

Decarbonising Distillation: Options, Opportunities and Risks

10th May 2023
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What will I be talking about?



Who are Loco₂gen and what do we do?



What is the problem we are trying to solve?



What are some of the solutions?

- Technologies
- Opportunities & barriers
- Risks
- Case Study: Arbikie



Locogen



Consultancy

OA / Feasibility

Consenting

Due Diligence

Project Management

Engineering

Procurement

Construction

Asset Management

Operation & Maintenance

Investments

Design & Development

Shared investment

Clients



Technologies

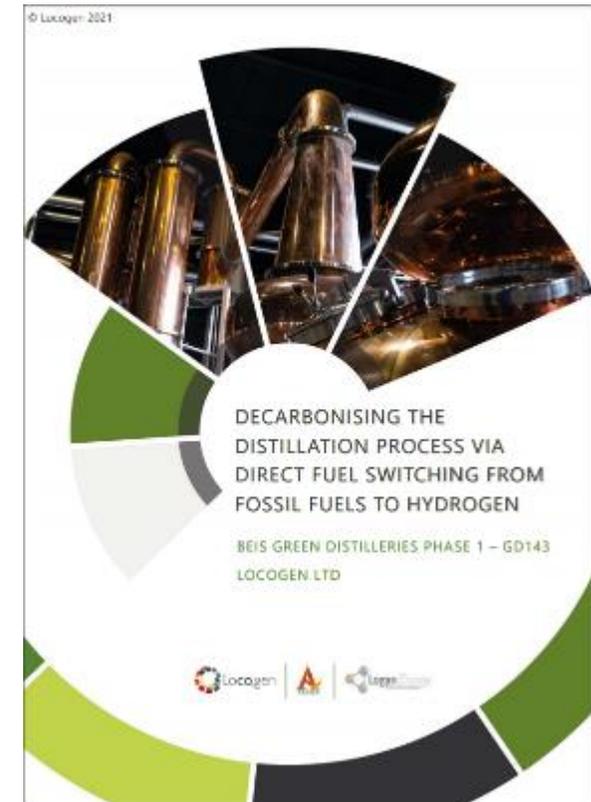
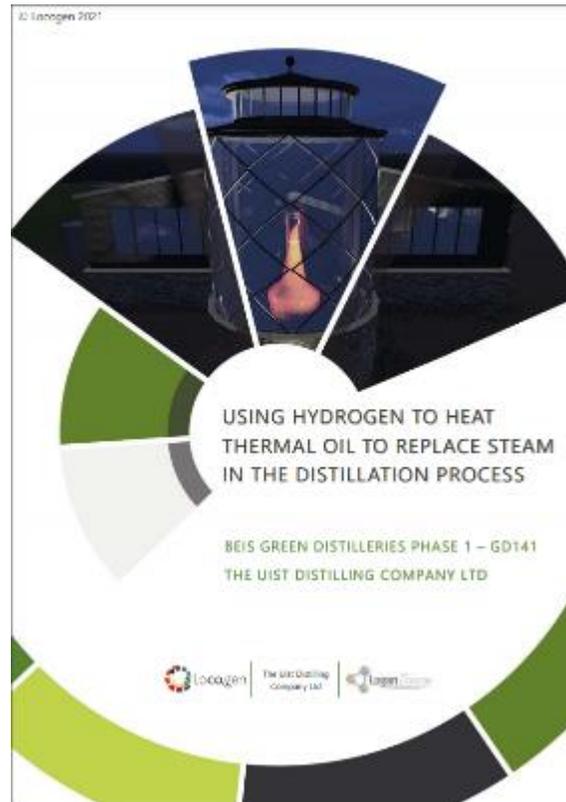
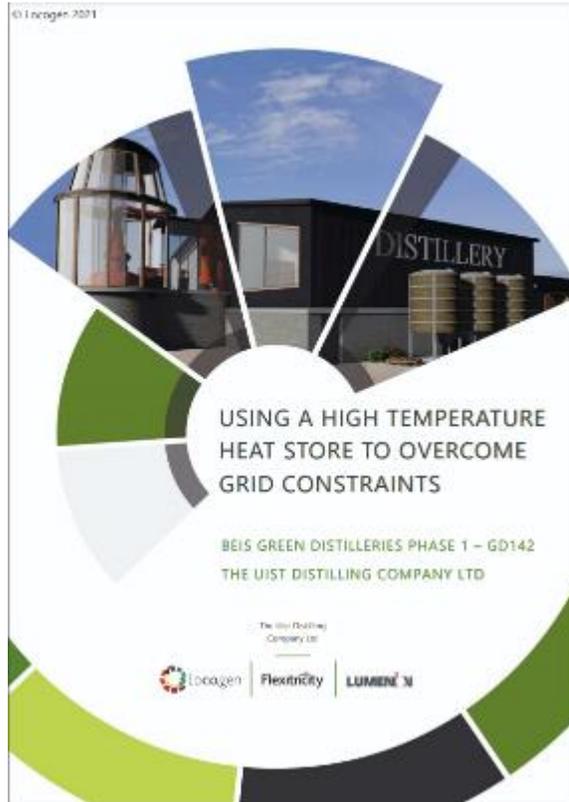
- Wind
- Solar
- Renewable Heat
- Storage
- Hydrogen
- Smart Networks
- Green Transport

Locogen's Distillery Projects



| Geography | million LOA/a | Business as usual fuel | Status |
|------------|---------------|------------------------|------------------|
| Rural | 3.2 | Biomass and LPG | Operational |
| Rural | 6.0 | Gas | Operational |
| Semi-rural | 4.0 | Gas | Operational |
| Semi-rural | 3.0 | Gas | Operational |
| Rural | 4.0 | Biomass and LPG | Operational |
| Semi-rural | 19.0 | Biomass and gas | Operational |
| Semi-rural | 10.2 | Gas | Operational |
| Rural | 1.8 | Oil | Operational |
| Rural | 0.2 | Oil | Operational |
| Urban | 2.1 | Gas | Operational |
| Rural | 0.5 | Oil | Operational |
| Rural | 0.3 | Oil | Pre-construction |
| Rural | 0.6 | Oil | Pre-construction |
| Urban | 0.4 | Gas | Pre-construction |
| Urban | 0.1 | Gas | Pre-construction |
| Urban | 1.0 | Gas | Pre-construction |
| Rural | 0.5 | Oil | Pre-construction |

Locogen's Distillery Projects



<https://www.gov.uk/government/publications/green-distilleries-competition/green-distilleries-competition-projects-selected-for-phase-1>

Decarbonising distillation – the challenge



We need **steam!**

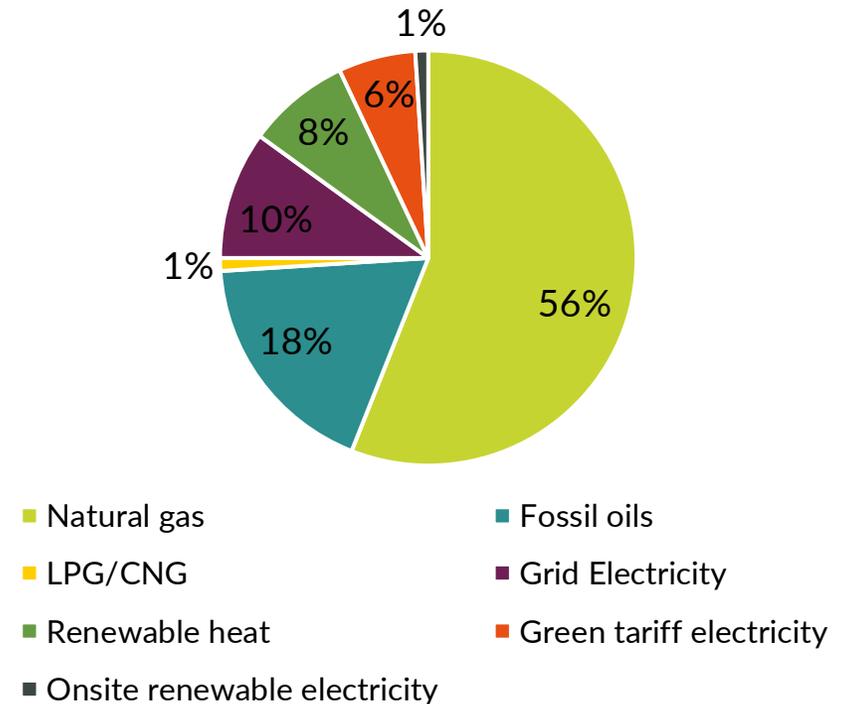


We need an **energy source**. This is predominantly fossil fuels



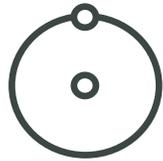
SWA has set a 2040 target for Net Zero

Distillery energy consumption



Source: Ricardo EE, 2020

MANY OPTIONS EXIST TO DECARBONISE DISTILLING



Hydrogen

Hydrogen Boilers



Electric

High Temperature

Heat Pumps

Electric Steam
Boiler

High Temperature
Thermal Storage



Bioenergy

Biomass Boilers

Anaerobic Digestion

Biofuels

HIGH TEMPERATURE HEAT PUMPS

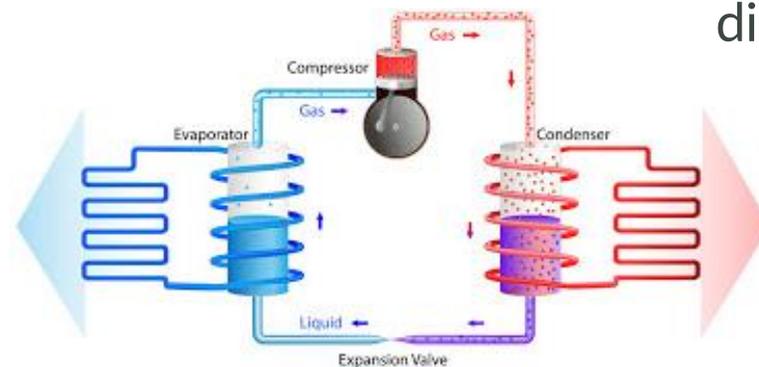


Technology Benefits

- High efficiencies
- Reduces energy demand
- Can be integrated with renewable generation
- Can be integrated with heat recovery

Considerations

- Retrofitting required of existing distilleries
- Cannot be used as primary source
- Additional grid import capacity required
- Not been implemented in working distillery setting



HYDROGEN BOILER



Technology Benefits

- Commercially available components
- High temperature and ramp rates
- Simplicity in retrofit
- No alteration to spirit making process
- Zero carbon emissions at combustion

Considerations

- Supply of green hydrogen
- Price point
- Storage requirements
- Safety considerations



NO ONE SIZE FITS ALL



Technical

Grid connection
Planning
Location
Land
Spatial requirements
Integration



Financial

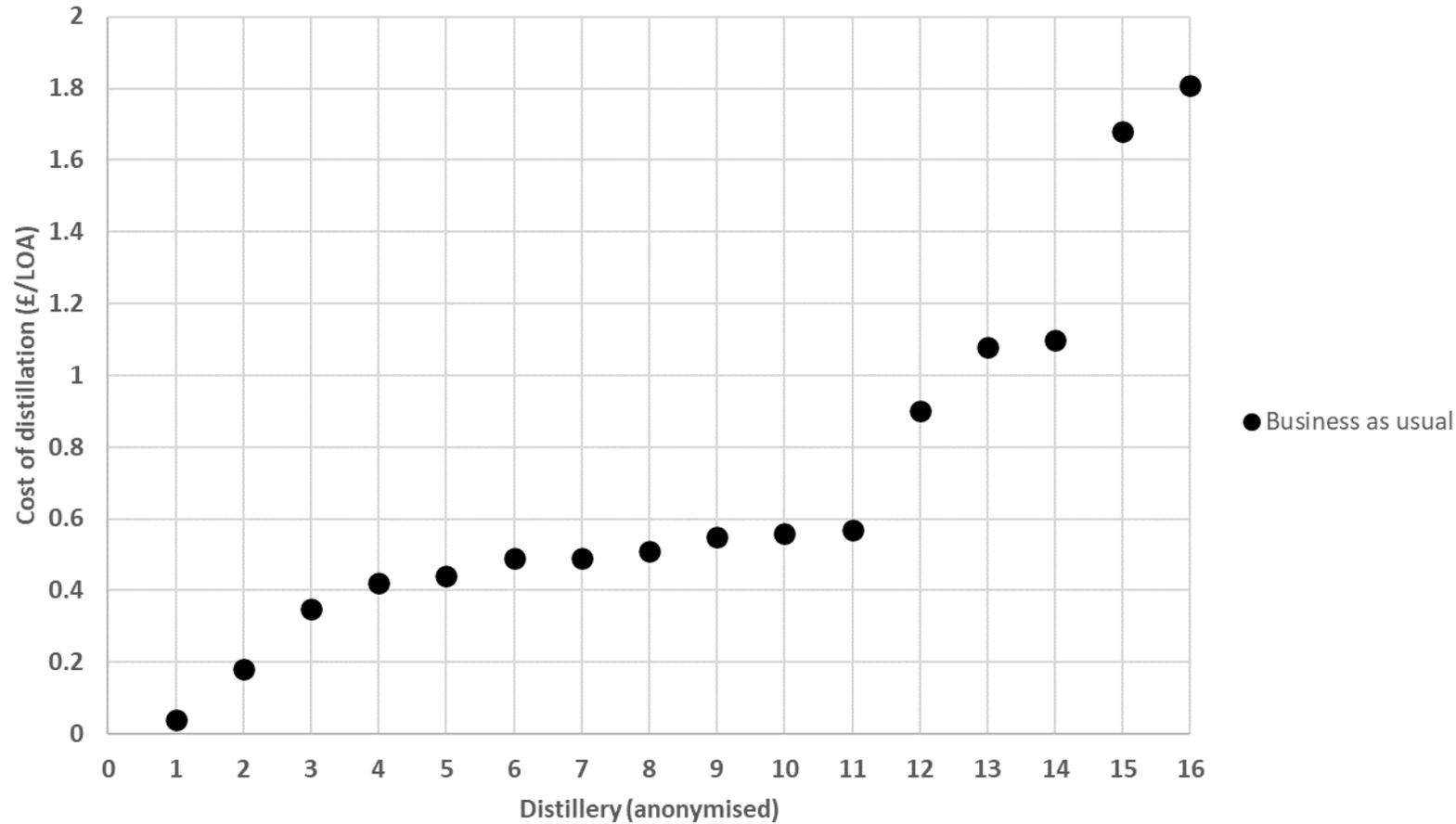
DEVEX
CAPEX
OPEX
Funding



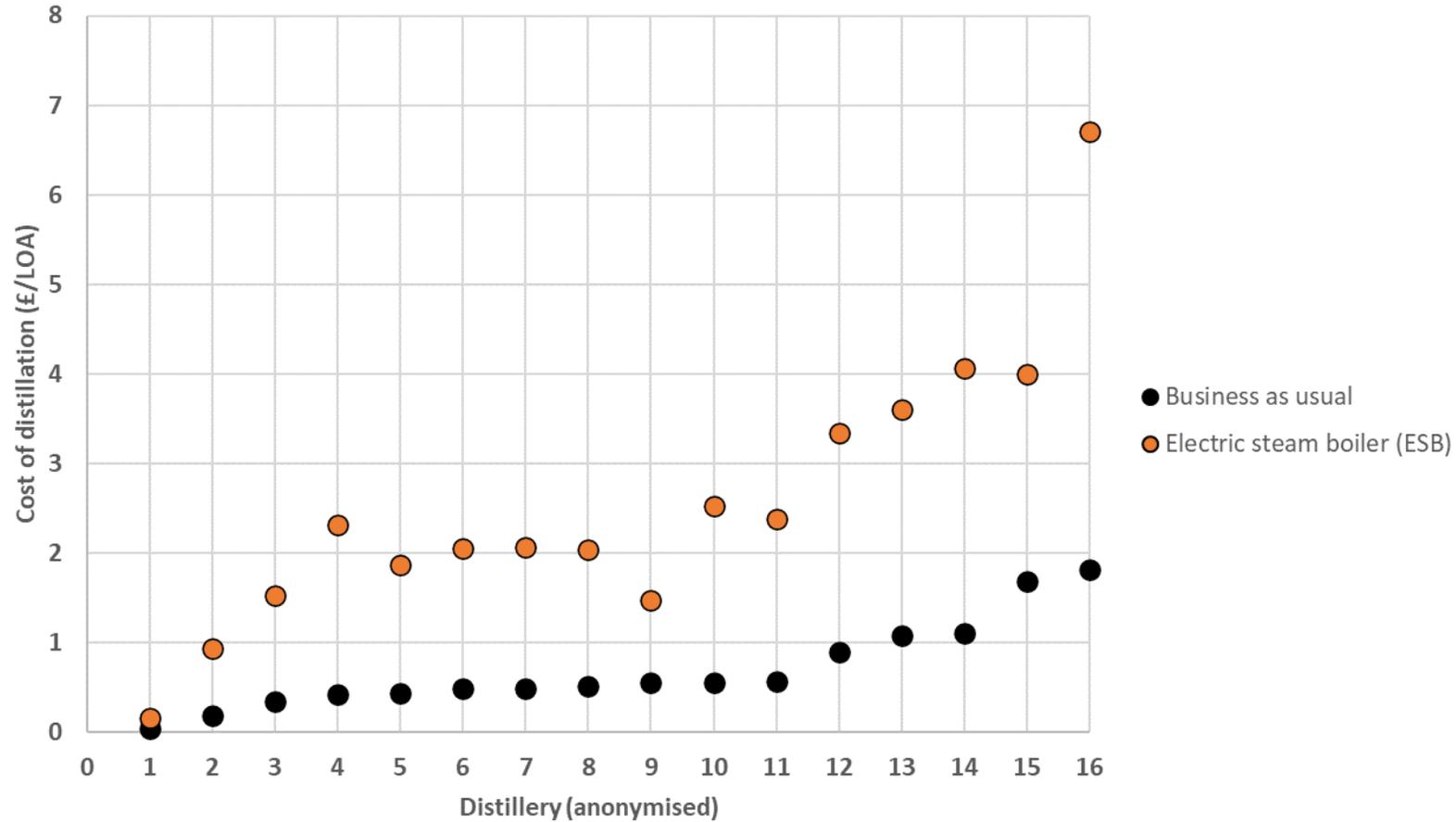
Product

Product quality
Product price
Future proofing
Branding

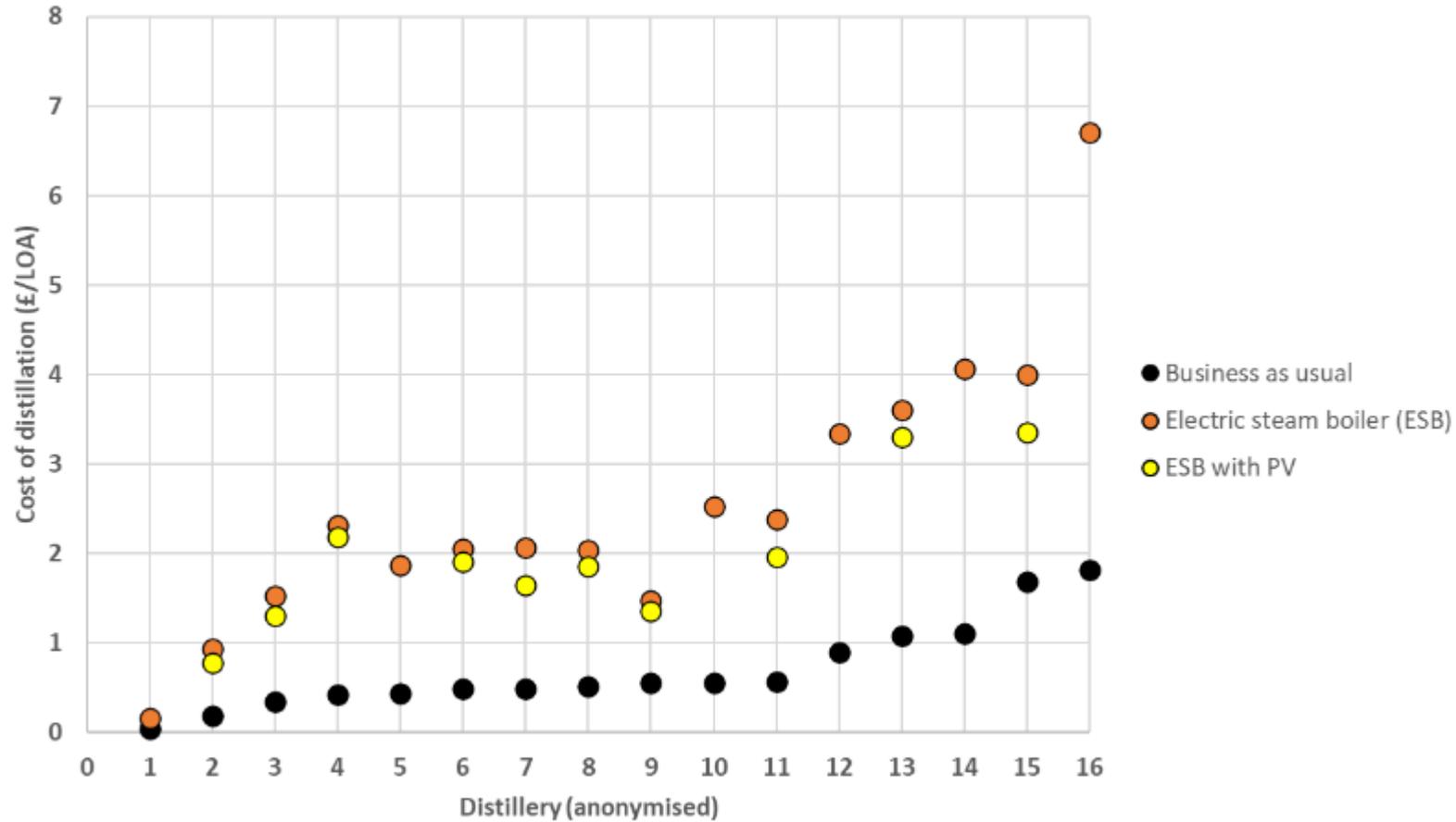
Analysis – running costs



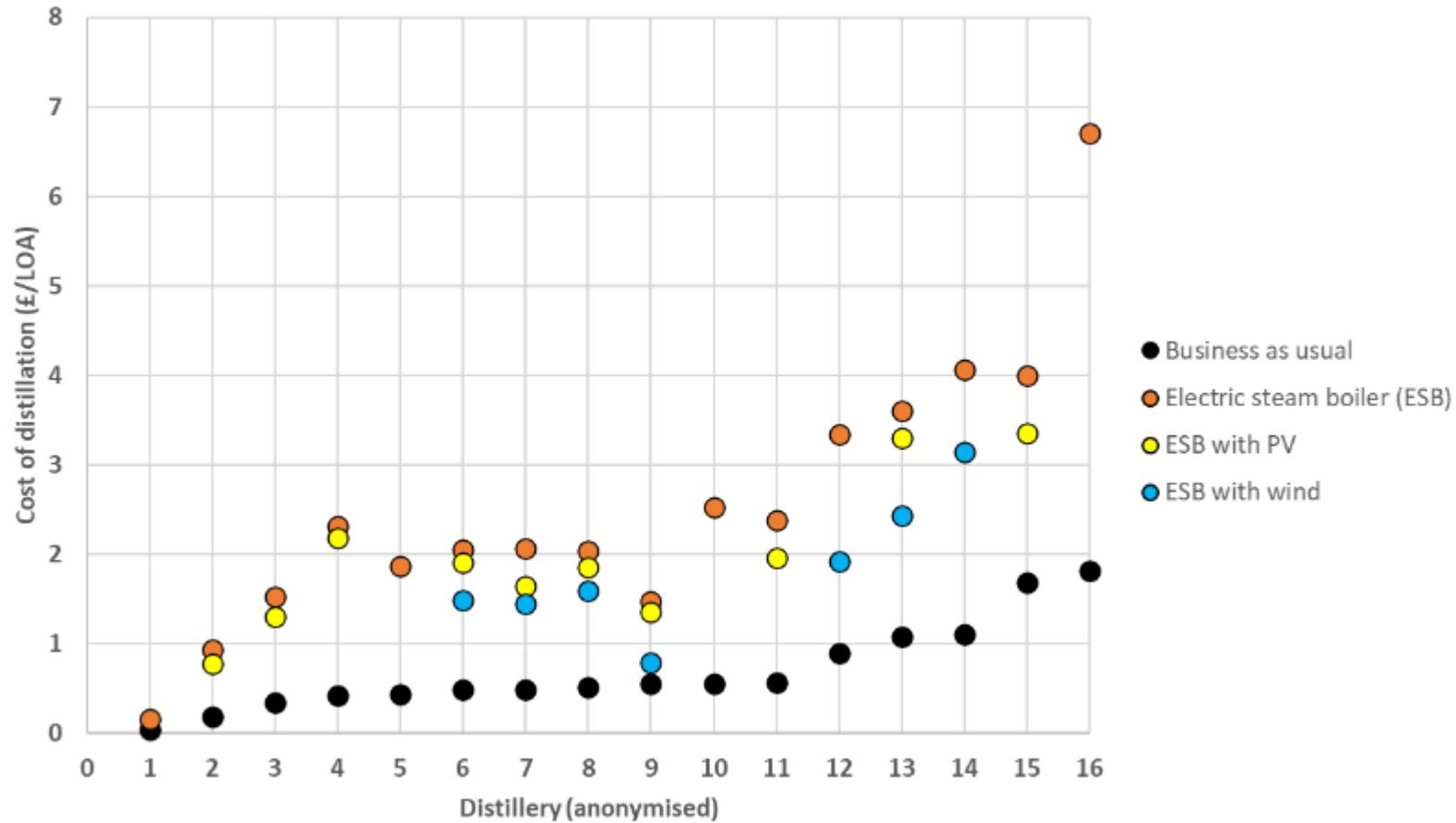
Analysis – running costs



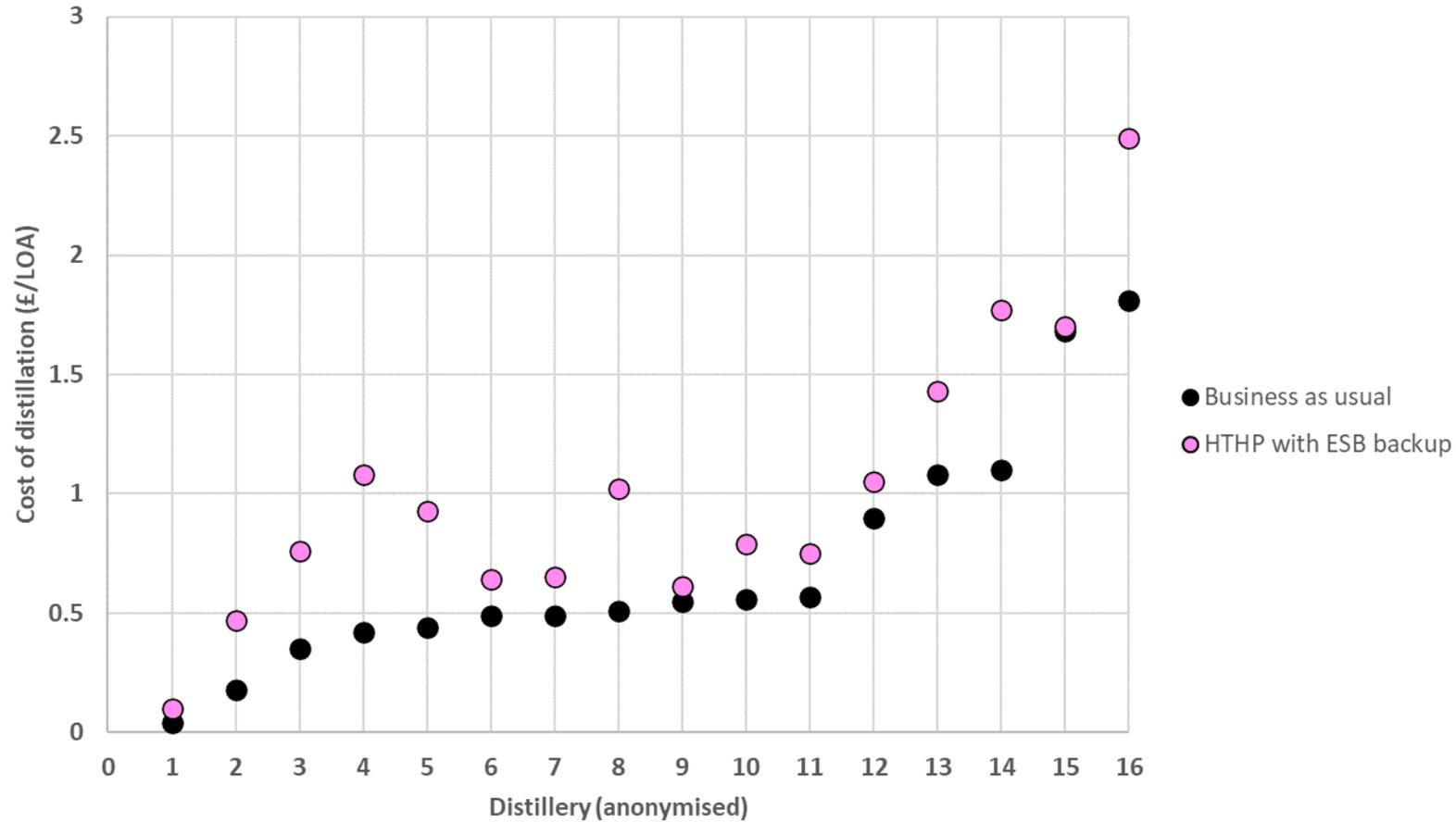
Analysis – running costs



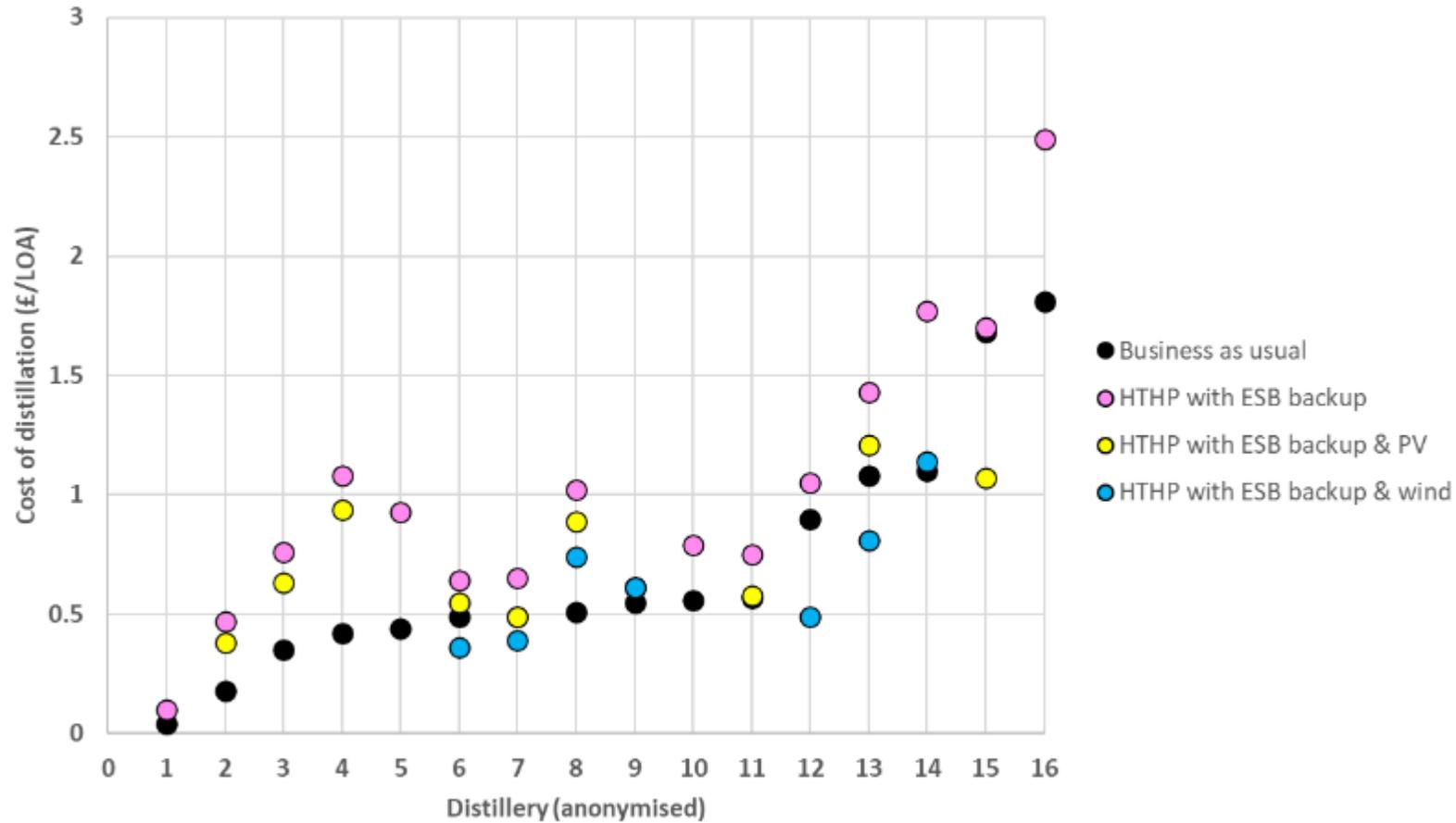
Analysis – running costs



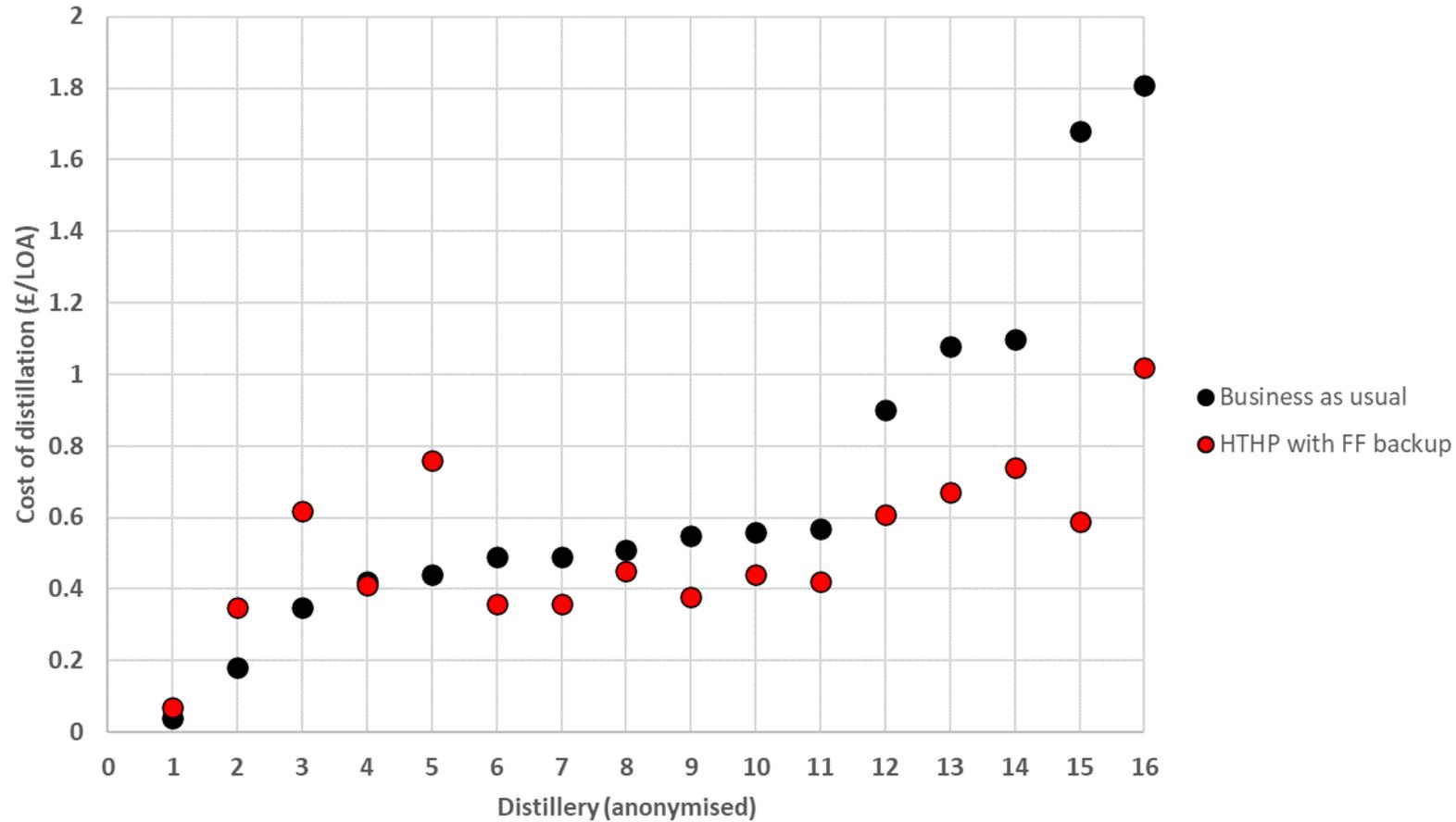
Analysis – running costs



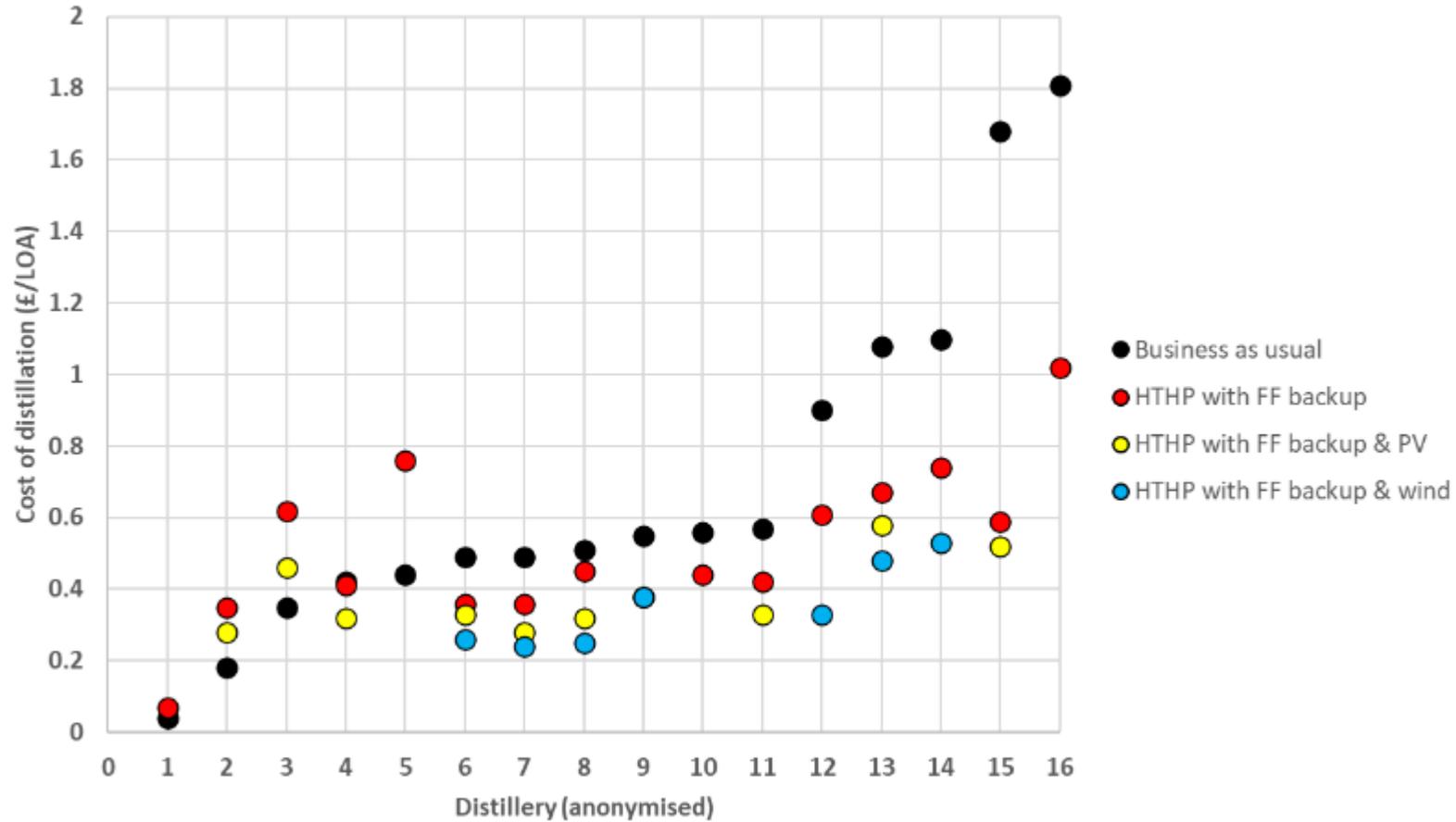
Analysis – running costs



Analysis – running costs



Analysis – running costs



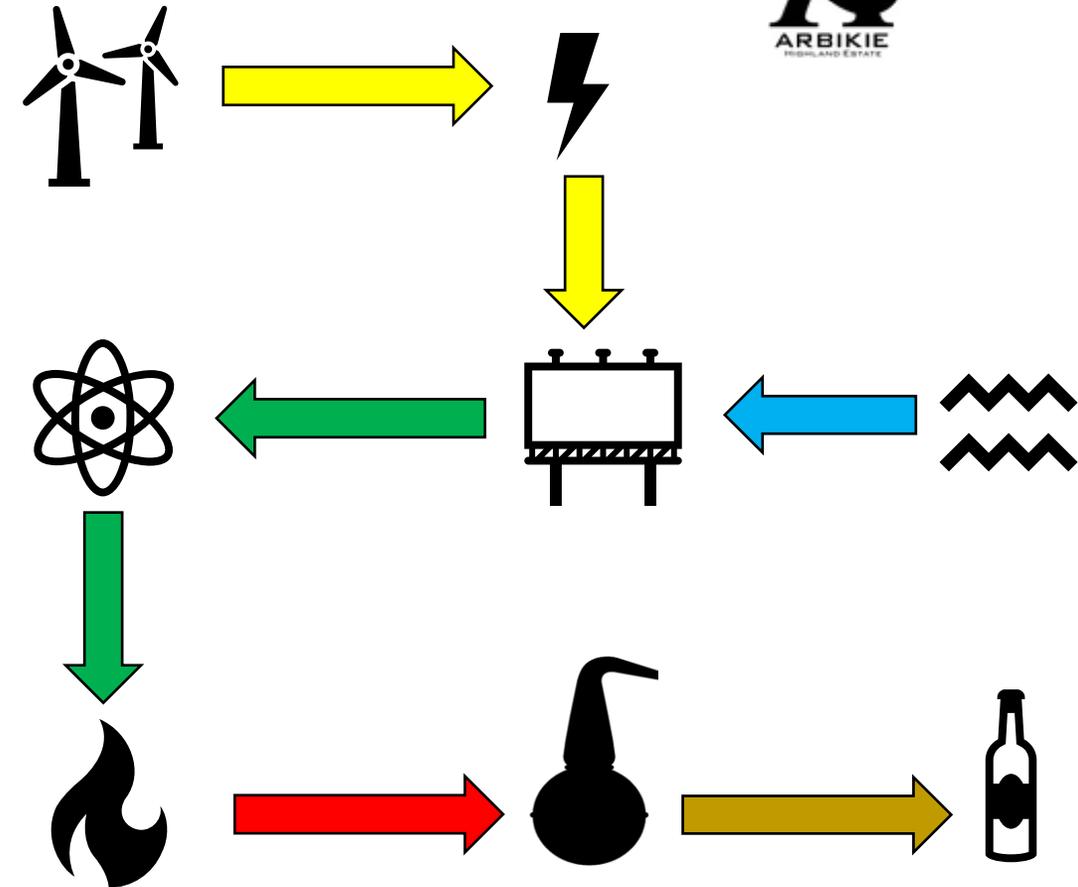
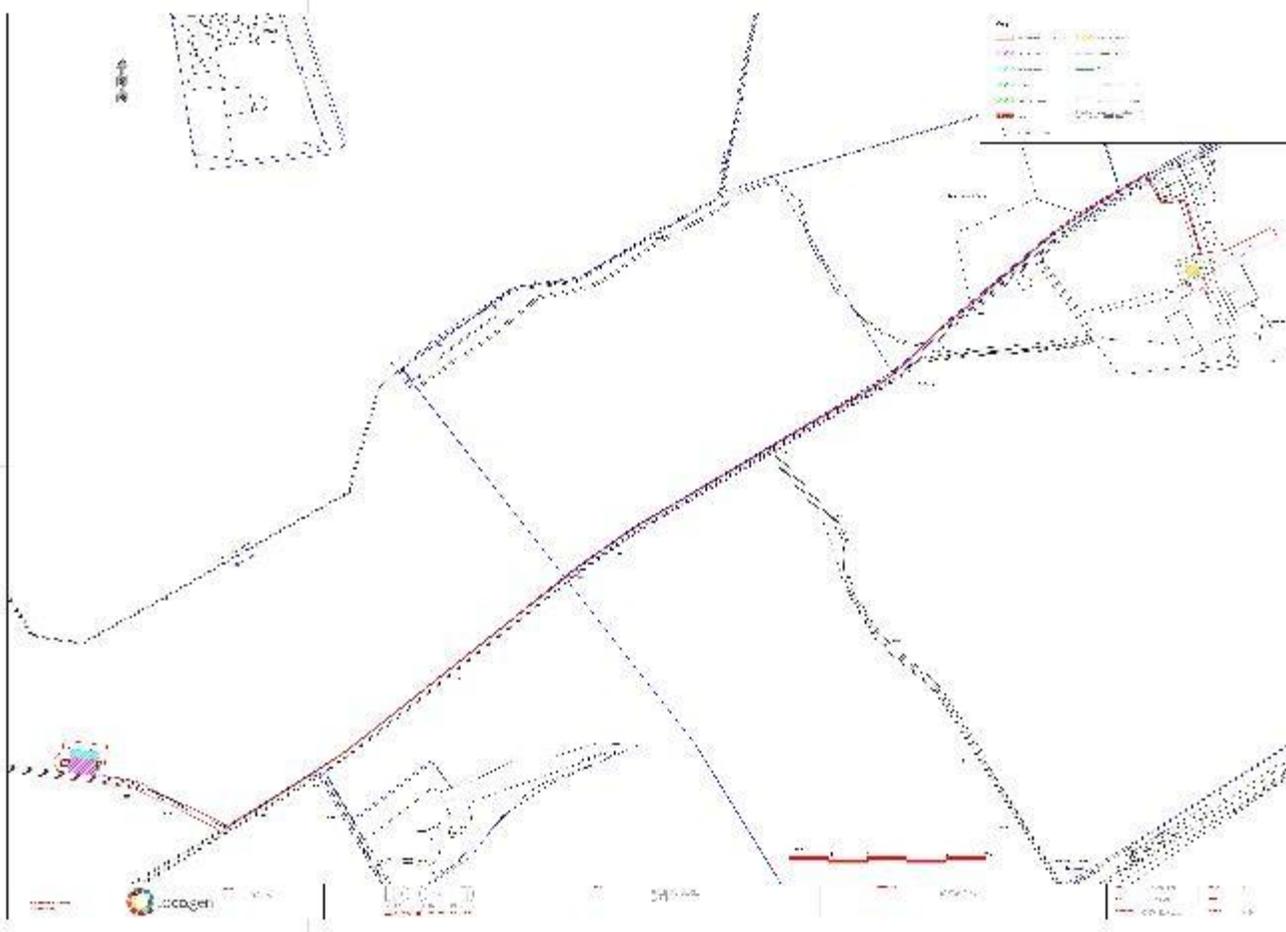
Case Study – Arbikie Highland Estate Distillery

The world's first green hydrogen fueled distillery



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The world's first green hydrogen fueled distillery



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The world's first green hydrogen fueled distillery



1MW wind turbine installed



Arbikie Wind Turbine Construction Sneak Peek



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Case Study – Arbikie Highland Estate Distillery

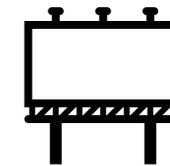
The world's first green hydrogen fueled distillery



1MW wind turbine installed



Hydrogen-ready dual fuel burner and boiler installed



Hydrogen plant due for installation in August. Full operation in September

Case Study – Arbikie Highland Estate Distillery

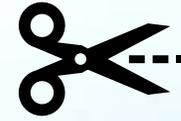
The world's first green hydrogen fueled distillery



Approx. 50%
demand fueled by
hydrogen



Save money on fuel



Halving carbon emissions



Thank you for listening!

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