Preliminary Findings from the New York Energy Efficiency and Renewable Resources Potential Study

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Consultant Team

- Optimal Energy Inc. (OEI)
- Vermont Energy Investment Corp. (VEIC)
- American Council for an Energy-Efficient Economy (ACEEE)
Project Scope

- Assessment of long-term, 20-year potentials for:
  - End-use energy efficiency (EE)
    - Electricity, natural gas, and petroleum fuels
    - Residential, Commercial/Institutional, Industrial
    - Economic and Achievable Potential scenarios
  - Renewable energy (RE) resources
    - Grid-level electric generation
    - Customer-sited production of electric and thermal energy
    - Bounded Technical and Economic Potential scenarios
    - Assessment of Development Paths
  - Greenhouse gas and other air pollutant emission reductions associated with EE/RE
Conceptual Framework for Potential Study
General Methodology: Analysis by Zone

Zones
- Long Island
- New York City
- Hudson Valley
- Rest-of-State

Differentiated by
- Climate
- Avoided cost of energy supply
- Fuel use / availability
- Cost of EE/RE measures
EE Methodology Overview

- Disaggregate the baseline energy sales forecasts
- Characterize the efficiency measures
- Screen measures for cost-effectiveness
- Estimate economic potential (apply measure penetrations)
- Estimate achievable potential
Achievable Potential Savings vs. Forecast, by Fuel

Percentages on the right are savings as a % of forecast in 2030

History vs. Forecast

- Electric Potential: 18%
- Natural Gas Potential: 11%
- Petroleum Fuels Potential: 19%

GWh vs. TBtu
Electric Efficiency Potential vs. Forecast
Electric Achievable Potential by Sector

- Residential
- Commercial
- Industrial
- Achievable Potential
Natural Gas Potential vs. Forecast

- History
- Forecast

- Statewide Forecast
- EEPS
- Achievable Potential
- Economic Potential

Graph showing the comparison between natural gas potential and forecast over the years from 1990 to 2032.
Natural Gas Achievable Potential by Sector
Petroleum Fuels Potential vs. Forecast
Petroleum Fuels Achievable Potential by Sector

- Residential
- Commercial
- Industrial
- EE Potential

History vs. Forecast

TBtu

RE Methodology: Bounded Technical Potential

Constraints:
- Land use, sustainability,
- Delivery and manufacturing infrastructure, siting process
- and factors, grid integration.

Conversion Technologies:
- Efficiency, scale, operations
- And maintenance, availability.

Resource:
- Solar
- Wind
- Biomass
- Water

Bounded Technical Potential
RE Methodology: Economic Potential

- Phase in of Economic RE Potential
  - Resources included incrementally as they become cost effective
RE Technology Types

- **Biomass**
  - Biomass Co-firing
  - Biomass Direct-fired plants
  - Commercial-Scale CHP/District Heat
  - Landfill Gas
  - Anaerobic Digesters
  - Res stove, boilers, furnace
  - Com stove, boilers, furnace
  - Biodiesel B5 Fuel Oil Blend

- **Hydro**
  - Run of River
  - New Dams – Undeveloped Sites
  - Repower/Upgrade Existing Dams
  - Tidal Energy
  - Wave Energy

- **Solar PV**
  - Residential PV
  - Small Commercial PV
  - Large Commercial PV
  - Grid Supply – MW Scale PV

- **Solar Thermal**
  - Residential
  - Commercial

- **Wind**
  - Residential
  - Commercial – customer sited
  - Cluster
  - Onshore Wind Farm
  - Offshore Wind Farm
Renewable Energy Bounded Technical Potential Summary Results

2010 Mix of Primary Energy
- Non-Renewable Sources, 91%
- Renewable Sources, 9%
  - Hydro, 6%
  - Bioenergy, 2%
  - Wind, 1%
  - Solar, <0.1%

2030 BTP
- Non-Renewable Sources, 59%
- Renewable Sources, 41%
  - Hydro, 9%
  - Bioenergy, 6%
  - Wind, 11%
  - Solar, 15%

2010 Total Renewable Energy is 348 TBtu
2030 Total Renewable Energy is 1,636 TBtu
Bioenergy Thermal and Electric Results

**Thermal Applications**
- Commercial Blended Fuel Oil (B5 blend)
- Residential Blended Fuel Oil (B5 blend)
- Commercial CHP
- Residential Direct Combustion (pellet, wood chip, and cord wood)

**Electric Applications**
- Direct Fire Biomass
- Landfill Gas
- Commercial CHP
- Farm waste, food waste, and wastewater digesters

Cumulative Annual TBTu
Cumulative Annual GWh
Hydro Results

Cumulative Annual GWh

- **Existing Hydrokinetic Tidal**
- **Repowering and Upgrading**
- **New Production at Non-powered Dams**
- **New Hydrokinetic Tidal**
- **New Production at New Dams**
- **New Run of the River sites**
- **Existing Conventional Hydro**

**Bounded Technical Potential**

- **2020**
- **2030**
PV Results

Cumulative Annual GWh

2020

2030

Existing PV
Residential
Utility
Small Commercial
Large Commercial

Bounded Technical Potential
Solar Thermal Results

Thermal Applications

Electric Applications
Wind Results

![Wind Results Chart]

- **Cumulative Annual GWh**
- **Bounded Technical Potential**
- **Residential**
- **Commercial**
- **Cluster**
- **Existing**
- **Utility (Onshore)**
- **Utility (Offshore)**

2020:
- Residential: 5000
- Commercial: 7000
- Cluster: 2000
- Existing: 1000
- Total: 15000

2030:
- Residential: 30000
- Commercial: 40000
- Cluster: 15000
- Existing: 10000
- Utility (Offshore): 30000
- Total: 115000

2040:
- Residential: 40000
- Commercial: 50000
- Cluster: 20000
- Existing: 15000
- Utility (Offshore): 40000
- Total: 135000
Summary

- EE Achievable potential by 2030:
  - 18% of electric sales, 11% of natural gas, 19% of petroleum fuels

- RE Bounded Tech Potential: 41% of energy needs by 2030
  - 9% Hydro, 6% Bioenergy, 11% Wind, 15% Solar