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Advanced waste gasification, future strategies and potential outputs

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ETI10 | TEN YEARS
OF INNOVATION
2007—2017

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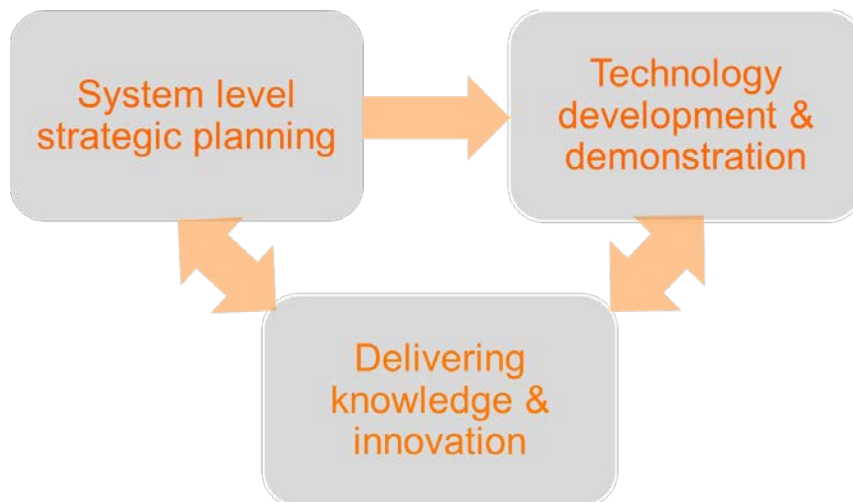
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What is the ETI?

- 10-year public-private partnership
- Set up to identify and accelerate the development and demonstration of an integrated set of low carbon technologies needed to meet 2050 emissions reduction targets



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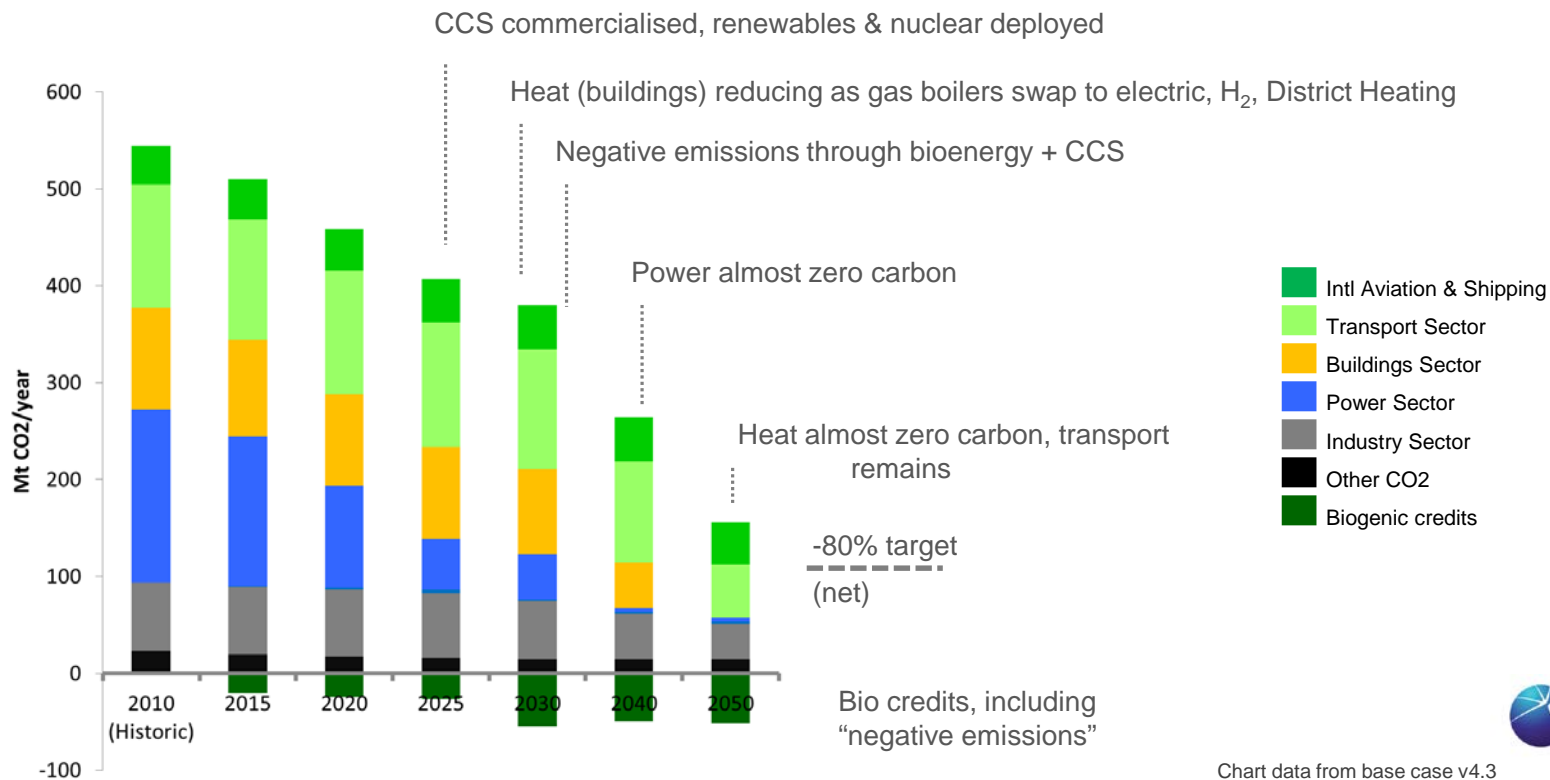
Agenda

- What's the issue and the opportunity?
- Why is gasification important?
- ETI's work in gasification



A route to Meeting – 80% CO₂ for the UK

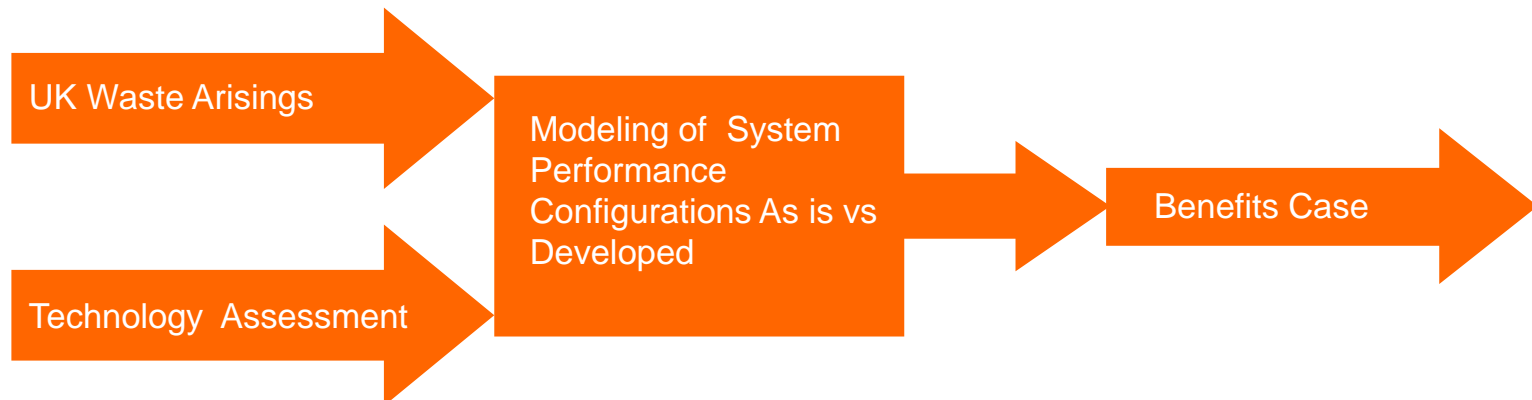
Power now, heat next, transport gradual – cost optimal





Why energy from waste

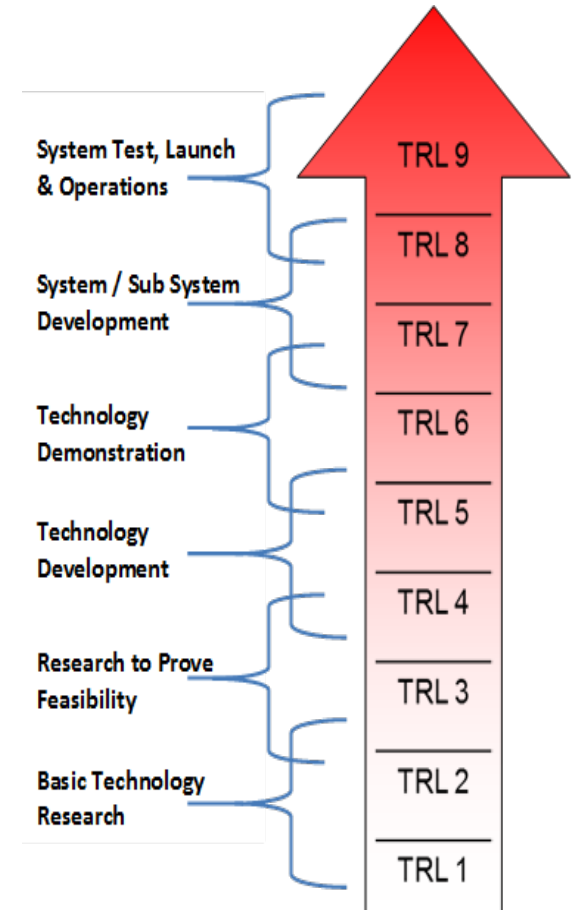
- Drivers to use waste as a fuel
 - Reduce waste sector emissions
 - Landfill diversion – landfill tax and landfill diversion targets
 - UK commitments
 - Reduction of UK emissions by 80% by 2050
 - To supply 15% of energy from renewable sources by 2020
- ETI's work started with the Energy from Waste project in 2009





Why do we need gasification?

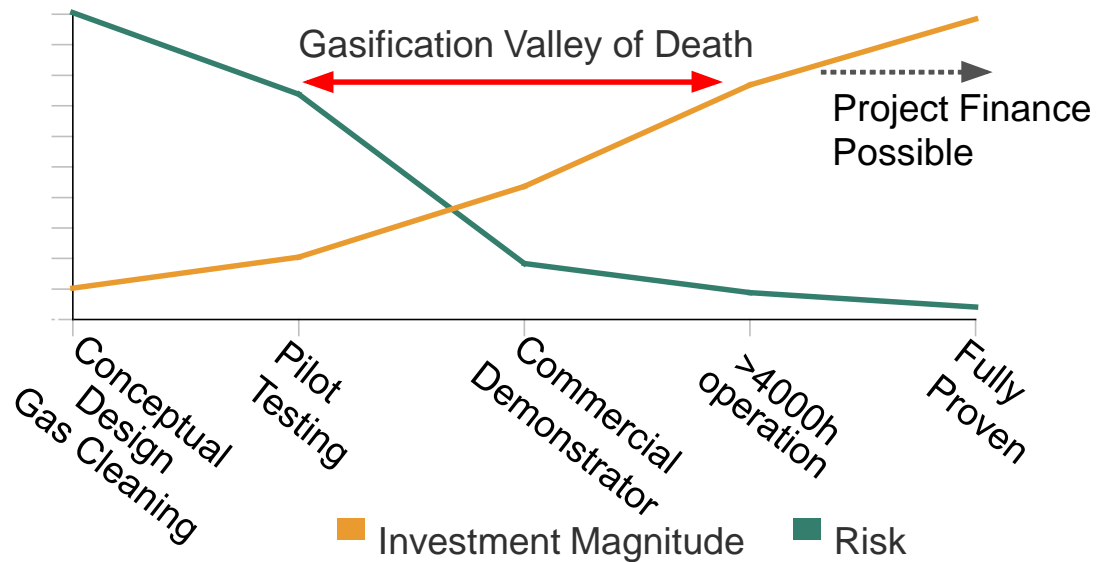
- Gasification is a good fit with UK strengths:
 - Accepts varying quality feedstocks compared especially with other 2g technologies
 - Produces power at high efficiency, especially at smaller scales (e.g. town scale)
 - Output flexibility – future scenario resilient
 - End products are compatible/fungible
 - Good fit with CCS – negative emissions
- Key risks:
 - Valley of death
 - Demonstrating reliable operations





Valley of death mitigation

- Waste Gasification Projects (to produce clean syngas) have been stuck in the 'valley of death'.
- 2 phase ETI approach - incubation period has mitigated risks.
- Due to complexities related to gas cleaning, management of ash and high process costs, commercialisation of such technologies has been challenging
- Extensive rigour in evaluating technology and commercial risk, unlike many other projects of this type built to date
- Rigorous operating processes to the delivery of the project





ETI Advanced Waste Gasification Demonstrator Project (SEC)

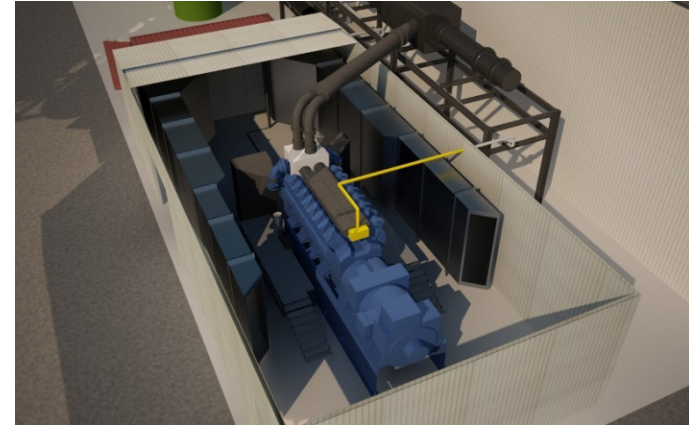
- There is a strong demand for a flexible, small-scale & highly efficient waste gasification system.
- Gasification technology provides flexibility and high efficiency energy generation utilising waste feedstocks (after maximising recycling) & low grade biomass, at small scale (1.5MWe upwards).
- The market seeks embedded generation where heat & power can be utilized most effectively.
- An effective pathway to 2nd generation fuel synthesis from waste and biomass is also a critical part of long term carbon reduction





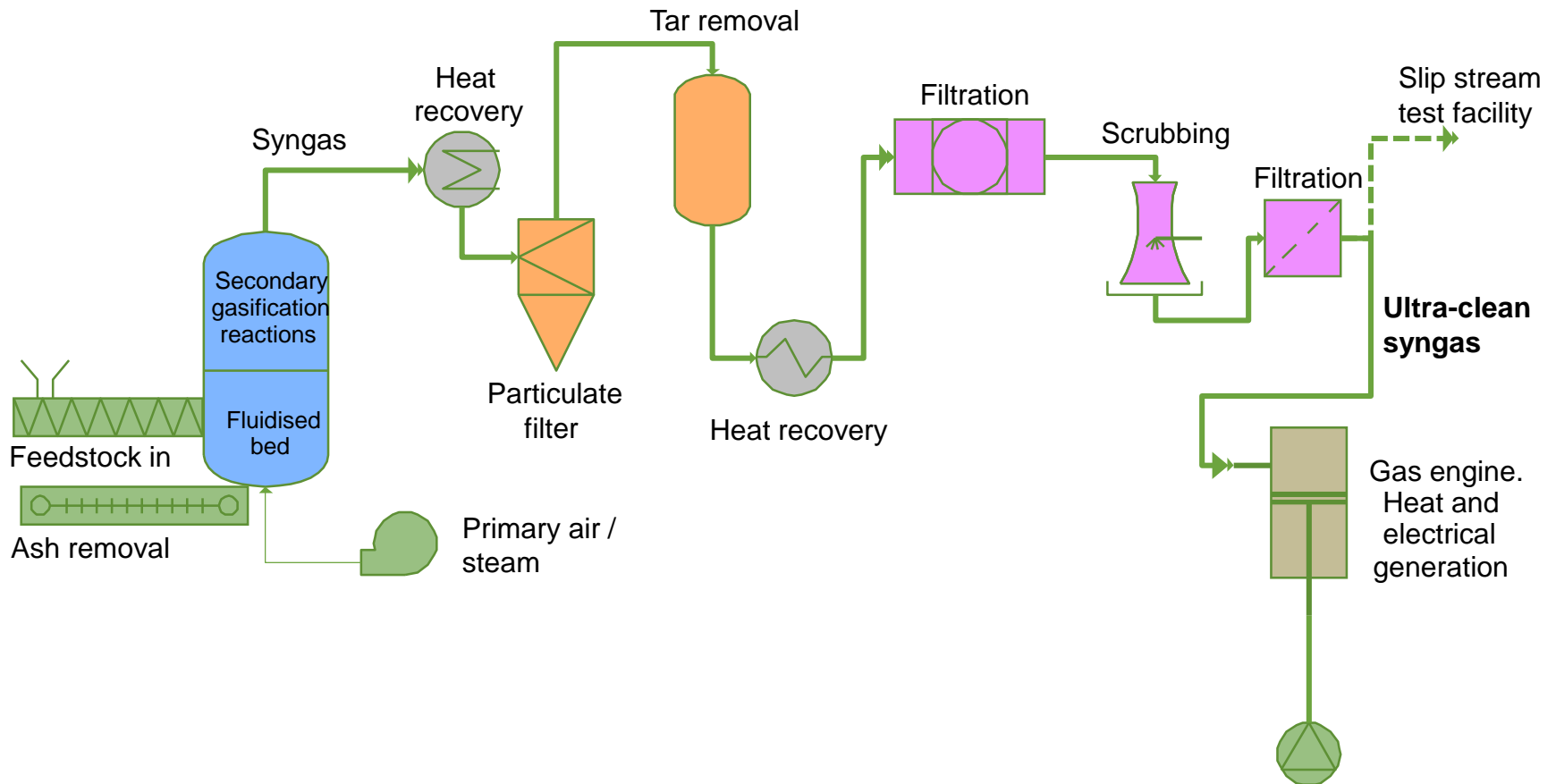
The Sustainable Energy Centre

- SEC is a flagship commercial demonstrator project currently under construction in the UK Midlands.
- The £11.5m project will be operational by mid-2018.
- Will be fuelled by a variety of waste based feedstocks.
- Uses a pressurised fluidised bed technology with a high temperature treatment to produce a consistently high quality, hydrogen-rich syngas.
- Power will be generated using a specially built syngas engine.
 - Producing ~1.5MWe net power at high efficiency
- Project includes a unique syngas testing facility



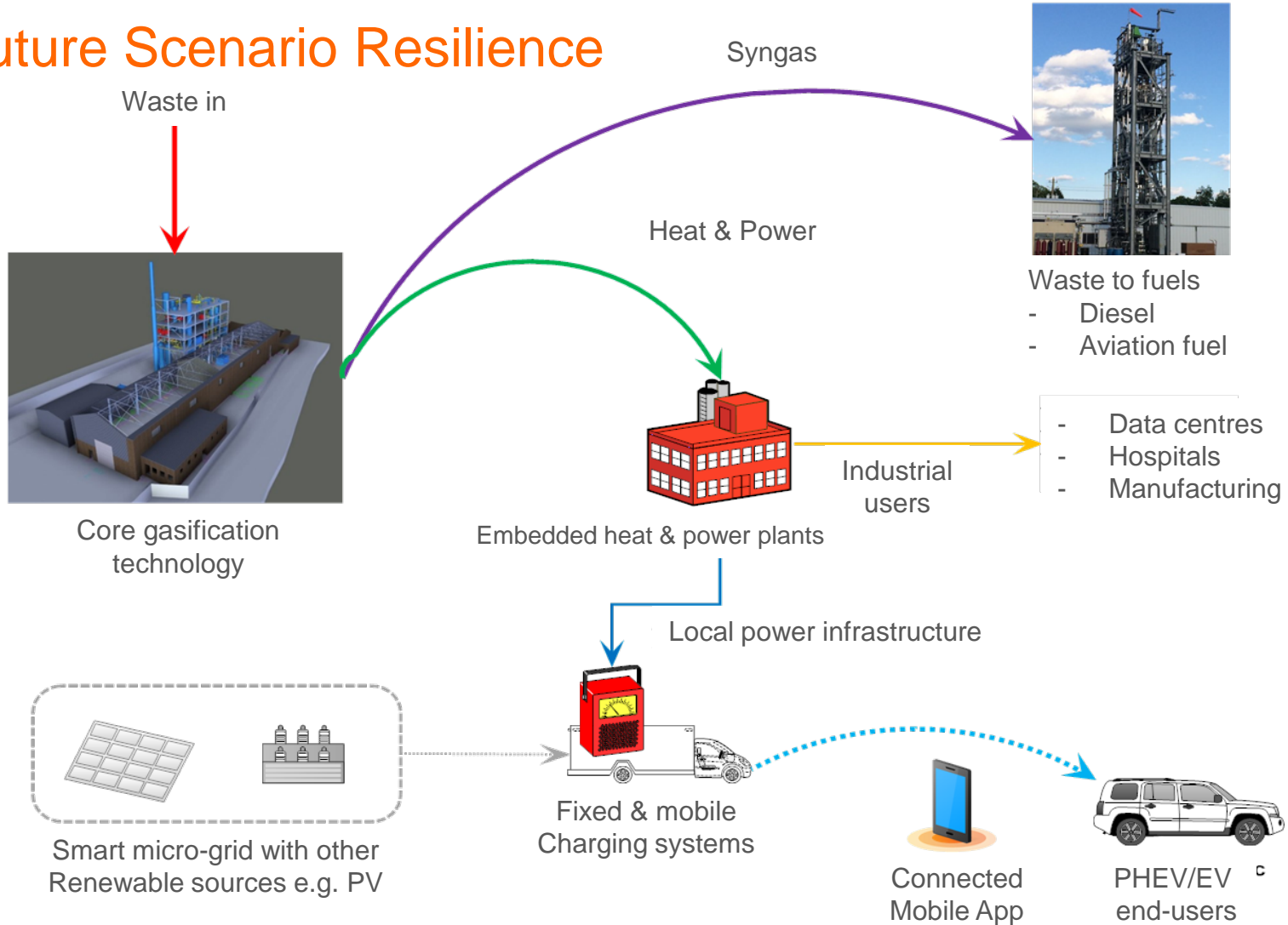


Waste gasification demonstrator





Future Scenario Resilience





What Next for the Waste Gasification Demonstrator

Construction ends

Commissioning ends

Operational testing phase starts

Extended test phase
completes

Exploitation starts

2018				2019			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



In Summary / Our Vision

- For a cost effective low carbon energy system, bioenergy has a vital part to play
 - negative CO₂ emissions
 - If CCS is unavailable, then heat & transport are most important sectors
- Gasification is a key enabling technology
 - Flexibility – can use a variety of feedstocks & yield a variety of outputs
 - High efficiency to power, particularly at smaller scales
 - Good fit with CCS
 - Scenario resilient
- Gasification systems today are just developing – there is a need to progress to demonstrate reliable production of cleaned syngas
 - Robust demonstration - data
 - Only with cleaned up syngas can we fully realise the benefits offered by gasification



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