

**Society of Petroleum Engineers**  
***Seccion Argentina***

# **Energy Planning**

# **in New York State**

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**September 5, 2008**

# Presentation Outline

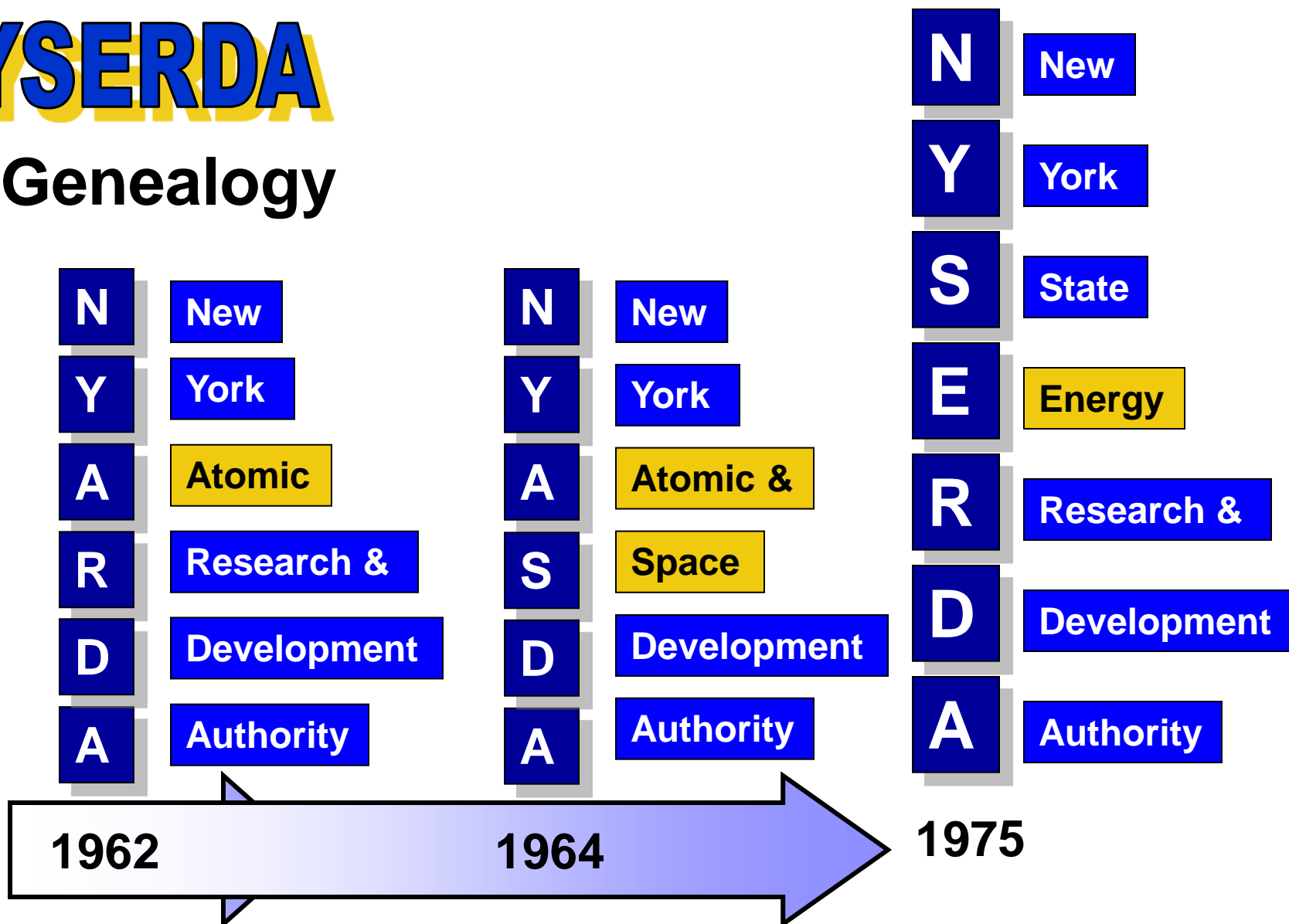
- **Introduction to NYSERDA**
- **Energy Characteristics of New York**
- **Energy Planning in New York**

# NYSERDA

- **Genealogy**
- **Mission**
- **Holistic Approach**

# NYSERDA

## Genealogy

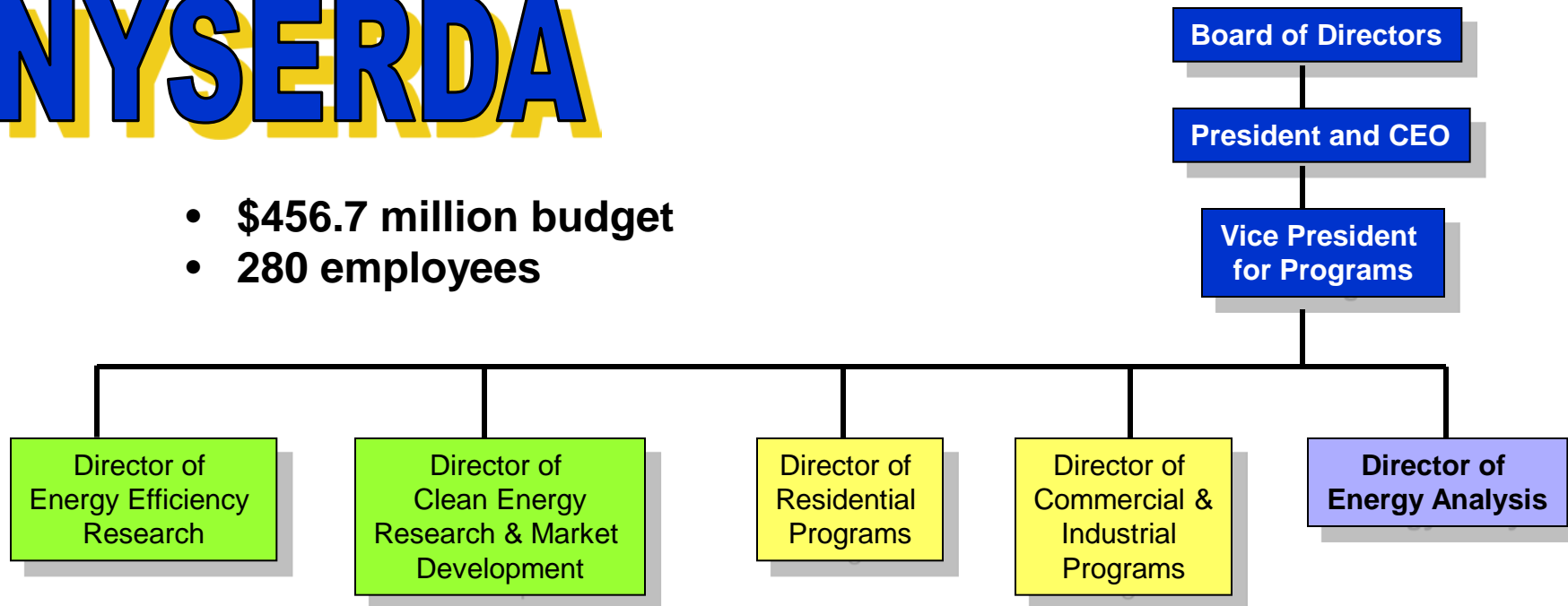


# NYSERDA

- **Genealogy**
- **Mission**
- **Holistic Approach**

# NYSERDA

- \$456.7 million budget
- 280 employees



## NYSERDA Mission Statement

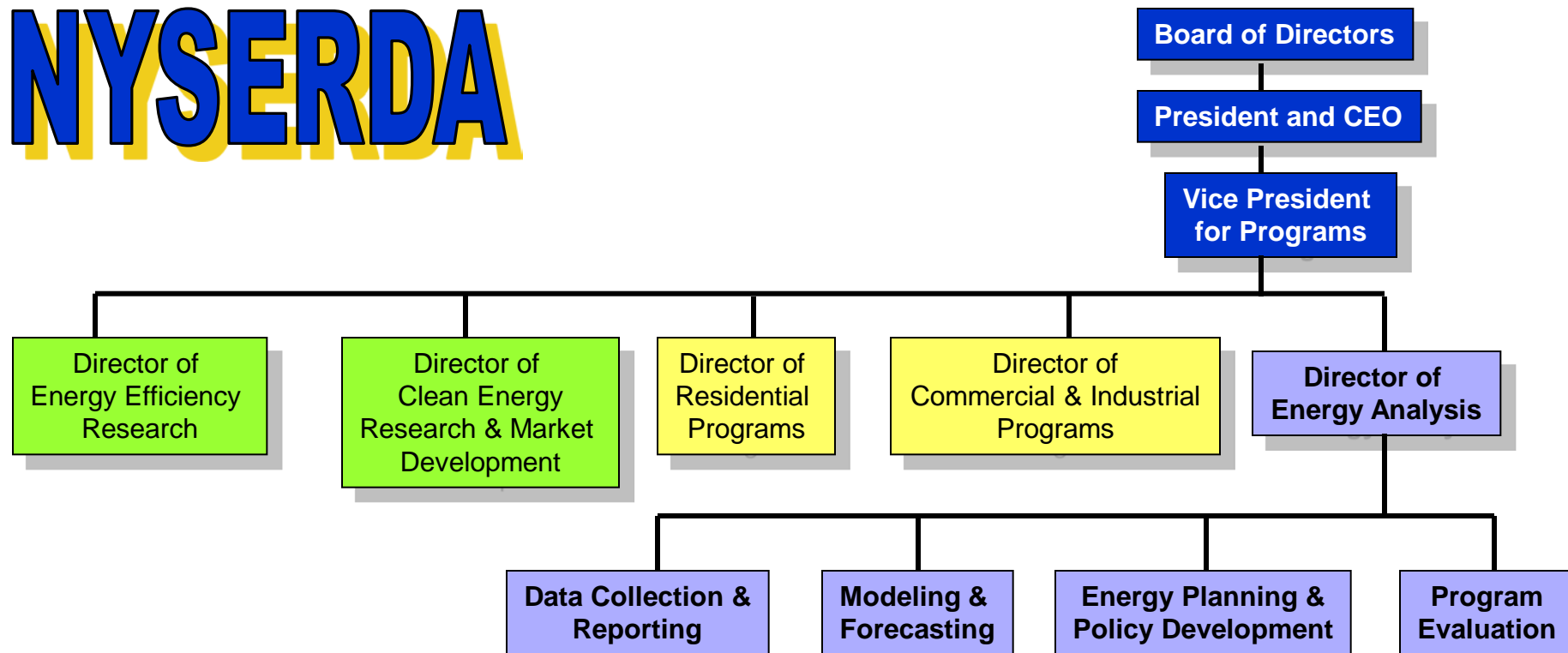
Use innovation and technology to solve some of New York's most difficult energy and environmental problems in ways that improve the State's economy.

Research and Development

Market Penetration and Adoption

Policy and Planning

# NYSERDA



## **Energy Analysis Mission Statement**

Provide objective information and analysis in a responsive manner to meet the needs of New York State's energy policy stakeholders

Research and Development

Market Penetration and Adoption

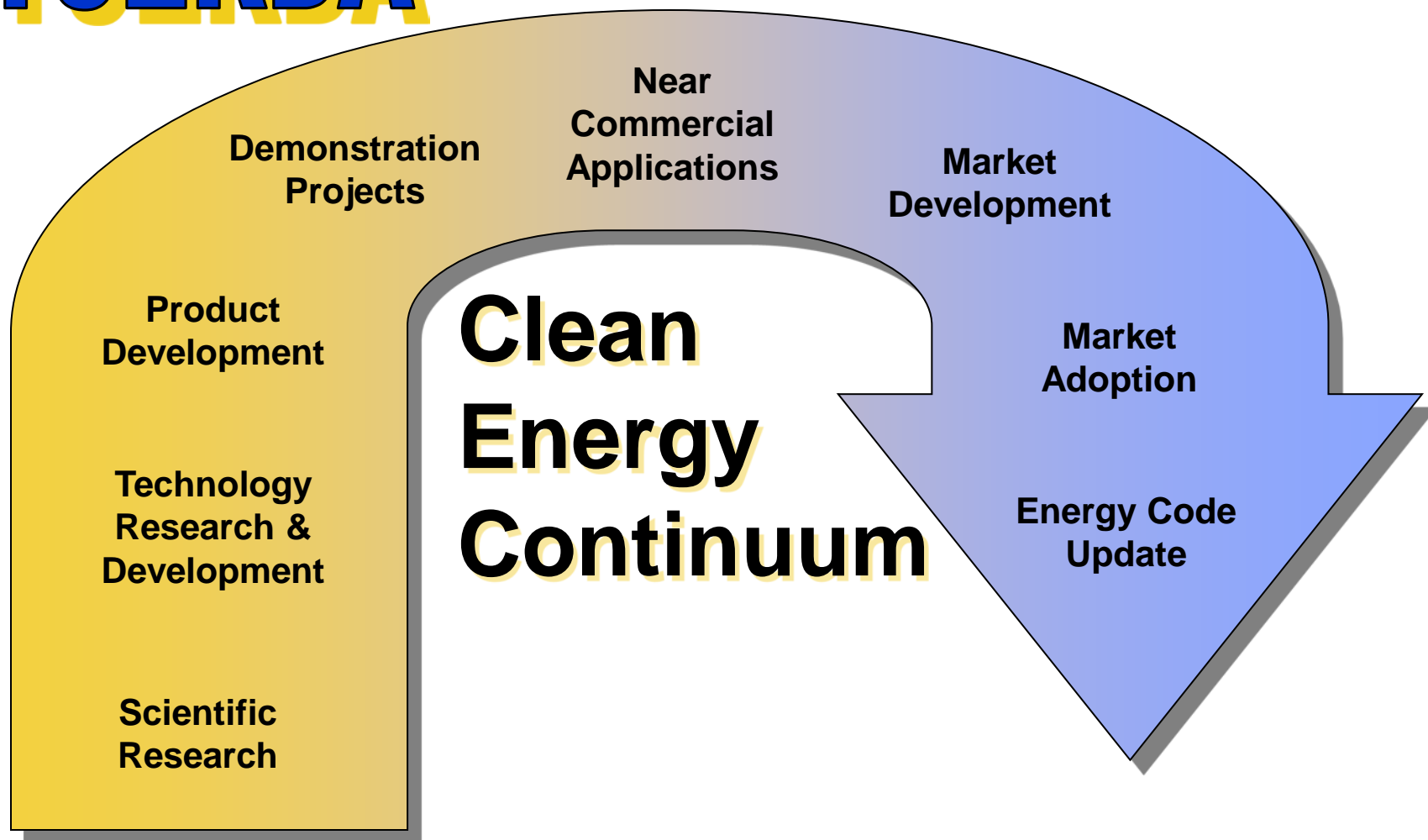
Policy and Planning

# NYSERDA

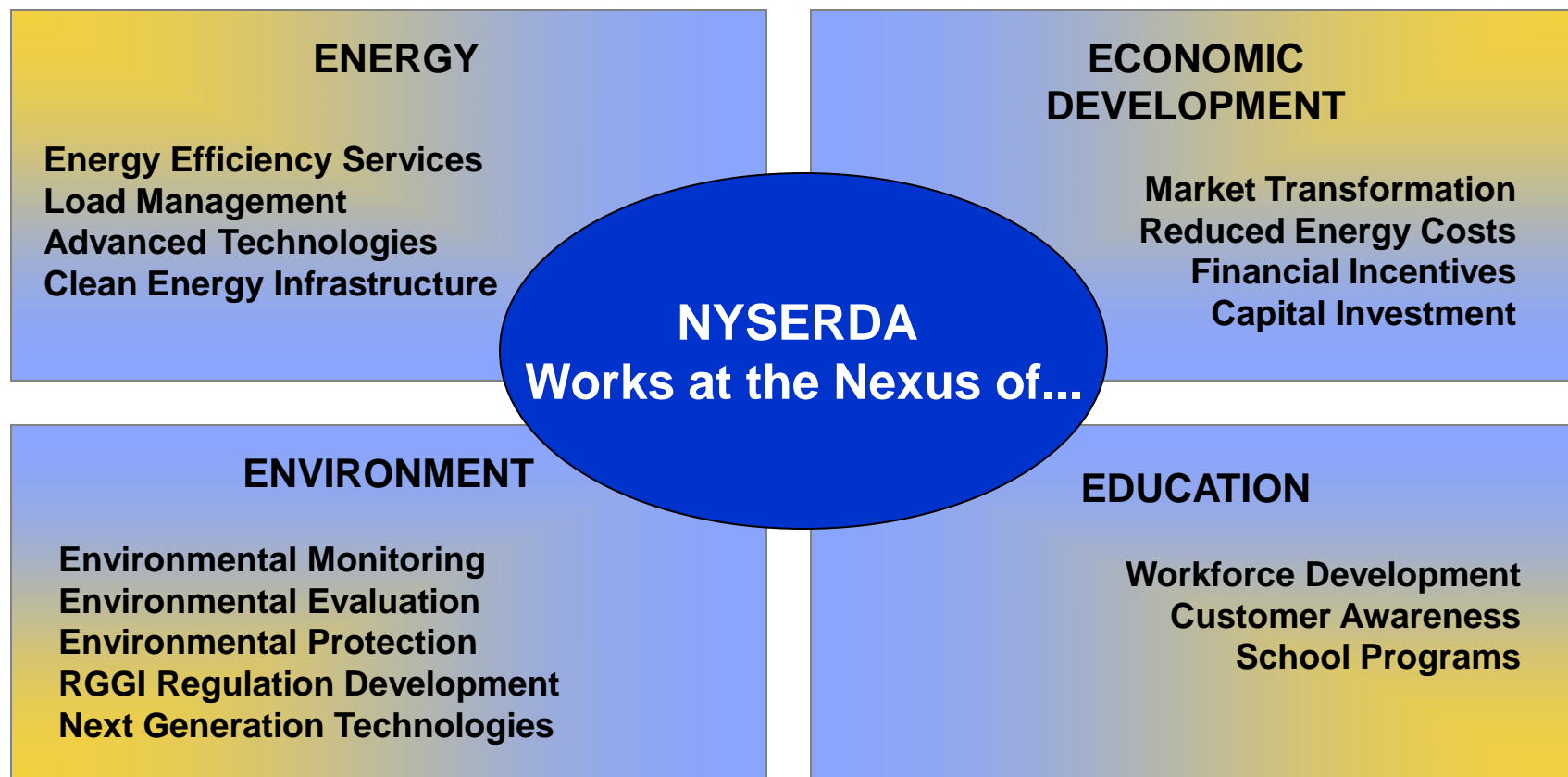
- **Genealogy**
- **Mission**
- **Holistic Approach**



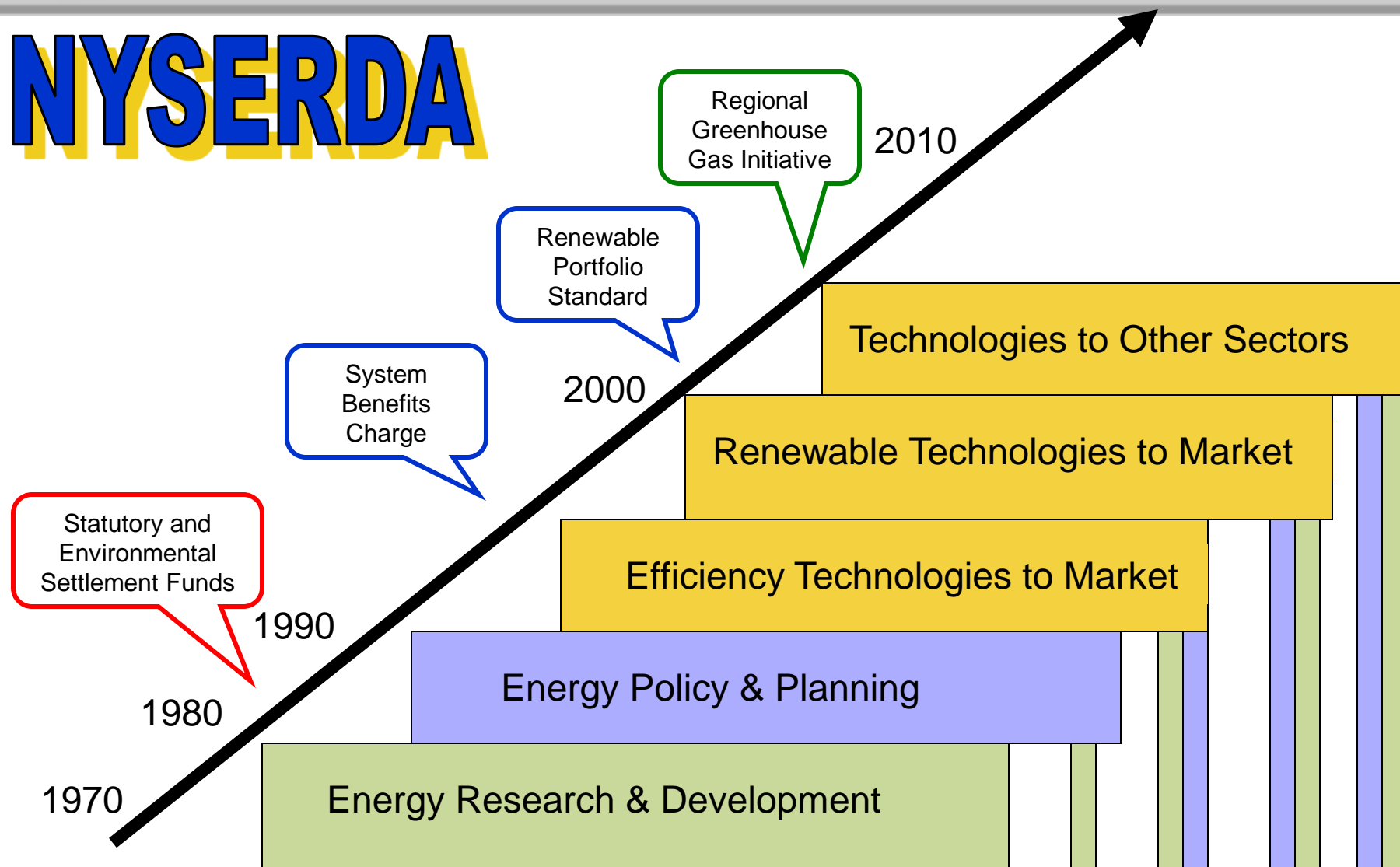
**NYSERDA**



# NYSERDA



# NYSERDA

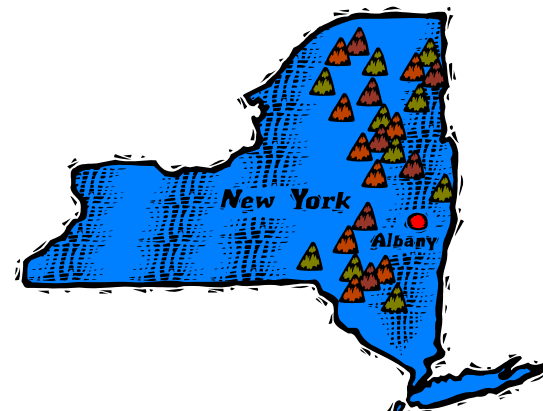


# Presentation Outline

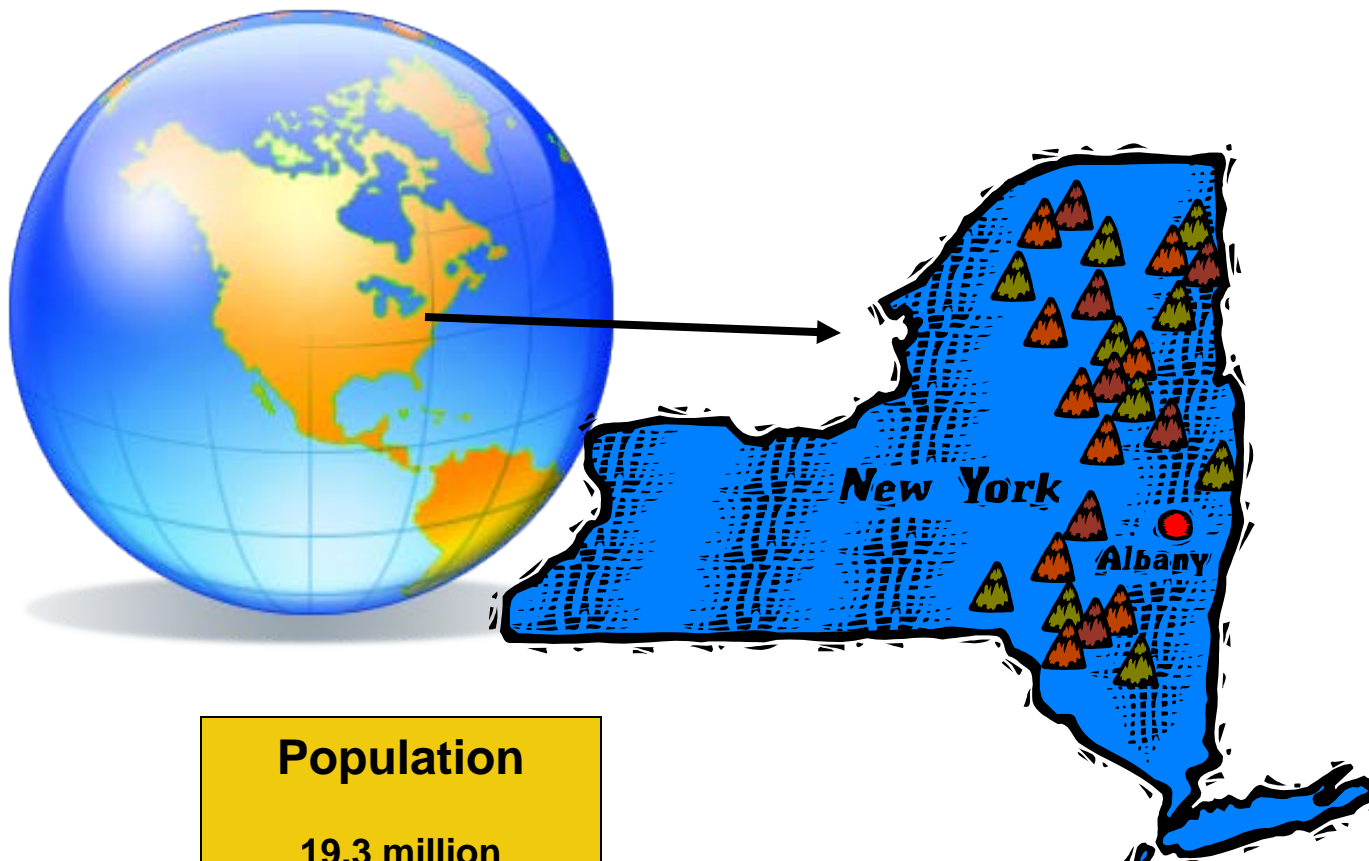
- **Introduction to NYSERDA**
- **Energy Characteristics of New York**
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# Energy Characteristics

- Consumption Patterns
- Energy Flows
- Energy Industry



# New York Energy Consumption Patterns



## Population

19.3 million  
6.4% of U.S. total  
Rank 2 of 50 States

## Primary Energy Consumption

4,070.9 trillion Btu  
4.1% of U.S. total

## Petroleum Consumption

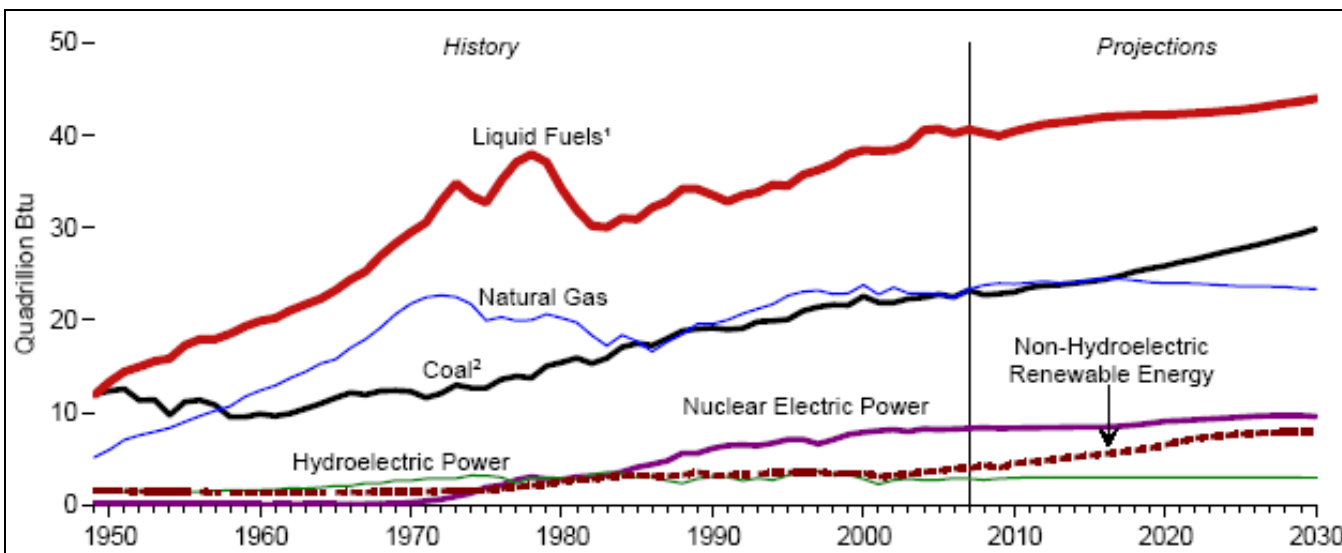
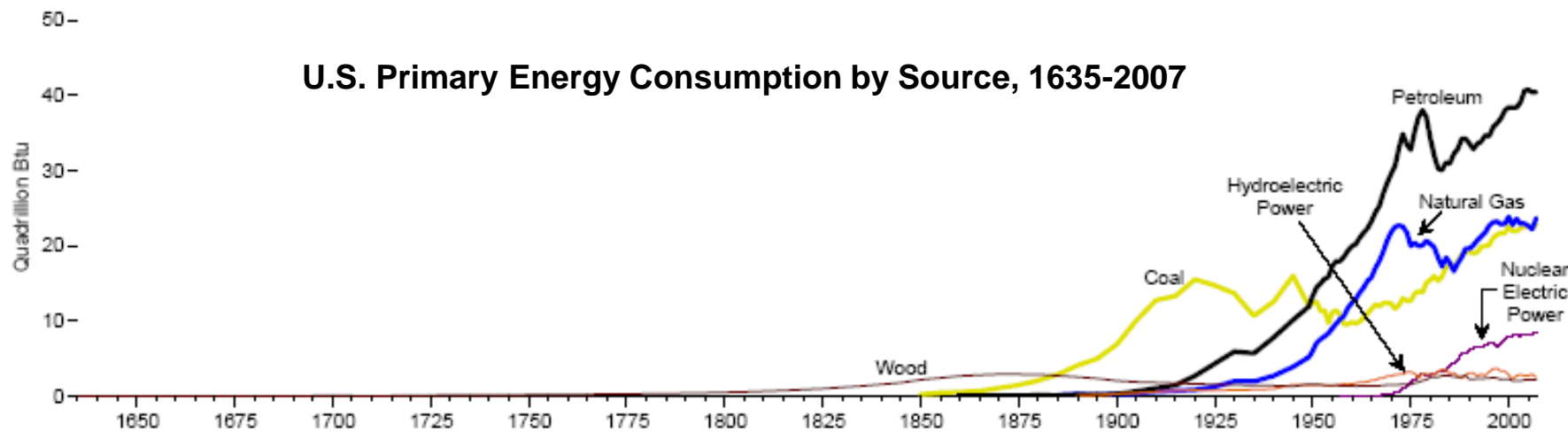
288.1 million barrels  
4% of U.S. total

## Natural Gas Consumption

1,093 billion cubic feet  
5% of U.S. total

# Energy Consumption Patterns

**U.S. Primary Energy Consumption by Source, 1635-2007**

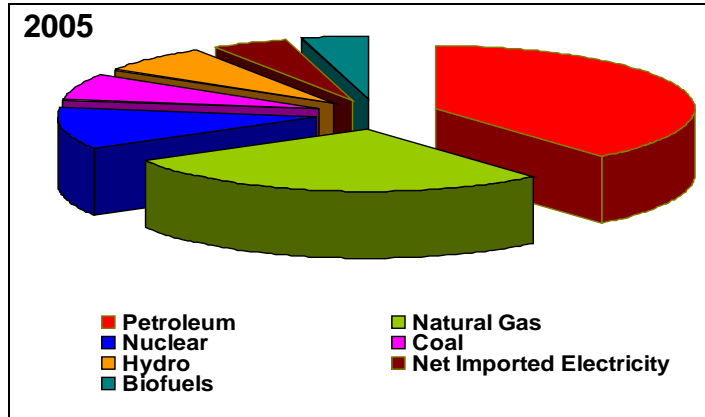
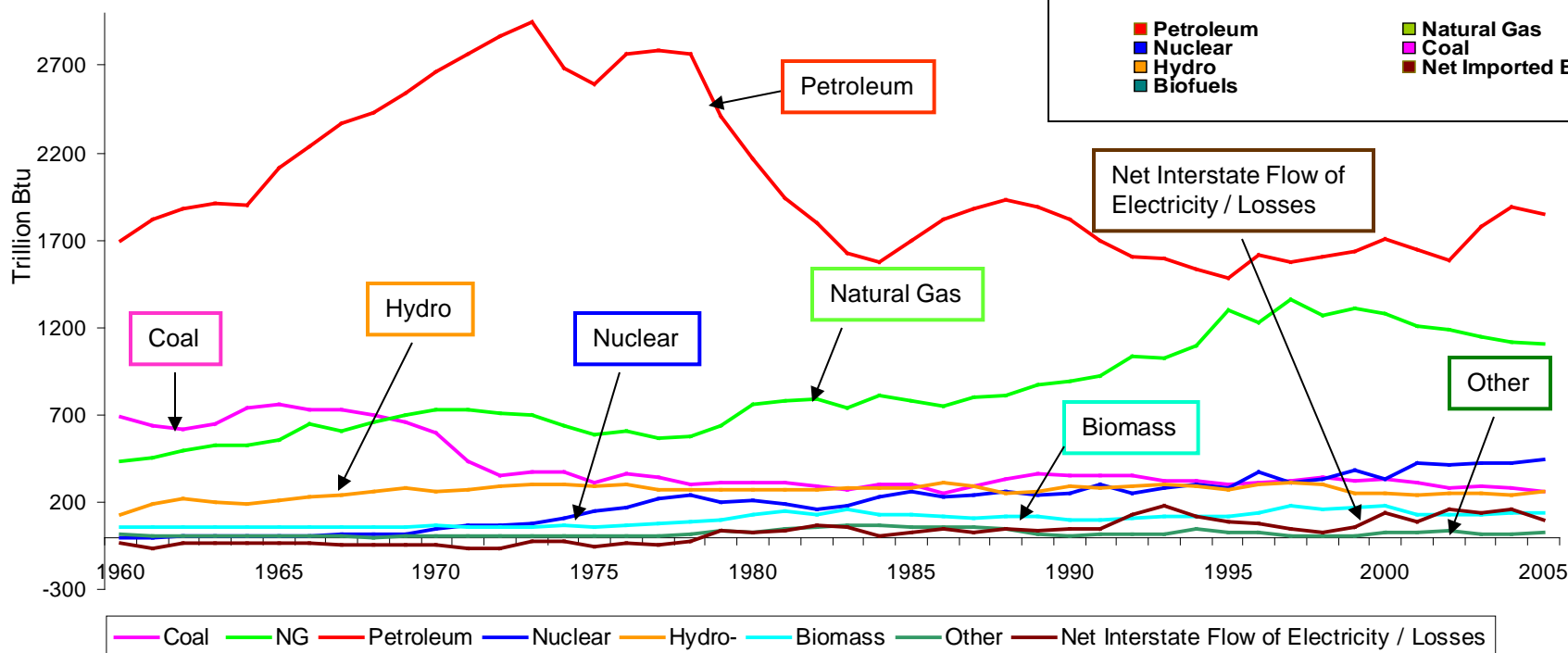


## U.S. Energy Consumption History and Outlook, 1949-2030

1. History: petroleum-derived fuels. Projections: petroleum-derived fuels and non-petroleum-derived fuels, such as fuel ethanol, biodiesel, and coal-based synthetic liquids.
2. Includes net imports of coal coke.

# Energy Consumption Patterns

## NYS Energy Consumption History by Source



"Other" is geothermal, wind, photovoltaic, solar thermal energy, and net imports of electricity.

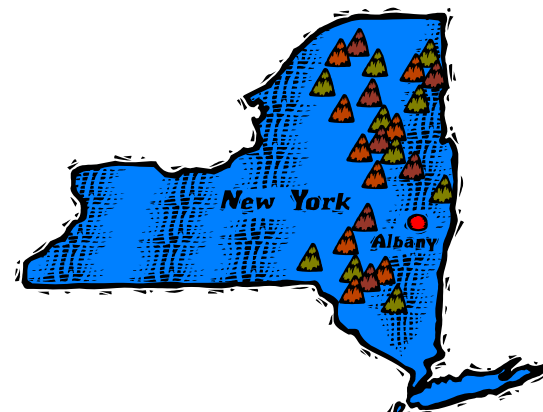
"Biomass" is wood and waste.

Source: EIA State Energy Data System



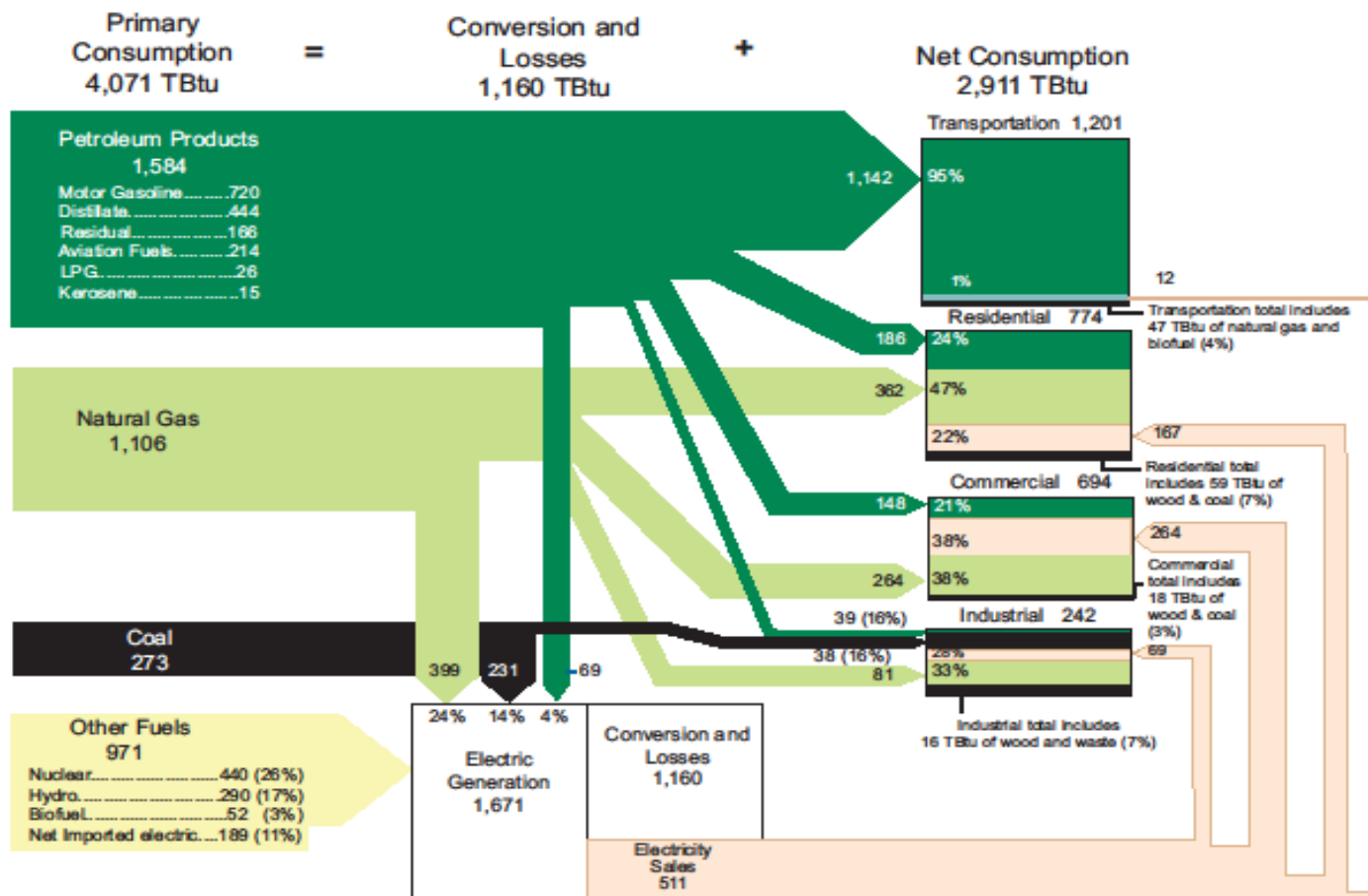
# Energy Characteristics

- Consumption Patterns
- Energy Flows
- Energy Industry



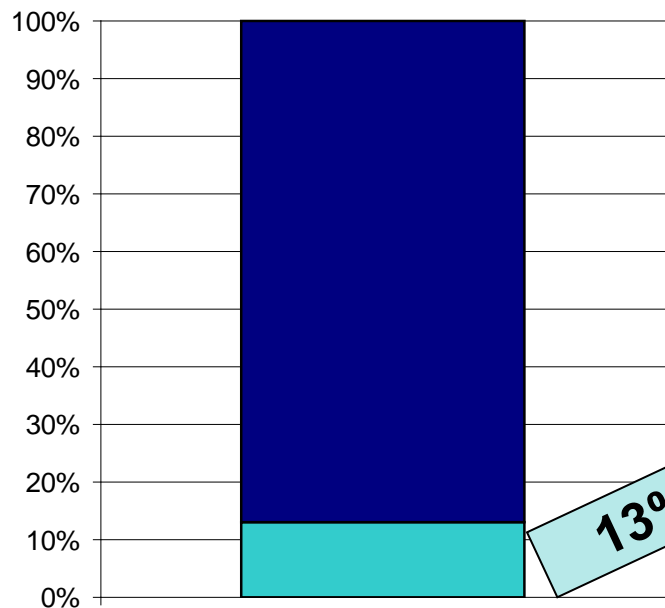
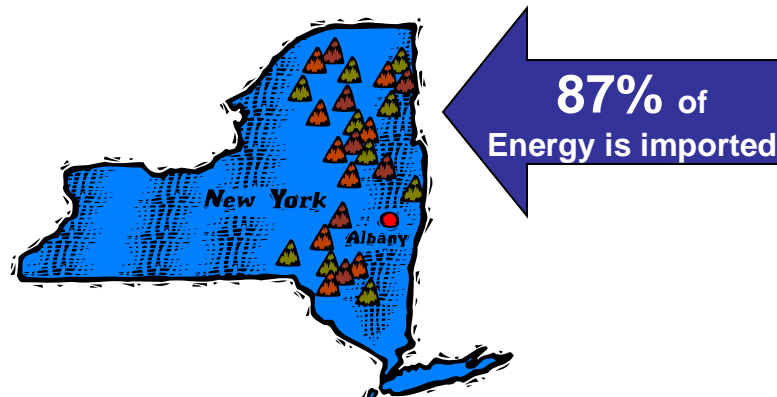
# Energy Flows

## 2006 NEW YORK STATE ENERGY FLOW (TBtu)



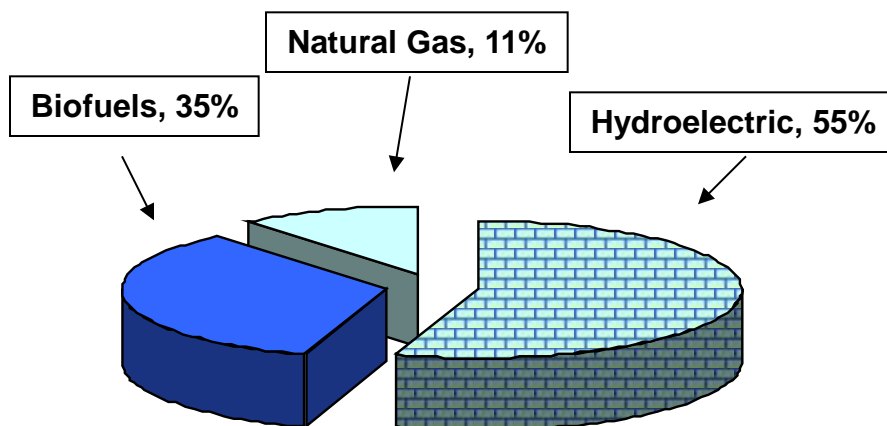
# Energy Flows

Only 13% of New York's primary energy requirement is met from in-state resources



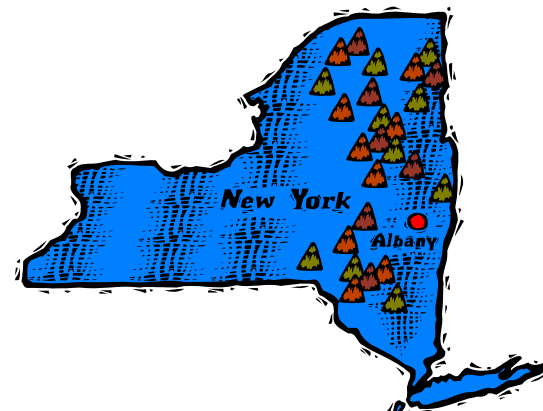
■ In-State Resources ■ Out-of-State Resources

## In-State Energy Resources



# Energy Characteristics

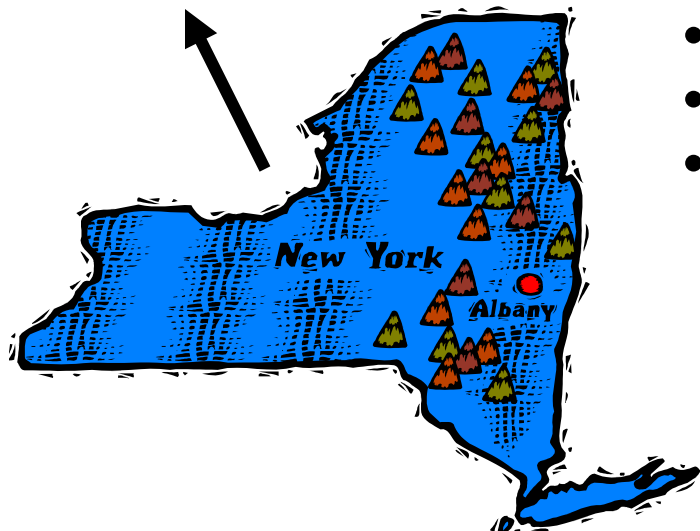
- Consumption Patterns
- Energy Flows
- Energy Industry



# Energy Industry

**“A public good provided largely by private interests.”**

**\$80 Billion  
Energy Bill**



- Electric and Gas Providers
- NY Public Service Commission (PSC)
- New York Power Authority (NYPA)
- Long Island Power Authority (LIPA)
- NY Independent System Operator (NYISO)

# New York Utility Industry

- “System Planning”
- “Safe and adequate service” at “just and reasonable rates”

## Electric Utilities



### 6 Investor Owned Utilities

Central Hudson Gas & Electric Corporation  
 Consolidated Edison Company of New York, Inc.  
 New York State Electric & Gas Corporation  
 National Grid  
 Orange & Rockland Utilities, Inc.  
 Rochester Gas and Electric Corporation

### 42 Municipal / Cooperatives

**300+ Energy Service Companies**

## Gas Utilities



### 10 Investor Owned Utilities

Central Hudson Gas & Electric Corporation  
 Consolidated Edison Company of New York, Inc.  
 Corning Natural Gas Corporation  
 National Grid (Upstate)  
 National Grid (Downstate)  
 National Fuel Gas Distribution Corporation  
 New York State Electric & Gas Corporation  
 Orange & Rockland Utilities, Inc.  
 Rochester Gas and Electric Corporation  
 St. Lawrence Gas Company, Inc.

# New York Public Service Commission

**\$32 billion electricity and gas annual sales**

**5 Member Commission appointed by NY Governor, 6-year terms**

**Oversees and regulates electricity, natural gas and water utilities to assure:**

- **Just and reasonable rates**
- **Safe and reliable service**
- **Fair and adequate consumer protection**
- **Environmental and natural resource stewardship**

**The PSC also regulates telecommunications, cable and internet service providers**

## New York Power Authority - NYPA

- **\$3+ billion annual revenue**
- **Generates 20% of New York State's electricity (75% Hydro)**
- **Invested over \$1 Billion in energy efficiency**
- **1,400 miles of high voltage bulk transmission**

## Long Island Power Authority - LIPA

- **\$3.7 billion annual revenue**
- **Owns transmission and distribution system on Long Island**
- **Serves over 3 million people**



# New York Independent System Operator - NYISO

- **Manages 10,775 mile network or high-voltage lines**
- **Oversees wholesale electricity markets with more than \$50 billion transacted since 1999**

## Comprehensive Reliability Planning Process

1. Reliability Needs Assessment – 10 year planning period
  - Identification of Market-Based Solutions
  - Identification of Regulated Backstop Solutions
2. Comprehensive Reliability Plan

# Presentation Outline

- **Introduction to NYSERDA**
- **Energy Characteristics of New York**
- **Energy Planning in New York**

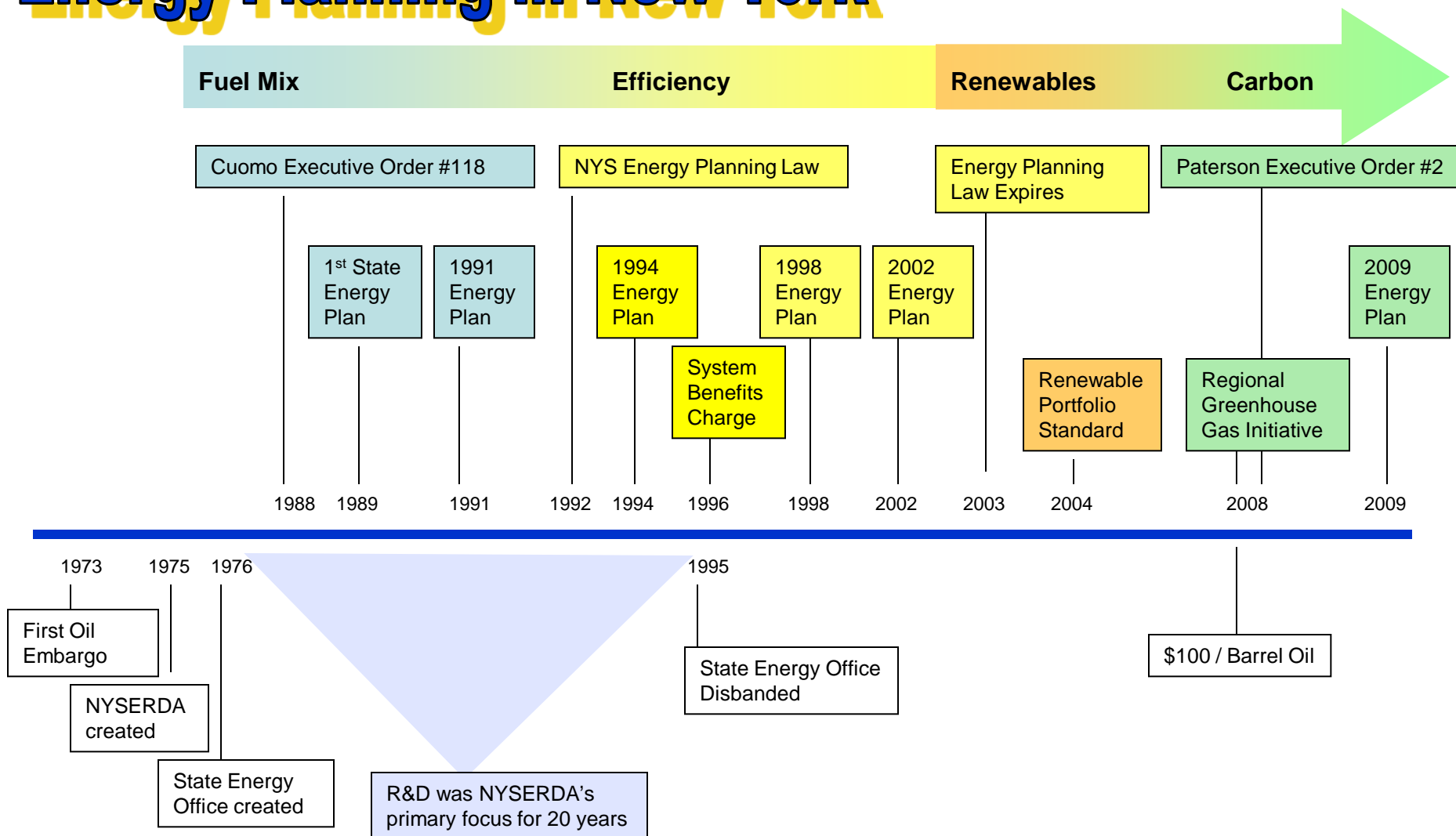
# Planning



# Energy Planning in New York

- **History and Evolution**
- **Policy Considerations**
- **Energy Planning Process**

# Energy Planning in New York

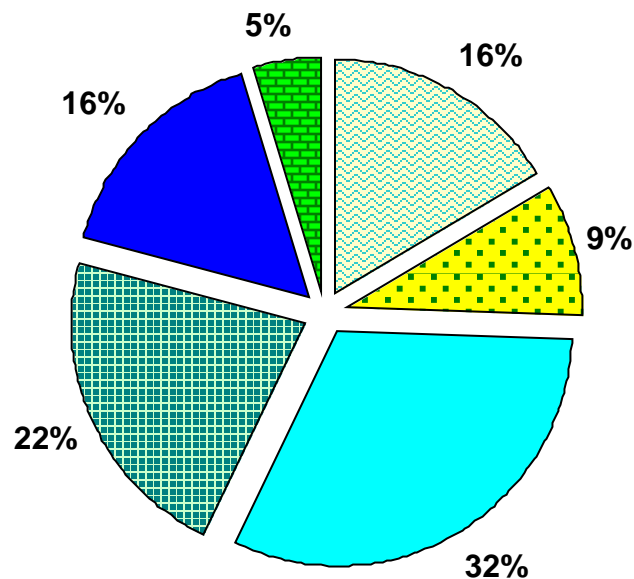


# Success Story – Electricity Generation Fuel Mix

## Primary Consumption for Electric Generation

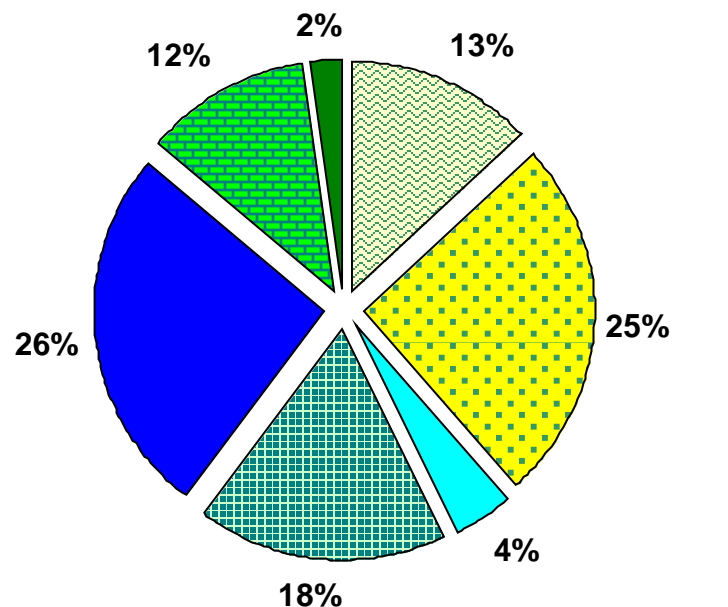
1980

**32% Petroleum**



2006

**4% Petroleum**

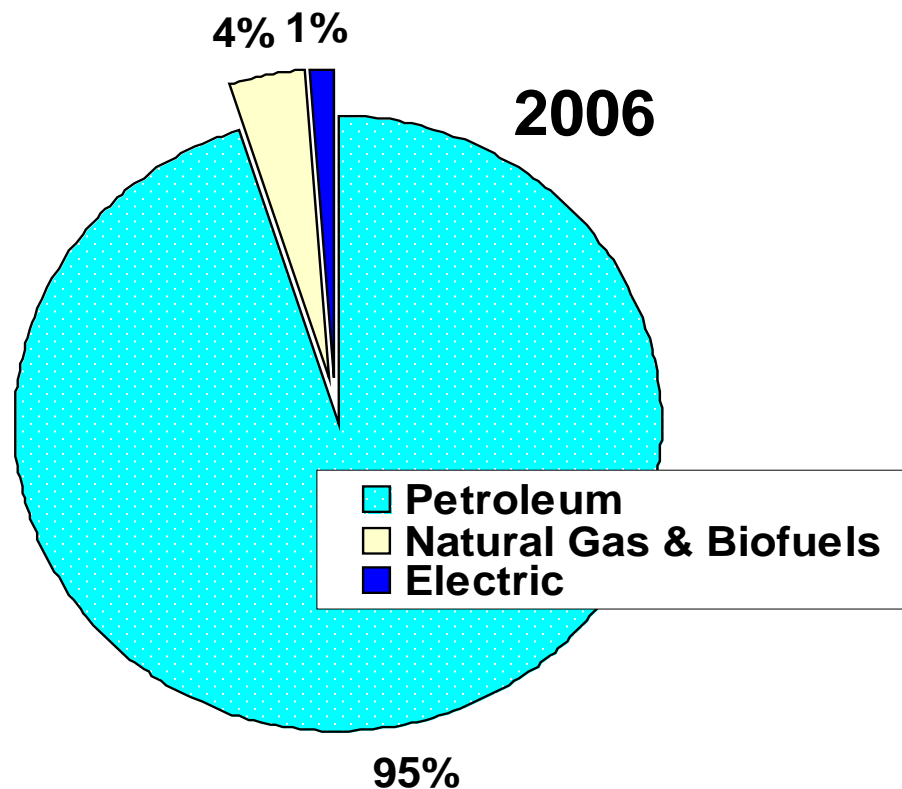


Coal  
 Petroleum  
 Nuclear  
 Natural Gas  
 Hydro  
 Imports

Coal  
 Hydro  
 Other  
 Natural Gas  
 Nuclear  
 Petroleum  
 Imports

# Next Fuel Mix Challenge – Transportation Sector

## Primary Consumption for Transportation

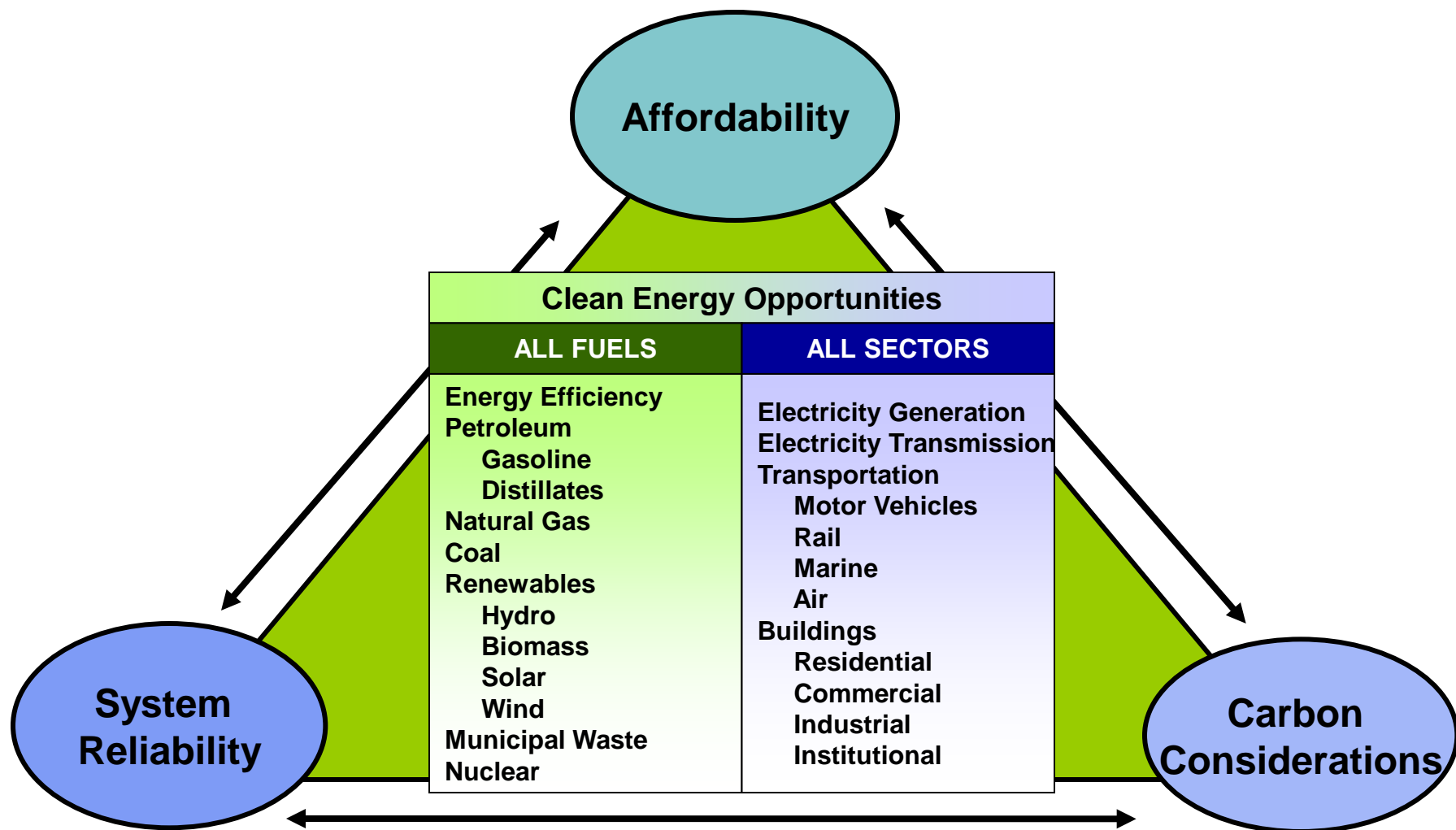


# Energy Planning in New York

- **History and Evolution**
- **Policy Considerations**
- **Energy Planning Process**

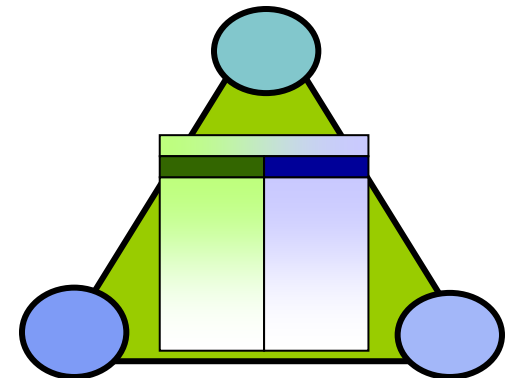


# Policy Issues – Balancing Multiple Objectives



**System  
Reliability**

**Ensuring the reliability of electric,  
natural gas, oil, and  
transportation systems**



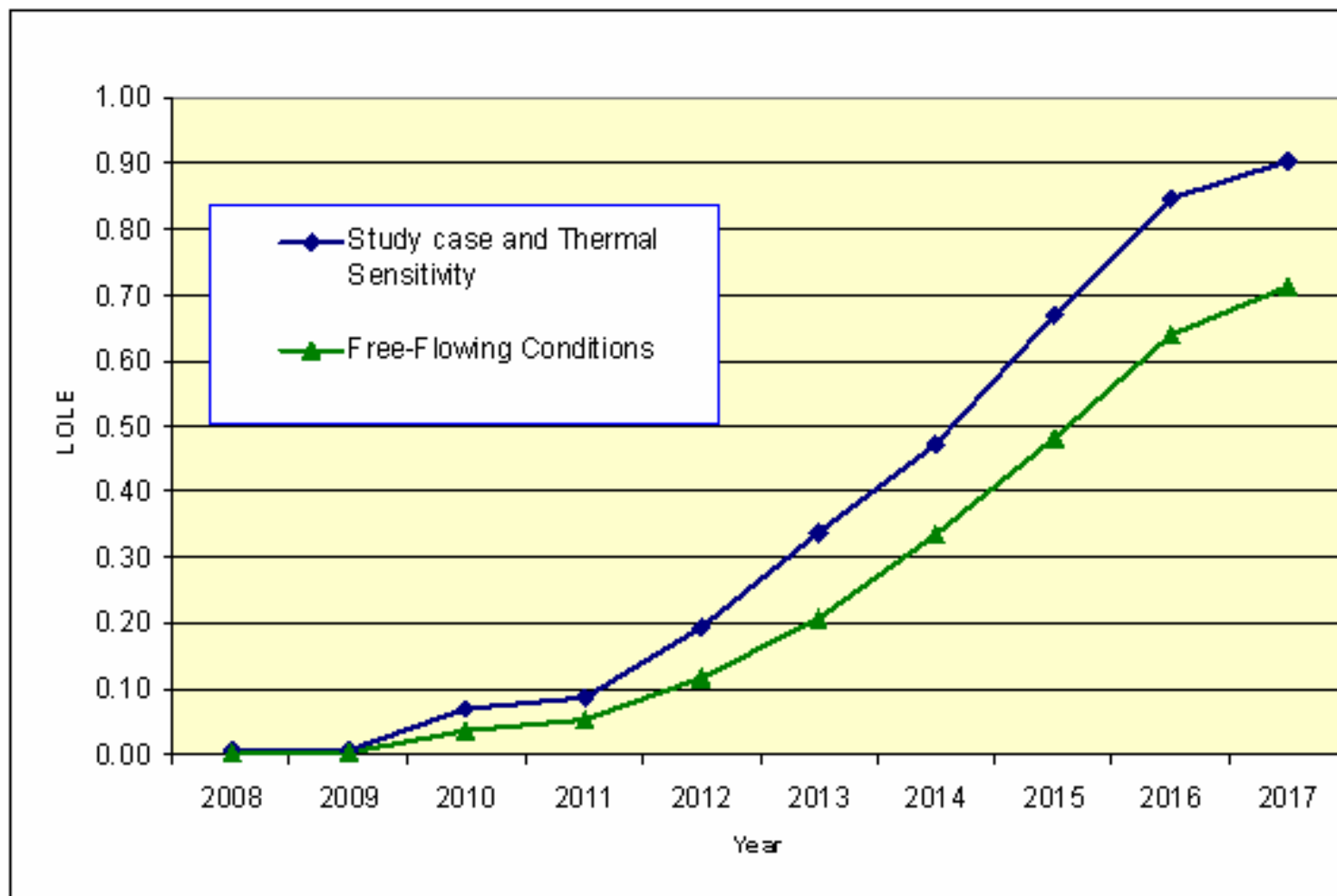
# System Reliability Challenges

- **Need to encourage and support private sector investment in New York**
- **All Fuels – All Sectors**
  - Transmission and Distribution systems:
    - “Wires and Pipes”
  - Supply needs: Natural Gas mining; petroleum storage
  - Electricity Generation
- **Portfolio Approach**
  - Demand-side and Supply-side
- **Advanced Technology Applications**

# Electric Sector

- System Reliability
  - “One Day in Ten Years” Loss of Load Expectation
  - Need for new infrastructure in 2012
  - Operating Standards and Blackout of 2003
- System Expansion
  - “Upstate” Energy Resources – “Downstate” Load Pocket
  - Split Incentives Impair Investment
- System Improvements
  - Aging Infrastructure vs. SmartGrid Technologies
  - Renewable/Intermittent Generation vs. Interconnect and Balance
- Customer Service Quality Standards
  - System Average Interruption Frequency Index (“SAIFI”)
  - Customer Average Interruption Duration Index (“CAIDI”)

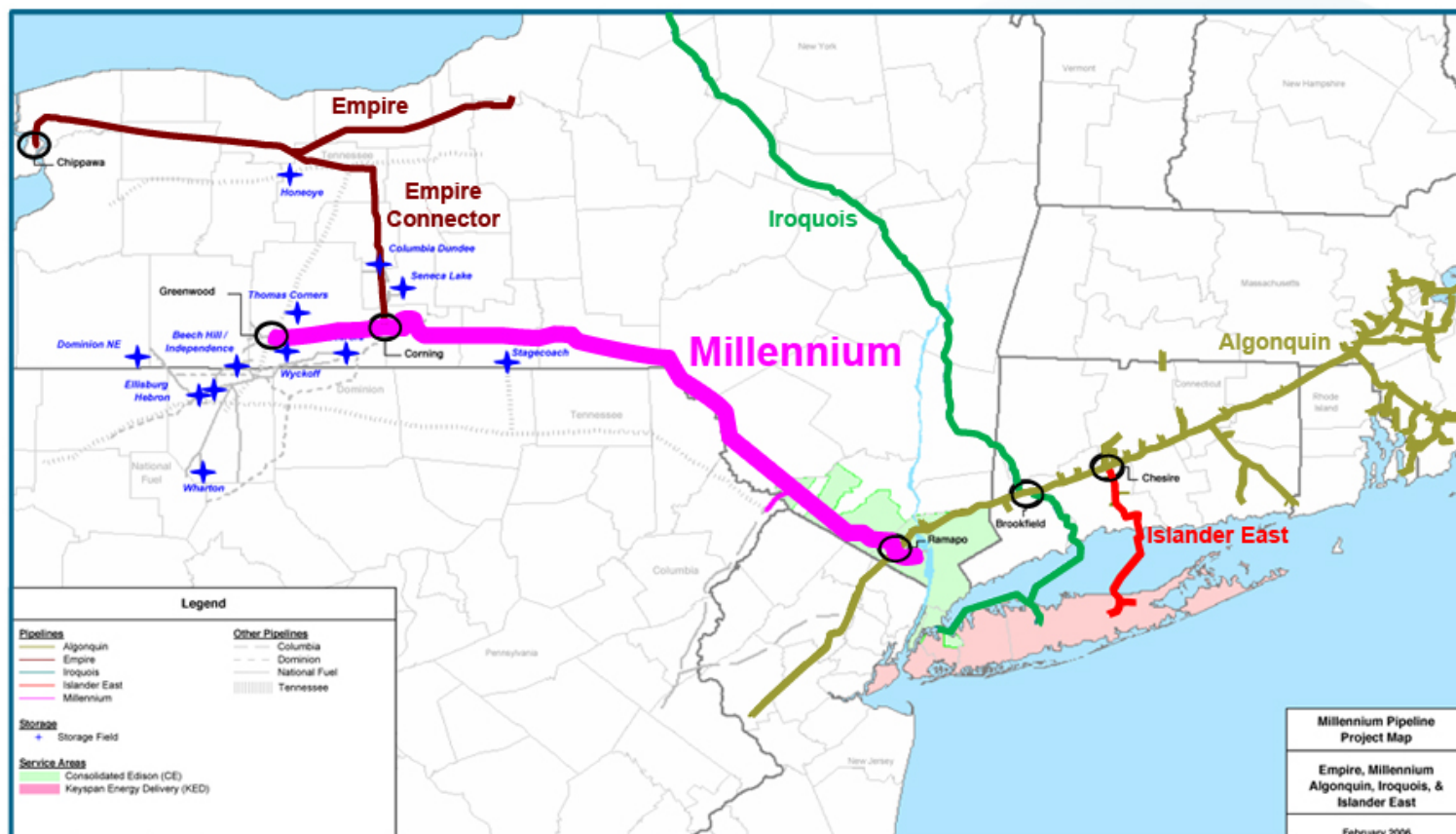
## New York Independent System Operator 2008 Reliability Study (2008 Reliability Needs Assessment)



# Natural Gas Sector

- Rapid demand increase in constrained “downstate” area
  - 21.3% Growth over 5 years
- System Expansion Required
  - Expanded use in Electric Generation
  - Transmission Constraints to Downstate market
- Supply Issues
  - Liquefied Natural Gas
  - Marcellus Shale Deposits in Western and Southern NY

# Natural Gas Pipelines



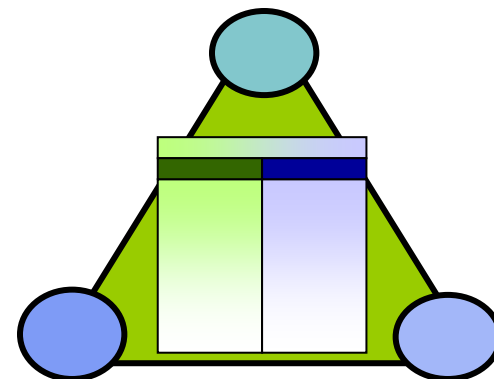
# Petroleum Sector

- Infrastructure Needs
  - Loss of tankage and supply capacity
  - Biofuels equipment needs
- Transportation Sector
  - Overdependence on single fuel
- Buildings Sector
  - Approx. 33% of residences use petroleum for home heating
  - Price volatility affects home budgets and supply chain

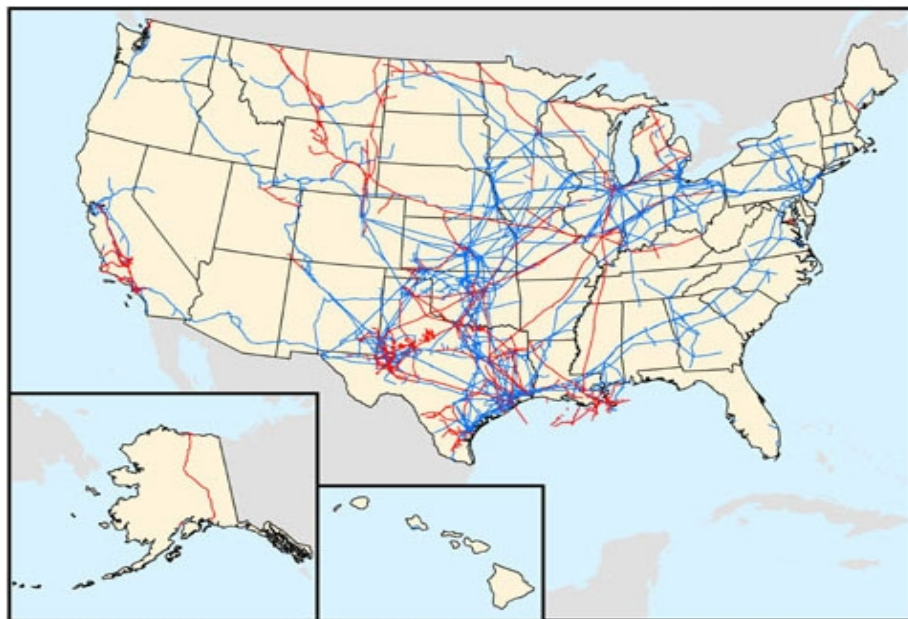


**Affordability**

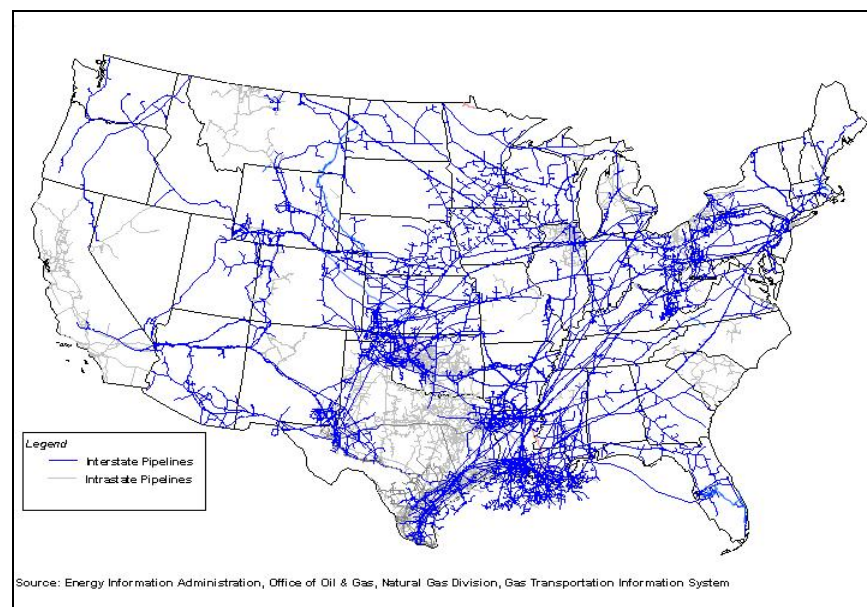
# **Energy affordability and economic competitiveness**



**New York is at the end of the energy product pipeline, making New Yorkers more vulnerable to energy supply disruptions and more likely to experience greater price volatility**

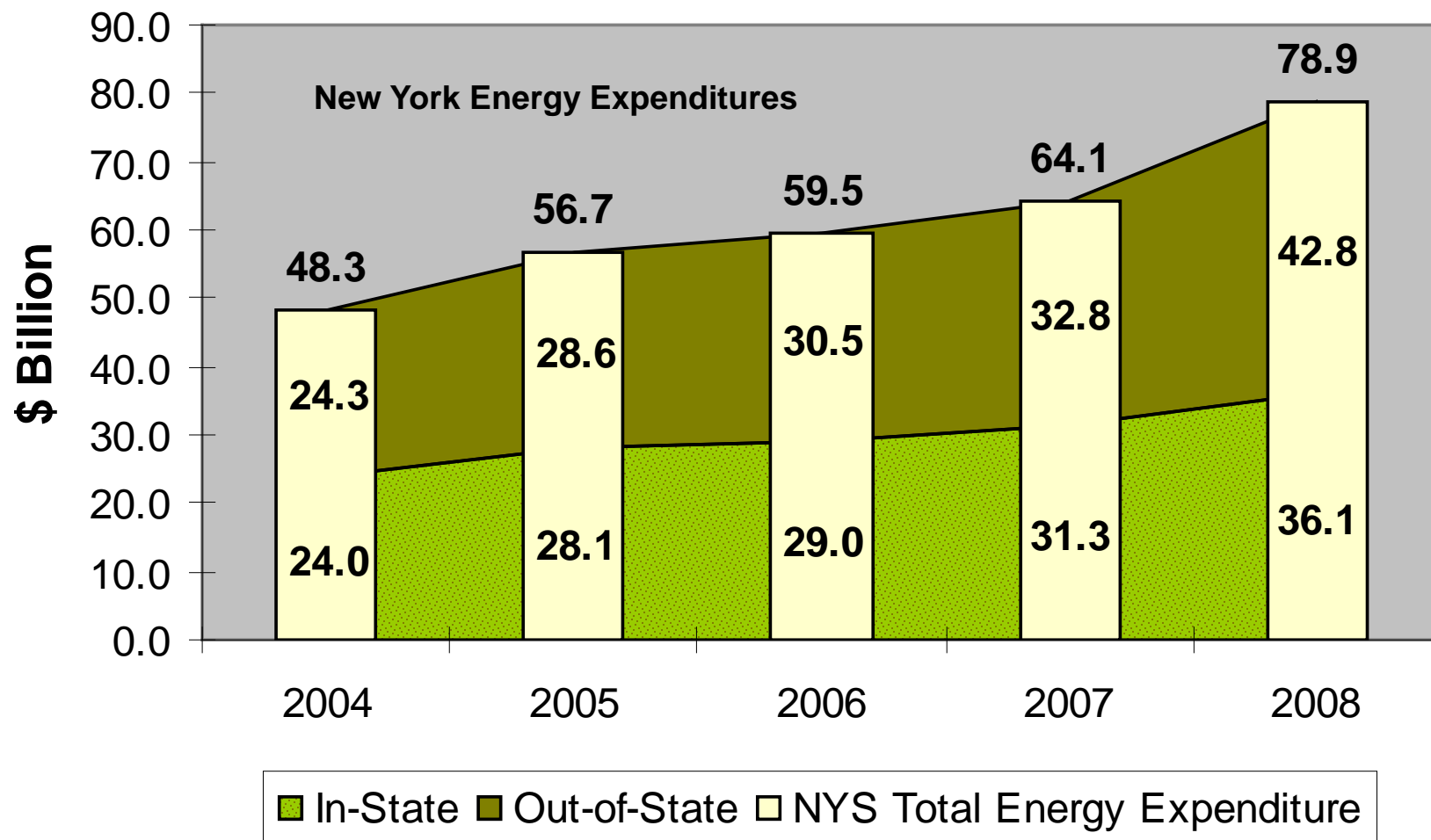


Oil pipeline infrastructure



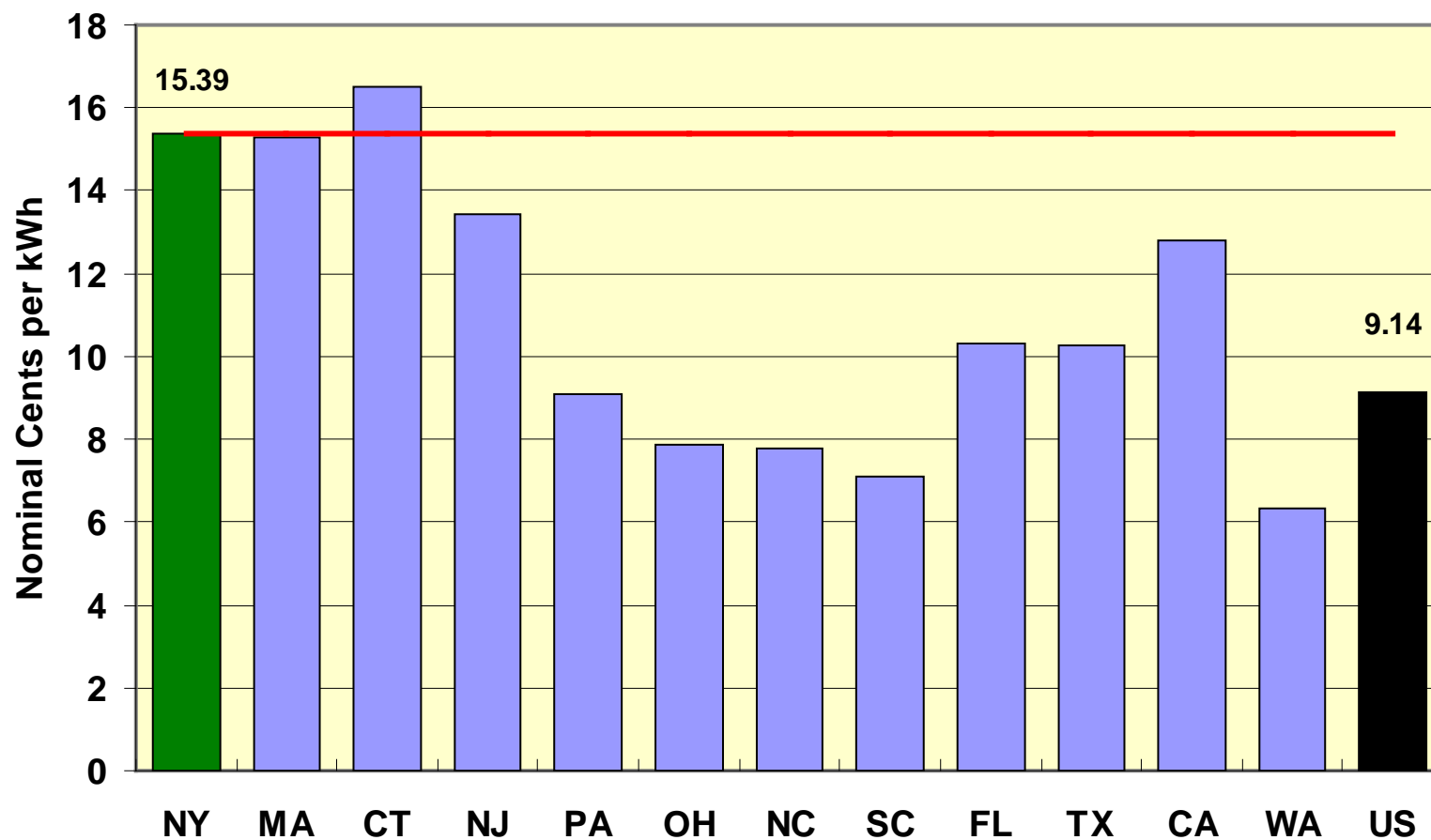
Natural gas pipeline infrastructure

# Estimated NYS Energy Dollar Export



## All-Sector 2007 Retail Electricity Price

*New York Compared to Selected States*

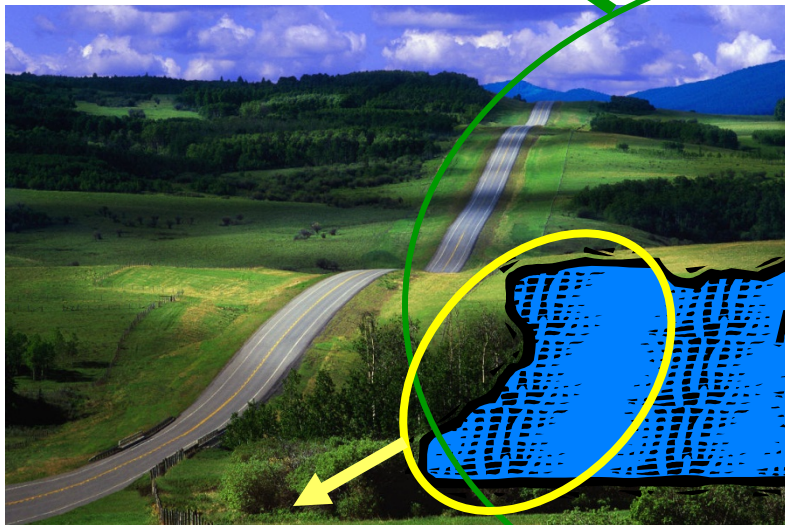


## New York's Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, March 2008

	Average Retail Price of Electricity, March 2008 (Cents per Kilowatthour)		New York Rank Out of 50 States
	New York	U.S.	
<b>Residential</b>	16.9	10.52	4
<b>Commercial</b>	15.01	9.67	4
<b>Industrial</b>	8.67	6.51	14
<b>All Sectors</b>	14.97	9.09	5

Source: Energy Information Administration, Form EIA-826, "Monthly Electric Sales and Revenue Report with State Distributions Report."

153 persons/ sq. mile

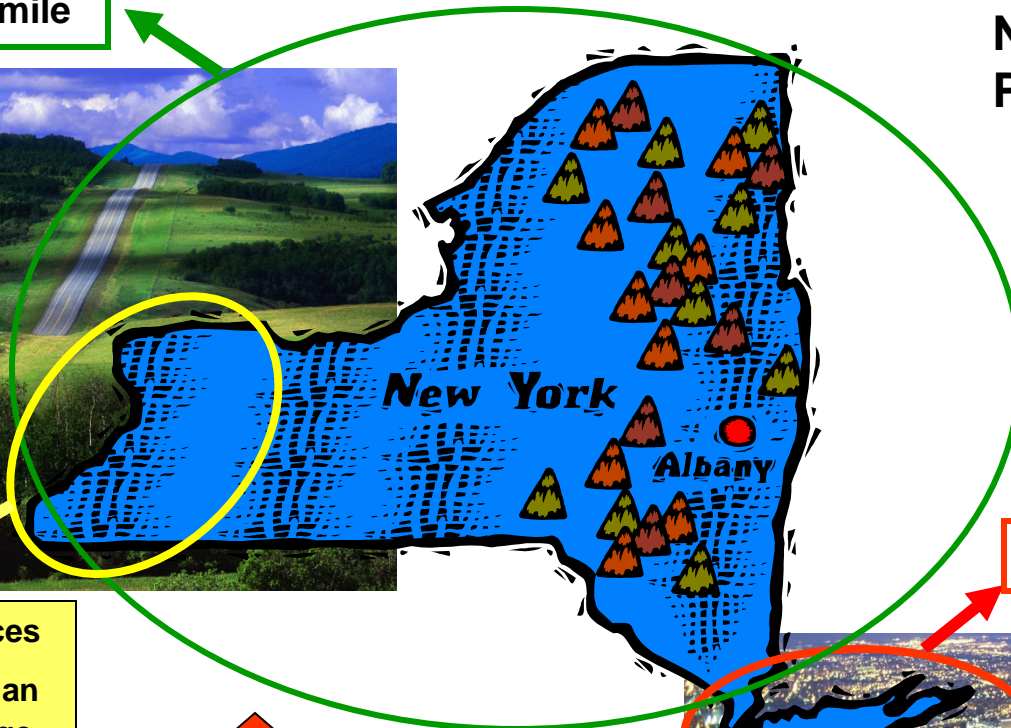


## New York State Population Estimates

Total New York State  
19,297,729

NY City and Suburbs  
12,282,097

8,817 persons/ sq. mile



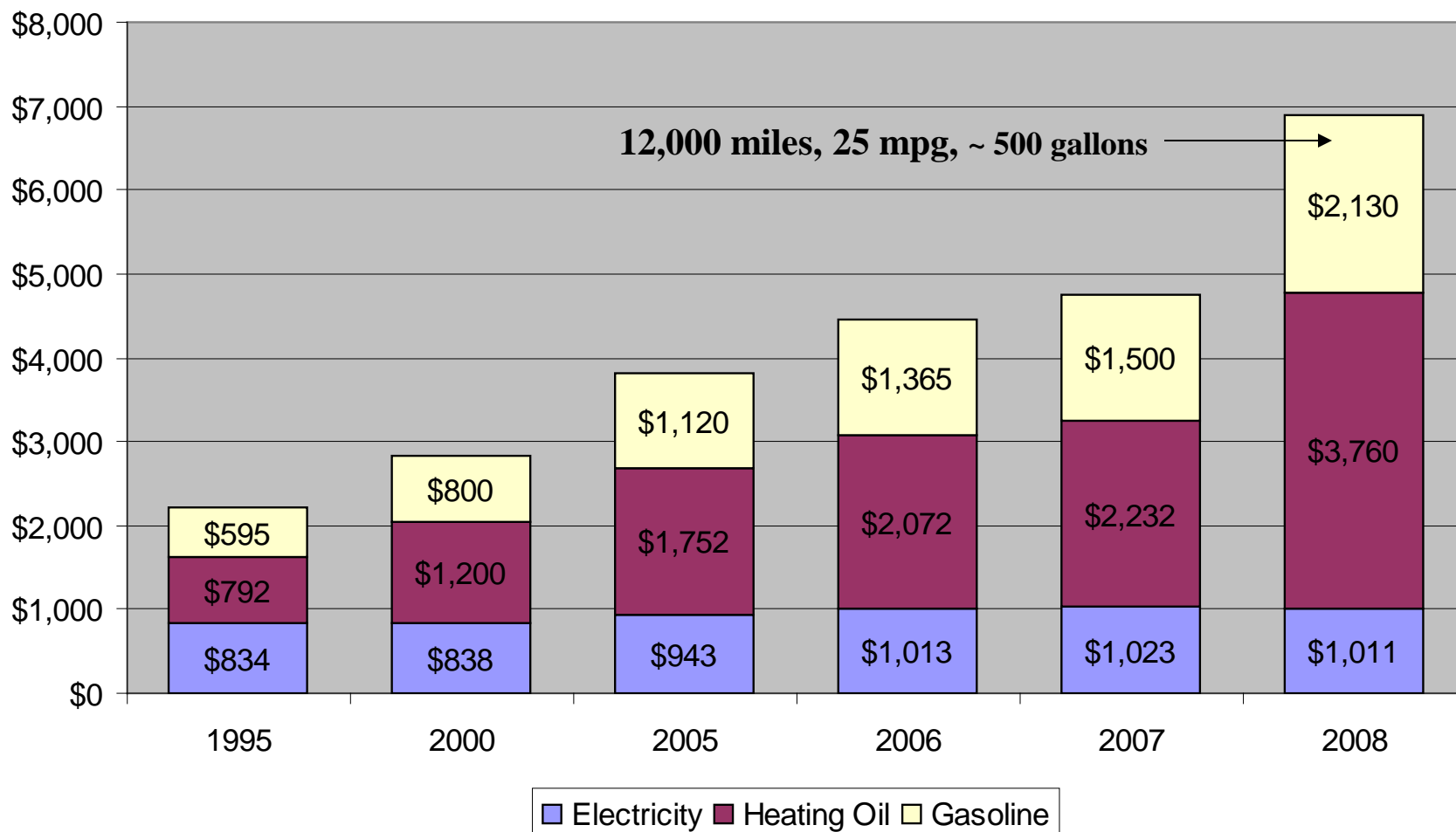
Load Zone A Prices  
**23% lower** than  
Statewide Average

Load Zone K Prices  
**21% higher** than  
Statewide Average



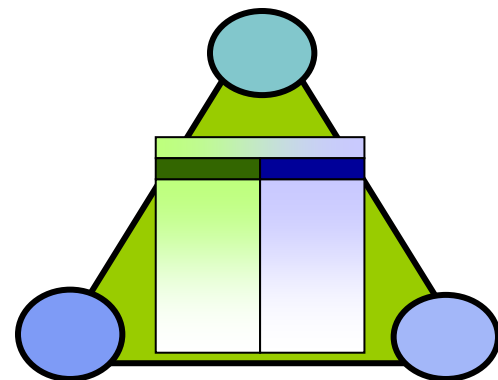


## Household Energy Expenditures



**Carbon  
Considerations**

**Evaluate the opportunities for  
developing strategies towards a  
New York State goal of 80%  
greenhouse gas reductions by  
2050**





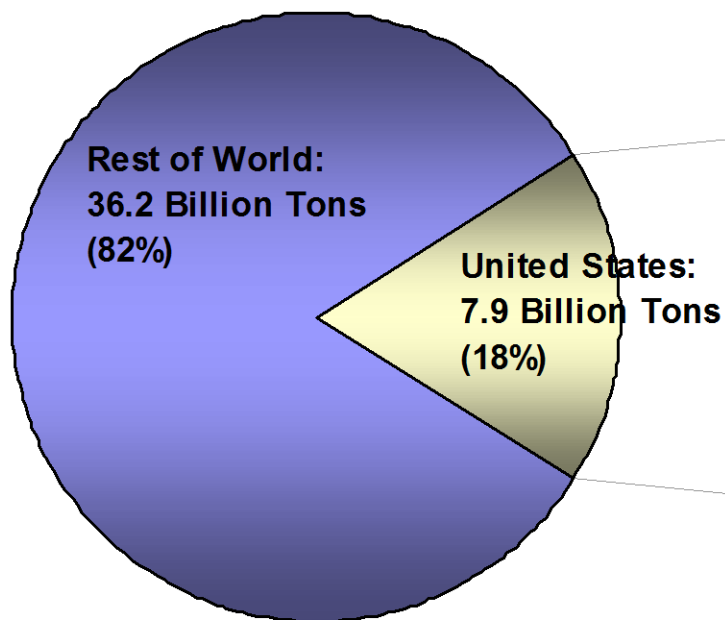


**Perito Moreno Glacier - Argentina**

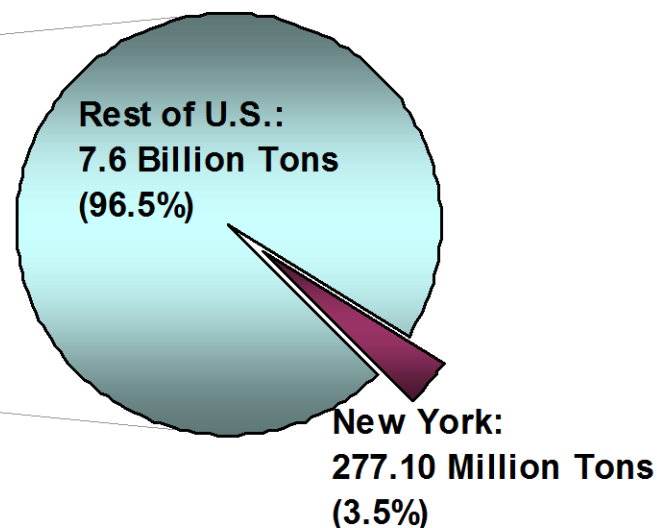
## ***New York's Greenhouse Gas Emissions in a Global and National Context***

(Carbon Dioxide Equivalent Units)

**World Emissions Total:**  
**44.1 Billion Tons**



**U.S. Emissions Total:**  
**7.9 Billion Tons**



Global emissions estimate from the UN Intergovernmental Panel on Climate Change *Report of the Expert Meeting on Emissions Scenarios*, 2005. NY represents 6.5% of the U.S. population. US represents 4.6% of the world population.

# GHG Inventory

- **Greenhouse Gases**  
(‘Kyoto Six’)

- Carbon Dioxide
- Methane
- Nitrous Oxide
- Perfluorocarbons
- Hydrofluorocarbons
- Sulfur Hexafluoride

- **Sector Analysis**

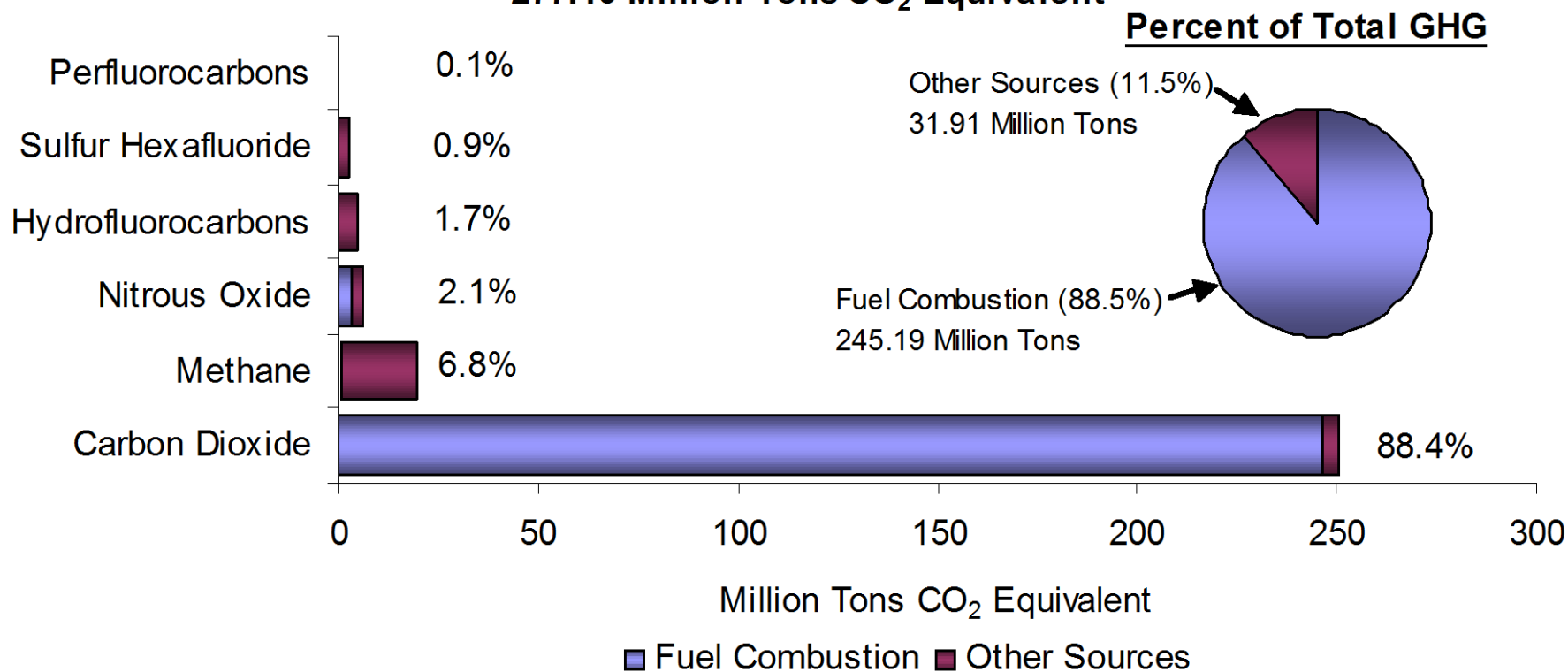
- Transportation
- On-Site
  - Residential
  - Commercial
  - Industrial
- Electricity Generation

- **Sources**

- Fuel Combustion
- Cement Production
- Limestone Use
- Soda Ash Use
- CO2 Use
- Municipal Waste
- Municipal Wastewater
- Semiconductor Mfg.
- Aluminum Mfg.
- Chemical Mfg.
- Iron & Steel Mfg.
- Natural Gas Leakage
- Refrigerant Subs.
- Electricity Distribution
- Agricultural Animals
- Crop Waste Combustion
- Manure Management
- Soil Management

# ***Total Greenhouse Gas Emissions in New York - 2005***

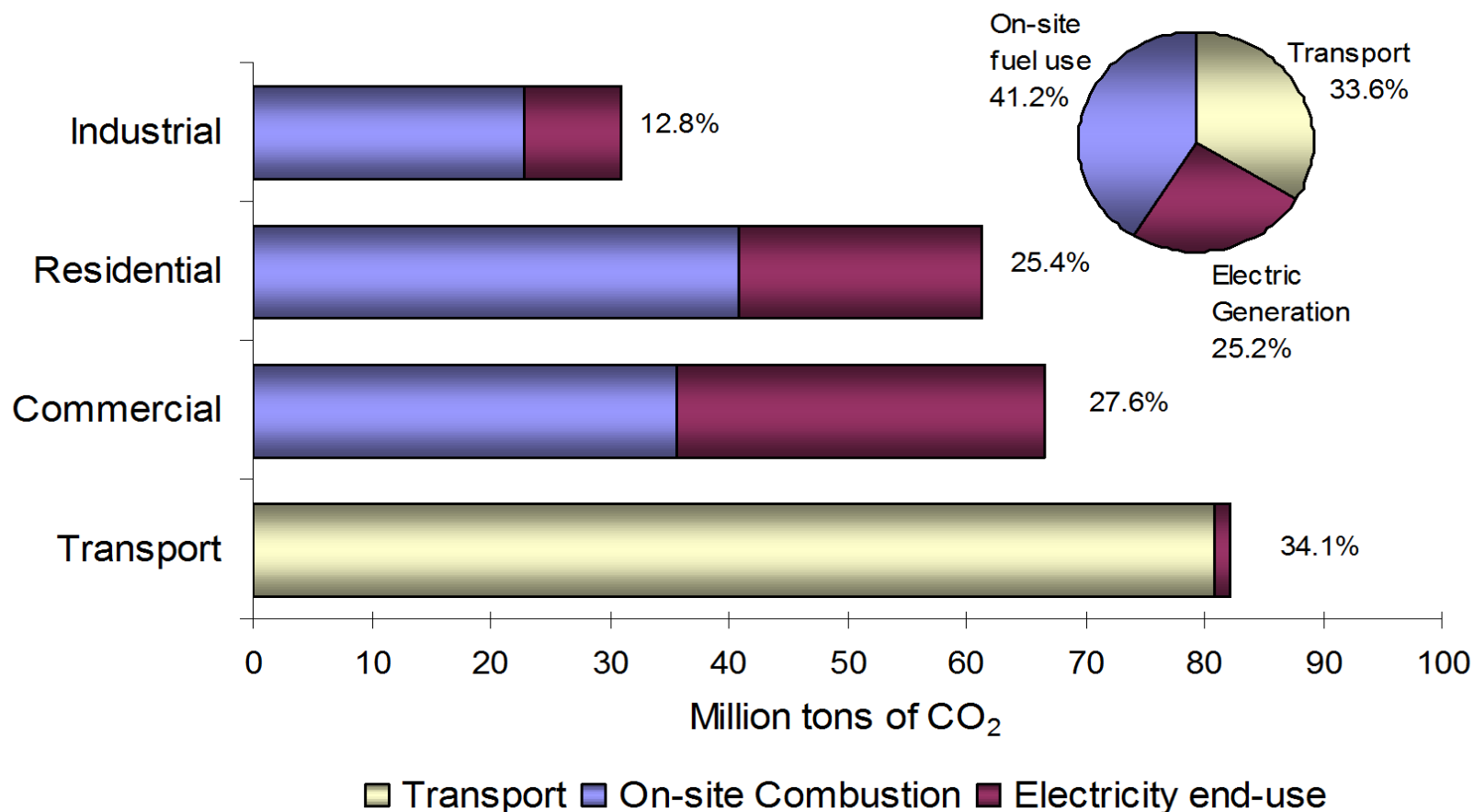
**277.10 Million Tons CO<sub>2</sub> Equivalent**



## CO<sub>2</sub> from Fuel Combustion by End Use Sector - 2005

Total CO<sub>2</sub> from Fuel Combustion: 240.77 Million Tons (87% of Total GHGs)

(Electricity allocated across end-use sectors)



# Energy Planning Must Incorporate Existing Energy Policies

## 15-by-15

**Reduce forecasted energy consumption by 15% by 2015**

- 25,000 Cumulative GWh by 2015
- Expanded System Benefits Charge - \$175 + \$330 million per year

## RGGI

**Regional Greenhouse Gas Initiative**

- Reduce carbon dioxide emissions from power plants by 10% by 2019
- 10 States will auction 100% of allowances

## RPS

**Renewable Portfolio Standard**

- 25% Renewable Energy by 2013
- \$741.3 million through 2008; Estimated \$1.2 billion through 2013

## RETF

**Renewable Energy Task Force**

- 100 MW solar photovoltaic by 2011

## OTHER

**Building Code Updates**  
**Air Emission Regulations**  
**Sulfur Content in Fuels**  
**Etc.**

# Energy Planning in New York

- **History and Evolution**
- **Policy Considerations**
- **Energy Planning Process**

# New York Energy Planning Process



## State Energy Planning Board

- Public Service Commission
- Department of Environmental Conservation
- Department of Transportation
- New York State Energy Research and Development Authority
- Division of Budget
- Department of Health
- Empire State Development Corporation
- Department of State
- Governor's Secretaries for Energy and Environment

## Energy Coordinating Working Group

- Energy Plan Scoping
- Work Products supporting Energy Plan
- Public Outreach



# Executive Order No. 2

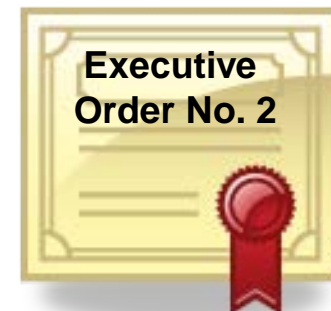
## Specifications for State Energy Plan



- 10-year Planning Horizon
- All Fuels All Sectors Approach
  - Forecasts for supply and demand for electricity, natural gas, coal, and petroleum products
  - Price forecasts
  - Assess energy delivery and transportation systems
- Address Economic and Societal Issues
  - Health Impacts of Energy
  - Economic Development Opportunities
  - Climate Change
- Recommend Legislation, Policy and Programs
- All State Agencies shall give due consideration and be guided by Energy Plan in decision-making

# Executive Order No. 2

## Specifications for State Energy Plan



- **June 30, 2009** – Issuance date for State Energy Plan
- **“Living Energy Plan”** - Energy Planning is designed to continue for 3-years
- **Technical Assessments - 7**  
Generally quantitative in nature, will include market intelligence, data, modeling results, forecasts and projections.
- **Issue Briefs - 9**  
Address cross-cutting issues that affect development, distribution and use of energy; review current and planned policies; will synthesize the issues analyses in assessments and provide basis for policy recommendations.

# Technical Assessments

**Energy Efficiency:** Potential, by sector using latest data on price, state of technology, and programmatic issues.

**Renewable Energy:** Potential for electric generation, thermal, and transportation.

**Electricity Resource:** Will look at current electricity infrastructure; electricity load and price forecasts and model various potential future scenarios.

**Natural Gas:** Assessment of current and forecasted gas demand and prices, and address future supply options.

**Petroleum:** Overview of industry and description of markets; demand and price forecasts.

**Coal:** Demand and price forecast; overview of domestic and New York market; emerging trends in coal use in generation

**End User Energy Prices:** Assessment of price effects on end users; consumer descriptions that highlight regional differences

# Issue Briefs

- Energy Infrastructure Needs
- Siting New Energy Infrastructure
- Energy Costs and Economic Development
- Health Impacts of Energy Use
- Environmental Justice
- Meeting Transportation Needs and Alternative Transportation Options
- Climate Change
- Environmental Impact and Regulation of Energy Systems
- Regional Collaboration

# Public & Stakeholder Outreach

## ECWG Stakeholder Meetings List

- Adirondack Council
- Adirondack Energy Smart Park Coalition
- Alliance for Clean Energy NY
- American Lung Association
- Apollo Alliance
- Association for a Better Long Island
- Association for Energy Affordability
- Association of Towns of NYS
- Babylon, Town of
- Buffalo Niagara Partnership
- Business Council of NYS
- Citizen's Campaign for the Environment
- Clean Energy for Jamestown
- Community Energy Services, Inc.
- Consolidated Edison Company of New York
- Empire State Petroleum Association
- Energy Association of NYS
- Environmental Advocates of New York
- Hauppauge Industrial Association
- Healthy Planet
- IBEW Local 236
- Independent Power Producers of New York
- Innovative Energy Systems
- Jamestown Board of Public Utilities
- Long Island MidSuffolk Business Action
- Long Island Oil Heat Institute
- Multiple Interveners
- National Grid
- Nature Conservancy
- Neighborhood Network
- Network for New Energy Choices
- New York Association of Public Power
- New York Aviation Management Association
- New York Bicycling Coalition
- New York City EDC
- New York Energy Consumers Council
- New York Farm Bureau
- New York ISO
- New York Lawyers for Public Interest
- New York League of Conservation Voters
- New York Motor Truck Association
- New York Propane Gas Association
- New York Public Transit Association
- NYS Association of Counties
- NYS Association of Service Stations & Repair Shops
- NYS Association of Town Highway Superintendents
- NYS Conference of Mayors
- NYS Reliability Council
- NYS Rural Electric Association
- New York Thruway Authority
- Niagara Frontier Transportation Authority
- Northeast Gas Association
- Oneida-Madison Electric Cooperative
- Pace Energy
- Port Authority of NY & NJ
- Preservation League of NYS
- Regional Plan Association
- Renewable Energy of Long Island
- Retail Energy Supply Association
- Riverkeeper
- Rockville Center, Village of
- Scenic Hudson
- Shell Gas & Power
- Sierra Club
- Small Customer Marketer Coalition
- Suffolk County
- SUNY – Stony Brook Advanced Energy Research & Technology Center
- Taylor Biomass Energy
- UPROSE
- Vote Solar Initiative
- Workforce Development Institute

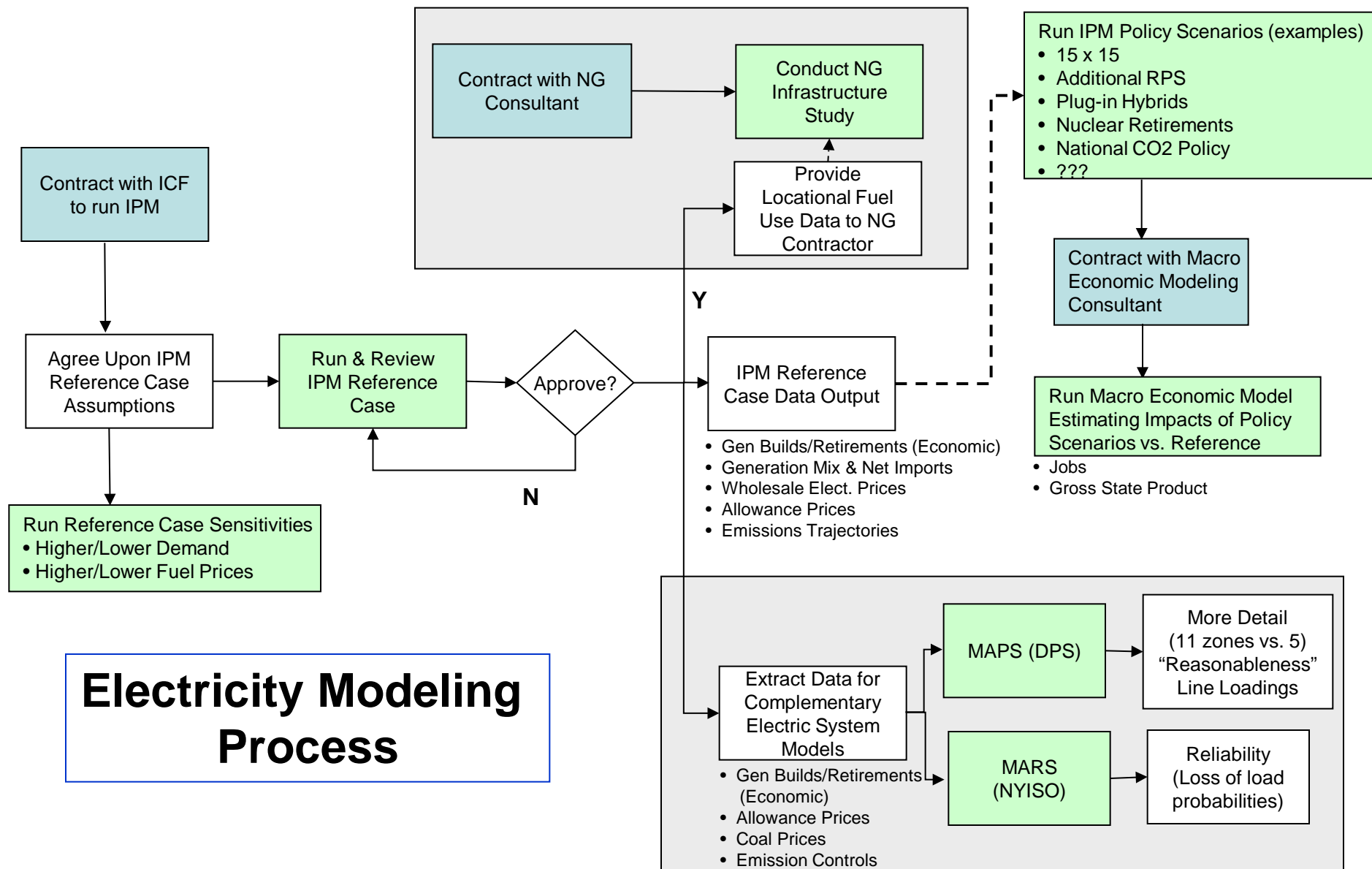
# Public & Stakeholder Outreach

## Parties Submitting Written Comments

- A Page & Associates LLC
- Adirondack Council
- Adirondack Energy Smart Park Coalition
- Air Products and Chemicals, Inc.
- Alliance for Clean Energy NY, Inc.
- American Wind Power & Hydrogen LLC II
- American Wind Power & Hydrogen LLC
- Audubon, New York
- Bay Area Economics
- Business Council of NYS
- Capital District Transportation Authority (CDTA)
- Capital Region Energy Forum
- Central Hudson Gas & Electric Corporation
- Citizens Campaign for the Environment
- Communities Against Regional Interconnect
- Consolidated Edison Company of NY and Orange & Rockland Utilities
- ConsumerPowerline, Inc.
- CPV Valley LLC
- Dave Bencic
- Dormitory Authority of NYS
- Energy Council for Citizens Power Alliance
- Elizabeth Thorndike, Ph.D.
- Empire Advocates
- Energy Association of NYS
- EnerNOC, Inc.
- Environmental Advocates of NY
- Network for New Energy Choices
- Fuel Cell Energy
- Healthy Planet, Inc.
- Horizon Wind Energy LLC
- Independent Power Producers of New York
- Innovative Energy Systems, Inc.
- John Droz, Jr.
- Liberty Power Holdings LLC
- Multiple Intervenors
- National Energy Marketers Association
- National Grid, Tom King
- National Grid, William Flynn
- National Hydrogen Association
- National Wind Watch, Inc.
- Neighborhood Network
- Network for New Energy Choices
- New York Association of Public Power
- New York Aviation Management Association
- New York City Economic Development Corporation
- New York Energy Consumers Council, Inc.
- New York Energy Marketers Coalition
- New York Interfaith Power and Light
- New York Lawyers for the Public Interest
- New York State Apollo Alliance
- New York State Electric & Gas and Rochester Gas & Electric
- New York State Office of Temporary and Disability Assistance
- New York State Reliability Council
- Northeast Gas Association
- Onondaga County Resource Recovery Agency
- Oppenheim & MacGregor
- Pace Law School Energy and Climate Center
- Power for Economic Prosperity
- Riverkeeper Inc.
- Sierra Club
- Small Customer Marketer Coalition
- Solar Alliance and New York Solar Industry Association
- Solar Alliance
- Stamford Village Planning Board
- SUNY College of Technology
- The West Firm
- TransCanada Corporation
- Workforce Development Institute

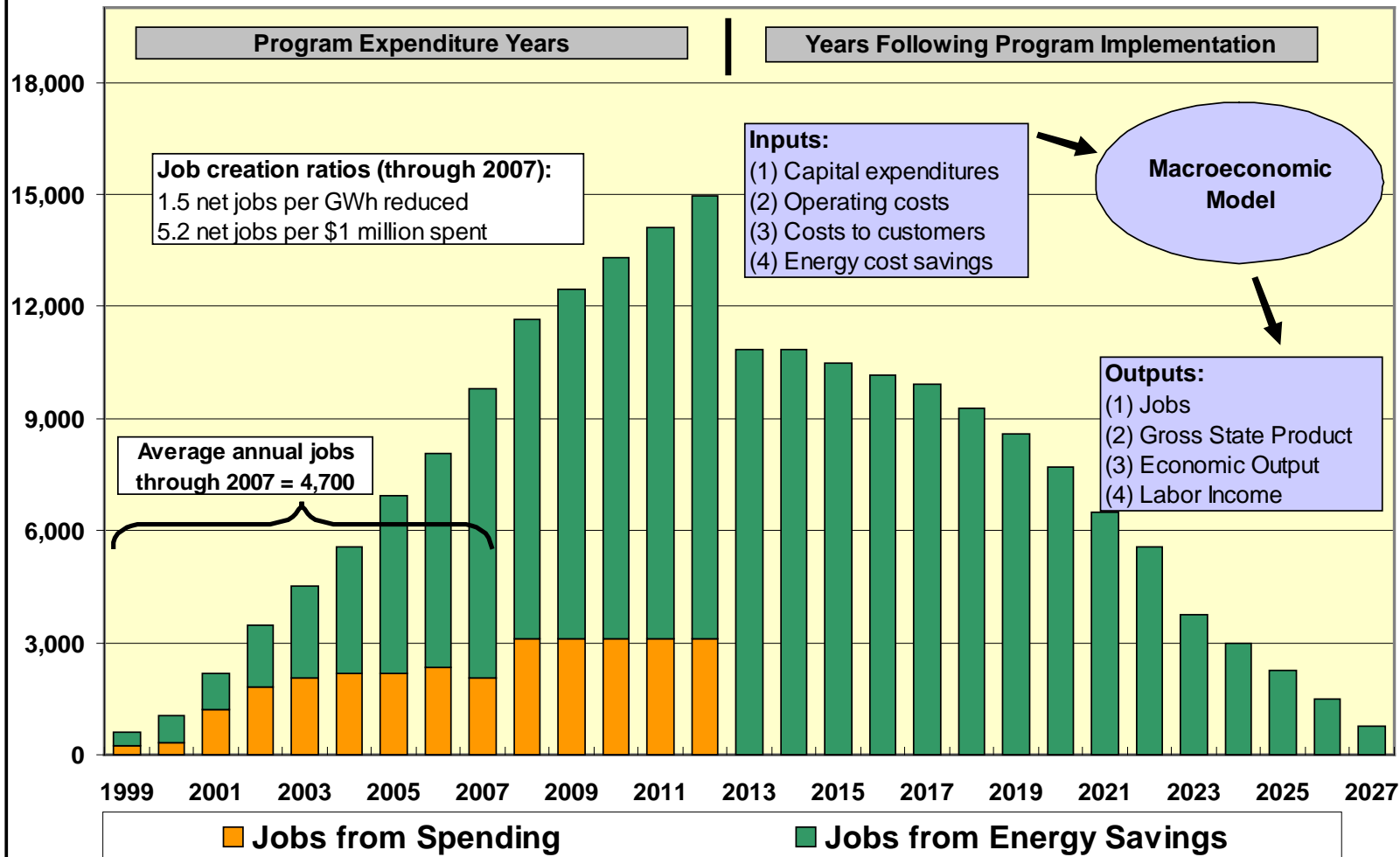
# Energy Modeling....

- **Identifies the physical capacity of the system**
- **Prioritizes market opportunities**
- **Helps optimize energy use mix**
- **Prepares for a carbon constrained economy**
- **Informs decision-makers**
  - **Energy policy**
  - **Environmental policy**
  - **Economic development policy**
  - **Tax policy**





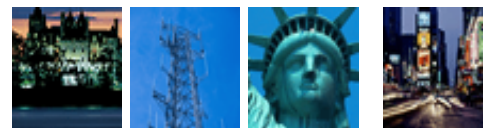
## Macroeconomic Modeling of Energy Efficiency Programs



Note: Energy efficiency measures are assumed to last 15 years.

# Schedule

April 9, 2008	Energy Planning EO
May 6, 2008	Energy Planning Board meets; directs staff to prepare for the energy planning process
May 19, 2008	Framework Working Paper to Board
May 30, 2008	ECWG begins soliciting public comment on scope of Energy Plan via meetings and website comments
July 18, 2008	ECWG public comment solicitation on scope of Energy Plan
August 7, 2008	Planning Board Meeting
December 11, 2008	Planning Board Meeting
March 31, 2009	Draft Plan Released
April/May 2009	Public Hearings on Draft Plan
May 15, 2009	Public Comments on Draft Plan Due
June 30, 2009	Final Energy Plan



David A. Paterson, Governor



[www.nysenergyplan.ny.gov](http://www.nysenergyplan.ny.gov)