Co-Firing with Wood Pellets
Opportunities in the U.S.?

July 20, 2010

Pellet Fuels Institute Annual Meeting

Asheville, NC

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www.inrsllc.com

Innovative Natural Resource Solutions LLC

- Based in New Hampshire and Maine, a region with 25+ years of continuous biomass power experience
- Based in the forest industry
- Focus is on feedstock supply for biomass electric, thermal, pellet and liquid fuel projects
- Clients include utilities, merchant generators, investors, developers, and industries
- Conducted work in all regions of the country
- www.inrsllc.com

Co-Firing with Wood Pellets Opportunities in the U.S.?

- What is driving interest
- Are pellets are realistic solution
- Where are the opportunities
- What will it take to get a contract
- Crystal ball

Why Are Utilities Interested?

What is Driving Interest?

- Renewable Portfolio Standards
- Biomass as "carbon neutral"
  - Premise coming under attack – Manomet, EPA…
- Local economic development
- Fuel diversity
- Retention of coal-based generation
- Very low (capital) cost renewable generation

Renewable Portfolio Standards

- Requirement that electricity providers secure a certain percentage of their electricity from “renewable” sources
- 29 States have an RPS of some sort
- Vary widely in requirements, eligibility, pricing
- Most (all?) allow biomass
  - Co-firing not always allowed, in fact or in practice
  - Sustainability requirements (?)
- An RPS is public policy, and subject to change
- Impact of a national RPS?
  - Is that even realistic?

DSIRE™

Database of State Incentives for Renewables & Efficiency

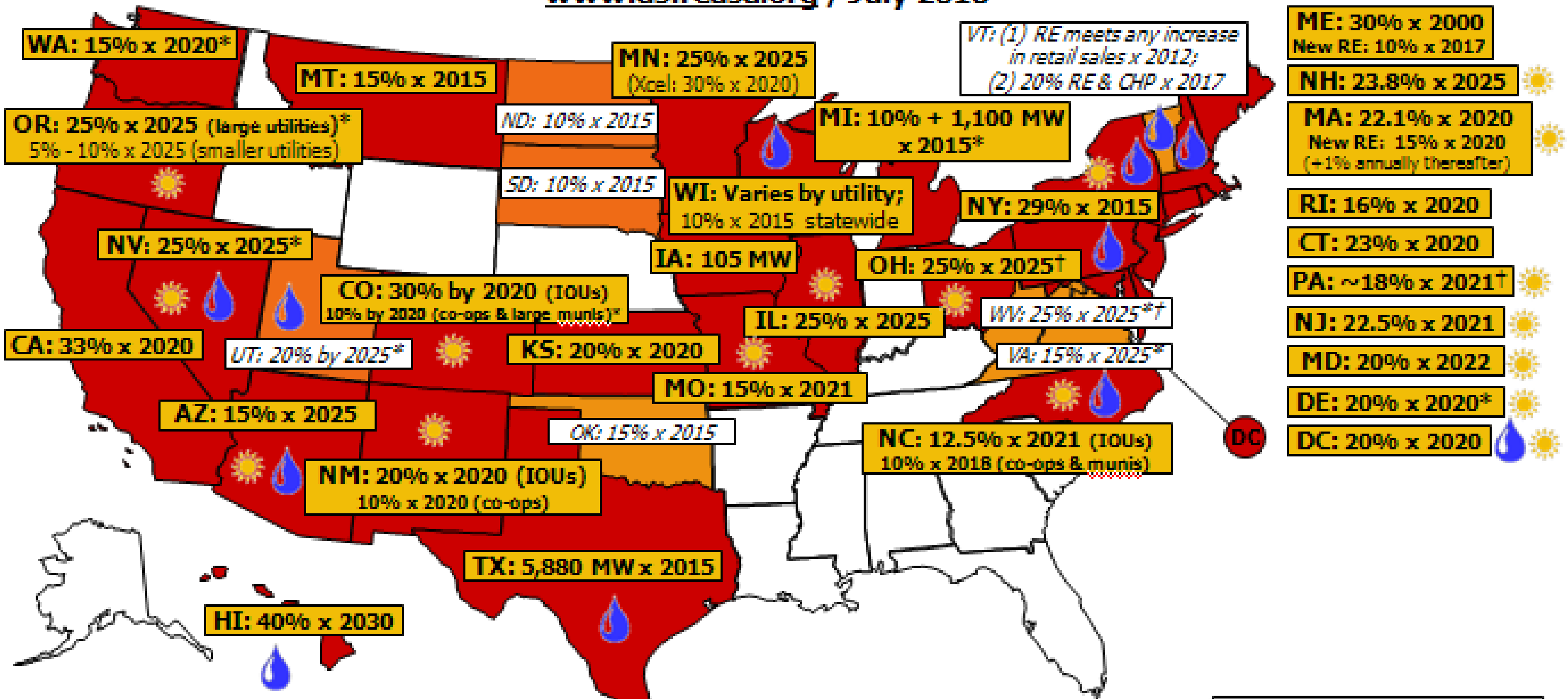
U.S. Department of Energy | Energy Efficiency & Renewable Energy

North Carolina Solar Center

IREC

Renewable Portfolio Standards

www.dsireusa.org / July 2010



State renewable portfolio standard

State renewable portfolio goal

Solar water heating eligible

Minimum solar or customer-sited requirement

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources

29 states + DC have an RPS

(7 states have goals)

Renewable Portfolio Standards

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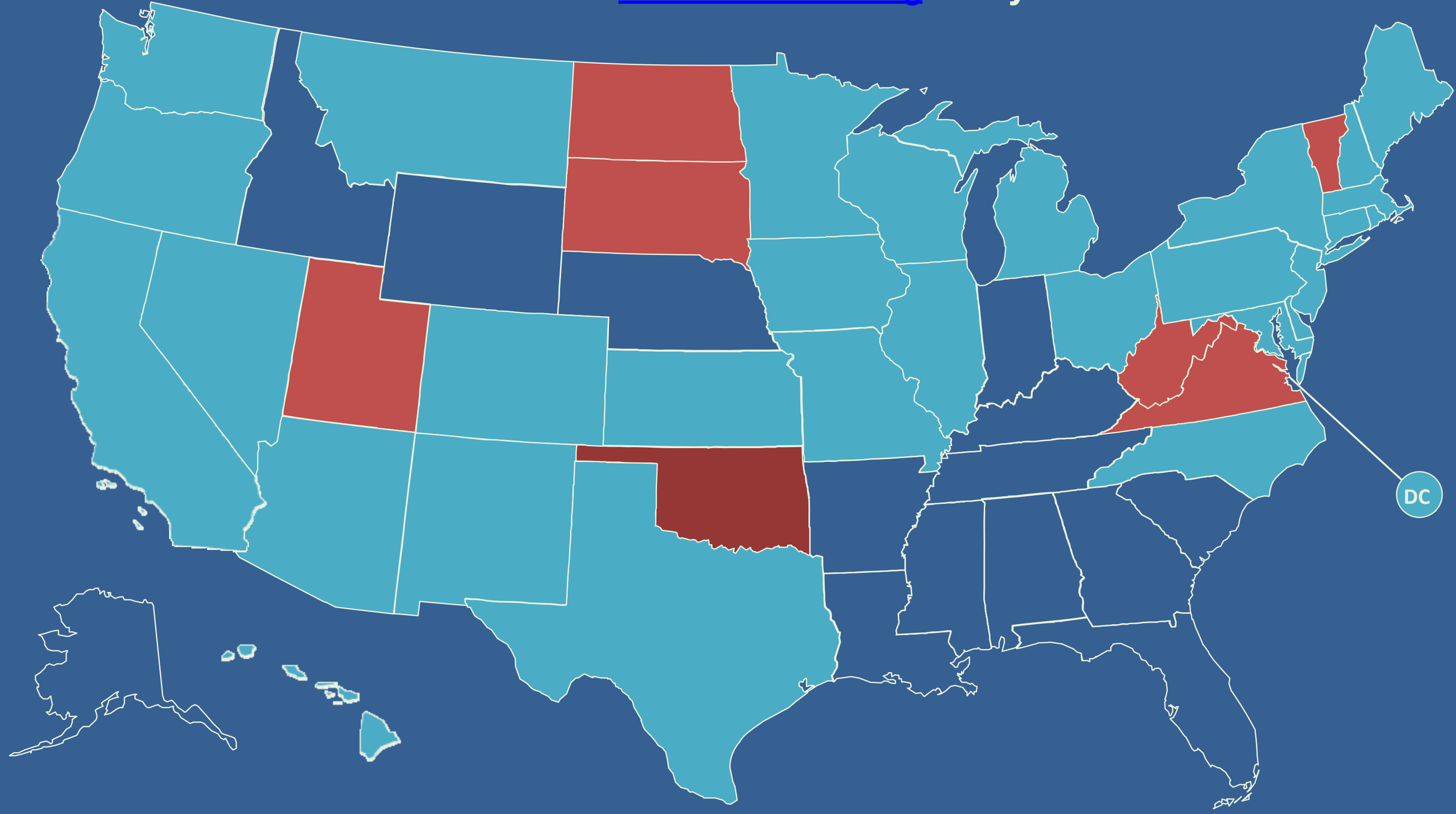


Do Pellets Present an Opportunity?

What Utilities Want from Biomass

- Coal, just made out of wood and “green”
  - Single source for supply
  - Credit worthy counter-party
  - Rail delivery (some barge, truck, but generally rail)
  - Reliable, consistent supply
  - Someone to handle all “wood stuff” (e.g., forestry laws, sustainability, BCAP, etc.
  - Regulatory approval
  - Public relations benefit

Pellet Fuels

Strengths

- RPS eligible
- A consistent, refined, low-moisture fuel
- Low capital cost
- 100k tons is enough to support +/- 15 MW baseload
- One contract, one supplier, credit worthy(ish)

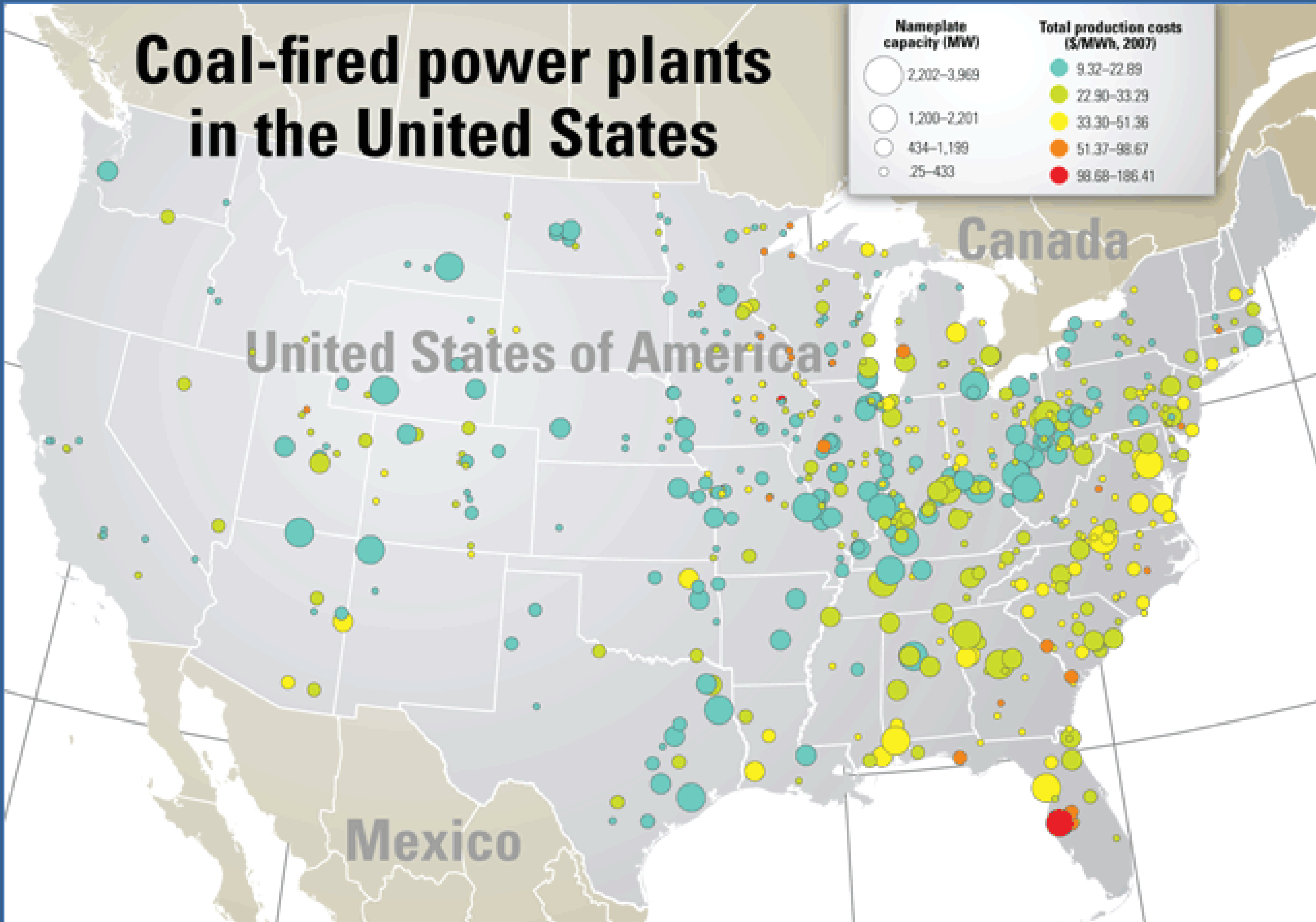
Challenges

- Expensive on a BTU basis
  - More than other biomass
  - WAY more than coal
- Handling and covered storage
- Regulatory uncertainty
- Some credit issues in industry

Where is the Opportunity?

Greatest Opportunity for Pellets

- Pulverized coal units
- Proximate to pellet manufacturer or rail-to-rail service w/ single carrier
- Space on site for storage
- Constraint on capital costs higher than constraint on operating costs
- Regulatory and other support
- Management (HQ and plant) wants to do something



Platts Energy Advantage and POWERmap

New Coal Plants Are Under Construction TODAY

Wood Pellet Manufacturing

Facilities Listing in USDA Forest Service 2009 Publication *(Spelter, et al)*

Contract Requirements

INRS Observations

- U.S. electric generators are the best and most sophisticated buyers of coal (and other fuels) in the world
- Wood buying is traditionally relational and highly dynamic, which doesn’t fit the “coal model”
- Attempts to make wood fit into the “coal model” have fallen flat
- The electric generation industry needs to understand (and move toward) the forest industry model, and the forest industry needs to (and will) move toward a traditional utility supply model.

You May Need to Have a Good Handle on Where Your Feedstock Comes From

- From a recent utility Biomass RFP
  - In no case shall any Biomass fuel come from components of the National Wilderness Preservation System, Wilderness Study Areas, *Inventoried Roadless Areas*, old growth stands, *late successional stands*, National Landscape Conservation System, National Monuments, National Conservation Areas, *State Parks*, Designated Primitive Areas, or Wild and Scenic Rivers corridors, except, in each case, for dead, severely damaged, or badly infested trees.
- This is expected to grow as a concern, and supply chain tracking (and perhaps certification / auditing) will likely be a future requirement

Utilities Are Asking for Information Well in Excess of What Is Forest Industry Standard

- "Typical" Biomass analyses (Recent RFP)
  - Proximate,
  - Ultimate,
  - Trace Elements (Se, As, Hg, Pb, Cu) and
  - Mineral Ash Analyses,
  - Grindability Index,
  - Chlorine,
  - Ash Fusion Temperatures,
  - Pre-pelletization Size and Pellet Size

Utilities Are Seeking “Long-Term” Partners

- Utility X is evaluating the use of biomass fuels as a renewable energy resource for compliance with the State Renewable Energy and Energy Efficiency Portfolio Standard (NCREPS). The purpose of this Request for Information (RFI) is to identify suppliers who are interested in entering into multi-year contracts to supply biomass fuel.

- While responses to this request shall be considered as strictly non-binding expressions of interest, they are intended to serve as the basis for further negotiations leading to definitive and binding supply agreements.

Requirements from a Recent Utility Biomass RFI

- **Description of the existing business** including lines of business and products, years in business, annual revenues, number of employees, number and type of equipment fleet, latest audited financial results including footnotes etc.

- **Description of any industry certifications** – Sustainable Forestry Initiative (SFI) certification is desired but not required. Please indicate whether company has certification, or ability to obtain certification, either directly or through contracting with SFI Master loggers.

- **Description of Best Management Practices (BMP's)** – Utility requires suppliers to follow applicable state forestry BMP's, rules, and regulations

- **Description of transportation methods** and unloading requirements at point of delivery, and weighing plan

- **Description of Sustainability Plan** – Utility desires a sustainable biomass supply in terms of both volume and price. In order to ensure future supply, Utility believes forests must be managed and harvests must be performed in an environmentally responsible manner.

Requirements from a Recent Utility Biomass RFI

- **Please indicate whether the fuel source is eligible for open or closed loop production tax credits.** Open loop tax credits are generally available for residues and thinnings but not whole trees. Closed loop credits are available for products that are grown specifically for energy production.

- **Please indicate whether the fuel source is eligible for Biomass Crop Assistance Program (BCAP) subsidies.** BCAP subsidies are generally available for products harvested from private lands when the land is managed under a Sustainable Forest Plan. The term of the subsidies is limited to two years.

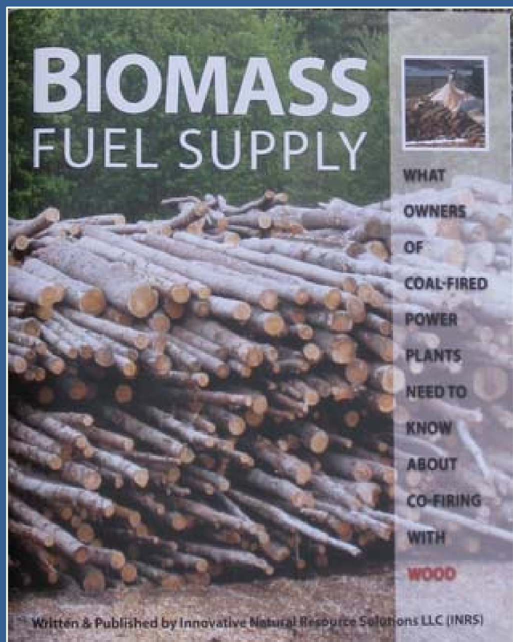
Expect a Coal Contract

- The person in charge of buying wood / pellets has been a coal buyer for their entire career
- Contracts have been through years of legal review and are coal-industry standard
- Expect to have to meet conditions that make no sense to you
- This will (must) change over time, but the start will be rocky and puzzling

Crystal Ball

Will There Be Opportunities?

- Yes, but limited, and slow to develop
- Pricing needs to support higher cost – regulated utilities well positioned to do this
- Some concerns about carbon
  - Carbon neutrality
  - Carbon accounting
- Will require a customer focused attitude
- Torrified wood may be a major opportunity / challenge…



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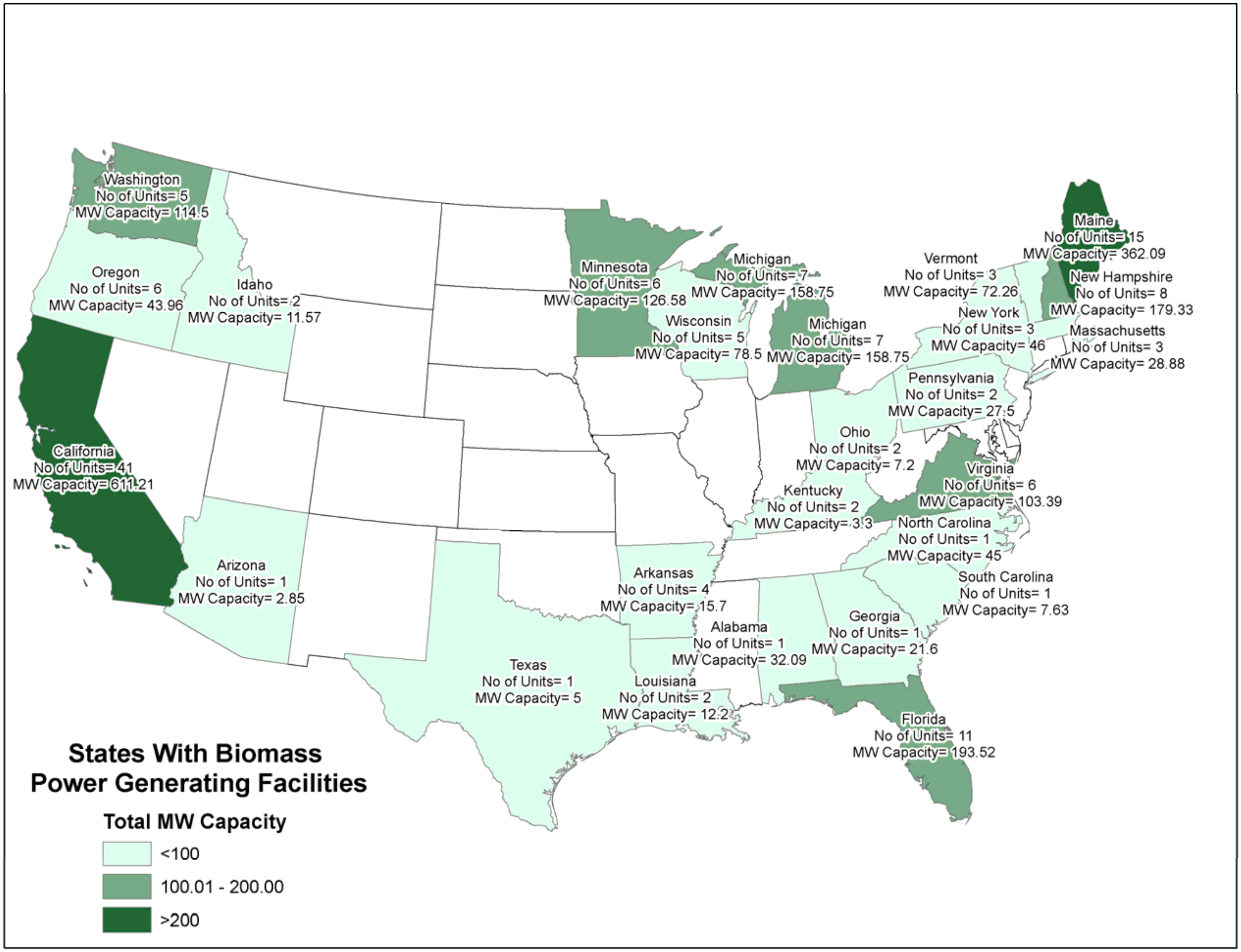

Washington
No of Units= 5
MW Capacity= 114.5
Oregon
No of Units= 6
MW Capacity= 43.96
Idaho
No of Units= 2
MW Capacity= 11.57
California
No of Units= 41
MW Capacity= 611.21
Arizona
No of Units= 1
MW Capacity= 2.85
Texas
No of Units= 1
MW Capacity= 5
Minnesota
No of Units= 6
MW Capacity= 126.58
Wisconsin
No of Units= 5
MW Capacity= 78.5
Michigan
No of Units= 7
MW Capacity= 158.75
Michigan
No of Units= 7
MW Capacity= 158.75
Arkansas
No of Units= 4
MW Capacity= 15.7
Louisiana
No of Units= 2
MW Capacity= 12.2
Alabama
No of Units= 1
MW Capacity= 32.09
Kentucky
No of Units= 2
MW Capacity= 3.3
Ohio
No of Units= 2
MW Capacity= 7.2
Georgia
No of Units= 1
MW Capacity= 21.6
Florida
No of Units= 11
MW Capacity= 193.52
South Carolina
No of Units= 1
MW Capacity= 7.63
North Carolina
No of Units= 1
MW Capacity= 45
Virginia
No of Units= 6
MW Capacity= 103.39
Pennsylvania
No of Units= 2
MW Capacity= 27.5
New York
No of Units= 3
MW Capacity= 46
Vermont
No of Units= 3
MW Capacity= 72.26
Maine
No of Units= 15
MW Capacity= 362.09
New Hampshire
No of Units= 8
MW Capacity= 179.33
Massachusetts
No of Units= 3
MW Capacity= 28.88
States With Biomass
Power Generating Facilities
Total MW Capacity
<100
100.01 - 200.00
>200