AUSTRALIAN ACADEMY OF TECHNOLOGICAL SCIENCES AND ENGINEERING (ATSE)

ENERGY ACTION STATEMENT

# LOW EMISSION FUELS FOR TRANSPORT

NOVEMBER 2014

This Action Statement supports the ATSE Energy Position Statement which sets out the challenges and priority focus areas, and a way forward, for the low emission energy systems required to sustain Australia's economic development and future prosperity.

AUSTRALIA MUST ACCELERATE PROGRESS TOWARDS SUSTAINABLE MOBILITY OF PEOPLE AND FREIGHT BY INTEGRATING LOW EMISSION FUELS INTO ITS TRANSPORT ENERGY MIX.

## THE ENERGY CHALLENGE FOR TRANSPORT

Transport (including road, rail, aviation and shipping) is largely dependent on combustion engines powered by liquid fossil fuels in the form of gasoline, diesel and kerosene. The global transport sector consumes more than 60 per cent of the world's total oil production, or around 2,200 million tonnes of oil equivalent each year.

Oil use by the transport sector is forecast to rise due to increased demand for travel, goods and services by rapidly growing urbanising countries such as China and India. This is not a desirable or sustainable outcome, because it would lead to further increases in emissions (transport currently contributes approximately 20 per cent of global anthropogenic carbon dioxide emissions), deaths from airborne pollution (nitrogen and sulphur oxides and fine particulates) and utilisation of a finite resource.

Countries around the world are taking steps to reduce transport emissions while accommodating growth in the economy and population by maximising energy efficiency, electrification and development of low carbon fuels. Additional benefits include greater energy security and independence from reliance on a single fuel source.

## REPOWERING TRANSPORT IN AUSTRALIA

Reliance on liquid fossil fuels for transport is a particular concern for Australia, which imports the majority of its transport energy in the form of crude oil or refined petroleum products.

The Australian economy depends on well-developed and extensive transport networks that move people, goods and resources domestically and offshore. Our geographically dispersed economy, with a mix of heavily populated urban areas and sparsely populated remote areas, creates different transport system requirements in different areas. Relative to global figures, the percentage of transport energy used by aviation in Australia is higher because of the necessity of long haul flights. Road dominates our transport energy use (75 per cent), followed by aviation (18 per cent), sea (4 per cent) and rail (3 per cent).

Overall, transport accounts for more than a third of all energy consumed in Australia. More than two thirds of this energy is derived from oil. Closure of several domestic refineries has reduced local refining capacity by at least 30 per cent during the last two years alone, and Australia is currently not meeting its treaty obligations to hold the equivalent of 90 days of net oil equivalent demand. This makes Australia vulnerable to disruption or misdistribution of supply because of our geographical isolation from overseas refineries. In addition, loss of capacity to refine crude oil, 20 per cent of which is processed into petrochemicals, is causing significant disruption to the Australian chemical industry.

Australia's high and rapidly growing dependence on imported vehicles and fuels means that overseas markets will largely dictate the technological paths we follow to repower our transport fleets and the rate at which we adopt them. Hybrid and electric vehicles, especially cars, buses and light duty trucks, hold considerable potential for our densely populated cities. However, the carbon footprint of the electricity supply systems for these vehicles will need to be progressively decreased. It will take some time before cost structures, distribution and supply points, standards and regulation of electric vehicles are put in place. The rate of uptake could be accelerated by reforms to Australia's electricity supply systems and markets in order to deliver reliable, competitive, low emissions electricity and manage load variability.

The use of compressed natural gas and liquefied natural gas for heavy vehicles such as trucks will expand in some settings where the cost of adjustments to infrastructure, and the likely rising cost of gas, can be mitigated. Aviation, shipping and rail have fewer options to switch from existing fuels or the associated expensive energy supply infrastructure. Even so, imperatives to reduce carbon dioxide, nitrogen and sulphur oxides and fine particulate emissions are very strong in these sectors because of global voluntary industry targets. Low carbon fuels, such as those derived from agricultural or other waste streams, that "drop-in" (i.e. require minimal adjustment to infrastructure and engines) to the conventional fossil fuel supply chains will be required.

The characteristics that differentiate Australia from many other developed countries will guide the repowering of transport here:

- A heavy reliance on imported (increasingly refined) petroleum products for transport fuels and chemicals, which is likely to increase.
- A highly urbanised but small population that is sparsely distributed and separated by long distances.
- Distances covered by national and international flights make secure sources of aviation fuel a priority.
- Electricity generation being primarily fossil fuel based, making meeting of internationally agreed emissions targets a challenge.
- Finite agricultural land and water, most of which is needed for production of food and fibre.
- A vibrant but under-resourced energy research, development and demonstration (RD&D) sector.

# THE WAY FORWARD

ATSE's Position Statement on a Sustainable Energy Future for Australia has designated low emission fuels for transport as one of its four priority areas.

To ensure the integration of low emission transport fuels into Australia's transport energy mix, ATSE recommends the following policies and actions:

## RECOMMENDATION 1:
### Energy productivity, electrification and low carbon fuel technologies in the transport system

Government and industry sectors (including electricity, oil, gas, chemicals, forestry, agriculture and waste) need to work together to develop national targets for reduction of emissions from our transport systems, increased transport energy productivity and accelerated utilisation of low emission fuels.

## RECOMMENDATION 2:
### Security and diversity of transport fuel supplies

The Australian Government should review the security, diversity and independence of Australia's transport fuel supplies. The Government should facilitate the development of new fuel reserves, ensure diversity of Australia's fuel supplies (including alternative fuels and electricity), meet Australia's international oil security obligations and augment domestic transport fuel security at an acceptable cost.

## RECOMMENDATION 3:
### Production of low emission fuels for aviation as a strategic priority

Industry, in conjunction with the Australian Government, should designate production of low emission fuels for civil and defence aviation as a strategic priority for Australia.

## RECOMMENDATION 4:
### Regulations, incentives and market signals to improve vehicle efficiency and pollution standards

Australian Governments should create durable strategies, market signals, regulations and incentives for stringent vehicle efficiency and pollution standards. They should also greatly expand mass transit programs. Vehicle emission standards should be reviewed to ensure that Australia complies with international best practice.

## RECOMMENDATION 5:
### Innovation to support future fuel research, development and demonstration (RD&D)

The Australian Government, in conjunction with industry, universities and research centres, should encourage innovation by supporting RD&D of new transport energy technologies, new methods of manufacturing renewable fuels (such as biofuels produced without competing for land and water resources), decarbonised electricity sources and first-of-a-kind demonstration plants.

# ALIGNMENT WITH ATSE's ENERGY POSITION STATEMENT

ATSE's Energy Position Statement, A Sustainable Energy Future for Australia, sets out four key priorities to transition to low emission energy systems that are affordable, secure and reliable. The following are particularly relevant to progressing future fuels for Australia.

## THEME 3: Supply systems and market measures that deliver reliable supply of competitively priced, low emissions fuels for transport.

Reform Australia's transport fuel supply and use policies—including excise and subsidies—to ensure progressive and efficient transition without supply constraints to low emission liquid fuels (particularly for aviation, maritime and heavy logistics) and electricity (particularly for passenger and light-duty logistics vehicles), including fostering local production of transport energy supplies that significantly reduce Australia's growing dependence on imported liquid fuels.

## THEME 4: Strategic investments in innovation of low emissions energy technologies.

Australia should support and fund research, development, demonstration and deployment (RDD&D) for low emission fuel technologies. There are various ways to support RDD&D including:

- Direct R&D grant funding;
- R&D tax concessions;
- Accelerated depreciation of investments in exploration, plant and infrastructure; and
- Support for demonstration projects (either in Australia or in collaboration with overseas partners).

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