

IRBEA Conference 2013

A Whistlestop Tour of a Mature Biomass
Industry in Europe



Contents

- Who are Dalkia?
- The Biomass Value Chain – the European View
- Regulation and Support – the European View
- Keys to Successful Industry – from the European Perspective

Dalkia Financials

Dalkia Globally

- €8.3bn revenue in 2011
- Manages 123,500 facilities worldwide
 - Industrial Utilities, District Heating, Building Energy Services

Dalkia Ireland

- €74m revenue in 2011
- 30 managed industrial sites
- Power production capacity: 72MWe (58MWe via CHP)
- Heating capacity: 455MWth

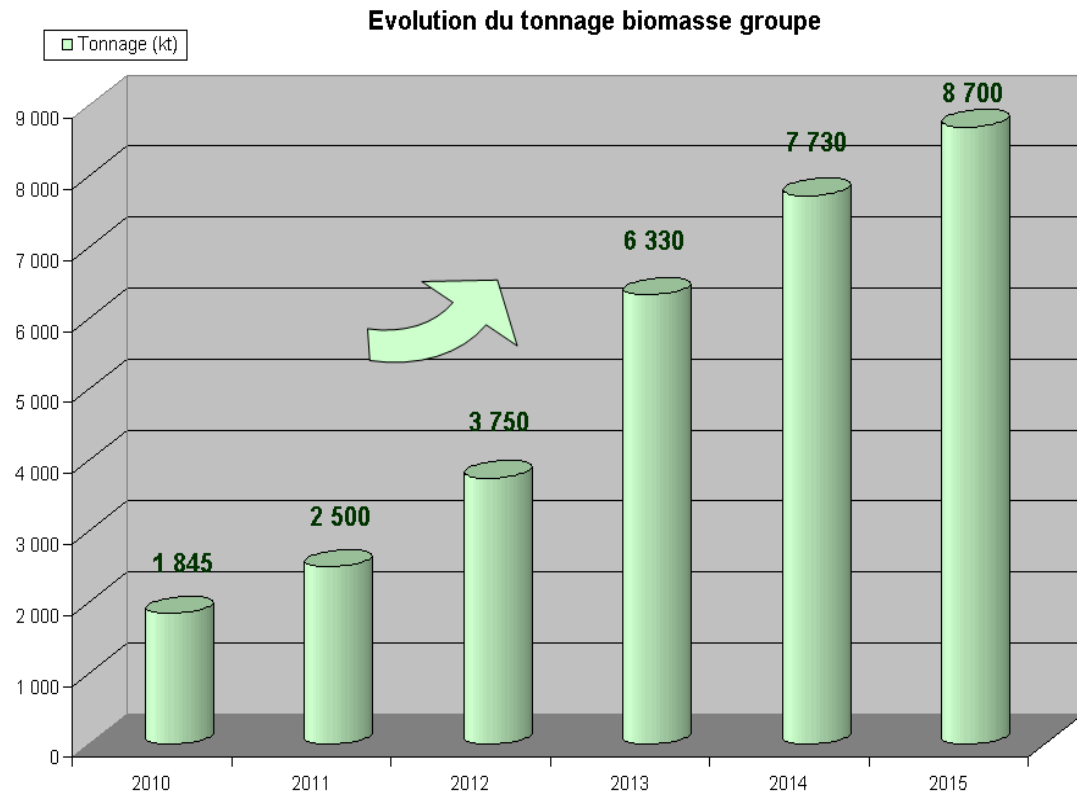
Some questions.....

- Is Ireland as advanced as European Countries in using Biomass?
- If not, why not?
- What are the key success factors in their success?
- How many of those success factors can we emulate?

Dalkia and Biomass

2012: 3.7Mt

2020: 8.7Mt



- 379 Operating biomass plants worldwide in 16 countries
- 29 projects in construction phase
- 43 projects under development

The biomass energy recovery process

1. Fibre Sourcing (various channels)

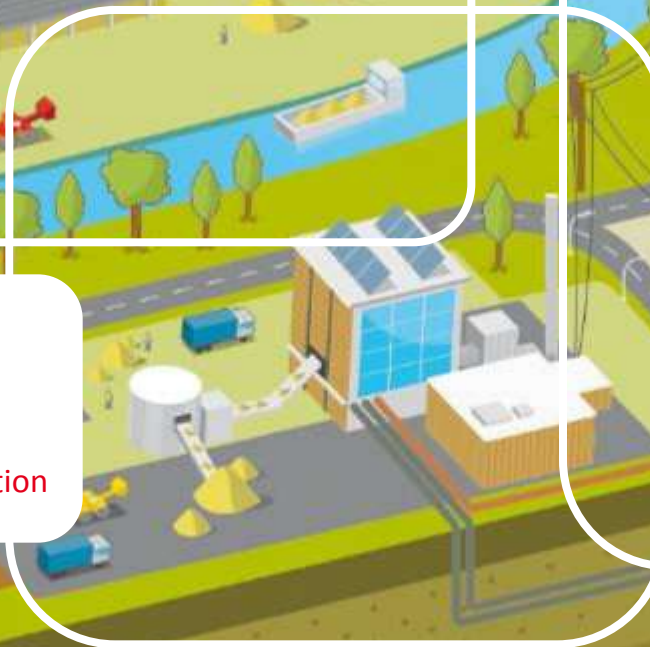


2. Preparation (drying, crushing, removal of ferrous metals, sifting, etc.)



3. Energy production (heat / electricity)

- delivery, storage, supply, combustion
- flue gas treatment, ash extraction and recycling



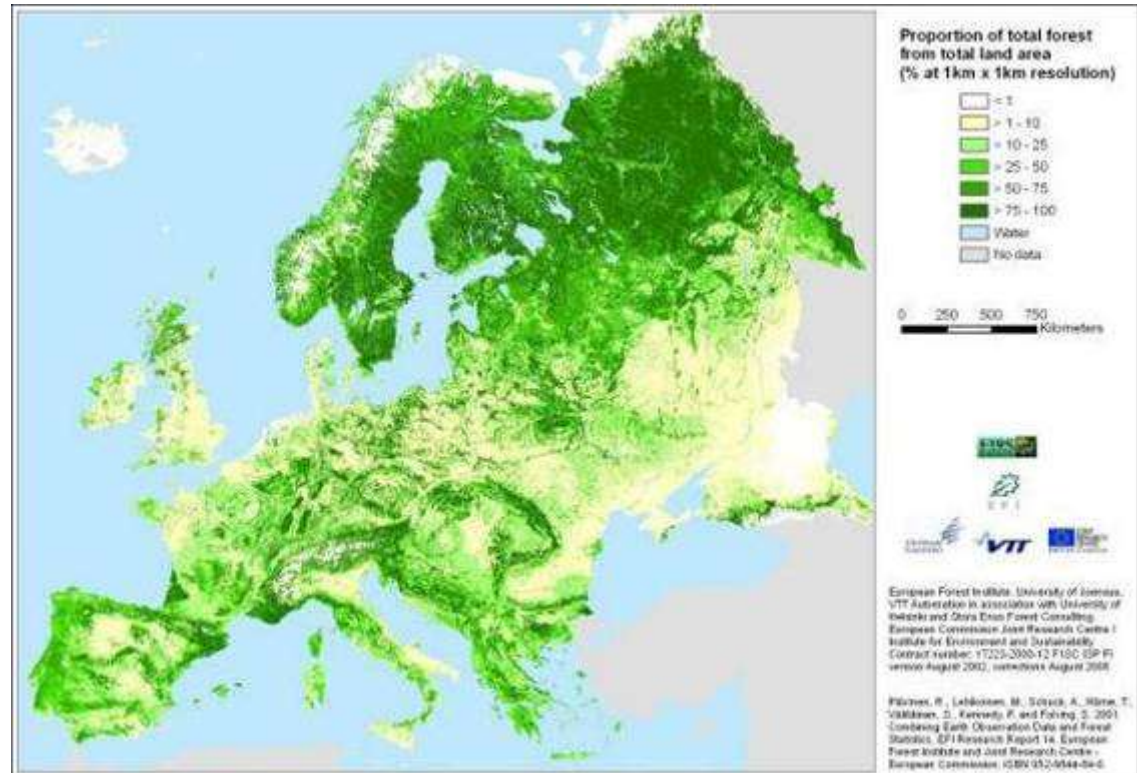
4. Distribution of heat (industrial steam or hot water, central heating systems, hot water facilities)



European Forestry Resources

Some basic statistics on Europe's forests

- Europe is a heavily wooded continent, from the boreal forests of the north to the Mediterranean forests of the south: forests cover around **one third of the landmass (115 million ha)**.
- Sweden, Finland, France, Germany and Spain** have the largest forested areas: together they account for 70% of Europe's forests.

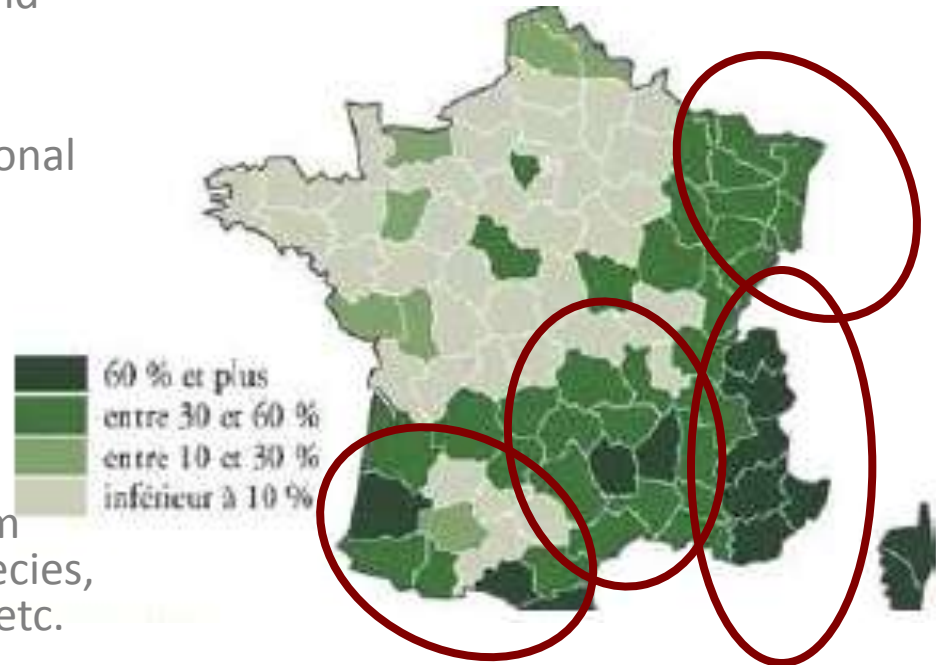


Source: EFI (European Forest Institute)

Example - French Forestry Resources

Forests in France include both public and private forest:

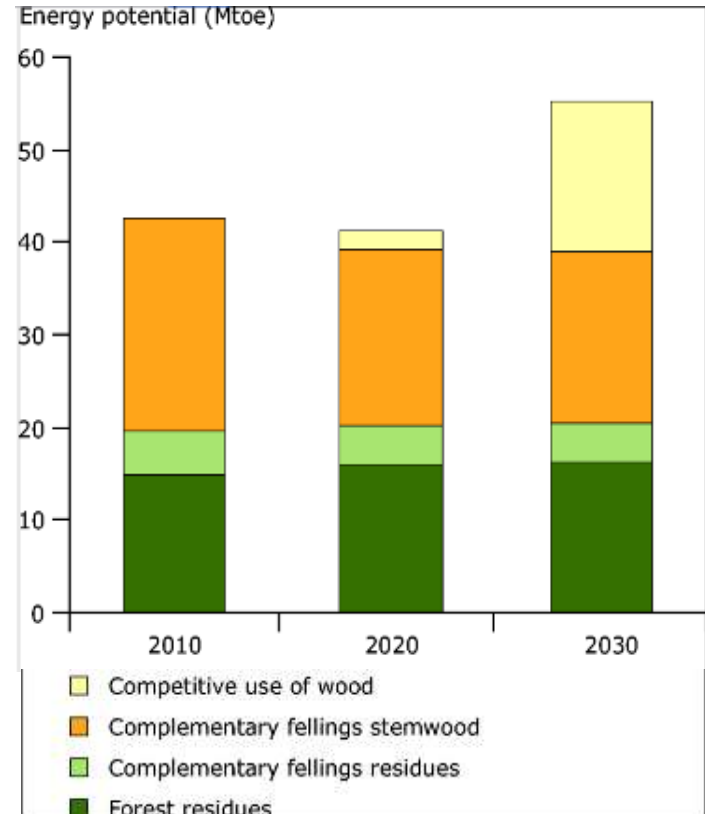
- Public forests are **managed almost exclusively by the ONF**, France's national forestry commission.
- **Private forests account for 3/4 of France's total forest:**
 - Over 10 million ha
 - Over 4 million landowners
- France's forests vary significantly from one region to another in terms of species, altitude, orientation, ease of access, etc.
- Key figures on French forests:



- Growth in forest area: more than 50% since 1950 (annual growth rate of about 1%)
- Forest covers 28% of France's land area, totalling 15 million hectares
- The annual wood harvest totals 52 million cu.m

Forestry Resources

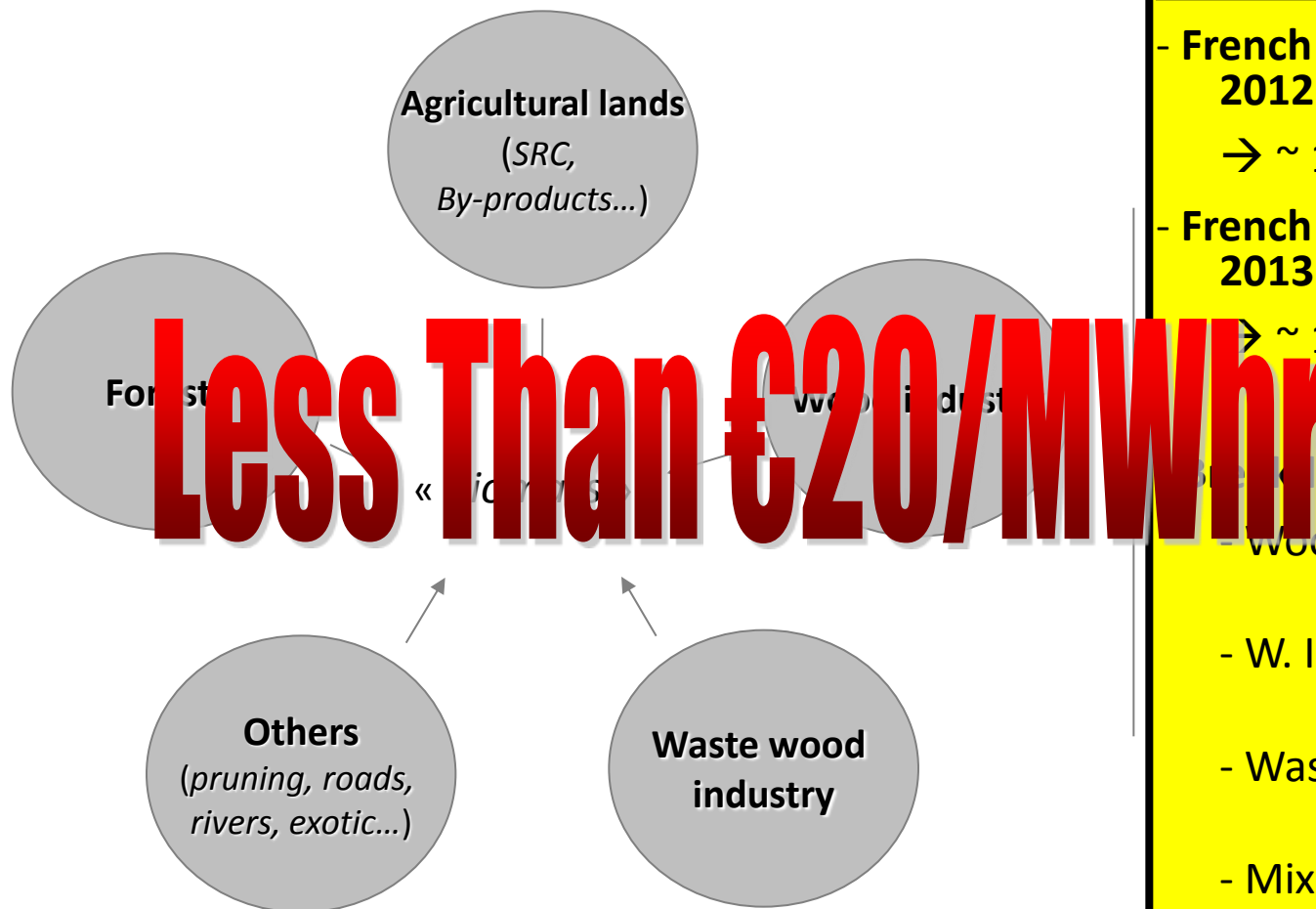
- The potential resources are considerable (40 Mtoe in Europe, according to a 2010 estimate) and consist of:
 - slash
 - neglected forests brought under management
 - Returning neglected forests to management will bring benefits not only to the energy sector, but also for high-grade applications (construction, furniture, paper manufacturing and other wood-based industries).
 - The slash will be used almost in its entirety for energy applications (see the notes for more details) since no other use is possible
- This resource can only be used once a commercial application is in place.



Source: EEA, 2008.

 A resource that can be directly mobilized once a commercial application is in place

Typical Dalkia Fuel Basket



Statistics :

- French tonnage in 2012

→ ~ 1 Mt

- French tonnage in 2013

→ ~ 1,5 Mt

Break down :

- Wood chips
55%

- W. Ind. prod
10%

- Waste wood
20%

- Mix
15%

The biomass energy recovery process

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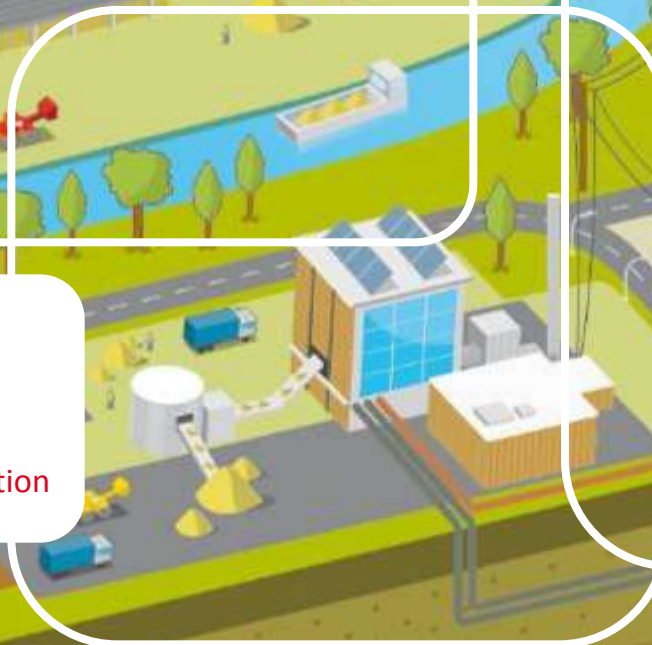


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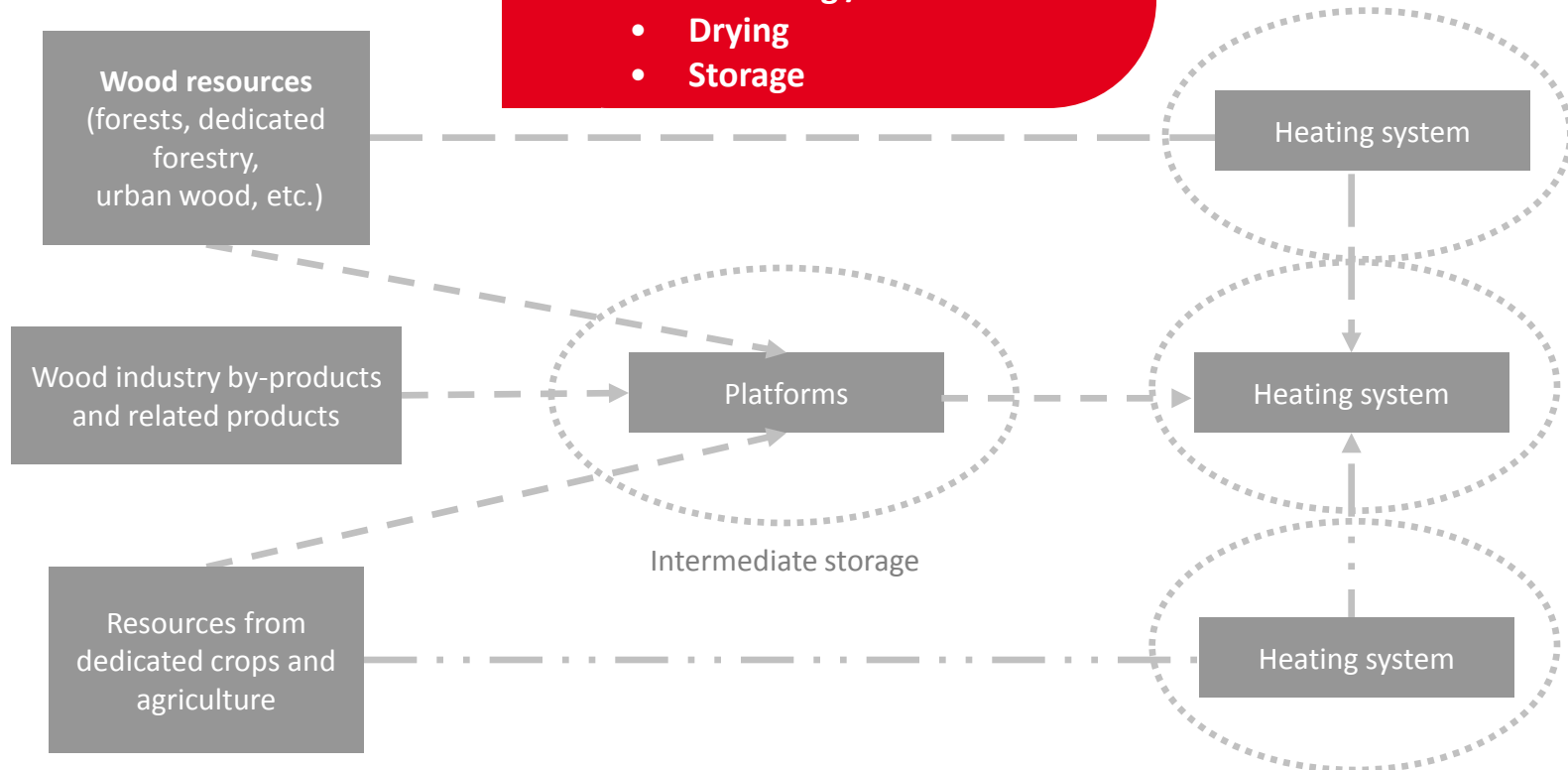
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Wood Fuels Preparation

Intermediate platforms

- **Crushing / chipping**
- **Removal of scrap iron and non-ferrous metals**
- **Screening / dust removal**
- **Drying**
- **Storage**



→ For smaller facilities, supplies can be secured over a very limited radius (10-15 km) from the local agricultural and rural milieu or directly from the forestry authorities.

Intermediate Platform Facility in France



The biomass energy recovery process

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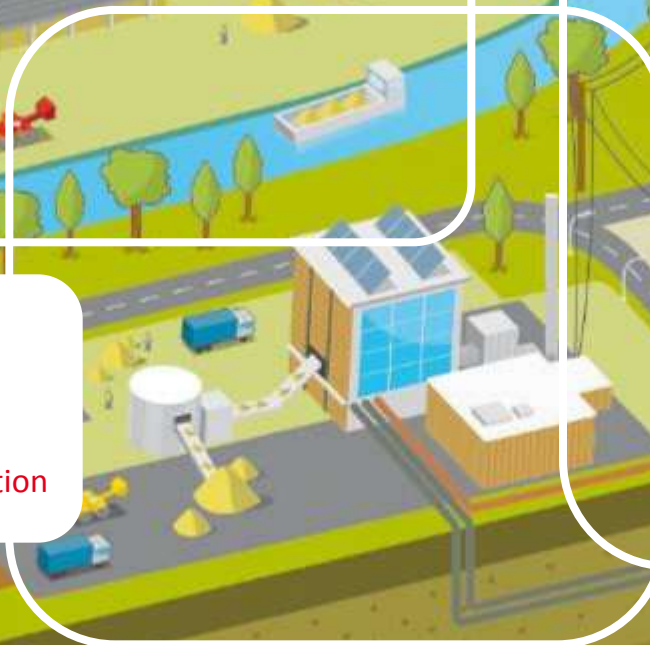


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Biomass CHP in an Industrial Plant



Biomass CHP – heating a city (Tallinn Estonia)



Biomass heating system in La Duchère, France

A biomass heating plant for the La Duchère (Lyon) heating network

Key figures:

- 5,190 housing units served
- Heating network: 9 km and 55 substations
- Annual wood consumption: 25,000 tonnes



Dalkia's Heating Networks

Zone	Entities	Number of networks	Total length (km)	Installed capacity (MW)	Zone	Entities	Number of networks	Total length (km)	Installed capacity (MW)
France	Dalkia Nord	86	240	2,726	Development	USA	17	169	4,349
	Dalkia Est	44	198	1,071		Canada	1	4	130
	Ile de France	112	295	2,455		China	2	363	597
	Atlantic	46	216	1,242		Estonia	32	538	1,259
	Centre Med	43	232	1,613		Lithuania	13	891	3,558
	Switzerland	3	30	Not known		Russia	14	38	163
Northern Europe	Belgium	1	4	10	Central Europe	Czech Republic	29	627	3,670
	Ireland	4	2	26		Poland	55	1,703	4,291
	Norway	1	3	37		Slovakia	130	189	1,089
	United Kingdom	8	42	116		Romania	20	172	388
	Sweden	9	247	200		Bulgaria	1	33	258
South	Spain	2	6	8		Hungary	11	69	104
	Italy	5	24	32		Germany	100	223	346

OVERALL TOTAL

789 networks

6,558 km

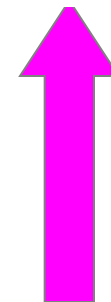
29,736 MW

Regulatory Support

Relevant EU directives – common to all EU members

- Emissions Trading Directive - EU ETS for larger industrial sites and district heating systems
- Energy Efficiency Directive (EED)
- CHP directive (now subsumed into EED)
 - REFIT 3 accessed through HECHP compliance which is fully dictated by CHP directive

Carbon Prices – What Incentive?



Phase 3 starts!

France – The Environmental Grenelle

An innovative joint process involving the central government, local authorities, workplace partners and environmental organisations

Secteur	Situation 2006 (ktep)	Objectif 2012 (ktep)	Objectifs 2020 (ktep)
Chauffage domestique	7400 (5,75 M logements)	7400 (7,3 M logements)	7400 (9 M logements)
Collectif /tertiaire	200	600	2000
Industrie	1200	1900	3200
Cogénération (chaleur)	0	540	2400

1 tep = 11,63 MWh = 11 630 kWh (consommation moyenne d'un logement)

Source : ADEME/COMOP n° 10

25,000 MWth - Equivalent to 2,500 x 10MWth boilers!

The situation in France: Measures adopted in the Grenelle 2

- **Creation of €1bn heat plant fund – 5.5MToe of renewable heat by 2020**
 - 10,000 MWth of plant
- **Development of heating and cooling networks**
- **5.5% VAT rate for heating networks with greater than 50% renewable heat input**
- **Feed in tariffs for renewable power (see next slide)**

The situation in France:

Grenelle 2 – Feed in Tariff for Renewable Power

- **The mandatory purchase price for biomass power has very recently been revised:**

For projects between 5-12 MWe

- The purchase price is adjusted to reflect the energy efficiency of each facility.
- It ranges from €120.5 per MWh (for 50% energy efficiency) to €149.5 per MWh (for 80% efficiency).

For projects between greater than 12 MWe

- The potential price for the electricity generated is capped, and ranges from a maximum €135 per MWh for 60% energy efficiency to a maximum €155 per MWh for 80% energy efficiency.

Other European Support mechanisms

Germany	Market rate + 7.8 to 11.67 €/MWhr
Austria	Market rate + 11.3 to 15.7 €/MWhr (first 10 years), then from 11.1 to 15.6
Bulgaria	between €162 and €215 per MW hr
Italy	Market Rate + €22/MWhr
Luxembourg	€145/MWh for small installations
	€125/MWh for large installations (> 5 MW)
Portugal	Market Rate + €11/MWhr

UK Regulations

SPECIAL CASES						
FUEL CELL SCHEMES	QI =	180 x	η_{power}	+	120	x η_{heat}
ALTERNATIVE FUEL SCHEMES ¹						
Category A						
≤1MWe	QI =	220x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	195 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}
Category B						
≤1MWe	QI =	245 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	191 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	176 x	η_{power}	+	120	x η_{heat}
Category C						
≤1MWe	QI =	245 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	195 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	176 x	η_{power}	+	120	x η_{heat}
Category D						
≤1MWe	QI =	362 x	η_{power}	+	130	x η_{heat}
>1 to ≤10MWe	QI =	362 x	η_{power}	+	130	x η_{heat}
>10 to ≤25MWe	QI =	362x	η_{power}	+	130	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category E						
≤1MWe	QI =	348 x	η_{power}	+	130	x η_{heat}
>1 to ≤10MWe	QI =	348x	η_{power}	+	130	x η_{heat}
>10 to ≤25MWe	QI =	348 x	η_{power}	+	130	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category F						
≤1MWe	QI =	352 x	η_{power}	+	120	x η_{heat}
>1 to ≤10MWe	QI =	316 x	η_{power}	+	120	x η_{heat}
>10 to ≤25MWe	QI =	316 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category G						
≤1MWe	QI =	319 x	η_{power}	+	120	x η_{heat}
>1 to ≤10MWe	QI =	293 x	η_{power}	+	120	x η_{heat}
>10 to ≤25MWe	QI =	285 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	220 x	η_{power}	+	120	x η_{heat}
Category H						
≤1MWe	QI =	294 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	221 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}
Category I						
≤1MWe	QI =	329 x	η_{power}	+	120	x η_{heat}
>1 to ≤25MWe	QI =	299 x	η_{power}	+	120	x η_{heat}
>25MWe	QI =	193 x	η_{power}	+	120	x η_{heat}

Key Success Factors

- **Cheap and reliable supply – multiple sources (forest, waste wood, SRC)**
 - Target prices €20/MWhr or less = €45/t @ 50%
 - Accessing forest residues – not competing with other demands
- **Long term index linked contracts with wood suppliers**
 - Forestry management companies
 - Waste companies
- **EU directives as guiding principles for local sophisticated regulations**
 - Not just transposed from EU directives
 - Recognise the reality of developing projects
 - Dedicated regulators
- **Tradition of District Heating – and high urban density**

Key Success Factors

- **Clear playing field for developing projects**
 - Defined emissions regulations not just on a case by case basis
- **Local Government that can do deals**
 - Directly elected Mayors
- **Public sector institutions that can act on their own**
 - Universities
 - Hospitals
- **Real commitment to meeting targets**
 - Dialogue and forums for the same
 - Detailed multi year plans
 - Involvement of all stakeholders – industry, central government, local government environmental bodies