

Integrated Resource Planning for Energy Efficiency and Renewable Resources: A Consumer Perspective

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JBS Energy, Inc.

- Consulting firm serving consumers, environmentalists, government agencies, and renewable energy producers since 1984
- Economic analysis of utility operations, plans, and rate design
- Assist energy project developers with strategic feasibility analysis
- Manufacture and sell Aquacalc (handheld computer for surface water measurement)



IRP, Energy Efficiency, and Renewables

- Integrated Resource Planning
- “Least cost planning”
- Comprehensive View of All Utility Options (Supply and Demand) using Long-Run Avoided Cost Metric
- May include external effects
- “Portfolio Management”



Why Utility Scale Renewables “Don’t Fit” the Traditional Supply Model

- Siting is tied to the available resources.
 - Can’t just be put in the “best” location for grid support.
 - May require new transmission.
- Accommodating intermittent resources both operationally and on a planning basis requires creativity.
 - How much “back-up” is required – not much for the first few megawatts, but can increase with penetration.
 - Transmission and ISO rules need to accommodate.
- Costs are more site specific than for conventional power and vary by technology.
- Higher capital costs and lower fuel costs.
- Generally not installed under utility ownership because third parties have more expertise.



Why do we need conservation programs at all?

- “Price Signals” are overrated.
- “The Market” doesn't work like a Swiss watch.
- “Lost Opportunities” (savings that can only be achieved when a building is built or an appliance is installed)
- Focus on up-front cost, ignore long-term energy cost
 - Behavioral economics (people do not rationally trade off present and future costs)
 - Split incentives (landlord-tenant, builder-new owner, internal bureaucracy in large organizations)
 - Tenure vs. appliance life
 - Lack of capital or high hurdle rates
 - Customer transaction costs

What IRP Is Not

- Preparing a load forecast on graph paper
- Playing with efficiency and renewables
 - A couple of token efficiency programs and renewable projects to mollify environmental stakeholders, or
 - Doing nothing on efficiency to keep rates low and keep free-market-oriented industrial customers happy
- Rushing through the process to get on with the real work (building a supply project or issuing an RFP for gas and coal power sources)



IRP Can Be Controversial

**IT IS UNLAWFUL TO CARRY A HANDGUN OR
OTHER FIREARMS ON THE PREMISES OF THE
PUBLIC UTILITY COMMISSION OF TEXAS**



**ESTA PROHIBIDO POR LA LEY CARGAR
REVOLVERES, PISTOLAS Y OTRAS ARMAS
DE FUEGO EN CUALQUIER ÁREA DE LA
COMISIÓN PÚBLICA DE UTILIDADES DE TEXAS**

Understanding Utility Incentives



- Utilities want to expand rate base by building projects
 - ROE above cost of capital
 - Credit rating agencies “debt equivalence”
 - Affiliates and generation
 - Not just generation, but T&D and Advanced Metering
- Utilities have little experience in building renewables
- Fighting “the competition” versus acquiring potential resources
 - Net metering wars over solar
 - Combined Heat and Power behind the meter gets short shrift
 - Interfuel competition (in the South and Midwest)
 - Uneasiness because energy efficiency reduces sales

Rate of Return vs. Cost of Capital

- Plans to add rate base are done to meet peak loads, serve new customers, and replace old equipment.
 - Growth makes the stock price go up.
 - Disconnect between utility ROE (10-12% for the most part) and other financial analysis
 - Pension actuaries
 - Utility nuclear decommissioning funds
 - Investment advisors
 - Affiliate transactions benefit shareholders even more.
 - T&D or advanced metering less risky than generation.
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“Debt Equivalence” of PPAs

- ❑ Fraction of capacity payment is “really” debt.
 - ❑ The newest way for rating agencies to “make” utilities increase their shareholder returns and “protect bondholders” by adding equity.
 - ❑ Raises rates to consumers if state commissions adopt it.
 - ❑ Makes utility-built projects look better in planning and competitive procurement processes.
 - ❑ Particularly detrimental to renewables because of their capital intensity and non-utility ownership.
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Ideological Pitfalls to Overcome

- Role of Energy Efficiency (Minimizing Rates vs. Minimizing Customer Bills)
- Identifying and Monetizing Externalities
- Who's in Charge



Ideology: Minimize Rates or Bills

- Minimizing rates means very restrictive set of conservation programs.
 - Decreased usage usually reduces bills but increases rates.
 - Utilities that don't want to do conservation and industrial customers often follow this direction.
- Minimizing bills (present value of revenue requirements) is more flexible.
- Some utilities analyze both rates and bills.



Ideology: Externalities

- Some utilities claim that no externalities should be included.
- Environmental effects are uncertain but non-zero.
 - SO₂ credits <\$100 5 years ago, now \$700-\$1000
 - CO₂ next item of concern
- Pacificorp, California explicitly include carbon values in planning



The “Alexander Haig” Syndrome

- Utilities often claim they have responsibility for keeping the lights on and thus want to be in charge of entire process.
- Many utilities want to build their own plants.
- IRP means that utility gives up some autonomy to stakeholders and regulators.
- Lack of control causes some utilities to want to limit participation in the process.
- Particular concern about power supplier involvement.



Analytical Pitfalls to Overcome

- Poor understanding of renewables, EE, CHP leads to bad cost estimates or even ignores key resources altogether.
- Picking cheapest EE instead of “lost opportunities” and EE that offers “best fit”
- Optimistic oil/gas forecasts (today’s prices “can’t” continue)
- False precision of results
- Value of risk reduction not considered (fixed prices and load forecast risk reduction from EE)



Renewable Providers Can Respond to Utilities' Limited Information

- YOU ARE THE EXPERT ON RENEWABLES, NOT JUST ANOTHER POWER SUPPLIER.
 - Provide non-confidential information supporting general estimates of the cost, amount, operations, resource availability, and timing of projects.
 - Review information provided by others.
 - Work to analyze risk reduction value of fixed price contracts.
- Make sure your information is considered later in the process.



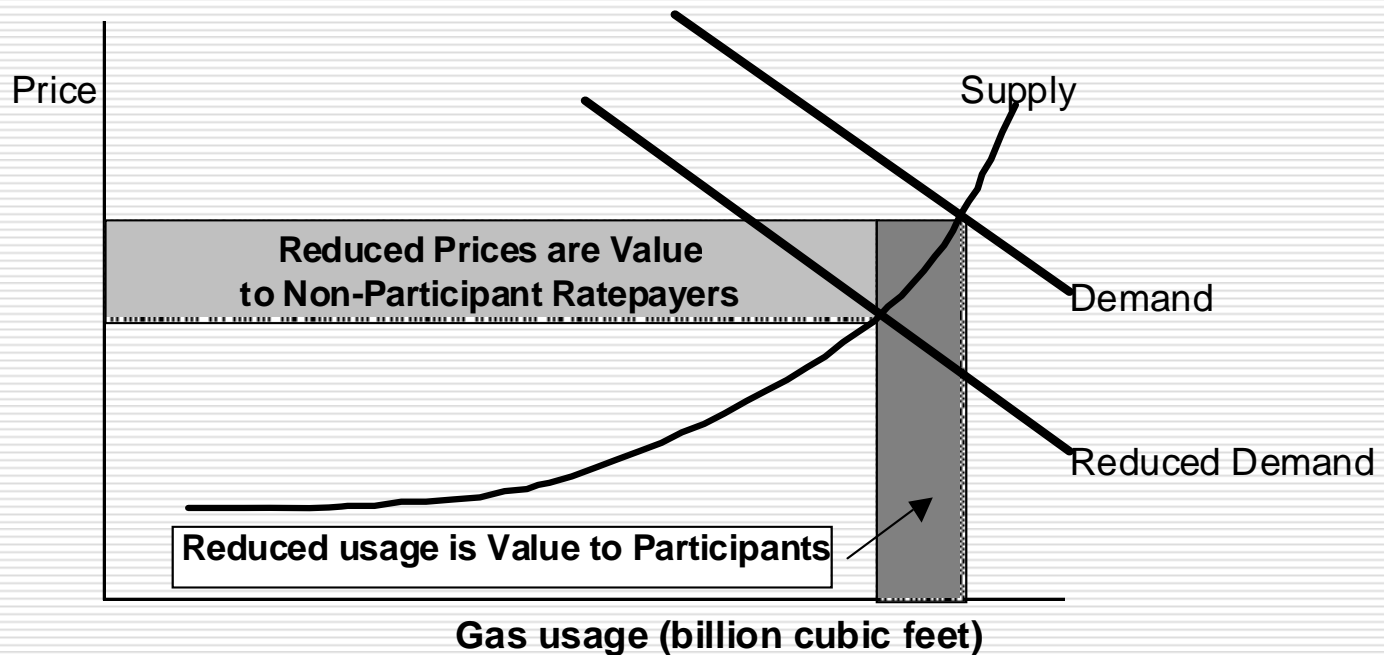
Independent DSM Administration Can Improve EE Delivery

- Organization with a single focus.
- Avoids utility conflict of interest between desire to build supply projects and efficiency programs.
- Can provide economies of scale and a consistent message in a state with a large number of utilities.
- Vermont and Wisconsin.

Oil/Gas Forecasts

- ❑ Coal and nuclear aren't the only resources that don't depend on oil and gas.
 - ❑ Both physical and financial hedges are needed.
 - ❑ Renewables provide physical hedge and can be priced to provide financial hedge.
 - ❑ Demand reduction from EE/renewables reduces use of highest cost fuel sources, thus reducing long-term oil/gas prices.
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Effect of Reducing Gas Demand on Long-Term Gas Prices





When IRP Doesn't Work

- Ideological Conflicts Over Role of Energy Efficiency (discussed above)
- Disintegrated Resource Planning
- Utility Inexperience
- Timing is Everything
- The "Green Ghetto"



Disintegrated Resource Planning

- Example: Over 20 Different Ways of Meeting Peak Power Needs
 - Conventional Supply (base, intermediate, peak)
 - Combined Heat and Power (especially chilled water)
 - Solar (distributed PV and utility-scale thermal)
 - Other Renewables (base, intermittent)
 - Energy Efficiency (A/C and other)
 - Demand Response (variety of customer classes)
 - Pricing and Metering
 - Doing nothing and taking market prices

DISINTEGRATED RESOURCE PLANNING: NON-EXHAUSTIVE LIST OF PEAK POWER OPTIONS

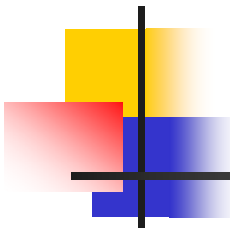
(REVIEW AT YOUR LEISURE)

1. Do nothing: buy spot power and paying relatively high unhedged prices (but could be cheaper than other options if high peak loads and/or plant outages do not materialize as planned).
2. Build or contract for the output of modern central station gas turbine peaking plants.
3. Build or contract for the addition of duct firing on a combined cycle powerplant that the utility would acquire in any event to increase the plant's capacity during peak periods by up to 25%.
4. Build or contract for the output of new hydro or pumped storage generation for peaking and ancillary services.
5. Retain or contract for dispatchable output from existing inefficient steam plants used for high intermediate and peaking purposes.
6. Build or contract for output from solar thermal generators (with or without gas assistance).
7. Acquire baseload, renewable, or intermediate generation that meets peak needs and sell excess off-peak energy if not needed
8. Promote distributed generation to meet both peak generation and localized transmission and distribution peaks.
9. Promote distributed cogeneration that not only produces power but uses waste heat to produce chilled water to offset commercial air conditioning demand, thus having a double impact on reducing peak electricity loads.
10. Promote installation of photovoltaics for generation and distribution benefits.
11. Install air conditioner cyclers on residential and small commercial customers.
12. Mandate residential pool pump trippers in new construction and install more pool pump trippers on existing customers
13. Install irrigation pump trippers on agricultural loads.
14. Work with water utilities to use water delivery system storage capabilities to reduce their peak loads.
15. Pay an industrial interruptible customer for voluntary load reduction.
16. Install mandatory advanced meters for industrial and large commercial customers and mandate revenue-neutral critical peak pricing.
17. Install a mandatory advanced meter on a residential customer using 14,000 kWh per year to provide for TOU and/or critical peak pricing
18. Install the same mandatory advanced meter on a residential customer using only 5,000 kWh per year.
19. Provide rebates equal to the excess cost of an EER 16 residential central air conditioner above the cost of an air conditioner meeting the minimum appliance standards.
20. Change out extremely inefficient wall and window air conditioners in low-income people's houses and replace them with top efficiency models.
21. Promote energy efficiency programs that save energy at peak and at other times of the day (e.g., commercial lighting, industrial motors). Promote geothermal heat pumps to increase efficiency where natural gas is not available but summer air conditioning loads are high.
22. Promote efficient dual-effect (mechanical plus absorption chilling) gas-fired commercial air conditioning.
23. Promote use of natural gas for irrigation pumping.



Disintegrated Resource Planning (2)

- When there are strong, organized constituencies for some options and not others, options with fewer backers lose.
 - Why supply options tend to win out over demand options generally.
 - Why more money is spent in California on advanced meters to provide “price signals” to force customers to conserve energy 12 days per year and less on air-conditioner efficiency investments to save energy on those same 12 days and 50-100 more days per year.
 - Why almost no one ever looks at CHP and gas A/C and pumping.



Disintegrated Resource Planning (3)

- When the process is fragmented, head-to-head comparison of resources is prevented.
 - This is how California outsmarts itself.
 - Both the PUC and the CEC have individual cases to promote specific resources that don't really compare options.
 - Divisions within regulatory bodies (economists vs. pragmatists)
 - Only utilities with ratepayer funding can afford to be everywhere at the same time.
 - California regulators have never met a ratepayer who couldn't afford to pay more for their next pet project.



Utility Inexperience

- When utilities are inexperienced and stick with their comfort zone, plans are timid.
 - Lack of information on renewables in some cases
 - Difficulty in costing out renewables
 - The token very expensive solar project
 - Lack of information on energy efficiency options causes utilities to propose limited programs.



“Hurry Up and Wait”

- Timing of Need Is Used to Favor What the Utility Wants to Build.
- Overcapacity means little investment in renewables and EE.
 - Need sustainable programs over time for renewables and even more for EE.
- Energy efficiency “on paper” can cause renewables to be deferred.
 - Need good measurement and evaluation of EE
- If demand grows more rapidly than forecast, there may not be enough time to do anything but what the utility wants.



"Green Ghetto"

- Limited amount of efficiency not optimized with reference to the cost of the rest of the plan.
- The RPS (if there is one) will "take care" of renewables.
- If there isn't an RPS, the market will provide.
- Now that we've dealt with that green stuff, let's build a coal plant !!!



De-Regulated Retail Environment and the Portfolio Manager

- Green power marketing opportunities in some cases.
- Leverage customer choice into greener resources.
- Community Choice Aggregation and Municipal financing can promote renewables.
- Otherwise, cheap, short-term resources have preference
 - Renewable Energy Credits raise costs, don't provide financial hedges, and may not be enough to allow new projects to be financed.
- Term contracts of several years.
- If you don't have a secure customer base, it's hard to commit to long-term contract to finance renewable projects.



Renewable Developers and IRP: Strategic Overview

- Work with Commission on development of rules if applicable.
- Get involved in Stakeholder Process if there is one.
- The utilities are your customers.
- However, environmentalists and consumers are likely allies in a resource planning process.



Renewable Developers and IRP: Participating in the Process

- Look closely at underlying assumptions (fuel prices, demand forecasts, etc.).
- **YOU ARE THE EXPERT** on your own technology. Share your information and make sure it is used.
- Make sure energy efficiency is backed up with real Measurement and Evaluation.
- Make sure that IRP **action plans** for resource acquisition do not discriminate against renewables.