

# TASK 40 NORWEGIAN COUNTRY REPORT - STATE OF THE ART ON THE NORWEGIAN BIOENERGY SCENE

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## OUTLINE

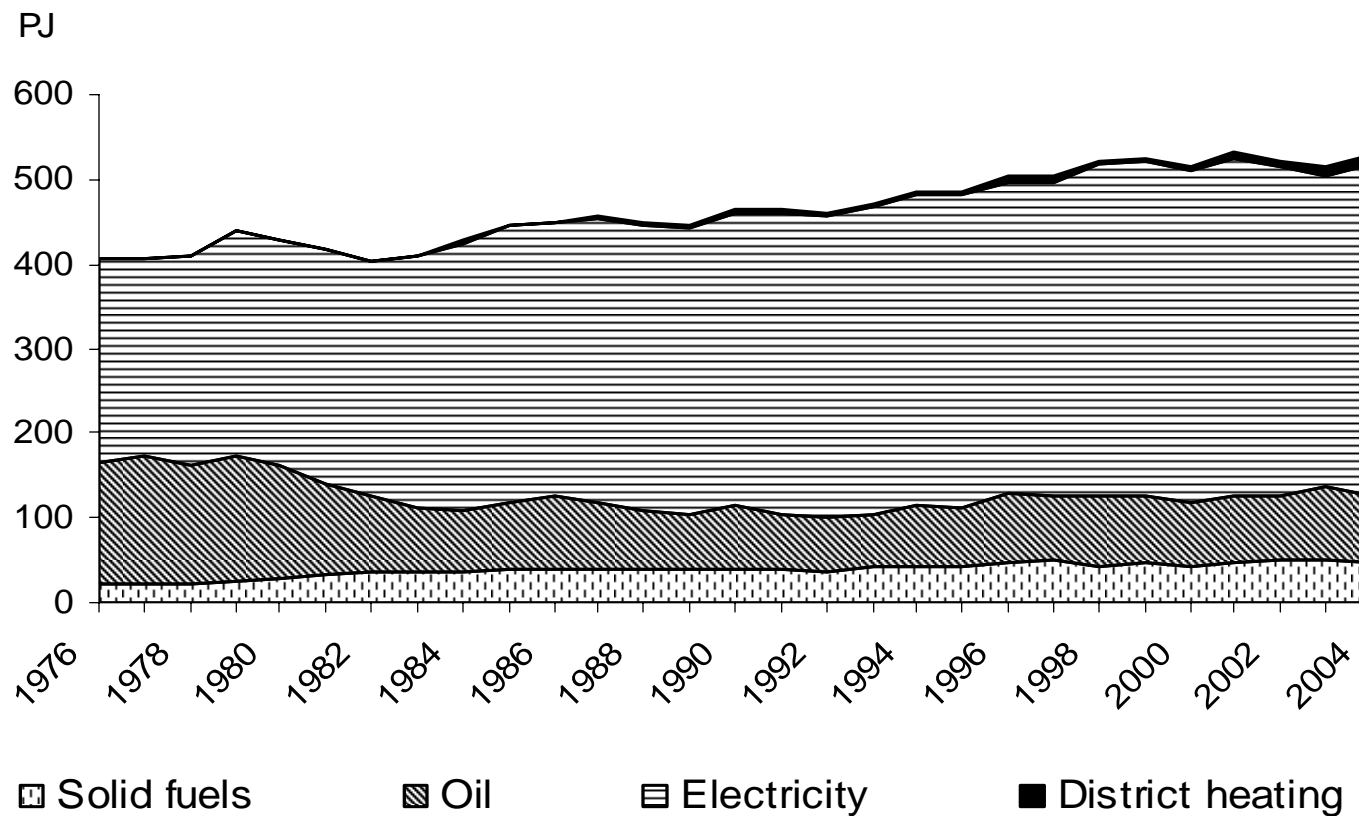
- PART I – CURRENT STATUS
  - Briefly on the Norwegian energy system
  - Current bioenergy use
  - Biomass potential
  - The role of international trade
- PART II – FUTURE PROSPECTS
  - Barriers
  - Market modeling projections
- Main focus on the heat market and woody biomass

# PART I: CURRENT STATUS

## SOME FACTS ABOUT ENERGY AND ENERGY USE IN NORWAY

- “Oil economy”
  - Europe’s largest exporter of petroleum
  - Income from oil and gas sectors represents 18% of GDP
- Also, extensive access to hydropower
  - Extensively utilized
  - Electricity is traded in a liberalized Nordic market
- But:
  - Increasing electricity consumption and limited capacity of production units and grids put pressure on the electricity market (prices and security of supply)
  - CO<sub>2</sub> emissions are rising and current emission levels are well above the Kyoto targets

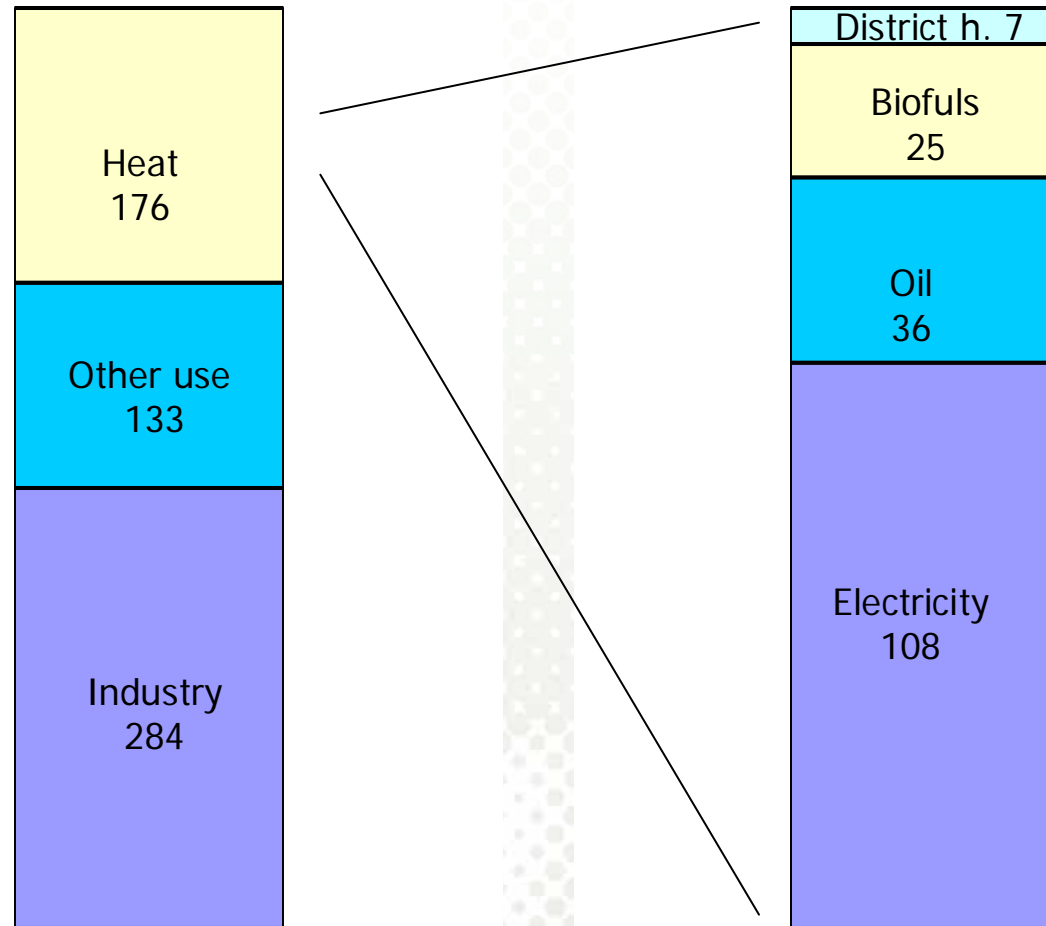
## STATIONARY ENERGY USE 1976-2004



Source: Statistics Norway



# HEAT CONSUMPTION (STØRDAL, 2004)



Stationary energy use  
593 PJ

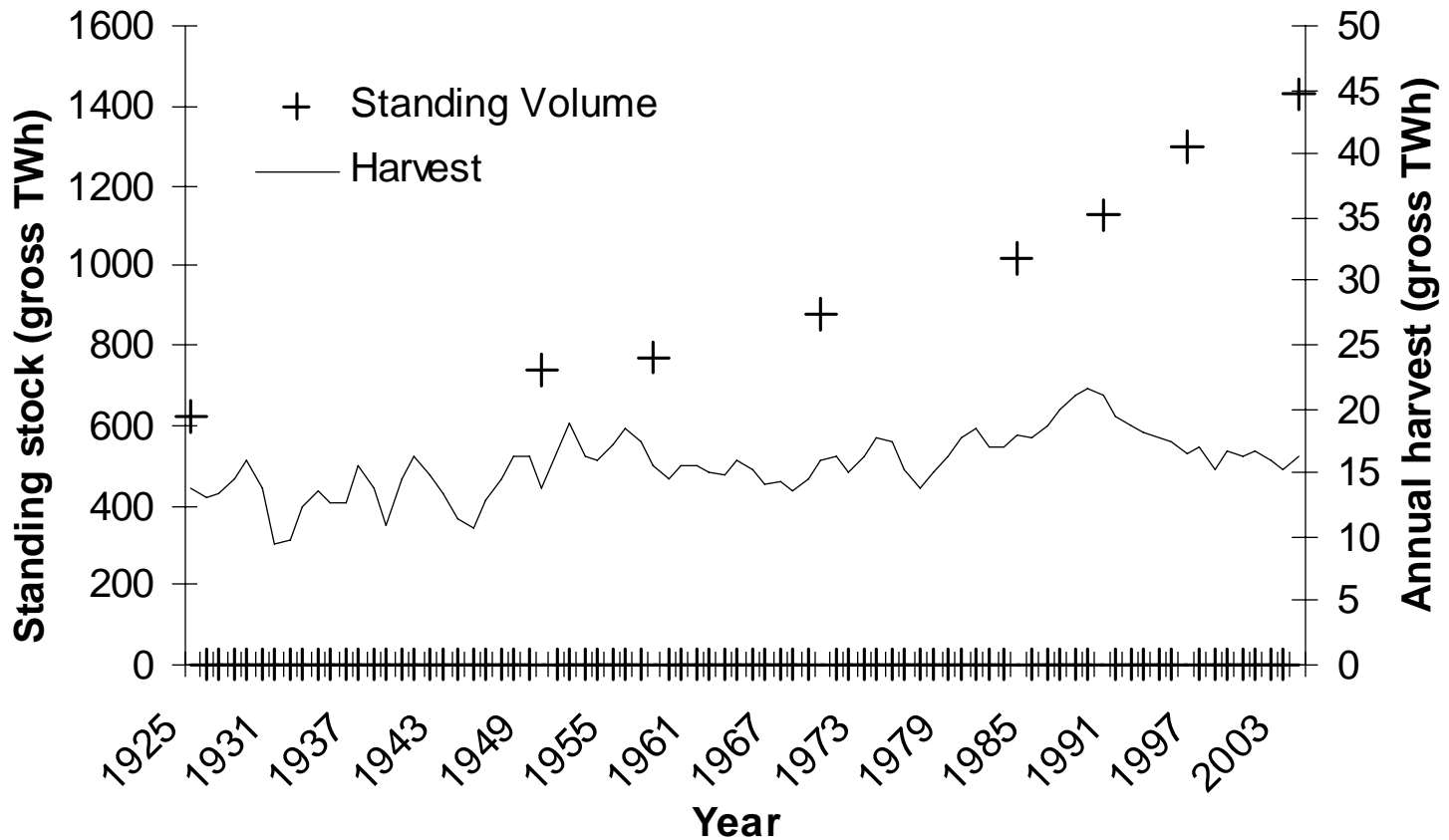
Heating  
176 PJ

## SOLID BIOFUEL PRODUCTION, 2004

	Quantity (1000 ton)	
Logging residues	15.0	-Relatively minor production
Forest industry residues	3.0	
Bark	14.0	
Briquettes	27.7	-Low coverage of water borne heating systems
Pellets	35.1	
Fire wood	≈1000	

Source: Nobio

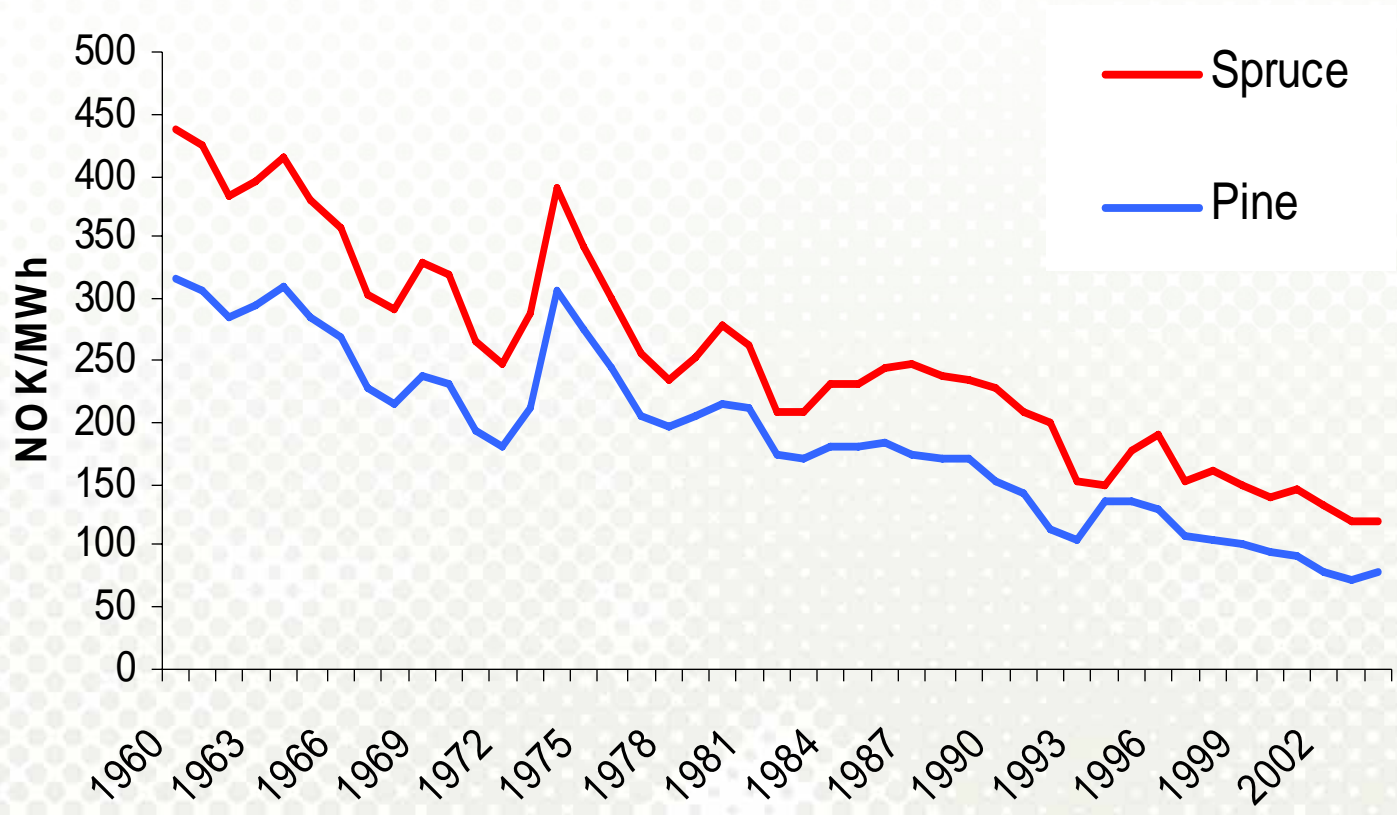
# FOREST BIOMASS RESOURCES



Sources: Nyrod (2003), Statistics Norway and Norwegian land inventory institute



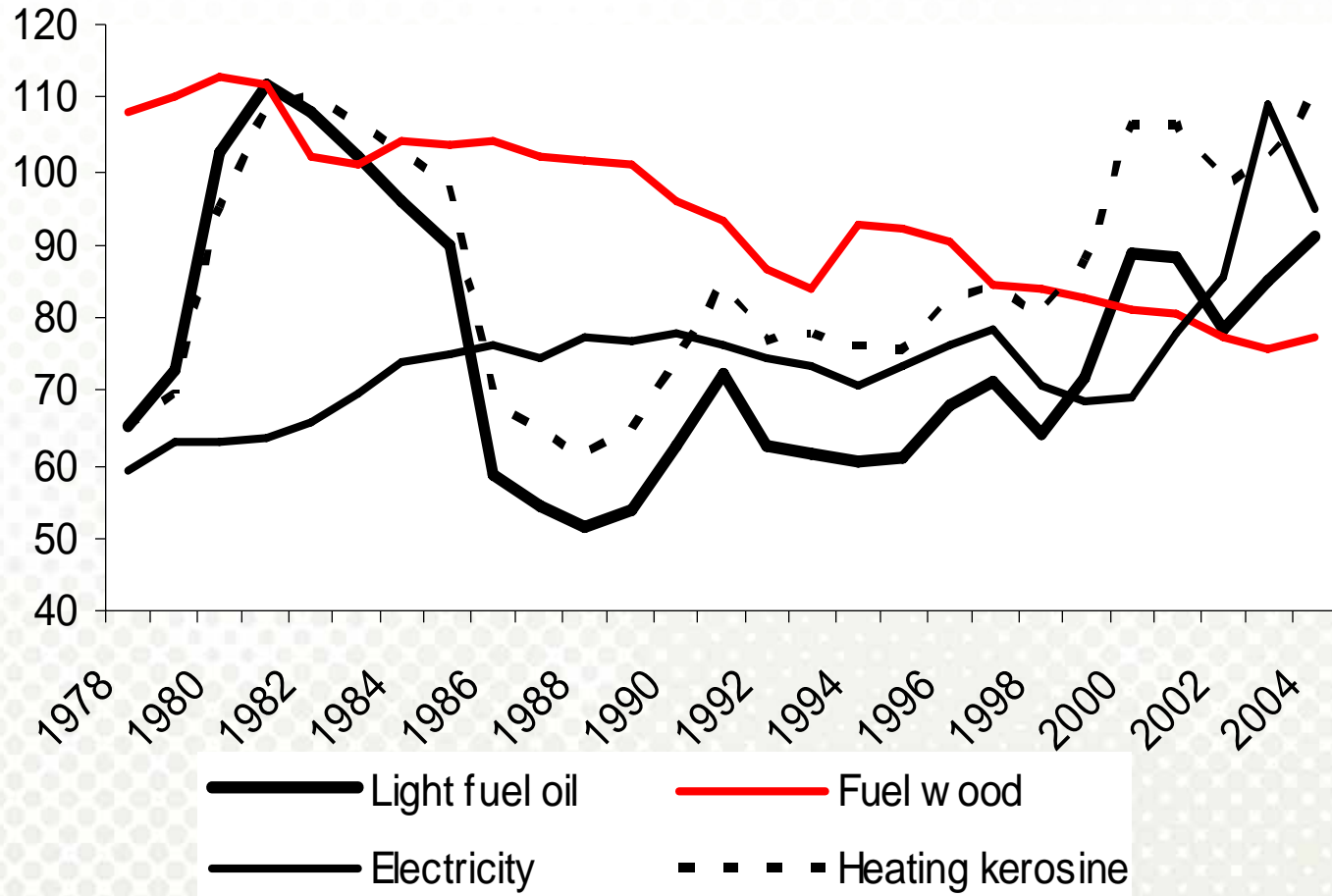
# NORWEGIAN (REAL) PULPWOOD PRICES (1960-2004)



Source: Statistics Norway



## END-USE PRICES OF ENERGY (€/MWh)



Source: Statistics Norway



## INTERNATIONAL TRADE (TJ)

	Import	Export	Net flow
<b>Direct trade</b>			
Pellets	1	27	26
Briquettes	3	5	-2
Firewood	361	4	357

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Firewood	361	4	357
<b>Forest industry</b>			
Roundwood	4405	754	3651
Chips	2196	213	1984
Sawdust	763	142	621
<b>Total</b>	<b>7729</b>	<b>1145</b>	<b>6637</b>

## CONCLUSSIONS PART I

- Electricity (based on hydro power or imports) covers more than 60 % of the heat market, fossil fuels more than 20% and biofuels 15-20%.
- There is a substantial potential for increased utilization of woody biomass.
- Timber (biomass) prices have steadily decreased in recent decades, while electricity and oil prices increases ⇒ improving bioenergy competitiveness
- Low coverage of waterborne heating systems hampers/delays the development

# PART II: PROSPECTS FOR BIOENERGY IN NORWAY

## MAIN BARRIERS FOR INCREASED (SOLID) BIOFUEL USE IN NORWAY

- Point of departure: Bioenergy must be economically competitive to increase market shares
- Barriers
  - Short term: Lack of well functioning markets, especially for biofuels, may hamper development
  - Biofuels markets and heat markets should grow in fairly correspondence
    - Challenge for policy making
    - International (functioning) market is a buffer
- Political barriers

## FUTUTRE PROSPECTS - MARKET MODELING

- Observation: Most bioenergy market potential studies focus on supply OR demand side
- A weakness in these studies is that the market dynamics and thus the impacts of changes in prices is handled inadequately – no (or weak) price mechanisms
- NTM II: A market equilibrium model for timber, forest products and heat markets jointly

## NTM II – BRIEF OVERVIEW

- Components: Timber, forest products (pulp, paper, sawnwood etc), forest industry residues and bioenergy
- Interregional and international trade
- Calculates market clearing prices and quantities in different regions for each product and year
- Advantages
  - Prices are made endogenous
  - Wood fiber supply is well described
  - Competition for fiber between forest industries and bioenergy
  - Regional differences in wood supply and bioenergy competitiveness and demand
  - International trade

## PROJECTIONS TO 2010 USING NTM II

	Bau	Low growth	High growth
<b>Production (GWh)</b>			
Stoves	4226	4726	5175
Micro-grid	261	1622	1949
District heating	375	2904	3284
<i>Total</i>	<i>4862</i>	<i>9252</i>	<i>10408</i>
<b>Import (GWh)<sup>1</sup></b>			
Pine	226	660	922
Non-coniferous	449	1757	1927
<i>Total</i>	<i>675</i>	<i>2417</i>	<i>2849</i>
<b>Wood price (NOK/GWh)<sup>1</sup></b>			
Pine	10.7	12.8	13.2
Non-coniferous	12.2	15.3	15.7

Source: Bolkesjø, Trømborg & Solberg (2006)

## MAIN FINDINGS AND CONCLUSIONS (PART II)

- Bioenergy based on biomass from the forest sector will be fairly competitive in some market segments with constant (2003) price levels of electricity and oil.
- Relatively minor increases in prices of electricity and oil could release substantially increased bioenergy production levels.
- Cost effective expansion of the bioenergy sector in Norway will partly be based on domestic timber and forest industry residues and partly on imported woody biofuels (timber, chips or pellets).
- Investors and policy makers must account for, *ceteris paribus*, increasing raw material costs as the bioenergy sector grows in volume.

Thank you for your  
attention!