

Toward a Sustainable Energy Future: Energy Policy and Programs in New York

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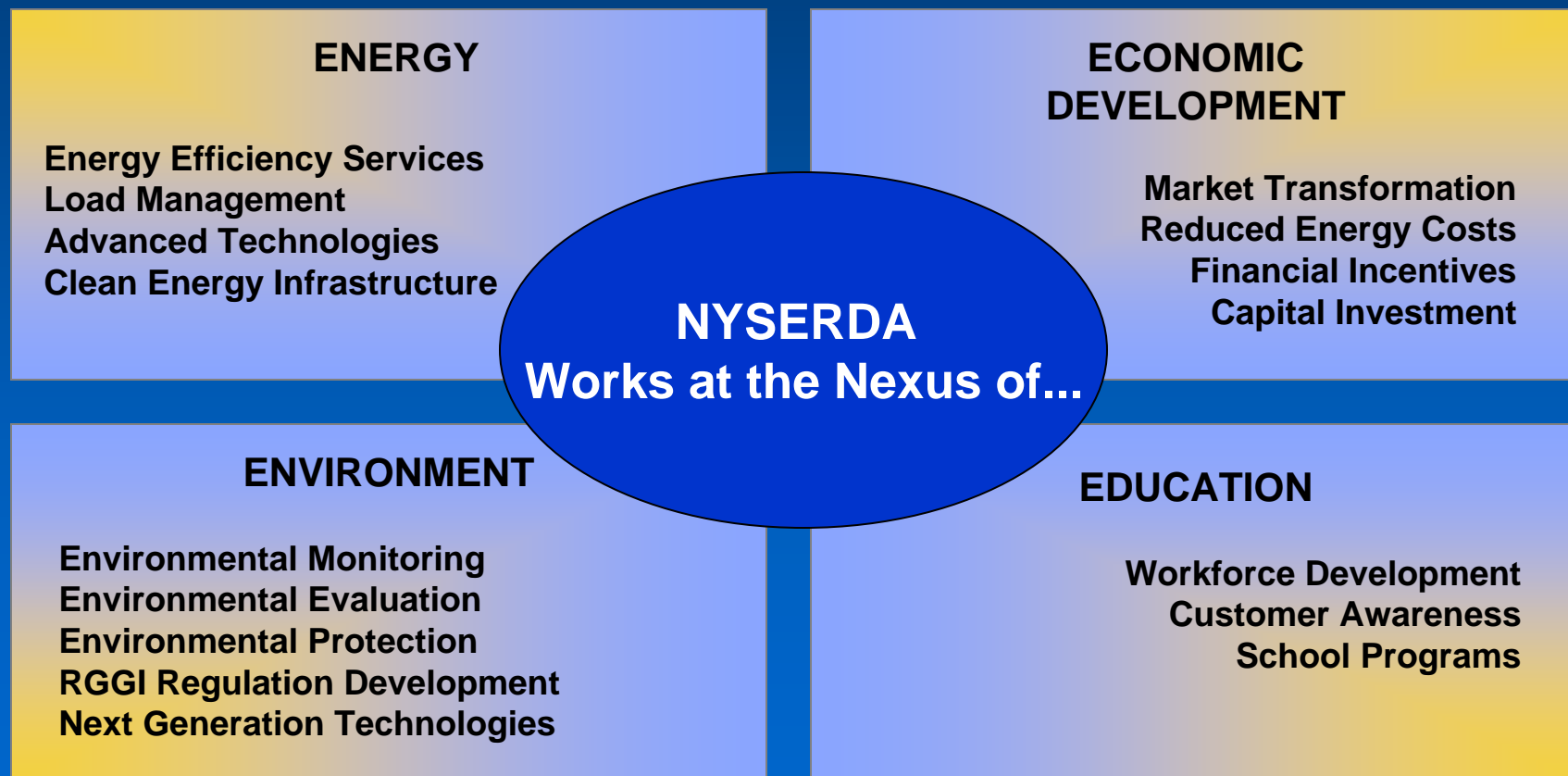
MIT-NESCAUM Symposium

Outline

- Overview of energy-climate challenge
- NY initiatives in energy sustainability
- Prospects for a clean energy economy



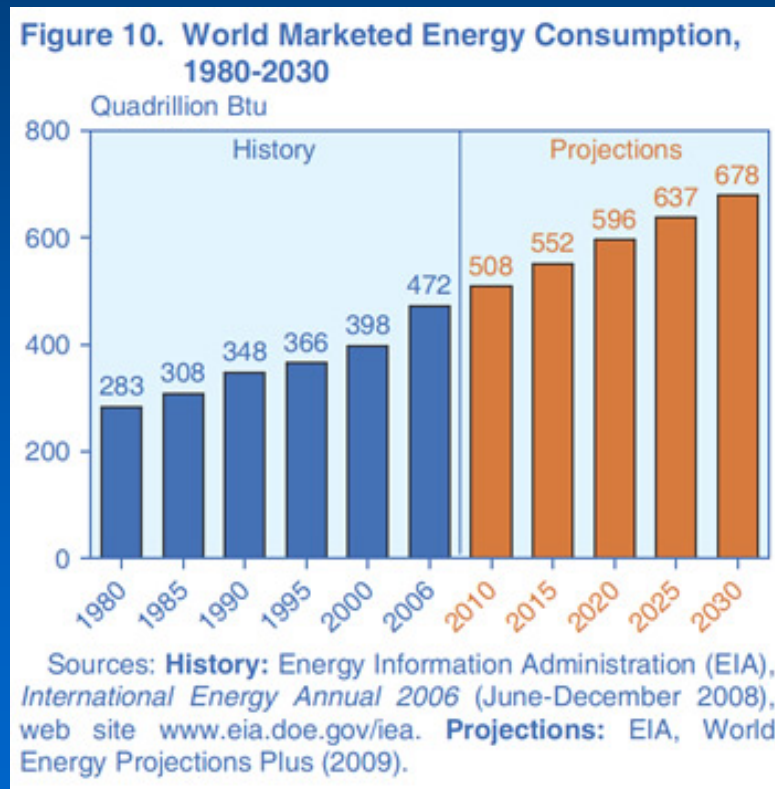
Mission: Advance innovative energy solutions in New York State in ways that improve the environment and the economy.



ENERGY-CLIMATE CHALLENGE - GLOBAL CONTEXT ...



World Energy Trends

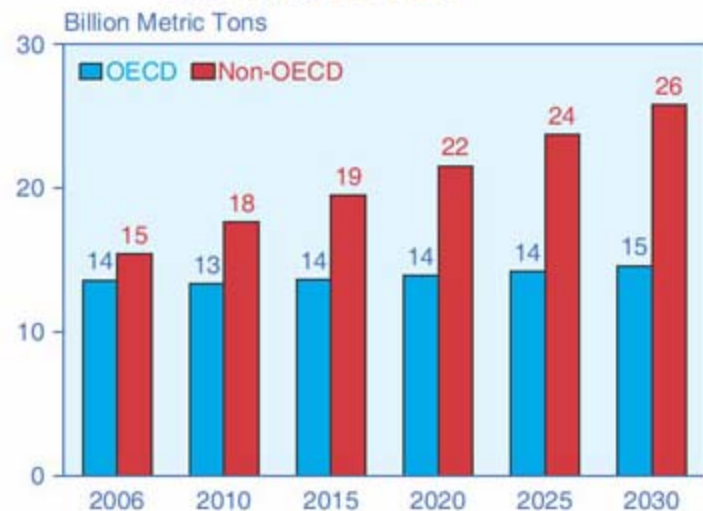


Energy demand is growing substantially

Energy-Climate Challenge

Where We are Headed

Figure 80. World Energy-Related Carbon Dioxide Emissions, 2006-2030



Sources: 2006: Energy Information Administration (EIA), *International Energy Annual 2006* (June-December 2008), web site www.eia.doe.gov/iea. Projections: EIA, *World Energy Projections Plus* (2009).

Where We Need to Be!!

Figure 2.22 Paths to reach a 400 ppm CO₂-equivalent greenhouse gas concentration target (Kyoto gas emissions plus land use CO₂)

Maximal reduction rate of

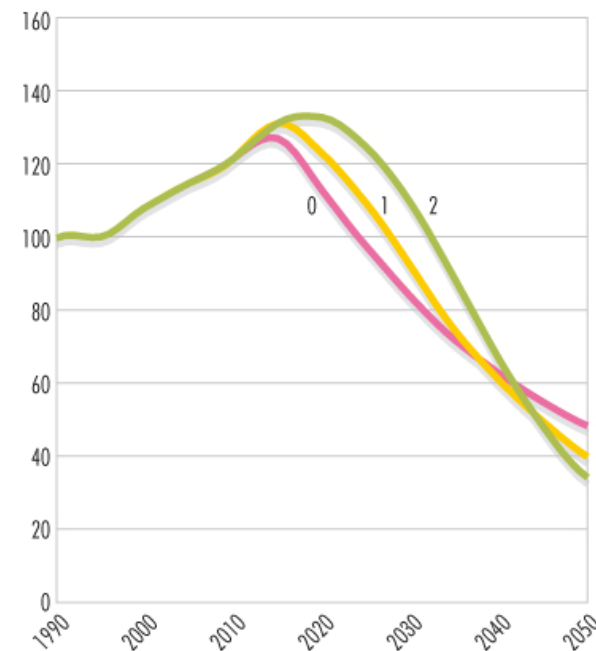
- ~2.6%/y
- ~3.6%/y
- ~5.4%/y

Notes: The risk of overshooting a 2°C threshold increases rapidly if greenhouse gas concentrations are stabilized much above 400 ppm CO₂-equivalent in the long term.

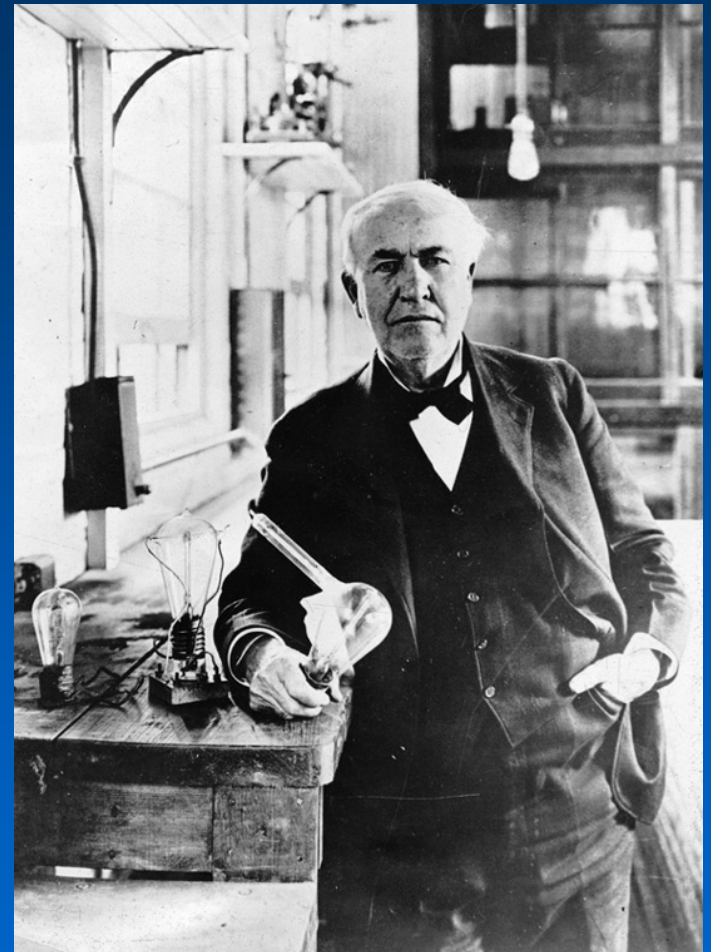
Path 2 postpones the peak in global emissions until about 2020, but requires subsequent annual emissions reductions at an exceptionally challenging pace of more than 5 per cent/year.

Source: Den Elzen and Meinshausen 2005

Emissions relative to 1990 level (%)



If our energy system is
wholly recognizable
by Thomas Edison
in 2050 ...



We're in trouble!

Innovation Needed on All Fronts

- Technology
- Policy
- Finance



Transformation Requires Tremendous Capital Investments

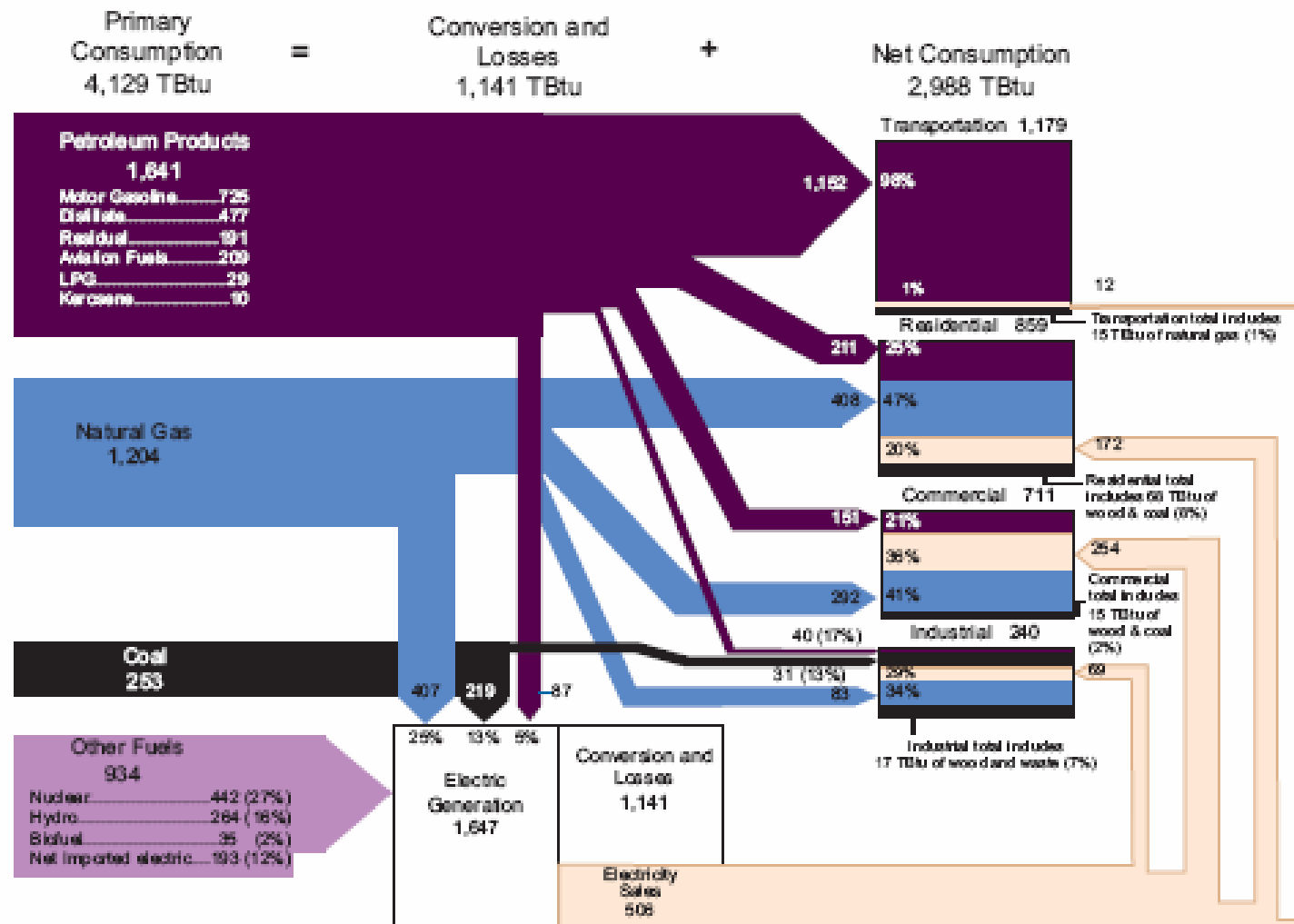
Valley and Mountain of Death



STATE PERSPECTIVE...



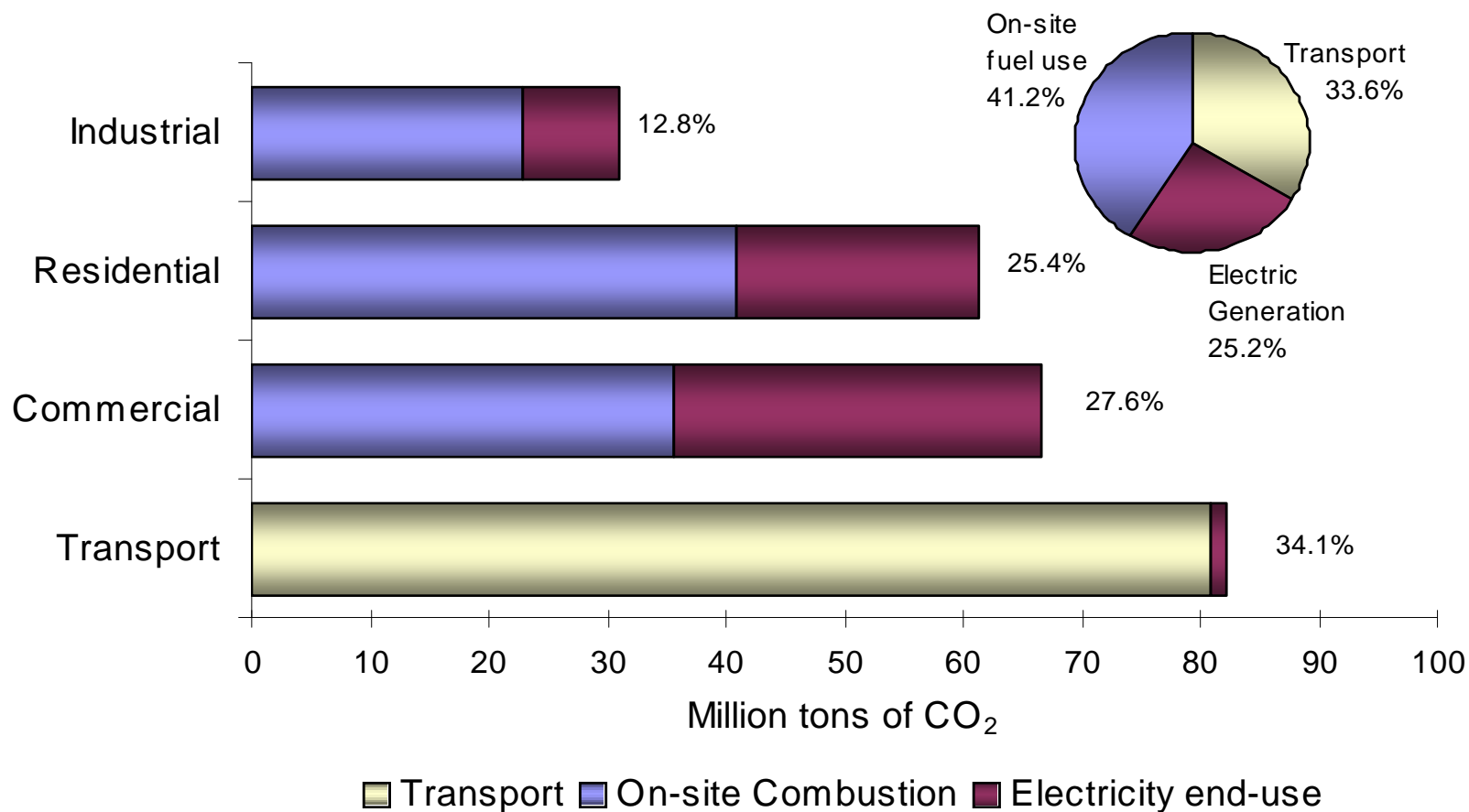
2007 NEW YORK STATE ENERGY FLOW (TBtu)



CO₂ from Fuel Combustion by End Use Sector - 2005

Total CO₂ from Fuel Combustion: 240.77 Million Tons (87% of Total GHGs)

(Electricity allocated across end-use sectors)



New York State Initiatives Toward a More Sustainable Energy Future

- Energy efficiency
- Renewable resources
- Emerging technology investments
- Climate policy and research

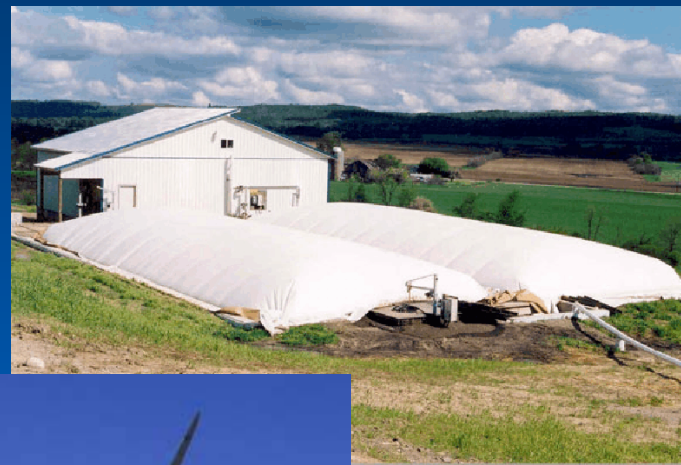
→ → Energy Planning

Energy Efficiency

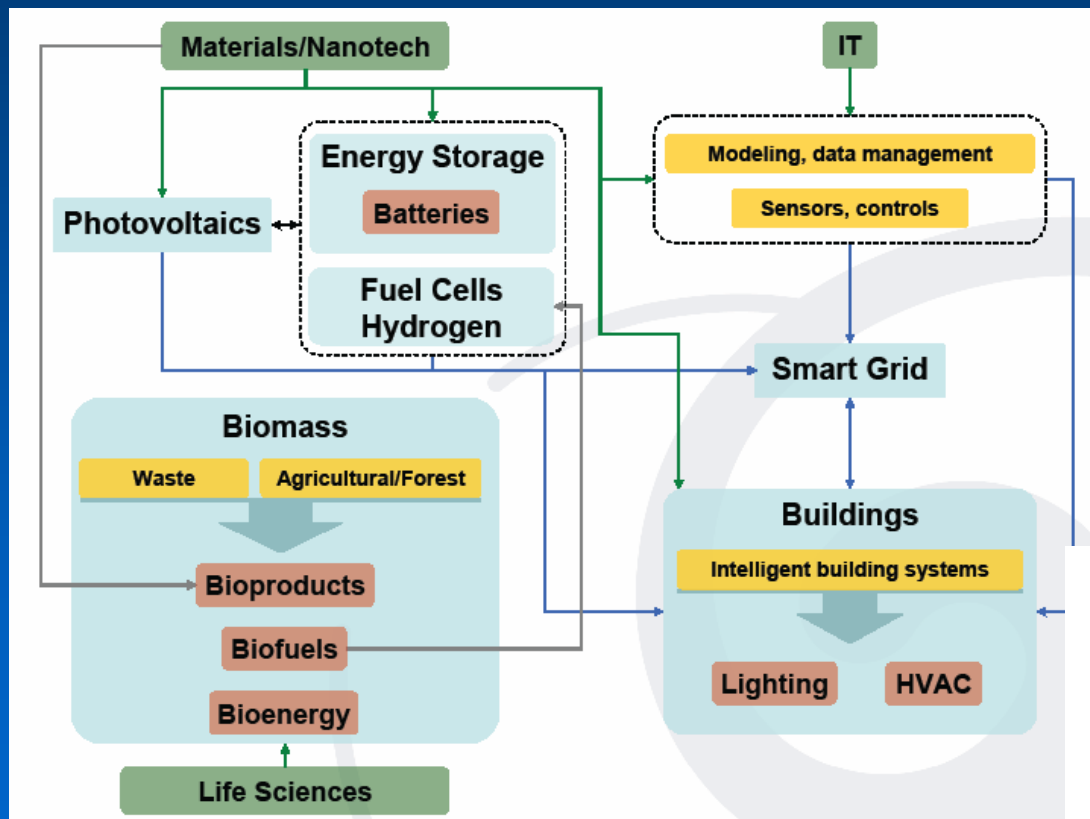
- New York Energy \$mart:
 - Annual energy bill savings: \$590 M
 - For every \$1 invested → \$2 in energy costs avoided
 - 3,220 GWh saved annually (equivalent to 2.2 million tons CO₂ per year, or removing about 435,000 cars)
- 15*15: will quadruple investment in energy efficiency in NY

Renewable Resources

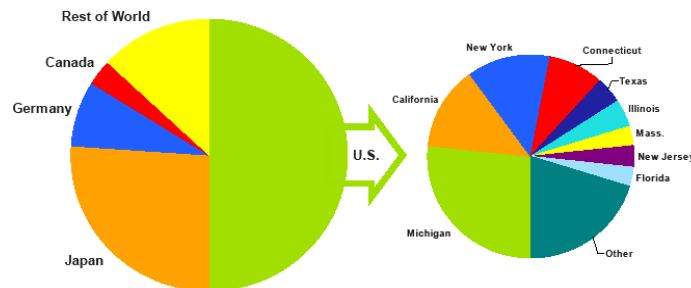
- Renewable Portfolio Standard:
 - Goal: 25% renewable electricity by 2013
 - Customer-sited renewables and large central power
 - 1300 MW of new renewable energy in NYS
 - \$4 billion in economic benefits
 - 6:1 benefit cost
- LIPA/NYPA 150 MW PV
- Off-shore wind collaborative
- 30% target under consideration



Innovation and Clean Tech Assets in NYS



Cleantech Landscape Clean Energy Patent Distribution



Emerging Energy Technology

- \$240 million in new product sales in 2008 from NYSERDA R&D investments
- For every \$1 NYSERDA invested in product development → \$5 in economic benefits in NYS



Energy efficient boiler



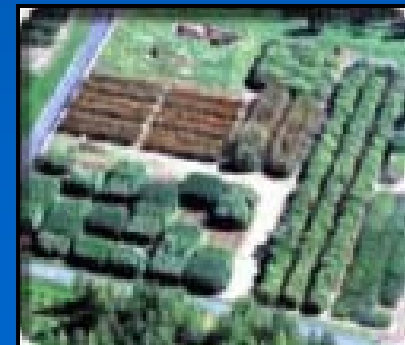
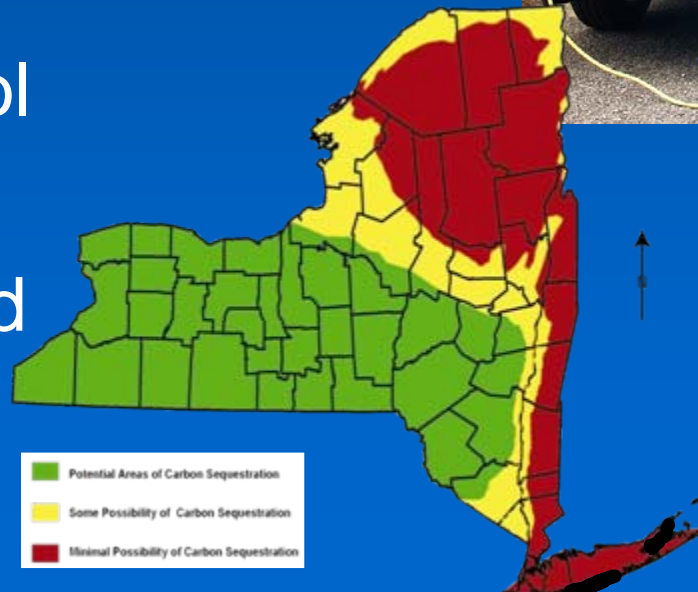
Advanced lighting control



Kinetic hydroturbine

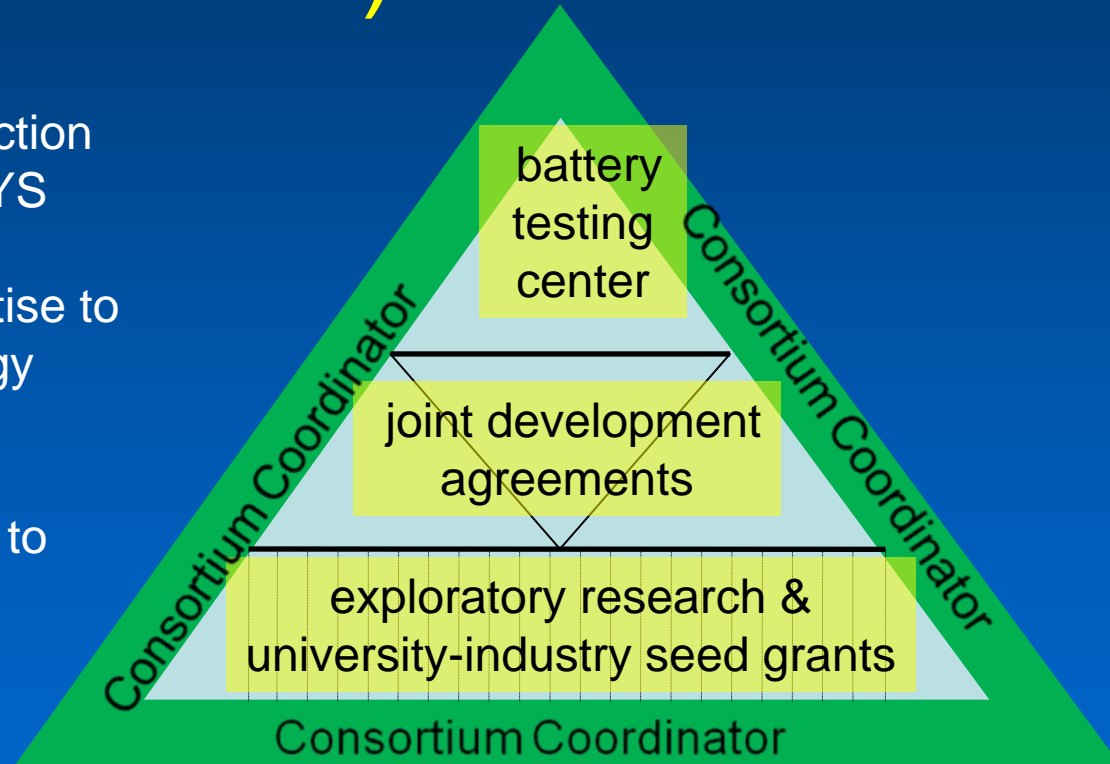
Emerging Energy Technology

- Plug-in hybrid vehicles
- Cellulose-to-ethanol
- Carbon capture and sequestration



NY- Battery and Energy Storage Technology (NY-BEST) Consortium

- Accelerate the commercial introduction of energy storage technology in NYS
- Build the human capital and expertise to sustain a vibrant commercial energy storage industry in NYS
- Leverage seed resources of \$25M to create a sustainable organization that provides value to imembers

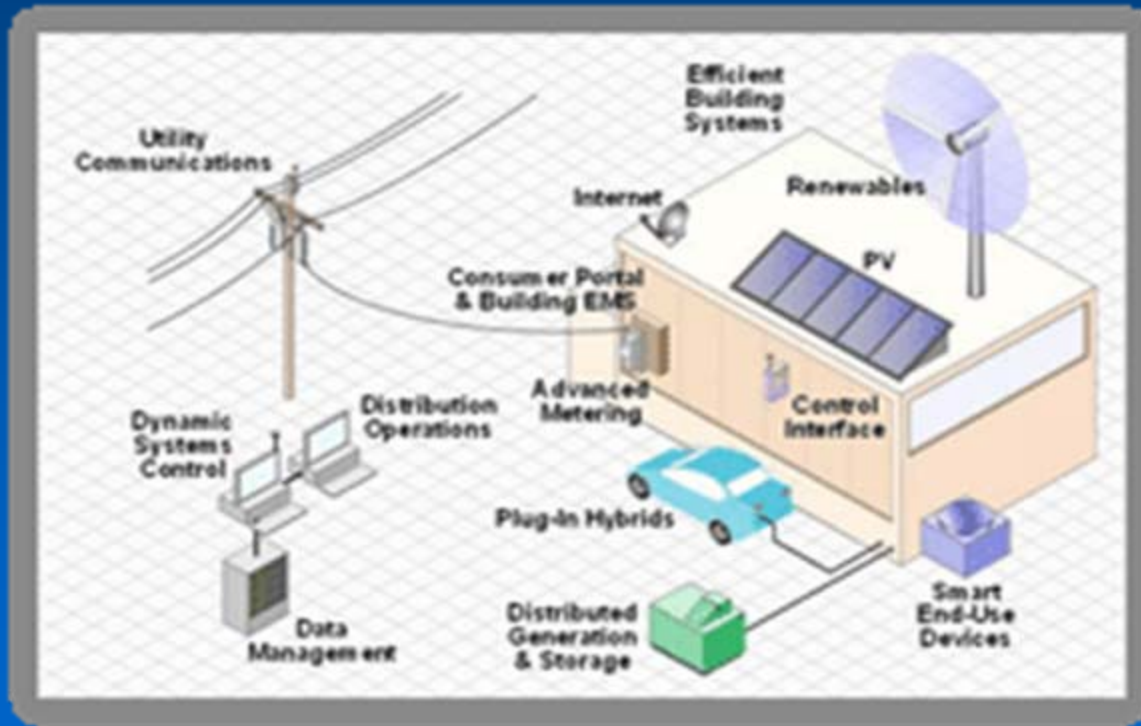


GE sodium metal halide battery

NYS Smart Grid Initiative

“Smart Grid” functionality:

- 1) Enhance customer service
- 2) Improve operational efficiency
- 3) Enhance demand response/load control
- 4) Transform customer energy use behavior
- 5) Support energy efficiency and renewable energy
- 6) Support system reliability and security



NYS Smart Grid Consortium

Bioheat Technology: Wood and Pellet-fired PM Emissions (lb/MMBtu)

OWB standard - Phase I	0.44 input
OWB standard - Phase II	0.32 output
EPA certified woodstove	0.42 – 0.78 approx.
American pellet stoves	0.07 - 0.2
Austrian pellet stoves	0.01 - 0.02
Austrian wood-fired boilers	0.01 - 0.04
No. 2 oil-fired boilers	0.005
No. 2/biodiesel (B20) oil-fired boilers	0.004
500 ppm S oil-fired boilers	0.001
500 ppm S/ biodiesel (B20) oil-fired boilers	0.0008
15 ppm ULS oil-fired boilers	0.00002 - 0. 00004
Natural gas-fired boilers	0.00002



Climate Policy

- RGGI
 - First mandatory, market-based effort in the U.S. to reduce greenhouse gas emissions
 - 4 auctions completed
 - See www.rggi.org
- NYS Climate Action Plan: 80*50

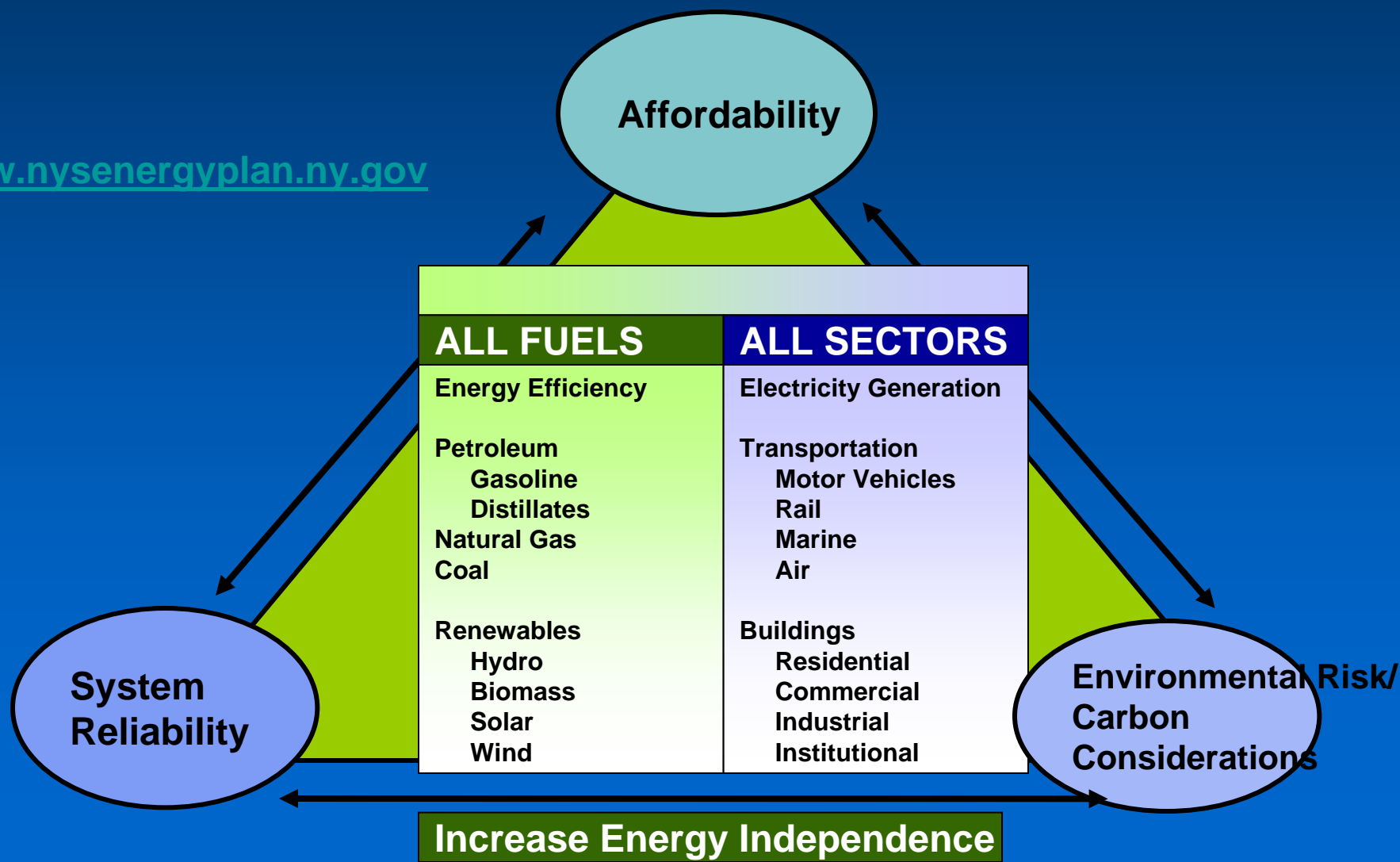


Climate Research, Analysis, and Outreach

- Multi-sector Climate Impact and *Adaptation* Study
- CO2 mitigation cost curves
- Assistance to local governments to develop and implement climate action plans – Climate Smart Communities

Energy Planning – Balancing Multiple Objectives

www.nysenergyplan.ny.gov

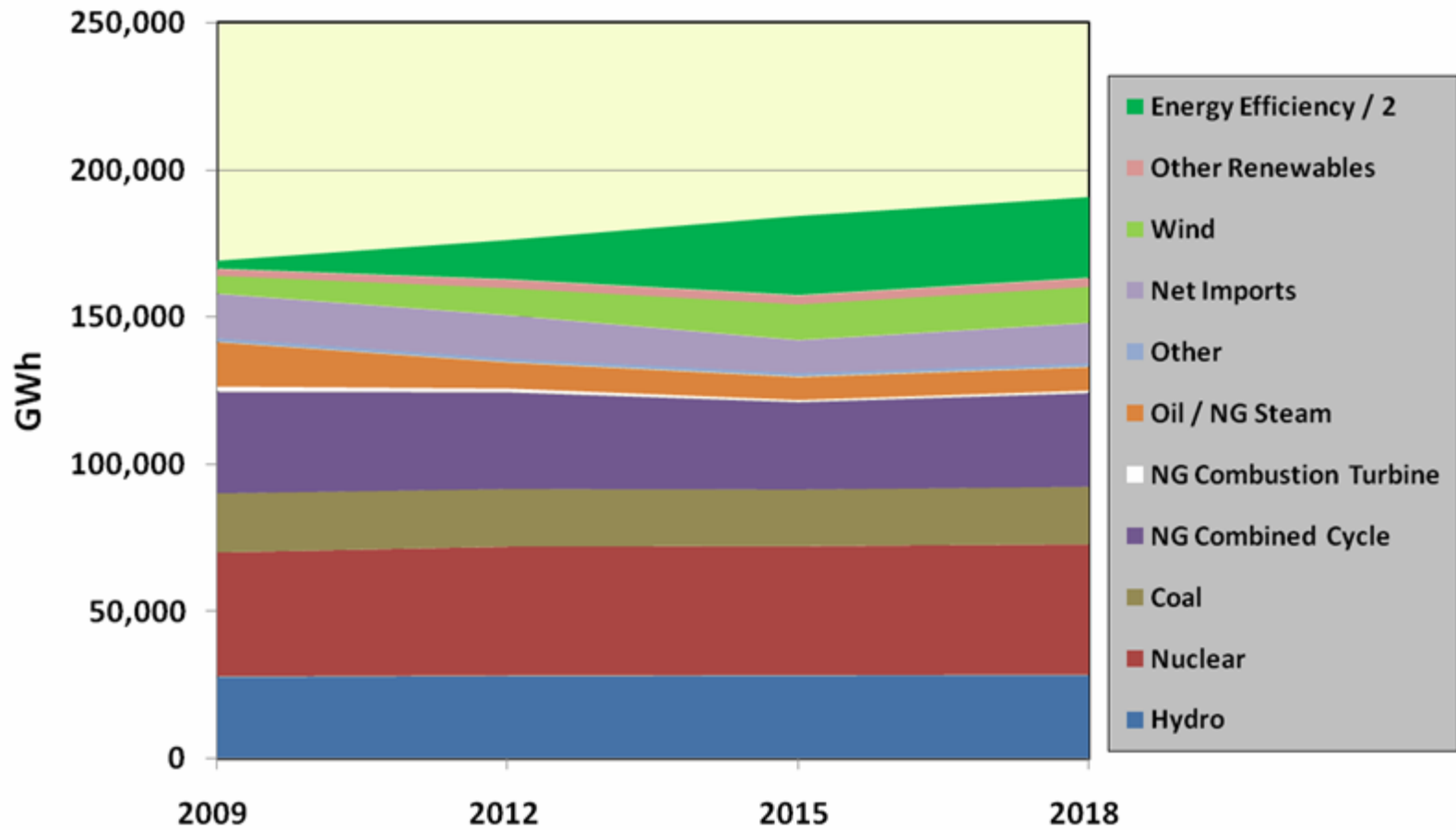


NYS Energy Plan: Clean Energy Strategies

- Increase energy efficiency in ALL sectors
- Support development of indigenous resources (natural gas, wind, solar, geothermal, hydro, bio)
- Invest in infrastructure
- Stimulate technology innovation
- Coordination, collaboration with stakeholders

Meeting NYS Electricity Needs: 2009 to 2018¹

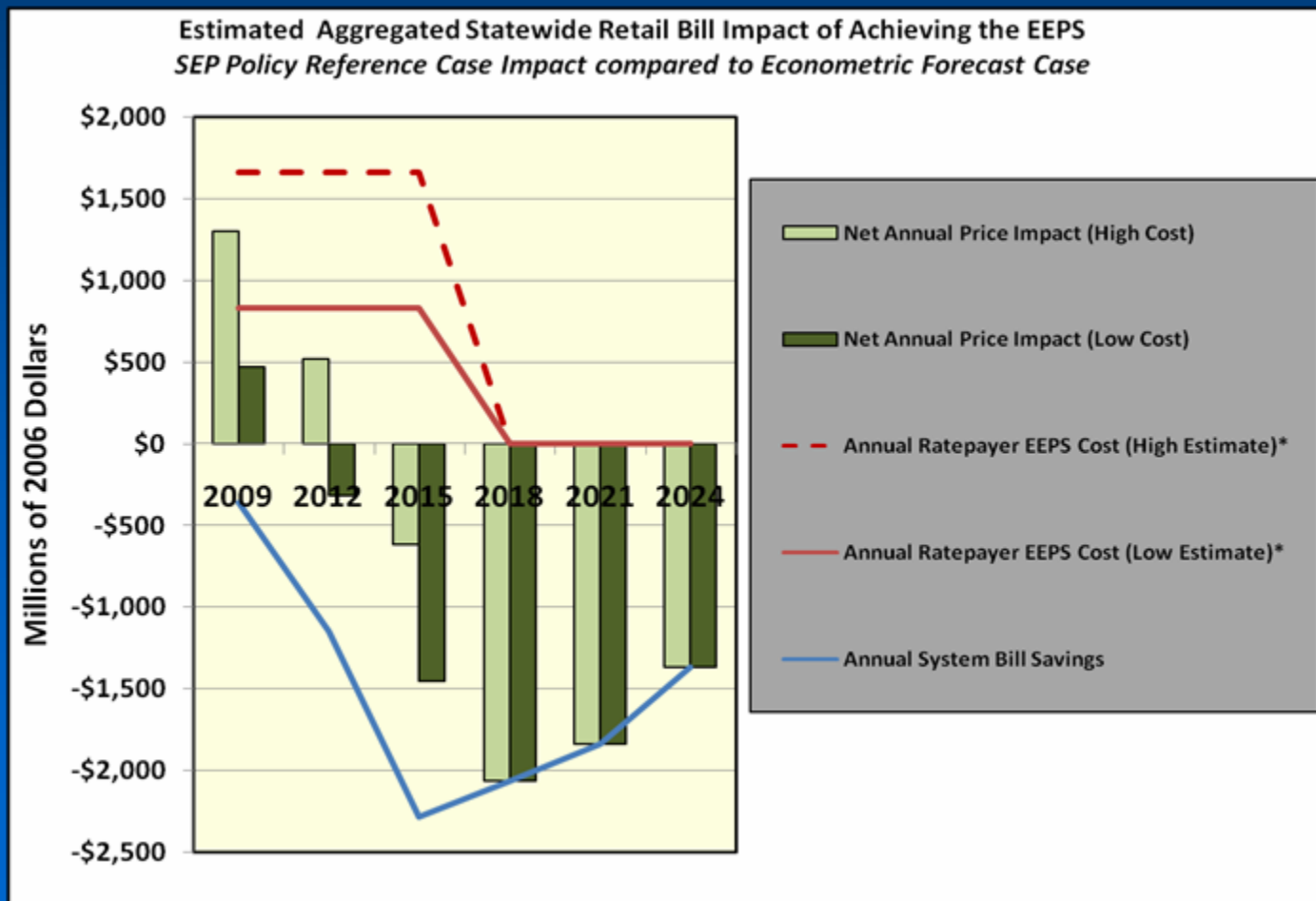
Based on 2009 SEP Modeling Results



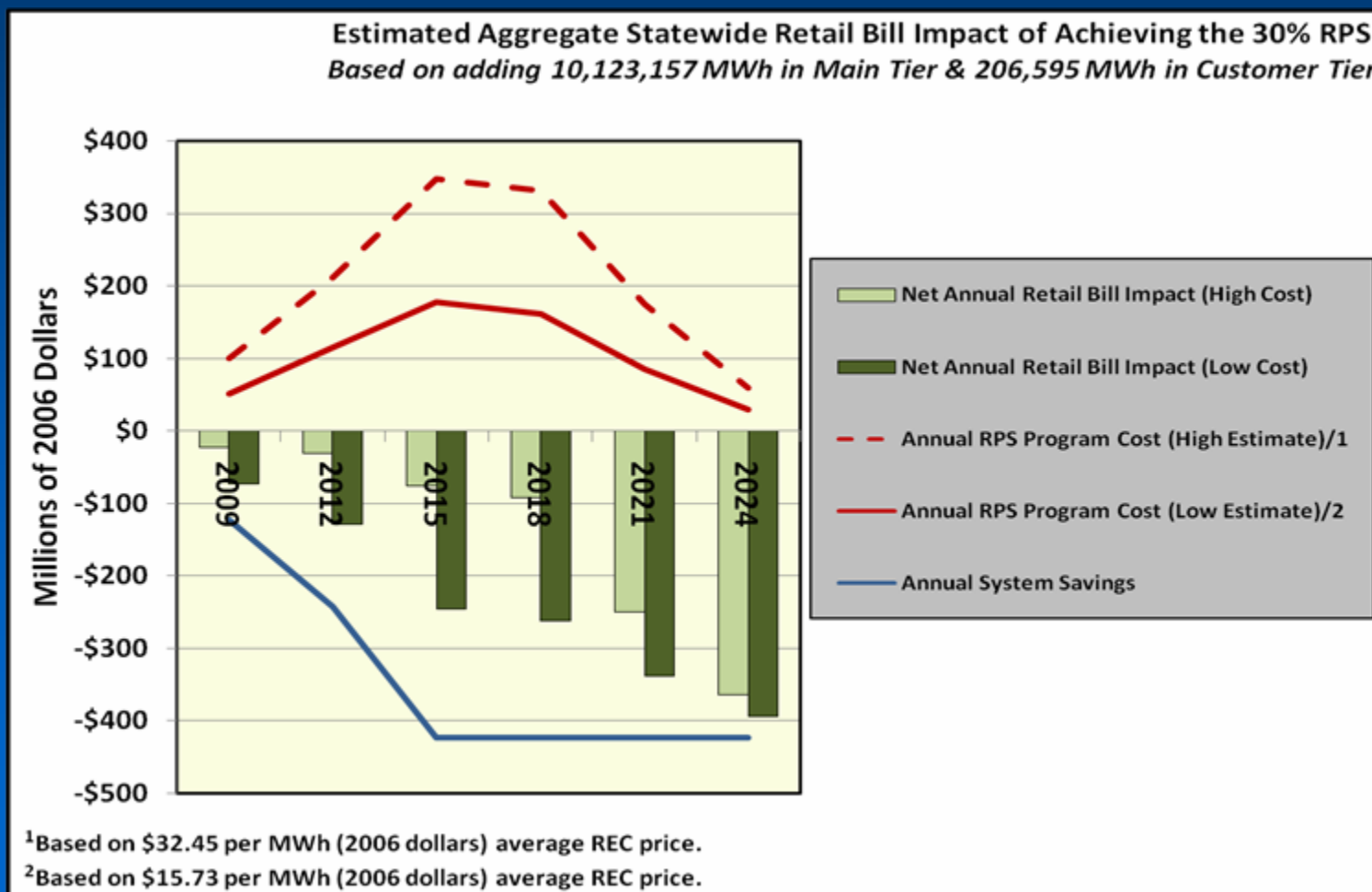
¹ Assumes achievement of the 30% RPS and the EEPs ("15x15").

² All energy efficiency shown is incremental to approx. 5,000 GWh achieved by NYSDERDA, LIPA, and NYPA through 2008.

System-Wide Market Impacts of Efficiency



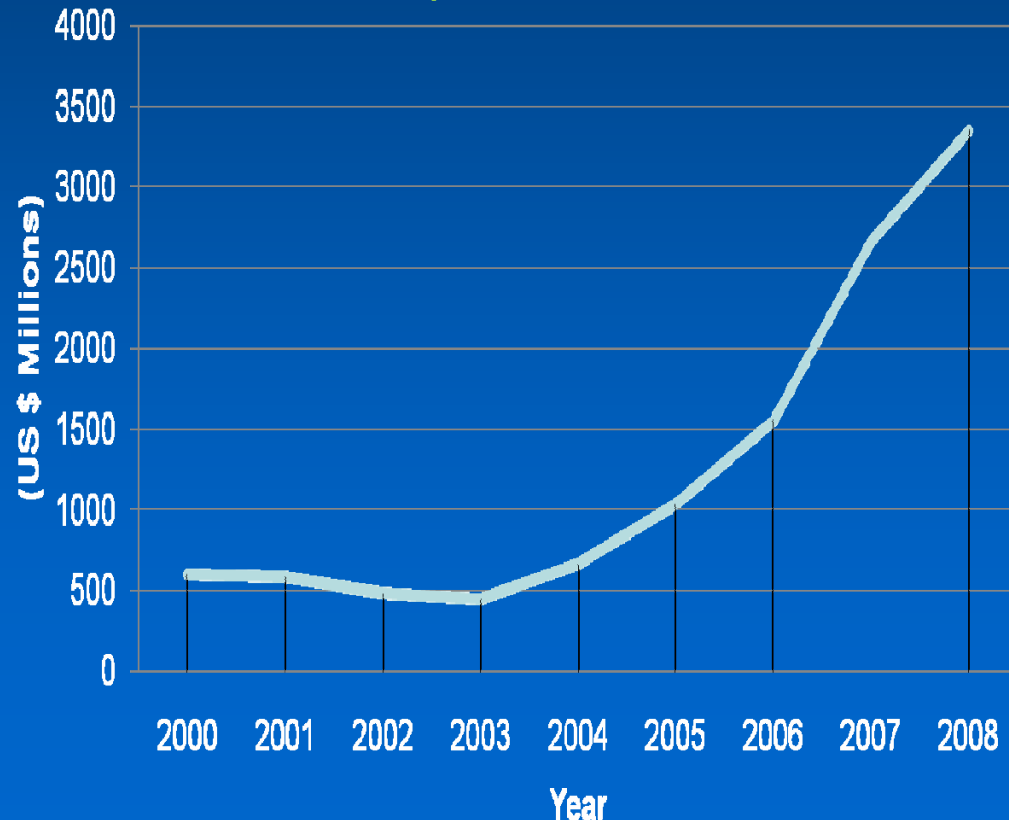
System-Wide Market Impacts of Renewables



TOWARD A CLEAN ENERGY ECONOMY...

- Approximately 50% of US annual GDP growth is attributed to increase in innovation¹
- Record investments in cleantech
- *ET: the next IT!*
:The next great global industry

Clean Energy Venture Capital Investments in US-Based Companies



¹ Measuring Regional Innovation, Council on Competitiveness.

Closing

1. Energy-climate challenge before us is enormous
2. Solutions will come only if we unleash our capacity for innovation -- on top of sound public policy incorporating externalities
3. NYS has been a leader in sustainable energy and will continue to forge ahead
4. Silver lining in the energy-climate challenge: opportunity for a clean energy economy