Hiringa Energy is creating zero emission hydrogen solutions for NZ

First New Zealand company dedicated to hydrogen infrastructure development with key capabilities:

- Hydrogen production, refuelling design, commissioning and operation
- Whole of hydrogen supply chain solutions
- Knowledge of vehicle and fuel cell technology
- Engineering and project management
- Health and safety management, gas facilities operation and maintenance

We are building a network of projects that are commercially viable and provide the backbone for nationwide supply & refuelling infrastructure.

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FCEV Projects

Partnering and working with key logistics and heavy fleet operators & owners

- Heavy freight & line-haul
- Bulk liquids (eg milk collection)
- City and intercity buses
- Waste collection and haulage
- Warehousing and logistics
- Civil contractor vehicles
- Ferry manufacturers and operators

Looking to aggregate projects for NZ suitable vehicle development, pilot & commercial scale up.

Maturing multiple options from importation of OEM, new-build power and drive train conversion, BEV conversion, through to New Zealand manufacture.

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Supply & refuelling infrastructure

Government grant to develop pilot network infrastructure project in New Zealand.

Scope:

- **Supply/Generation** - 1-2 hydrogen generation facilities (including central and distributed options)
- **Storage/Distribution** - Mobile compressed tube trailers
- **Refuelling** - 3 modular hydrogen refuelling stations

Project will provide excellent test bed for rolling out infrastructure across NZ.

We are developing ~20 refueling hubs across NZ as first phase establishment of hydrogen network.

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Roll-out strategy

- **Targeting** applications that play to hydrogen’s strengths:
  - High availability, range, payload
- **Aggregating** demand to build scale:
  - Light, medium and heavy vehicles, rail, materials handling and industrial offtake from same production
- **Creating** hubs at:
  - industrial parks, bus & rail terminals, ports, airports, fleet hubs, transport corridors
- **Leveraging** hubs to provide transport corridors and industrial supply.

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Integration with renewables

Hydrogen lends itself to hybrid coupling with renewable generation:

- Industrial parks provide high density hub
- Un-utilised roof space provides potential cost effective solar power generation
- Power utilised to generate hydrogen off peak and reduce power costs during peak periods

Hiringa Energy’s integrated renewable / hydrogen production site selection tool

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Integrated power to ammonia Joint Venture

- Leverages existing facilities
- Provides early offtake
- Flexible as transport market grows

Grid connect

4 New Wind Turbines

Peak power

4.3 Mw Plant power

Excess power

Electrolysis

H₂ for green ammonia /urea

H₂ for zero emission transport

7000t Green Urea / annum

Transport Market

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Hiringa co-sponsored project together with MBIE, Venture Taranaki and New Plymouth District Council.

Describes how the region will leverage its natural resources, energy sector expertise and infrastructure to drive the development of a hydrogen industry in NZ.

Roadmap outlines a series of tangible projects in key areas:

- Zero emission **transport** and development of **refuelling infrastructure**
- Major decarbonisation of **industrial chemicals**
- Short and long term energy **storage** on small and large scale
- Activities will help underpin the development of a hydrogen **supply chain industry** capability and nurture a major **export** opportunity

Official launch in March and feed into the National Hydrogen Energy Strategy.
Thank you
Modular refuelling station design

Proven technology exists and is in operation in several countries.

Leveraging existing technology but ensuring fit for purpose:

- Flexible & expandable modular platform
- Integrates with on-site production or delivered hydrogen
- Multiple refueling options/combinations for materials handling, light vehicles and heavy vehicles
- Integrated network will provide economy of scale, enhanced reliability and provide platform for broader uptake

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Key metric: Cost per Tonne-km

Freight weight: Diesel & H₂ trucks: 20 T / EV trucks: 13 T
Kilometers a year: Diesel & H₂ trucks: 208 000km/ EV (50kW charger): 120 000km/ EV (150kW charger): 203 000 km
The range is smaller for battery trucks due to charging time
Hydrogen Safety

There are hundreds of hydrogen refuelling stations now in operation.

Hydrogen can be stored and handled safely:

• It is odourless, colourless and non-toxic
• Hydrogen is flammable but diffuses rapidly
• Hydrogen has low emissivity (doesn’t radiate heat)

Hydrogen refuelling stations:

• are designed to international standards
• follow best practice safety in design principles
Hydrogen as an "Energy Vector"

Multiple Supply/Generation Pathways
- Geothermal (baseload)
- Hydro (seasonal)
- Wind (intermittent)
- Solar (Variable)
- Natural Gas

Multiple Uses
- Heat and Energy
- Industrial Process Feedstock
- Fuel Cell transport solutions
- Hydrogen Export Markets
- CNG Transport

Storage & Transport
- Electricity Grid
- Pumped Hydro Energy Storage
- Fuel Cell
- Battery Energy Storage
- Electric vehicles

Natural Gas Network
- Combustion
- CO₂
- Methane cracking
- CO₂
- Methanation
- CO₂

Multiple supply = increased resilience, can change over time
Multiple uses = greater impact on greenhouse gas emissions

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Relative emissions

LEGEND:
- Current
- Future

1. **Brown hydrogen**
   - Coal gasification
   - Steam reforming

2. **Renewable Electrolysis**
   - (~2025)
   - (2018)

3. **Blue hydrogen**
   - Coal gasification with CCS
   - Steam reforming with CCS

4. **Green hydrogen**
   - Biomethane cracking (CCU)
   - Renewable Electrolysis

5. **Current**
   - Allam cycle with CCS
   - Natural gas cracking (CCU)
Getting over the infrastructure cost hurdles to stimulate investment

- High upfront capital due to early stage technologies
- Clear role for public sector intervention to bridge early cost gap
- Investment requires market and regulatory certainty
- Business models then need to demonstrate sustainability
- ETS alone isn't sufficient incentive for investment
Commercial scale infrastructure is key

- Investment in demonstration scale infrastructure is pointless
- Need to move to commercial scale fleets
- Government assistance will be required to overcome market growth uncertainty