REGULATORY ASPECT OF ENERGY EFFICIENCY

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OUTLINE

- Rationale for energy efficiency programs
- Development and implementation of Energy Efficiency Resource Standard (EERS)
- Major regulatory issue on implementation of energy efficiency programs: decoupling of revenues
- Implementation of information, training and education campaigns

ENERGY EFFICIENCY

- Cornerstone of any energy policy
- Identified as a country's most important energy resource
- Referred to as country's largest and low cost energy source
- Top priority procurement resource (California)

ENERGY EFFICIENCY

- May refer to the relative “thrift or extravagance” with which energy inputs are used to provide a service
- May refer to the act of controlling and reducing energy demand
- May refer to avoided energy consumption through prudent utilization of energy resources
- Encompasses all changes that result to a reduction in the amount of energy used to produce one unit of economic activity
- Reflects consumers’ buying decision

IMPORTANCE OF ENERGY EFFICIENCY PROGRAMS

- Maximizes utilization of existing capacity/energy resources
- Defers date for the need of additional capacity
- Saves consumers and businesses money
- Reduces upward pressure on energy prices
- Promotes energy independence
- Reduces carbon emissions
- Leads to economic development

ROLE OF REGULATORS IN IMPLEMENTATION OF ENERGY EFFICIENCY POLICY

- Regulators have jurisdiction over power utilities
- Regulators can authorize full recovery of costs
- Regulators can penalize
- Regulators have access to requisite data

KEY ELEMENTS OF ENERGY EFFICIENCY PROGRAMS

- Cost-reflective price signals
- Dynamic energy performance requirements
- Increased consumers' awareness
  - o Energy efficiency standards
  - o Performance ratings
  - o Product labeling
- Innovation and technology

DRIVER TO ENERGY EFFICIENCY

- **PRICE** seems to be the single most significant driver to energy efficiency

" PRICE the commodity HIGH;

PRICE the

commodity RIGHT"

- A well designed social safety net (lifeline rate policy) in place

PRICE EFFECT ON CONSUMER BEHAVIOR

- If real price of fuel rises by 10% and stay at that level:
  - o Short term impact (within a year)
    - ❑ Volume of traffic will fall by 1%
    - ❑ Volume of fuel will fall by 2.5%
  - o Long term impact (for a five year period)
    - ❑ Volume of traffic will fall by 3%
    - ❑ Volume of fuel will fall by 6%
- People use public transport, walk more, bike more

Data Source: Goodwin, Dargay, Hanly: Elasticities of Road Traffic and Fuel Consumption with Respect to Price and Income: A Review

ENERGY EFFICIENCY RESOURCE STANDARD (EERS)

- Simple market-based mechanism designed to encourage more efficient generation, transmission and use of electricity
- Consists of multi-year targets on energy savings that allow flexibility for changes
- May allow cap and trade mechanism to ensure lowest cost saving measures
- May be supported by complementary and similar programs
- Currently implemented in selected US states, UK, Italy, Flemish regions of Belgium and France

DESIGNING ENERGY EFFICIENCY RESOURCE STANDARD

- Determining the target savings: modest savings targets during the initial years
- Target savings may be based on the following:
  - Previous year's retail sales, expressed in kWh
  - Percentage of projected load growth
  - Absolute amounts (ex. 130 million kWh or 100 kW)

State/Country	Target Savings	Target Year
California	23,183 GWh 4,485 MW peak	2013 2013
Texas	10% of load forecast	2004 & thereafter
United Kingdom	130,000 GWh	2008

Data Source: Nadel, Steven: American Council for An Energy Efficient Economy, March 2006

DESIGNING ENERGY EFFICIENCY RESOURCE STANDARD

- Program coverage may include all distribution utilities, retail energy suppliers, independent energy efficiency providers
- Target period may be annually or multi- year (3 to 4 years)
- May be best administered by utility commissions
- Target sector: residential, commercial, industrial
  - Sub-target sector: UK – 50% of target savings should come from low to middle income households
  - Sub-target sector: Flemings region of Belgium- low voltage customers should generate savings equivalent to 10.5% annually of electricity sales each year

DESIGNING ENERGY EFFICIENCY RESOURCE STANDARD

- Energy saving measures coverage
  - End-use efficiency measures at customer facilities (common energy efficient approaches)
  - If transmission and distribution enforcements are included (e.g. superconducting transmission technology and high efficiency transformers)- target savings should be higher
  - Distributed generation efficiency measures at end-user sites (CHP, recycled energy technologies)
- Longer time frame for EERS
  - Provides more certainty for resource planners and power providers
  - Provides incentives for investments in cost-efficient energy saving technologies

EERS: MONITORING, EVALUATING, VERIFICATION

- Important to monitor, evaluate and validate claimed savings
- Ensures savings targets are met (real and verified achieved energy efficiency savings)
- Savings segregated from impact of renewable energy, weather effects
- Lends credibility, transparency and consistency
- Various approaches to validation
  - Utility required to submit quarterly or periodic reports
  - Commission contracts independent parties for verification of achieved savings

EERS: MONITORING, EVALUATING, VERIFICATION

- Random, periodic evaluation of sample installation
- CHP – installation of meters to measure kWh output
- Statistical evaluation of bills of consumers before and after installation for common measures
- Engineering estimates supported by data on instantaneous power use reductions

EERS: MONITORING, EVALUATING, VERIFICATION

- Deemed savings approach: Europe
- Pre-calculated savings amounts for commonly used measures
  - Examples:
    - CFL lamp installed is equivalent to 65 kWh of annual savings for a six year period
    - ENERGY STAR refrigerator has savings equivalent to 75 kWh of annual savings for 19 year period
- Allows guaranteed and secured savings
- Ease of administrative implementation
- Deemed savings need to be reviewed and updated

EERS: PENALTIES FOR NON-COMPLIANCE

- Penalties should be steep and significant
- Penalties should not be passed on to consumers
- Flemish Region of Belgium: 12 US cents per kWh of shortfall achieved
- California: allowed utilities to keep financial incentives despite non-achievement of targets
  - Alters terms of energy efficiency risk-reward program
  - Cumulative penalties should have been $ 142 million
  - Rule changes undermines program

EERS: CAP and TRADE

- Trading: allows least expensive resource to be tapped
- Allows successful program operators to sell surplus credits
- Cost benefit analysis: buy surplus credit vs. implement own program
- Price cap on cost of surplus credit to be bought
- Ensures programs are cost effective

EERS CASE STUDY: UK

- United Kingdom: England, Scotland, Wales
- Established Energy Efficiency Commitment in 2001
- Requires electricity and gas suppliers to achieve target savings from residential customers
- Administered by the regulator: Office of Gas and Electric Markets OFGEM)
- Half of savings to come from low to modest income households

EERS CASE STUDY: UK

EERS Description	Applies To	Savings Target	Timeframe
Sets specific energy goal for each three-year period	Retail suppliers of electricity and gas	62,000 GWh of lifetime savings	2002 - 2005
		130,000 GWh of lifetime savings	2005 - 2008
Accomplishment: Target vs. Actual			
Period Covered	Target	Actual	Over (Under)
2002 – spring 2005	62,000 GWh of lifetime savings	87,000 GWh of lifetime savings	Over by 40%
Excess savings target can be rolled over to next target period			

Data Source: Nadel, Steven: American Council for An Energy Efficient Economy, March 2006

EERS CASE STUDY: UK

Target Savings by Specific Measure	
Specific Measure	% Contribution
Cavity wall insulation	29
Ceiling/attic insulation	26
Compact fluorescent lamps	24
Efficient appliances	11
Condensing boilers and other heating system improvements	9
Other measure	2

EERS CASE STUDY: VERMONT, USA

- Implemented not through the distribution utilities but a single, state wide energy efficiency utility: Vermont Efficiency
- Funded by a public benefit fund established by legislature and administered by Vermont Public Service Board (PSB)
- Implemented through a contract between Vermont Efficiency and PSB

EERS CASE STUDY: VERMONT USA

EERS Description	Applies To	Savings Target	Timeframe
Sets energy and demand goals for overall PBF program	Program Administrator (independent third party) – Efficiency Vermont	83, 766 MWh	2000 - 2002
		119, 490 MWh	2003 - 2005
		204,000 MWh	2006 - 2008

Accomplishment

2004: achieved 205 million kWh of annual savings and 26 MW of annual summer peak reduction. Met over 3% of annual Vermont's electricity requirements by end of 2004. To date, verified savings have exceeded the goals specified in the Efficiency Vermont contract with the Vermont Public Service Board

Data Source: Nadel, Steven: American Council for An Energy Efficient Economy, March 2006

REGULATORY ISSUES ON ENERGY EFFICIENCY

- Full recovery of approved energy efficiency programs
  - Funded through electric rates
  - Funded by the government
- Revenue decoupling
  - No incentive for power utilities to implement such programs
  - Energy efficiency leads to lower volume sales; hence lower revenues and profits

REGULATORY ISSUES ON ENERGY EFFICIENCY

- Full recovery of costs associated with implementing energy efficiency programs
- Consumers share through a public benefit fund
- Government shares
- Subject to regulatory approval

REVENUE DECOUPLING

- Remove financial incentive of power utilities to promote increase in sales
- Remove financial disincentive of power utilities to support energy efficiency programs
- Break the link between kWh sales and revenues/profits
- Rewards utility for achievement of environmental targets beyond mandate, quality service and performance

REVENUE DECOUPLING

- Power Utilities do not have the incentive to push energy efficiency programs
- There are no clear policies on full recovery of fixed costs
- Reduction in sales may lead to unrecovered fixed costs

REGULATORY ISSUES ON ENERGY EFFICIENCY

- Revenue decoupling
  - o Profits tied to kWh sales
  - o Breaking the link between volume sales and profits
- Energy efficiency leads to lower volume sales; lower revenues; less profits
- Example:

Revenues = kWh sales x $US 0.05 /kWh

IF ⇩ x $US 0.05/kWh

Therefore: utility gets less revenues… means reduction in profits

REVENUE DECOUPLING

- **Example**

Year	MWh Sales	US/kWh	Total Revenue, $
2004 (test year)	132,000	0.0256	3,379,200.00
10% increase in sales due to load growth			
2005	145,200	0.0256	3,717,120.00
Increase in revenues due to load growth			337,920.00

As such, utility has incentive to promote increase in kWh sales

REVENUE DECOUPLING

- **Example**

Year	MWh Sales	US/kWh	Total Revenue, $
2004 (test year)	132,000	0.0256	3,379,200.00

10% reduction in sales due to energy efficiency

2005	118,800	0.0256	3,041, 280.00

Reduction in revenues due to energy efficiency (337,920.00)

As such, utility has disincentive to sponsor energy efficiency program

REVENUE DECOUPLING: CALIFORNIA

- Guaranteed recovery of fixed costs based on latest Commission's rate case resolution (test year)
- Utility collects revenue shortfall
- Utility refunds over recovery
- Collection/refund carried out over a set period of time

REVENUE DECOUPLING

- **Issue on attribution**
  - Tracking impact on utility's sales level due to energy efficiency programs, general economic downturn, shifting weather conditions
  - Validating claimed energy savings

- **Guaranteed revenues regardless of performance**
  - Not based on quality of service
  - Utility becomes indifferent

REVENUE DECOUPLING:
A RATE DESIGN ISSUE?

- Recovery of utility's costs through appropriate billing determinants
- Fixed costs: demand charge, kW/month
  - o Residential and other customers without demand meters:

    kWh charge or kW/month based on connected load
- Variable costs: energy charge, kWh
- Customer-related costs: Fixed amount/ month

CASE STUDY: LESSONS LEARNED FROM REVENUE DECOUPLING IN MAINE

- 1991 – Maine Public Utilities Commission (MPUC) implemented Electric Revenue Adjustment Mechanism (ERAM)
- Allowed recovery by Central Maine Power Company (CMPC) revenue determined in a traditional rate case following energy efficiency program
- ERAM – not multi-year tariff ; adjustments filed annually
- 1990's period of serious economic recession
- Recession led to lower sales volume
- Lower sales volume forced substantial revenue deferrals

Data Source: MPUC, Office of Public Advocate, Office of Energy Independency and Security: Report on Revenue Decoupling for Transmission and Distribution Utilities: January 31, 2008

CASE STUDY: LESSONS LEARNED FROM REVENUE DECOUPLING IN MAINE

- Higher rate increases during economic recession unacceptable
- After 2nd year: total deferred amount reached US$ 52 million
  - How much was due to economic recession?
  - How much was due to energy efficiency and energy conservation?
- ERAM viewed as shielding utility from impact of economic recession
- ERAM viewed as a revenue decoupling strategy shifted all business risks to customers
- ERAM deemed as failure and terminated in November 1993

Data Source: MPUC, Office of Public Advocate, Office of Energy Independency and Security: Report on Revenue Decoupling for Transmission and Distribution Utilities: January 31, 2008

IMPLEMENTATION OF ENERGY EFFICIENCY PROGRAMS

- **Responsibility of distribution utility?**
  - o Incentives to sponsor program
- **Contracted to a third and independent party?**
  - o Public bidding
  - o Government agency

INFORMATION, TRAINING & EDUCATION

- Develop and implement a communication campaign that impacts on consumers' buying decisions
- Create awareness
- Inform the public of available options
- Involve the local government units, academe, non-government organizations, civil society, religious institutions
- Utilize tri-media and all forms of communication
- Institutionalize knowledge through school curriculum

THANK YOU