Australia's view on bioenergy

Robert Henry

Queensland Alliance for Agriculture and Food Innovation
Bioenergy

Economics
Environment
Security of energy supply
Declining Australian oil production

<table>
<thead>
<tr>
<th>Year</th>
<th>Australian Production</th>
<th>Imported</th>
<th>Oil Consumption</th>
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<td>2010</td>
<td></td>
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<td>2020</td>
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Source: ABARE

$30 Billion by 2030
US and Australian Navy
Food Security
Biofuel from non food plants

Biomass (cellulose) → Pre-treatment → Enzymes → Sugars → Ethanol, Biodiesel, Aviation Fuel
Energy crops

Australia may be source of globally important energy crops
Research Priorities for Native Species Bioenergy Crops

RIRDC Publication No. 09/127
Non-food Biomass with Competitive Advantage from Australia

Sugarcane
Eucalypts
Australian native grasses/native legumes
Algae
Which species?

**Grasses**
Napier grass
Sorghum (forage/sweet/biomass)
Sugarcane (energycane)
Native species

**Woody species**
Eucalypts
Acacias
Grasses as biomass
Australian native grasses
Domestication of New Biofuel Crops
Rural Industries Research and Development Corporation
Australian Research Council

Malory S, Shapter FM, Elphinstone MS, Chivers IH and Henry RJ (2011)
Characterizing homologues of crop domestication genes in poorly described wild relatives by high-throughput sequencing of whole genomes. Plant Biotechnology Journal 9: 1131-1140.
Evaluation of Biomass Potential of some Australian Native Grasses

RIRDC Publication No. 31/01

Australian equivalent of switchgrass
Energycane
Grasses related to sorghum and sugarcane


Sorghum species endemic in Australia

Potential to widen gene pool


Woody biomass
Tropical and subtropical species
Forest Climate Change Funds

Chemistry of biomass

Land use options

Plant Resources
FOR FOOD FUEL AND CONSERVATION

ROBERT HENRY
Where can we grow the biomass?

Rainfall

Soils

Transport infrastructure

Environmental restrictions
Rainfall map of Queensland
Trigger map for strategic cropping land in Queensland

Key
- Town or city
- Zone
- Potential SCL

This map indicates the location of potential SCL in Queensland.

This map is prepared using land suitability data and represents verifiable cropping lands, agricultural land class A and production from agricultural orchards in the 1999 Queensland Land Use and Planning Mapping Program (QLUPM) dataset.

Areas covered by remnant vegetation in version 6.0 of that mapping are removed.

Protected areas are removed. These are National Parks, State Forests, Timber Reserves and Forest Reserves in the DERMM Digital Cadastral Data Base (DCDB).

Urban areas are removed. These areas are:
- within the urban footprints in the Far North Queensland and the South East Queensland regional plans;
- within 25 metres of and including groups of 20 or more cadastral parcels with an area less than one hectare;
- mapped as residential in the QLUPM dataset.

Broad climatic zones were used with the western boundary developed from crop production and climatic modelling.

On-ground assessment under the Strategic Cropping Land Act 2017 is required to validate the land as SCL or non-SCL.
UQ Biofuels Initiative – Research Pipeline

UQ Faculties
- BEL
- EAIT
- Science
- SBS

UQ Institutes
- AIBN
- QAAFI
- CILR
- ISSR
- GCI

UQ Partners
- Feedstock
- Biochemical Facility
- Transportation
- US & Int. Research

Facilities
- Gatton – Field Trials
- Pinjarra Hills - Algae

Fundamental Research
- $0.02 – 0.2 M
- Grants
- Mainly Government

Applied R&D
- $0.2 - 1 M
- Grants
- Government + Industry

Pre-Commercial Demonstration
- $1 - 20 M
- Venture Capital + Strategic Investors

Commercial Deployment
- $20 – > 100 M
- Commercial Investors
Interactions in research

1. Biomass Composition
2. Conversion Technology
3. Bioenergy Molecule Identity
Future BioFuels

- The University of Queensland, Australia
- Queensland Government
- Joint BioEnergy Institute (jbei)
- BSES: Sugarcane for the future
- Clemson University
- BioEnergy Plantations Australia
- Australian Government
- Rural Industries Research and Development Corporation
- Southern Cross University
- CSIRO
- Australian Government
- Sugar Research and Development Corporation
Food, energy and biomaterials

Queensland Alliance for Agriculture and Food Innovation

QAAFI is funded by the University of Queensland and the Queensland Government.

Working together with the Queensland Government.