

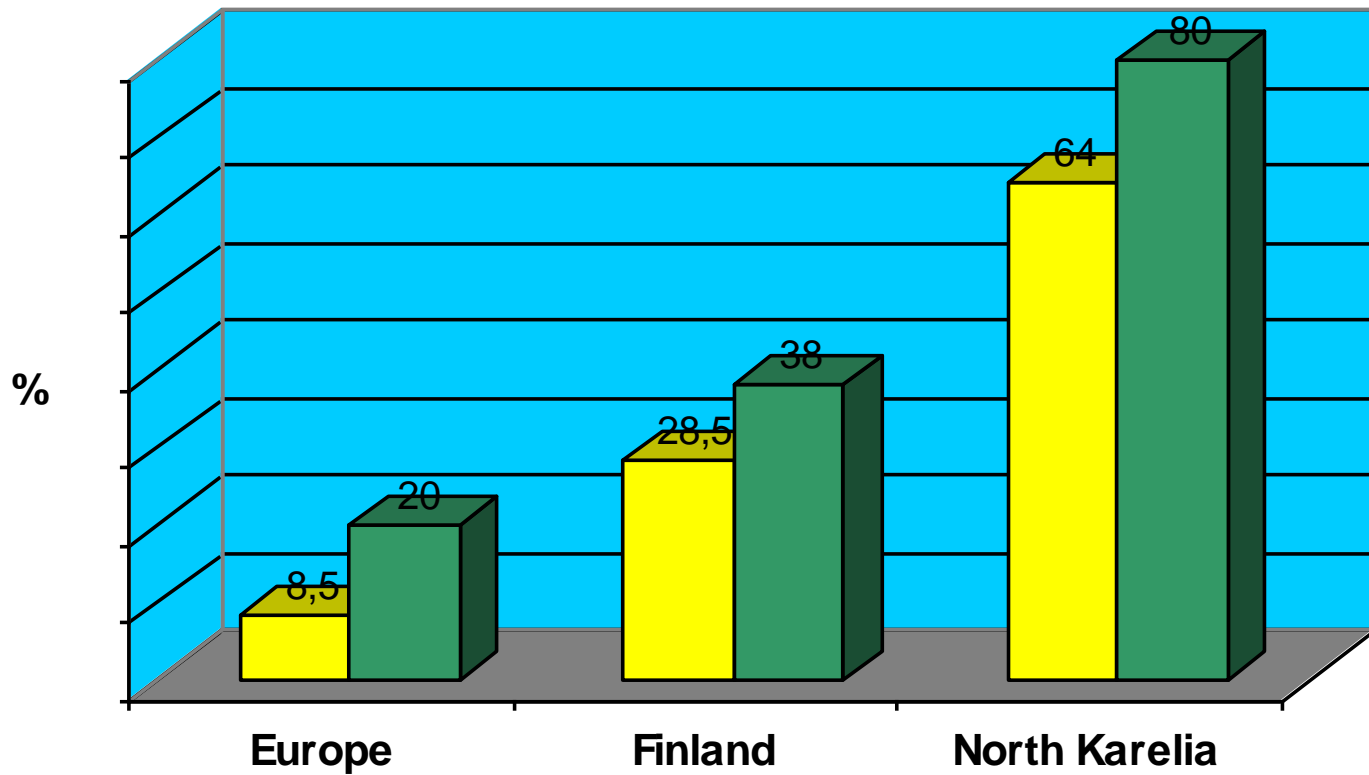


***Enon
Energia
Osuuskunta***

Local, renewable wood energy

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2013

USE OF RENEWABLE ENERGY 2005 AND TARGETS 2020



■ 2005 ■ 2020

USE OF FOREST CHIPS IN FINLAND

- Year 2012 total use was 8,3 million solid m³
- Small houses used 0.7 million solid m³
- Forest chips for heat- and power plants harvested
- 34 % logging residues
- 47 % small diameter trees (whole-tree and stem wood)
- 14 % stumps
- 5 % heavy, rotten stem wood

THE BEGINNING TOOK YEARS

The purpose is to produce heating energy by providing wood chips for the district heating plants

- The first meeting dealing with the topic took place in February 1996
- The meeting that led to the establishment was held on the 15th of September 1999. At the time of the foundation there were only 12 members (now 52 members)

OWN HEATING PLANTS

- Commercial operation started: 2000
- Bio boilers in the plant of Alakylä : $1.2 \text{ MW}_{\text{th}} + 0.8 \text{ MW}_{\text{th}}$
Yläkylä : $0.8 \text{ MW}_{\text{th}}$ and Uimaharju $1 \text{ MW}_{\text{th}} + 1 \text{ MW}_{\text{th}}$
- Combustion method: mechanical grate
- Feeding: Stoker dischargers and drag chain conveyors
- Fuel storage: 100 loose- m^3 to 300 loose- m^3
- Heated volume 288 000 m^3 , primary and secondary school buildings, high school, library, sports hall buildings, health centres, fire station, old people's home, business premises, church hall and terraced houses
- Heating pipe network: 9 800 m
- Heat production: 15 000 MWh
- Controlling: Automated GSM alarm and network connection for adjustment
- Owner and operator: Eno Energy Cooperative

ENO YLÄKYLÄ



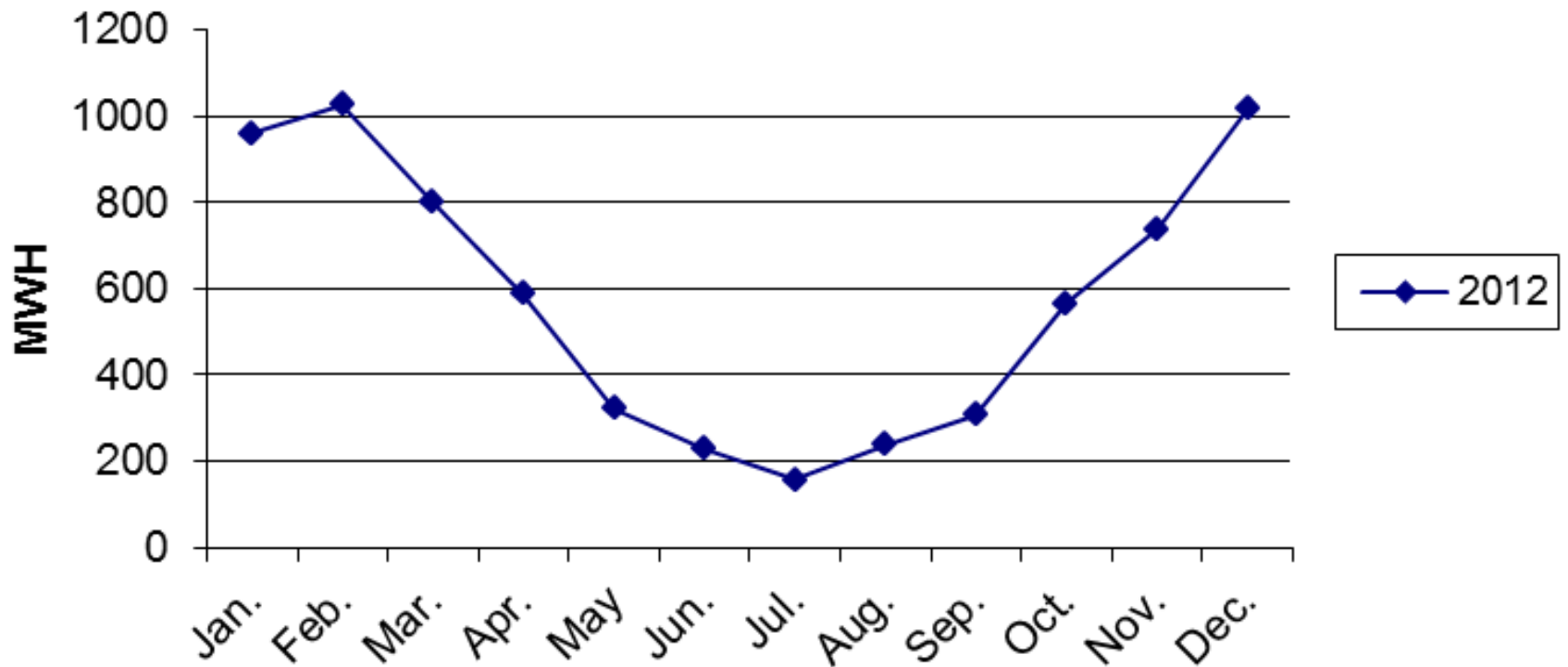
UIMAHARJU



ENO ALAKYLÄ



HEAT SALES MONTHLY ENO ALAKYLÄ





PELLET CONTAINER

160 kW



A total of 7 bio boilers and 6,46 MW_{th}

ADVANTAGES OF WOOD FUELLED HEAT PRODUCTION

- Almost all the capital investment stays within the municipality
- Positive effects on the area's local forestry and landscape
- Positive effects on employment
- Local energy source brings safety and independence in times of possible energy crisis
- The combustion of wood does not result in a net increase in carbon dioxide emissions
- The ashes and its nutrients can be returned back to the forest

BENEFITS IN ENO

- Heat is cheaper for consumers compared to light fuel oil
- Heating centers replace about 1.8 million liters oil every year
- This amount is equivalent to approximately 25 000 loose-m³ forest chips
- About € 2 000 000 were saved by the local economy
- As a result carbon dioxide emissions were reduced by near 5 million kilos annually
- All employment effects of using the forest chips at this consumption rate are between 7-10 man-years



WOOD FUEL HARVESTING IN ENO

Raw materials

- Small trees by manual felling about 15 %



Raw materials

- By multi-tree processing about 70%



YOUNG FOREST THINNINGS ABOUT 200 HA EVERY YEAR



Before



After

Raw materials

- Logging residues about 15 %
- Bark from the Uimaharju pulp mill (if available)



FOREST HAULAGE BY FORWARDER



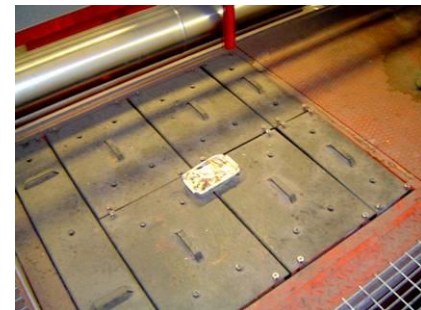
ROAD-SIDE LANDING



CHIPPING AND TRANSPORT BY TRUCK TO THE HEATING PLANT



CHIP SAMPLE FROM A CHIP LOAD



CUSTOMER PROFITABILITY

ROW HOUSE EXAMPLE, VAT 0 %

District heating

INVESTMENT

Entrance fee	15 250€
Heat exchanger and assembly	14 500€
Tot.	29 750€

VARIABLE COSTS

Produced heat energy	220 MWh/y	
	100 %	220 MWh/y
Heat price (heat energy meter)	63,0 €/MWh	
Annual costs	100 %	13 860 €/y
Basic fee		3 120 €/y
Operation		0 €/y
ANNUAL COSTS TOT.		16 980 €/y
HEAT PRICE TOT.		77 e/MWh

PROFITABILITY

Annual costs with oil	24 312€/y
Annual costs with district heating	16 980€/y
Difference	7 332€/y
Investment	29 750€
Interest-free repayment period without support	4,1years
Possible investment support	10 % 26 775€
Interest-free repayment period with support	3,7years

Oil heating

INVESTMENT

Renewing of oil equipment	0€
Tot.	0€

VARIABLE COSTS

Produced heat energy	220 MWh/y	
	100 %	220 MWh/y
Oil price	89,5 €/MWh	
Annual costs	efficiency 83 %	23 712 €/y
Repair and maintenance		100 €/y
Operation		500 €/y
ANNUAL COSTS TOT.		24 312 €/y
HEAT PRICE TOT.		111 €/MWh

This average row house has used oil about 26 500 liters per year.

Heated space 3 700 m³

Oil price: Average 1-10 2013 in Finland



GREEN SUN ENERGY

”think globally act locally”



www.enonenergia.fi

Thank you!

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