

BiogenGreenfinch

M2M - Food waste AD

Presentation by Andrew Needham

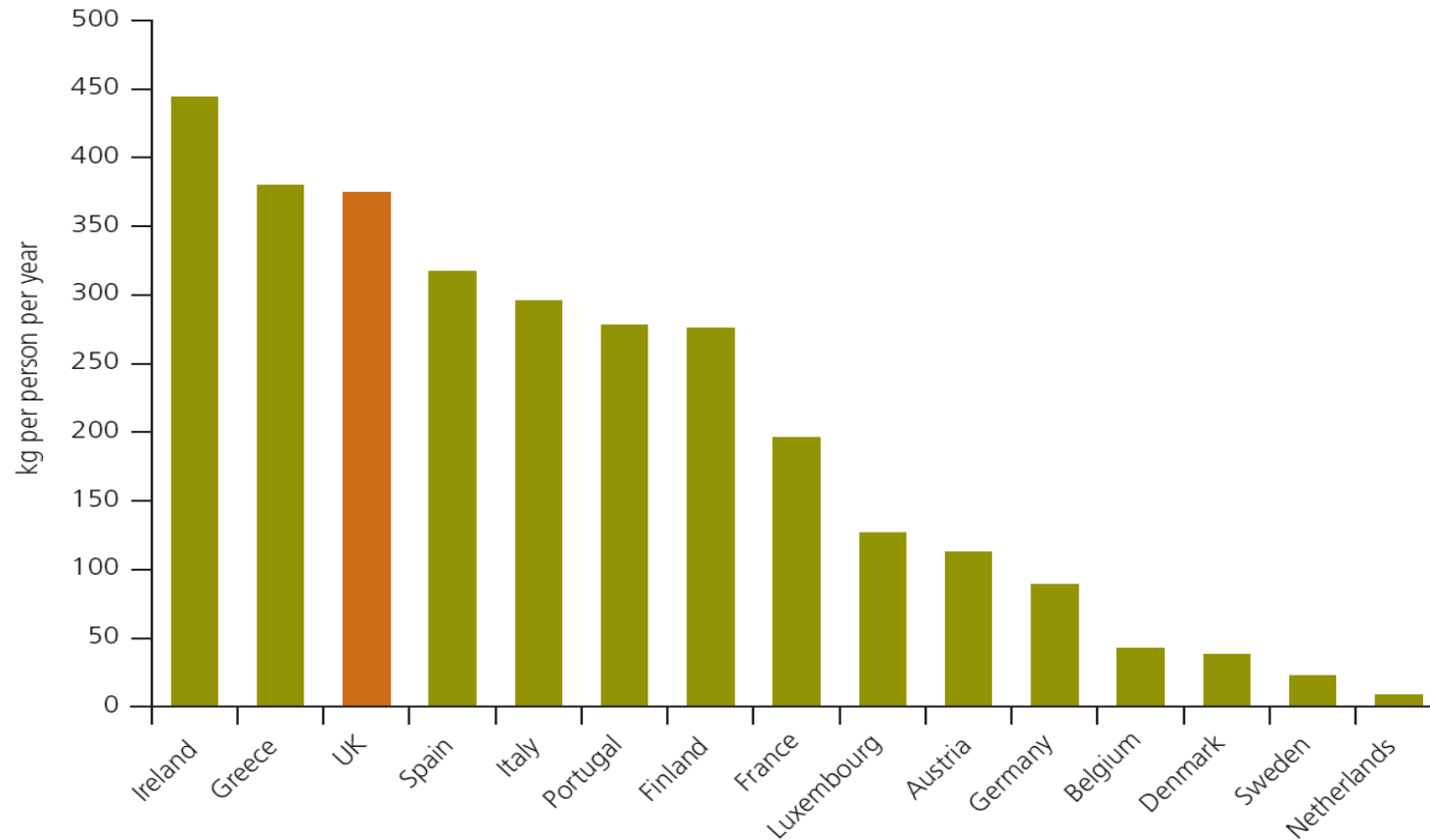
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Some facts about UK food waste...

1. In the UK, **c20 million tonnes of food waste is produced each year. 6.7 million tonnes of this is household food waste.**
2. WRAP estimates that each UK household produces about 250kg of food waste per year, representing one third of food purchased and **wastes £430 a year!**
3. Food waste also **generates 18 million tonnes of CO₂ greenhouse gas emissions.** This is the same as the emissions generated from one in five cars on the UK roads.

Local Authorities

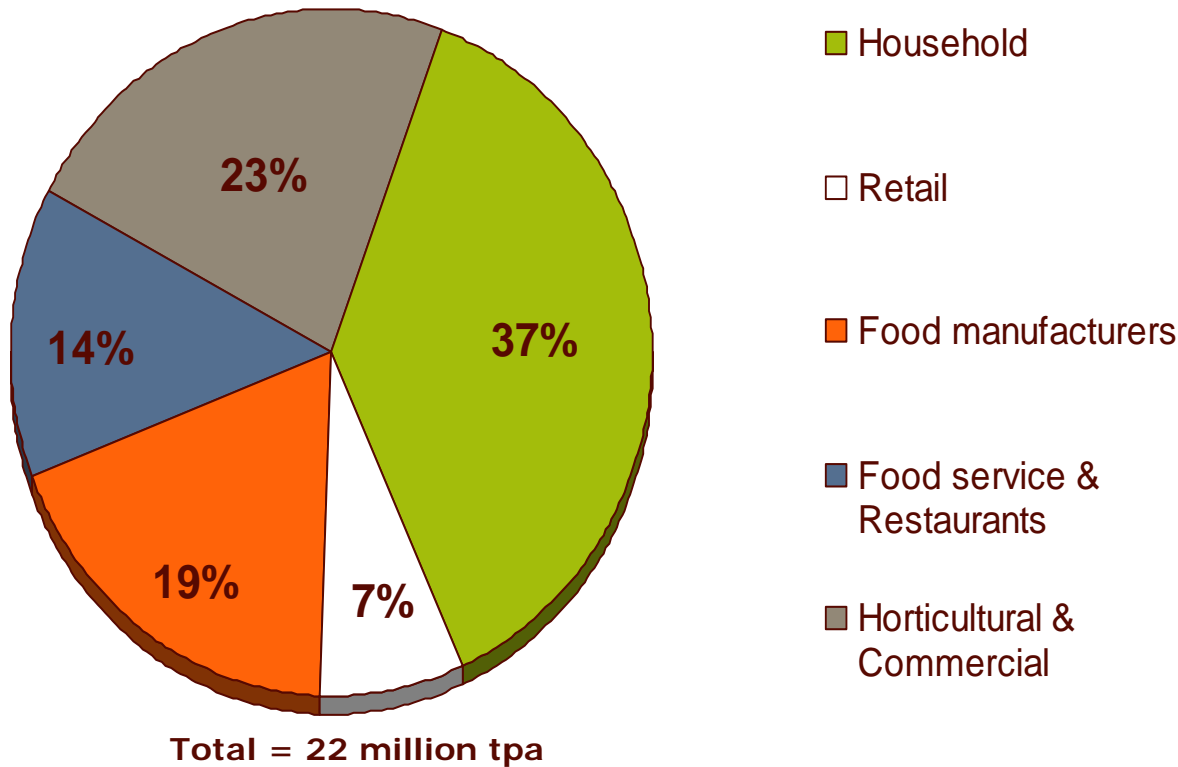
Chart 1.1: Municipal waste sent to landfill, EU 15 (2005)



Source: Eurostat

Food waste

The food waste market is large and diverse – with household waste the biggest component



Source: Wrap – Supply Chain Food Waste

UK AD Drivers

Commercial incentives - Driving food waste out of landfill

- Government support – BAT for dealing with food waste (WRAP report)
- Escalating landfill tax - £8/t/yr increases
- Recycling performance for Local Authorities - LATS

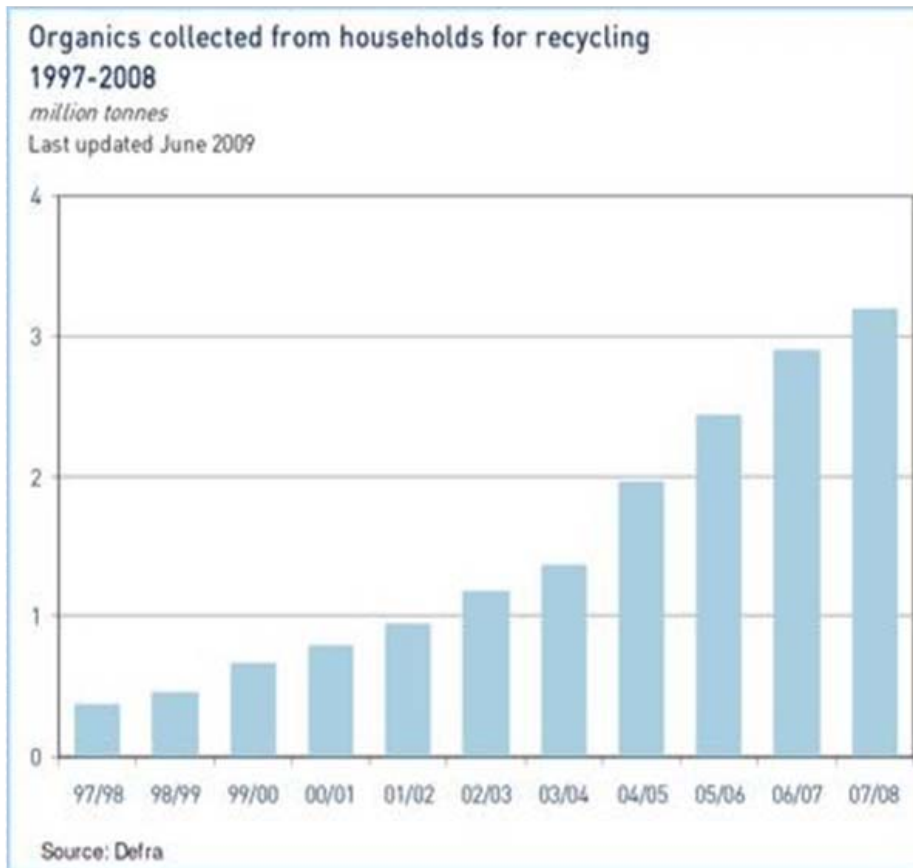
Commercial incentives - Energy

- Renewable energy targets
- Renewable Obligation Certificates
- Feed In Tariffs (future)
- Heat Obligation (future)

Indirect influences

- Corporate Social Responsibility
- Carbon reduction

Growing market



Source: Eunomia - Dealing with Food Waste in the UK March 2007

- 6.7 million tonnes of municipal food waste
- If separated for collection and put through AD, 477-761 GWh of electricity
- Enough to power for 103,000 to 164,000 households
- Relative to other treatment routes CO₂ savings are significant
 - Composting: 0.22-0.35 million tonnes of CO₂
 - Landfill: 1.6-3.6 million tonnes of CO₂
- Binding renewable energy targets - 15% of energy consumption by 2020

What's happening in the UK?

- Promoted by UK waste and energy policy for up to 20 years
- Deployment slow outside of water industry for sewage treatment
- Difficulties in making technology work commercially
- Government policy now in place
- Emerging market – 20 plants in 2008 mostly small scale on farm
- Four taking source segregated food waste
- Lots of development interest and plants being built

High level of official control

Planning Permission – Local Authority

Environmental permit – Environment Agency

Animal By-Products Approval – State Veterinary Service

Renewable Electricity Accreditation - Ofgem

Bio-fertiliser Land Use Exemption - Environment Agency

Who are we?

Bedfordia Group



Agriculture

Arable - 5500 acres
Livestock - 22,000 pigs
Grain Services - 27kt



Property

Residential
Commercial
Developments



Automotive

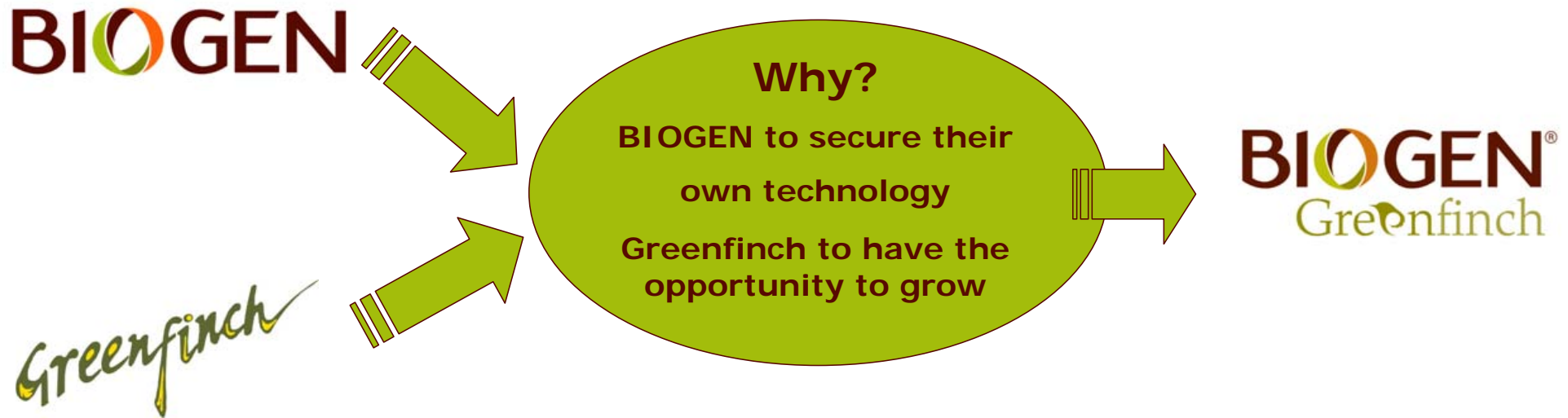
Elms BMW & Mini
Saab Chrysler Aftersales
Bodyshop
Presence in Bedford,
Cambridge, Stansted



Eco-technology

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BIOGEN & Greenfinch Merger – Oct 2008



Twinwoods

Proven operation over 4 years

Plant capacity

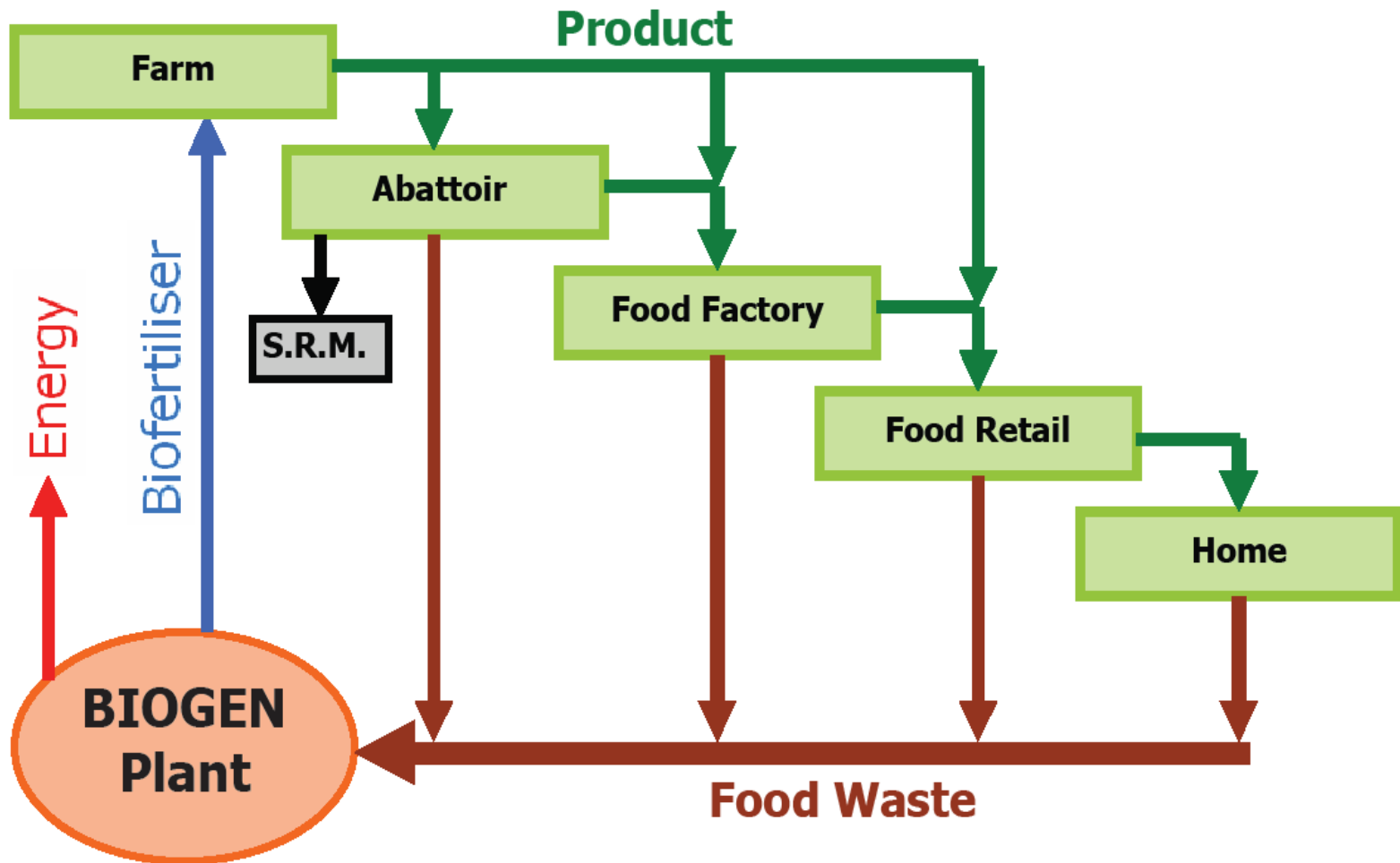
- 42,000 tonnes (30k food waste & 12k pig slurry)
- 1.3MW (1700 homes)
- 30,000 tonnes of bio-fertiliser (6000t of wheat)





Twinwoods Commercial Food Waste AD Plant, Bedfordshire

Food Waste Chain







Source-separated food waste





Biocycle

NTDP demonstrator plant

Biocycle – Leading UK Demonstrator Plant

Proven operation over 3 years

- Built under NTDP

Plant capacity

- 5,000 tonnes of LA food waste
- 0.19MWe output enough to power 300 houses

Centralised small scale plant in urban situation

- Designed to ‘fit in’ with local environment

Complete integrated solution

- 4k tonnes bio-fertiliser used on local farms
- Enough to grow 800 tonnes of grain





Westwood

2nd generation food waste AD

Project team - Westwood

Multi disciplined project design team assembled

- Operations
- Environmental & legislative
- Process engineering
- Civil engineering
- Mechanical engineering
- Electrical engineering
- Financial
- Project management



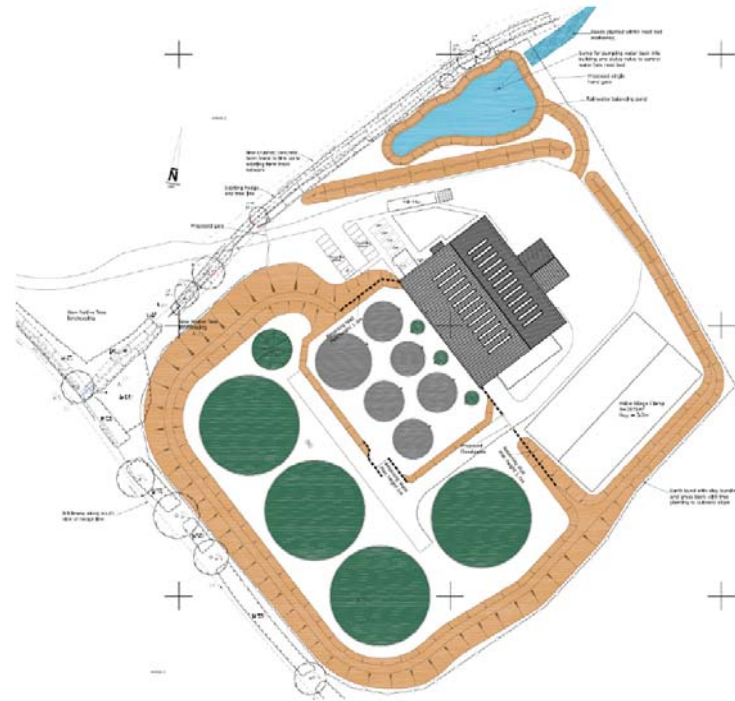
- Valuable learning from Twinwoods
- Comprehensive review
- Centred on operational reliability
- Designed for 25 years operation
- Flexible – multi feedstock handling
- High quality infrastructure
- High level of design detail through plant
- Incorporation of Greenfinch R&D

Twinwoods: valuable learning

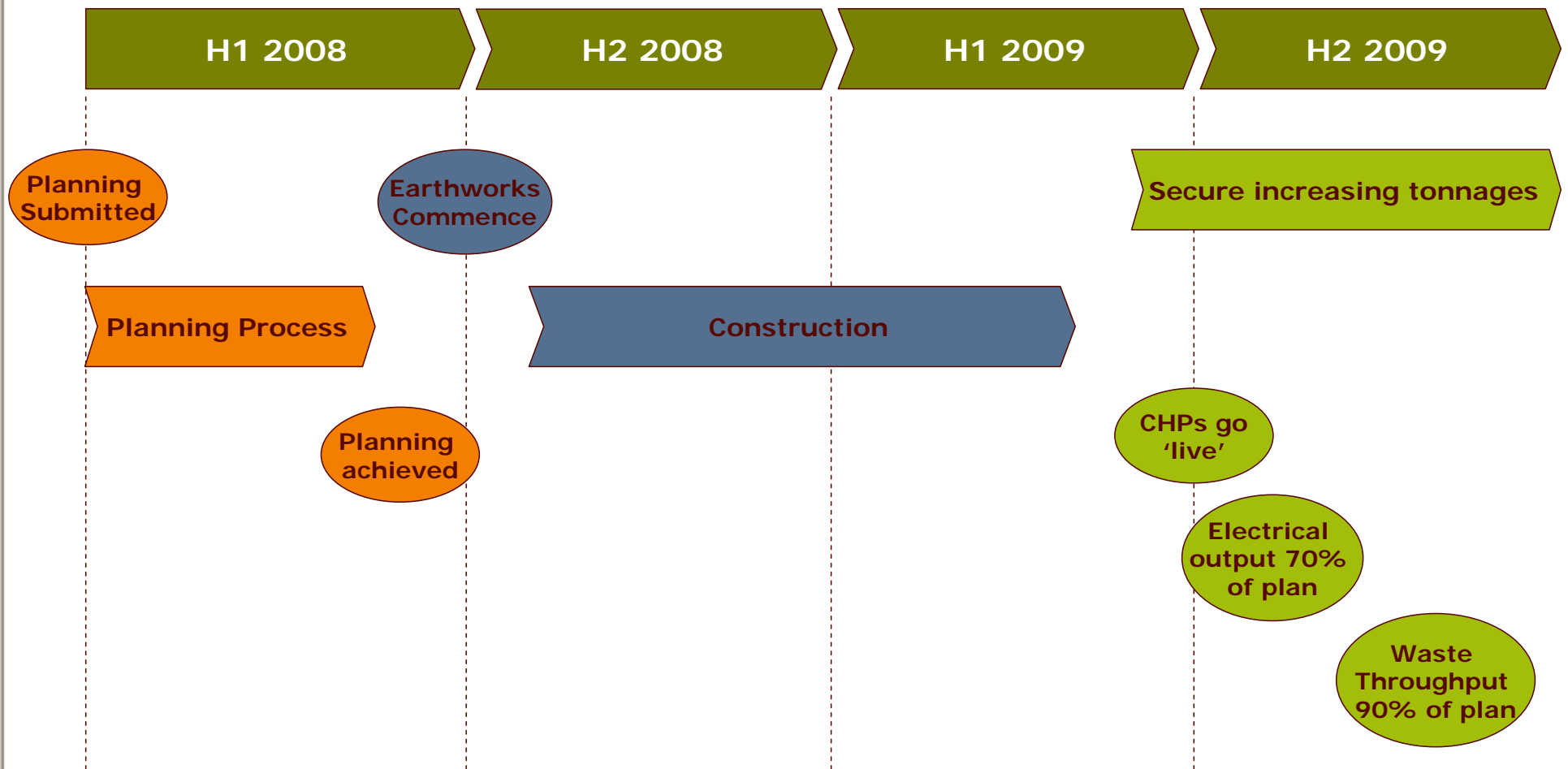
- Food waste AD is not easy, but it is possible given the right tools
- High investment with well researched and thought out business plan
- Intimate understanding of many different feedstocks and how they interact in the process
- Detail design is critical to success e.g. layout, control systems etc
- High operational expenditure with aggressive environment, therefore high quality infrastructure required
- Now understand intimately issues associated with AD of food waste
- AD of food waste is very different to German model based on energy crops
- Strong support team built up as a result e.g. Labs, Environmental etc

Westwood: the UK's leading AD plant

- Capacity: 45,000 tpa food only
- Electrical output: 2.1MWe (3,600 homes)
- Bio-fertiliser: 36,000 tpa (sufficient to grow 7,000 tpa wheat)



Westwood: a successful project



Westwood: the UK's leading AD plant



Westwood: economic process overview



Unpackaged (LA)

- Central Beds, West London, Surrey, Luton



Unpackaged (C&I)

- Greggs bakers



Packaged (C&I)

- Sainsburys, Waitrose



Liquid

- Sauces, oils



Efficiency of Conversion

- Feedstock quality and mix
- Fundamental biology
- Equipment design
- Operational control/ understanding/ capacity
- CHP unit efficiency
- Shared resourcing
- Capital cost servicing

Bio-methane/ Electricity

- £/MWhr
- Double ROCs/ FiTs
- Bio-gas?



Digestate

- Storage & pumping to Bedfordia farms





Westwood Commercial Food Waste AD Plant, Northamptonshire

Summary

The food waste problem is huge

AD provides BAT for dealing with food waste

AD of food waste is challenging but eminently possible

Works commercially providing the right incentives are in place

Thank you

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