Market Discussions
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Wood Energy in the UNECE region: 2013 and beyond

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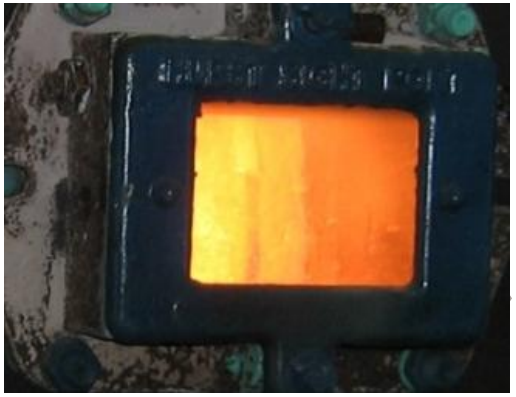
Wood Energy: A renewable feedstock

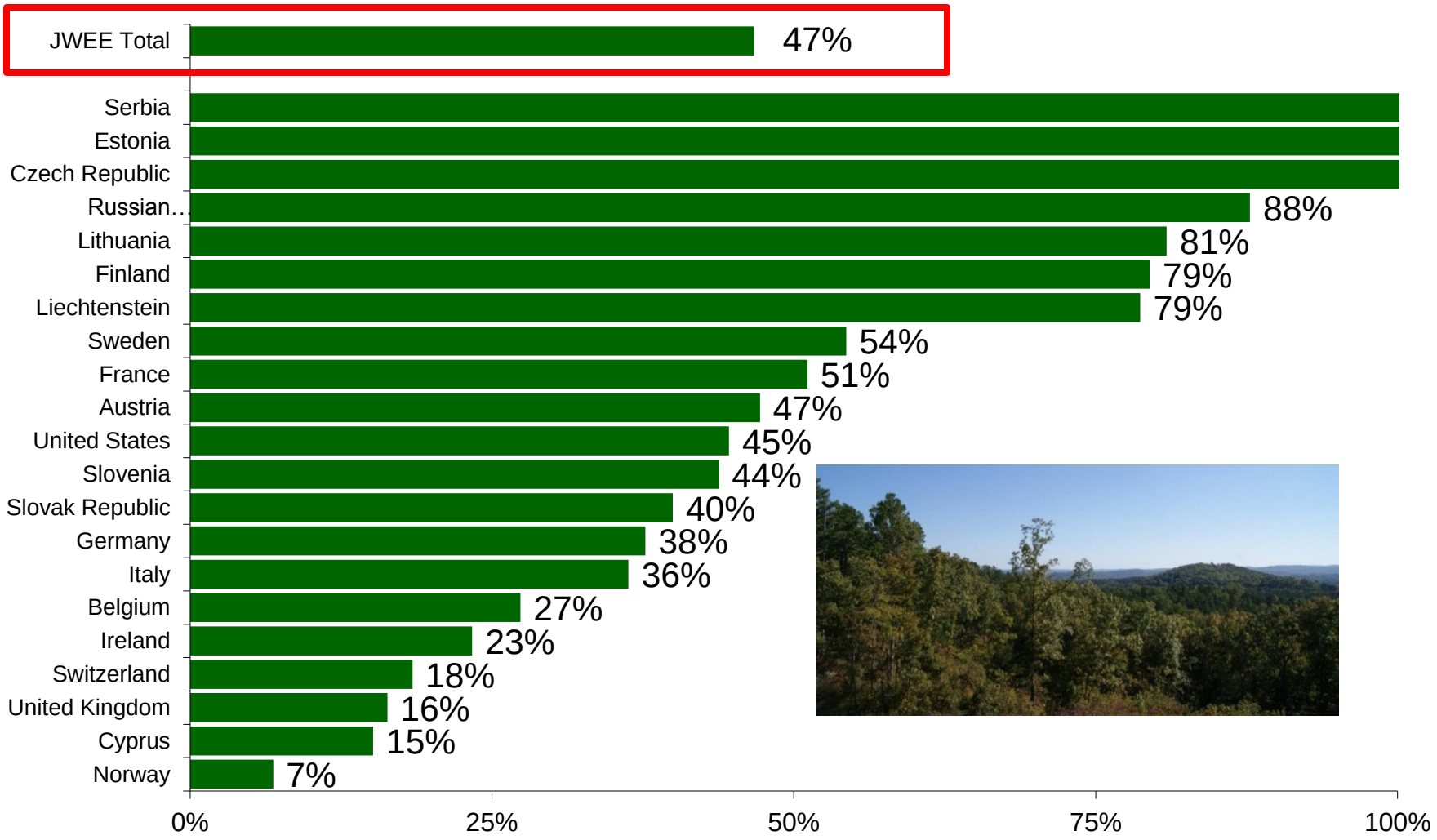
- Direct: Logging co-products; Removal of excess biomass (fuel treatments, thinnings); Fuelwood extracted from forestlands
- Indirect: Primary and secondary wood material mill processing co-product and pulping liquors
- Recovered: Urban wood residues
- Dedicated: Energy plantations (short-rotation coppice)



Wood Energy in the UNECE region

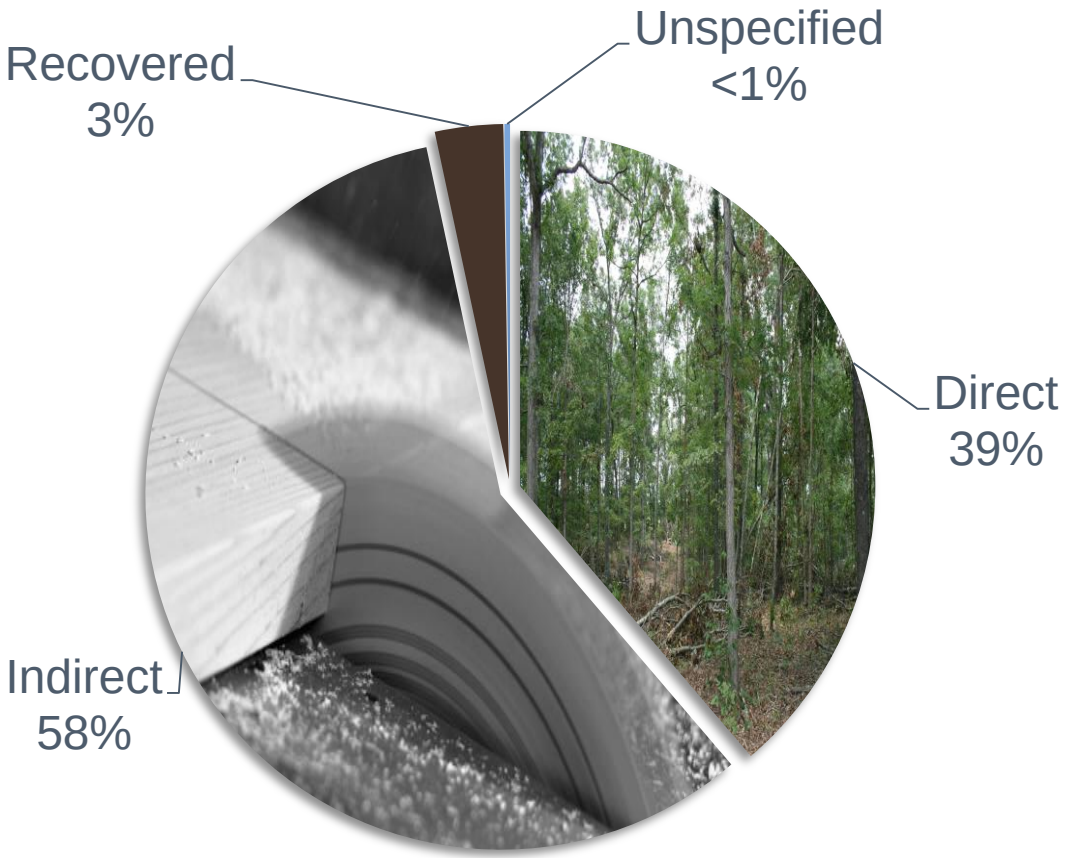
- Current and historically, a major source of renewable energy.
- Fast development of national and regional markets, allowed greater price transparency. Recent growth driven by RES. Wood pellets dominate international trade.
- Emergence coincided with decline in wood product manufacturing and employment.

Wood Energy Share of Renewables (2009)



Source: UNECE/FAO Joint Wood Energy Enquiry

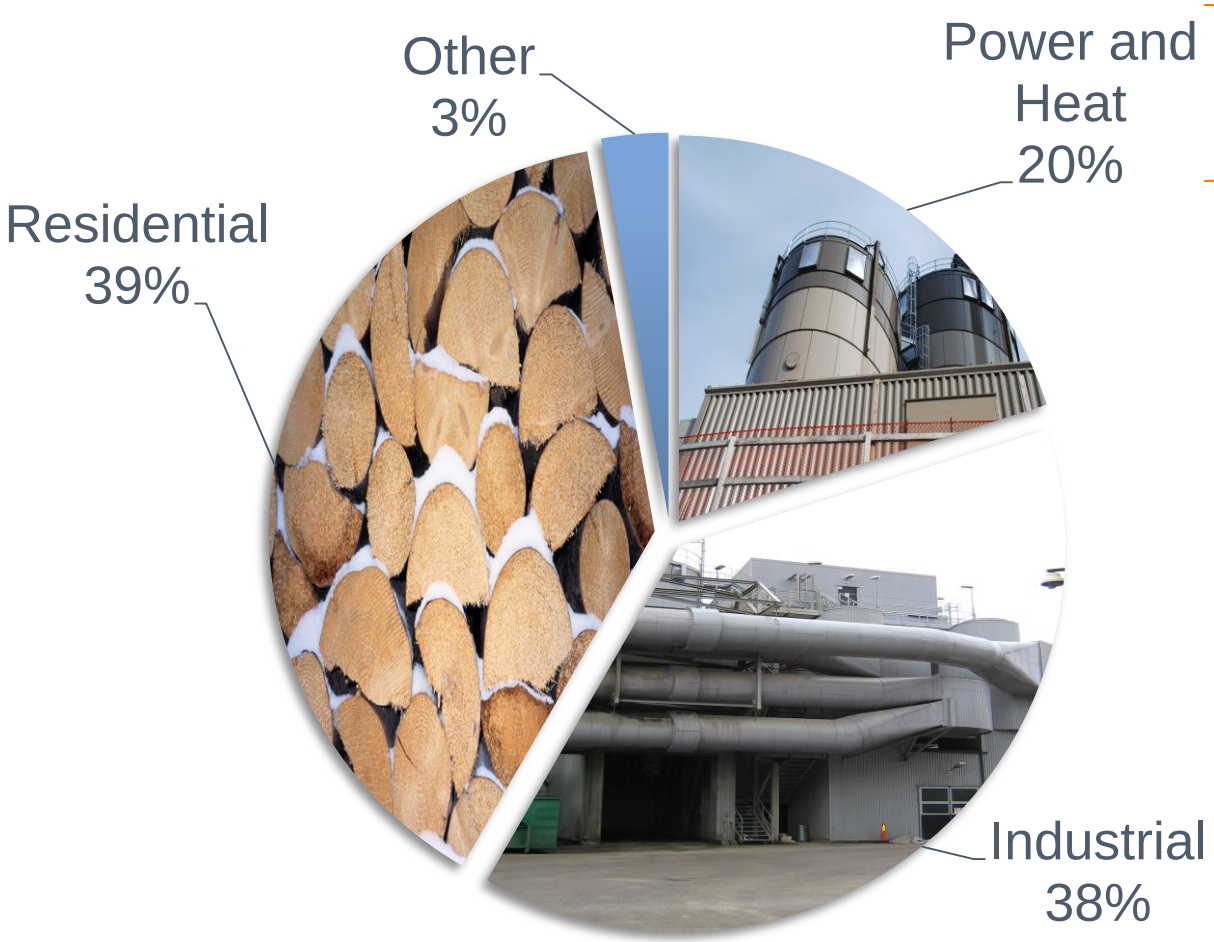
Wood Energy: Sources
JWEE total (2009)



Total wood energy generation: 595,682 (1000 m^3)

Source: UNECE/FAO Joint Wood Energy Enquiry

Wood Energy: Uses
JWEE total (2009)



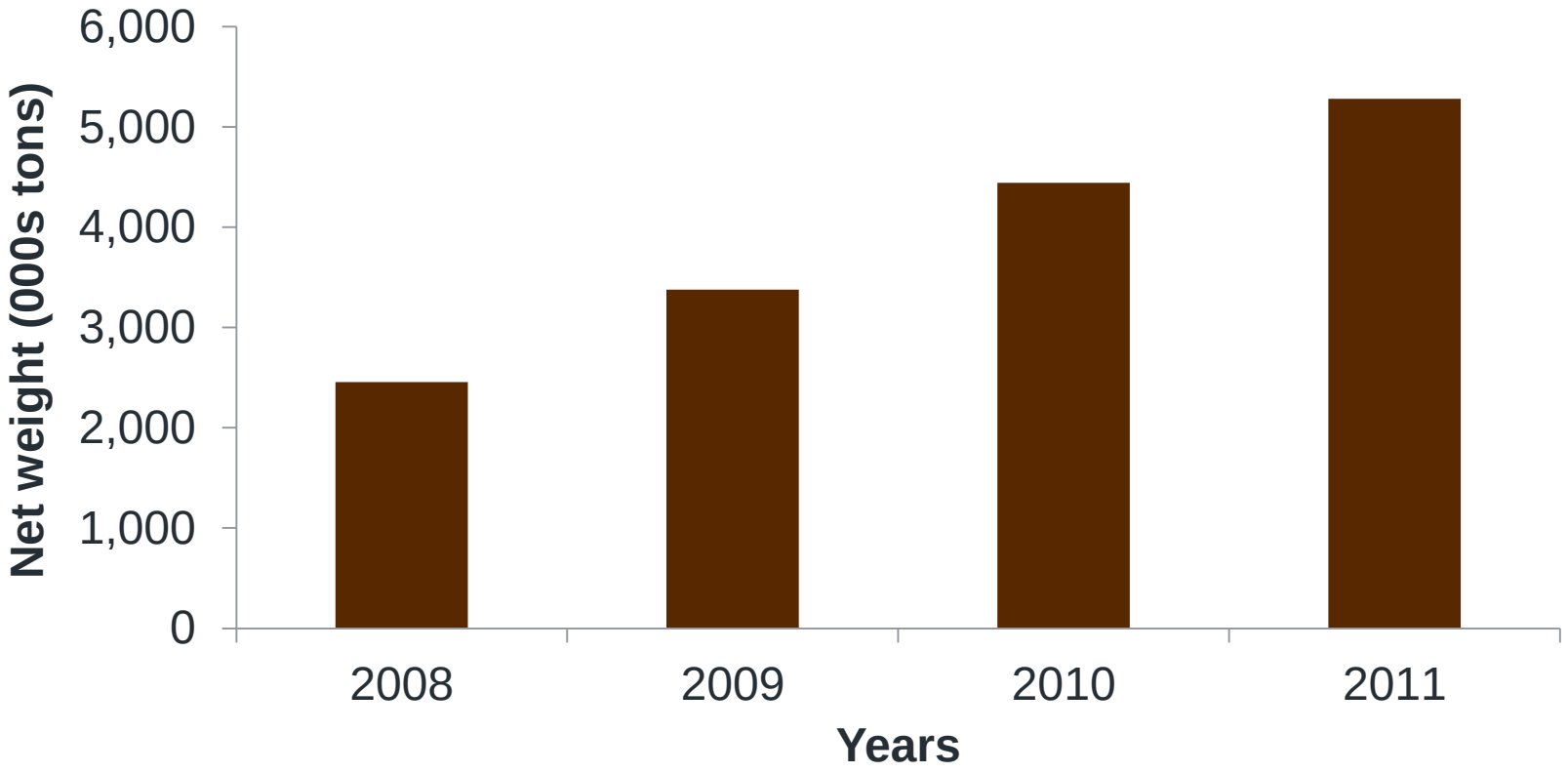
Total wood energy generation: 595,682 (1000 m^3)

Source: UNECE/FAO Joint Wood Energy Enquiry

Wood Energy Markets: EU

- Directive 2009/28/EC set EU target to reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy in the transport sector.
- EU produces most of the residential pellets for heating, a large proportion of industrial pellets are imported.
- Canada, USA and the Russian Federation are the main exporters of woody biomass feedstock to the EU

Imports by EU-27 of Fuelwood and Woody Residues (commodity 440130), as reported by EU-27: 2008-2011



Source: COMTRADE UN

Wood Energy Markets: Russian Federation

- Joined WTO in 2012
- Exports dominated by large industrial pellet companies. Pellet production reached 1 million tonnes in 2012.
- High dependency on European energy plants and government policies.
- Ongoing structural changes; trend towards increasing production capacity and capital investments.

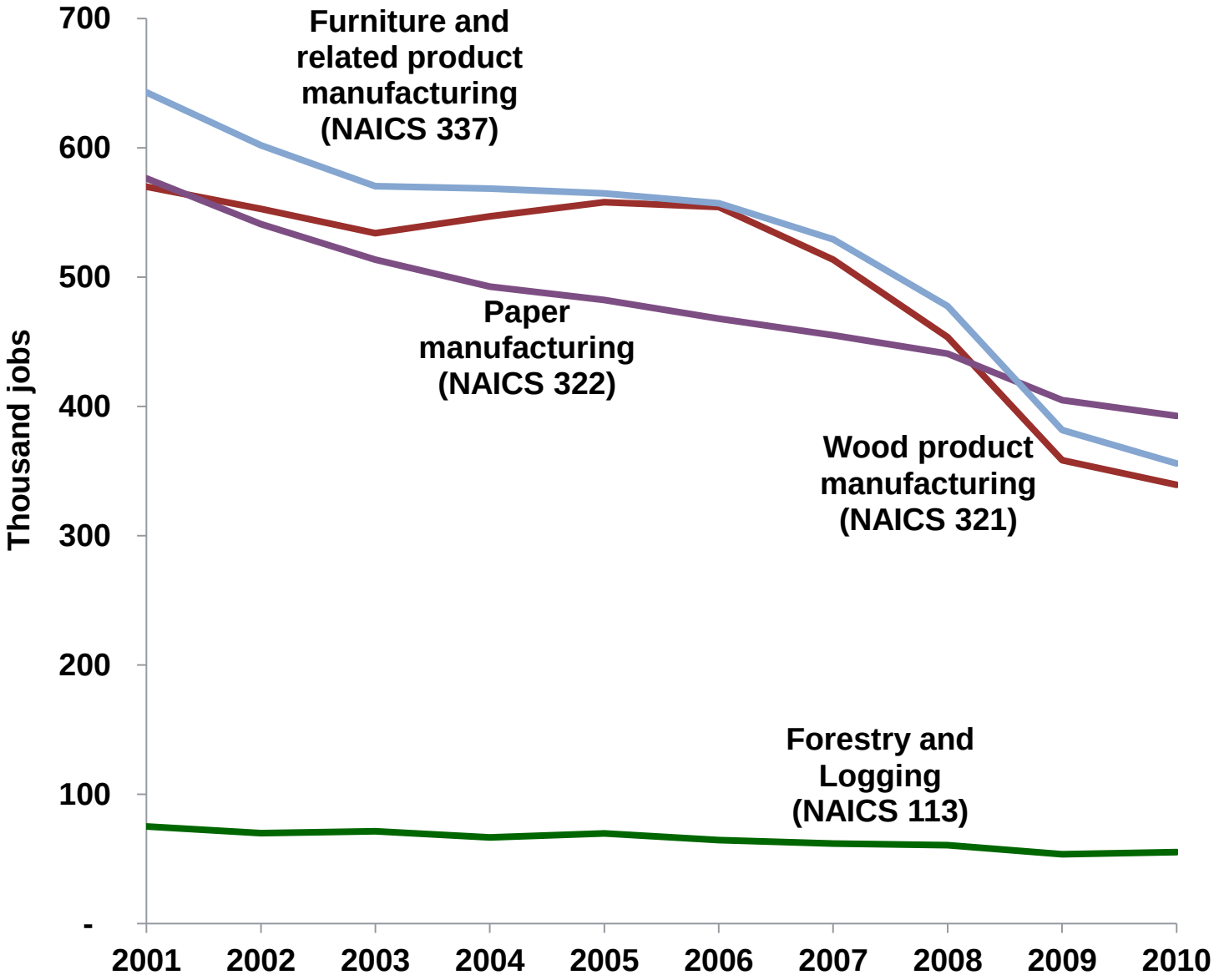
Wood Energy Markets: USA

- Wood energy consumption unchanged from 2010.
  - Estimated 10% decrease in use for power offset by increase in residential and industrial uses.

- Pellet manufacturing most dynamic wood energy sector. Export capacity has increased from <100,000 tonnes in 2008 to almost 2 million tonnes in 2011.

- Pellet production for the local market and use for US residential heating is stagnant and perhaps declining.

U.S. Employment trends in traditional wood-related industries.



Wood Energy: 2013 and beyond

Future Trends in UNECE region

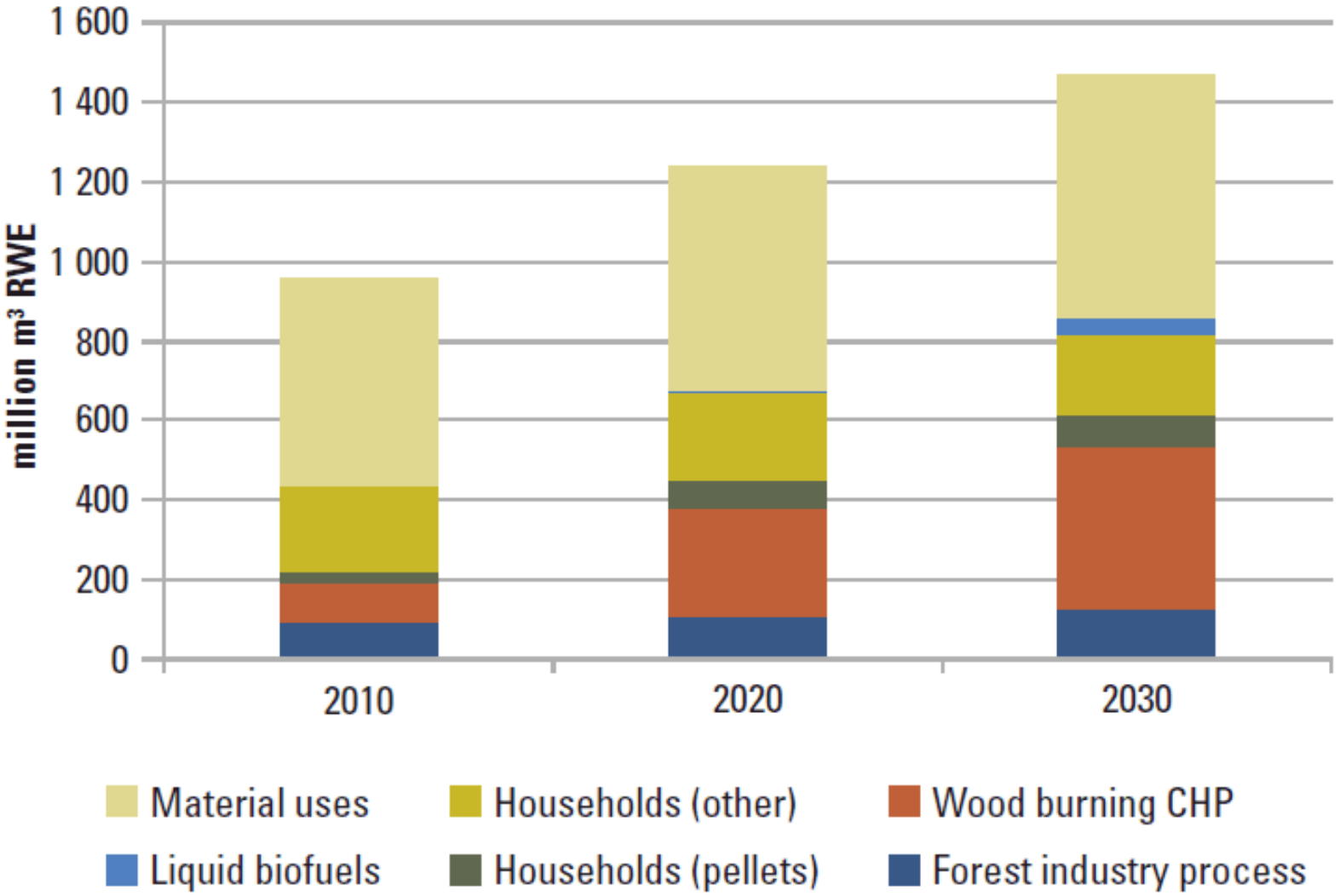
- Global wood energy markets expected to grow driven primarily by EU's 2020 commitment

- Trends vary by sector:
  - Wood energy use dominated by heat and power generation – heavily influenced by public policy
  - Wood energy consumption greatly dependent on pulp & paper production and wood manufacturing
  - Residential sector most likely to see modest growth

2013 and Beyond: European Forest Sector Outlook Study II

- Assumption: RES trend continues to reach 25% by 2030.
- Estimated growth rate for wood energy scenario is 3.5%. Share in RES falls from current 50% to 40% by 2030.
- Wood supply would have to increase by 50% by 2030. Increase in removals and more use from less conventional sources will be expected. Increase in harvest residues and stump extraction may threat healthy forests.

Consumption of Wood in Promoting Wood Energy Scenario 2010-2030 (European Forest Sector Outlook Study II)



2013 and Beyond:
European Forest Sector Outlook Study II

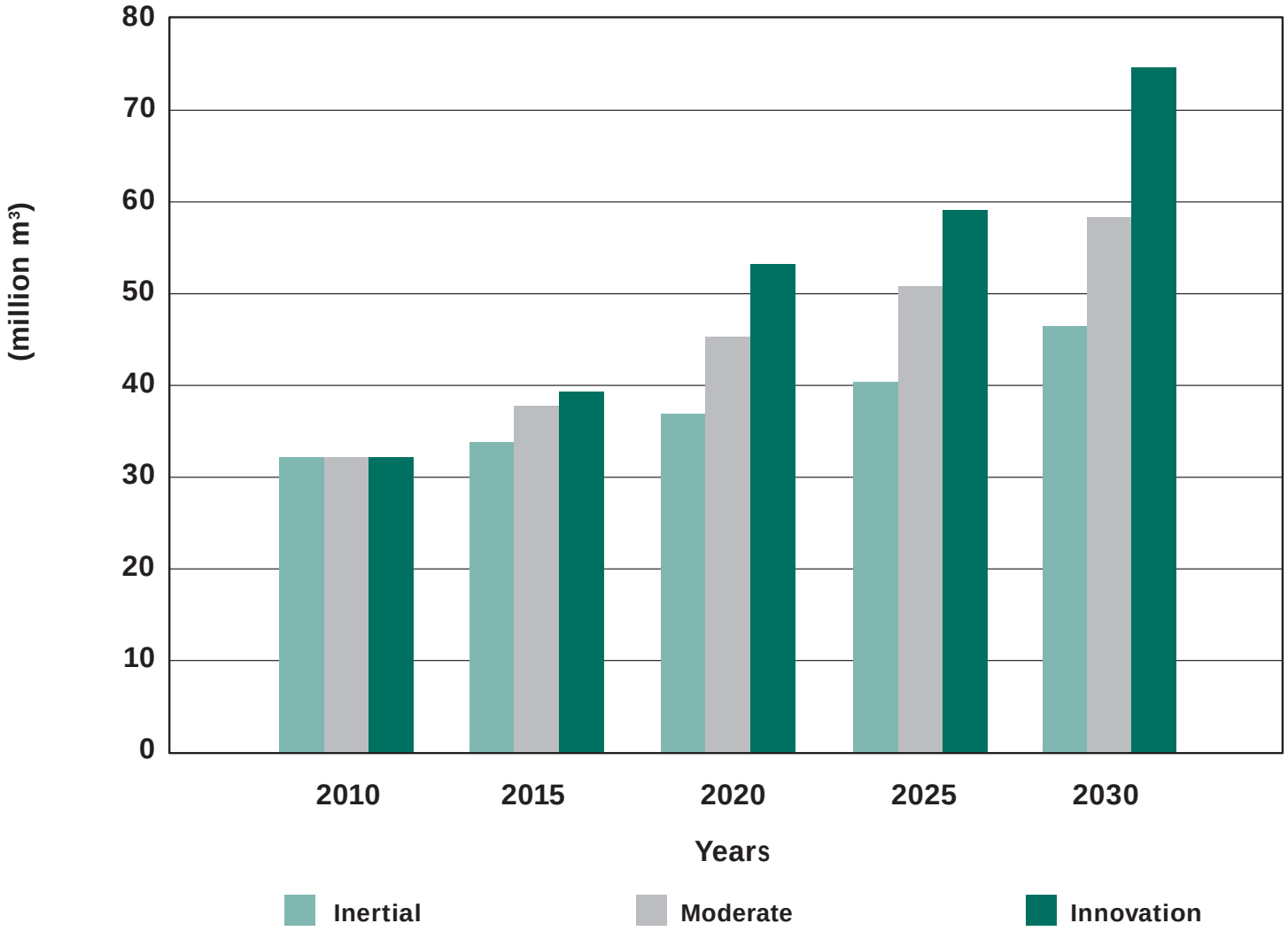
- Solutions may include:
  (a) imports certified for sustainability;
  (b) manage protected forest areas (managing 60% of protected forest areas at 60% harvest levels);
  (c) fast-growing tree plantations.

2013 and beyond: Russian Federation

- Expected growth in pellet production
  - Over 700.000 tonnes annual production capacity under construction in 'Priority Investment Projects'.
  - Plants under construction in Siberia and the Far East.

- Local markets are beginning to grow (e.g. Moscow), high price fluctuations.
- Challenges: Transportation and logistics, illegal logging, adoption of certification.

Outlook for Consumption of wood raw materials for biofuels in the Russian Federation

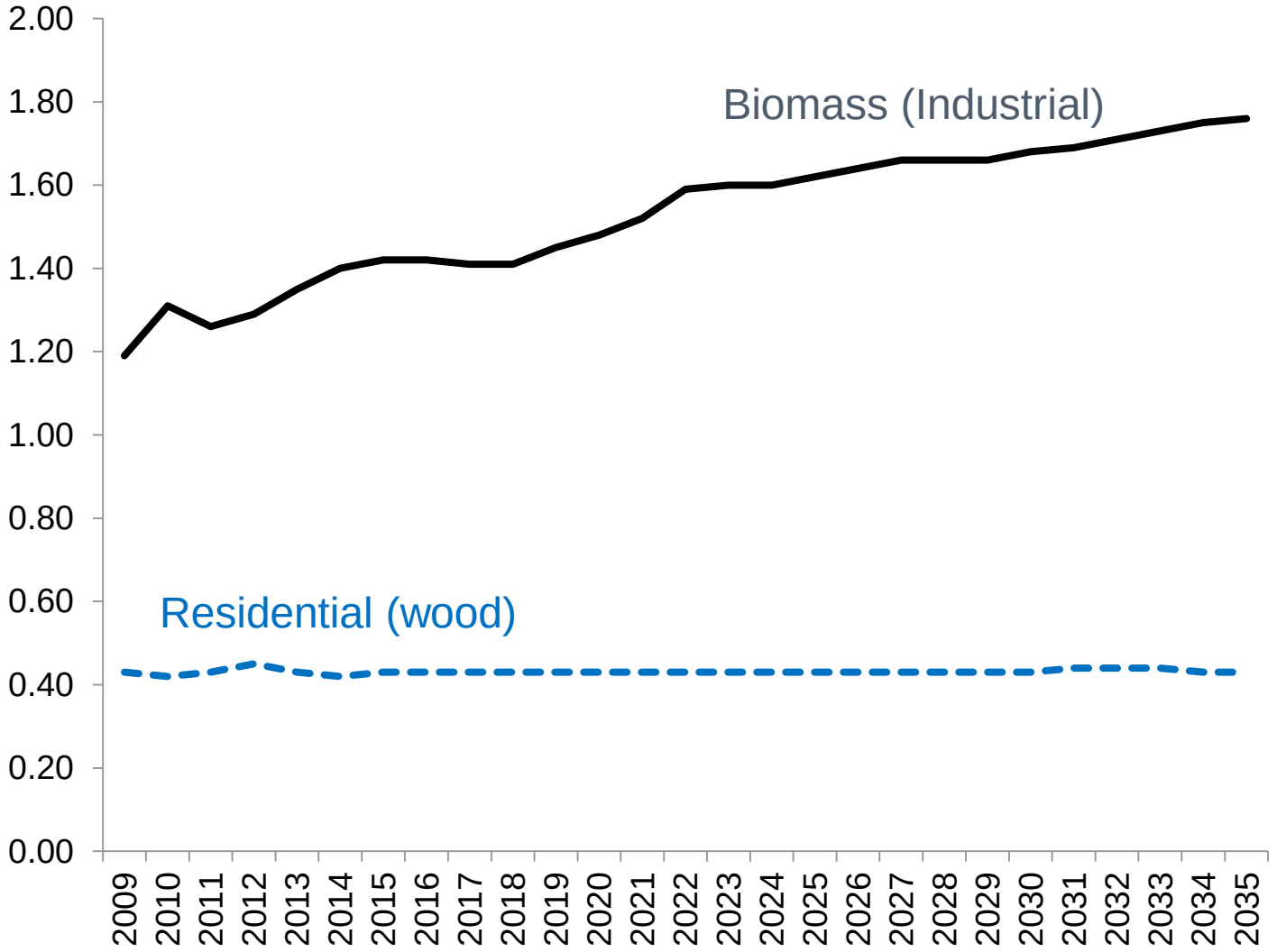


Source: FAO (2012) The Russian Federation Forest Sector Outlook Study to 2030

2013 and beyond: USA

- Production and consumption:
  - By 2015 capacity for exports could increase to more than 6 million tonnes to meet demand from the EU.
  - US Dept. of Energy estimates 2010-2035 (reference) growth rate 4.4% for marketed biomass energy. Flat consumption in residential sector. Transport?
- Public Policy:
  - Little Federal level action compared to states.
    Eg. Massachusetts

Biomass Energy Consumption by Sector and Source (USA)



Source: Annual US Energy Outlook - Early Release, U.S. Energy Information Administration (2012)

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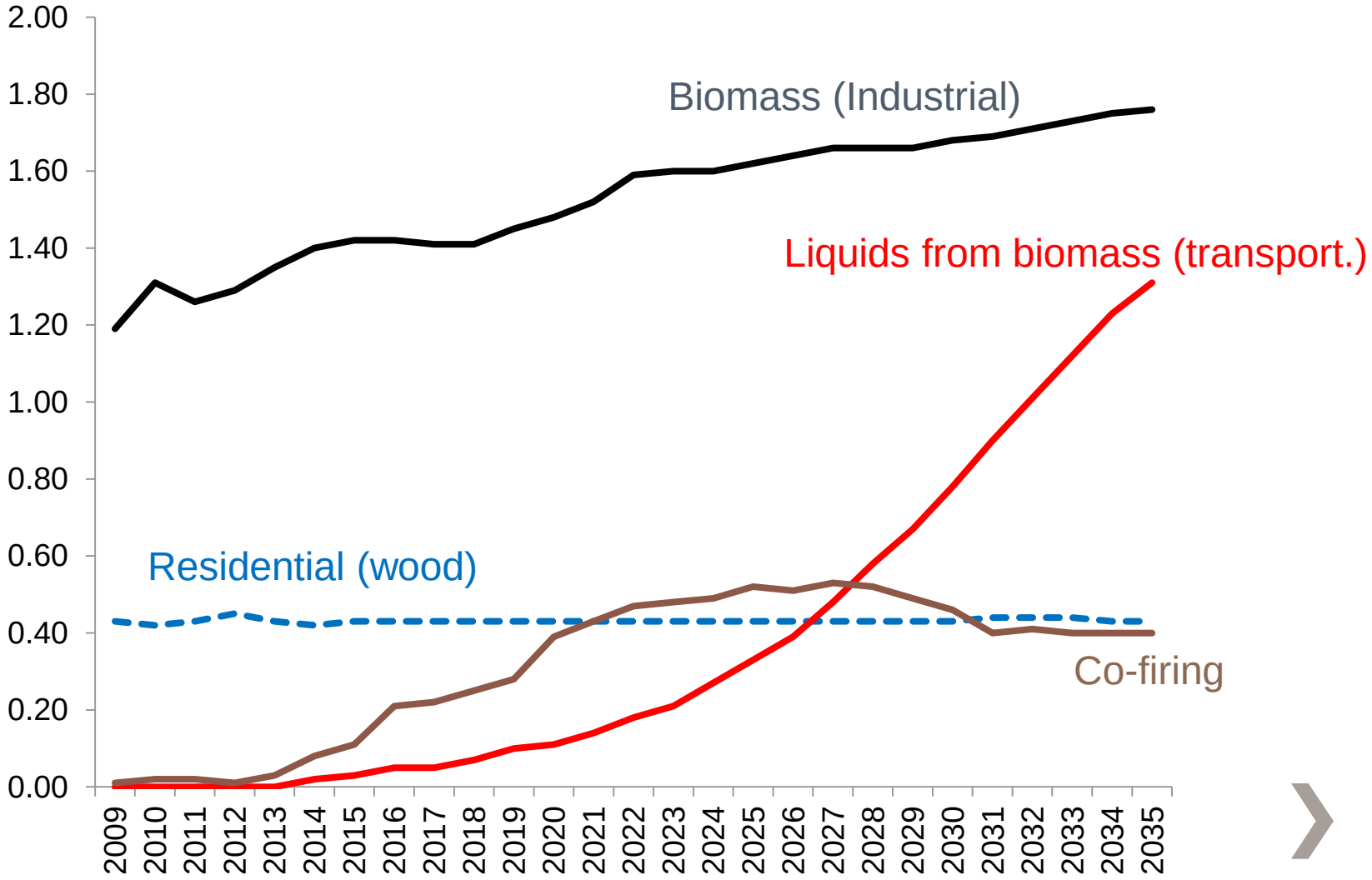

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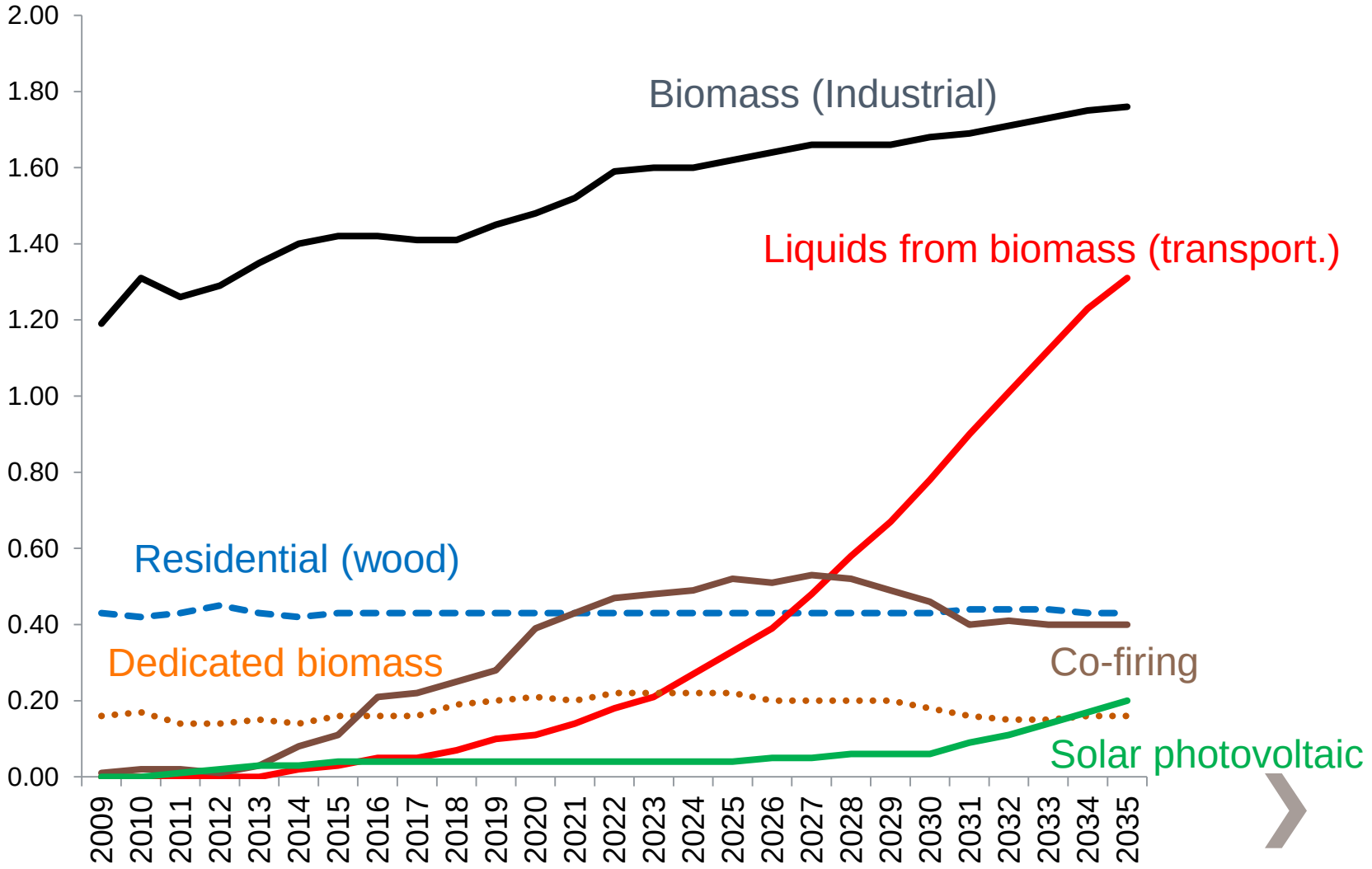
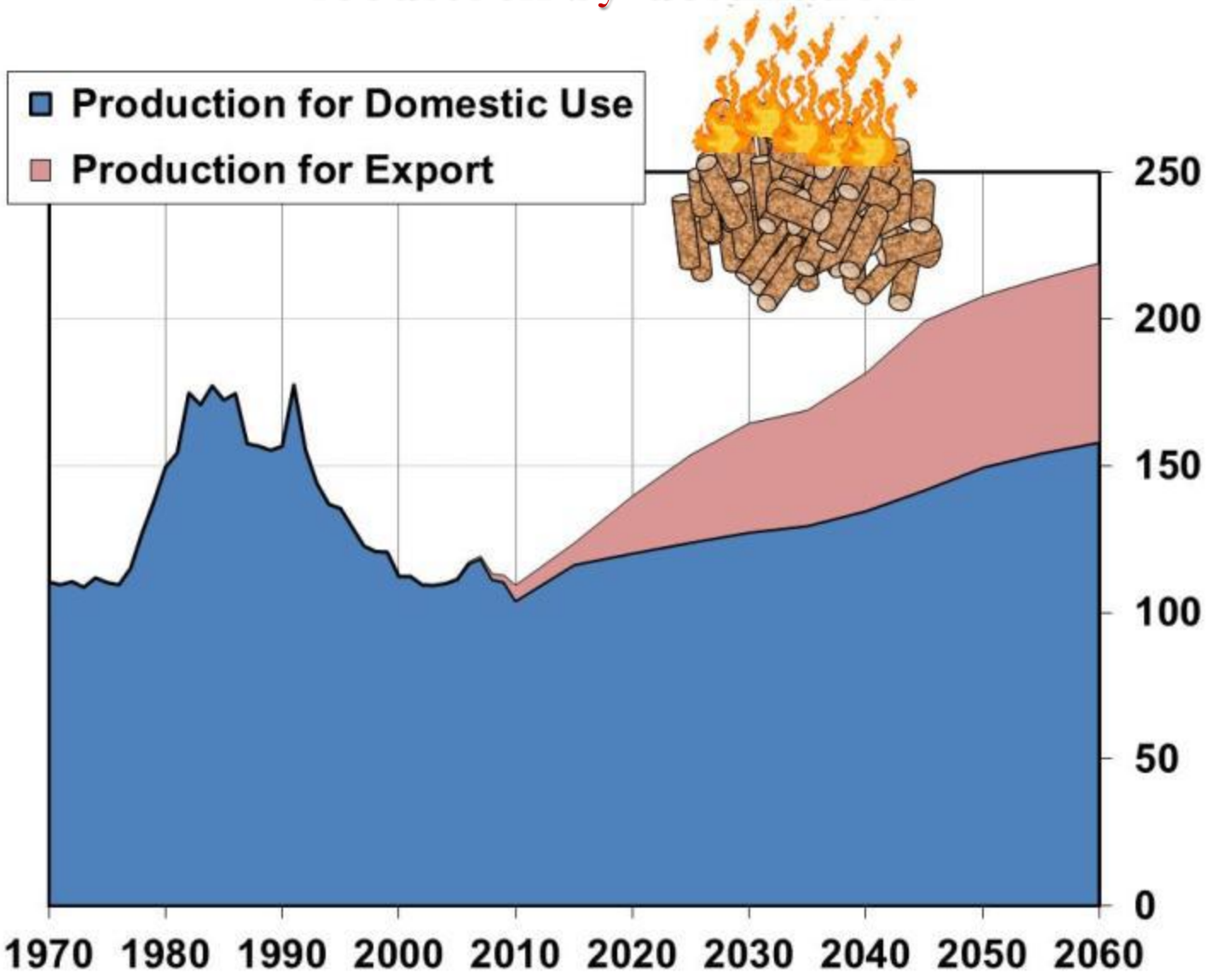


Source: Annual US Energy Outlook - Early Release, U.S. Energy Information Administration (2012)

Historical and projected U.S. production of wood fuel feedstock by destination



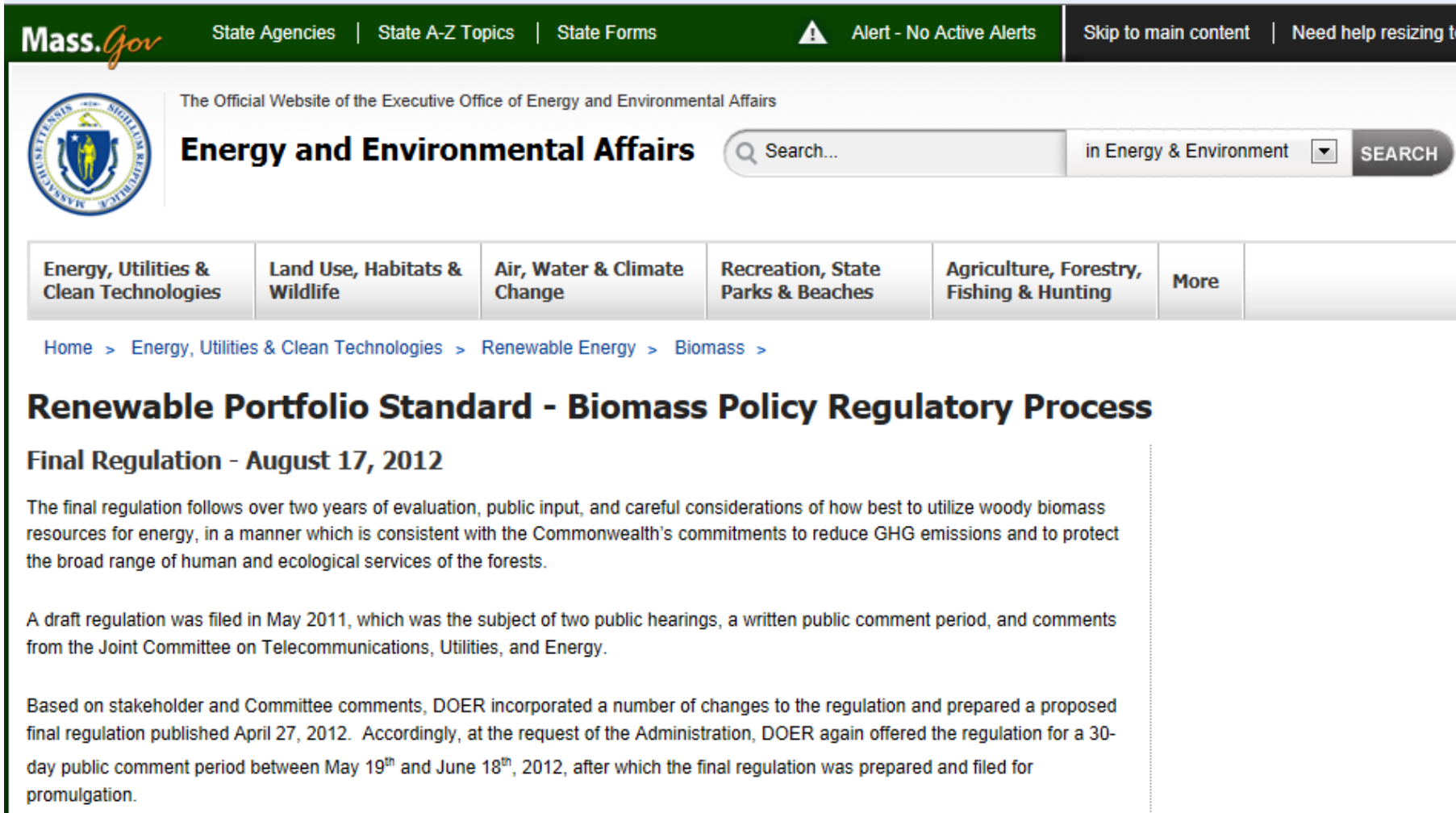
Sources: FAOSTAT(Historical) and USFPM/GFPM (Projections), Courtesy of Dr. Peter Ince USFPL

U.S. Environmental Protection Agency

Biogenic Carbon Emissions Panel recommendation to accounting framework for biogenic CO_2 emissions from stationary sources:

- Each case compared to anticipated baseline scenario where biomass is not used for energy.
- Important to capture market and landscape-level effects including market-driven shifts in planting, management, harvest, displacement of existing users and land-use changes.
- Consider (a) developing default Bioenergy Accounting Factors by feedstock category and region, (b) facility-specific BAFs calculated to reflect the incremental carbon cycle and net emissions effects of a facility's use of a biogenic feedstock.

Massachusetts Renewable Energy Portfolio Standard (RES)



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Renewable Portfolio Standard - Biomass Policy Regulatory Process

Final Regulation - August 17, 2012

The final regulation follows over two years of evaluation, public input, and careful considerations of how best to utilize woody biomass resources for energy, in a manner which is consistent with the Commonwealth's commitments to reduce GHG emissions and to protect the broad range of human and ecological services of the forests.

A draft regulation was filed in May 2011, which was the subject of two public hearings, a written public comment period, and comments from the Joint Committee on Telecommunications, Utilities, and Energy.

Based on stakeholder and Committee comments, DOER incorporated a number of changes to the regulation and prepared a proposed final regulation published April 27, 2012. Accordingly, at the request of the Administration, DOER again offered the regulation for a 30-day public comment period between May 19th and June 18th, 2012, after which the final regulation was prepared and filed for promulgation.

Over the next weeks and months, DOER will provide appropriate outreach and training to the forestry and biomass industries to prepare for compliance with the new regulations.

http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/biomass/renewable-portfolio-standard-biomass-policy.html

Massachusetts Renewable Energy Portfolio Standard (RES)

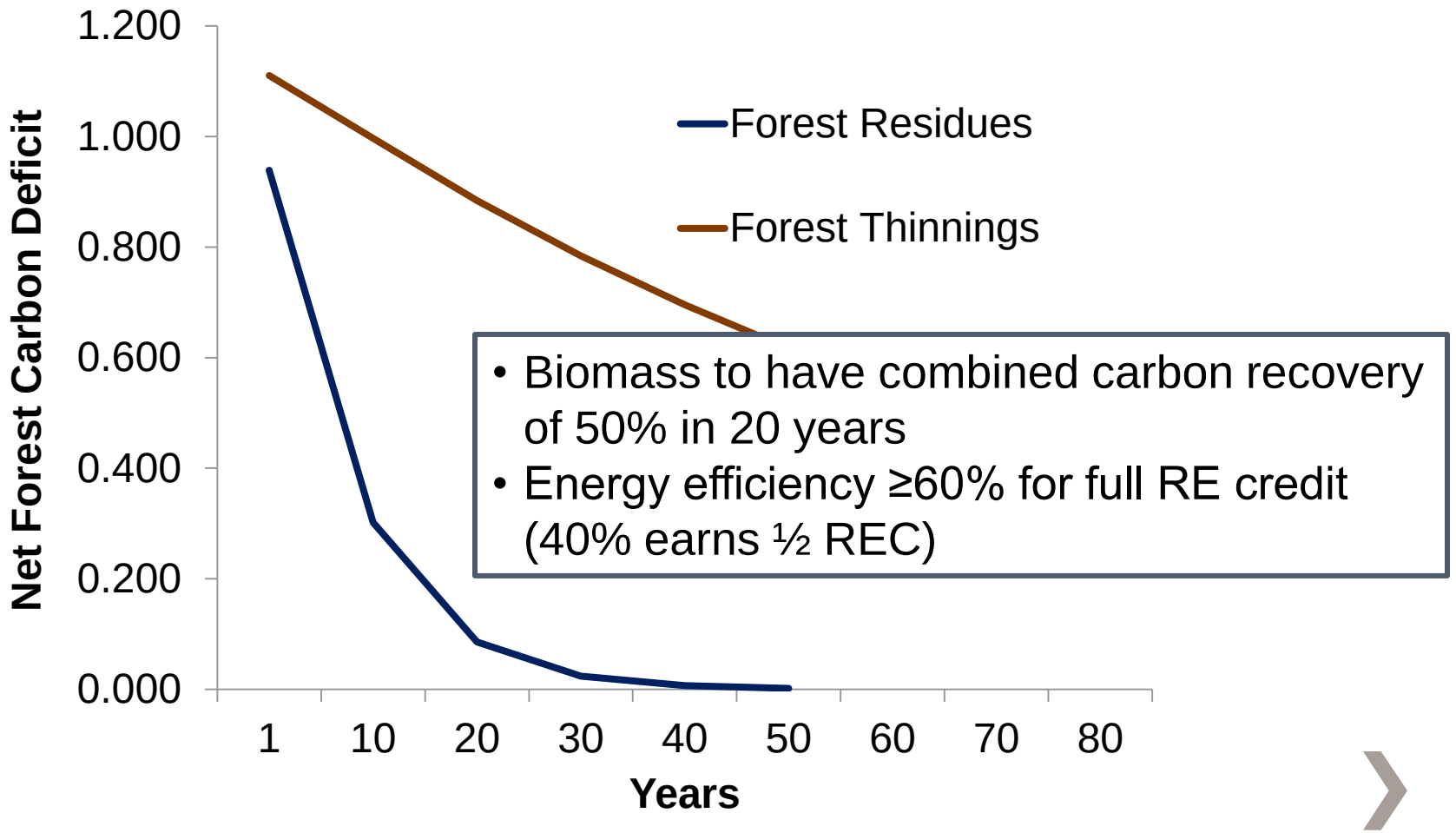
- GHG accounting template to demonstrate compliance with GHG emissions reduction of 50% in 20 years.

- Eligible Biomass Woody Fuel
  - Forest Derived Residues
  - Forest Derived Thinnings
  - Forest Salvage
  - Non-Forest Derived Residues
  - Dedicated Energy Crops

- Weighted average of all the metered weight of utilized biomass fuel types

http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/biomass/renewable-portfolio-standard-biomass-policy.html

Forest Derived Biomass Deficit Analysis – Thinnings and Residues Curves from Manomet Report



http://www.mass.gov/eea/docs/doer/renewables/biomass/ma-rps-regulation-overall-efficiency-and-ghg-analysis-guideline-doer-081712.xlsx

Biomass Fuel Certificate - F

Forest Derived Biomass Fuel

To be completed by Harvester and Deliverer

Verification provisions

- Advisory Panel to monitor and make recommendations on verification process
- Forest Impact Assessment every 5 years: Impacts on Massachusetts and regional forests

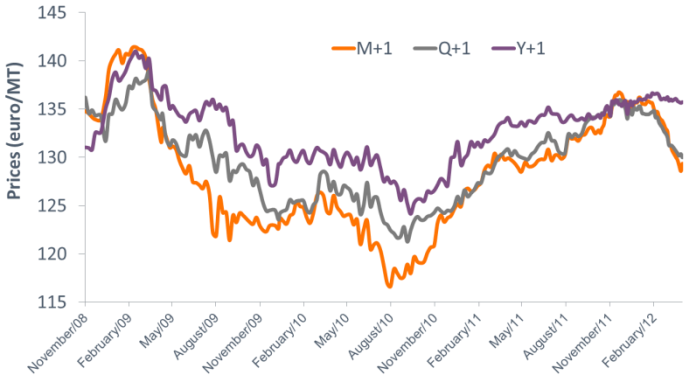
Name of responsible Harverster or Harvesting Company	0

Forest/Harvest Information (from *Biomass Tonnage Report*)

Landowner	Last, First
Tract Number or Name	0
Tract Town	0
Tract State*	0
Forester Name	Last, First
Forester License/State	Number,
Total Acreage of Harvest	0
Date of Submisssion	1/0/1900
Date of Harvest	0

Percent of Eligible Biomass Fuel as prescribed in Forester harvest plan	**Residues**	
	Thinnings	

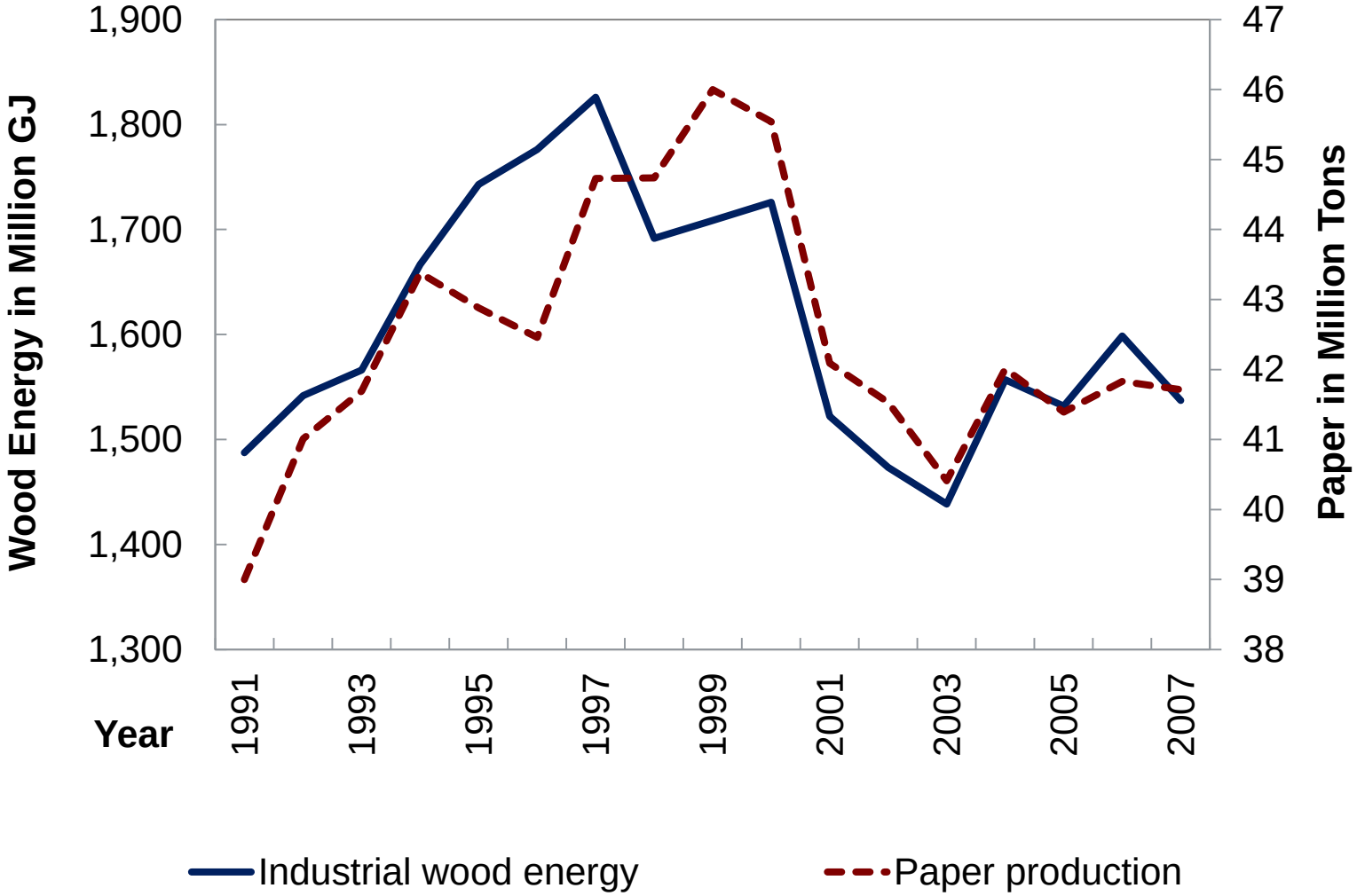
The Future of Wood Energy



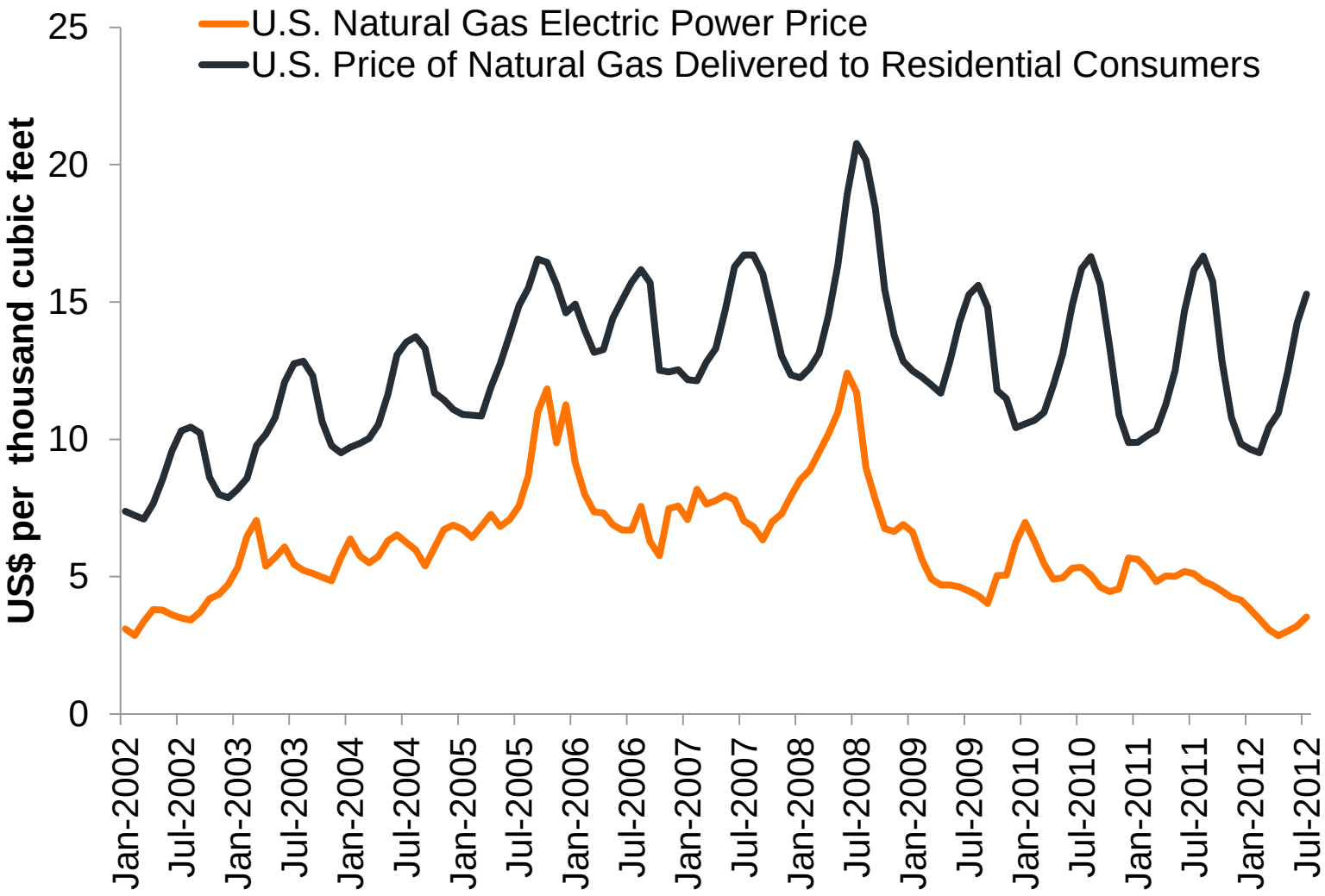
Wood Energy : Key Influential Factors

- Economic growth - Pulp & paper, wood manufacturing industries
- Fossil fuel prices: Oil and natural gas in particular
- Global markets: Expected growth in demand from Asia
- Public policy
  - Sustainability Criteria
  - Treatment of Biogenic Emissions (Carbon neutrality?)
  - RES targets and financial incentives

Pulp and Paper Production & Industrial Wood Energy



Wood Energy: Fossil Fuel Prices



US Energy Information Administration, Online at http://www.eia.gov/dnav/ng/hist/n3010us3m.htm

Wood Energy : Demand in Asia

- South Korea:
  - RPS for power generation: 2012 – 2%
  - Increase ~ 0.5% annually until 2022 – 10%
  - Biomass energy target for 2020: 4.2 million tons of oil equivalence
  - Pellet equivalent: 10 million tons
- Japan: Alternative to nuclear power
- China: Continuously growing demand

Wood Energy: Public Policy (certification)

Sustainability criteria for solid biomass:

- 25 February 2010: European Commission presented a report on sustainability requirements for the use of solid biomass and biogas in electricity, heating and cooling → report makes recommendations, no binding criteria.
- Consultation on the possible criteria was organized for EU Member States and stakeholders by the European Commission in January 2012.
- Forest-rich states do not support additional criteria. Instead, link sustainability criteria with existing legislation, such as the coming EU Timber Regulation.

Wood Energy: Public Policy (carbon neutrality)

- Management of carbon neutrality can affect wood products manufacturing industry and wood energy generation

"If all of a sudden the 55% biomass-based energy produced by the paper industry was no longer carbon neutral, the additional carbon price to be paid by the sector under ETS (EU Emissions Trading System) *would range from 0.5 to 1.5 billion euros per year."*
Bernard de Galembert, Confederation of European Paper Industries (May, 2012)

Wood Energy : Public Policy Recommendations

- Support sustainable and integrated wood energy systems
- Emphasize locally-generated energy
- Promote efficiency, innovation, private investment
- Flexible and adaptable to changing market, technological and environmental conditions
- Public investments in research and training

Conclusions

- Wood energy remains major source of renewable energy
- Growing at slower rate than other renewables, shrinking share of TPES
- Capital investments (pellets) to meet demand in EU, Asia
- Ecological risks of additional removals require options
- Economic growth and global energy markets
- Public policy has been instrumental to creating markets for wood energy and can equally stall them

Thank You

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