Energy Company Initiative

Stony Brook University
Small Business Development Center

Renewable and Clean Energy Technologies

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STONY BROOK
STATE UNIVERSITY OF NEW YORK

NYS Small Business Development Center

NYSERDA

U.S. Small Business Administration
SBA
Your Small Business Resource

NYSERDA's Goals

- **30% by 2015**
  - NYSERDA's goal is for 30% of New York State's energy needs to be generated by clean or renewable means by 2015

- **45% by 2015**
  - Governor Patterson had set an even more ambitious target: 45% by 2015 (including savings from energy efficiency)

Where are we now?

NYS Energy Consumption in 2008 = 4,027 trillion BTUs

Petroleum	37%	(2007 = 40%)
Natural Gas	30%	(2007 = 29%)
Nuclear	11%	(2007 = 11%)
Coal	6%	(2007 = 6%)
Hydro	7%	(2007 = 6%)
Biofuels	3%	(2007 = 3%)
Imported Elec.	6%	(2007 = 5%)

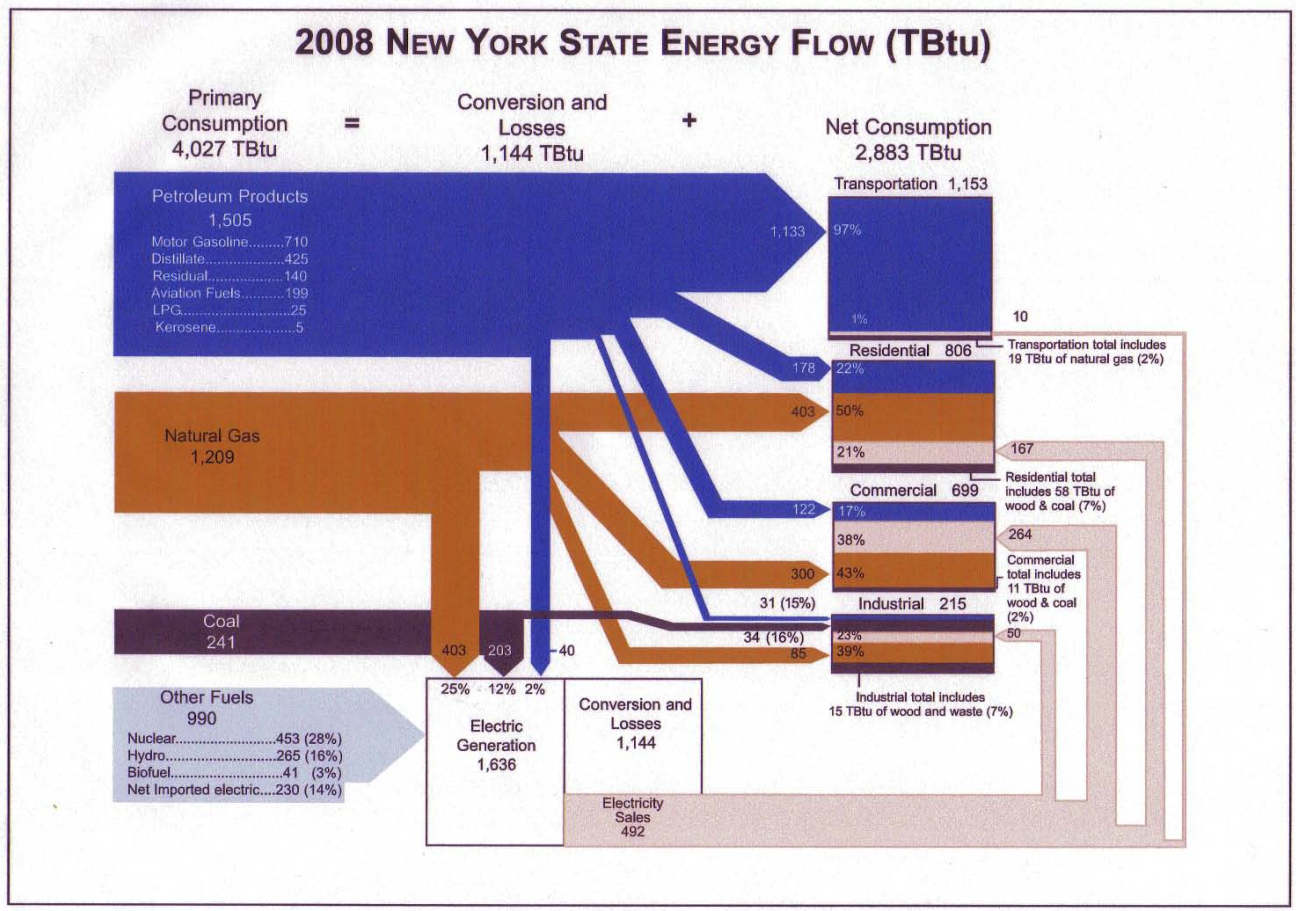
Use of Energy in New York State

- NY is 4th in the US, at 4.1% of the total.
- NY is the 2nd most energy-efficient state.
- NY is the 4th largest renewable energy generator in the US (primarily hydro).
- NY consumes more residential and commercial energy than the US overall.
- NY consumes less energy for industrial and transportation uses than the US overall
- NY relies more heavily on foreign oil for petroleum (91% vs 88% in 2007) than the US overall (68% vs 65% in 2007).

Some Implications…

- Large residential and commercial demand, and low industrial demand = **small-scale systems.**
- Dependency on imported petroleum products makes it especially vulnerable to price spikes = **alternatives are imperative**.
- New York's renewable energy production is currently about 16% of the total. To meet the RPS target of 30% by 2015, renewable energy **= increase by about 2.8% of total primary consumption each year.**

Energy Flow in NYS



What are the current options?

- **<u>Renewable and clean energy technologies include:</u>**
  - Passive Solar
  - Photovoltaics
  - Wind
  - Biofuels (Ethanol, Biodiesel)
  - Geothermal
  - Hydrogen (Fuel Cells)

What are the current options?

- **Greater Energy Efficiency Technologies include:**
  - Combined Heat and Power (CHP)
  - Smart HVAC
  - Smart Lighting

What are the future options?

- Controlled Nuclear Fusion via Magnetic Confinement
- Controlled Nuclear Fusion via Laser Inertial Confinement
- Controlled Nuclear Fusion via Cold Fusion

Solar Passive

- **Advantages**
  - Well established,
  - relatively inexpensive
- **Disadvantages**
  - Limited applicability (hot water on sunny days)
  - Storage an issue

Solar Photovoltaics

- **Advantages**
  - Produces DC electricity directly
  - Utilities are (slowly) embracing net metering
  - Thin-film versions in development phase
- **Disadvantages**
  - Expensive - $40-50K capital cost, 7-10 yr. break even
  - Storage – electricity only generated when sun is shining.
  - Finite life span of solar cells

Wind

- **Advantages:**
  - Cost effective
  - Works day and night, rain or shine
  - Scalable – Residential to Commercial
  - Long life span of equipment
- **Disadvantages:**
  - Very expensive
  - Permiting issues
  - Only works when and where there is wind – optimal steady 35 mph

Biofuels - Ethanol

- **Advantages:**
  - Works in combustion engines up to E85
  - Storable and semi-transportable
  - Very cost effective from cellulose
  - Not so much from sugar
- **Disadvantages:**
  - Using sugar feedstock upsets food chain
  - Good cellulases still in development
  - Only semi-transportable – best if production is local

Biofuels - BioDiesel

- **Current Sources:**
  - Expired cooking oil
  - Turkey guts
  - Soy Beans
- **Future Sources:**
  - **Algae**
  - Manure
  - Sewage

Biofuels - BioDiesel

- **Advantages:**
  - Works in standard diesel engines
  - Storable and transportable
  - Very cost effective from expired cooking oil
  - Cost effective from other sources
- **Disadvantages:**
  - Cooking oil feedstock limited
  - Other sources still in development
  - Carbon neutral at best, polluting at worst
  - Other than algae, other sources are gross

Geothermal

- **Advantages:**
  - Very cost effective
  - Long life span of equipment
  - Works day or night, heat or AC, all seasons
  - Scalable to residential or commercial
- **Disadvantages:**
  - Expensive, especially installation
  - Space needed, albeit underground
  - Permitting

Hydrogen (storable electricity)

- **Advantages:**
  - Semi-transportable : fix position or transportation
  - Produces electricity and is storable
  - Feedstock is water or methanol
- **Disadvantages:**
  - Storable but storage is heavy, bulky
  - Proton Exchange Membranes are expensive and have limited shelf life

Nuclear Fusion

- **Sources of feedstock:**
  - Tritium from Lithium (mined: known reserves = 1000 yrs)
  - Deuterium (seawater : 1 gallon = 30 gallons of gasoline)
  - Helium -3 (mined on the moon: very large amounts present)

Nuclear Fusion

- **Advantages:**
  - Virtually unlimited feedstock
  - Zero pollution
  - Zero carbon footprint
- **Disadvantages:**
  - Very early in development – no prototype
  - Confinement is energy intensive
  - Large capital expenses to start-up

Future Workshops

- Five additional workshops planned over the next 5 months – all are invited.
- Make sure we have your email address

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