

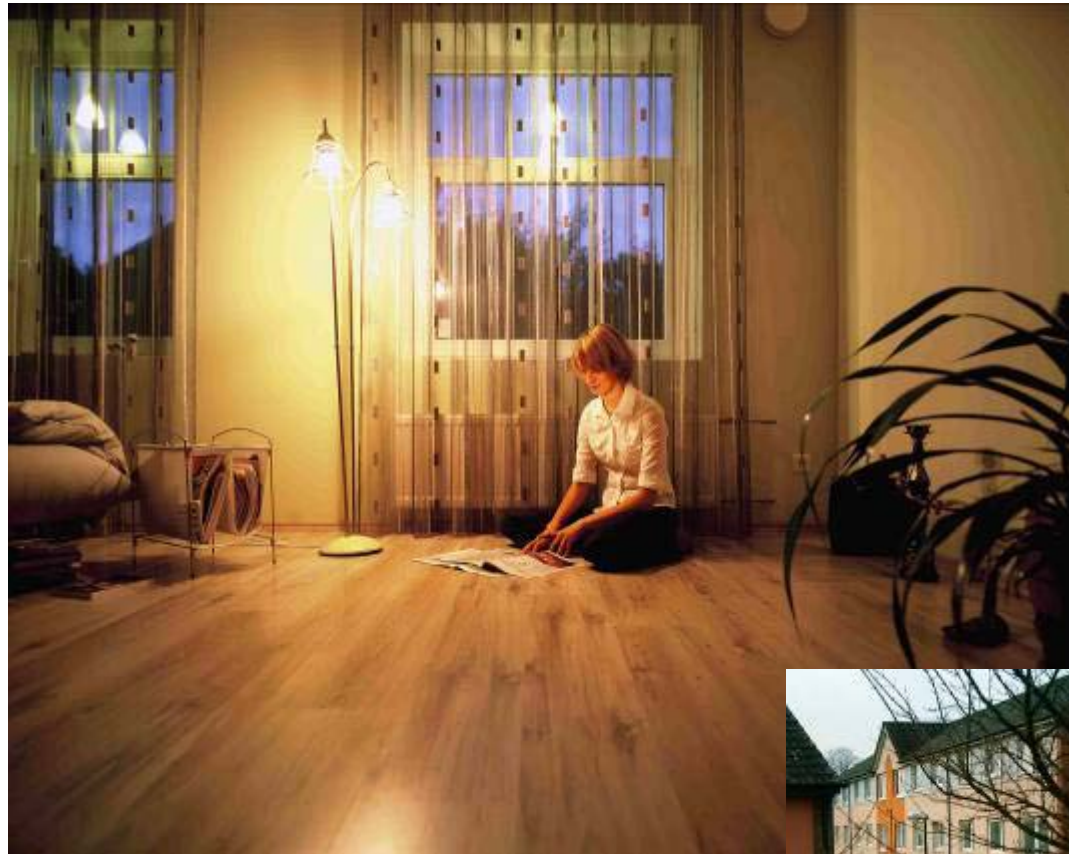
Energy for future communities

The benefits of CHP for district heating



District Heating – why?

- Legislative
- Environmental
- Financial
- Energy efficiency
- Proven

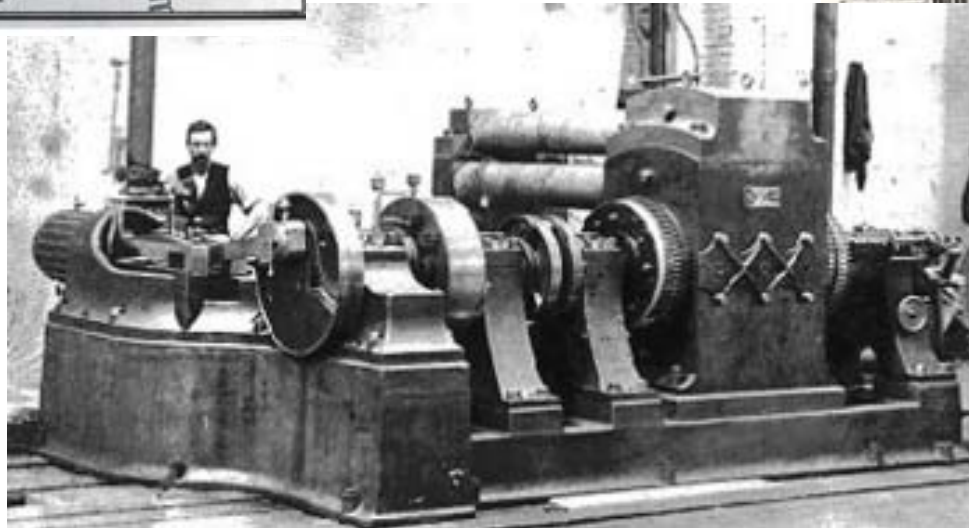
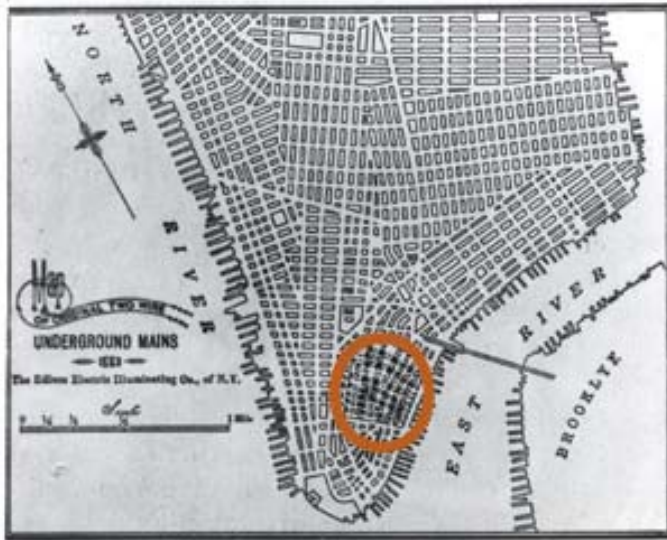


Realising the benefits - A brief history

- The Romans
- 14th century Chaudes-Aigues, France - geothermal
- 1623 London proposal
- 1851 Crystal Palace, London
- 1853 Annapolis, USA
- 1877 Lockport, New York – first system on a commercial basis

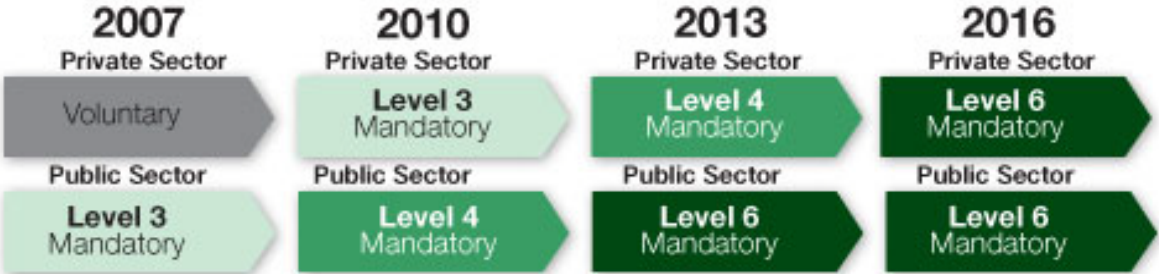


1882 New York - first CHP district heating

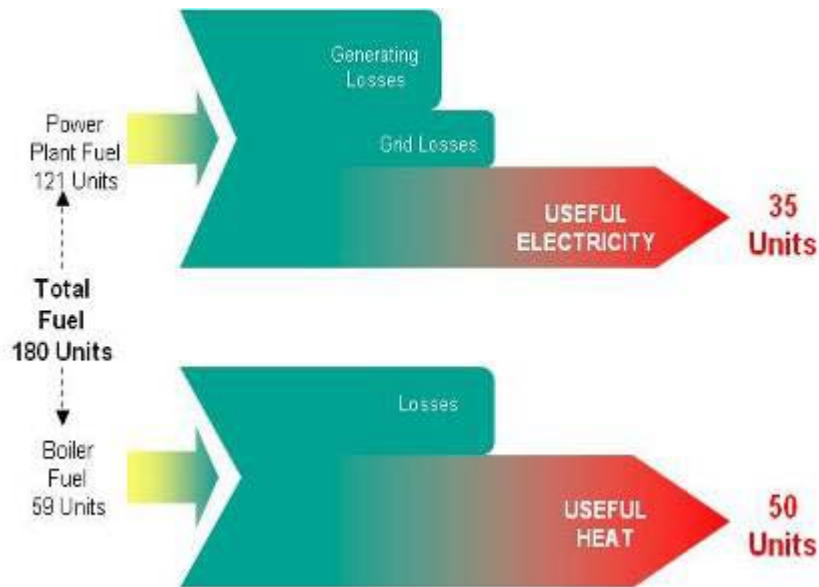


The Code for Sustainable Homes

- Mandatory for all new housing



Combined Heat & Power



Separate Heat & Power

Total Conventional Efficiency = 47%

(85 output / 180 input)

Conventional Power Plant Efficiency = 29% (35 output / 121 input)
Conventional Thermal Efficiency = 47% (50 output / 59 input)



Combined Heat & Power (CHP)

CHP Combined Efficiency = 85%

(85 output / 100 input)

Aberdeen City Council

- Scheme serves 198 homes and Hazelhead Academy school and leisure centre
 - Population 500 people
 - Supplies hot water, heating and electricity
 - Energy efficiency 85%
-
- Reduces CO₂ emissions
 - Up to 50% lower energy bills for residents
 - Winner of the 2008 Outstanding Achievement in Housing Award



Barkantine - CHP for Tower Hamlets

- Scheme serves 1000 homes, schools, leisure centre and community buildings
- Population 4,000 people
- Supplies hot water and electricity
- Energy efficiency 80%

- Reduces CO₂ by 2,500 tonnes per year
- Lower cost for residents



Extending the benefits – utilising the energy

- Cooling
- Heat storage
- Export of energy to industry/ commerce
- Phased implementation



University of Warwick dhs

- 4.45MWe CHP installed in phases
- Absorption chilling for air conditioning
- Ice storage for air co
- Hot water buffer vessels
- £300,000 saving per year
- CO₂reduction 32,500 tonnes



Lyon - Heating and cooling for 416,000 people

- Scheme serves 40,000 homes, schools, offices, shopping centre, station, hospitals and community buildings
 - Population 416,000 people
 - Uses domestic waste, gas
 - Supplies super heated water, steam, chilled water and electricity
 - Network length 70 km
 - Capacity 300MW
-
- Energy optimization in high density urban areas



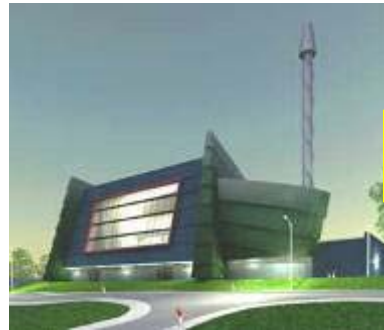
The Code for Sustainable Homes- level 6

- Code level 6 mandatory by 2016
- Level 6 zero carbon home:
 - Net zero CO₂ emissions including energy for heating/cooling/hot water/lighting/cooking/appliances
 - Achievement of level 5
 - On-site renewable including private wire



Extending the benefits - Carbon neutral energy

CO₂ is absorbed by trees during their life



Carbon neutral heat and electricity



CSH 4++

Lower cost energy

Reduced emissions

After primary use wood is recycled as a fuel source – providing renewable energy and avoiding landfill

Wood is used for manufacture



Reclaimed wood fired 20MWe power plant

- Provides Electricity for Delitzsch region
- Uses chipped wood
- Serves 45,000 homes
- Generates 140,000MWh
- On site processing, storage and quality control of reclaimed wood

- Annually saves 92,000 tonnes CO₂
- Cost savings



Olomouc – 50,700 homes benefit from renewable energy

- Serves 50,700 homes
- Uses woodchips, straw (21,000 tonnes pa)
- Supplies hot water, heating and electricity
- 141MWth from biomass (213MWth total)
- 46MWe electricity generation

- Emissions savings and lower cost



Biomass CHP district heating



- Renewable energy for 20,000+ homes
- Fuelled by UK sourced waste wood biomass
- Avoids landfill

Other renewable fuels

- Energy crops – straw, coppiced wood
- By-products from food processing – cocoa husks
- Biogas



Vilnaus – renewable energy for 140,000 homes

- Serves 140,000 homes
- Uses straw, woodchips and peat (124,000 tonnes pa)
- Supplies hot water, heating and electricity
- 60MWth
- 12MWe electricity generation



- Emissions savings and lower cost

50MWe Biomass plant

- Hungary's largest biomass CHP
- 50MWe generation
- 313MWth heat generation
- Stores, processes and utilises timber on site
- Dedicated timber growing



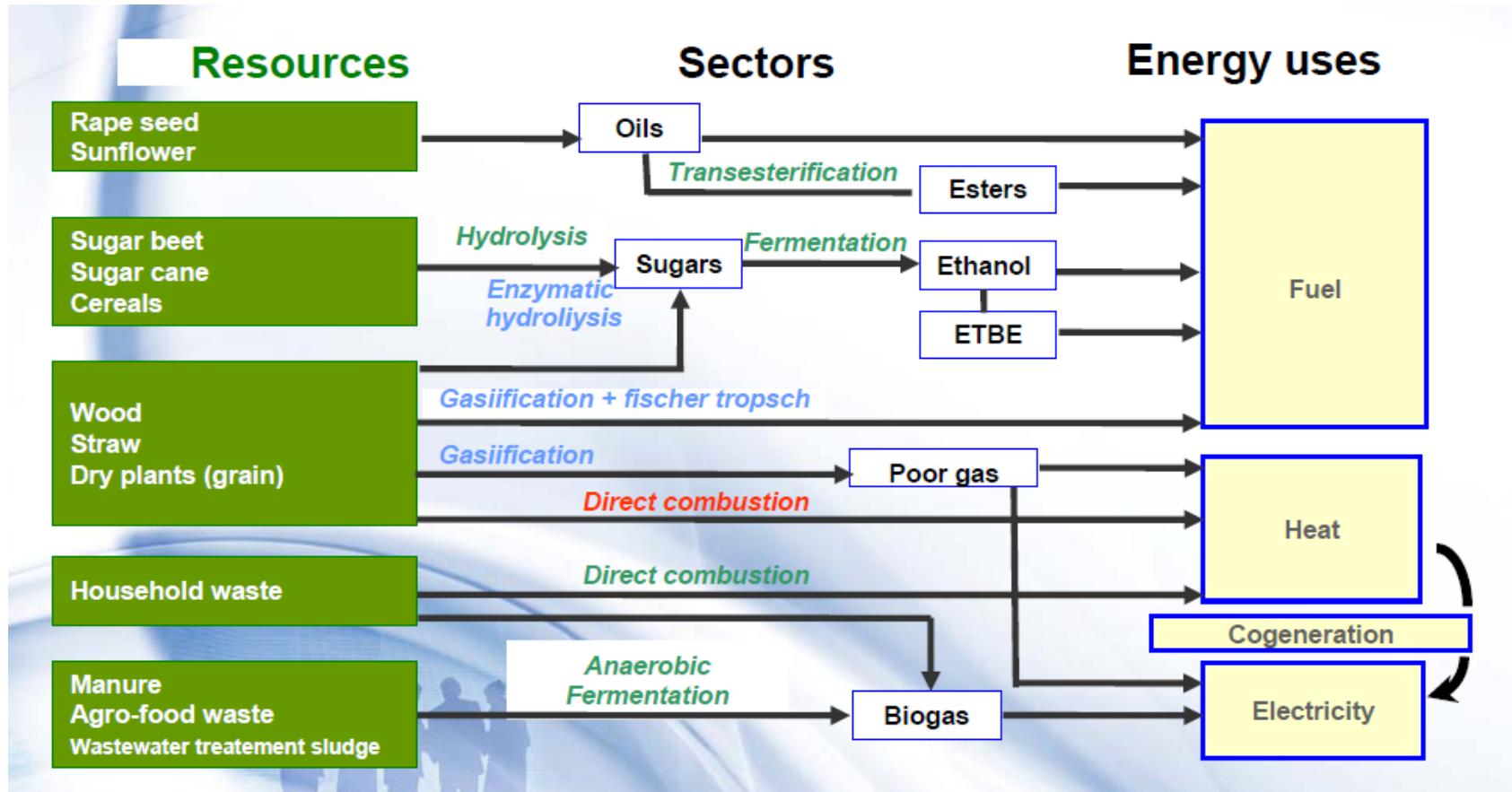
- Emissions savings
- Plant has aided regional growth

Biogas - Germany

- 10x500kWe biogas CHP
- supplying heat and electricity to local villages
- Anaerobic digestion of corn/rye
- Agreement with farmers
- Use of digestates as fertiliser



Alternative fuels



Extending the benefits – adding services

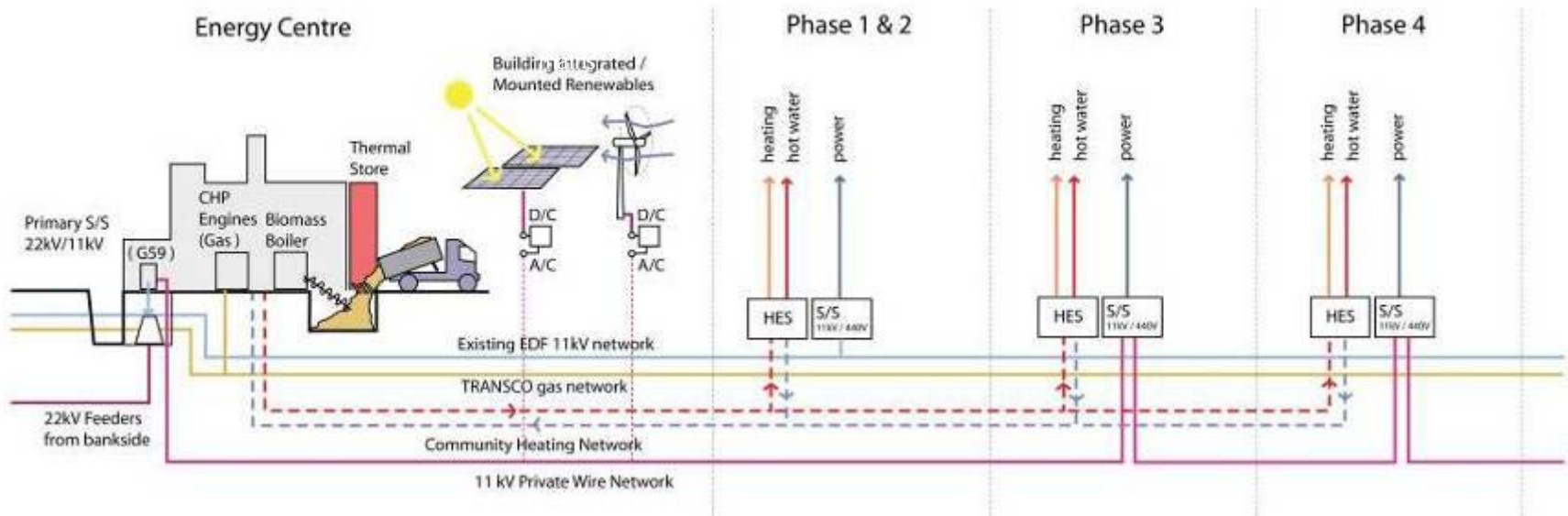
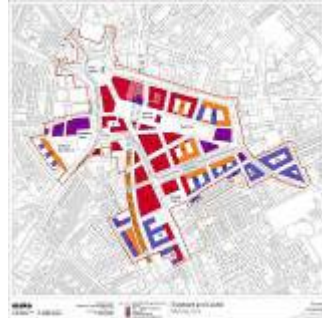


Extending the benefits – ESCo/MUSCo

- Implementation and investment
- Manage operation and maintenance
- Transfer of risk
- Fuel supply
- Provide billing services
- Reduce fuel poverty



Extending the benefits- retrofit



Extending the benefits - £ investment



- Finance for schemes
- CHP without significant investment of capital and risk
- Larger schemes 500+ homes funded
- Non recourse
- Risk transfer



Implementing district heating

CO₂ Strategy

- Integrate CHP fully into your overall CSH strategy
- Work with existing consultants to optimise offer and selected sites
- Detailed advice / help through the planning process

Design

- Detailed design of the site energy solution
- Integration at site level with other CSH initiatives
- Planning support

Finance

- Fully funded on non-recourse basis
- No cost / exposure to developer
- Ownership of asset remains with Freeholder / Developer

Build and commission

- Agreed build / installation by Dalkia
- Full integration with construction programme
- Liaison and management of other utility providers (supply connections)

Operation & Maintenance

- Fully operation over contract period
- Bio fuel supply guaranteed
- Covered by contractual SLA's giving full protection to consumer.
- Customer billing

Replacement / Upgrade

- Full contractual obligation to maintain / upgrade plant & equipment
- Risk transfer



Complete Energy Solution

- A **complete turnkey solution** for community heating/cooling and electricity needs
 - Robust, proven technology
 - Fully funded and non-recourse
- Clear, long-term benefits
 - ***Greener - Compliance with the Code***
 - ***Cheaper – Highly efficient, tackling fuel poverty***
 - ***Secure – Long-term direct contracts including the fuel supply chain / price control***

Dalkia – Europe's leading partner for community energy

- 800 district heating networks
- 8,000km of managed distribution
- Operating more than 180 biomass schemes
- 780MWe biomass electricity generation
- 3,170MWth heat
- 500,000+ homes (renewable energy)
- 70 years experience
- ESCo track record
- Life expired wood biomass fuel facilities - UK

Questions?