Energy Efficiency: How far can we go and what are the implications for nuclear policy in Wisconsin ?

Michael Messenger
DSM Planning and Evaluation Consultant
Ontario Power Authority

Presentation before Wisconsin Special Committee on Nuclear Power
November 15, 2006
Madison Wisconsin

Themes for the Day

- Make energy policy NOW- not during crises-The time to repair the roof is when the sun is shining
- Nuclear genie is out of the bottle. “There are but two courses: to hide the ring forever or to unmake it . But both are beyond our power. Who will solve the *nuclear* riddle? - Source :The Lord of the Rings)

Preview

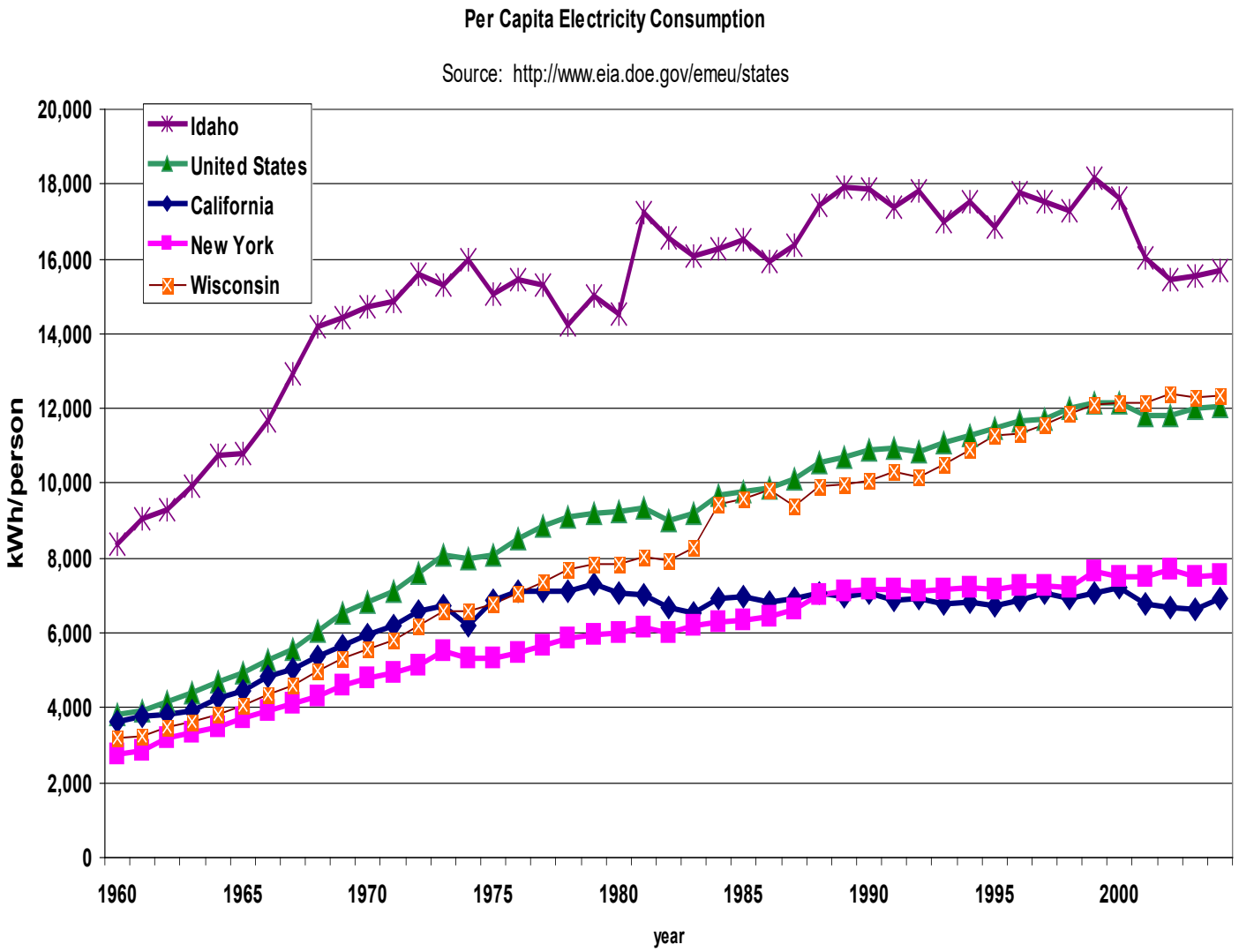
- Compare and contrast Wisconsin's efforts to achieve increased energy efficiency with other jurisdictions and discuss differences in approach
- Identify policy initiatives that could increase the level of energy efficiency, carbon free resources, and increase balance of trade.
- Outline strategies to increase Wisconsin's electricity options to meet increase in energy demand over next 20 years and reduce climate change and fossil fuel risks

My Background

- Degrees in Economics and Resource Management
- Consultant, Regulatory staff, Program Manager, and Facilitator
- Forecaster of trends and likely outcomes
- Developed appliance standards, energy savings goals for utilities, shared savings mechanisms, and AMI business cases

Energy Context- A Tale of 4 States

- Trends in per capita electricity use for (Idaho, WI, NY, CA and the U.S) on the next slide illustrate cumulative effects of a focus on energy efficiency in New York and California for 3 decades
- Roughly half of the differences shown here can be explained by climate, the remainder is policy related
- Innovations in State energy policy are usually picked up 5 to 10 years later in other states or by DOE policy as national default (appliance standards, cap n trade systems)
- What are the key differences in policy that make CA and NY stand out?


Per Capita Electricity Consumption
Source: http://www.eia.doe.gov/emeu/states
Idaho
United States
California
New York
Wisconsin
kWh/person
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
year

Key Differences in Per Capita Electricity Usage Trends: California vs Other States

- Aggressive development of Building and Appliance Standards in CA since 1978- trickles down to national standards
- Growth of High Tech "light" industry and environ regulations catalyzed the early migratoin of energy intensive industry out of California- Leads to focus on emerging technologies- windows, CFL's, EMS systems

Key Differences in Per Capita Electricity Usage Trends: California vs Other States

- Stable state policy requiring utilities to focus on developing energy efficiency resources first and payment for performance
- Aggressive Utility EE Programs which are linked and coordinated with standards making body, the CEC

Results of CA focus on Efficiency and Renewable as New Resources

- Need for new coal and nuclear facilities has been deferred for 20+ years (since 1978)
- Instead new generation facilities have been fueled by natural gas and renewable sources
- Underlying sales growth rate cut in half (1.3%/year vs 2.5%/year)

Review of Energy Center of Wisconsin Energy Efficiency Potential Study

- Based on sound economic principles- looked at efficiency technologies that are cheaper than generation alternatives
- Conservative exclusion of Emerging technologies may make savings projections seem to low in long run
- Based on engineering models of performance, missing the human feedback dimension and potential for change given the growth of networks and smart meters

Review of Energy Center of Wisconsin Energy Efficiency Potential Study

- Attitudes of youth will be the key driver of participation
- Organizational constraints may limit the growth of energy savings achievement to 25%/year after initial big jump in 2007
- Saving projected to meet 10-20% of incremental demand

Comparison of Wisconsin and California EE programs

	Wisconsin	California
Population- millions in 2005	5.5	36.4
Elec Efficiency Program Spending- $milllions	39.7	518
Electricity EE Program Spending/capita	$7.22	$14.23
Statewide Reported Savings 2005 MW	37	561
Rate of Energy Demand Growth (MW/year)	375	1000
Fraction of growth filled by EE programs in 2005	9.9%	56.1%
Avoided Costs $/MWH over 10 years	60	75

Summary of Electricity Savings Goal Analysis

- Feasible to Reduce Forecasted Electricity consumption in CA over next ten years by 26,508 GWH or 55% of Incremental demand
- Compared to Wisconsin's current trend of meeting 10 % of incremental energy demand growth or ECW recommendation to meet 20% of demand by doubling funding

Summary Analysis continued

- CA achieved doubling of annual electricity savings in 5 years- Wisconsin has technical and evaluation resources to achieve this increase in place if stable funding was available
- Consider also a pay for performance system
- Levelized Cost of Conservation programs
  - in Cal= 3.51- 4.40 cents/kwh (PA vs TRC)
  - In Wisconsin= 3.99-5.41 cents/kwh
  - Generation- 5-10 cents/kwh

How far could Efficiency programs in Wisconsin Go?

- Current Rate of Savings= 40 MW/year
- Six year from now- Double to 80 MW
- Fifteen years out- another doubling is possible-160 MW out of 375 MW/year= 45% of incremental demand, similar to CA share of new growth
- Savings growth not limited by economics but by funding constraints, market acceptance rates, and overall rates of innovation in market

New Technologies that could make a Large Difference on future Electricity demand

- Light Emitting Diodes (factor of 10 more efficient than CFL's)
- In home displays with intelligent feedback
- Hybrid cars that recharge fuel cells at night
- Integrated Zero energy homes with renewables matched to efficient cooling loads

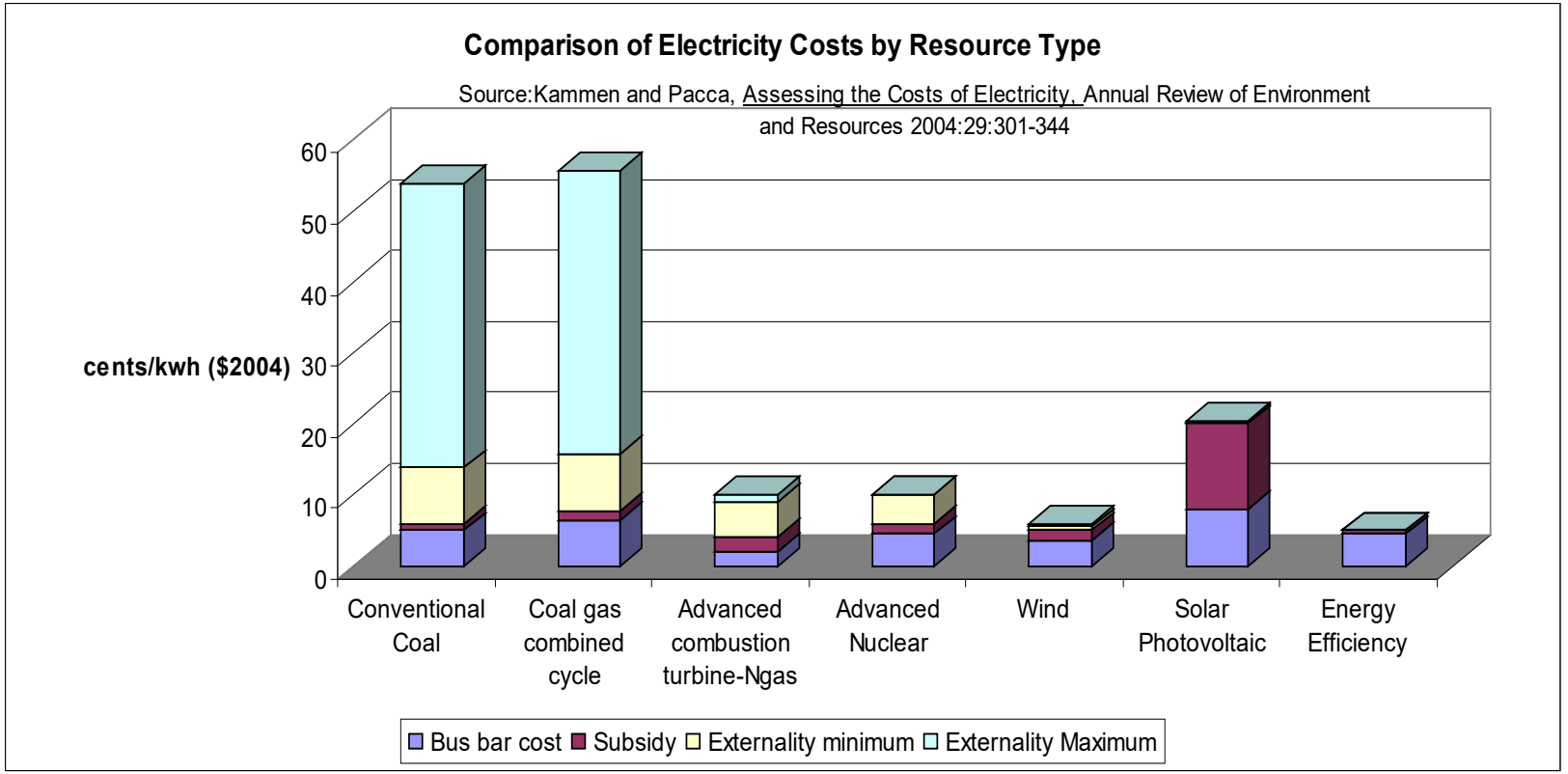
Policies to Increase Rate of Energy Efficiency Savings

- Funding is now available (and may be secure) for Wisconsin program administrators but motivation to achieve additional savings may be low
- Wisconsin or Public Service Commission should set state level savings goal at 50% of incremental growth and reward performance with profits; Give priority to Efficiency because frequent feedback is available on performance and short lead time.

Policies to Increase Rate of Energy Efficiency Savings

- Encourage energy savings competitions between local communities or schools
- Strong need to reinforce behavior directed at community good to generate buzz and awareness.
- Showcase good Samaritan communities, private firms and citizens on a regular basis. It's the right thing to do.

True costs of fossil fuel generation options are likely to be higher than alternatives when externalities are included



Policy Implications of Increasing Amount of Carbon Free Resources

- Important to think about opportunities and risks associated with different energy futures and how the level of energy efficiency achieved might effect each future
- Opportunities- Carbon trading, export opportunities for new technologies, networks opportunities and export of program evaluation services
- Risks- Global warming impacts on econ growth and environment, carbon taxes, volatile fossil fuel prices, nuclear waste and terrorist attacks
- My bias- the risks and costs associated with global warming are much higher (tenfold at least) than risks of catastrophic nuclear release; Thus
- Priorities should be: First develop all Energy efficiency First HOWEVER it won't be enough to make real slowdown in emission growth, Second priority should be nuclear and renewable sources
- Key opportunity for Wisconsin may be ability to trade carbon credits from coal plants for cash to reinvest in making WI more competitive or in new generation

Implications for Nuclear Policy/Moratorium

- Sound portfolio policy suggests Wisconsin free up all of its electricity supply and demand options going forward and repeal nuclear moratorium (with conditions)
- Continued development of Efficiency and nuclear resources would allow Wisconsin to back off coal development and trade existing carbon credits on world market
- World Energy Future is going to look worse before it gets better and makes no sense eliminating some options that have large upside potential and lower risks
- Legislature should create conditions for supporters of nuclear and energy efficiency/renewables to work together. Set portfolio targets equivalent to meeting a large fraction of future demand, suggest 75% for now, with carbon free resources. Priority to EE due to short lead time.

Nuclear Waste Policy- The conundrum

- Humans have a very poor record of safeguarding anything from theft (from art treasures to industrial secrets) over geologic time frames (in 1000's of years)
- Witness the Italian record in safeguarding renaissance art (200 years at best) or Egyptian's safety record for the Pharoeh's tombs (maybe 2000 years)
- Back to Bilbo, should we hide the nuclear ring (bury it deep) or unmake it? (technological solution)

Suggested Nuclear Waste Policy

- Wisconsin should stop waiting for Godot (and DOE) at Yucca mountain and solve the storage problem locally.
- World will be much better off if nuclear wastes are treated onsite and “in sight” for three reasons:
  - Keeping wastes above ground gives strong signal to scientific community to “ solve the problem” by developing easier ways to reprocess fuel and isolate high level waste.
  - Much harder to treat nuclear wastes that leak over decades into ground water aquifers miles below the surface of the earth.
  - DOE has a horrendous safety record when it comes to safely storing waste (See Hanford Washington or Maxley Flats Kentucky) and risk during transport of waste to Yucca mountain is high.

Thinking about the Future

- Tendency to focus on problems: crime, terrorism, traffic congestion, poor schools
- Encourage you to think about Hidden Opportunities in Energy Sector and capitalize on them
- Example: 1) Networks: evolutionary path to meet future problems, 2) Carbon trading

Five Customer Demands that will Drive the 21st Century

- Convenience - set it and forget it (automated load control first/recommendation on buying strategies later)
- Control (of bills and lifestyles)
- Choices (tariffs and programs that fit my lifestyle)
- Community- Alienate Americans long for a Sense of Community and ability to be CREATIVE.
- Credibility - Programs deliver what they promise

*Note all C words apply to product development or social programs

Merging Customer Demands with Evolution of Networks

- First wave - Devices that communicate with web and manage energy use - Ubiquitous programmable communicating thermostats by 2012-2015
- Second wave - Devices that communicate with web servers and send feedback on effectiveness of on site efficiency strategies and tips to customers and local supplier network on how to save money
- Third Wave - Networks that benchmark efficiency performance of customer nodes, sector nodes, and later charge higher prices to inefficient nodes/customers

High Level Electricity Policy Initiatives

- Favor capital investment; not continued buy down and heavy use of fossil fuel stocks
- Support less reliance on volatile fossil fuel costs to stabilize energy bills and prices
- Favor innovative networks- Encourage more useful feedback to customers on energy costs- vis bills, real time energy displays , energy information/control systems, web feeds

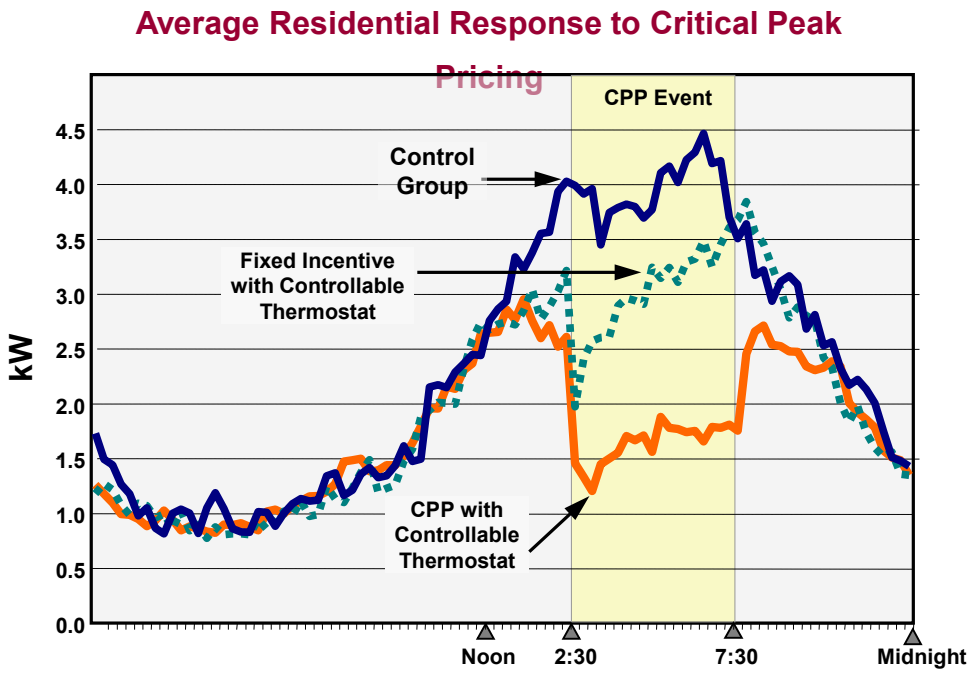
Recommended Legislative Solutions

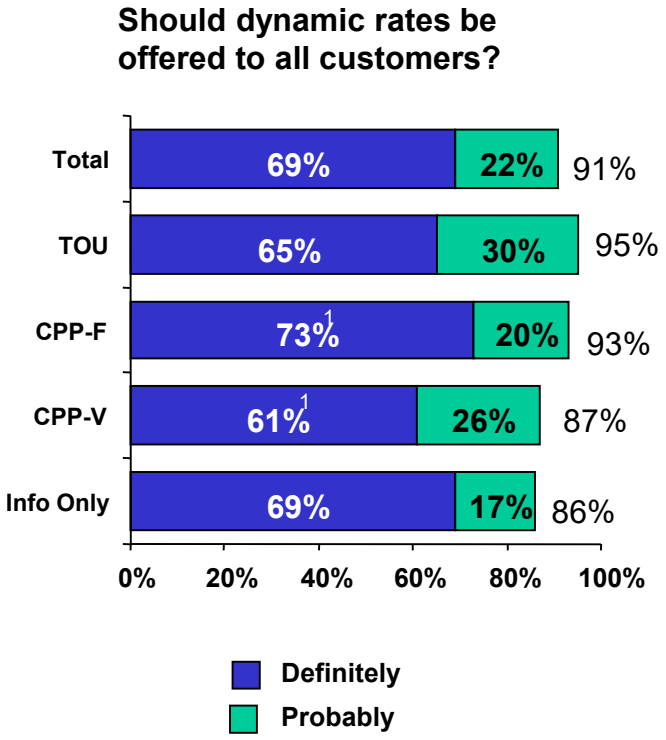
- Set Legislative goal or a Carbon free portfolio standard-
  - Utilities must meet 50% of incremental demand by 2015 using Efficiency, renewables or nuclear-
  - meet 75% of incremental electricity demand by 2020 with same sources-
  - Meet 90% of all incremental demand by 2025 Internalize the waste problem;
- Legalize/ encourage local storage and provide incentives to dramatically reduce the risk of waste release and amount generated- Consider reprocessing wastes- (Don't just export the problem to Nevada,Study Canadian and French storage programs
- More details on types of recommended local storage policies available on request

Radical Steps to Encourage Energy Innovation & Productivity

- Phase out 50% of state income tax over the next decade and replace with increased energy taxes or royalty income from cap and trade systems
- Encourage the younger generation to get involved in the development of energy efficiency and renewable programs- Give a $100,000 scholarship every year to the university or college that comes up with the most creative and effective program to reduce energy use.

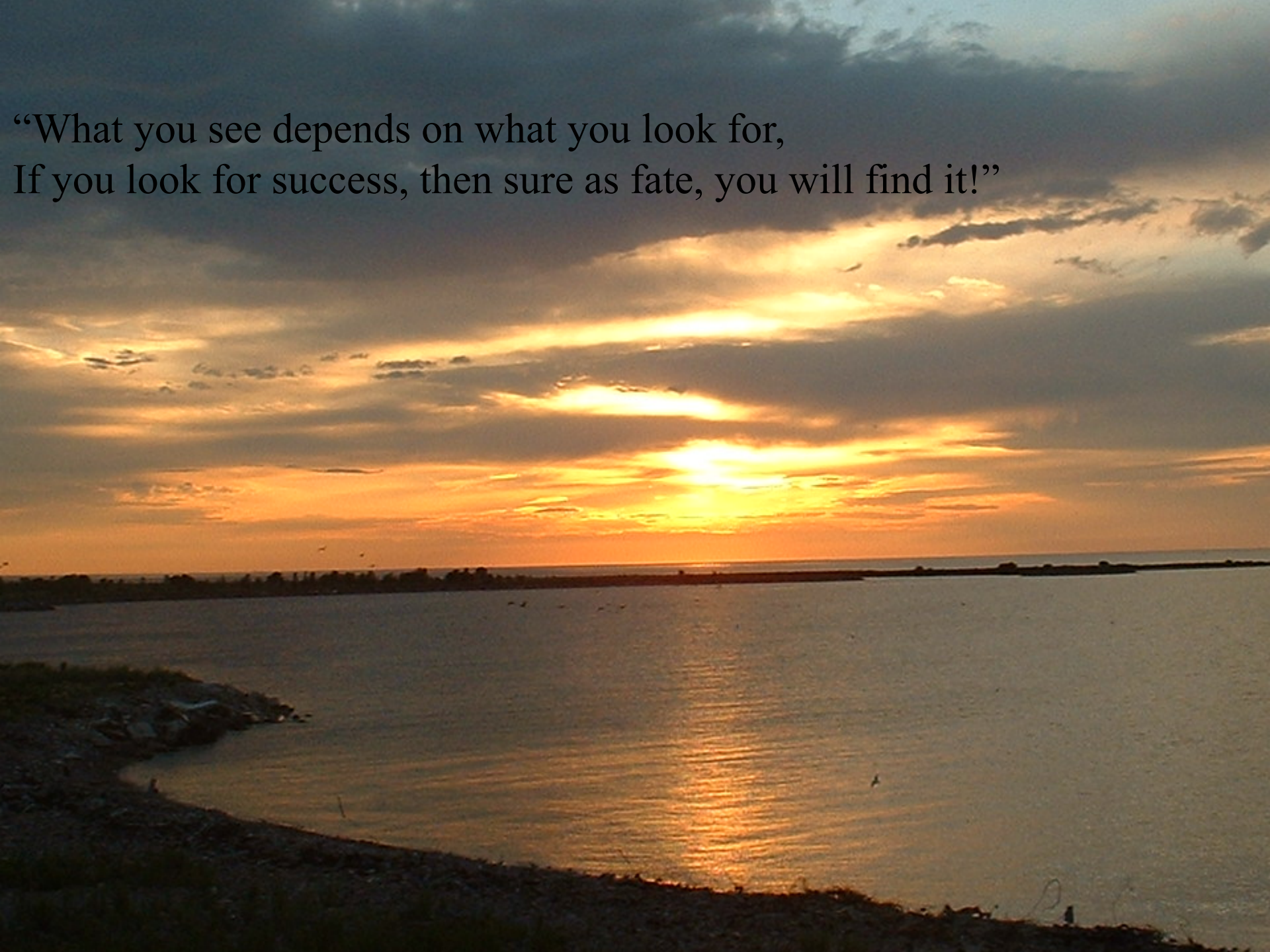
Key Graphical Results from Ca Statewide Dynamic Pricing Pilot





Summary

- Achievable Potential for Energy Efficiency is limited by political will and resource commitments; not resource economics
- Consider setting Carbon Free resource targets to facilitate development of nuclear and renewable resources.
- Address the nuclear waste problem locally, don’t wait for a federal solution.


“What you see depends on what you look for,
If you look for success, then sure as fate, you will find it!”

Thanks for listening!

- Please email your reactions, thoughts or comments on this presentation to me at my email address
- Mike.Messenger@powerauthority.on.ca

or call at 416-969-6069 or 916-212-2110