New Zealand Industry Leader's Address

2019 New Zealand Petroleum Conference
Andrew Jefferies
Chief Executive, New Zealand Oil and Gas
10:30am Monday, 30 September 2019

Greeting and Acknowledgements

After I talk, Chris Graham and I will discuss the biggest areas of change ahead for the oil and gas industry.

I want to introduce the topic by sharing some thoughts about the role of oil and gas in New Zealand today, and where it is headed.

And I want to make the case for oil and gas from New Zealand.

For almost our entire modern history, our way of life has been powered by hydrocarbons.

In fact our modern economy only began to take shape in 1882.

Back then the export economy consisted mainly of wool.

A gold rush was powered by pick axes, saw blades, calloused hands, sinew and muscle.

There were no meat or butter exports because there was no technology to cool the produce all the way to London, where it could be sold.

Everything changed when a pioneer farmer called William Soltau Davidson fitted a coal-powered Bell Coleman freezing plant to a sailing ship.

"The Dunedin" made the voyage to London with five thousand mutton and lamb carcasses in its hold.

Harnessing energy to refrigerate agricultural exports transformed New Zealand.

Sailing ships like the Dunedin were replaced with oil-powered ships.

Fertiliser was imported to be spread on farms by shiny new diesel tractors.

The productivity of the land rocketed, and over the next fifty years created a society that may have been, for a while, the richest in the world per capita.

Statistics New Zealand created this graphic showing where our exports go today.

We send products all over the world. Products that are created using oil and gas, and shipped to market using oil and gas.

Our largest foreign exchange earner is tourism.

Tourists arrive by kerosene-powered plane, and drive around New Zealand in diesel-powered camper vans.

When they arrive in beautiful Queenstown, skiers and boarders get up to the slopes in gasoline cars or diesel busses.

Often it is diesel that drags skiers up the slope.

All this so they can slide down on their petroleum epoxy skis and snowboards in their brightly colored petrochemical jackets.

The ski-lifts themselves are built from steel, mined and smelted then manufactured using petroleum products.

There have always been non-oil technologies to drive ships to markets, and to bring travellers to New Zealand.

Sailing ships existed long before there was an oil industry.

You could always walk up a ski slope.

Food was grown before fertiliser was made out of petrochemical products.

So there are alternatives. Always have been, always will be.

Oil and gas are ubiquitous because, for many applications, they are more efficient, more available, and more cost-effective than the alternatives.

Therefore, the conversation about our industry's future should begin with the questions:

> What are qualities that make oil and gas such a big part of our economy?

and

> As we come to look at the future of the industry, how do we meet those needs in the way that is best for humanity?

The world needs answers to these questions because global energy demand will increase by a quarter to a third over the next 20 years.

This is good news.

In 2017, for the first time, fewer than a billion people were without access to electricity.

The graphic shows the number of people without access to electricity or clean cooking.[1]

Cooking indoors over open fires is a deadly health hazard.

Cooking with electricity or natural gas literally saves lives.

While demand for energy is going up, supplying the next unit of energy is getting tougher.

A 2013 study[2] looked into the energy return on investment from different fuels - that is, the amount of energy we get out for each dollar put in to generating that energy.

Energy return on investment: "E-ROI".

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[1] Reproduced from the IEA World Energy Outlook 2018, page 96.

[2] [(Charles A.S. Hall, Jessica G. Lambert, Stephen B. Balogh, Energy Policy, 2013), available here: www.sciencedirect.com/science/article/pii/S0301421513003856]

The study found that the EROI of our most important fuels is declining.

That is, we are getting less energy out for each new dollar we put in.

"Most renewable and non-conventional energy alternatives have substantially lower EROI values than traditional conventional fossil fuels.

"Declining EROI means that an increasing proportion of energy output and economic activity must be diverted to attaining the energy needed to run an economy."

In other words, we will not just be spending more on energy - the world will spend a greater proportion of its wealth and earnings to generate energy.

It is a zero sum game. More income used on energy means less is available for everything else — health systems, education, housing. Everything.

The study authors conclude:

"The declining EROI of traditional fossil fuel energy sources and the effect of that on the world economy are likely to result in a myriad of consequences, most of which will not be perceived as good."

Our demand for energy is growing, and so is the cost of delivering it.

Simple economics of supply and demand tell us that shortages result in price rises.

Shortages combined with sharply-rising demand result in faster-rising prices.

If shortages are exacerbated by bans and other avoidable policies, then prices must rise even faster still.

The east coast of Australia has vast gas reserves.

Enormous plants have been built to transform gas into LNG for export.

Australia is the world's second biggest LNG exporter, after Qatar.

Ten- or 20-billion dollar LNG construction projects helped to keep Australia's economy bouyant after the global financial crisis.

Around the same time, state governments introduced fracking bans.

An onshore drilling ban was imposed in Victoria.

They had sharply rising demand for gas for LNG exports, and severely restricted new supply.

Guess what happened next.

The Sydney Morning Herald reported: in two years from 2015 to 2017, domestic gas prices in eastern Australia increased by up to 500%[3].

Industry energy bills rose from $3 to $4 a gigajoule to as high as $20 for some contracts.

In New Zealand, we need to pay attention.

The energy experience of the east coast of Australia is the energy future for New Zealand.

Shortages look like price rises.

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[3] www.smh.com.au/environment/higher-energy-prices-have-little-to-do-with-gas-shortages-researchers-say-20170517-gw6tg2.html

We can already see a pattern emerging.

Take, for example, our friends at Meridian who claim to sell only renewable electrons.

Here is an interesting graphic from this year's annual results presentation.

It shows a steep increase in "average generation price."

Regardless of our energy source, the price of future energy is going to go up.

It is going to increase faster than the economy grows.

The cost will rise whether we use renewables, oil and gas, or any other source.

Therefore, it makes sense to be cautious about our energy mix, and constrain future costs as much as possible.

The world's future demand for energy is so great — and the circumstances are so different to the past - that all forms of energy have to play their part.

When our sailing boat goes out to defend the America's Cup next year, they won't have some of their grinders sitting around doing nothing.

They need the whole crew to pull their weight.

(Incidentally, the vessel will be powered by wind - and built from petrochemicals.)

Likewise, in energy, we need the whole crew to pull its weight.

We need to deploy all our resources to meet our needs adequately.

The best way to deploy all our resources is to use economic signals.

Energy resources should be put to their most economic use.

If we use them inefficiently, then the inevitable future rise in energy prices will be steeper.

One of the keys to using economics is that the full costs of the resource should be reflected in the pricing.

To use the economic terminology - the externalities should be priced in.

Where the world is determined to reduce carbon emissions, pricing is the solution because it is more efficient than banning.

Without price signals, we risk directing investment into less effective solutions.

It's true that no economically viable technological substitute exists for many applications of oil and gas.

Flying planes, making steel, and petrochemicals are examples.

But it's not true that no solution exists to reduce carbon emissions.

William Nordhaus and Paul Romer were awarded the Nobel Prize in economics last year.

The two economists developed models to study long-term, sustainable economic growth. Nordhaus' best known work finds that societies should undertake environmental policies only when their benefits exceed their costs.

They show that an efficient, affordable, solution to carbon emissions exists in plain sight and could be introduced tomorrow: A carbon price.

If you don't want to pay the price, then that tells you how much you really want to reduce emissions.

You can hide the price. If you ban things and redirect investment using fiat, or subsidies, or even cheerleading, you can conceal the true cost.

But you can't avoid the cost by making inefficient decisions.

This is NOT a battle between decarbonisation and economics - it is a battle in which decarbonisation can be achieved using sensible economics.

There are better tools to use than picking renewable winners or banning non-renewable fuels.

As China and India grow, their use of renewable energy will grow very rapidly.

But renewables will not replace fossil fuels for decades, at least.

The logic then follows: If you want to reduce global carbon emissions then oil and natural gas can be part of the solution.

The IEA "sustainable development" scenario sets out an aggressive decarbonisation path.

It has the main reduction in fossil fuel coming from reductions in the use of coal.

To summarise the implications: increased use of natural gas is consistent with the IEA's 'sustainable development' scenario.

Look to our largest trading partner, China.

Over the next 30 years, China could add 2000 gigawatts of electricity capacity. That is more than the total installed capacity of the United States plus the UK, plus France, Germany, Russia and Japan combined.

This is likely to result in the global LNG trade more than doubling, with China set to be the largest importer.

China is aiming to double the share of gas in its overall energy mix over the next ten years.

Around half of its gas imports are likely from pipelines, including from Russia.

The remainder will come from imported LNG.

China has invested in LNG terminals to facilitate these imports.

A major discovery of gas in New Zealand could help to meet that demand and displace coal consumption.

Japan, China, South Korea and India import over 60% of the world's LNG.

All of them continue to import coal as well as LNG.

LNG in Asia is competing with coal as an energy source.

Therefore: new LNG sources will displace coal production that would otherwise occur.

A comprehensive study by the International Gas Union compared carbon emissions from LNG used for power generation in competition to coal.

It looked at the entire LNG production chain, including drilling wells, processing gas, liquefaction, shipping, re-gasification, pipelines and the power station itself. It included fugitive emissions.

This study is directly applicable to any LNG that would be exported from New Zealand.

It showed LNG power generation in Asia produced emissions of half to a third of those from installed coal power plant emissions.

Natural gas imports will reduce new coal plant construction.

But the story gets better: Coal plants closed by competition from gas imports will be the oldest, least efficient and highest emission plants.

This means in the scenarios with more emission reductions, where total coal use is reduced, gas could displace more emissions.

I haven't even talked about the advantages from cleaner air and the reduced demand for water use in generation.

So a large gas discovery from New Zealand, which was used to create LNG exports, can help to displace coal.

Today, half of the gas we produce in New Zealand is converted to methanol for export.

More methanol is produced and used in China than any other country.

Much of the methanol produced in China is made from coal.

Its manufacture emits nearly three times as much CO2 than methanol produced from gas.

It also requires substantial quantities of water and produces waste products of ash, slag and atmospheric emissions.

And so gas exported from New Zealand as methanol reduces global CO2 emissions and improves global environmental outcomes.

So I am proud of the contribution our industry makes today.

And I will be prouder if we are able to increase this contribution in the future, by exporting gas from New Zealand…by finding a new North Sea in the South.

But we are also oil companies.

We are challenged to show how oil produced from New Zealand can also be part of the solution.

This is a challenge we can meet.

We often hear warnings that the climate cannot afford for the world to produce all the oil that has already been discovered.

Here, I agree with Greenpeace.

Lets follow that logic

Let us accept that oil will be superceded by new technology before all the world's oil resources are used up.

This will leave some discovered oil in the ground.

Much of this discovered oil is not yet developed.

The infrastructure is not in place to produce it.

This means there is lots of room to produce oil from a new source of supply to displace other discovered sources of supply.

Heavy oils are less attractive and have a much higher environmental impact than light oils.

So it follows that, to the extent that we all agree we are going to use some oil, we should prefer light oils to heavy.

Over half the world's discovered oil resource is extra heavy oil.

Vast reserves are sitting discovered and ready in Venezuela and Canada.

These are expensive to produce (remember the EROI we talked about) and they have the highest environmental impact.

New Zealand is predominantly a light oil province.

Even as the world reduces emissions to the level demanded in Paris, every forecast suggests oil will be used for decades to come.

So it follows, that anyone wanting to reduce emissions should prefer to produce oil from New Zealand.

New Zealand light oils will displace production of extra heavy oil overseas.

Oil discoveries in New Zealand would leave an equivalent amount of less attractive oils in the ground.

Our analysis shows that producing New Zealand light oils will reduce global CO2 emissions per litre of petrol by about 20%.

Even though that oil would probably not be used in New Zealand, it would offset use of those oils elsewhere.

It is better for the world to use light oil from New Zealand than to produce oil from open cast mines of tar sand in forested Canadian wetlands.

Offshore production from New Zealand, in contrast, is very low impact.

The impact on the marine envrionment amounts to the anchoring on the sea floor.

Around the world, offshore platforms are known to attract marine life as a kind of artificial reef.

There must be room for our industry to co-exist with our marine heritage.

In a competitive world New Zealand does not have many competitive advantages.

One of the few we have is a massive continental shelf - the fifth largest in the world.

Beneath it lie vast quantities of undiscovered natural gas, and probably some light oil.

It will benefit the world to find it, produce it, and export it to energy-hungry markets of the world, the same way that a hundred-and-thirty years ago we began to send frozen meat to a literally hungry world.

As we survey our world, we see populist and nationalist moods, anger and instability.

Whatever the causes, rising energy costs, and reduced access to food and transport will worsen them.

Our world will be less safe if it is a world where inequality is sustained because the fruits of development are confined to places where energy was low cost and easily accessible energy.

Never before have so many people been lifted out of poverty as fast.

Energy is doing its share of the lifting, and more will be needed.

Oil and gas from New Zealand can be part of the solution to a safer and better world.

NEW ZEALAND
OIL & GAS

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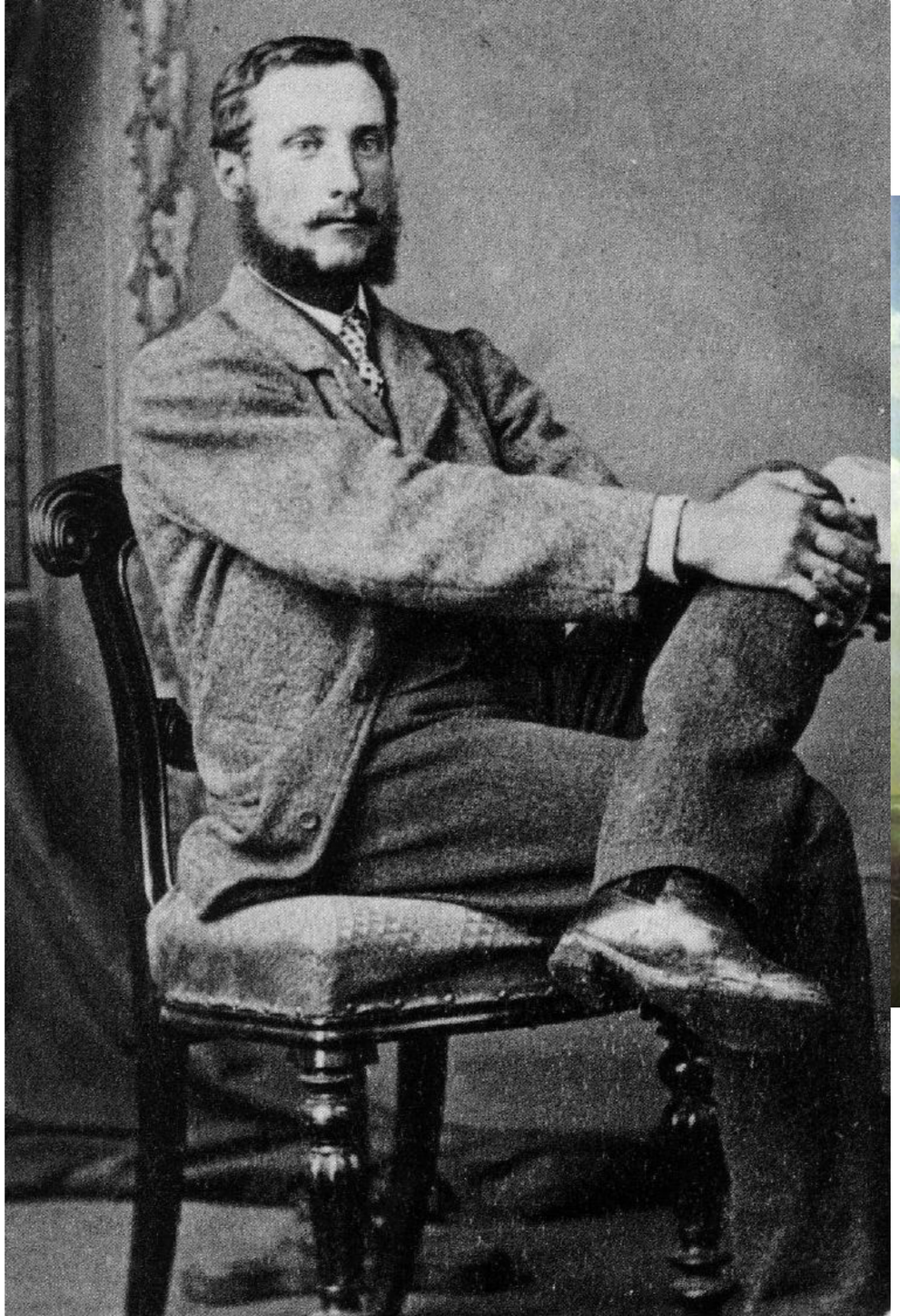
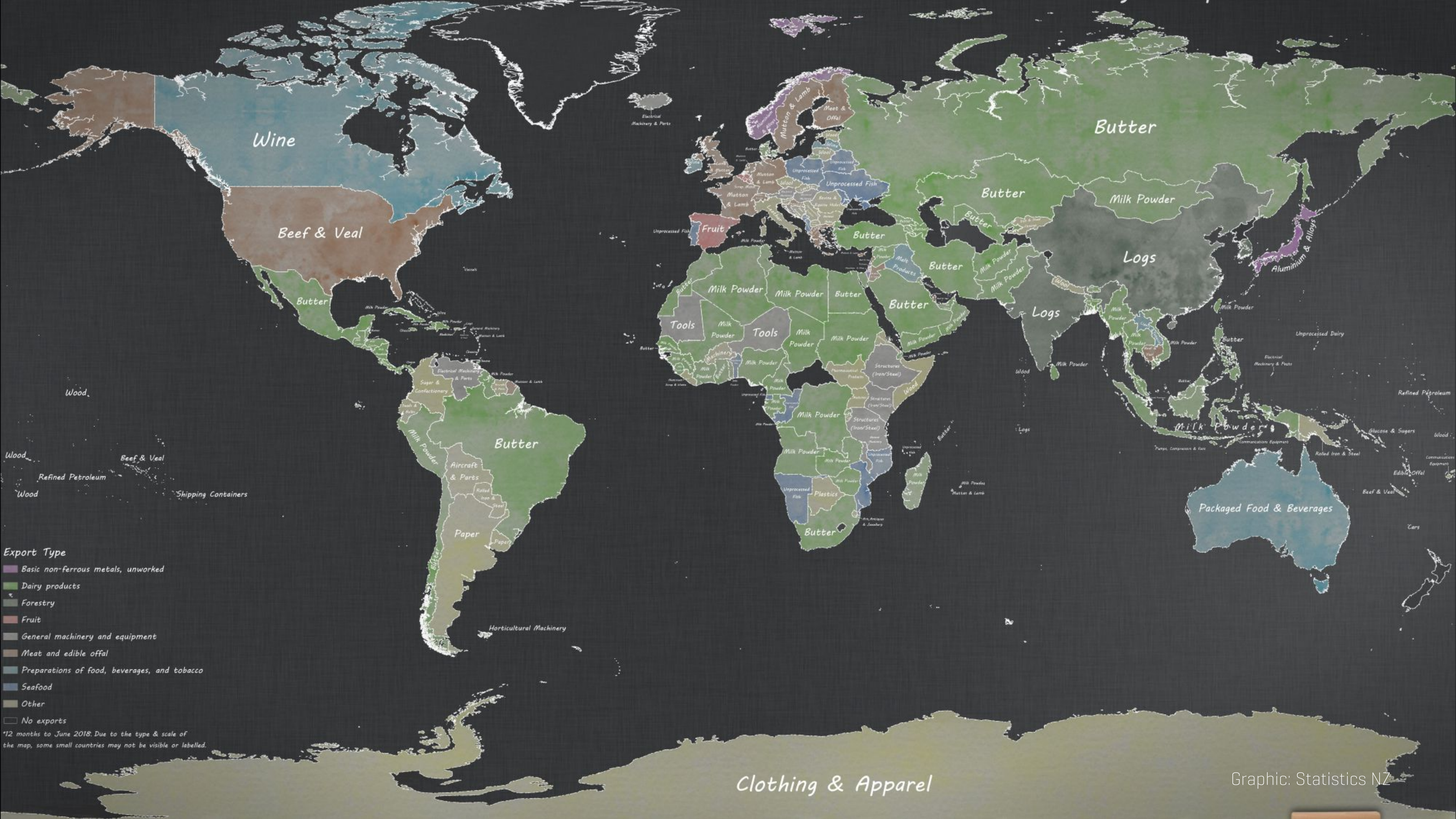


Pictures: Wikipedia


Wine
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Aircraft & Parts
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Horticultural Machinery
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Mutton & Lamb
Meat & Offal
Electrical Machinery & Parts
Unprocessed Fish
Fruit
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Glucose & Sugars
Rolled Iron & Steel
Edible Offal
Beef & Veal
Cars
Export Type
Basic non-ferrous metals, unworked
Dairy products
Forestry
Fruit
General machinery and equipment
Meat and edible offal
Preparations of food, beverages, and tobacco
Seafood
Other
No exports
*12 months to June 2018. Due to the type & scale of the map, some small countries may not be visible or labelled.
Graphic: Statistics NZ


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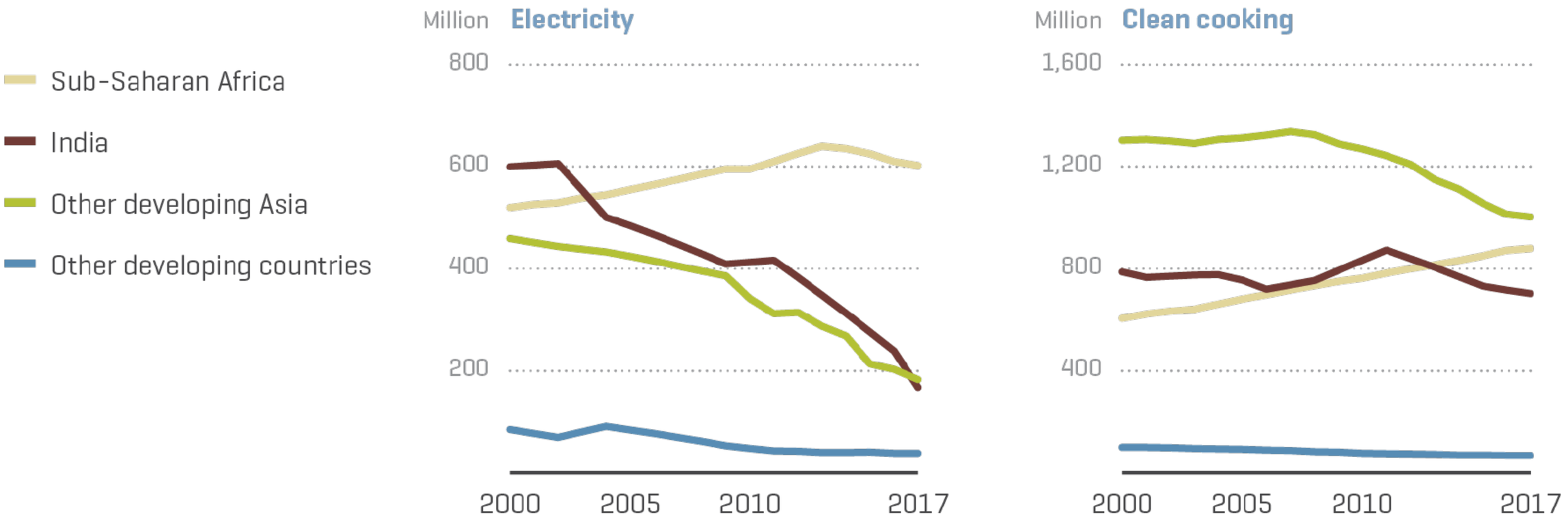
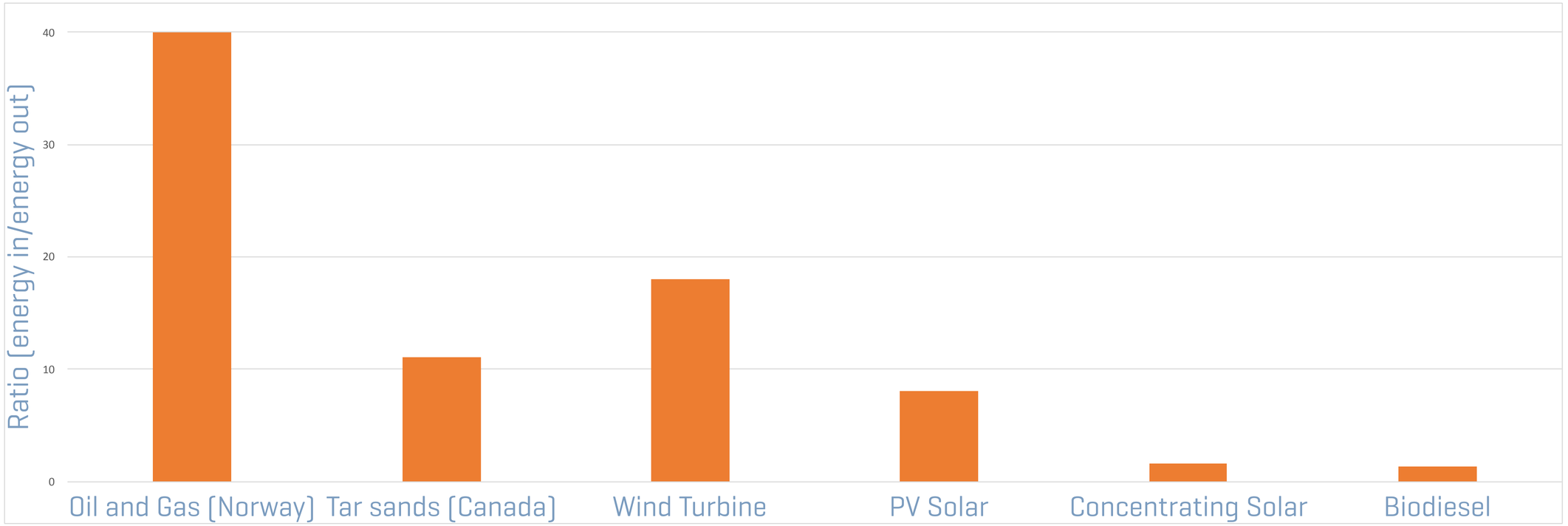
Population without modern energy access



Fewer than a billion without electricity for the first time

Energy return on investment of various fuels



[Charles A.S. Hall, Jessica G. Lambert, Stephen B. Balogh, Energy Policy, 2013, available here: www.sciencedirect.com/science/article/pii/S0301421513003856]

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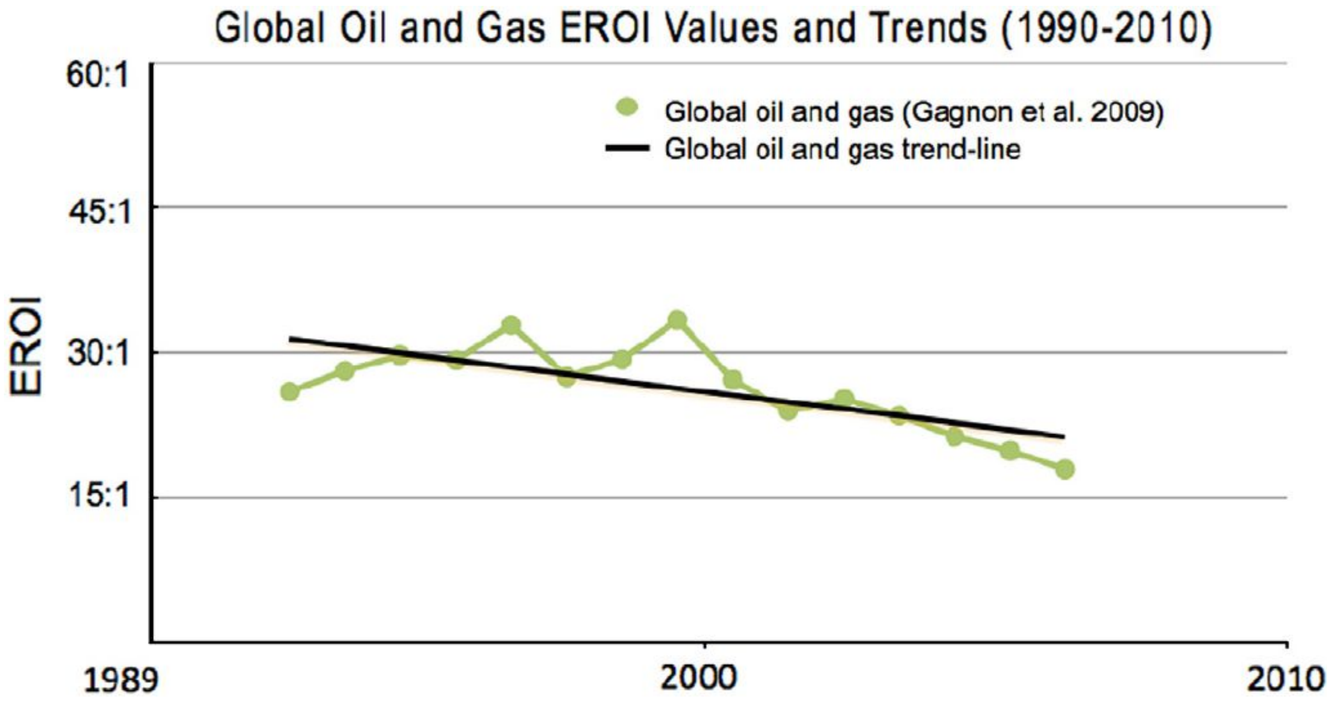

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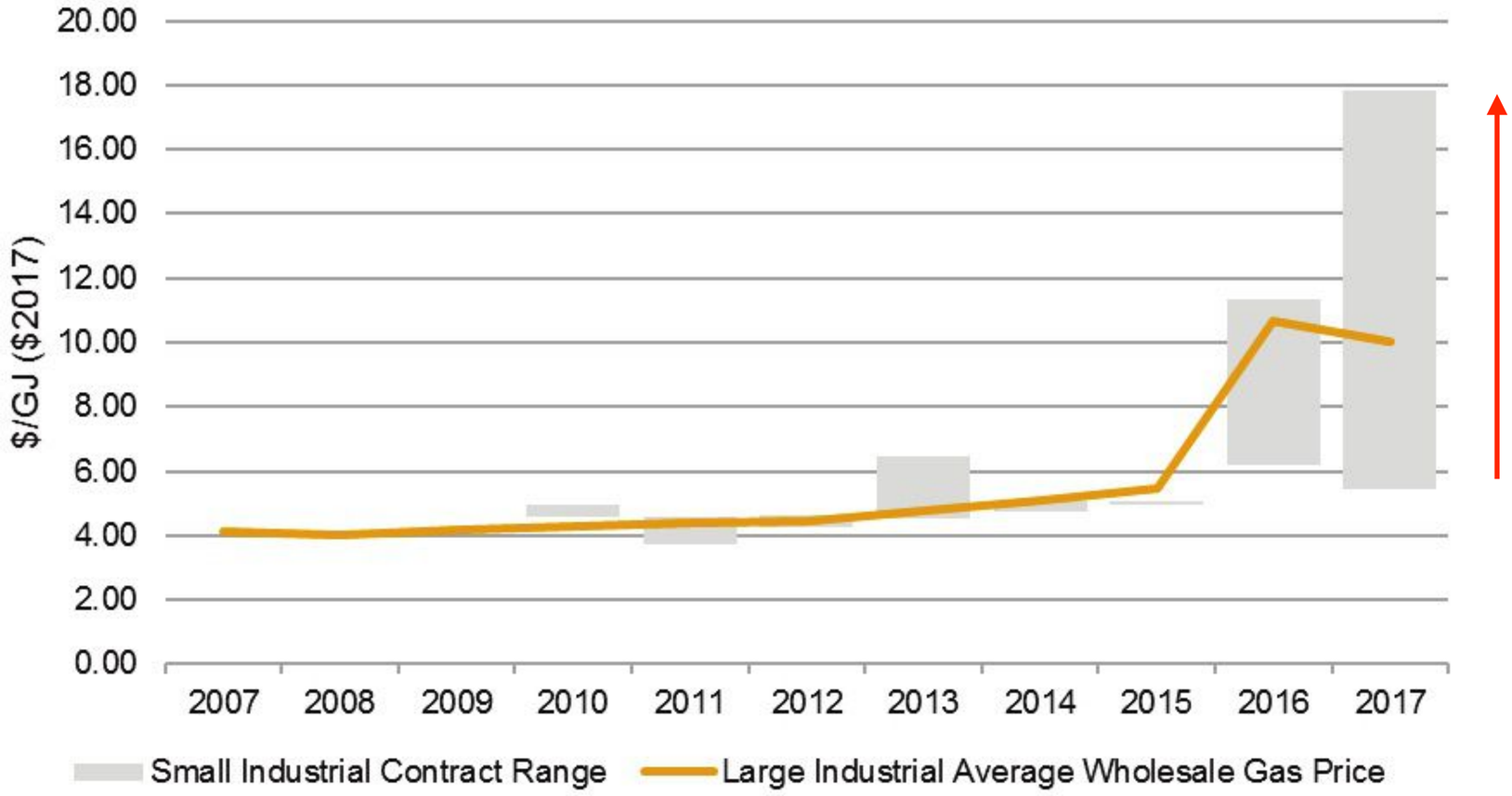
"The declining EROI of traditional fossil fuel energy sources and the effect of that on the world economy are likely to result in a myriad of consequences, **most of which will not be perceived as good**."

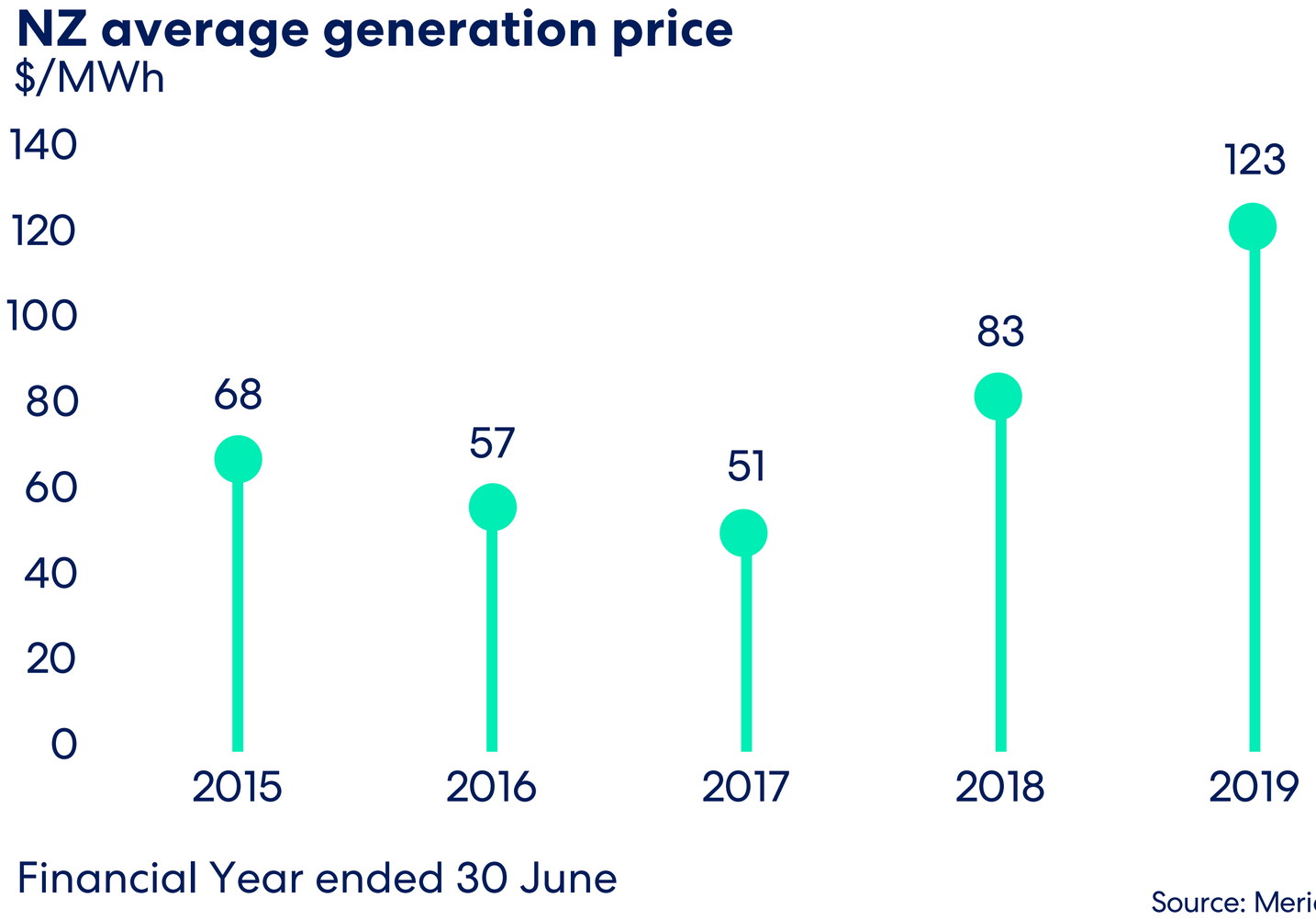
Charles A.S. Hall, Jessica G. Lambert, Stephen B. Balogh, Energy Policy, 2013), available here: www.sciencedirect.com/science/article/pii/S0301421513003856. Emphasis added.

Scarcity leads to price rises
Industrial price scatter, Victoria



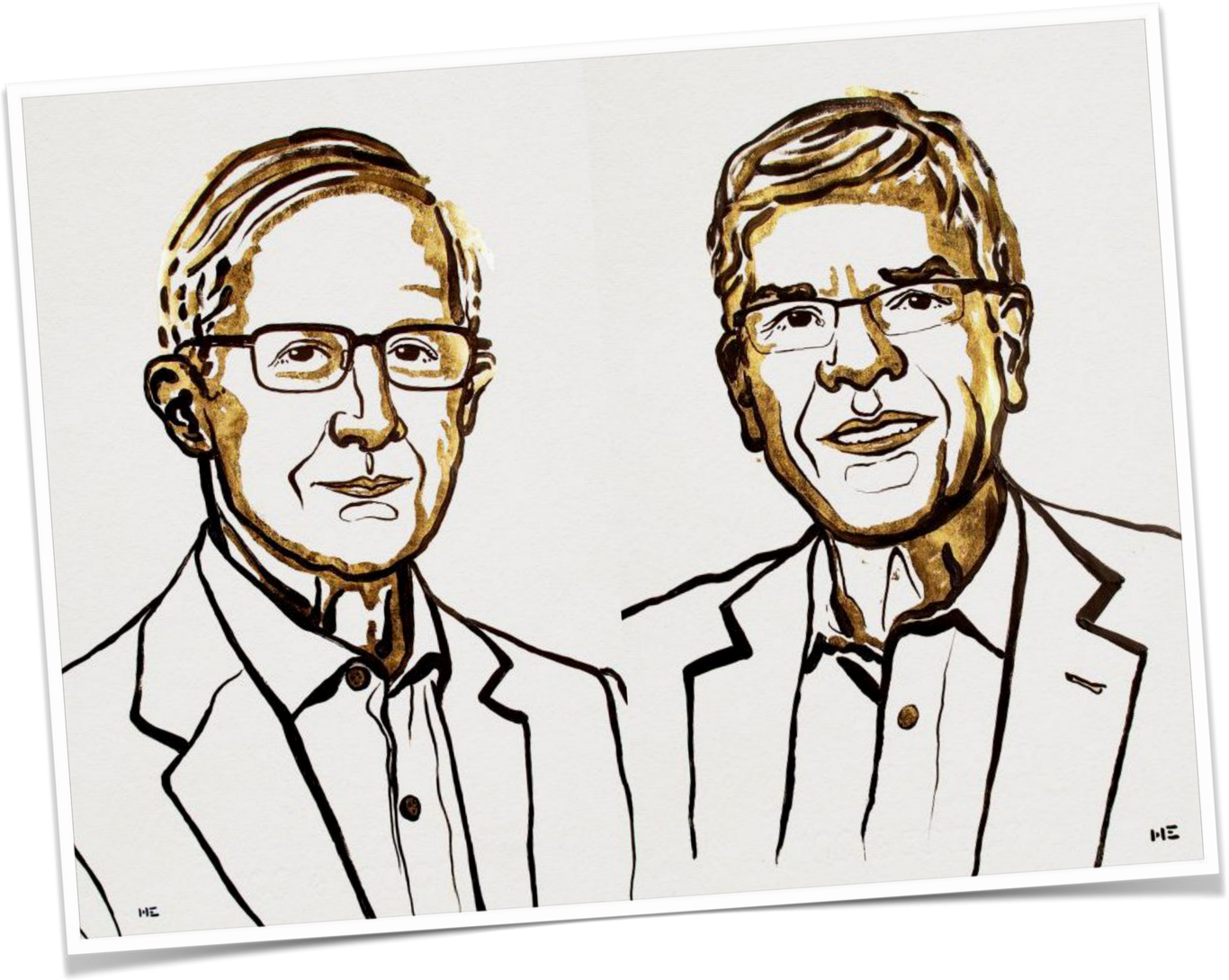
Oakley Greenwood, Gas Price Trends Review 2017 for the Council of Australian Governments (COAG) Energy Council available at https://www.energy.gov.au/sites/default/files/gas_price_trends_review_2017.pdf.

Cost of producing energy rises across all energy sources



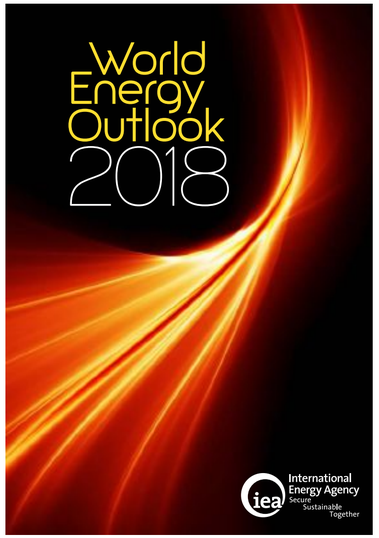
Source: Meridian

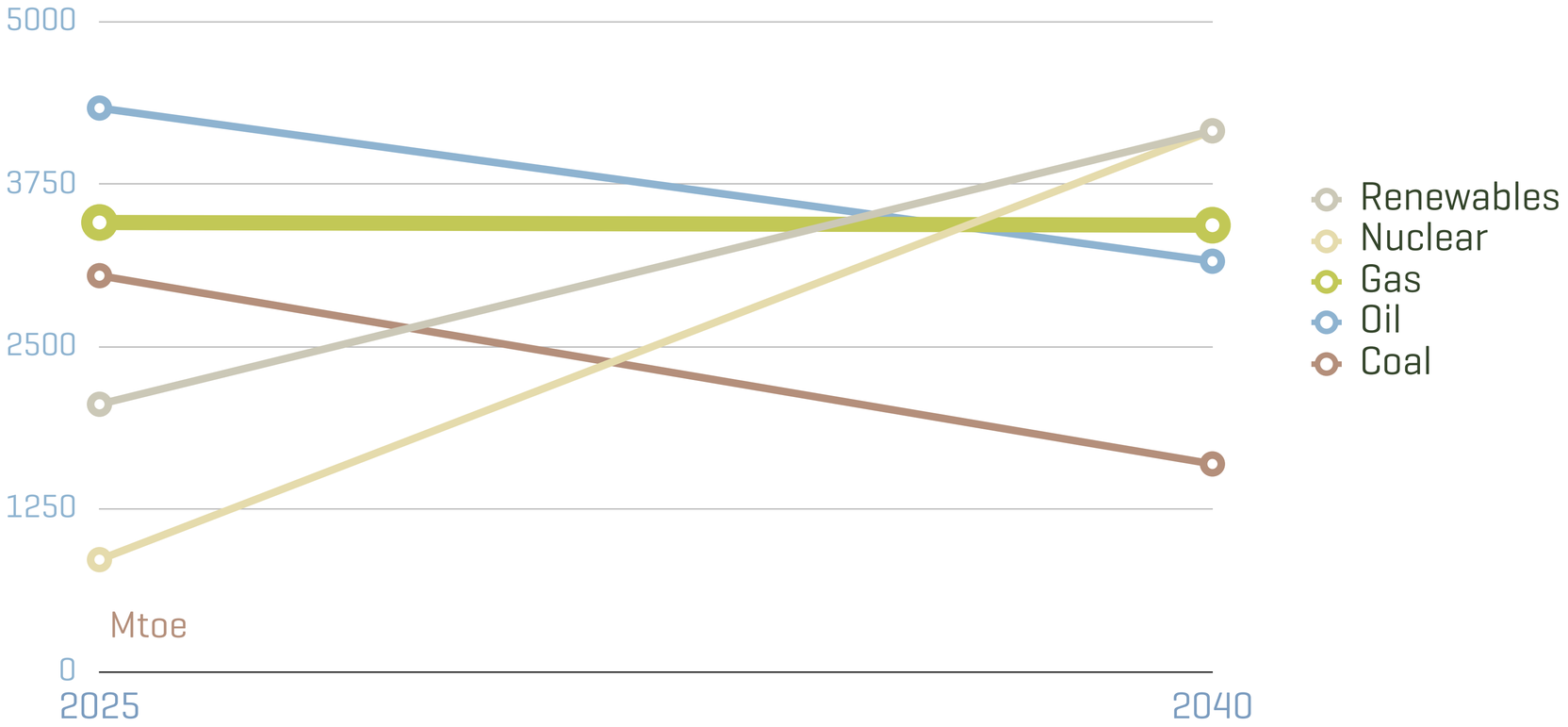

Emirates
Estrella Damm
TOYOTA
www.emirates.com



Royal Swedish Academy of Sciences

In the Sustainable Development Scenario,
natural gas is stable over the next 25 years

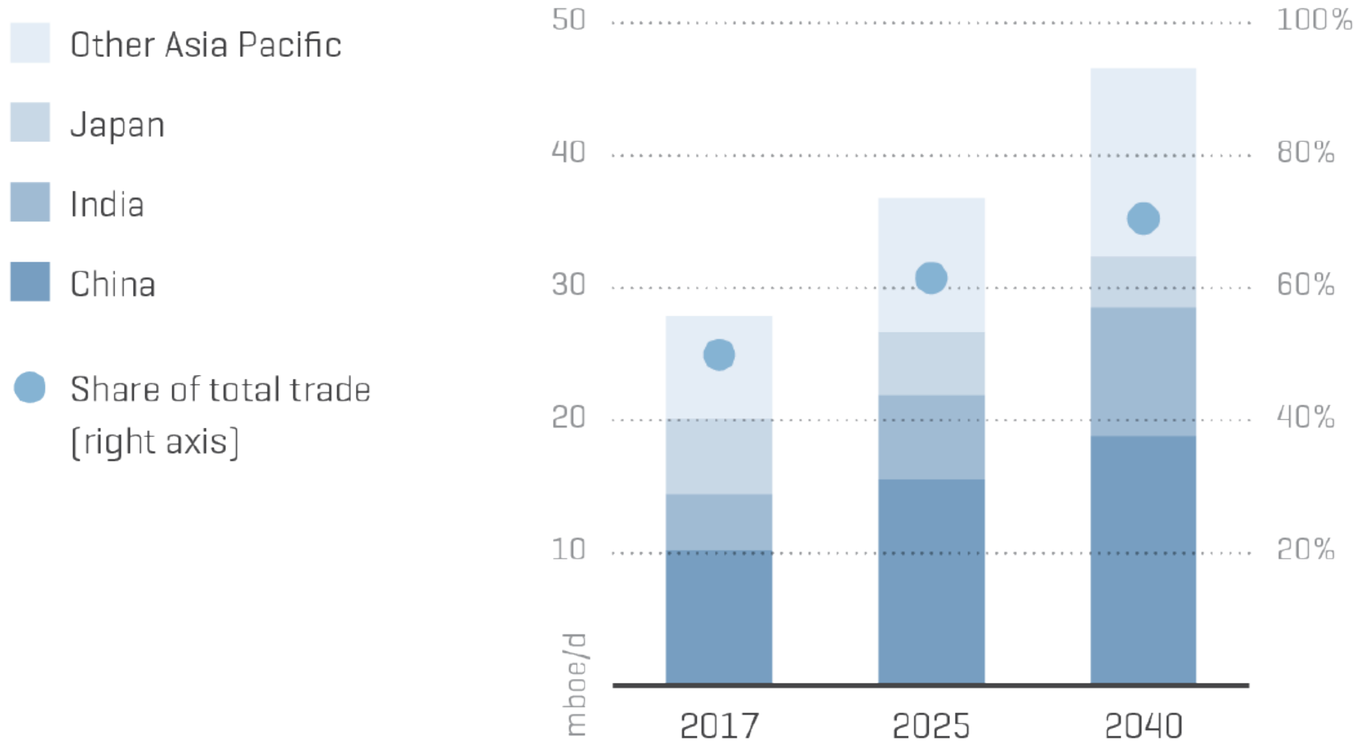




World primary energy demand in the IEA Sustainable Development Scenario

Source: OECD/IEA World Energy Outlook 2019, Table 1.1, Page 38

Next 20 years of oil and gas imports by Asian destination

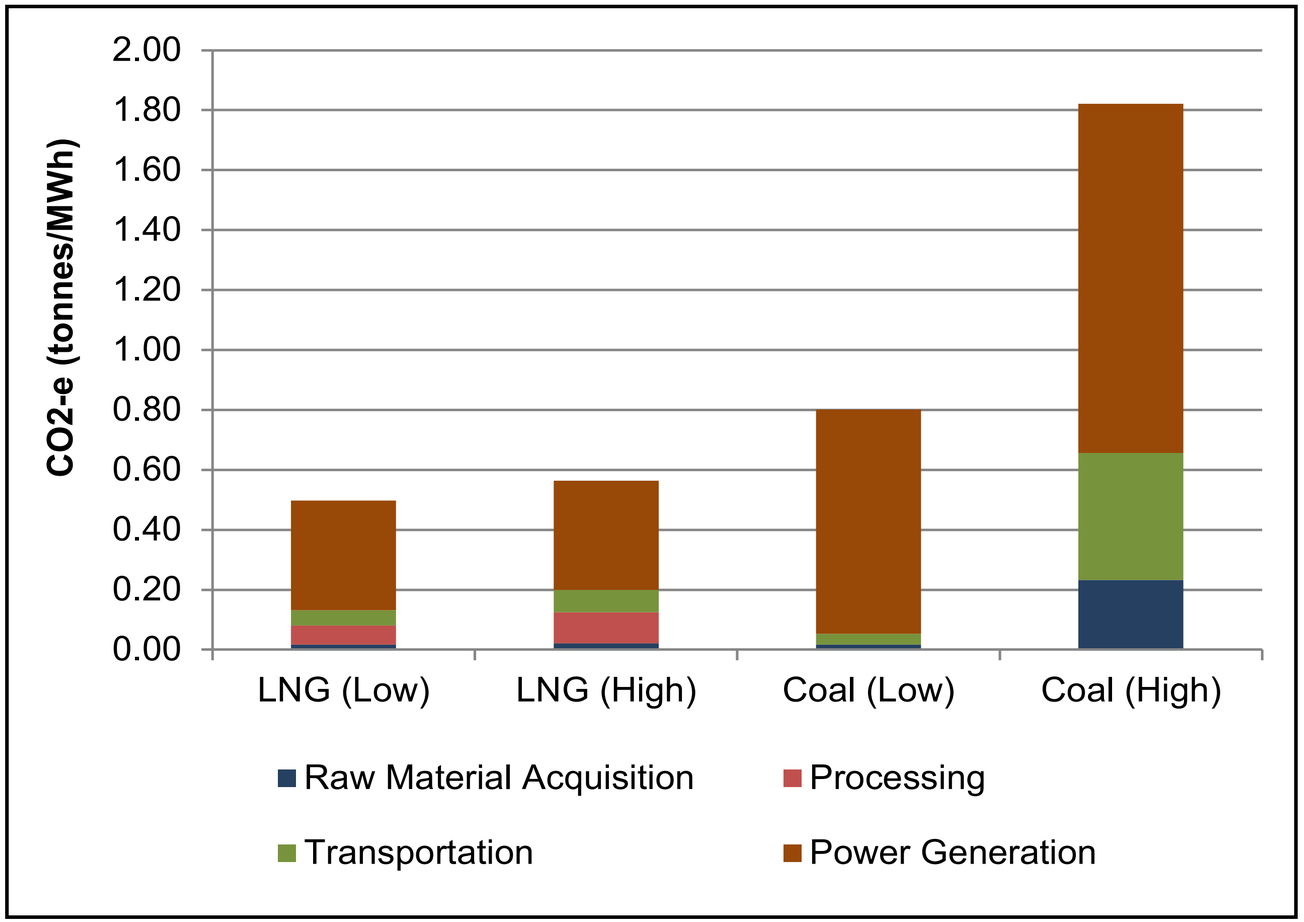


Two thirds of global oil and gas imports flow to Asia by 2040

IEA New Policies Scenario

Power generation from LNG

emits less carbon than power generation from coal

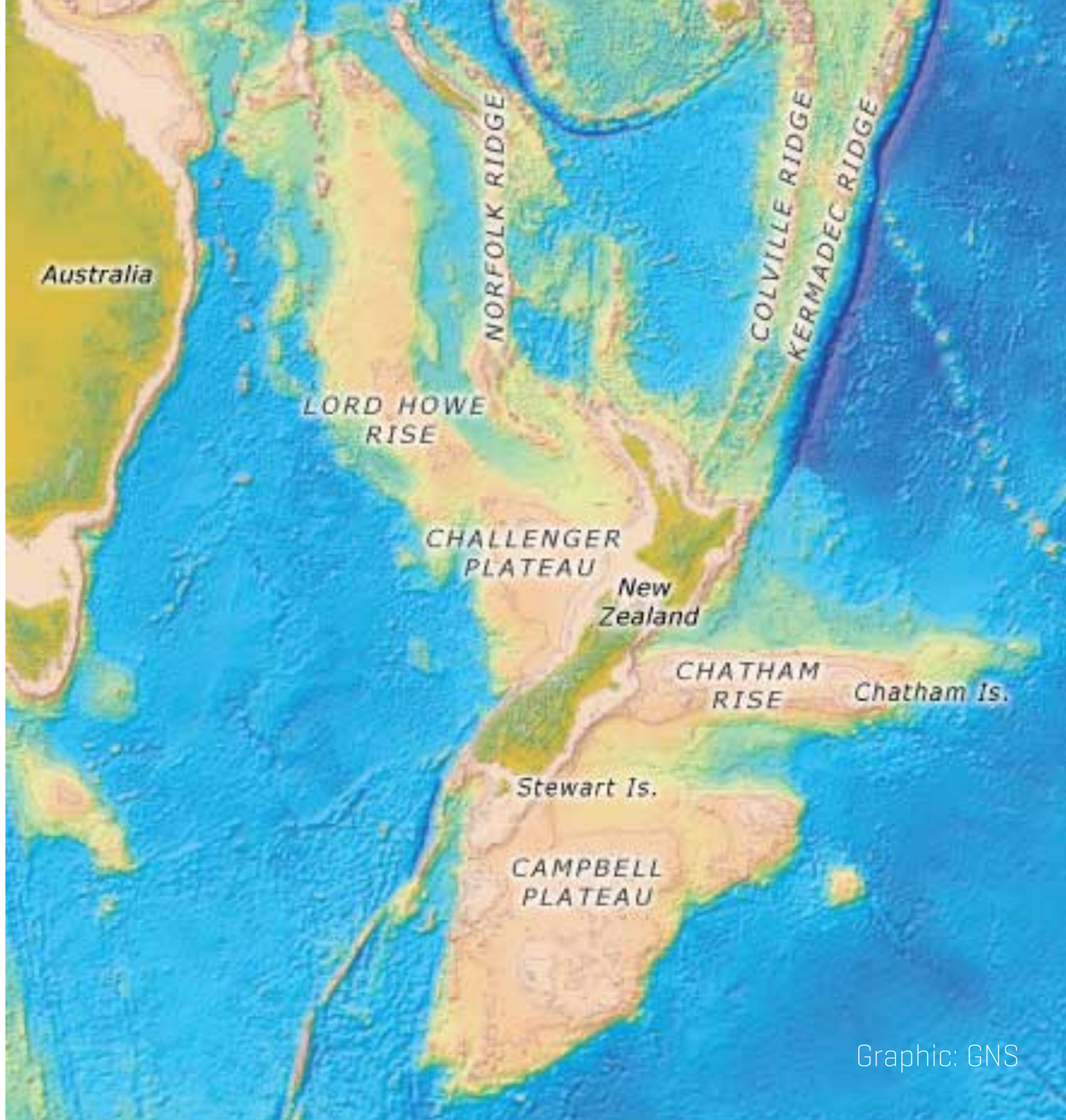


Life Cycle Assessment of LNG, International Gas Union, available at http://www.igu.org/sites/default/files/node-page-field_file/LNGLifeCycleAssessment.pdf

Open cast tar sands mine in the Boreal forest
North of Fort McMurray, northern Alberta, Canada.

Oil and light oil production
offshore and onshore New Zealand

New Zealand's enormous continental shelf



Graphic: GNS