Miscanthus New Zealand Ltd

Peter Brown | Managing Director

What is Miscanthus?

- A perennial C4 grass related to sugar cane
- A triploid hybrid so is completely sterile
- Of temperate origin (Japan) but tolerant of cold
- A cellulosic plant with high productivity
- Tolerant of low fertility sites
- Low input crop
- A multi-use crop

Miscanthus within months of harvest

Lawn Road, Hastings. This crop in Hawkes Bay was two years and two months since planting. At end of 2012 drought.

Miscanthus at end of third year in NZ

This trial stand near Huntly averaged 3.5 – 4 metres tall when photographed

Site requirements

- Siting limited by the terrain
- Limitation is based on machinery for harvest including trucks
- Slopes similar to where maize could be grown
- Tolerates drought but loves rainfall
- Enjoys damp but not waterlogged ground
- Likes deep soils for its deep rooting
- Fertility not required. Grows fine on low fertility land.

25 year old in Illinois

Tom Voigt of University of Illinois and Eric Rund at stand of 25 year old MxG. Illinois

Four year old Miscanthus near Huntly in January 2014

What is Miscanthus used for

- Reducing Nitrogen leaching
- Boiler fuel in place of coal or natural gas
- Stock shelter – on dairy farms in Canterbury
- Stock bedding – equine industry and dairy
- Wood pellets
- Production of renewable diesel and biochar with very low N leaching and GHG negative effect – through the biochar sequestration.

Chipped Miscanthus

As harvested. Suitable for a variety of uses including stock bedding

Miscanthus wood pellets

The first wood pellets made in New Zealand from NZ grown Miscanthus – Hornum clone

Ready for silage production?

Beginning of December - second year

Mid January in New Zealand

Miscanthus in its fourth growing season

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Renewable diesel

Drop-in substitute fuel

Orion
Biomass to Diesel Technology

Smaller Scale Italian technology

500L/hour)

Constructed 1st Generation Plant (2011-12)

Stainless Construction

- Closed loop process
- Only emissions from generator exhaust

Biomass to Diesel Fuel Economics

New Orion Biomass to Diesel plant

Plant size: 12,000 litres/day, 500L/hr, 4M litres/yr

Diesel selling price: $1.10/litre (estimated)

Diesel yield (net) : 300 litres/tonne biomass (bone dry)

O&M cost: $0.78/litre

Biomass: $100/tonne

Fuel production cost: $0.90/litre

Capital cost US$5 million

But building, tanks, infrastructure are extra.

Facility payback < 10 years

Proton Power, Inc

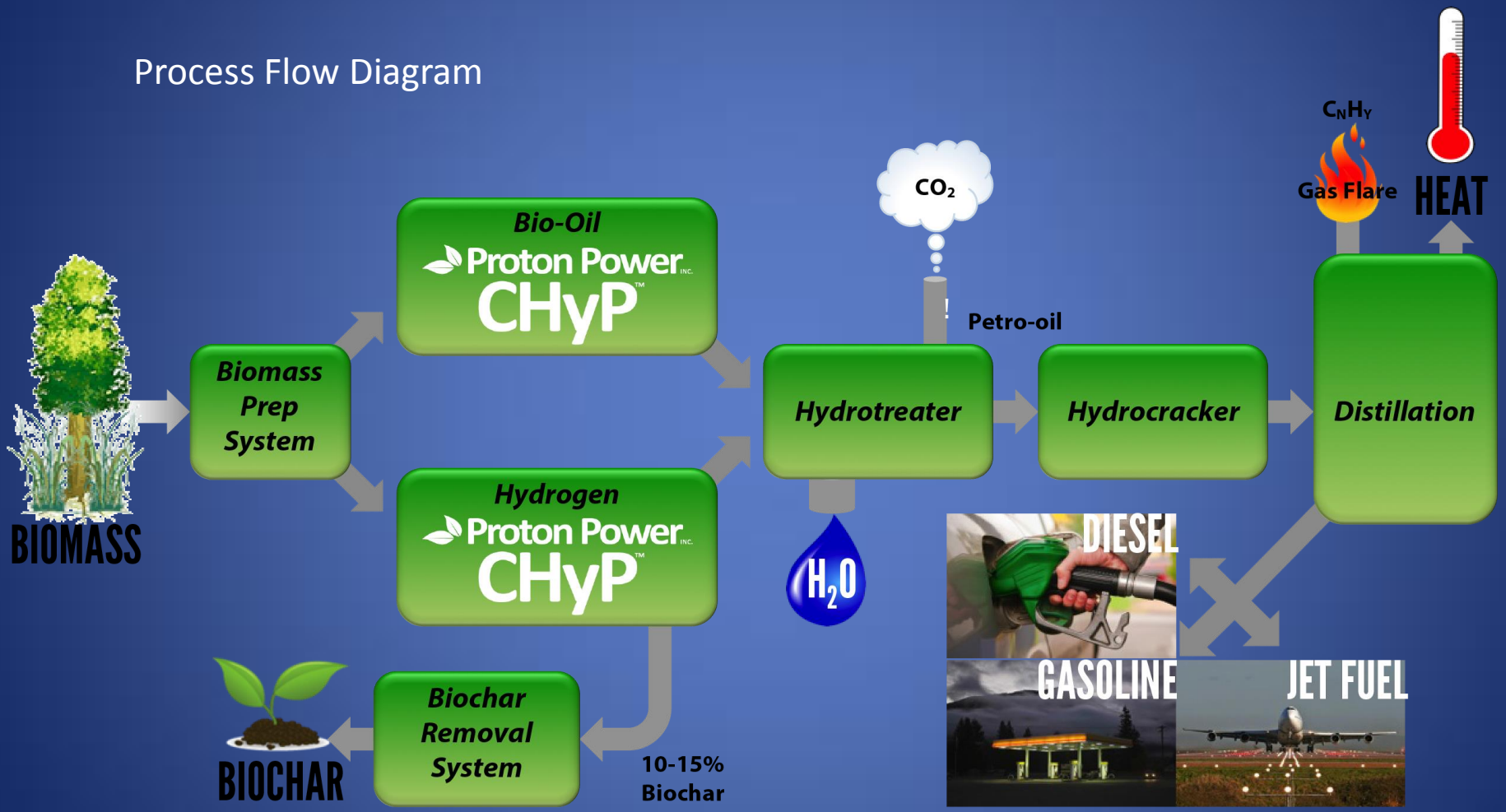
Biomass to Diesel with Biochar co-product

Slightly larger sale technology

500 – 2500 litres per hour

Created new ‘Biomass to Diesel’ process

Process Flow Diagram



Biomass to Diesel Fuel Economics

New Proton Power Biomass to Diesel plant

Plant size: 54,000 litres/day, 2270 litres/hr, 18M litres/yr

Diesel selling price: $1.00/litre (estimated)

Diesel yield: 350 litres/tonne biomass (bone dry)

Biochar yield is 13% of biomass input. (>30% of the revenue)

O&M cost: $0.29/litre

Biomass: $100/tonne

Fuel production cost: $0.74/litre

Capital cost US$33 million – turnkey operating handover

Facility payback < 5 years

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