

Pellet production and market in Sweden

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Energetic Valorisation
of Forest Biomass
in the South of Europe

PAMPLONA, 24th-25th JANUARY 2007

Energy supply in Sweden 2005

Crude oil and oil products	197 TWh
Biofuel and peat	112 TWh
Nuclear power	210 TWh (including losses of 140 TWh waste heat, gives 70 TWh electricity)
Hydro power	73 TWh
Coal and coke	28 TWh
Natural gas, gaswork gas	10 TWh
Heat pumps (excl. residential)	6 TWh
Wind power	1 TWh
Import-export of electricity	<u>-2 TWh</u> 635 TWh

Source: Swedish Energy Agency

Biofuels in Sweden 2005:

Black liquor	approx.	38 TWh
Other industry residues (Bark, saw dust, chips)		42 TWh
Peat		3 TWh
Refuse		8 TWh
Forest residues	approx.	7 TWh
Pellets residential	approx.	3 TWh
Pellets non residential	approx	4 TWh
Firewood		
Ethanol		
Biogas		

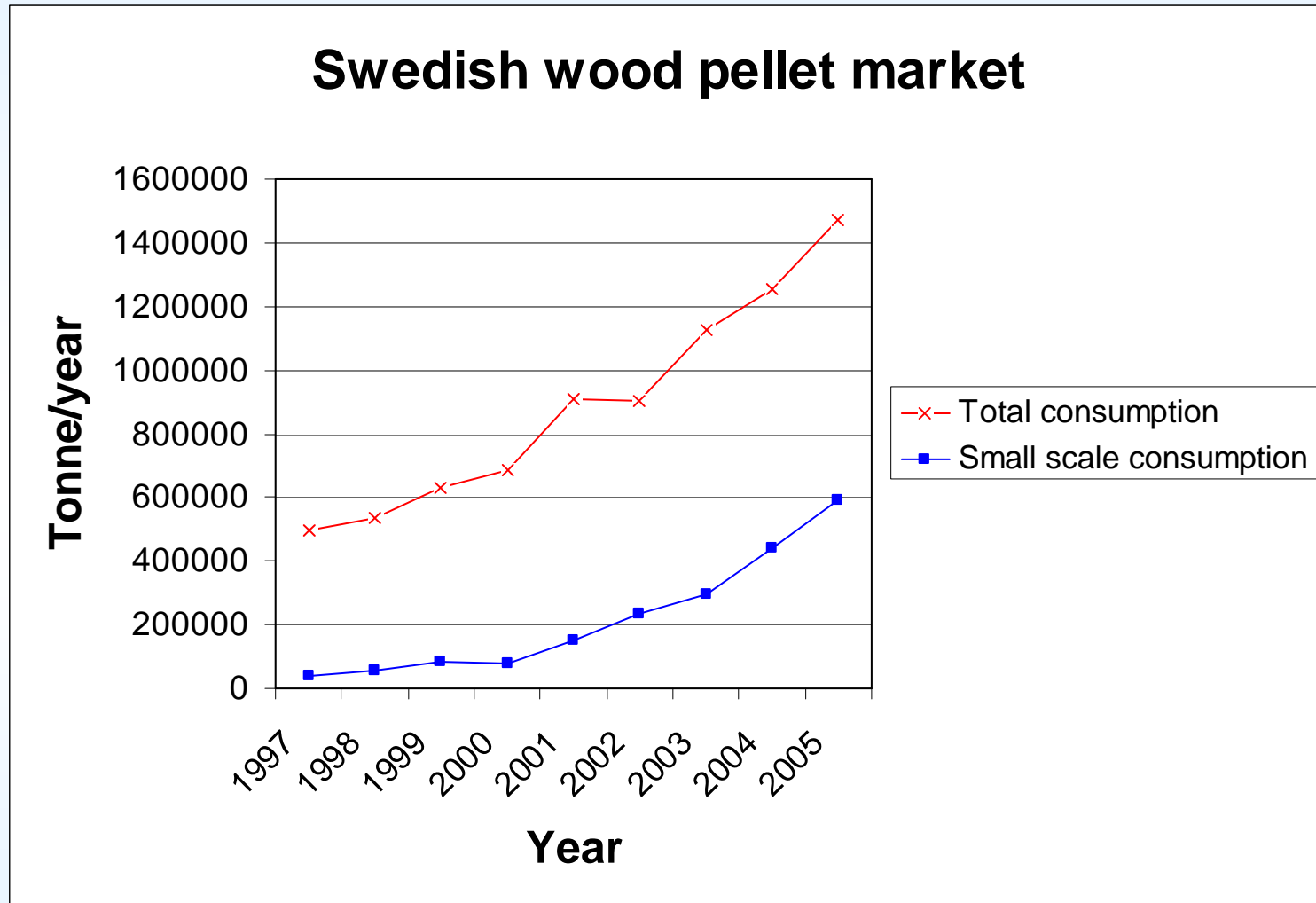
Source: Swedish Energy Agency

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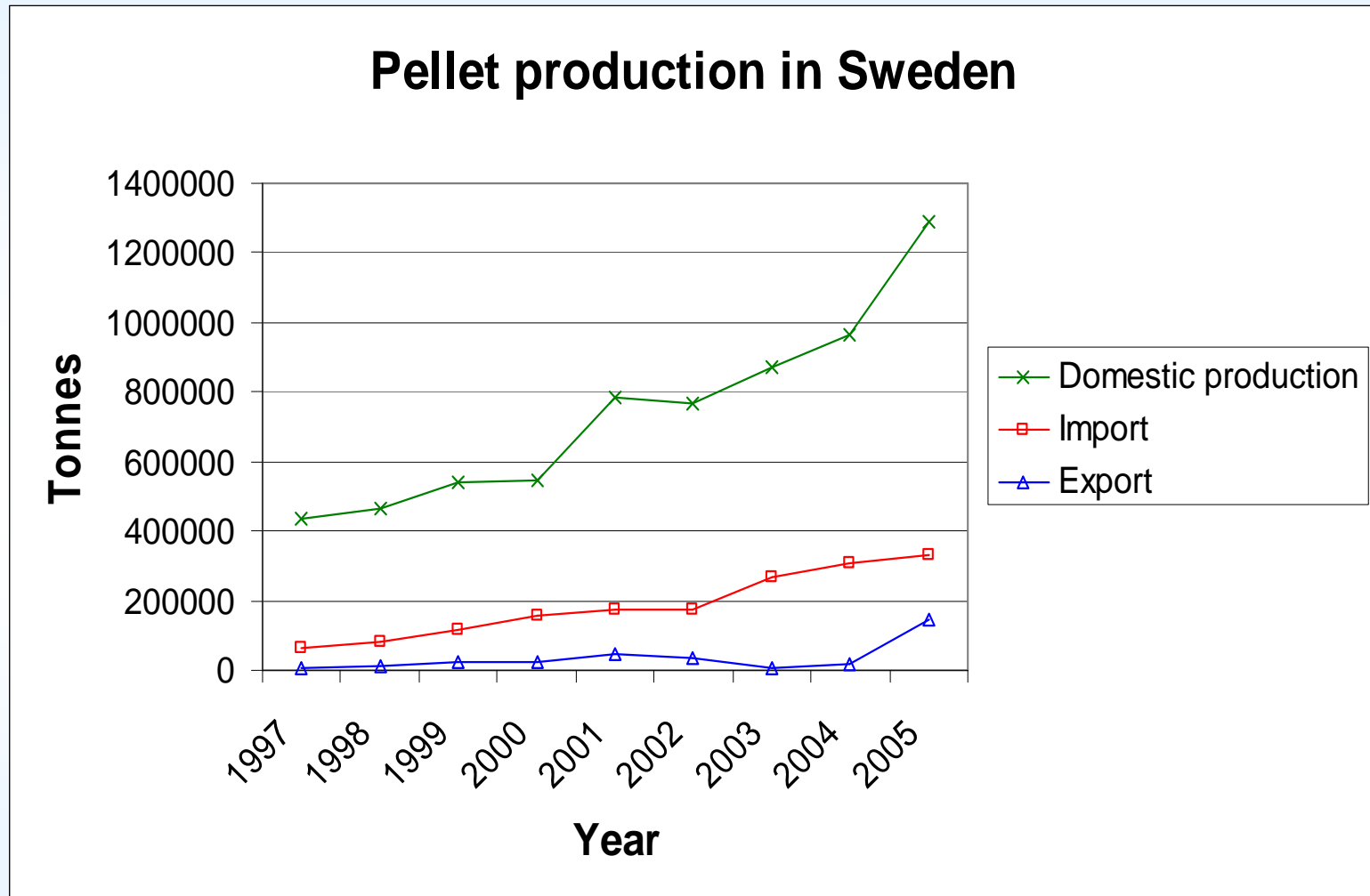


ENERGETIC VALORISATION OF FOREST BIOMASS IN THE SOUTH OF EUROPE
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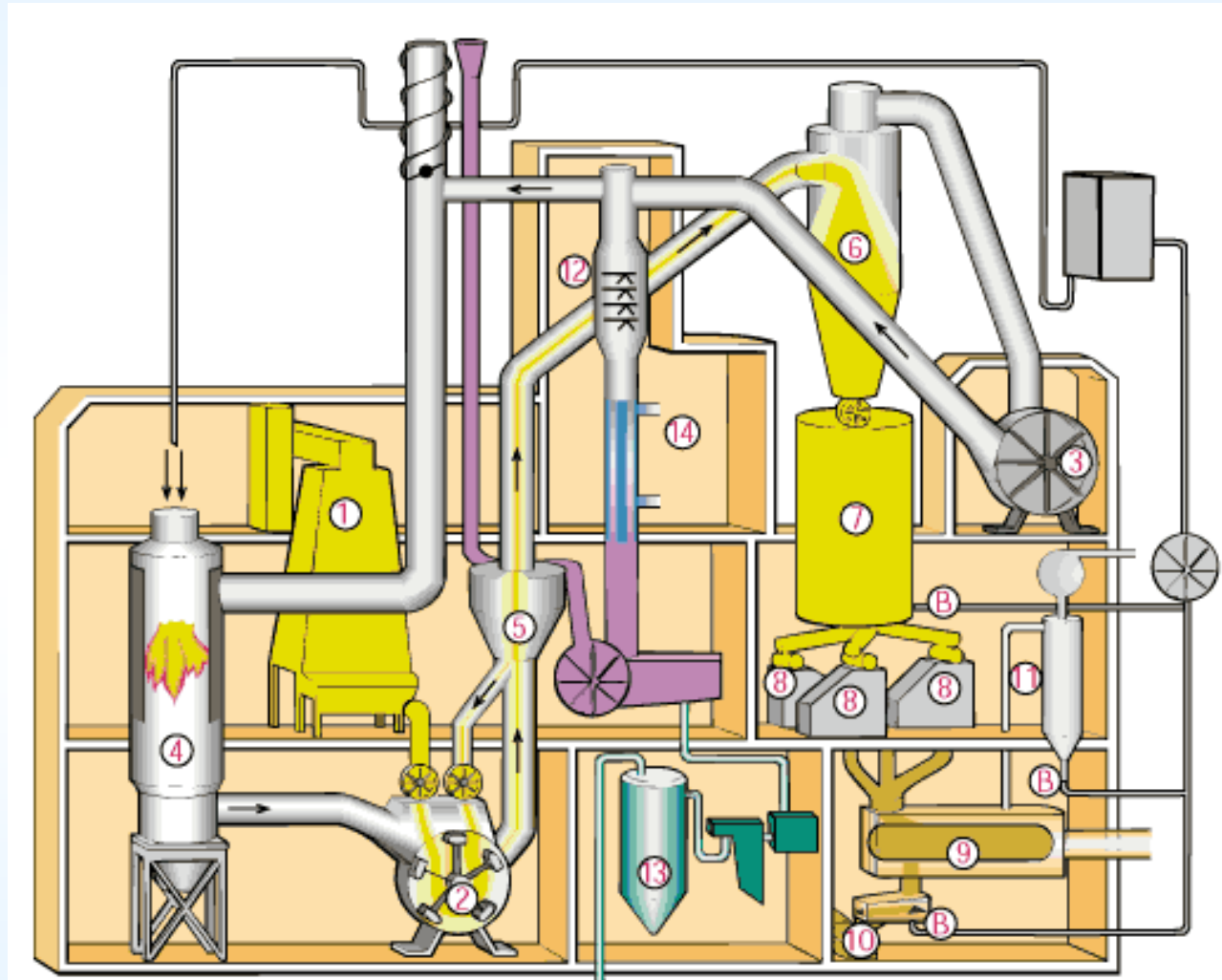


Pellet Production and market in Sweden



Raw material for pellets	
Raw material	Tonnes
Saw dust	830 000
Dry saw dust, cutter shavings etc.	420 000
Bark	50 000
Total production in Sweden 2005	1 300 000

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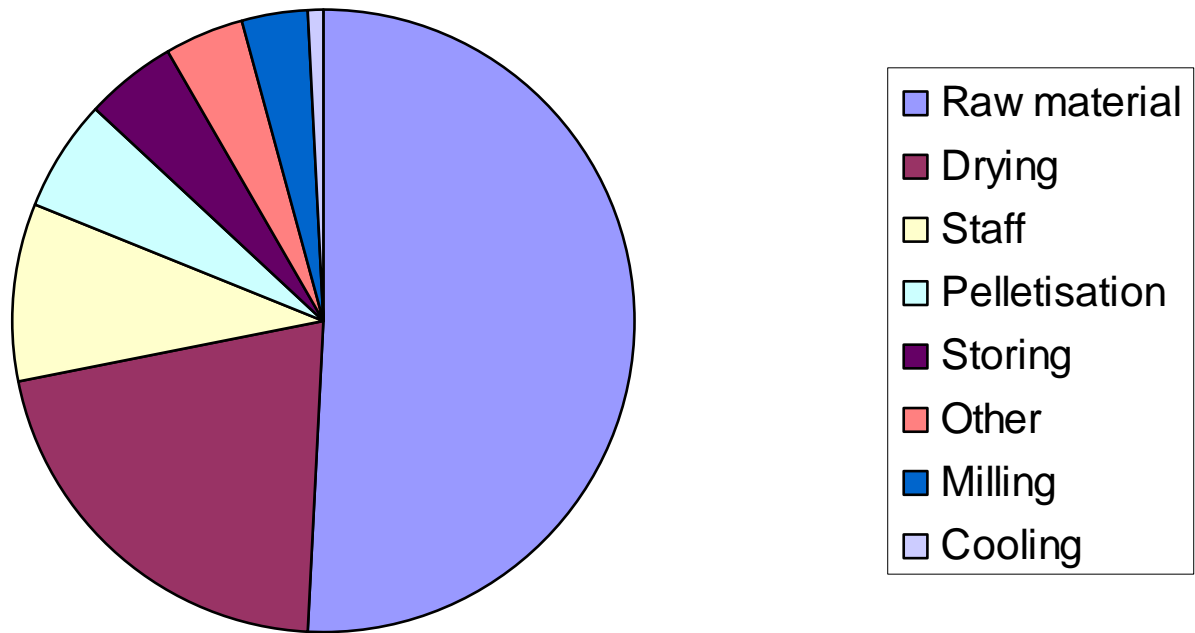


Source: *Bionorr Pellet factory*

Pellet Production and market in Sweden



Production Costs Total ~60 €/tonne (2002)



Source: Zakrisson 2002

Future raw material supply:

Saw dust

Present production: 830 000 tonnes

Potential production: 1 100 000 tonnes

Market situation: Competition with board industry and district heating.

No surplus.

Ash content: < 1%

Future raw material supply:

Dry saw dust, cutter shavings

Present production: 420 000 tonnes

Potential production: 500 000 tonnes

Market situation: Competition with stables and district heating.

No surplus.

Ash content: < 1%

Future raw material supply:

Bark

Present production: 50 000 tonnes

Potential production: 3 000 000 tonnes

Market situation: Most of the bark is combusted in the saw mills and pulp mills where it is produced. The rest is combusted in district heating plants. If bark shall be pelletised, the present bark consumers need replacement from other fuel (i.e. forest residues)

Ash content: 2-4%

Future raw material supply:

Thin stem wood

Present production: < 50 000 tonnes

Potential production: ?

Market situation: Competition with pulp industry. Two pellet production units are recently started, where stem wood is included in the raw material stock. They are located far from pulp industry.

Ash content: < 1%

Future raw material supply:

Short rotation coppice

Present production: -

Potential production: ?

Market situation: Is cultivated on approx. 15 000 ha today. Harvested every 3-4th year, with a yield of 30-50 tonne dry matter/ha. Only used in district heating today.

Ash content: approx. 2%

Future raw material supply:

Forest residues

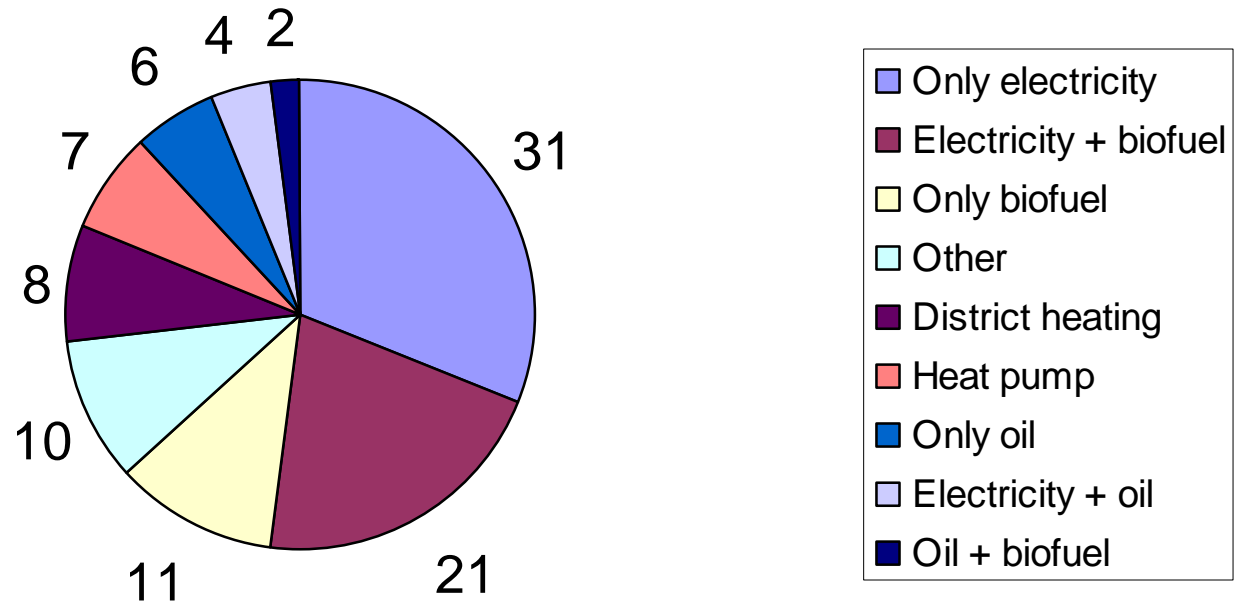
Present production: -

Potential production: ?

Market situation: Large volumes falls out every year from forestry. Most of them not utilised, due to long distance to demand. Mostly used in district heating. Will not be used as pellet raw material in the foreseeable future.

Ash content: 2-6%

Heating of small houses (%)



Source: Statistics Sweden

Stoves



- 2-15kW
- Common in houses with electrical radiators
- Air borne or water borne heat



Small scale pellet units

□ 10-40kW



BioLine 20

12-20kW



EcoNom

15 kW



IWABO Villa

S1

10-20kW



Mid scale pellet units

- SME's, schools, dwellings etc.:
- 50-300kW



IWABO Fastighet
100-200kW



BioLine 150
150kW

Large scale pellet units

tps BioSwirl™

- Powder burner
- Load range 1 to 25MW
- High combustion efficiency
- Suitable for alternative fuels



Storage

- ❑ **Small scale**

1. Weekly storage
2. Indoor/outdoor silo for bulk

- ❑ **Mid scale**

3. Outdoor silo

- ❑ **Large scale**

4. Outdoor silo

1



2



3



4



Delivery

- ❑ **Small bag (20kg)**

- ❑ Price € 230 per tonne incl. vat.



- ❑ **Big bag (600kg)**

- ❑ Price € 210 per tonne incl. vat.



- ❑ **Bulk (> 3 tonne)**

- ❑ Pris € 180 per tonne incl. vat.



Total investment (small scale)

Cheapest

- Burner
- Weekly storage
- € 2-2 500

Best

- Modern boiler with integrated combustion
and automatic ash treatment
- Bulk storage (Min 5 m³)
- € 8 500-10 000

Conclusions

- The Swedish pellet market will continue increasing, based on both domestic production and import.
- The domestic production can increase slightly using the same raw materials as today.
- The most likely new raw materials are thin stem wood, bark and short rotation coppice.
- If bark is going to be pelletised, it need to be replaced by i.e. forest residues where it is used today.
- The large scale consumption of pellet might decrease, and be replaced by forest residues etc.
- The small and mid scale consumption will increase



THANK YOU FOR YOUR ATTENTION

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For further information, don't hesitate contact me on e-mail:

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...or visit the web site of Energidalen:

<http://www.energidalen.se>

