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Specialist Knowledge.
Practical Solutions.

Green Energy from Brown Water

The Opportunities for Hydrogen



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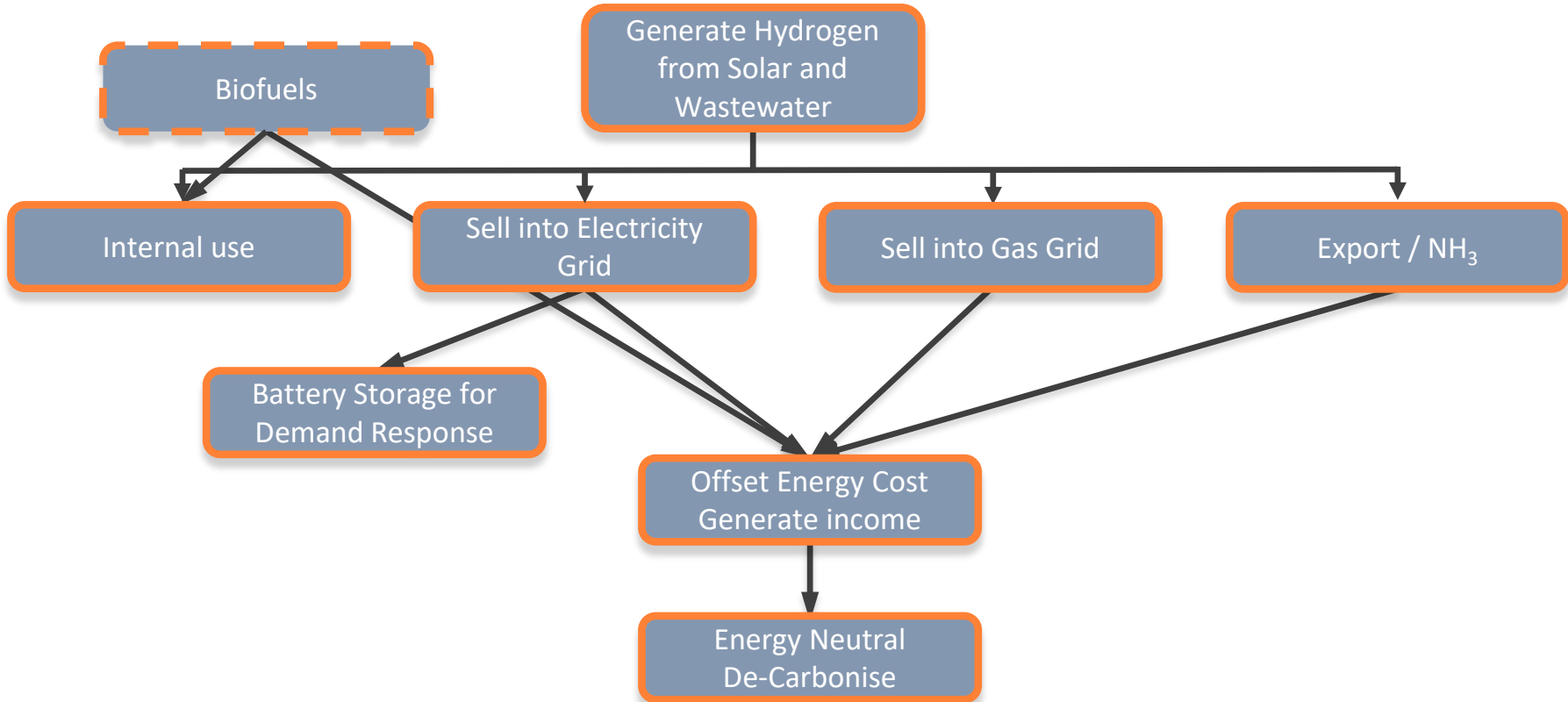




The Interest in Hydrogen

The Concept

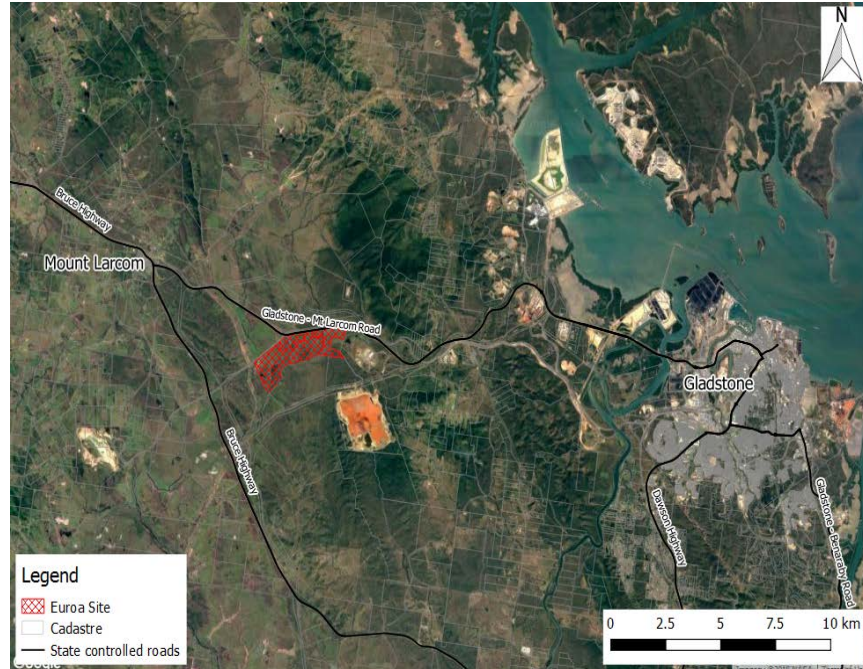
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Euroa Abattoir Overview

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- Proponent: Asia Pacific Agri-Corp (Projects) Pty Ltd (APAC).
- Located in the Gladstone State Development Area.
- Zoned High Impact Industry Precinct.
- DA approved



Euroa Abattoir Overview (cont.)

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- State-of-the-art abattoir capable of processing up to 2,400 head per day (at peak).
 - Beef for export to China and possibly other Asian countries.
 - Associated beef and hide processing plants, packing, freezing and storage rooms together with ancillary Service Areas.
 - 12 holding pens, with the ability to house 375 animals.
 - 12 lairage corrals with a total capacity of 840 animals.

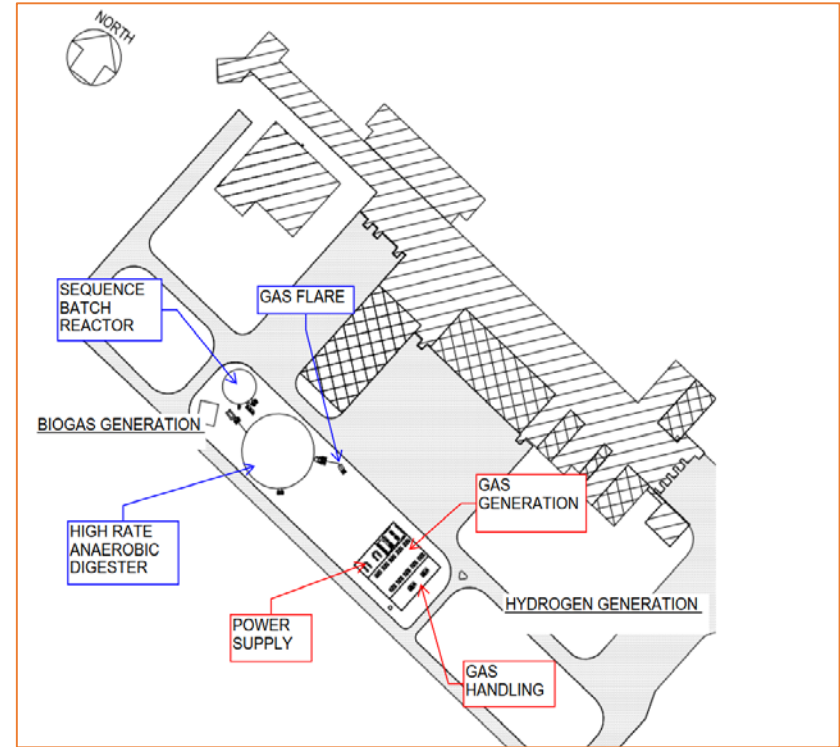


Euroa Abattoir Overview (cont.)

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Will set a new international benchmark for integrated sustainable industrial development:

- Methane capture (used for boiler heating);
- Solar farm (78 MW) (used to power abattoir and electrolyser);
- 33MW hydrogen electrolyser (used to power abattoir, trucks, commercial sale);
- Effluent irrigation; and
- Aim to have zero waste leaving the facility.



The energy mix

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Site profile

- 6 MW Peak
- 44GWh electricity - expensive and constrained grid power
- 350,000 GJ p.a. – no natural gas connection



793,650
Swap'n'go bottles



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Where are the additional energy opportunities?

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- Biogas opportunity – methane capture back to site as gas
 - up to ~ 100 – 120,000 GJ possible
- Approx. 440,000 kL of waste water per annum
 - costly off-site treatment
- Abundant solar opportunity
 - client wants to use the space
 - 75MWp ground mount system
 - can generate up to 153GWh electricity per year



Excess electricity – what options are there?

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Solar generation – 153GWh

Site consumption – 45GWh but only 22GWh from solar

Available excess = ~ 131GWh

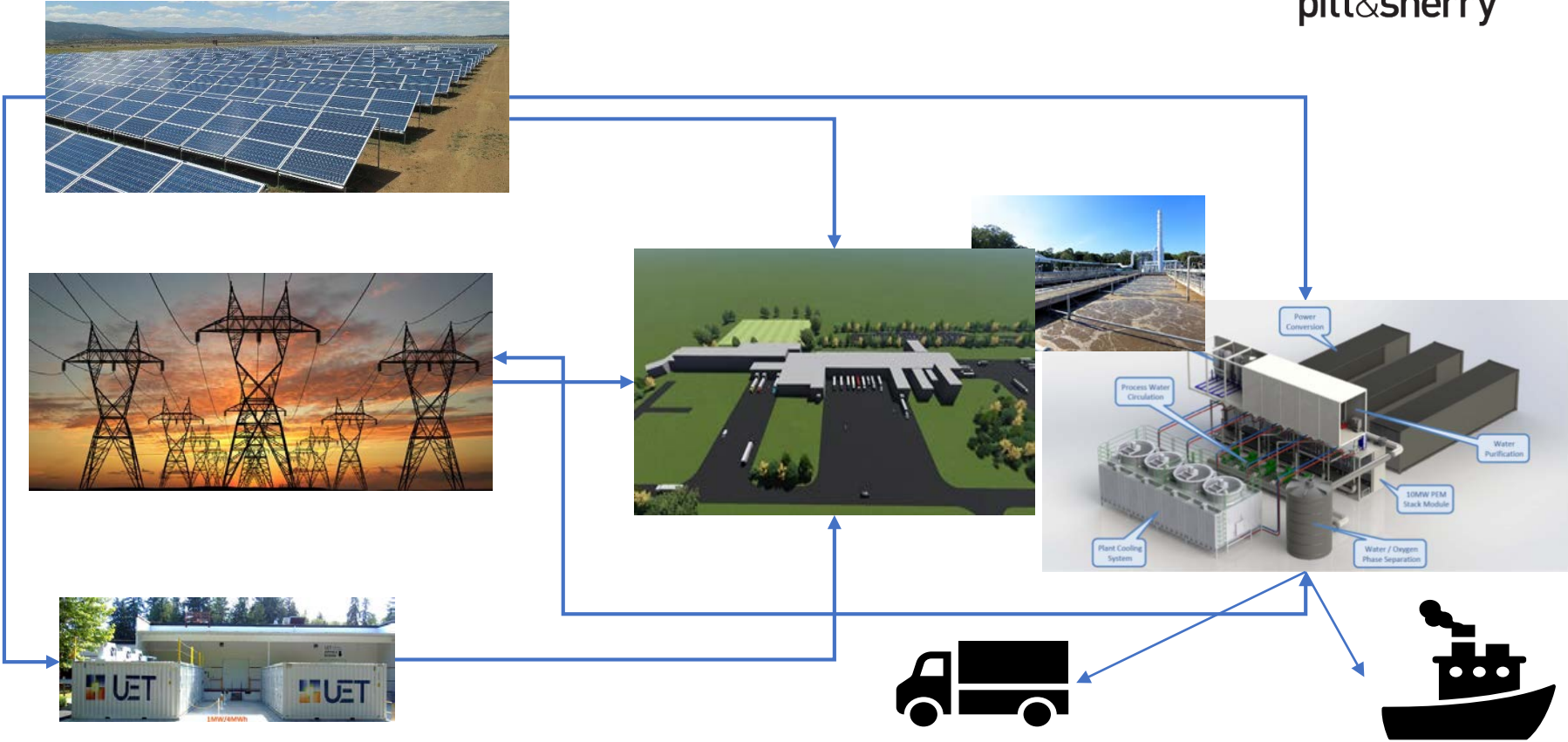
Battery Storage? Consider 20MW battery – 80MWh (cost is a factor)

Hydrogen production - ~100GWh available – is there a business case?

If so, How do we realise it?

Value Flows

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Integrating energy / Optimising energy

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A diverse energy mix
that provides
additional opportunity

Diversifies business
Creates an economy

Establishing the business case

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Abattoir needs to buy electricity - typical grid price – say \$0.10 per kWh



The solar farm can produce electricity at a LCOE – \$0.035



Solar farm supplies additional battery power – LCOE - \$0.085



Abattoir needs gas – LPG x 350,000GJ p.a. (LPG cost = ~\$12-15 – GJ)



Abattoir can produce bio-gas – 100,000 GJ p.a. - BG cost - \$8.00



Electrolyser - produces HT heat (turbine added value) + H₂ income

Business case for Hydrogen

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- Install 33MW ITM Power PEM Electrolyser (largest in the world)
- Production = Max 550kgs per hour / Min production 110kgs per hour
- Potential production – 24/7 = 4.8m kgs per year (not all green)
- Early calculations indicate production of **Green** H₂ of 1.8m kgs per year at only 37% utilisation of the electrolyser (behind the meter PV only)
- Current LCOH = <\$3.5 per kg (inline with CSIRO projections)
- Cash flow positive – Positive NPV and IRR 6%
- **Increase electrolyser utilisation – LCOH decreases**

Future Opportunities

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Domestic

- Reliable, secure, cheap energy supply (e.g. industry)
- Back to base transport (e.g. buses, garbage trucks)
- “Cleaner” ag production
- Electricity spot market (use of existing electricity infrastructure)
- Distributed production – regional & capital cities

Export

- Existing and growing high demand
 - Japan/SE Asia
- Use of existing LNG network.

