

# Modern Wood Heating

John Bushby

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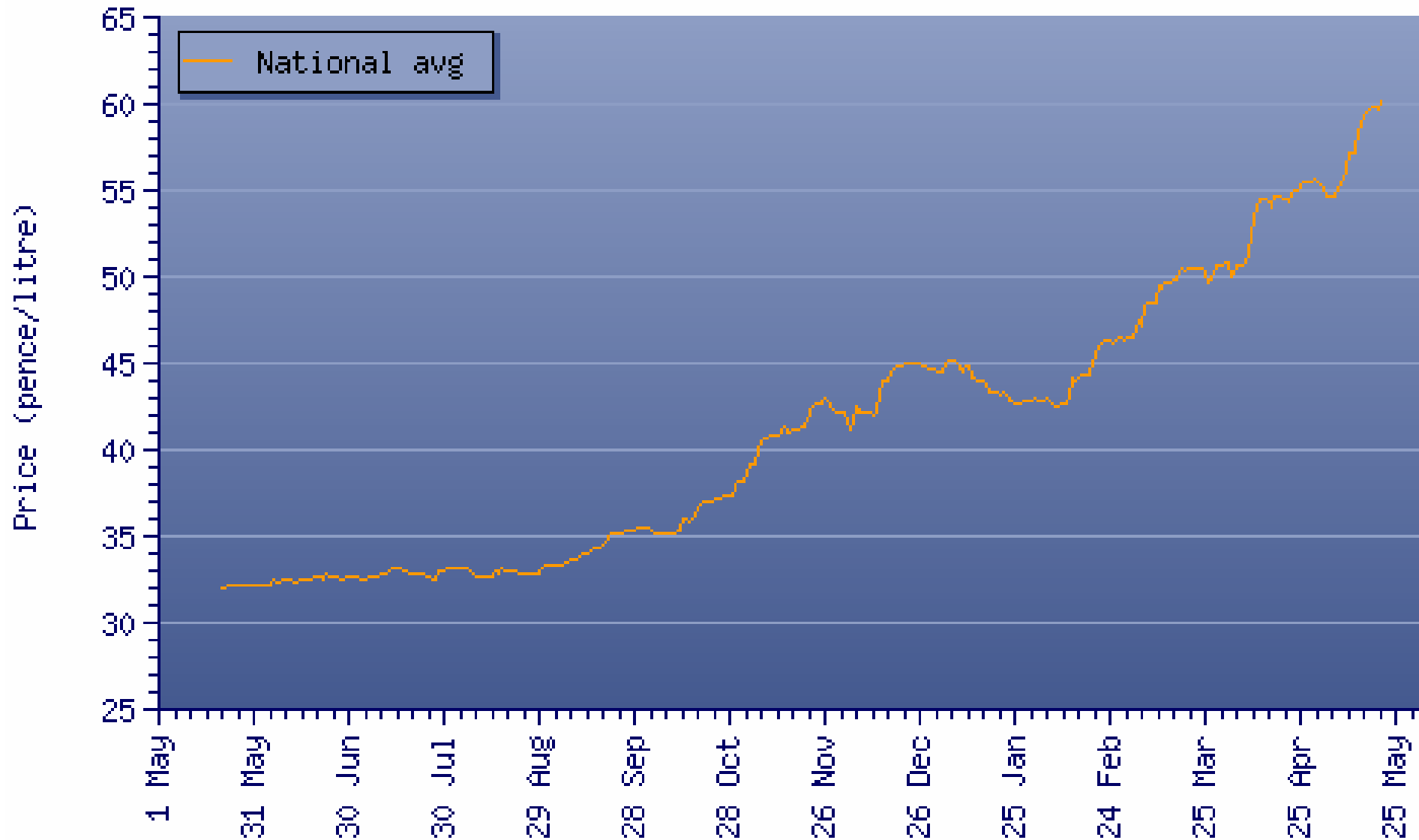
# Modern Wood Heating

- Alternative Fuels
- Boiler Types
- Some Local Examples
- Certainty and Confidence

# Alternative Fuels

Fuel	Scale	Cost (p/kWh)	Pros	Cons
Logs	15 – 70kW	0.5 – 2.5	<ul style="list-style-type: none"> <li>•Small scale</li> <li>•Supply chain</li> </ul>	<ul style="list-style-type: none"> <li>•Manual loading</li> <li>•Small scale</li> <li>•Variable quality</li> </ul>
Chip	30kW – MWs	1.0 – 3.0	<ul style="list-style-type: none"> <li>•Low cost fuel</li> <li>•Automatic operation</li> </ul>	<ul style="list-style-type: none"> <li>•Bulky</li> <li>•Quality depends on supplier</li> </ul>
Pellets	10 – 1,000kW	3 – 4.5	<ul style="list-style-type: none"> <li>•High energy density</li> <li>•Free flowing</li> </ul>	<ul style="list-style-type: none"> <li>•Relatively expensive</li> <li>•Not yet local</li> </ul>
Heating oil		7.4	<i>Ref: Source Nottingham Energy Partnership Website  <a href="http://www.nottenergy.com/">http://www.nottenergy.com/</a></i>	
LPG		5.9		
Mains gas		3.5		
Elec		12.0		

# 12 Month Average Oil Price Trend (boilerjuice.com)





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# Froling: automated log boiler

- up to 70KW
- Full control of heating system, back-up boiler & DHW
- Modulating output control -up to 92% efficiency
- Logs up to 50cm
- Up to 20 hours running time (more with buffer)
- Combustion optimisation
- Manual load (daily)
- Lower cost than wood chip installation



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# Basic Log/Pellet Boiler?

- Woodviking
- Basic 15 – 30kW boiler
- £2,900 - £4,500 supply only
- Jaspi, Finnish manufacturer
- Recent introduction to UK
- ???



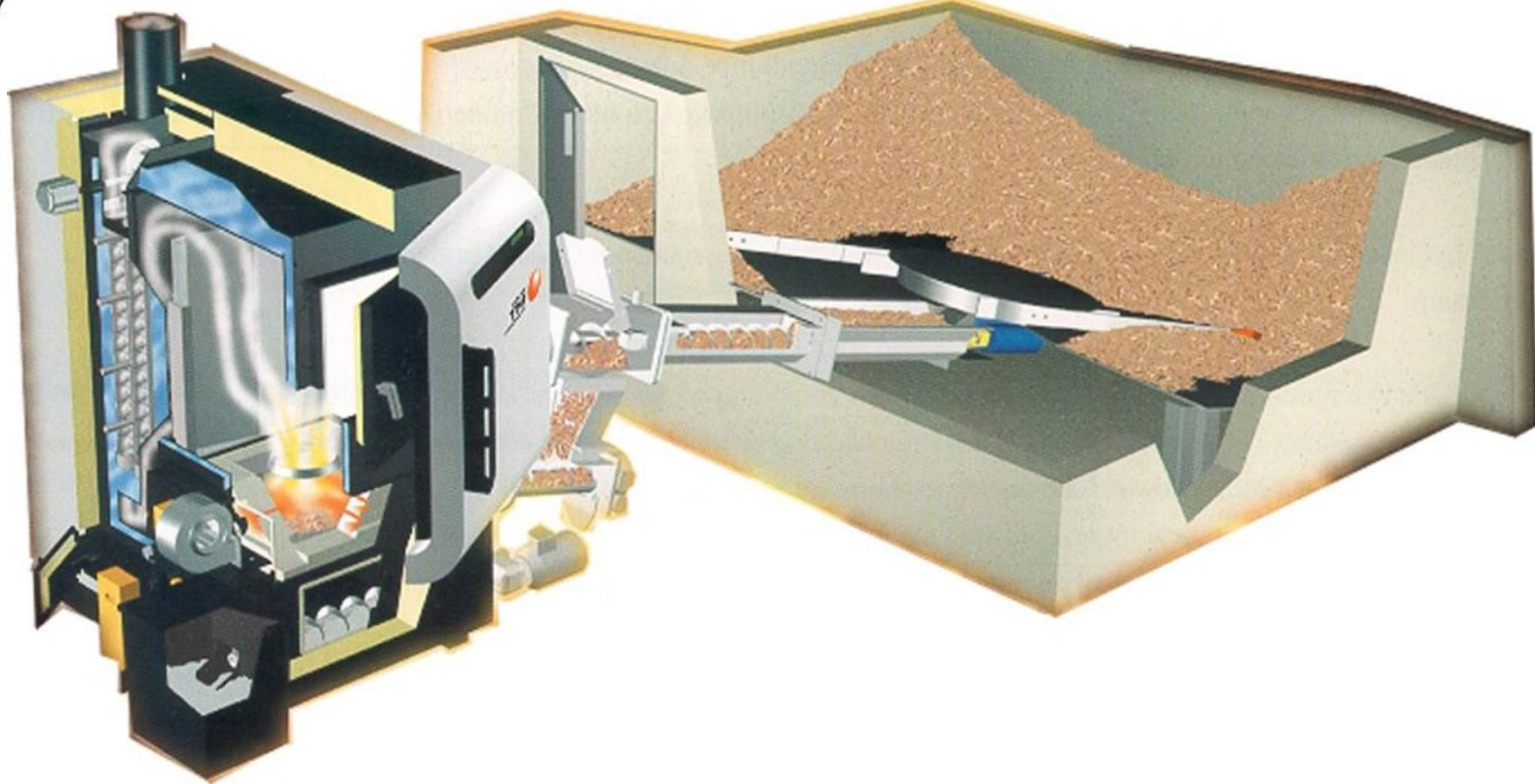
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# How does the technology work ?

Wood chip/pellet boiler with spring outfeeder

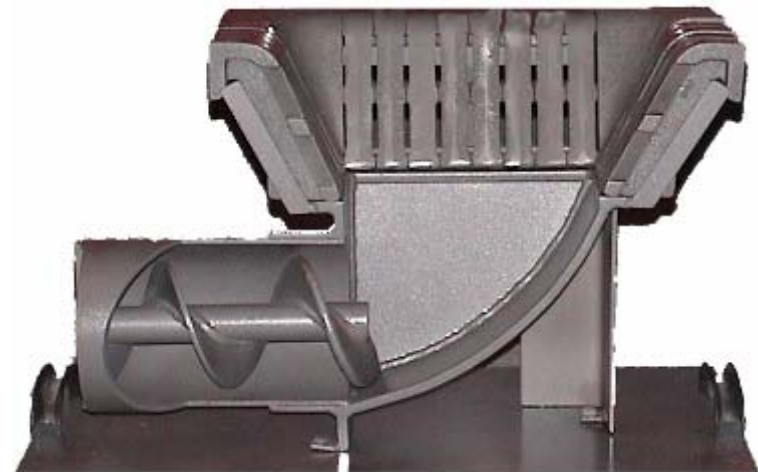
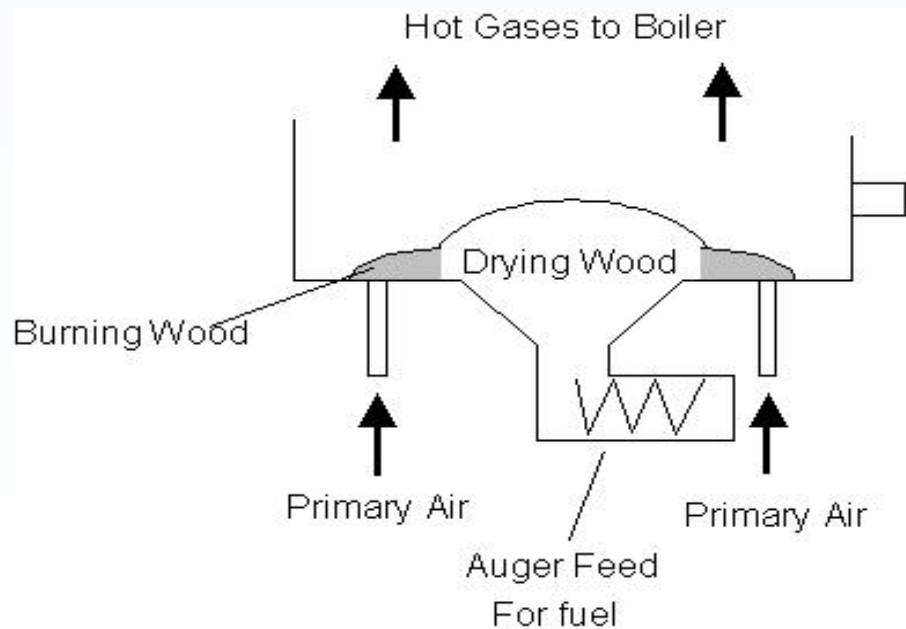


*Fully automated 24 x 7 operation  
Auto-ignition, ash removal, heat exchanger cleaning,  
particulates removal  
Spring outfeeder feed system: Suitable for wood chips or  
pellets (15 to 1000KW)*

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# Combustion Chamber - Underfed Hearth...



# The underfed hearth wood-boiler.



- From 25kW to 650kW
- Efficiency; 91% at full-load, 92% at part load.
- Utilise drier fuels from 35% MC down to 10% - chips and pellets
- Fully modulating down to 20% MCR
- With buffer tank, below 20% MCR in summer
- Automatic ash removal
- Automatic heat exchanger cleaning + EGR

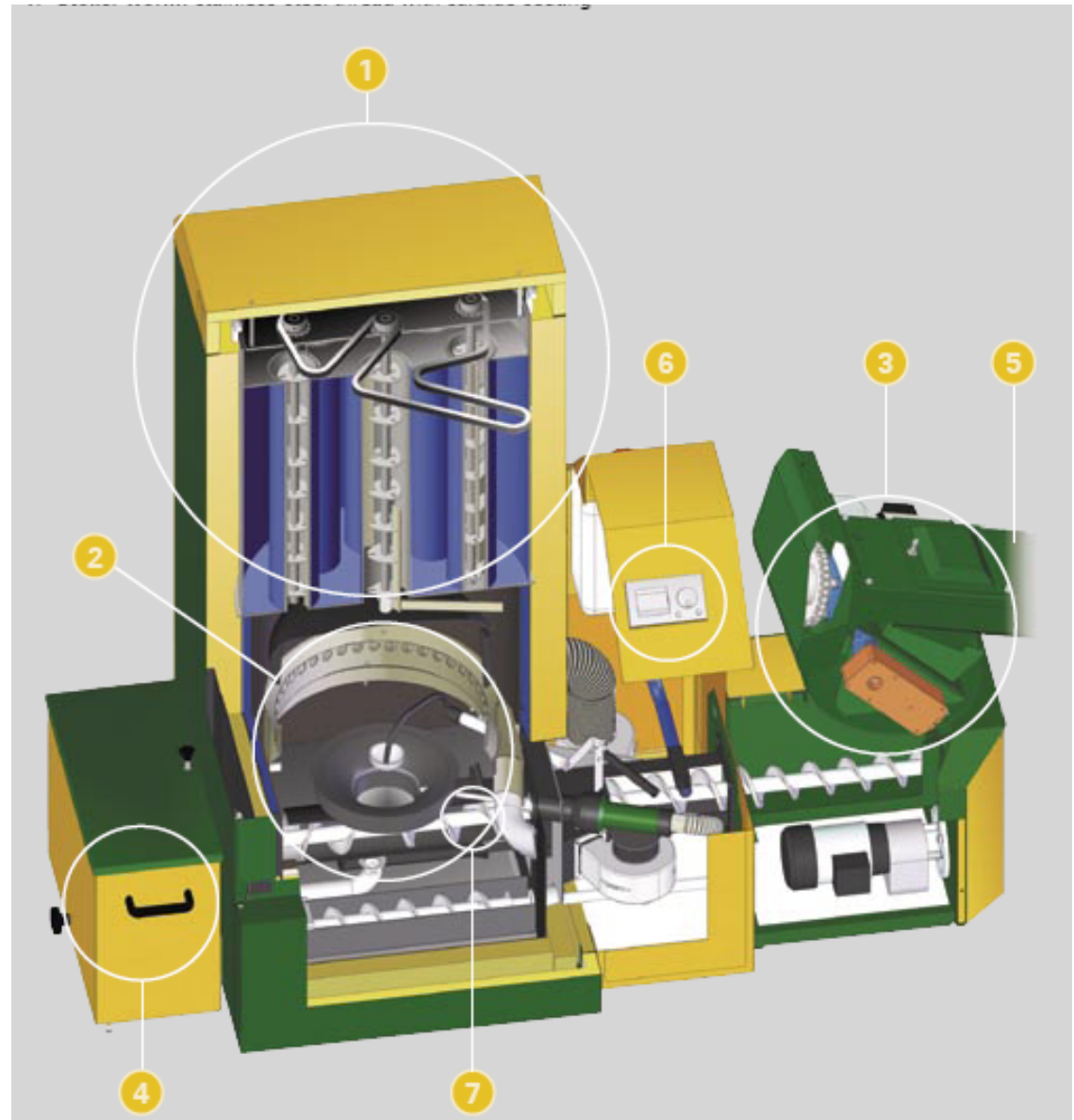




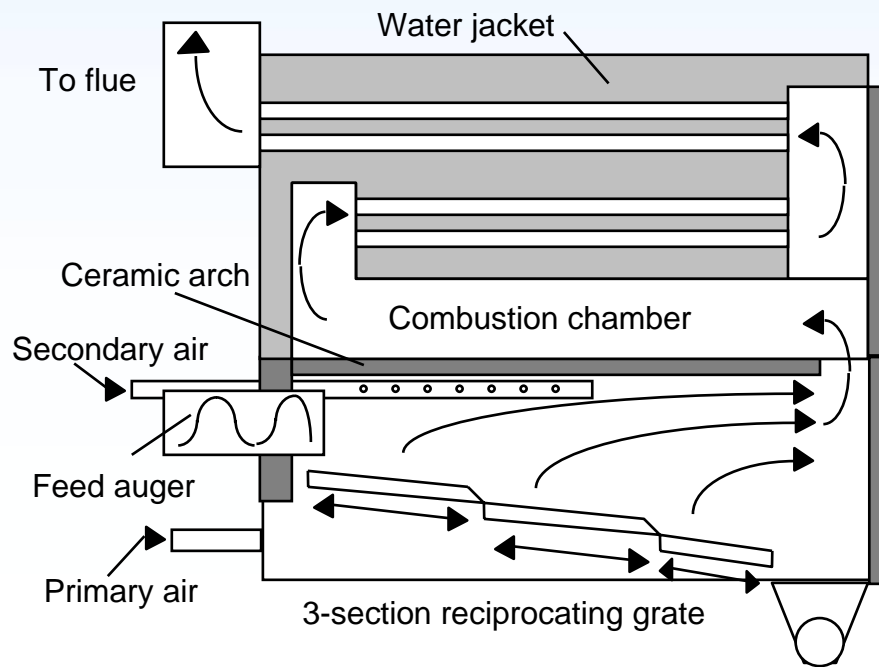
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## Modern underfeed Stoker (15 to 750KW)

- Automatic ignition
- Backfire protection
- Lambda sensor (O<sub>2</sub>)
- Automatic ash removal
- Automatic heat exchanger cleaning
- Cyclone to remove particulates
- Optional district heating controls
- 90% full load, 92% part load (30% turn-down)
- Fuel 8% to 35% MC
- 0.5 to 1.0% ash

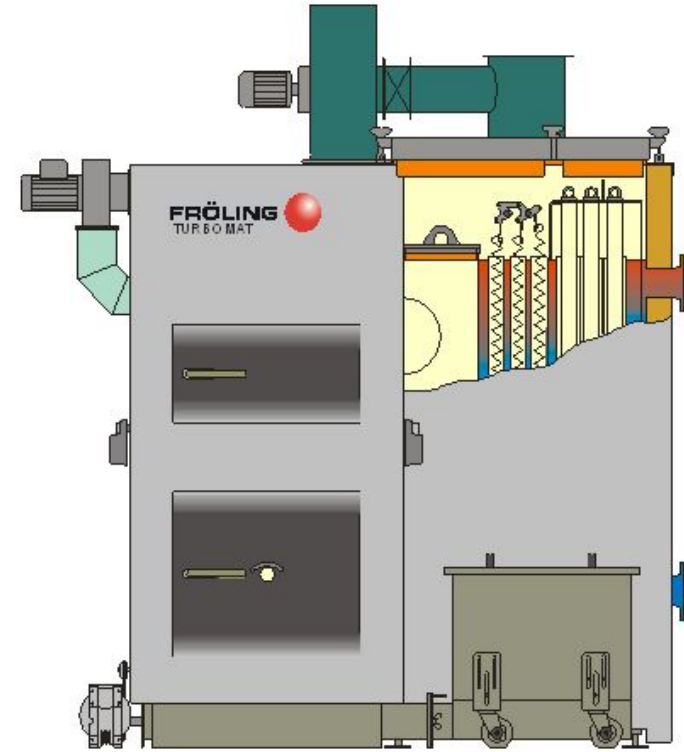
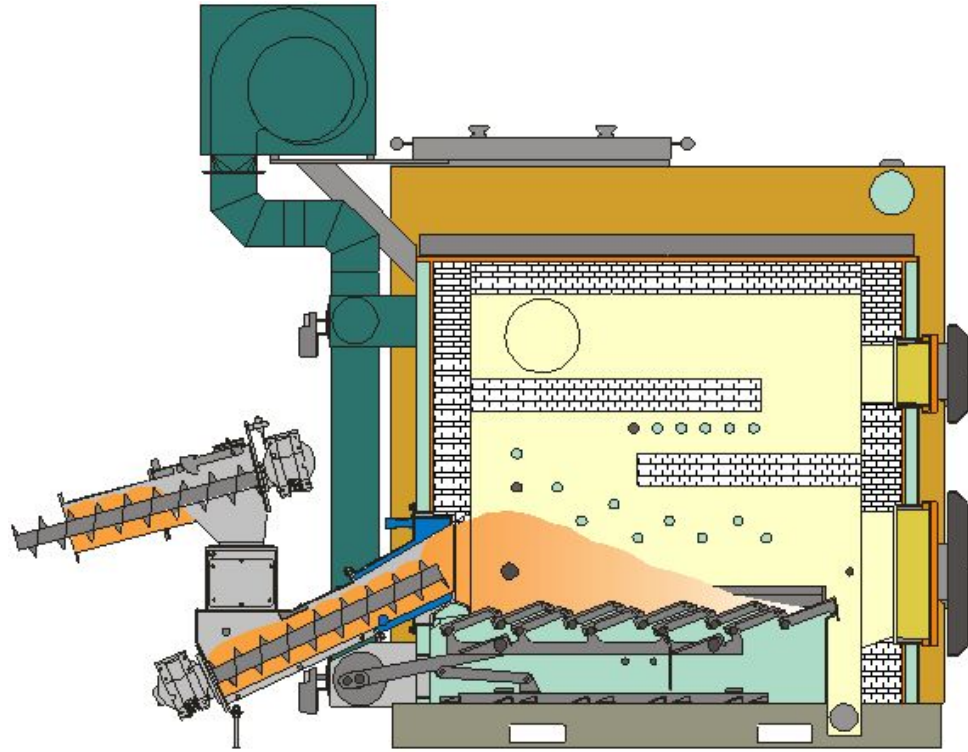


# Combustion Chamber - The Step Grate Hearth...





# Step Grate Boiler (150KW - 5MW) with screw feed



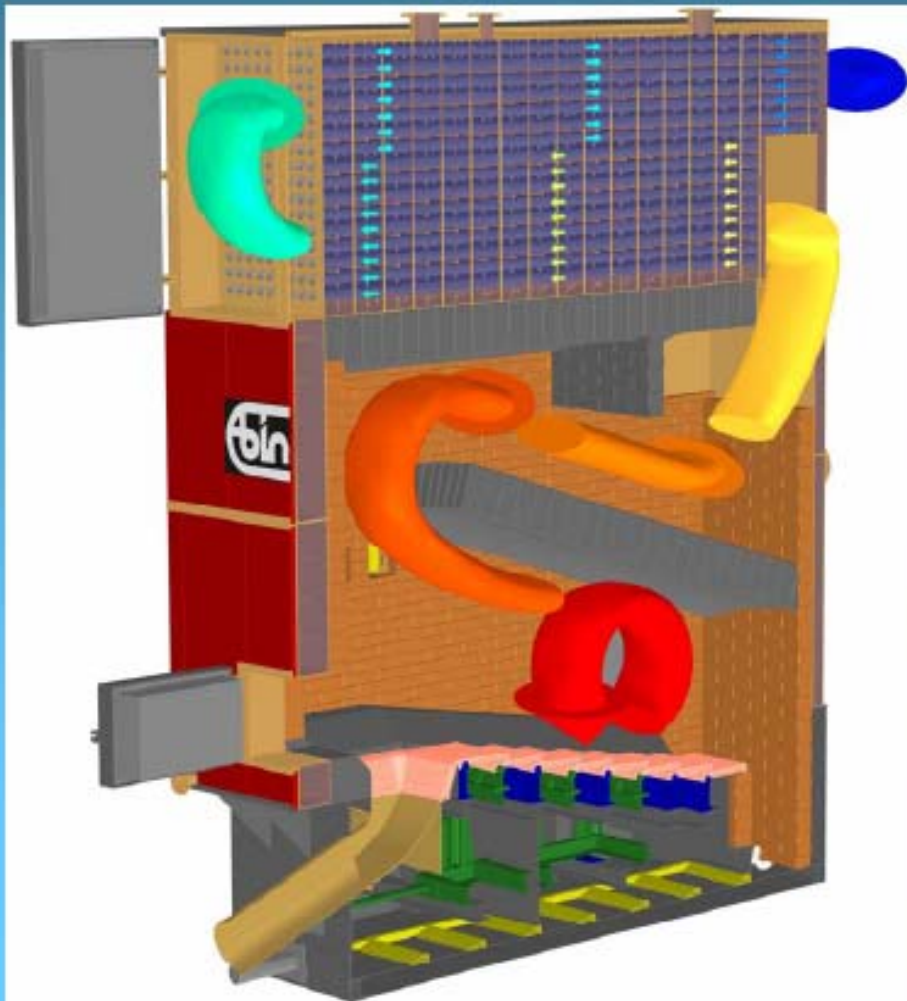
- Higher moisture content: up to 50% for a Fröling TM 500KW boiler
- More robust to fuel impurities & larger chip size
- Efficiency 91% full/ 92% partial



# The stepped-grate wood-boiler.

BINDER Josef Maschinenbau u Handels GmbH  
 8572 Bärnbach  
 T: +43 (0) 3142 / 22 5-44  
 F: +43 (0) 3142 / 22 5-44-18

Unterschubrostfeuerung mit Stokerschnecke



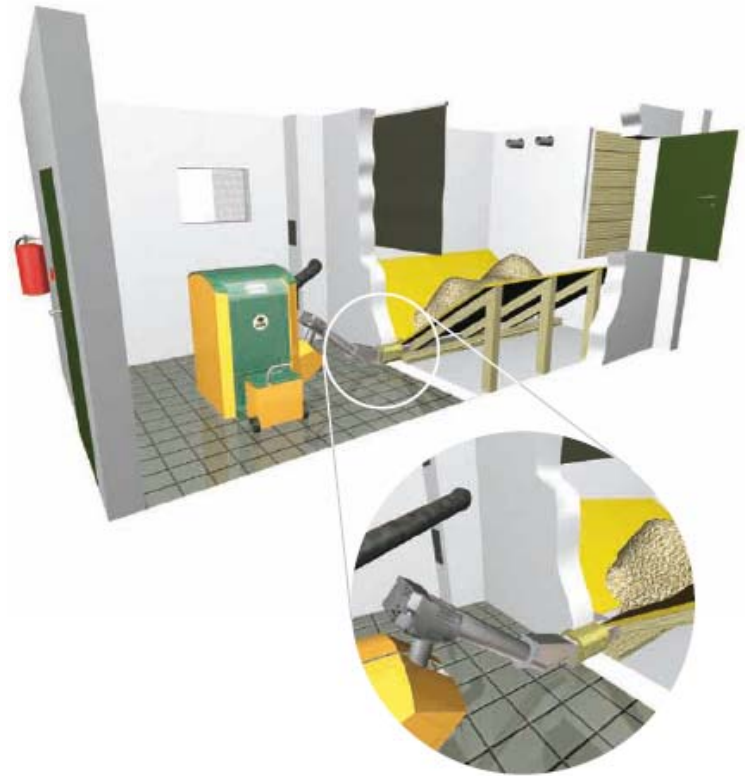
- From 150kW to ~ 10MW
- Efficiency; 88-91% at full-load, 90-92% at part load.
- Can utilise a wide range of fuels from 55% MC down to 10% - chips and pellets
- Fully modulating down to 40% MCR (or 20% MCR for fuels < 35% mc)
- With buffer tank, below 20% MCR in summer
- Automatic ash removal
- Automatic heat exchanger cleaning + EGR





# Feed system: pellet only

- Pellets are pumped into fuel store
- As pellets flow, a V-shaped bottom is adequate
- Must be kept dry
- 6mm for boilers to 30KW
- 8mm for >40KW



# Domestic – small-scale Pellet Products

- A number of simple back-boiler systems now available – Extraflame Ecologica Idro and Lucrezia 14.5kW and 22kW
- Many pellet stoves –Extraflame – 5-11kW
- Full scale boiler systems – Binder (Firefox) – 10kW to 45kW
- Commercial – Binder – 35kW to megawatts



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# The domestic pellet system



- From 10kW to 45kW
- Efficiency; 88% at full-load, 92% at part load.
- Utilise drier pellet fuel
- Fully modulating down to 30% MCR
- With buffer tank, below 20% MCR in summer
- Automatic ash removal
- Heat exchanger cleaning
- In-built control panel linked to building controls





# ENERGY

## INNOVATIONS



### HPK-RA 30kW Wood Pellet Case Study

- Boiler: **Gilles HPK-RA 30kW**
- Output: **30kW**
- Fuel: **6 / 8mm Wood Pellets**
- Fuel Storage: **Wooden Clad Steel Hopper**
- Fuel Storage Capacity: **5m<sup>3</sup>**
- Annual Heat Load: **63 MWh per year**
- Annual Fuel Requirement: **14 tonnes (Wood Pellet)**
- CO<sub>2</sub> Saving: **12 tonnes per year**
- Features: **Automatic ignition, heat exchanger cleaning, ash removal**
- Properties Heated: **House, Office Space**



House and Office Space



Boiler Room and Fuel Store

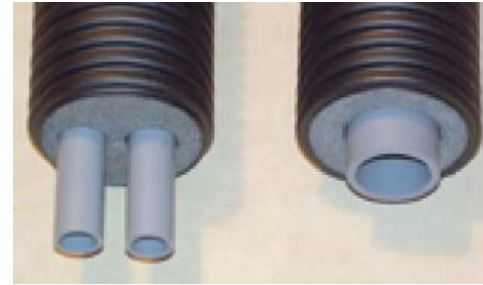
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# District Heating Distribution

- Design of heat distribution network
- Central energy centre
- Pre-insulated heating pipe
- Heat interface units to manage the heat input into each building or direct/indirect
- Heat measurement (KWh):
  - Energy centre output
  - Building input



# Sustainability Centre Boiler

120kW

Veto boiler + hopper feed

200m heat main

40 – 50 tonnes pa from own woodlands

£55,000 project cost



# West Dean

Large installation

Heating college buildings plus others

Operating for 25 years

Improved the management of 1,900 acres of woodland

Use 1,200 tonnes of chip p.a.



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# Park Farm Cottages, Avington

New holiday cottages

+ 2 farm cottages

60kW Gilles Boiler

Commissioned Nov 07



# Queen Elizabeth Country Park – Visitor Centre

80kW Froling boiler

Commissioned Nov 07

Currently installing  
information system for  
visitors



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# Ipley Manor, New Forest

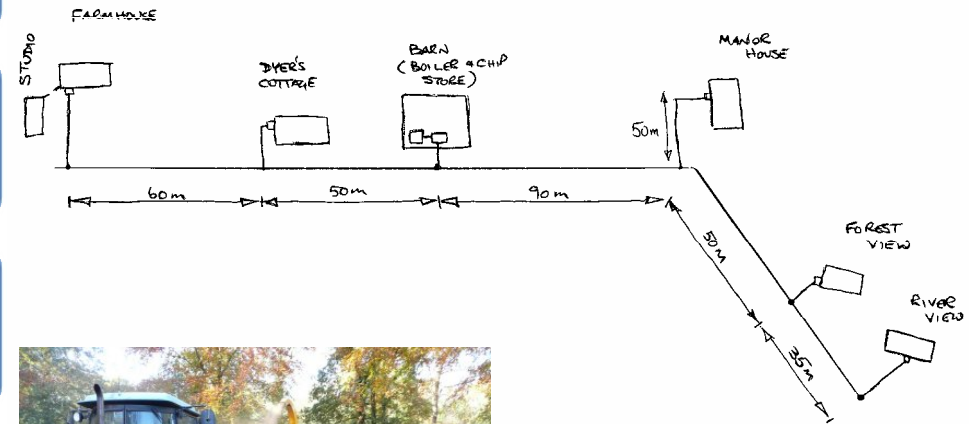
120kW veto boiler

Commissioned Nov 07

District main to manor house + 4 cottages

Fuel from own woodlands

Sustainable Development Fund Grant



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# Some Chip Boiler Supplier Installers in the UK

Econergy (KWB, Froling, Veto)

Energy Innovations (Gilles)

Wood Energy (Binder)

Rural Energy (Herz)

Talbotts (Talbot)

BioEnergy

3G Energi (KOB)

Ashwell

Mercia (Heizomat, Veto)

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# Modern Wood Heating

## Positives

- Proven European Equipment
- Competent UK Design / Install
- Supply Chain is ready
- Knowledge is growing
- Confidence is growing
- Oil prices rising fast

## Still to go

- Clusters – not there yet
- Changing Culture
- Equipment still too expensive



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John Bushby

John @wood4heat.co.uk

01730 823167

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