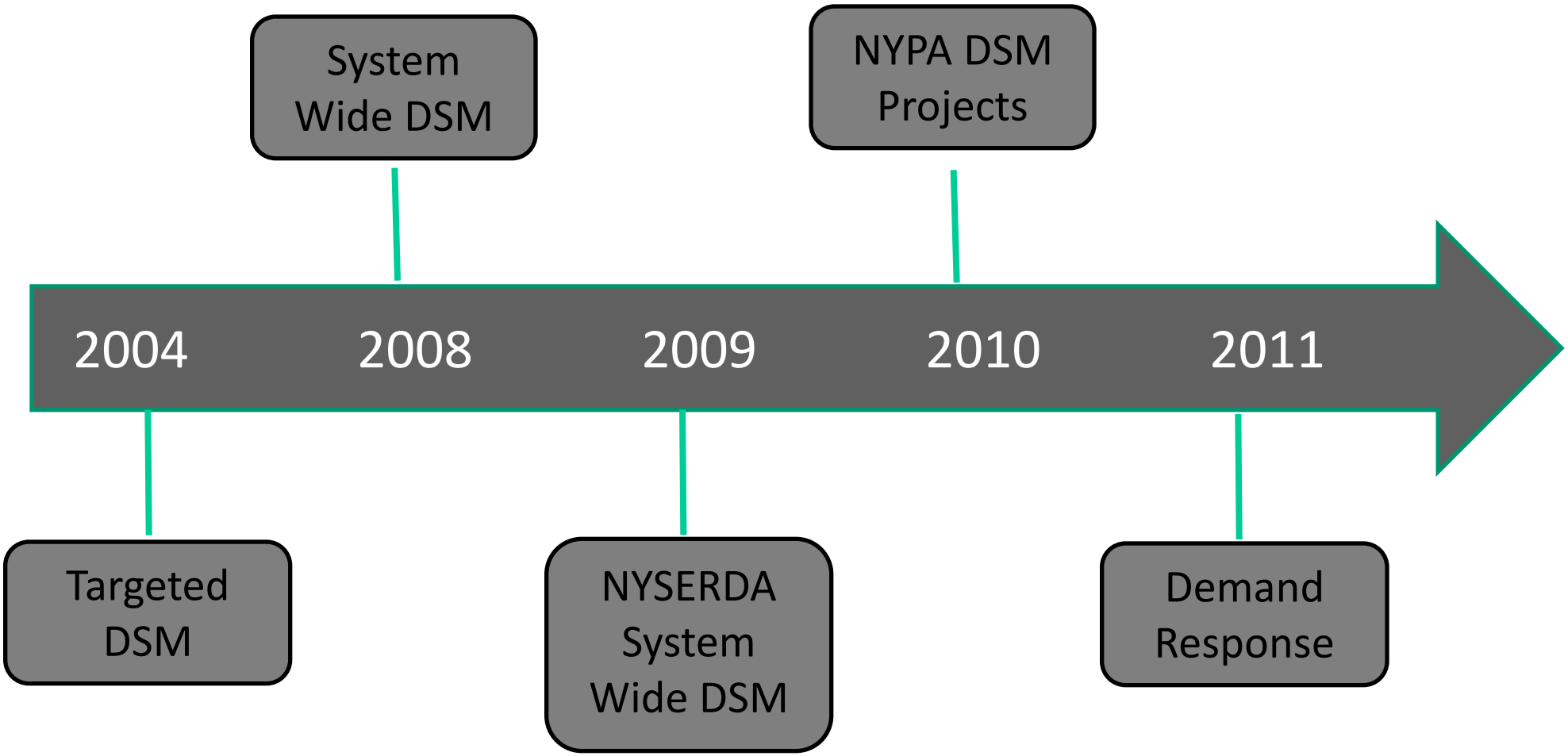


Evolution…

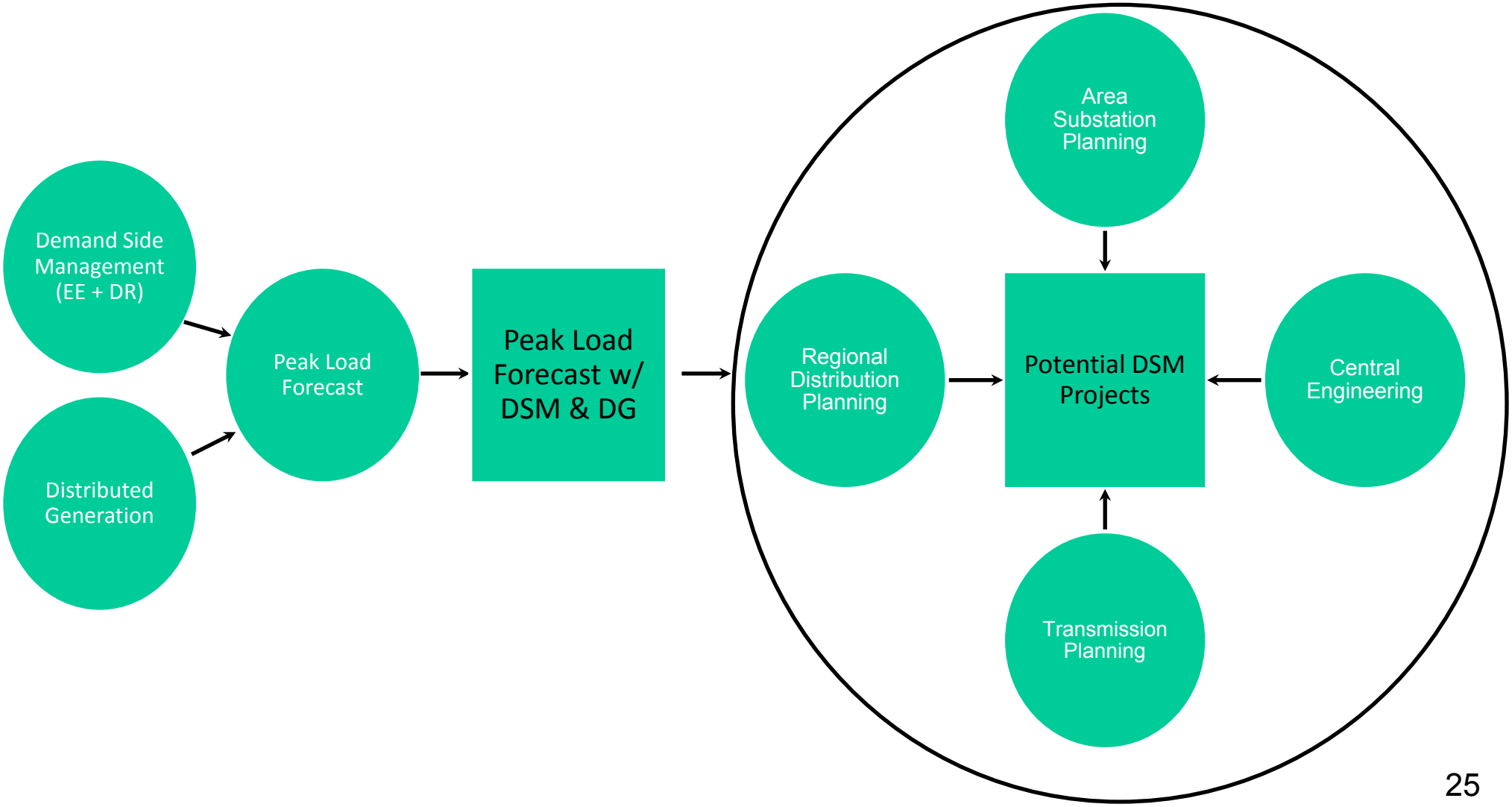

2000
2002-2004
2005-2008
2009-2010
2011-
• Market Restructured
• Generation assets divested
• Transmission assets under NYISO
• Con Edison distribution only
• Targeted DSM Program begins
• Demand Response programs begin
• Targeted DSM contracts for cap ex deferrals
• EEPS Programs begin
• Conservation Voltage Optimization
• 3G system design
• Portfolio approach
• Load Shaping
• Fuel Switching
• Targeted Steam Projects

Integration of DSM into System Planning

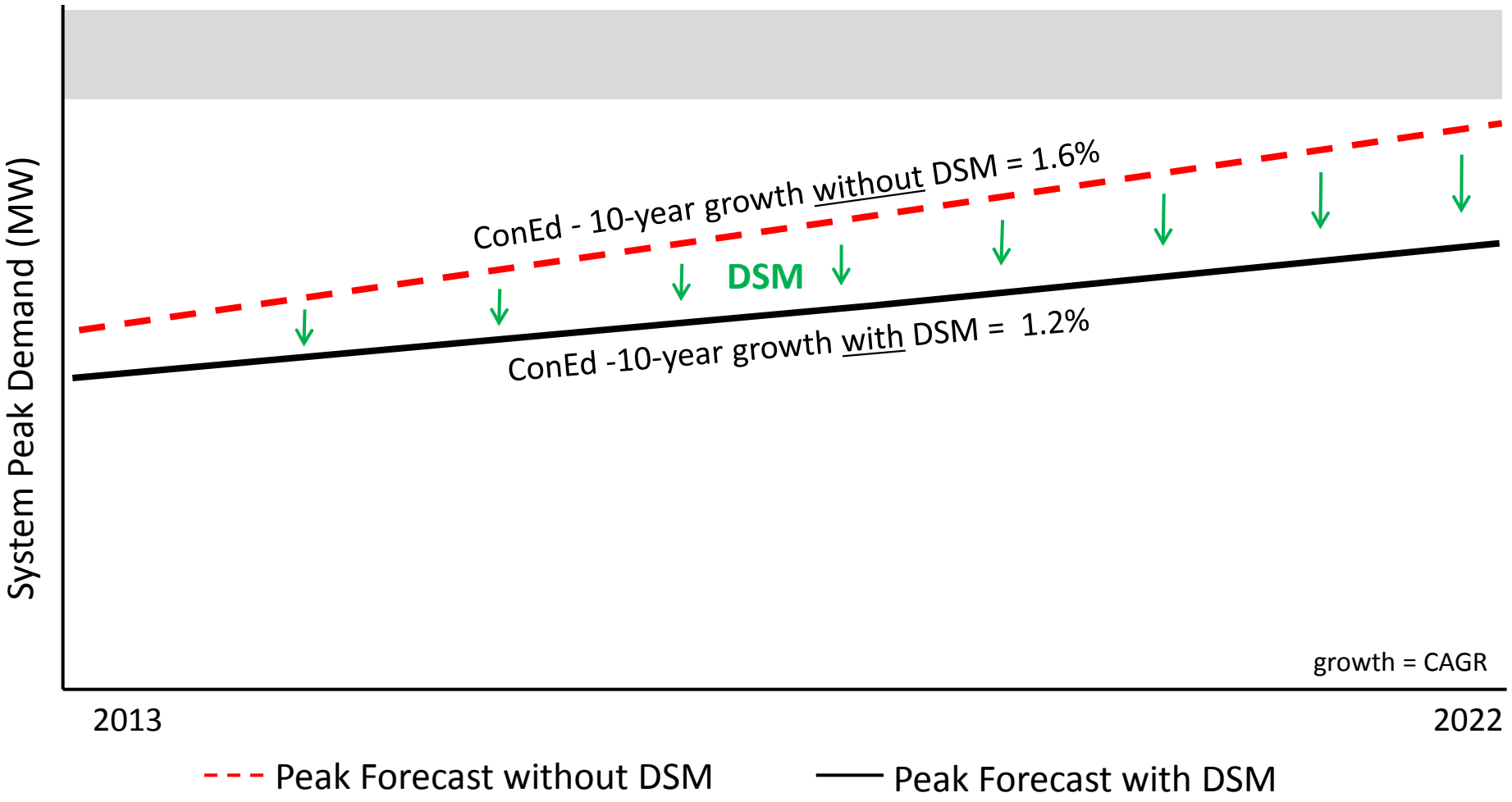
Evolution of DSM Integration



Planning Process and Internal Stakeholders



Long-Term Impact of DSM



Example: Ten Year Peak Load Forecast Substation "A"

(in MW)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Forecast	197	199	202	204	207	209	212	213	215	216
Less DSM	*(1)*	*(3)*	*(5)*	*(7)*	*(9)*	*(10)*	*(10)*	*(10)*	*(10)*	*(10)*
Net Demand	196	196	197	197	198	199	202	203	205	206
Capacity	200						250			

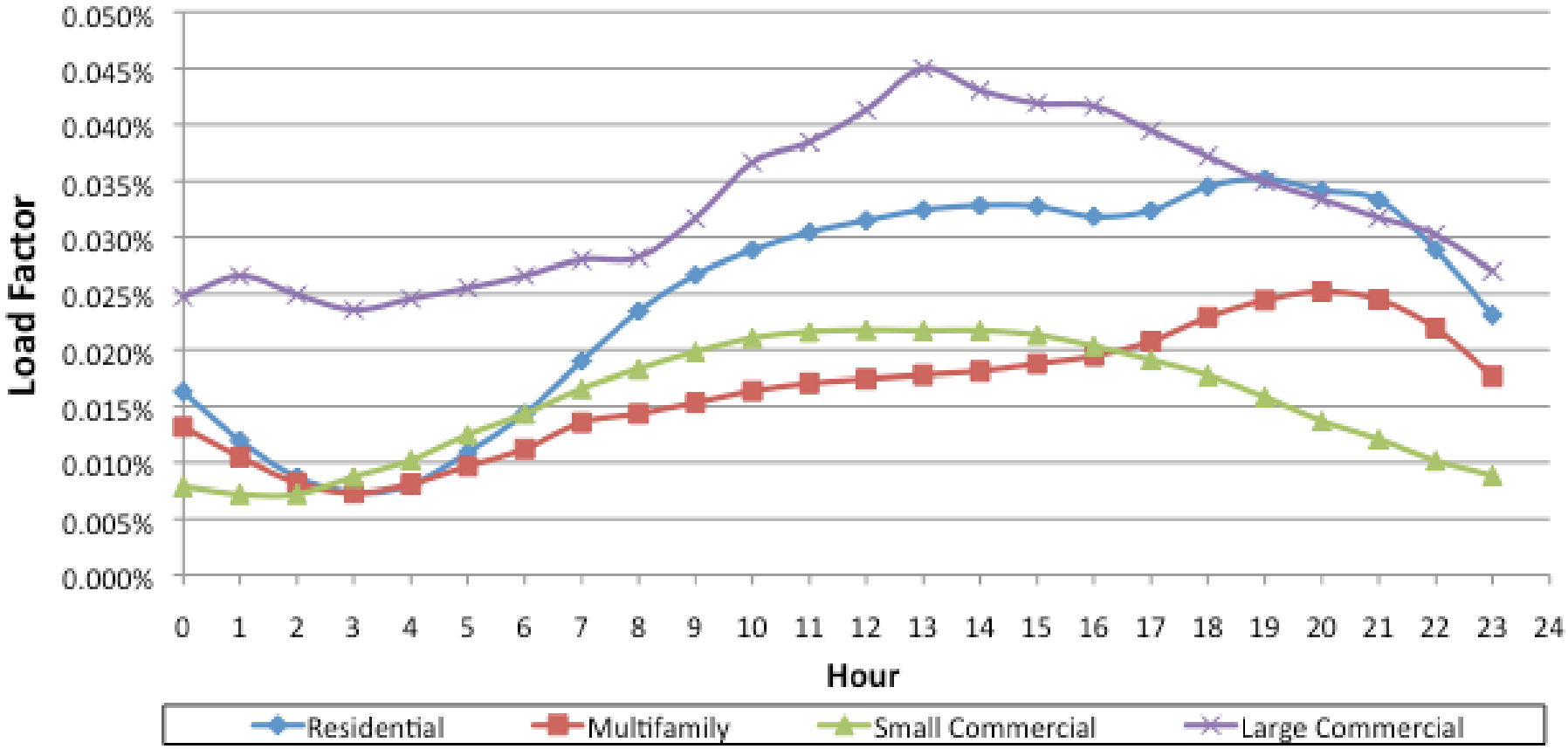
- Without DSM: demand is expected to exceed capacity by 2014
  - Capital investment needed to expand capacity.
  - Depending on the engineering solution, several years of lead time may be needed
  - Procurement/construction may start long before the impacts of EE are apparent.
- With DSM in forecast: project is deferred until 2018

Forecasting Approach: Overview

- Allocate expected energy savings to networks for each program
  - Con Edison has 91 networks/load areas, each with differing customer composition
  - Challenge is to estimate the geographic distribution of program participants by network (relative market penetration)
- Convert expected energy savings to coincident demand reductions
  - Program goals are expressed in energy—not demand—savings
  - Programs measures have differing load curves; networks peak at differing times
- Account for the variability of real outcomes (distribution uncertainty)
  - Grid reliability requires that the variance of the geographic distribution be estimated

Converting to Demand Reductions

- Generated 8760 load curves by program using Cadmus Portfolio Pro
  - Same tool used to design the programs
  - Sampled curves at each network's peaking hour to convert to demand



Impact & Results

- DSM has proven to be a viable load relief option for system planning
  - Contributed to capital investment deferrals and reductions
- Improvements in the accuracy of forecasts has enhanced the way engineers view DSM
- Increased DSM awareness and its importance in system planning

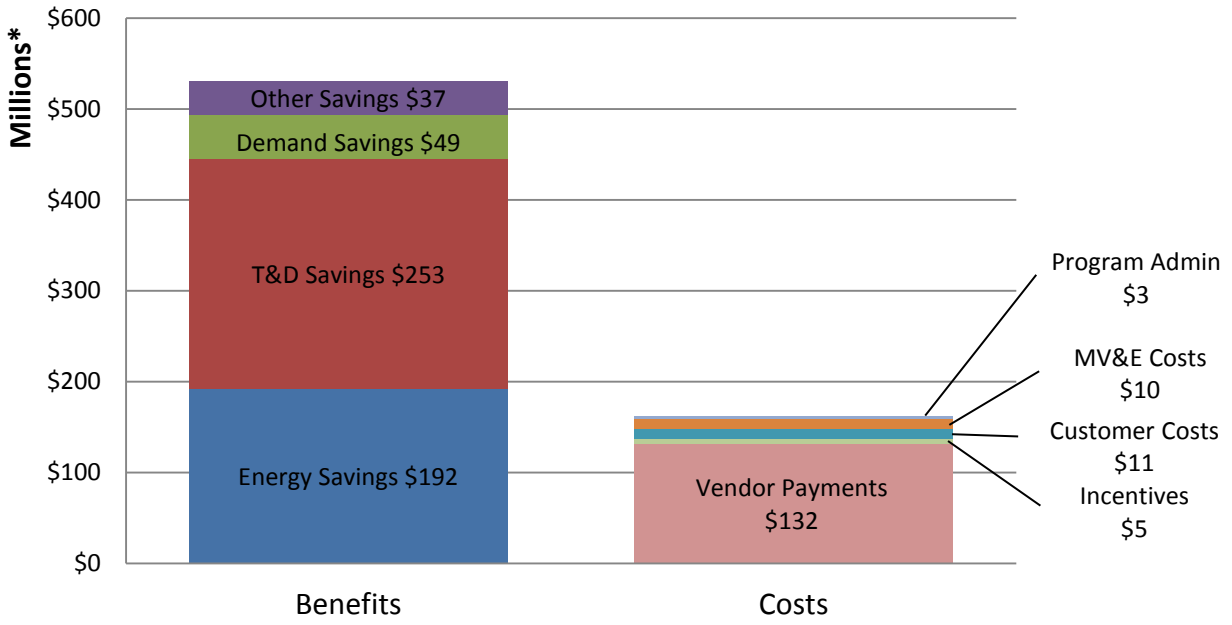
Targeted Demand Side Management (DSM) Program

Targeted DSM: History & Background

- Con Edison's "Targeted DSM" program has used EE proactively to reduce demand on specific circuits since 2004
- Contracted demand reductions in targeted networks included in 10 year peak load forecast, but…
  - No geographic uncertainty (ESCOs credited only for projects in targeted networks)
  - No coincidence uncertainty (ESCOs only allowed to include measures that would reduce consumption during the relevant network peak)
  - Only risk is ESCO non-performance: mitigated contractually via liquidated damage provisions that offset the costs of handling last minute capacity shortfalls

The Targeted DSM program created significant benefits for our customers

- Phases 1-4 achieved **108 MW** of demand reductions and **281 GWh** of annual energy savings
- The program created **$531M** in total customer benefits, including **$253M** in avoided T&D capital, on **$162M** in total costs. Achieved a **3.3** benefit-to-cost ratio.*

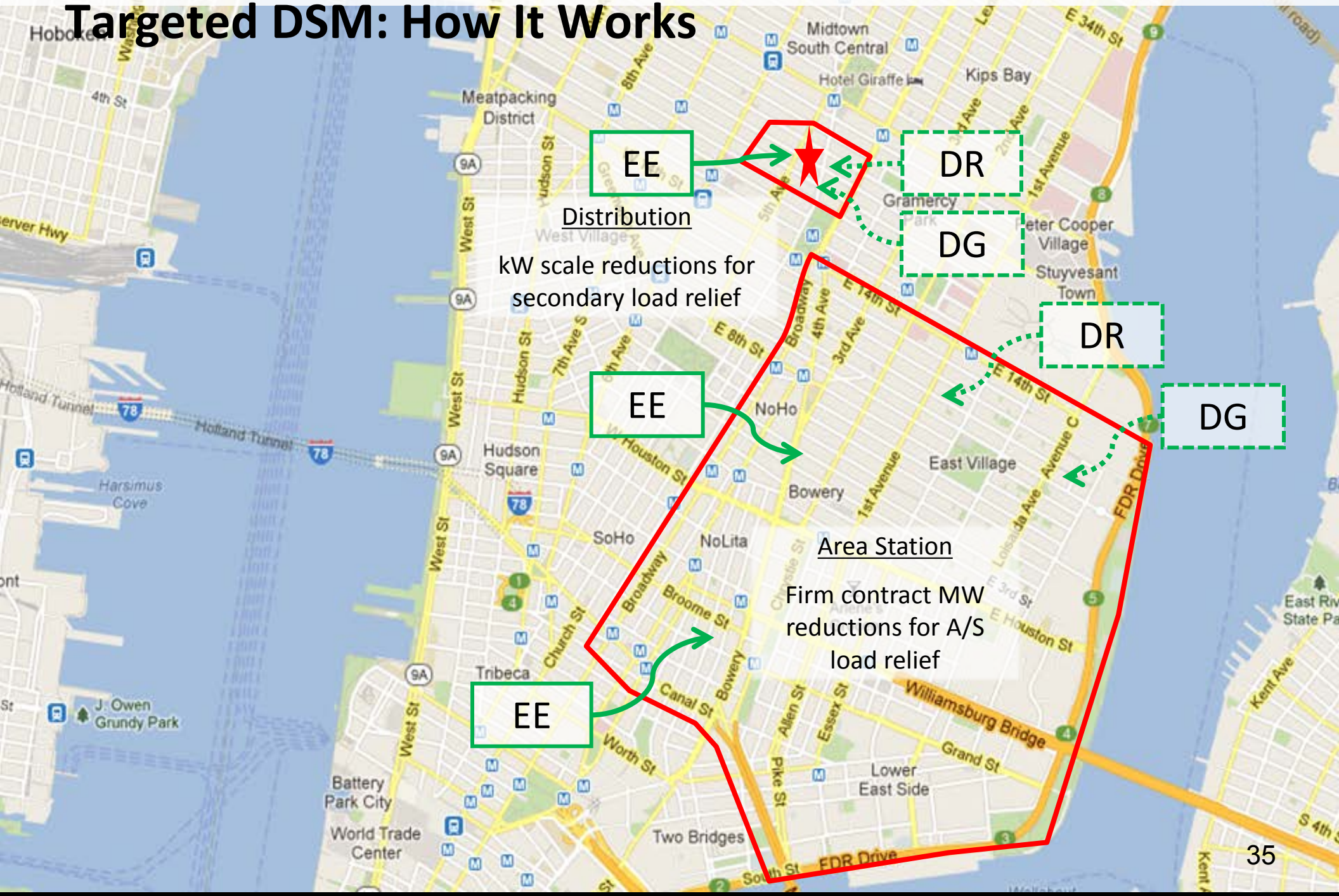


*2012$

Targeted DSM: How It Works

- System planning identifies future network shortfalls (capacity – forecast)
- EE Department issues RFP for required DSM delivery schedule
- Markets (ESCOs) respond with bids
  - Markets determine the optimal portfolio of measures (EE, DG, etc.)
- Economic bids selected and contracted
  - DSM bids compared to project costs on a Total Resource Cost (TRC) basis
  - Project planning stops if DSM solution is selected
- Firm contracts and strict M&V ensure load reductions
  - Rigorous M&V regime to be certain of load reductions (100% pre- and post-)
  - Liquidated damage clauses motivate ESCOs and protect utility and customers

Targeted DSM: How It Works



Targeted DSM: Example Project

Project: Install 3rd transformer and 138 kV supply feeder

Cost: $29 million

Deferral: 2007 to 2010

Shortfall (MW)*	May 1 2006	May 1 2007	May 1 2008	May 1 2009	May 1 2010
Shortfall (Incremental)	0	3	4	4	3
Contracted (Cumulative)	0	3	7	11	14
Achieved (Cumulative)	2	4	8	12	14

RFP: Sept 2005

Contract: Nov 2005 – May 2010

Savings: $44 million ($13.5 T&D savings)

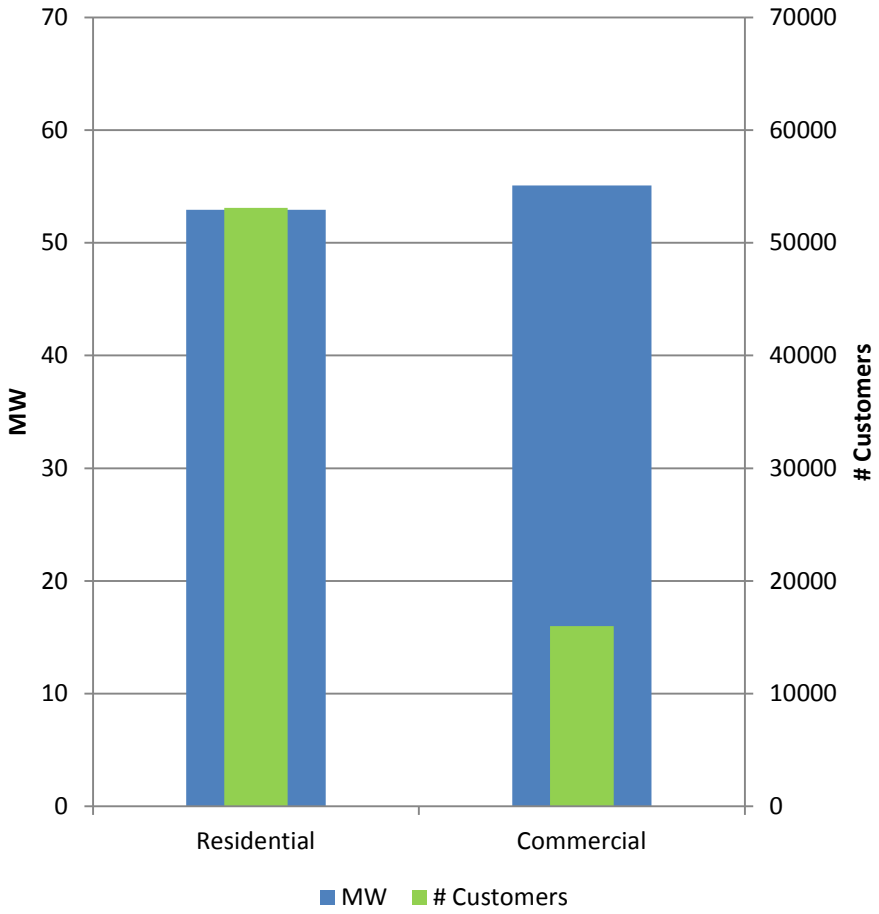
TRC: 2.6 (benefit/cost)

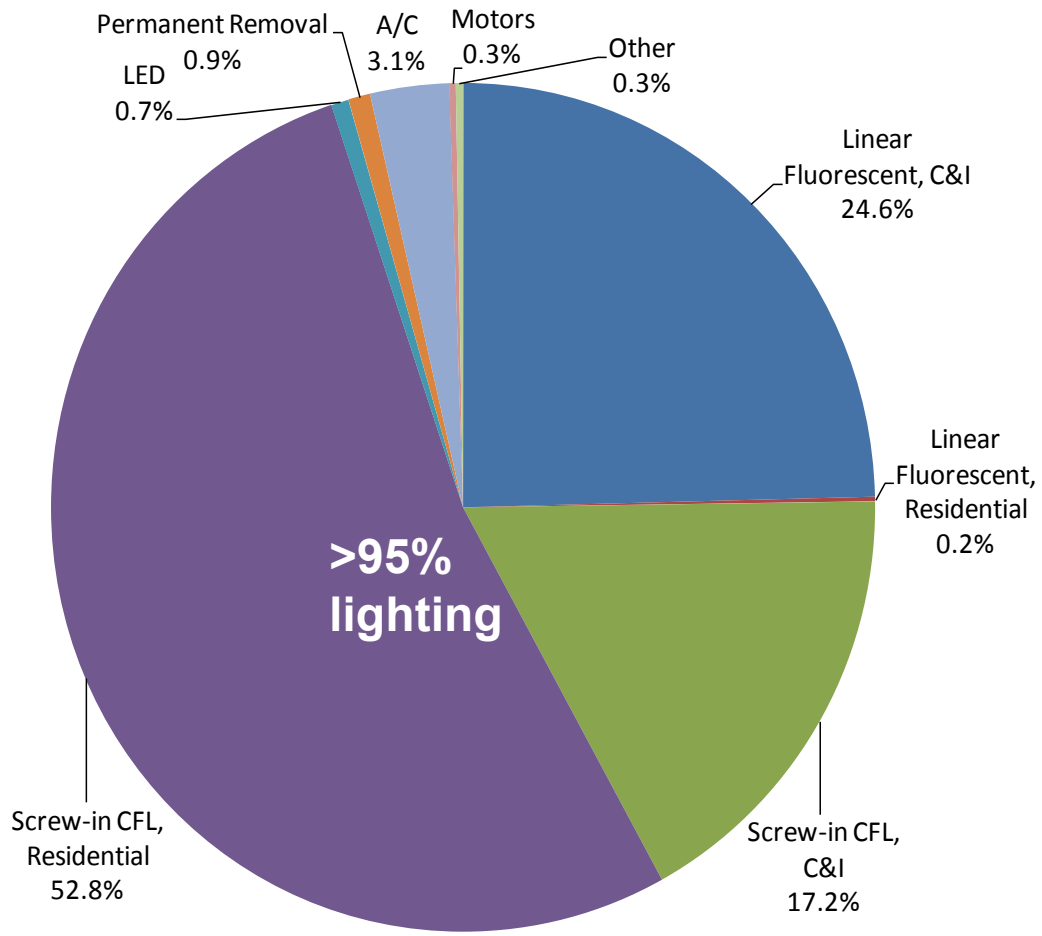
* Shortfalls, contracted, and achieved MW are as of May 1st each year (prior to the need each summer period)

Targeted DSM: Program Features

- Vendors fully responsible for all marketing and implementation
  - Con Edison did not initially lend its brand, but eventually did with success
- Rigorous M&V regime to assure real peak load reduction
  - 100% verification of existing and replacement equipment
- Security and Liquidated Damages
  - Upfront security & large financial penalties on ESCOs for missing goals
  - Proved important to driving ESCO performance
- Measures limited to those that reduced peak load
  - Fuel switching and DG allowed; residential and commercial peak differently
  - Mistake was to not applying coincidence factors in program design
- Physical Assurance for DG (but no projects actually done)

Targeted MW reductions came primarily from residential and commercial lighting





69,100 Total Customers Served,
16,000 Commercial (51% of MW),
53,100 Residential (49% of MW)

Other eligible measures: Distributed Generation (e.g. Solar, CoGen), electric-to-steam/gas conversion, thermal storage, alt. fuel/heat pump water heaters

Targeted DSM: Key Takeaways

- Formal coordination and communication with engineering and planning groups are essential
- Strong vendor management and contracts are key
- Need flexibility to review and adjust/modify/terminate contracts based on changing load relief needs
- Plan for coordination and communication with other DSM programs and company initiatives
- Utility branding and direct support makes a difference

Targeted DSM: Next Steps

- New $100 million Targeted DSM Program
- Adjusting program model and strategy based on delayed load relief needs at substation level (5+ years out)
- Looking at opportunities to leverage other existing EE and DR programs for targeted purposes
- Reviewing opportunities and challenges of extending the targeted DSM model to primary and secondary distribution
- Reviewing new, innovative technologies for potential targeted projects (e.g. storage, DG)
- DSM / DR / DG Market Research Project

More Information

"Planning for Efficiency", Public Utilities Fortnightly, August 2011

http://www.fortnightly.com/fortnightly/2011/08/planning-efficiency

"Con Edison's Targeted Demand Side Management Program: Replacing Distribution Infrastructure with Load Reduction", ACEEE 2010

http://eec.ucdavis.edu/ACEEE/2010/data/papers/2059.pdf

Questions?

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