Woody Biomass in the Northeast

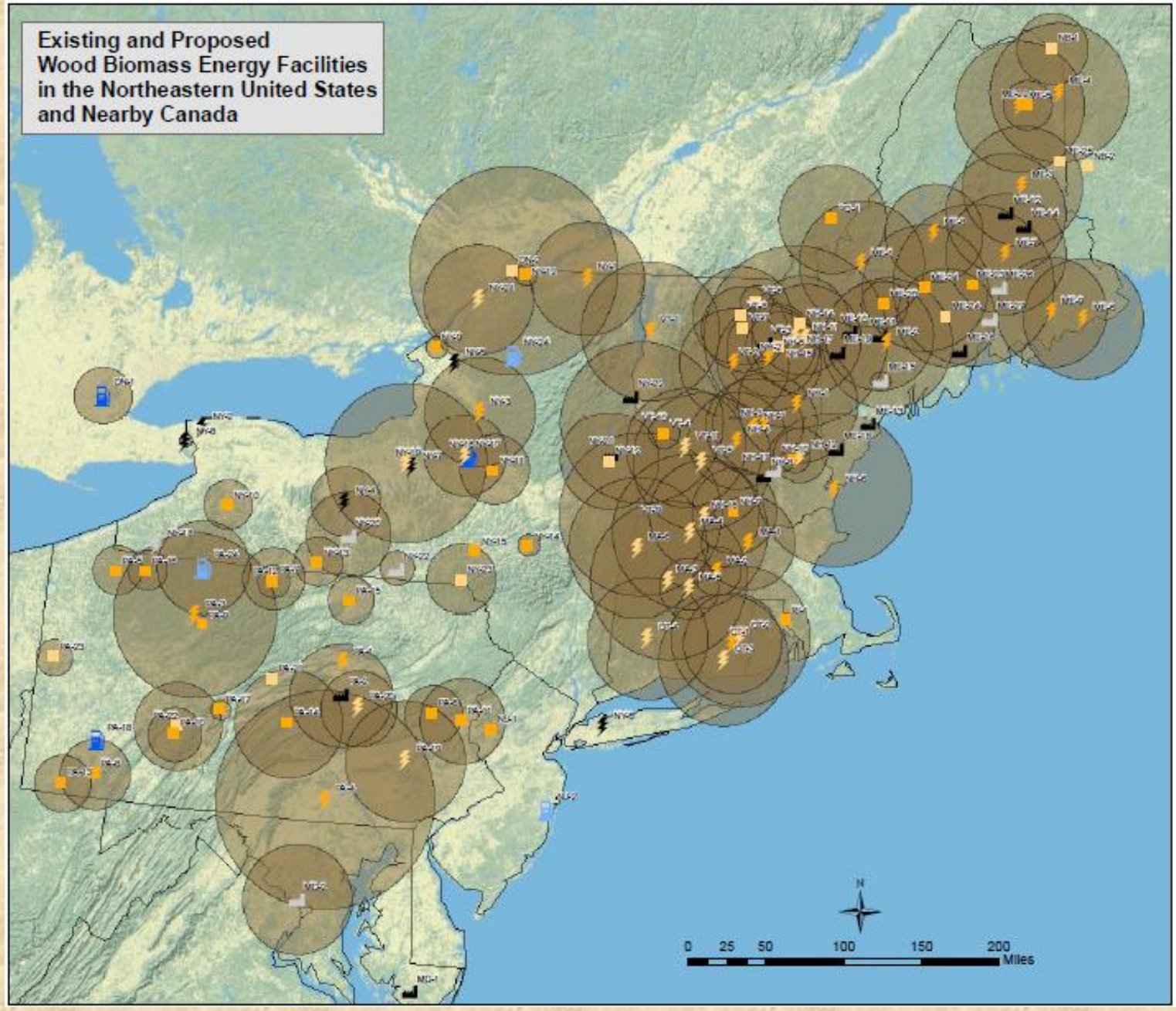
Timothy A. Volk - SUNY- ESF, Syracuse, NY

Woody Biomass Utilization Group, Washington DC, Oct. 16, 2012

Overview

- Woody biomass supplies in the NE
  - USDA BCAP for willow biomass
- NewBio - USDA AFRI regional feedstock project for the northeast New Woody Biomass Initiatives
- Recent CHP, power and thermal projects

Existing and Proposed Wood Biomass Energy Facilities in the Northeastern United States and Nearby Canada



ABOUT THIS MAP:

Facilities appearing on this map are drawn from various sources (listed on reverse). Some facilities shown may have shut down since lists were generated, and some proposed facilities will not be built. Facilities are located within a zipcode, but not by street address.

Woodsheds are proportional to estimated wood use (assuming a 50-mile-radius woodshed for a 50MW wood-fired electricity facility) and are shown only for those facilities with available use estimates. Many facilities co-fire wood with other fuels, so amounts of wood used are difficult to estimate and include both waste and forest-derived material. See reverse for facility information.

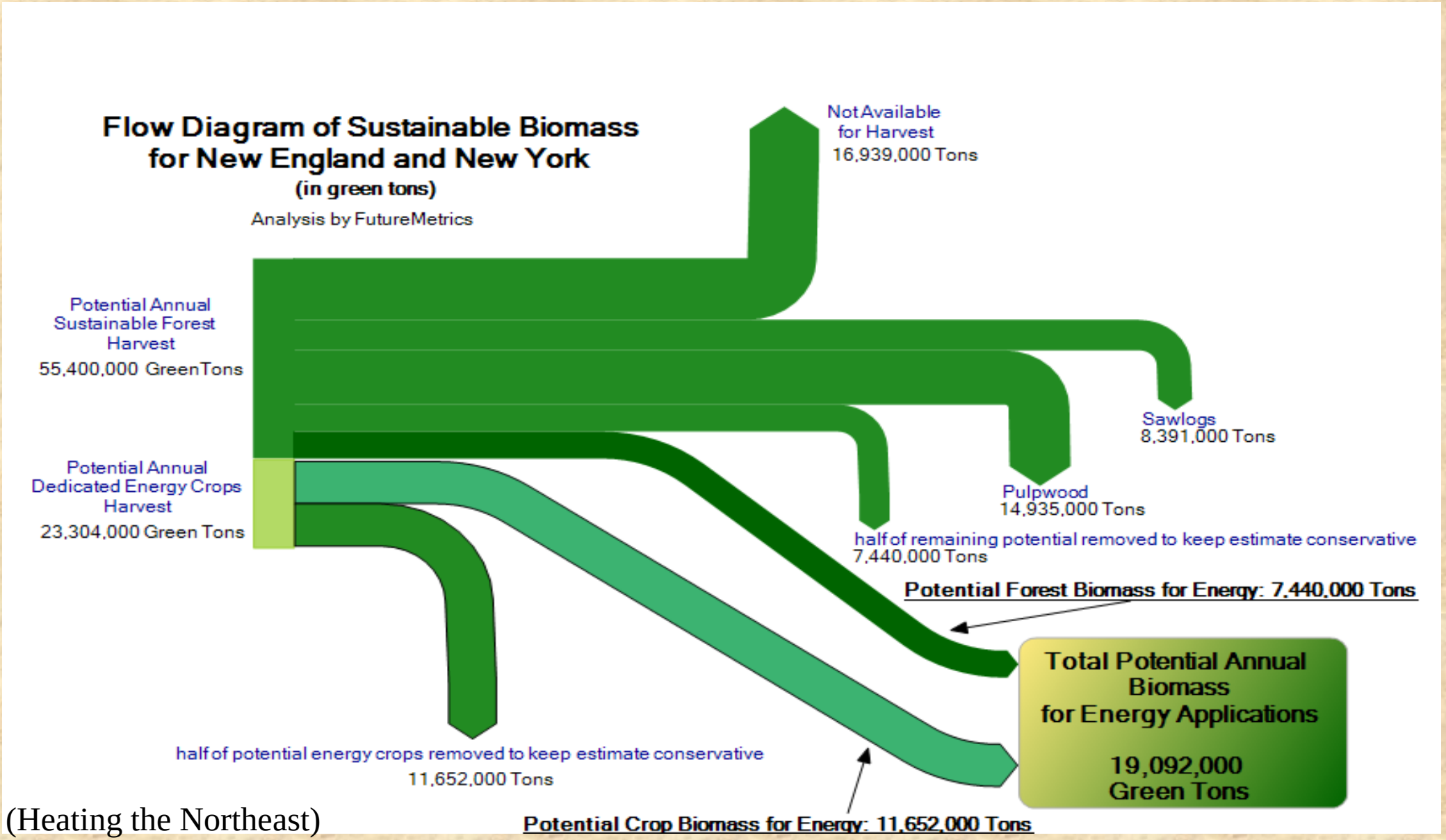
Energy Facility Type and Status

- Electric, Existing
- Electric, Proposed or Conversion
- Co-fire, Existing
- Co-fire, Proposed
- Pellet, Existing
- Pellet, Proposed
- Industrial and CHP, Existing
- Industrial and CHP, Proposed
- Biofuel, Existing
- Biofuels, Proposed
- Woodshed

Map updated 10/6/2010 by The Wilderness Society. Please direct inquiries or corrections to: Ann Ingerson, ann_ingerson@tws.org.

THE WILDERNESS SOCIETY

Renewable Feedstock Supply



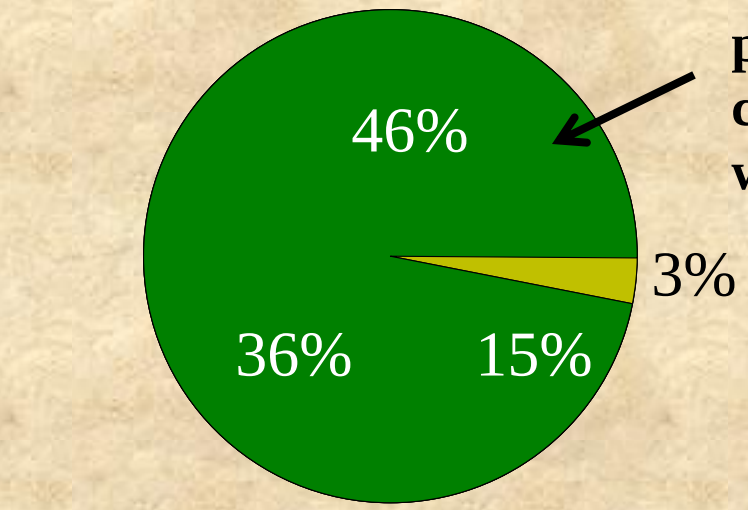
(Heating the Northeast)

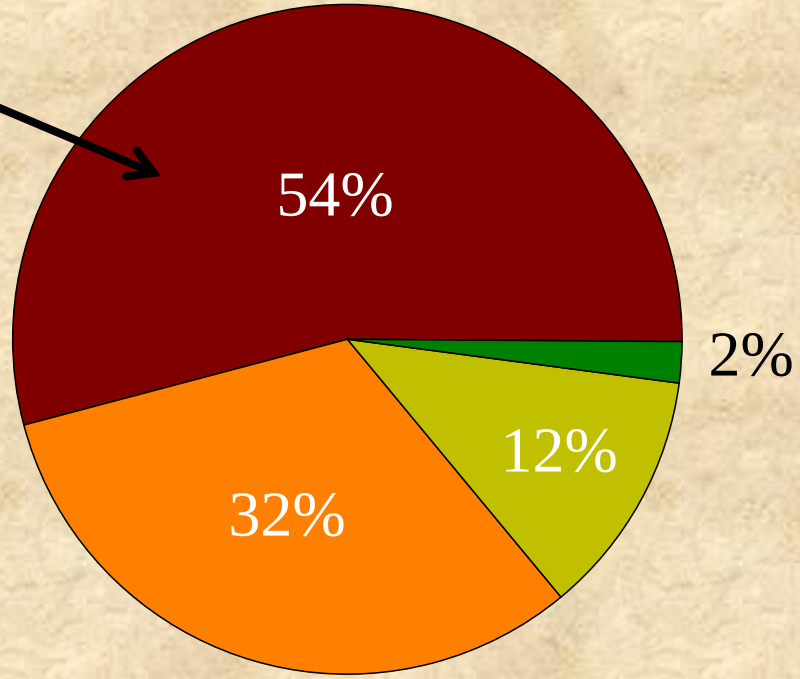
NY Renewable Fuels Roadmap: Potential Biomass Production

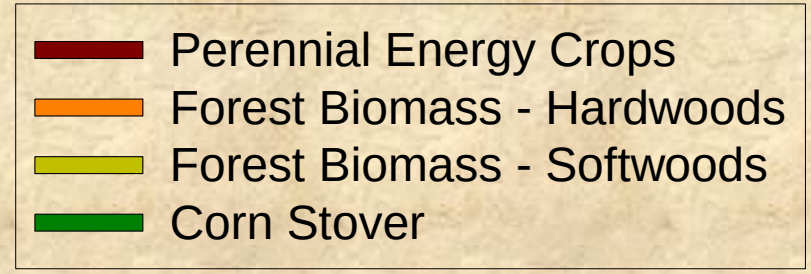
Scenario 1
9.5 million dry tons

Scenario 2 & 3
14.6 million dry tons

~45% of perennial crops are woody

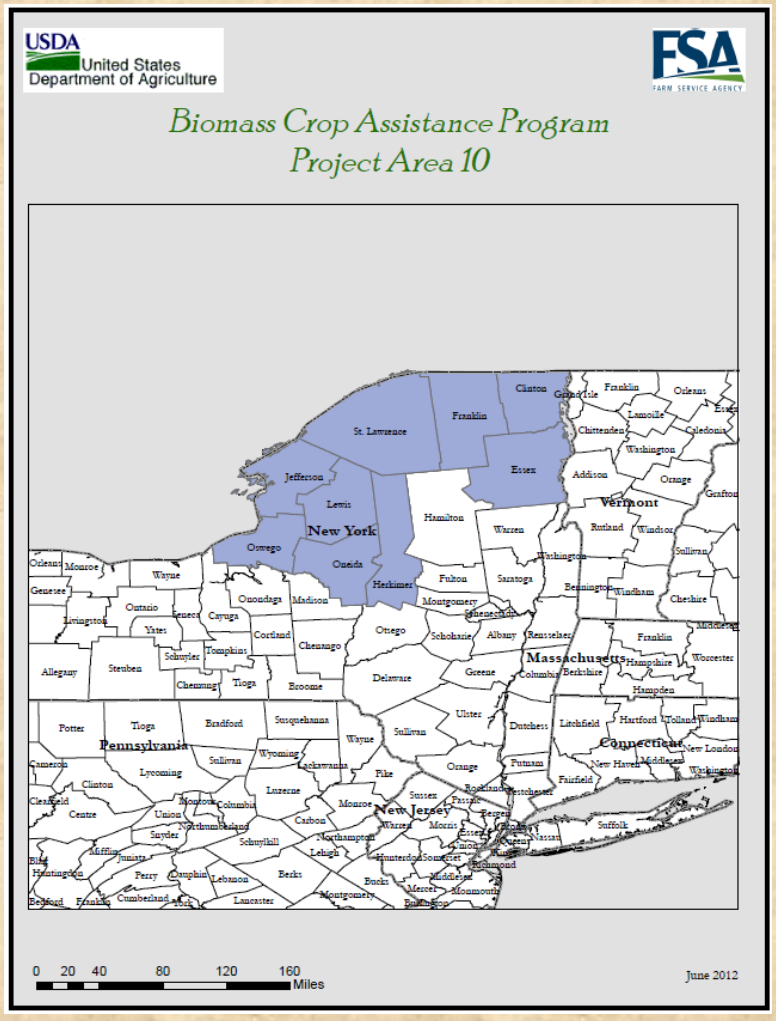






(Wonjar et al. 2012)

USDA BCAP - Willow Biomass Project

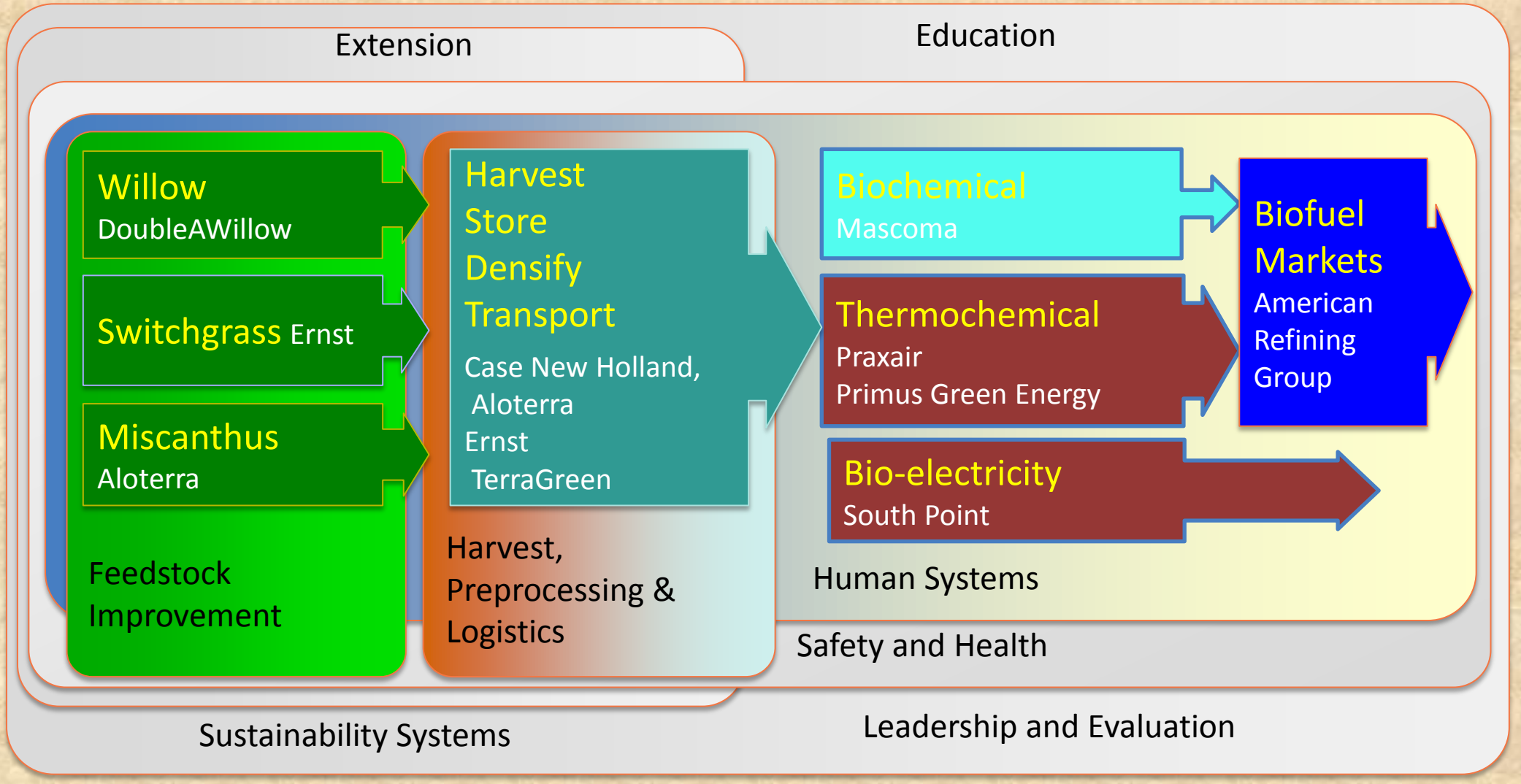


The BCAP project crops covers a nine county region in central and northern NY

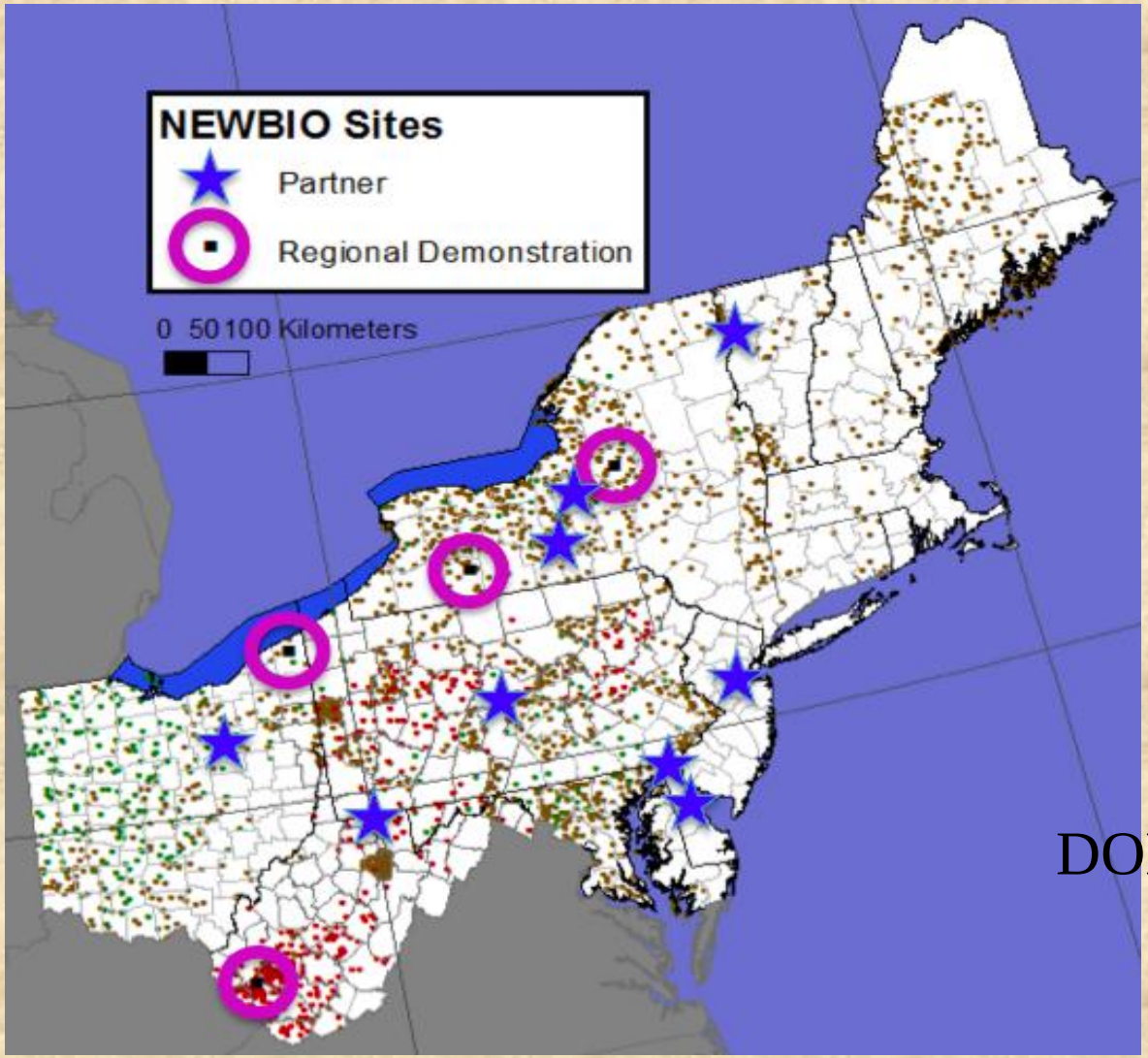
- USDA BCAP project for shrub willow in a nine county region in central and northern NY
- Initiated in June 2012, sign up completed in September 2012
- 1,200 acres signed up
- ReEnergy Holdings committed to purchasing all the willow biomass grown and using it in its Black River or Lyonsdale facilities

NEWBio:

Northeast Woody/Warm-season Biomass Consortium



NewBio:University and Federal Partners



Penn State University
Cornell University
SUNY ESF
West Virginia University
Delaware State University
Ohio State University
Rutgers University
Drexel University
USDA ARS ERRC
DOE Oak Ridge National Laboratory
DOE Idaho National Laboratory

Harvester Development

Harvesting three year old willow with a NH 130FB header designed for short rotation woody crops & NH FR9060 forage harvester

- Case New Holland has developed a dormant season, single pass cut and chip harvesting system based on New Holland (NH) forage harvester with support from DOE and NYSERDA
- Will harvest over 200 acres of willow this fall
- Head is now commercially available

Commercial Planting Stock Production

Shrub willows in nursery beds at Double A Vineyards, Fredonia, NY (www.doubleawillow.com).

- Double A Willow, Fredonia NY
  - More than 150 acres of willow nursery beds planted with varieties from SUNY ESF breeding and selection program since 2005
    - » Includes several improved clones that have been awarded patents
  - Projected production of 30 million cuttings

Conversion Partner:

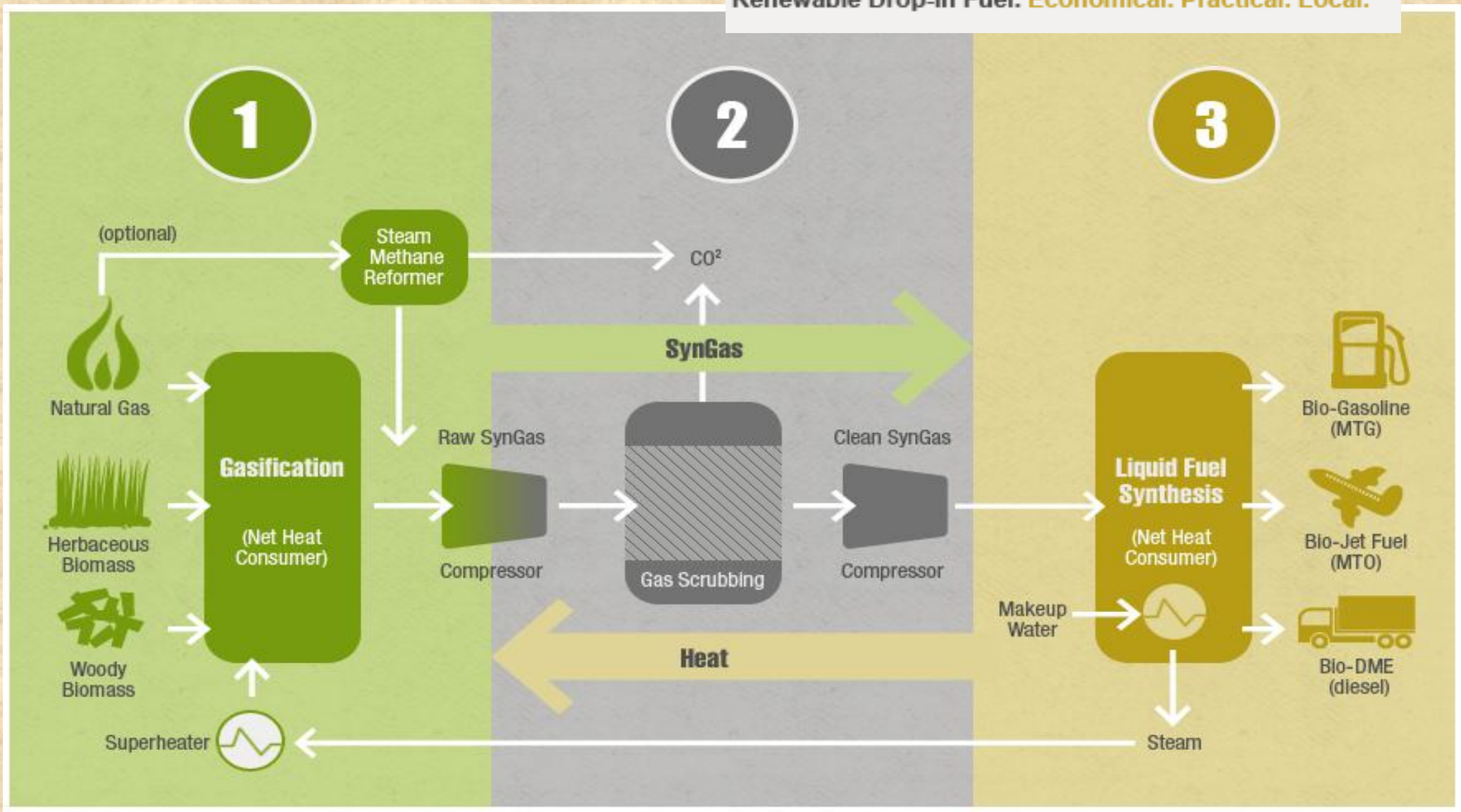
MASCOMA

Description	2011		2012		2013		2014		2015		2016
	H-1 Back		H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9 On
Operate Rome NY Pilot Plant											
Construct 20 MGY Kinross Plant											
Kinross Shake-Down Operation											
Kinross Full-Scale Production											
Project GO decision											
Construct 2nd Commercial Plant?											

Conversion Partner:

PRIMUS GREEN ENERGY

Renewable Drop-In Fuel. Economical. Practical. Local.



Conversion Partner:

PRIMUS GREEN ENERGY

Renewable Drop-In Fuel. Economical. Practical. Local.

Construction Timeline:

BECHTEL

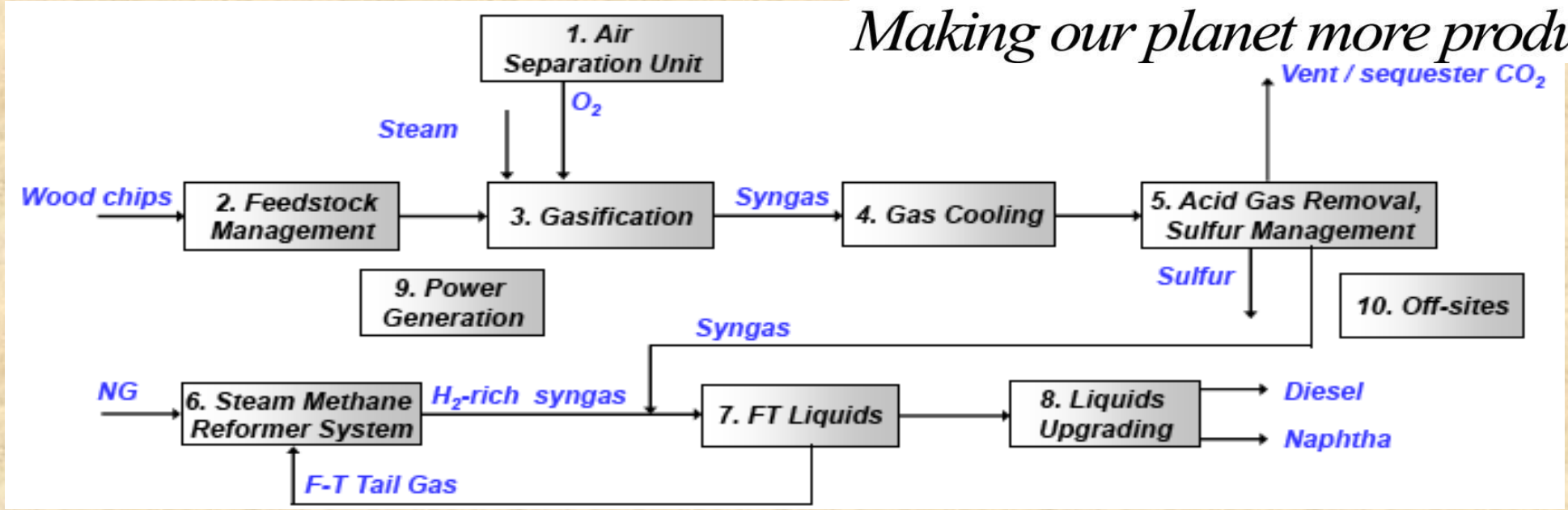
	2011		2012		2013		2014		2015		2016
Description	H-2	H-1	H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9 On
Operate 3 kg/hour Pilot Plant											
Project GO decision											
Detailed Design - 100 kg/hour											
Construct 100 kg/hour Demo. Plant											
Operate 100 kg/hour Demo. Plant											
Detailed Engineering Commercial Plant											
NEPA and Permitting											
Procurement											
Construction											
Commissioning and Start-Up											
Shake-Down Operation											
Full-Scale Production											

Contact: George Boyajian, VP Business Development. Cell: (646) 734-3986

Conversion Partner:

PRAXAIR

Making our planet more productive



Description	Prior Year			Year 1		Year 2		Year 3		Year 4		Year 5
	H-2	H-1	0	H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9 On
Feasibility Study (Complete)												
Project GO decision												
Preliminary Engineering												
NEPA and Permitting												
Detailed Design												
Procurement												
Construction												
Commissioning and Start-Up												
Shake-Down Operation												
Full-Scale Production												

ABS Process™

CleanTech disassembly of woody biomass to capture value not currently realized

Extracted Woody Biomass

Water-based Extract Solution

Pathway A

Hot Water Extraction™

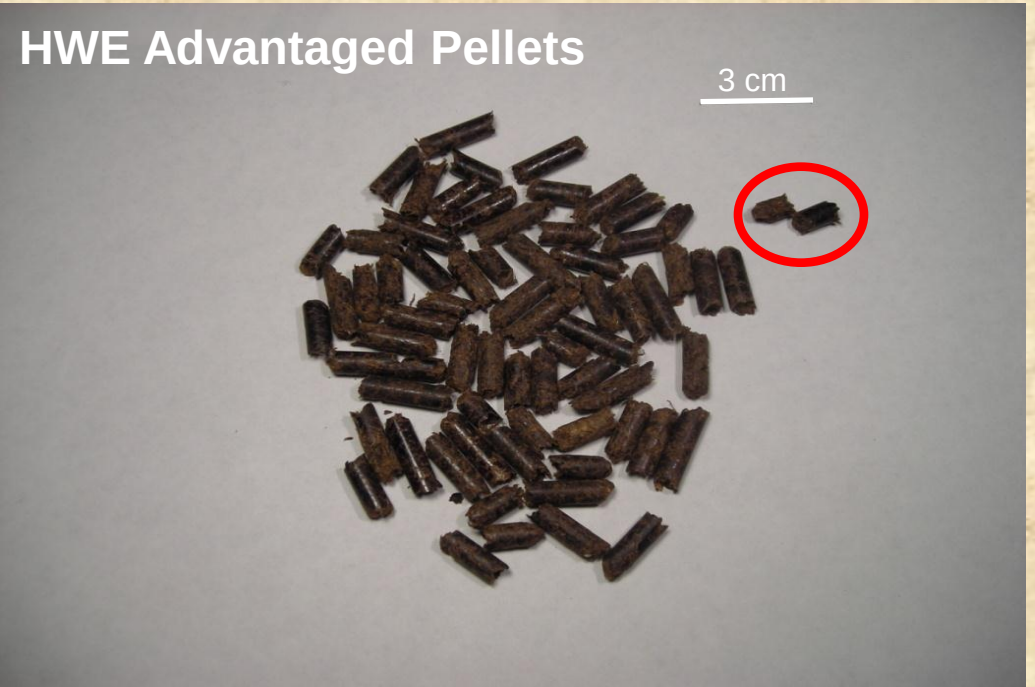
Pathway B

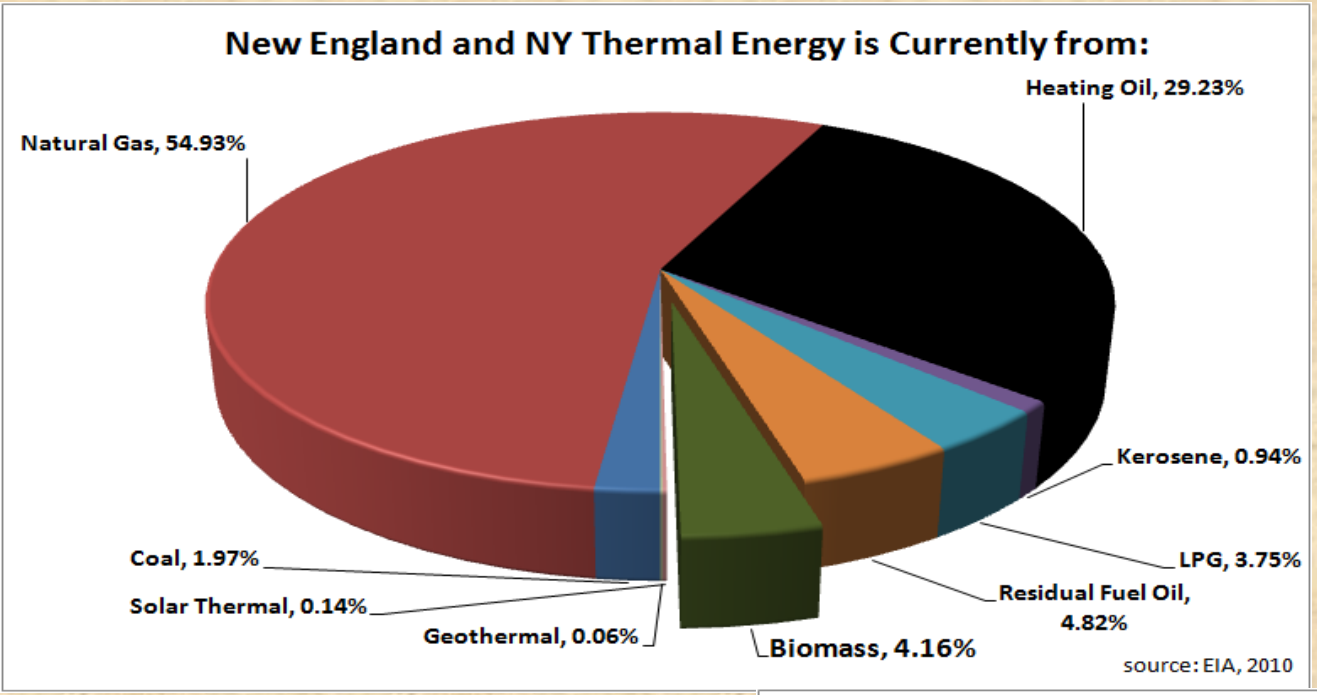
Generating two product streams instead of just one

Wood Uses After *Hot Water Extraction*™

Improved → ***Hydro-Torrefied*™ fuel pellets**

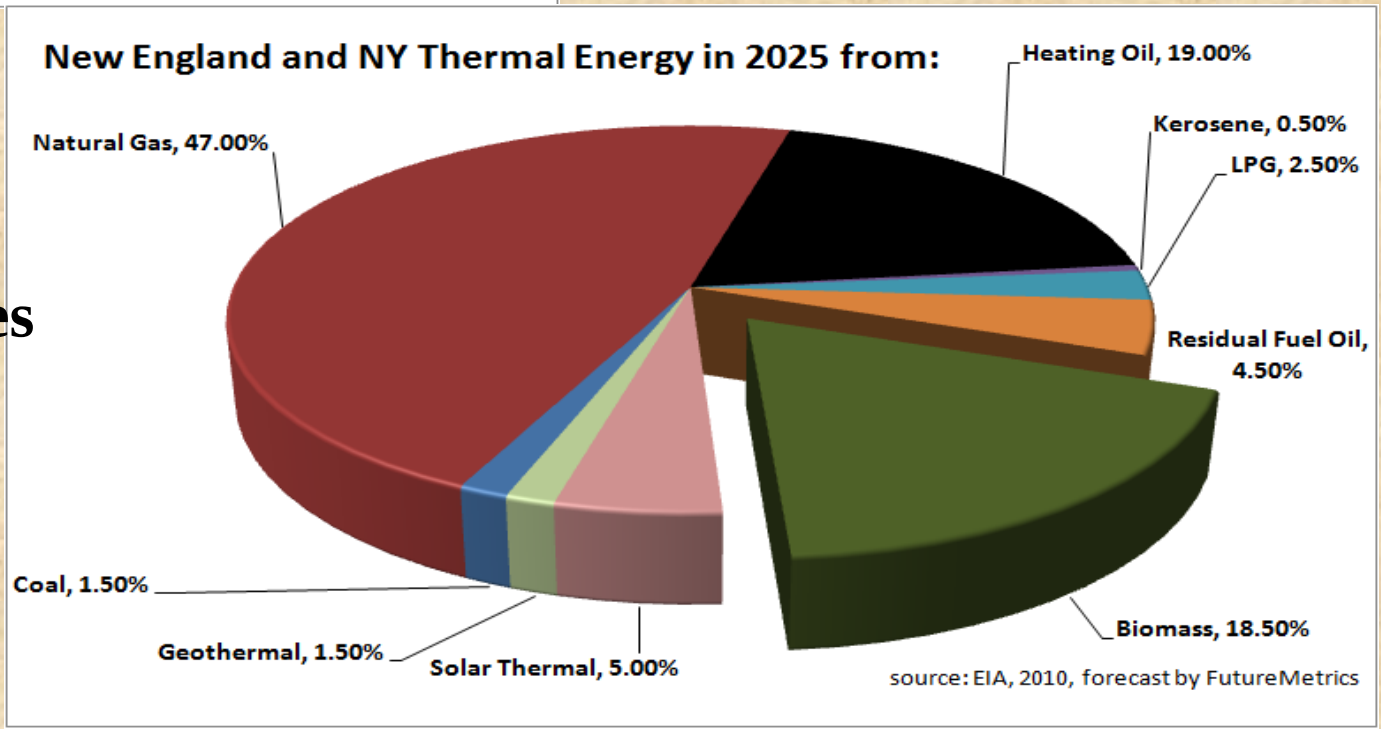
- Lower ash content, option to use whole tree chips and energy crops
- Increased energy content and structural stability
  - higher % lignin (less likely to break = fewer “nubs”)





Current energy sources for thermal energy

Vision of energy sources for thermal energy in 2025



(Niebling 2010)

Regional Biomass CHP

- Recently colleges implementing biomass CHP projects that are attracting a lot of attention
  - Middlebury College uses 20,000 tons of locally sourced green wood chips per year to replace #6 oil
  - Save about $840,000/yr
  - SUNY ESF – will use about 2,500 tons of locally sourced wood pellets per year
    - » Meet 60% of campus heating needs and 20% of electrical demand
    - » Save about $400,000/yr

Regional Biomass CHP

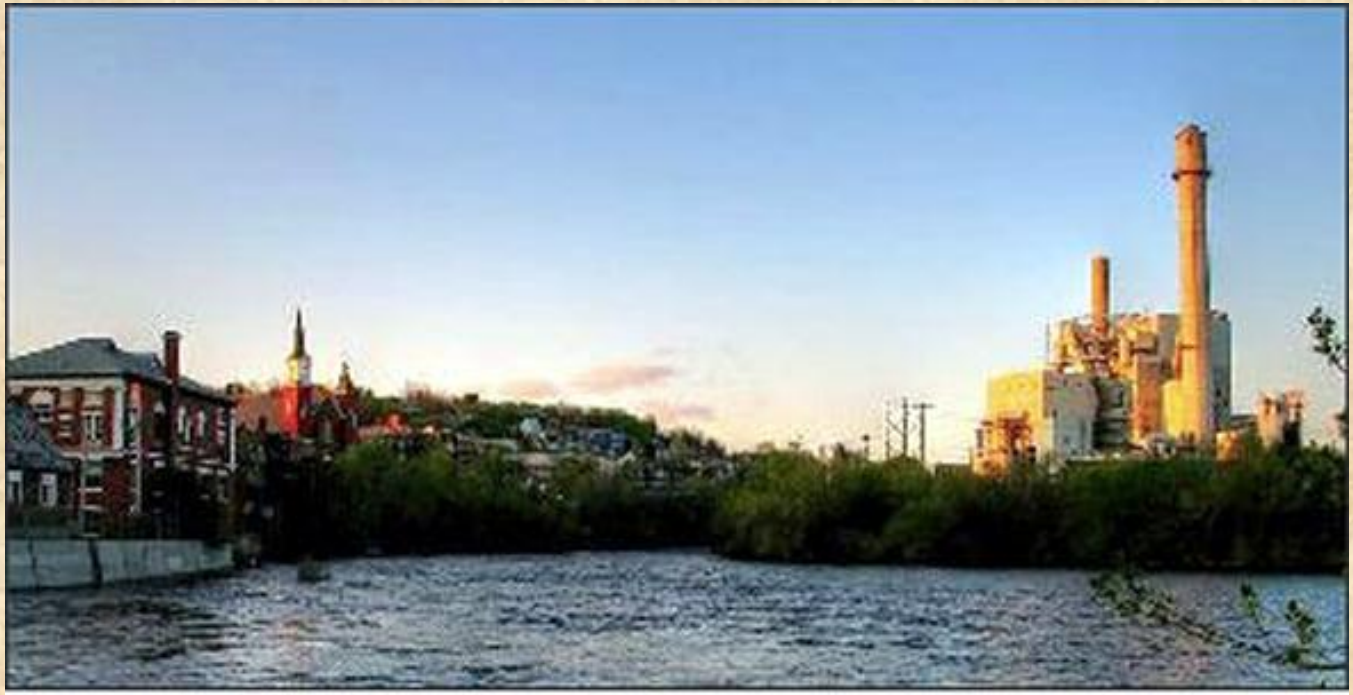
Griffiss Business and Technology Park CHP facility

- Griffiss Business and Technology Park
- On line November 2013
- 30,000 - 40,000 tons of wood chips per year.
- CHP, 1MWe, 10MWth. Wood chips.

Biomass Power Production

- ReEnergy Black River project converting 60 MW coal facility to woody biomass
  - Supply power to Fort Drum in northern NY
  - About $11 million dollars/year will be spent locally on forest residues
  - Include willow biomass crops as portion of fuel supply
  - Create over 300 jobs in the region

Power Production

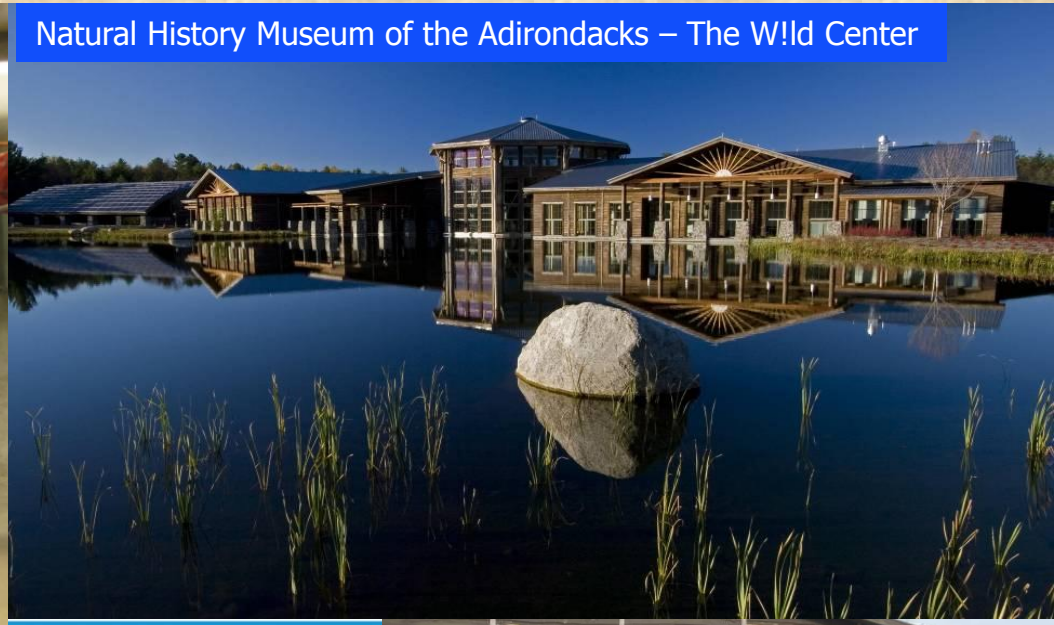


NH BIOMASS PROJECT

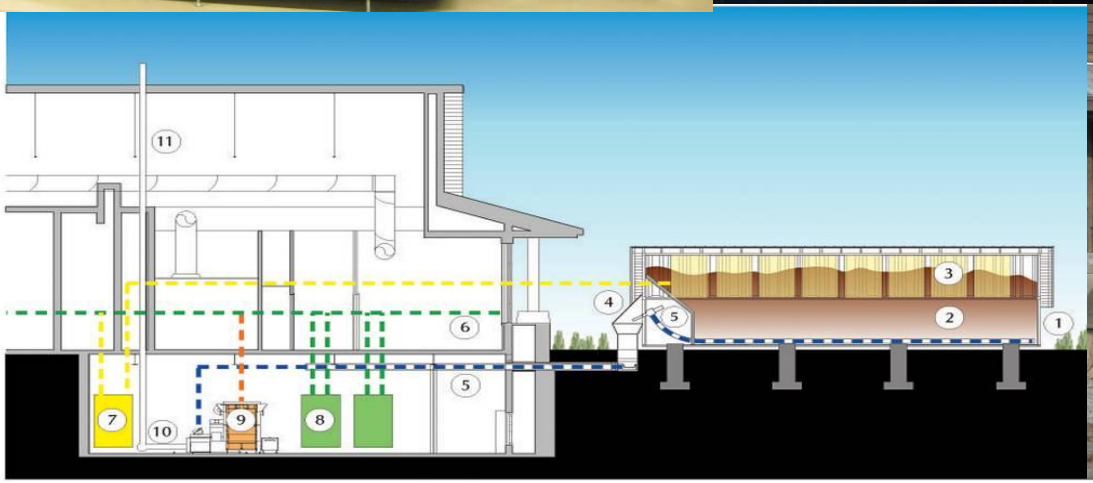
- Laidlaw developing 75 MW site in New Hampshire
  - Sell power as part of renewable portfolio standard in the state
  - Use about 750,000 tons of forest biomass per year

1.7 MMBtu ACT Bioenergy Boiler Integrated with Solar Panels


Pellet Boiler


Natural History Museum of the Adirondacks – The W!ld Center

1. RE-USED STORAGE CONTAINER
2. 30 TONS OF WOOD PELLETS
3. SOLAR THERMAL PANELS
4. PELLET DISTRIBUTION DISPLAY
5. WOOD PELLET DELIVERY AUGER
6. EXISTING MUSEUM HEATING LOOP
7. SOLAR THERMAL STORAGE TANK
8. EXISTING PROPANE FIRED BOILERS
9. NEW WOOD PELLET BOILER SYSTEM
10. EMISSIONS TESTING EQUIPMENT
11. CHIMNEY




Pellet storage

Biomass Thermal Roadmap

- NYSERDA funding a thermal biomass roadmap project for NY to develop a strategic plan to guide New York State in expanding the use of biomass in clean and efficient heating applications
- Multiple organizations involved including NESCAUM, BioEnergy 2020 (BE 2020), Brookhaven National Lab (BNL), and Integrated Natural Resource Solutions, LLC (INRS)
- Due to be completed late summer 2013

Questions