



**IEA Bioenergy**  
Technology Collaboration Programme

# UK Update

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**Technology Collaboration Programme**

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# UK Biomass relevant reports

- UK Hydrogen strategy; *August 2021*
- Advanced Gasification Technologies; *October 2021*
- UK Biomass Policy Statement; *November 2021*
- UK Biomass strategy; *next year 2022*

# UK Hydrogen Strategy

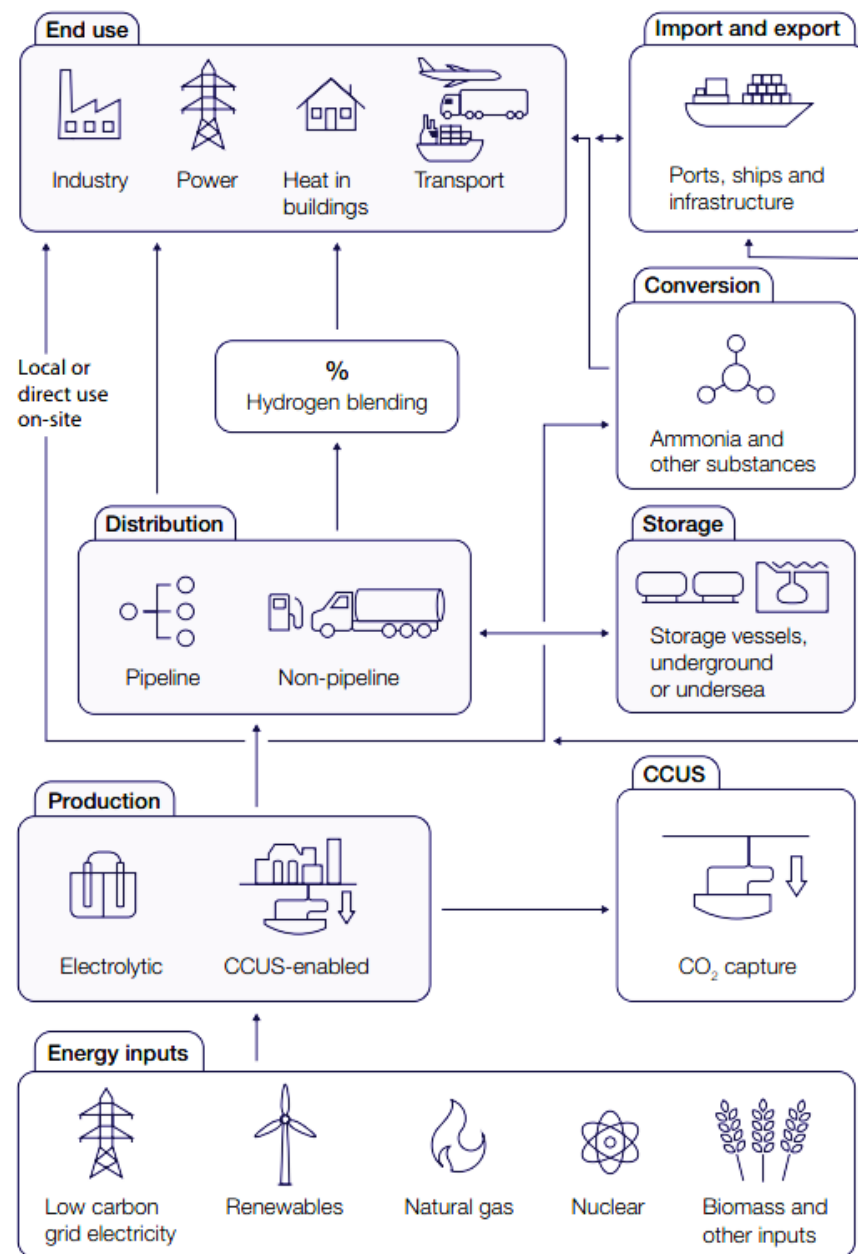
(Department for Business, Energy & Industrial Strategy: BEIS, August 2021)

The development of a low carbon hydrogen sector in the UK is a key plank of the government's plan to build back better with a cleaner, greener energy system.

Low carbon hydrogen has a critical role to play in the transition to net zero, by helping to bring down emissions in vital UK industrial sectors and providing flexible energy for power, heat and transport.

## Topics covered:

1. Low carbon hydrogen
2. Scaling up the hydrogen economy
3. Economic benefits for the UK
4. International leadership
5. Track progress



*The Hydrogen value chain*



# Advanced Gasification Technologies (AGTs): Review and Benchmarking

(Department for Business, Energy & Industrial Strategy: BEIS, October 2021)

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AGTs: thermal conversion technologies (gasification or pyrolysis) for conversion of biomass or waste into aviation fuels, diesel, hydrogen, methane & other hydrocarbons.

Goal: understanding the current development status of AGTs and to inform future policy direction and innovation spending in relation to this class of technologies.

Topics covered:

1. Current status of AGTs
2. Opportunities & barriers
3. Techno-economic analysis and product cost benchmarking
4. Development pathway

*AGTs Reviewed*

Adv. Biofuel Solutions Ltd.

Enerkem Inc.

Kew Techs.

GoBiGas

Standard Gas

PowerHouse Energy

LanzaTech

Velocys

Sumitomo Foster

Alphaco

ThermoChem Recovery

ReOil

# UK Biomass Policy Statement

(Department for Business, Energy & Industrial Strategy: BEIS, November 2021)

UK Government provides a **strategic view** on the role of **biomass across the economy** in different timelines: short (2020s), medium (by 2035), and long-term (by 2050). timelines.

Key **policy** aims for **biomass use across the economy** (electricity, heat, transport and industry).

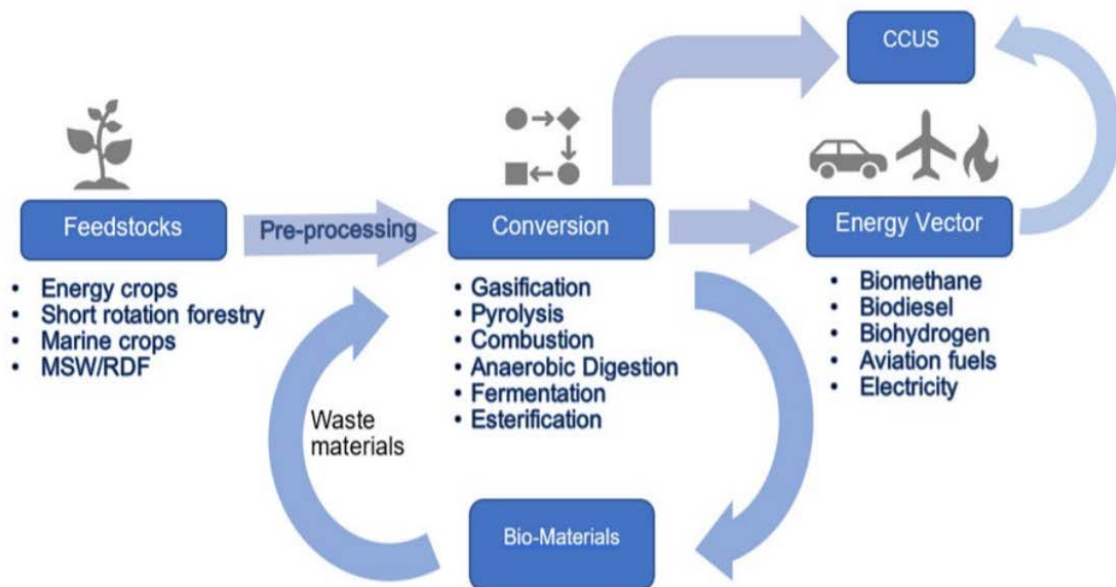
## Key principles:

- compliance with sustainability criteria and waste hierarchy principles;
- contribution to carbon budgets and net zero considering feedstock availability, life-cycle greenhouse gas emissions, and cost-benefits;
- biomass to be used with carbon capture utilisation or storage where feasible.

## Priority areas:

- Sustainable aviation fuel and hydrogen production (decarbonise relevant sectors)
- Bioenergy with Carbon Capture and Storage: BECCS (deliver negative emissions and support energy security).

*Potential routes for biomass processing and use*



# UK Biomass Strategy

Dr Joanna Sparks, Biomass Policy Fellow - [Linkedin](#)  
[The role of biomass in achieving net zero: call for evidence](#)

BEIS are still developing the UK Biomass Strategy. They are currently analysing the feedback provided by stakeholders through a call for evidence and from a series of round table discussions.

This consultation ran from April until June 2021; and the UK Biomass Strategy is expected to be published in 2022.

## Key areas:

1. **Supply** - how much biomass can we assume the UK will have access to?
2. **End use of biomass** - how should we use biomass to reach net zero?
3. **Sustainability and Accounting for Emissions** - (i) how can we strengthen our sustainability criteria and (ii) how can we improve the way we account for biomass emissions?
4. **Innovation** - what technological or systems developments do we need to see?



# UK industry updates

1. Altalto Immingham
2. KEW Technology
3. ABSL (Advanced biofuel solutions ltd)

# AltaImmingham Waste to Sustainable Aviation Fuel Project

- Plan to build what could be Europe's first waste-to-SAF plant
- 500,000 tonnes of residual waste saved from incineration or landfill per year
- Enough fuel to power over 1,000 transatlantic flights with net-negative carbon emissions
- Over 300,000 tonnes of CO<sub>2</sub> saved per year
- Collaboration between Velocys and British Airways
- Uses Velocys proprietary Fischer-Tropsch technology combined with TRI gasifier and other demonstrated technologies



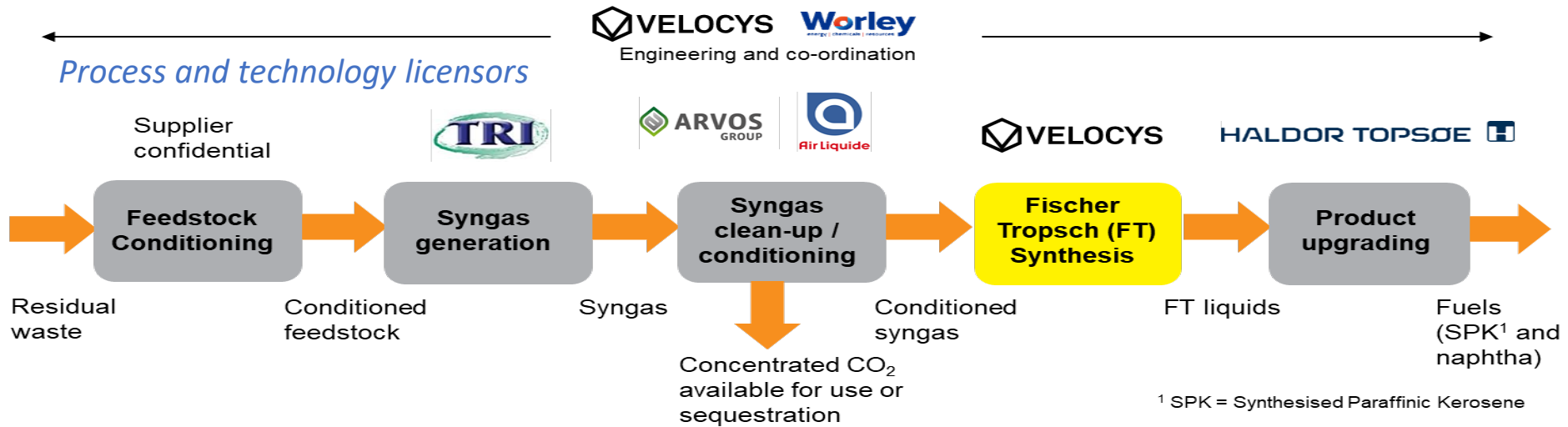
*Immingham site*



*AltaImmingham model plant*



## AltaImmingham Waste to SAF



### Feedstock

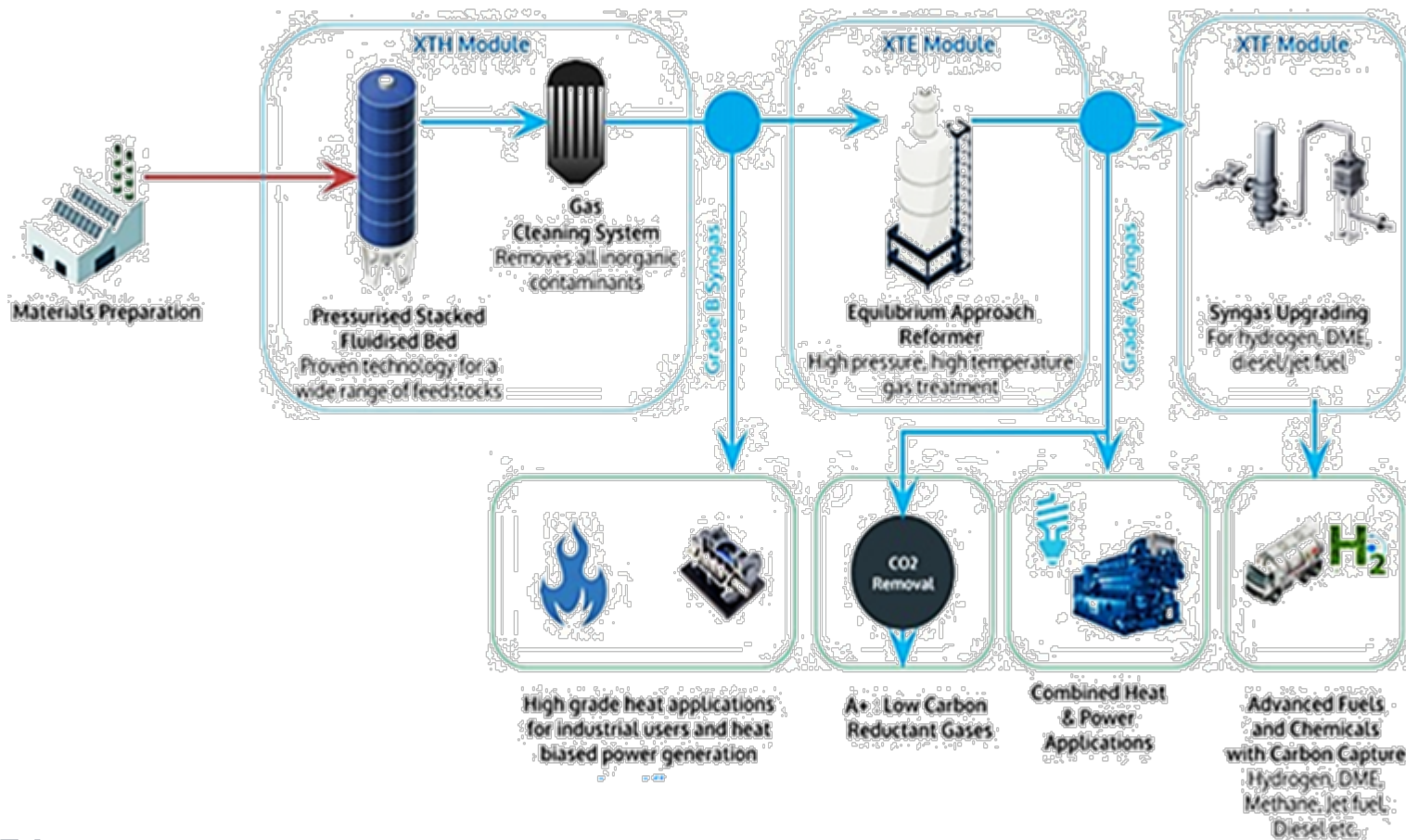
Municipal Solid Waste or Commercial and Industrial Waste, unsuitable for recycling and otherwise destined for landfill or incineration

### Technology

- Gasification to yield syngas provided by Thermochem Recovery International (TRI)
- Tar conversion: Partial Oxidation (supplied by Arvos)
- Syngas clean-up (adjust H<sub>2</sub>:CO, remove sulphur & chlorine): supplied by Air Liquide
- F-T to yield hydrocarbons (from Velocys), which are then upgraded in a final hydrocracking, isomerisation and separation step to make fuels.

# KEW Technology, Wednesbury, UK

Unique technology that converts all types of non-recyclable resources and low-grade biomass into a wide-range of sustainable energy vectors (hydrogen, power, heat and advanced fuels) for a zero carbon future.



# KEW Technology, Wednesbury, UK

First UK technology to achieve “End of Waste” status

Pressurised operation: making system compact and cost-effective

Pressurised syngas allows industrial integration and synthesis applications

Patented Equilibrium approach reformer: normalises gas composition independent of input feedstock

*The sustainable energy centre (SEC): flagship commercial demonstrator built in the UK*



**The SEC is commercial product validation of KEW's technology**

- > Hi-fidelity continuous operation commercial plant
- > Unparalleled technology performance validation and optimisation
- > Unique 'live-environment' platform for technology development

# ABSL (website updates future projects)

## PROTOS:



First large-scale industrial plant, situated in the Protos energy park near Ellesmere Port in Cheshire.

The facility will be able to convert 133,000 tonnes of waste into **biohydrogen and biomethane**, while capturing the CO<sub>2</sub> with no polluting emissions to air and no particulate or dioxin emissions.

Front-End Engineering and Design (FEED) is expected to be completed in Q3 2022, with construction and commissioning complete by the end of 2025.

## Greenenergy:

Joint Development Agreement with Greenenergy to develop, construct and operate up to five waste-based biofuel plants in the UK; (No further details).

*Not 1<sup>st</sup> hand communication but information from their website.*

# Nov 2021: Hydrogen-BECCS Competition

- BEIS funding for £5M design projects on H2-BECCS May-Oct 2022
- [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1030656/uk-net-zero-research-innovation-framework.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1030656/uk-net-zero-research-innovation-framework.pdf)

# UK country report



# UK Country Report Contributors

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- Tried reaching out to over 20 commercial projects in the UK.
- Positive response/contributions from:
  - Kew Technologies Ltd. (ETI, Midlands)
  - Advanced Biofuels Solutions Ltd. (Swindon)
  - Velocys (Altalto, Immingham)
- Other sites - UK
  - Energy Works Hull (28MWe) back in operation
  - Levensat (Outotec) operational
  - Ince Bio Power facility exploring option for CCS.
  - Hooton Bio Power (Kobelco gasifier) still in commissioning (contractor is BWSC)
  - Riverridge / Full Circle gasifier (nr Belfast) operational.
- Leveraging Supergen industrial and academic contacts to gather an updated picture of gasification of biomass and waste in the UK.

# UK Report Timeframes

Original timeline 2021:



Updated timeline 2021:





## UK Country report updates contact:

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