Industrial Technologies Program

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Industrial Utility Webinars:

Natural Gas Utilities Efficiency Programs

April 14, 2010

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Speakers

- Christopher T. Goff, Industrial Market Segment Supervisor, Southern California Gas
- Mark Dipetrillo, Manager of Program Implementation, National Grid
- Commissioner Susan Ackerman, Oregon Public Utilities Commission
- Jim Lazar, Senior Analyst, The Regulatory Assistance Project

APPA American Public Power Association

Areas Covered in this Webinar

- Natural Gas Utilities Energy Efficiency Programs for Industrial Customers
- Natural Gas Decoupling Mechanisms
- Barriers for Industrial Natural Gas Efficiency Programs

DEED

Sponsors

- DOE Industrial Technologies Program
- American Public Power Association (APPA)
- APPA, Demonstration of Energy-Efficient Developments
- Western Area Power Administration (WAPA)

Western AREA POWER ADMINISTRATION

Questions?

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California Natural Gas Energy Efficiency Programs

The Southern California Gas Company

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Discussion & Objectives:

1. The Gas Company's Service Territory
2. California's Energy Efficiency Environment
3. Mandated Energy Savings Goals & GHG Reductions
4. Energy Efficiency Program Offerings to Non-residential Customers
5. SCG's Energy Efficiency Program Protocols
6. Achievements / Successes Realized

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The Gas Company's Service Territory

The Southern California Gas Company

- The largest gas utility in the U.S.
- Over 5.5 million meters
- 1 TCF sendout (approx.)
- Large Industrial, EOR and EG base

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California Energy Efficiency Environment

California Energy Efficiency Environment:

- CA is generally on the leading edge in environmental policy
- CA has been at the front of Air Quality regulation
- CA's landmark AB 32 GHG Reduction legislation
- CA CPUC has committed over $3 Billion for energy efficiency for the 2010 – 2012 Program Cycle

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California Energy Efficiency Environment

The State of California's Strategic Energy Efficiency Plan states:

Cost effective energy efficiency is the resource of first choice for meeting California's energy needs.

Energy efficiency is the least cost, most reliable, and most environmentally sensitive resource, and minimizes our contribution to climate change.

California's landmark AB 32 caps and lowers GHG emissions for the State

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SCG's Energy Savings Goals

Utilities have continuously increasing energy savings goals

The Gas Company's 2010 – 2012 energy savings goal:

- 90 million therms and
- an associated half million tons of CO_2e reductions.

Energy savings accomplishments are audited by the California Public Utilities Commission

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Energy Efficiency Programs

Energy Efficiency Programs offered to Non-residential customers:

- Workforce Education and Training classes on energy efficiency
- Facility Benchmarking (EPA's Benchmarking software tool)
- Plant /process Assessments
- Deemed Rebate Program
- Calculated Incentives Program
- Retro-commissioning Program
- Continuous Energy Improvement Program

Program Protocols

The Gas Company has prescribed protocols & calculator tools for Calculated energy efficiency projects

- *U.S. Dept of Energy tools*:
  - SSAT & PHAST
- *Southern California Gas Company tools*:
  - Load Balance tool,
  - Thermal Oxidizer tool &
  - Evaporator tool
- Training on and use of these tools is mandatory for all energy efficiency projects
- In addition, all Calculated Incentive projects receive Engineering review

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Achievements/Successes

- Stronger Connection with customers:
  - Several customers have thanked us for our high quality assessments
- Identify new areas /opportunities for energy savings
  - Oxiders, Evaporators, MVR, TVR, Heat exchange networks
- Enables The Gas Company to meet our energy savings goals with high confidence in our energy savings numbers
- Engineering analysis is rock solid
  - Actual energy savings have been extremely close to what was calculated
- Commission Technical Reviews have gone well
  - No errors found in the savings numbers

Achievements (cont.)

Our Programs and internal processes have:

- Helped customers improve their processes
- Helped customers justify energy efficiency projects to their financial controllers
- Keep businesses on-shore because of better operations
- Customers gained a better understanding of their process
- Most customers took actions recommended in assessments reports
- Assessments helped customers map out an energy/production action plan for the long haul

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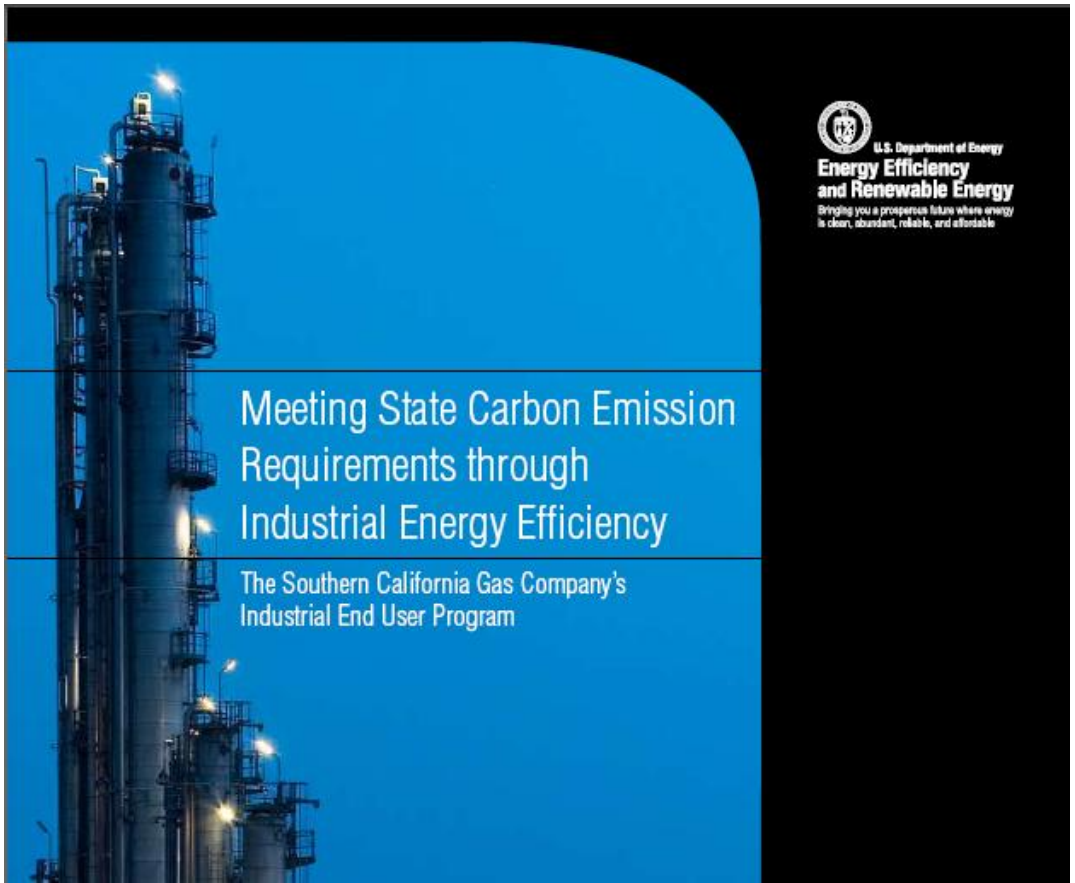
For more information

For more information on The Gas Company's Plant Assessment Activities, go to:

http://www1.eere.energy.gov/industry/saveenergynow/pdfs/socalgasco_casestudy.pdf



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National Grid's Energy Efficiency Programs

DOE Presentation
Mark DiPetrillo
April 14, 2010

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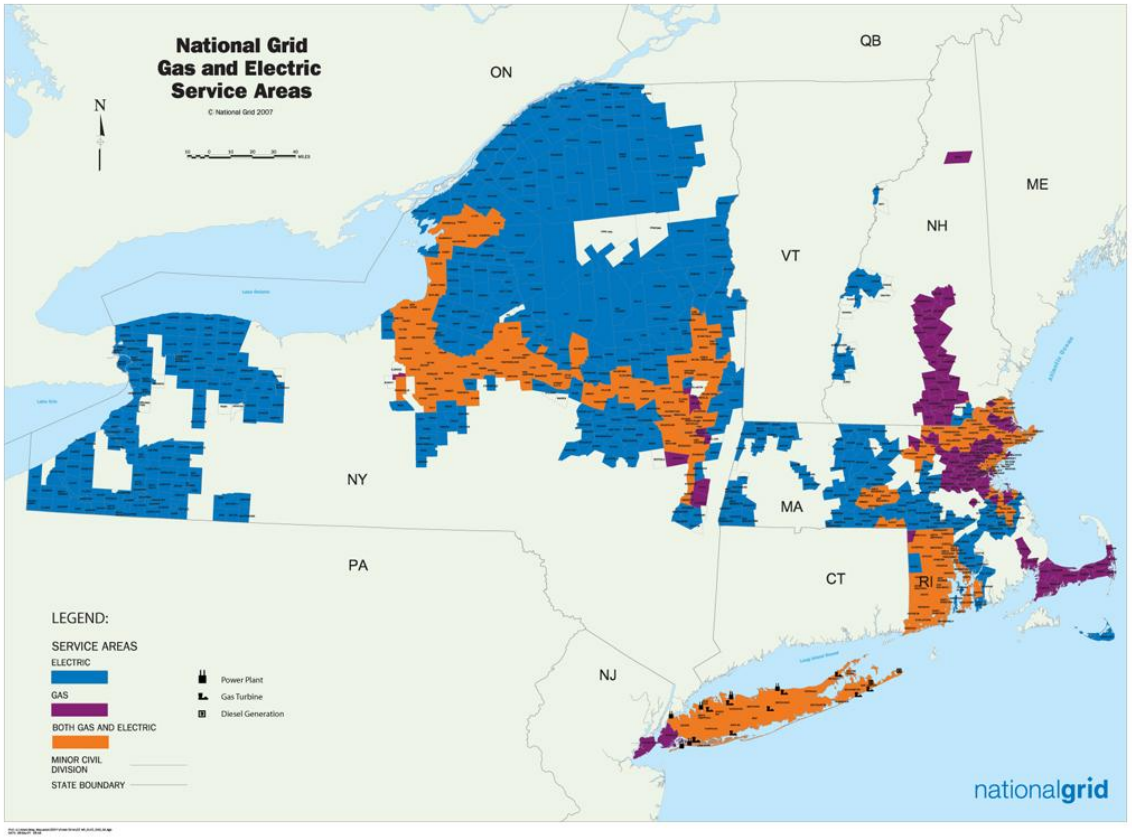
National Grid - A Little Background:

National Grid Electricity and Gas Service Areas - US



- One of the largest investor-owned energy companies in the world, with headquarters in the U.K. and the Northeast U.S.*
- Natural gas is provided to over 3.4 million customers; and electricity to about 4.4 million customers (including LIPA).
- For over 20 years, National Grid has been delivering innovative electric and gas efficiency programs to our residential and business customers.
- More than 4.7 million National Grid customer projects completed in New England, saving more than $3.6 billion in energy costs.
- Efficiency programs save customers over $250 million annually.
- Over $1 billion invested in efficiency to date.

**Based on customer numbers; includes the servicing of LIPA's 1.1 million customers*

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Industrial Energy Efficiency Initiative

- In 2009, National Grid filed for the approval of launching Industrial Initiatives in NY and RI.
- The program is aimed at treating industrial energy savings opportunities comprehensively under the company's gas and electric energy efficiency programs.
- The initiative will target heat recovery, process improvements, steam assessment and savings as well as other industrial application measures that will provide significant energy savings from this industrial sector.
- In Rhode Island Non-gas/electric energy benefits or additional costs related to improvements will be quantified to the extent possible. (some examples of additional benefits are: raw material, scrap and increased thru-put.)

2008-2011 Energy Efficiency Budgets

National Grid's Gas and Electric Budget

2008-2011 Budgets (in millions)					
Fuel	**Territory**	**2008**	**2009**	**2010**	**2011**
Electric					
	Massachusetts	54	79	123	183
	New Hampshire	2	2	1	1
	Rhode Island	16	25	28	41
	Upstate NY[1]		4	59	68
	LIPA	37	44	70	98
	Subtotal	109	154	281	390
	% increase from 2008		42%	159%	259%
	Shareholder Incentive	5	8	18	21
Gas					
	Massachusetts	15	21	44	64
	New Hampshire	3	3	5	5
	Rhode Island	4	6	5	5
	Upstate NY[1]		2	3	3
	Downstate NY[1]	29	33	15	15
	Subtotal	51	66	73	92
	% increase from 2008		29%	44%	83%
	Shareholder Incentive	2	2	4	5
Electric & Gas					
	Total Budget	159	219	354	483
	% increase from 2008		38%	122%	203%
	Shareholder Incentive	7	10	22	26

Industrial Gas Budgets

- NY City - $1,700,000
- Long Island - $1,800,000
- Upstate NY - $1,398,208
- Rhode Island - $600,000
- Mass and NH (Integrated into C/I)

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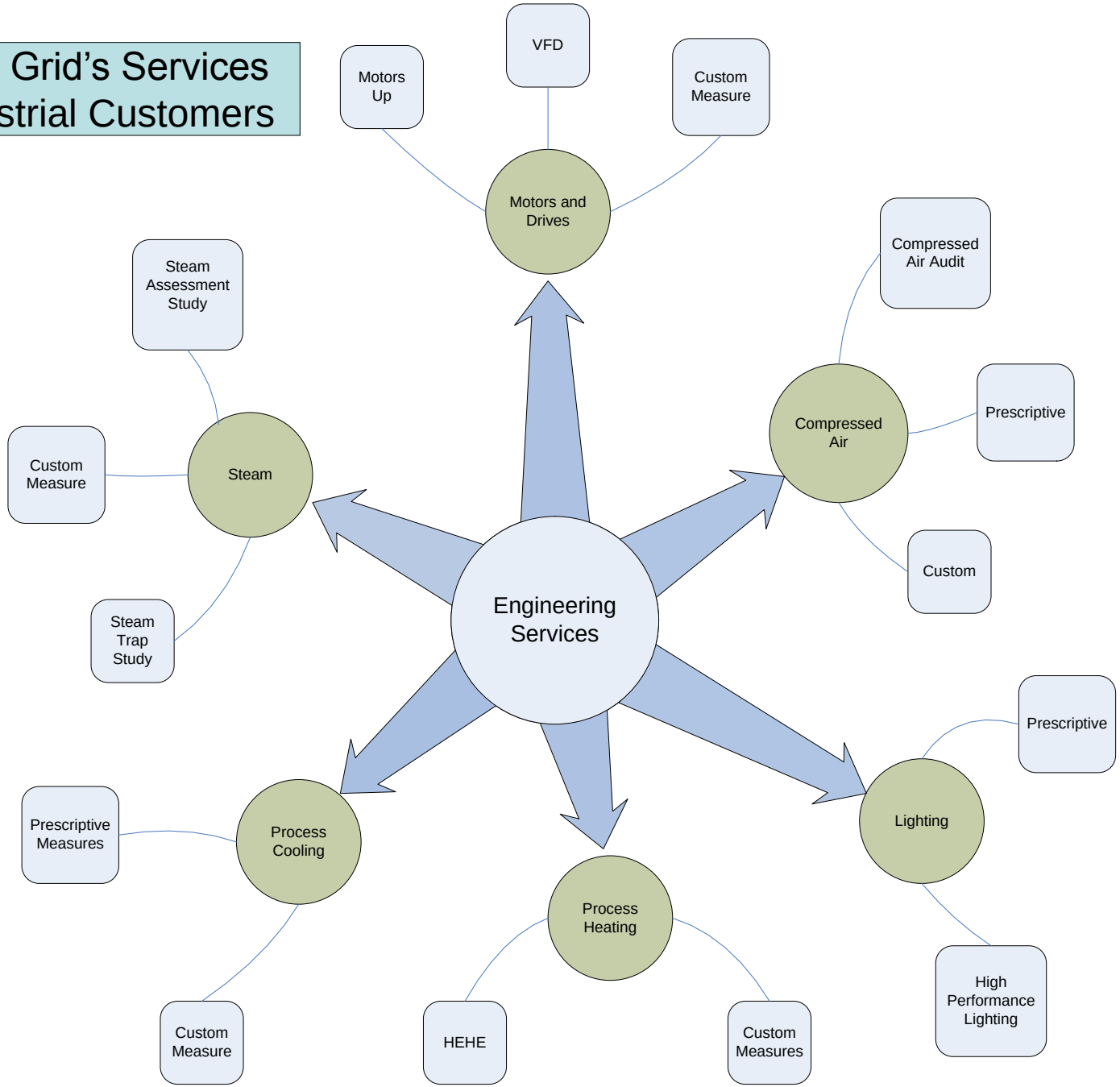
National Grid's Services For Industrial Customers



Incentive Structure

- **Incentive offering for electric and gas measures varies**
  - ✓ Prescriptive approach
    - based on a per unit-basis (fixed)
  - ✓ Custom approach
    - based on the unique energy savings and cost criteria of a project
  - ✓ Comprehensive approach
    - based on the evaluation of the whole building; and
    - based on the benefits from examining an integrated engineering approach (for multiple measures)

Industrial Projects

Darlington Fabrics Company

Boiler Burner Controls

Steam Boilers

1 x 600 HP

2 x 300 HP

Savings

NG 40,900 Th/Y

Electric 50,000 kWh/Y

Capital Cost

$102,000

Savings

NG $50,000/Y

Electric $6,500/Y

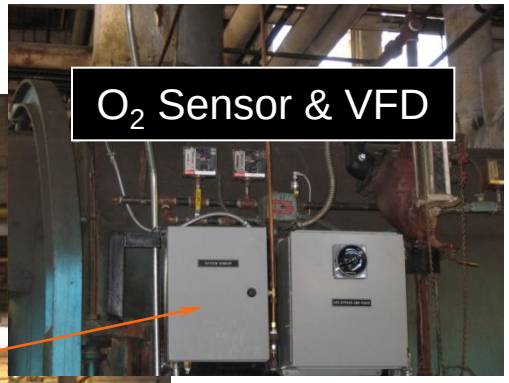
Incentives

NG $68,000

Electric $7,300

Payback

0.47 Years



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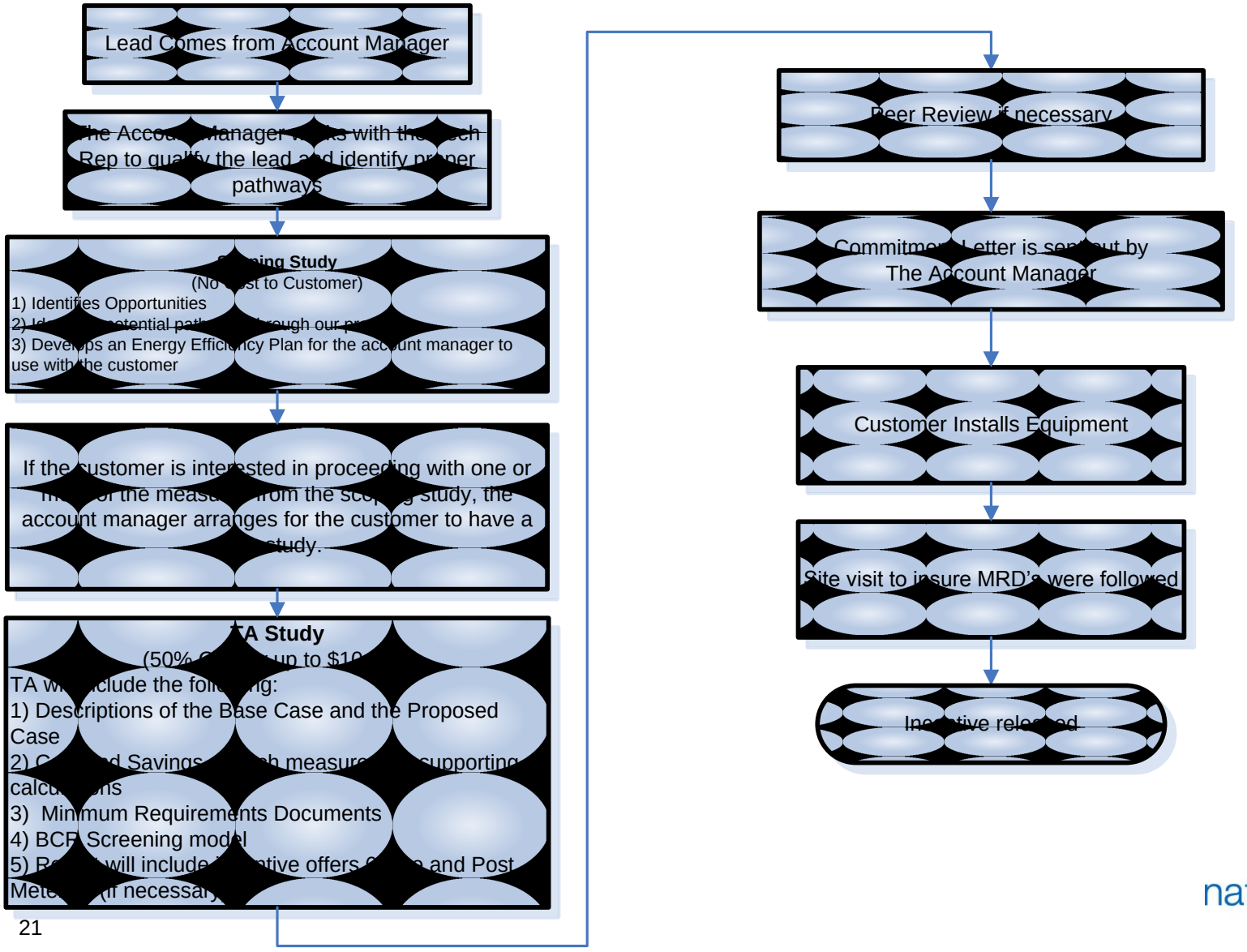
Process Flow



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Industrial Projects

Gorton's Frozen Seafood

Process Heat Recovery

Two Cooking Oil Fryers

500ºF Exhaust 24/5/50, 250ºF 24/2/50

Heat Recovery HW Uses

Absorption CHW 22 Tons for MUA

Pre-Heat 15,000 cfm for MUA

Pre-Heat 30 gpm for Cleaning Water

Capital Cost - $729,500

Incentive - $94,000

Savings: NG (47,000 Therms/Year) $64,000/Year

Electric (42,000 kWh/Y) $5,800/Year

Payback - 9.1 Years

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Industrial Projects - **Toray Plastics**

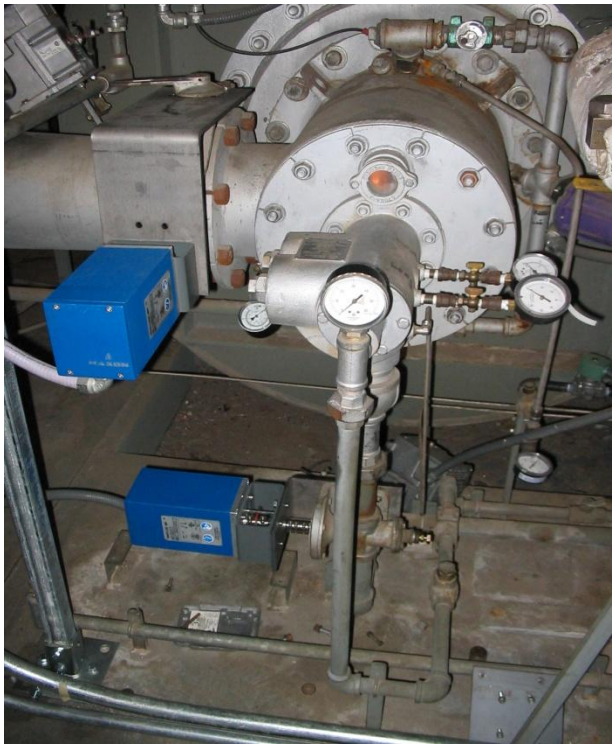
Combustion Ratio Controls on HM Plastic Furnaces

Capital Cost - $90,000

Incentive - $45,600

Savings: NG (66,230 Therms/Year) $69,540/Year

Payback – 0.65 Years



Flash Steam Heat Recovery

Capital Cost - $45,000

Incentive - $22,500

Savings: Natural Gas -$227,597/Year

(227,590 Therms/Year)

Payback - 0.1 Years

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Opportunities found at a local Paper Mill

Results from a recent natural gas audit of a paper mill.

The Mill's annual gas cost is $20M

ECM's found:
- Optimize Boiler/Burner Controls
- Process Heat Recovery
- Condensing Stack Economizer
- Flash Steam Heat Recovery Unit on DA
- Equipment Insulation
- Increase Condensate Return

Possible $4.3 million dollars in savings

Hurdles

- **Interactive Gas and Electric Measures**
  - Interveners need to address how to handle the budgets and the treatment of interactive measures
  - Utilities have to develop screening tools that can handle multiple fuels and non-energy benefits
  - CHP – Hot potato in all states
- **Engineers – National Grid has Lack of engineers that understand thermal processes.**
- **Gas Budgets vs. Electric Budgets**

Business Programs' Contacts

- **Customer Contact Information**
  - Mark DiPetrillo 1-401-784-7147
  - Large Business Program 1-800-787-1706
  - Natural Gas Energy Audit and Program 1-800-843-3636
  - Your Account Manager
- **www.Powerofaction.com**

US DOE ITP Webinar

Oregon: Decoupling Natural Gas Sales and Revenue

Susan Ackerman
Commissioner

April 14, 2010

Basics

- Oregon decoupling since early 1990s (for electrics); recently adopted for LDCs beginning in 2003
- The decoupling concept is simple – remove the LDC's disincentive to pursue effective DSM
- R&C customers' rate designs still (predominantly) volumetric, with fixed cost recovery dependent on sales
  - Volumetric rates for R&C retained to discourage high volume use at peak periods (so desirable from DSM & operational standpoint)
  - But, LDCs lose margin if sales decrease
  - Lower volume can be from: efficiency gains, demand response to commodity price increases, and economic downturn

Basics

- Decoupling goals also could be advanced if more of the LDC's fixed costs were included in fixed rate components
- Residential/Commercial decoupling established; No industrial decoupling as yet
- Oregon's decoupling goal: True up actual to expected LDC fixed costs per customer from DSM
- Oregon's DSM goal: Transfer DSM programs and funding to the Energy Trust of Oregon (ETO) as part of decoupling agreement

Adopted for Two Oregon LDCs

- "Decoupled" LDCs: NW Natural and Cascade Natural Gas
- Applies to residential and commercial customers only
- Service quality measures adopted due to a concern that decoupling could reduce the LDCs' incentives to provide good quality service
- Both mechanisms have sunset provisions; can be extended based on the results of an effectiveness assessment of the mechanisms
- Earnings sharing mechanism continues to operate along with the decoupling mechanism

Assessment of Mechanisms

- Thus far the hand off of DSM programs by the LDCs to the ETO appears to be working well
- The ETO is now operating integrated electric-natural gas DSM programs in a large portion of Oregon
- So far not able to identify share of sales (and revenue) reductions from: DSM, price elasticity effects, economic conditions
- From 1993-2009, weather and gas price seemed to be major factors in changed use per customer and reduced expected revenue; more important before 2005 than after

Assessment of Mechanisms (continued)

- Prior to 2008, economic activity was not a significant factor in changed expected revenue or use per customer
- Since 2008, economy has become a significant factor in changed expected revenue and use per customer
- As of 2005, it appeared that conservation did not account for a significant share of changes in expected revenue
- But, 2008-09 data indicate this may be changing as ETO ramps up natural gas DSM
- The 2005 Christensen report assessing NW Natural's decoupling mechanism indicated the following uncertainties:
  - Unclear if the mechanism reduced the LDC's disincentive to promote conservation
  - Unclear if the mechanism changed LDC behavior toward specific conservation activities

Assessment of Mechanisms (continued)

- These uncertainties remain, but could be due to the fact that decoupling is usually adopted when there's a simultaneous push for more efficiency
- If decoupling reduces utility risk, does it also reduce the utility's cost of capital? If so, should this be recognized in rate setting?
  - OPUC recently reduced an electric utility's awarded ROE by 10 basis points in exchange for a decoupling mechanism
- The required evaluation of LDC decoupling, while not conclusive, is comprehensive and well documented, and continues to improve
- Black & Veatch is just now completing a review of Cascade's decoupling; results will be final in a few weeks

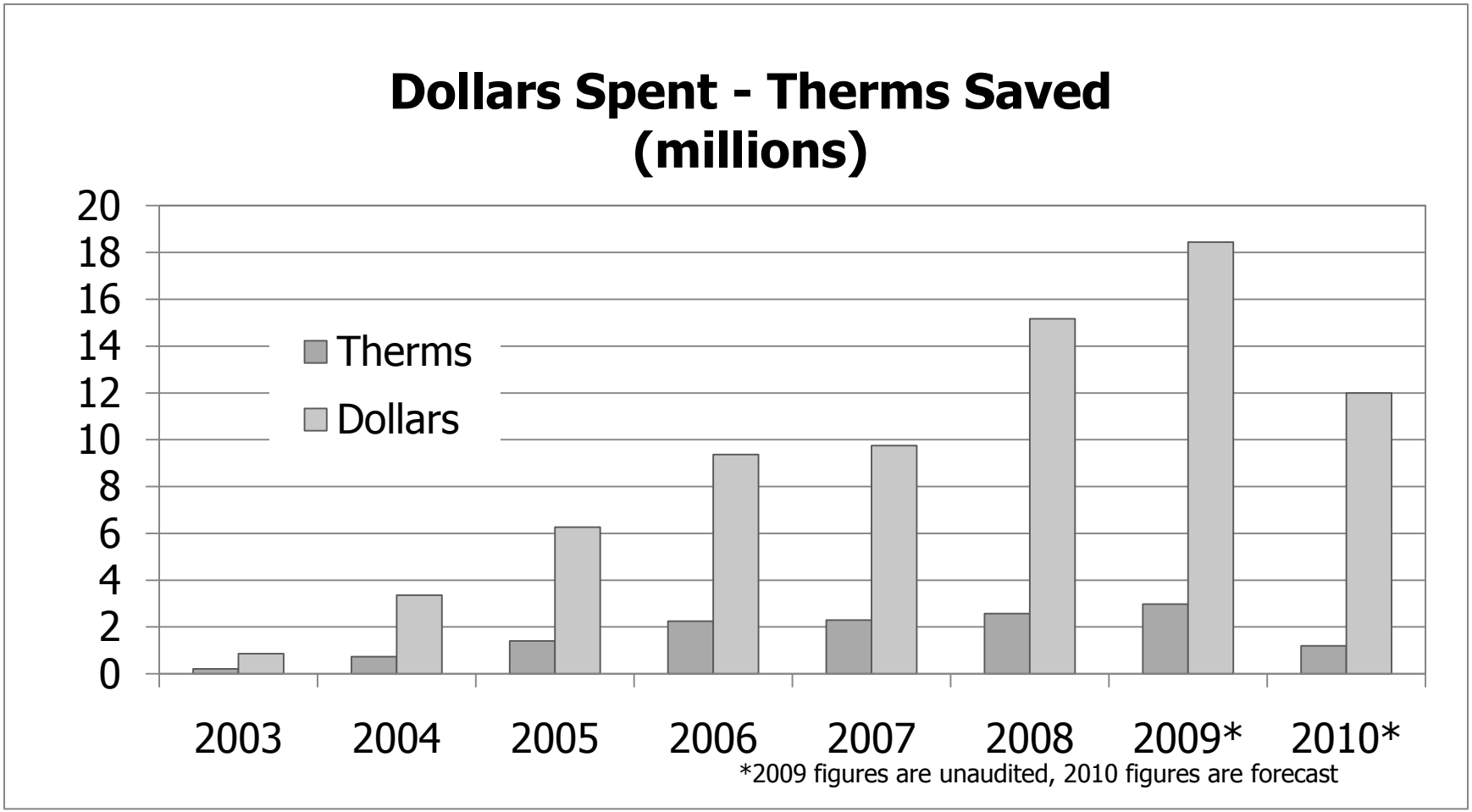
Commission's Role

- LDC mechanisms (and previous electric ones) designed through collaborative process, with only general guidance from Commission
- As approved by the Commission, LDC decoupling was a "package" agreement that addressed not just decoupling but the other concerns raised by and related to decoupling

ETO & Natural Gas Programs

- The ETO is the independent 3rd party approved by the Public Utility Commission of Oregon (OPUC) to design and administer cost-effective natural gas DSM Programs
- The Residential and Commercial programs are funded through the Public Purposes Charge (PPC) subject to Commission approval
  - NW Natural's Charge = 4.74% Res/4.41% Com (total energy use billed)
  - Cascade's Charge = 1.5% Res & Com (revenues)
- NW Natural's Industrial 2-year Pilot Program is funded by NW Natural. Company expenses deferred for future recovery (subject to OPUC approval)

ETO Program Performance



No Industrial Decoupling Yet

- In Oregon, decoupling for industrial customers was considered of little value because:
  - Most very large industrial customers had already physically bypassed regulated LDCs
  - Most remaining industrial customers are on transportation-only rates (no LDC commodity sales)
  - Transportation rates geared towards fixed cost recovery
  - LDC concern with fixed cost recovery among these industrial customers not as important as R&C

2010 Trial Industrial DSM Projects

- NW Natural's trial industrial DSM Program (for industrial sales customers):
  - Steam pipeline insulation
  - Boiler replacement
  - Steam system improvements
  - Optimizing moisture content of solids
  - Heat recovery from hot water
- NWN funding (deferring costs); ETO administering
- Should industrial customers also pay PPCs?
- Role of the ETO v. Utility?

Industry Customer Participation In Utility Energy Efficiency Programs and Decoupling: Skepticism, Barriers, and Constructive Approaches

Jim Lazar, RAP Senior Advisor

USDOE Webinar

April 14, 2010

The Regulatory Assistance Project

Maine ♦ Vermont ♦ Illinois ♦ New Mexico ♦ California ♦ Oregon

Regulatory Assistance Project

- Nonprofit organization founded in 1992 by experienced energy regulators
- Advises policymakers on economically and environmentally sustainable policies in the regulated energy sectors
- Funded by U.S. DOE & EPA, the Energy Foundation, ClimateWorks and other foundations
- We have worked in 40+ states and 16 nations

About Jim Lazar

- Economist with over 30 years experience in utility regulation, energy efficiency program design, and utility resource planning.
- Based in Olympia, Washington
- Clients have included utilities, regulators, consumer advocates, and NGOs
- Expert witness before numerous local, state, and federal energy regulatory agencies.
- Involved with RAP since 1997

Industrial Energy Efficiency Is Different

- Gas rate design for large industrial customers is generally "already decoupled" so utility resistance should be lower.
- Industries often have very short time horizons
- Industrial energy use may involve unique technologies, so specialized expertise is required
- 90+% of usage is often for boilers and process heat. Typically not weather-sensitive.
- Industries often believe that they are optimizing energy use, within constraints

Principal Barriers to Industrial Gas Efficiency

- Short time horizons of industrial customers
- Annual budget process and annual plant shutdown make retrofit difficult
- Unique equipment
- Protective of underlying technology

- **BUT: Analysts find boiler, process heat, and other efficiency opportunities almost every time they get inside a facility!**

Industrial Customers Often Believe They are Optimizing

- When asked, or in regulatory proceedings, many industrial customers assert they are "doing everything cost-effective."
- This generally reflects customer time-horizons, not utility or societal time-horizons.
- Be skeptical of customer claims they may not know the truth!
- SBC with self-direction gets around this

Divide Between Large and Small Industrial Customers

- **Large industries,** like oil refineries, smelters, and paper mills, need to be treated differently.
- Generally are gas transporters, not gas customers.
- Rate design can provide effective decoupling without a material impact on usage, because the delivery component of bills is small.
- **Self-direction programs are probably most effective.**

- **Small industries** on regular gas tariffs.
  - Millwork, Fabrication, Food Processors
- Mostly gas utility customers, not transporters.
- Should be eligible for regular utility energy efficiency programs.
  - System benefit charge
  - Audit and consultation
  - Program incentives
  - Decoupling will help reduce utility aversion to efficiency

What Is Decoupling

- In conventional utility regulation, the Commission determines the revenue requirement, divides by sales, and calculates a "rate" for service. That rate remains in place until changed, and the utility's revenues rise and fall as sales change. Generally, rising sales mean rising profits, creating what we call the "throughput incentive."
- Under decoupling, the Commission periodically changes the rate by small increments so that the allowed amount of revenue is received, independent of the sales volume.
- Decoupling is one tool to reduce utility resistance to investment in energy efficiency, as their profits no longer decline if sales go down.

Why Do Industrial Customers Often Oppose Decoupling?

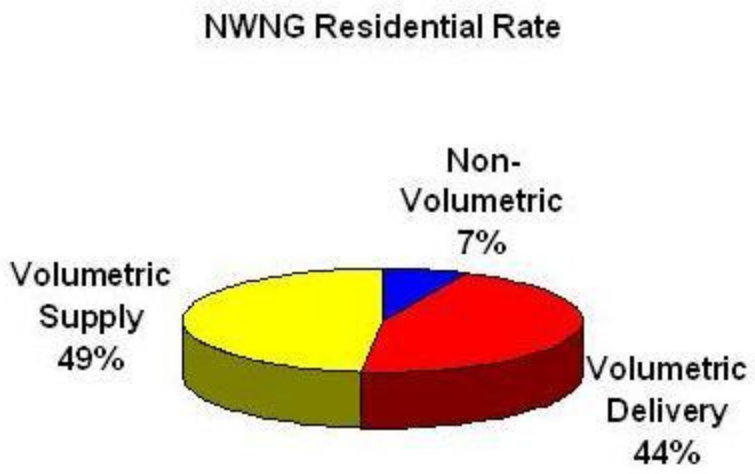
- ELCON 2007
  - ***Decoupling Promotes Mediocrity In The Management Of A Utility***
  - ***Decoupling Shifts Significant Business Risk From Shareholders To Consumers With Only Dubious Opportunities For Net Increases In Consumer Benefits*.**
  - ***Decoupling Eliminates A Utility's Financial Incentive To Support Economic Development Within Its Franchise Area.***
- AGA published a strong rebuttal in May, 2008

Very Large Industries Are Already "Decoupled" Using Fixed / Variable Rate Design

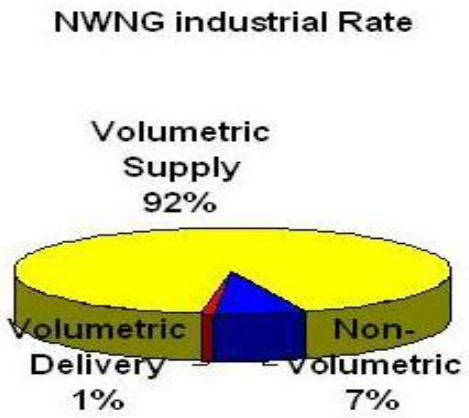
- **Northwest Natural Gas High Volume Rate**
  - Customer Charge (pipes): $38,000/month
  - Transportation Charge (metering): $250/month
  - Distribution Capacity Charge (pipes): $.15748/therm of deliverability (contract demand)
  - Volumetric rate (odorization/ leaks): $.00538
  - <10% of delivery charge is volumetric
  - Delivery charge is <10% of total bill; cost of gas is >90%
  - **Only 1% of total bill is volumetric delivery.**
- **Northwest Natural Gas Residential Rate**
  - **>80% of delivery charge is volumetric**
  - **About 44% of total bill is volumetric delivery**

Comparison of Residential to Industrial Rate Design

- Residential Rate:
  - $6.00/month
  - $.38/therm delivery
  - $.57/therm supply



- Large Industrial Rate
  - $38,000/month
  - Contract demand charge
  - Small variable delivery
  - $.57/therm supply



Large Industrial Rate Design Is Inappropriate for Small Users

- If small users faced high fixed charges, usage charges are lower, and conservation would suffer.
- Utility would not avoid distribution loop costs, but would lose marginal customers who currently pay more than marginal delivery cost.
- Low customer charge accurately reflects incremental costs for metering and billing.
- High (and inverted) gas rate blocks reflect the cost of service accurately, and price incremental usage close to incremental cost, including CO_2 costs.

Straight Fixed/Variable Rates Cause Higher Usage For Small Users

For small-use customers, where delivery service is half the bill, straight fixed/variable rates can result in up to 18% higher usage.

Unit Price With SFV Pricing		**$ 1.00**
Unit Price with Volumetric Pricing		**$ 1.36**
Change in Price / Therm:		**36%**
Assumed Long-Run Elasticity		**-0.5**
Elasticity Response:		**-18.00%**

For industrial customers, where delivery service is <10% of the bill, the effect is dramatically smaller.

Structuring a Gas System Benefit Charge

- Experience in Oregon, Idaho, and Vermont all converges on about 5% of electric revenues needed to fund all cost-effective energy efficiency. Less experience and data for gas.
- Needs to be expressed on a cents/therm basis, not a percentage basis, so that it is indifferent to transport vs. sales.
- Funding should be used to ensure that all measures that meet the Total Resource Cost test (TRC) are funded.

Self-Direction for Very Large Industries

- Many utilities have a System Benefit Charge for natural gas energy efficiency programs.
- For very large customers, more generally accepted if 80%+ of the customer's contribution is available for self-directed projects.
  - Up to 20% reserved for "general" conservation, including R&D, pilots, and low-income assistance
- Industrial customer proposes specific projects
  - Utility reviews and funds where cost-effective
  - Customer also eligible for pilot and R&D funding from the "reserved" amount for general programs.

Decoupling Generally Addresses the Fixed Cost / Variable Sales Dilemma

- Most of the cost of operating a gas utility, except the cost of gas, do not vary with volume in the short run.
  - Pipes, People, Computers, Trucks, and Buildings
- The "competition" for natural gas is sold volumetrically
  - Oil, propane, electricity; Energy efficiency
- If gas utilities adopt high fixed charges, they lose business from small users to alternatives.
- Decoupling stabilizes revenues while retaining competitive rate design.

Effective Decoupling Mechanisms for Gas Utilities

- **Revenue Per Customer**, provided that "new" and "existing" customers are either similar in usage, or treated differently in mechanism.
  - Example: $250/year x existing customers
    - + $200/year x new customers.
- **Test Year Plus Attrition** (California) may be more appropriate where customer growth is low, and/or infrastructure is being upgraded.
- For small customers, current decoupling (within billing cycle) is best, as it synchronizes weather-caused variations to rates and bills.
- For large customers, weather is less of a factor, and an annual true-up may be desirable.

Key Tools For Pursuing Industrial Gas Efficiency

- Specialized expertise that the customer respects.
  - Understanding of industrial, equipment, and operating environment
  - Customized analysis of process heat and steam system components
  - Operator training and continuing education
- Ability to work with budget and shutdown cycle.
- Understanding of time horizon issues.
- Funding for measures.
- Funding for measures.
- Funding for measures.

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RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.

For More Information

DOE Industrial Technologies Program (ITP) Utility Partnerships
www.eere.energy.gov/industry/utilities

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American Public Power Association (APPA)

Demonstration of Energy-Efficient Developments (DEED)
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Questions?