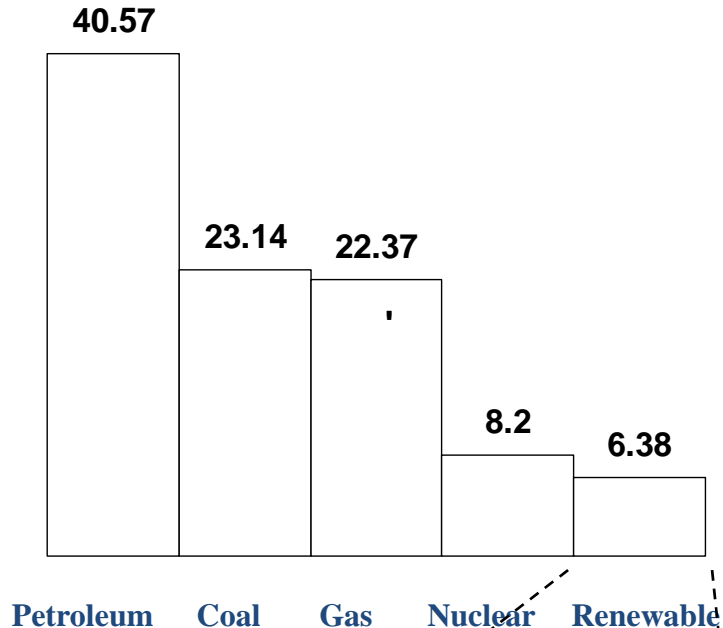
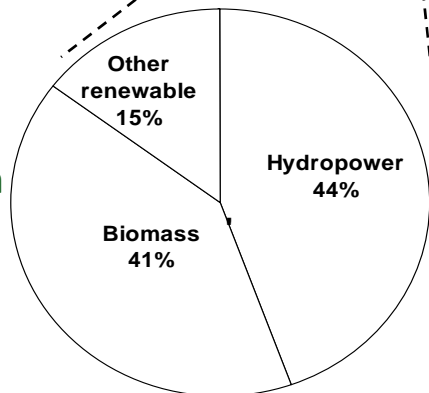


Thermal Energy about one-third of total energy consumption in U.S.

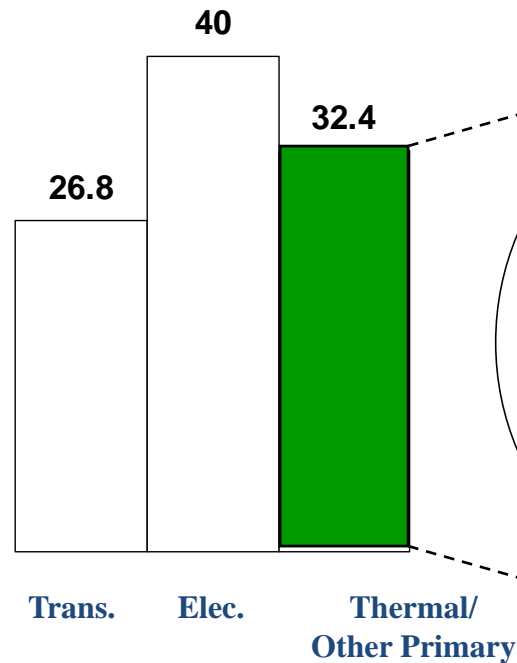
By Fuel Type



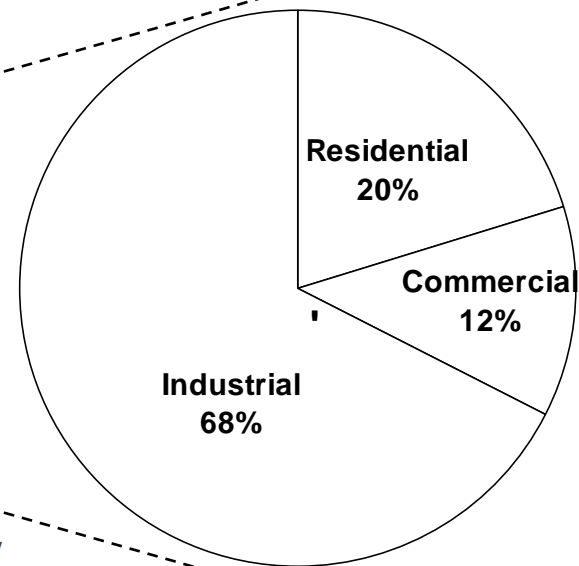
Renewable Energy Consumption



By Use



Thermal/Other Primary By Segment



Source: Energy Information Administration

What is Biomass Thermal?

Conversion of biomass into heat energy for:

- a) Space heating (and cooling through absorption chilling)
- b) Industrial process heat
- c) Combined heat & power, e.g. “heat-led cogeneration”

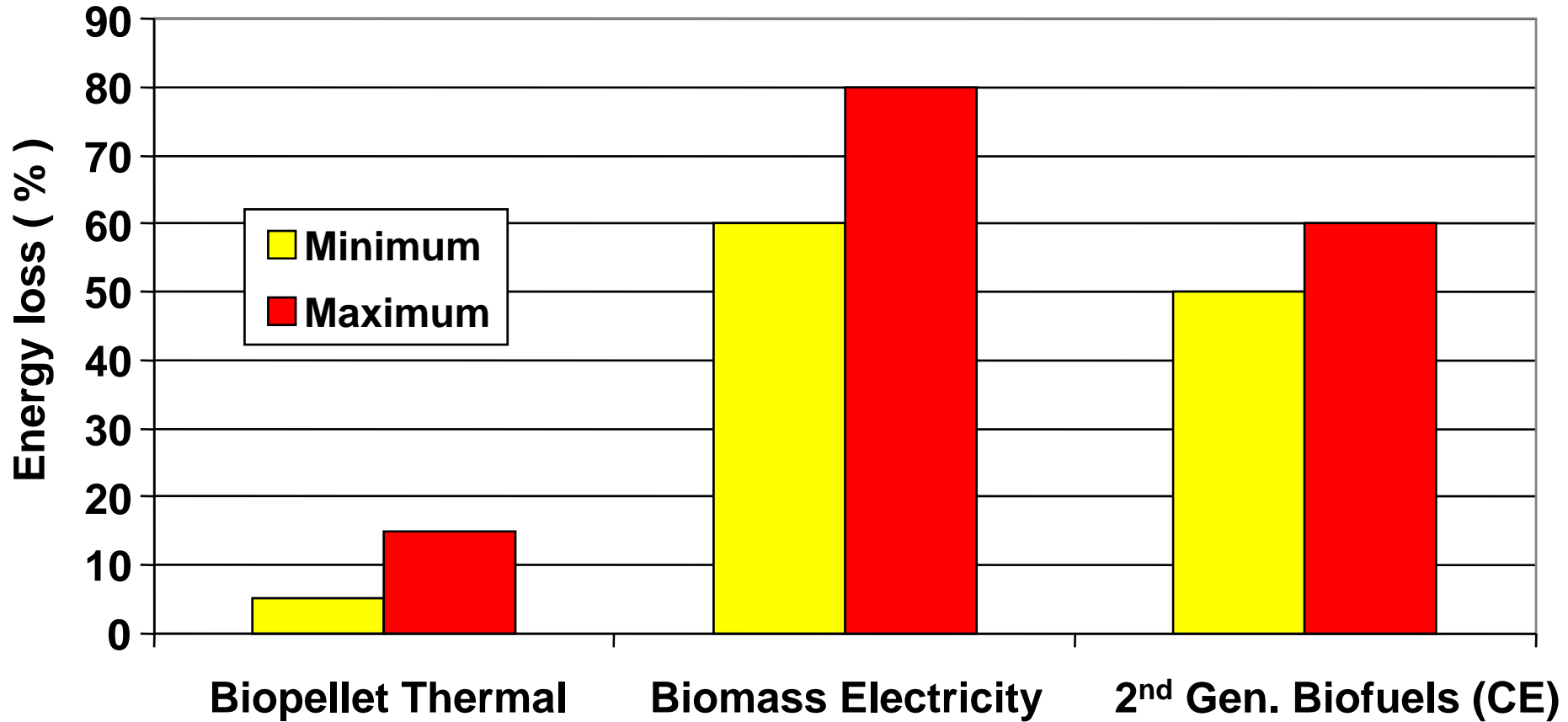
Woody Biomass Fuels Used for Thermal Energy

- Wood – chunk, chips, pellets, residues
- Agro-forestry – e.g. hybrid poplar, willow, other woody biomass “crops”
- “Urban wastewood” – e.g. ground pallets, clean separated C&D, landscaping waste, powerline and road ROW maintenance etc.

Public Policy Basis for RE Subsidies

- Conserve energy through increased **efficiency**
- Reduce reliance on foreign fossil energy; enhance **national & regional energy security**
- Reduce **air emissions** (e.g. PM, SO₂, Hg)
- Reduce **greenhouse gas emissions**
- Local sustainable **economic development**

EFFICIENCY: Energy loss of different conversion technologies



Source: ProPellets Austria,
www.propellets.at

Displaces Electric vs Displaces Thermal



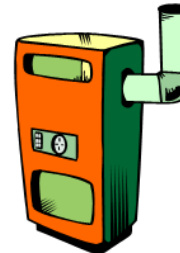
One Ton of Wood Chips
2,400 kwh

Biomass Power Plant
1,700 kwh LOSS

Power Transmission
100 kwh LOSS

Net Energy
600 kwh Electric

Displaces
32 gal oil for
electricity
generation



One Ton of Wood Chips
2,400 kwh

Wood Pellet Plant
375 kwh LOSS

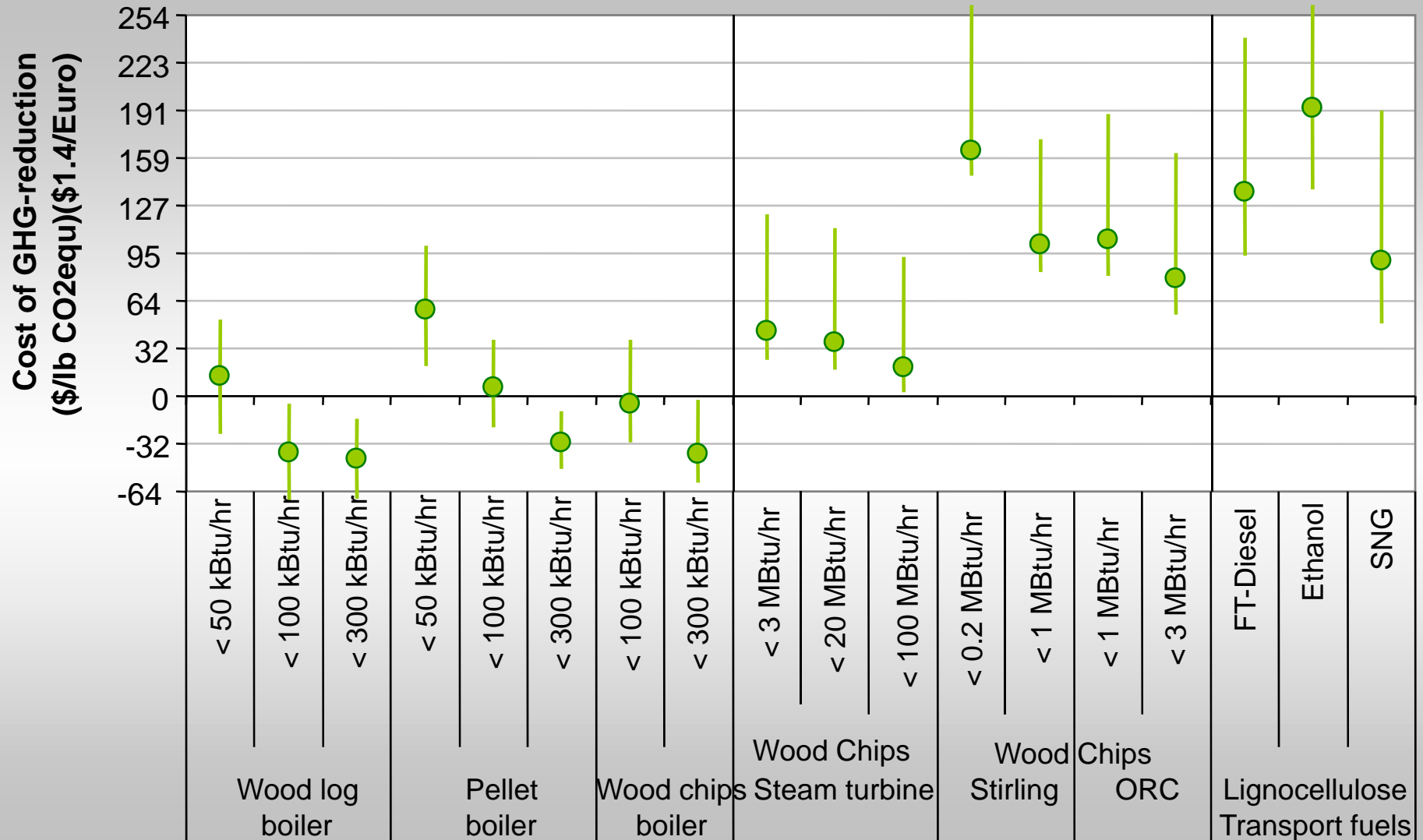
Transportation
50 kwh LOSS

Pellet Boiler
225 kwh LOSS

Net Available Energy
1,750 kwh Thermal

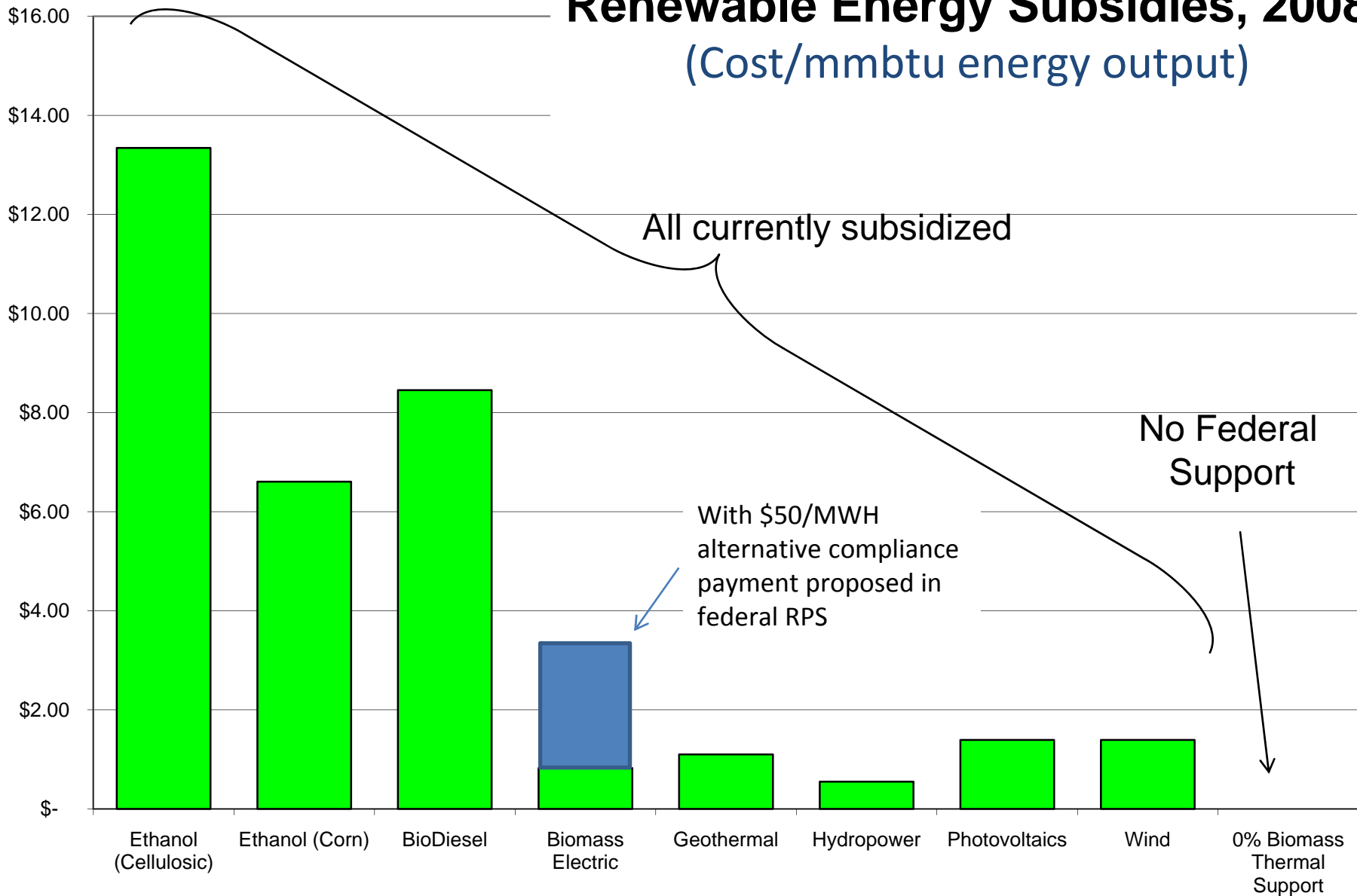
Displaces
54 gal oil for
heating

Costs of GHG-reduction (Modified for English Units)



Comparative Analysis of Federal Renewable Energy Subsidies, 2008

(Cost/mmbtu energy output)



Leveling the Playing Field: Policy Recommendations for Biomass Thermal

- Production tax credit for thermal renewable technologies (recommended by 25 x'25)
- Investment tax credit
- Construction loan guarantees
- Demand side grants/credits/rebates for installation of high efficiency heating technology – e.g. Community Wood Energy Program
- Infrastructure grants – e.g. bulk fuel distribution
- R&D – e.g. USDA FPL, NREL
- Wood stove “changeout” programs

Leveling the Playing Field: Policy Recommendations for Biomass Thermal

- Dedication of alternative compliance revenues from federal RPS (ex/NH and state RPS)
- Dedication of carbon allowance auction revenues from carbon cap&trade program (ex/NH and RGGI fund)
- Qualification of biomass thermal projects for carbon offset credits under carbon cap&trade