



# Is the Gas Industry Facing Its Volkswagen Moment?

## *Gas Is More Emissions Intensive Than the Gas Industry's Marketing Arm Suggests*

### Executive Summary

Similar to Volkswagen Group's emissions cheating, the Australian and global gas industry is also misleading and deceiving both its customers, investors and governments over the full effects of its products.

IEEFA notes:

- Conventional or 'natural' gas is a fossil fuel.
- Conventional or 'natural' gas is predominantly methane, and methane is released through gas leakages all along the supply chain, and during production and via transport to your home or business.
- Gas leakages are much worse in the production of liquefied natural gas (LNG) for export.
- Methane emissions from conventional or 'natural' gas have been seriously underestimated by between 25 - 40%, with some studies claiming emissions have been underestimated by as much as 60%.
- Methane poses the greatest threat to the warming climate. If you leak more than 2% or 3% of methane, it is worse for the climate than coal. Methane survives in the atmosphere for a shorter period than coal's carbon dioxide, but over 20 years has 86 times the planet-warming potential. Electricity produced from LNG is arguably even worse over a 20-year time frame.

### Volkswagen's 'Dieselgate' Emissions Cheating

After years of promoting 'clean diesel' as an alternative to electric or hybrid cars, Volkswagen shares lost up to 37% of their value in the days after authorities exposed illegal levels of pollution emitted from its diesel cars in 2015.<sup>i</sup>

The German car manufacturer had faked emissions levels in vehicles sold between 2006 and 2015 using special software designed to pass regulatory tests. When discovered, it was found that the emissions produced were several times the permissible limits.

Volkswagen Group was condemned for being dishonest, and today, continues to suffer enormous fines from regulators, and class actions from customers and investors, as a result of its emissions cheating.

The total costs to Volkswagen are expected to reach about 1 billion euros globally in 2020.<sup>ii</sup> Settlement for those affected in Australia was reached in December 2019, with the penalty amount of \$125 million being the highest ever ordered by the court for contraventions of Australian Consumer Law.<sup>iii</sup>

<sup>i</sup> Reuters. [VW investors sue for billions of dollars over diesel scandal](#). 10 September 2018.

<sup>ii</sup> Reuters, [Diesel scandal cleanup to cost more than \\$2 billion in 2019](#). 23 December 2018.

<sup>iii</sup> Reuters, [Australia fines Volkswagen record \\$86 million for emissions breach: regulator](#). 20 December 2019.

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- Global emissions of methane are increasing rapidly as the gas industry continues to expand globally.
  - The gas industry has generally ignored methane leakage to date, and claims conventional or 'natural' gas has 50% fewer greenhouse emissions than coal. This is misleading and deceptive, and only covers the domestic industry.
  - Australia is the world's second largest exporter of LNG, with approximately three quarters of Australia's gas chilled to  $-161^{\circ}\text{C}$  so that it becomes a liquid (LNG) for export. Producing LNG is an extremely energy intensive process, with around 17% of the gas produced lost in liquefaction and shipping.
  - Because most of the gas Australia produces is exported, it is misleading of the gas industry to claim that gas emits 50% less greenhouse gas than coal. The 50% figure covers only domestic consumption. Once the effects of liquefaction, shipping, regasification and distribution are considered, LNG may well be a more damaging way of producing power than even thermal coal.
  - Since the 1990s, the gas industry has led the rhetoric that conventional or 'natural' gas is the transition fuel away from coal. In doing this, the gas industry has been steadily replacing coal and cementing its place as the energy fuel of the future, and not just a transition fuel. This is despite renewable energy technology being low cost and deflationary, with near-zero emissions and barely any use of scarce water supplies.
  - The Australian government's Prime Minister recently promoted conventional or 'natural' gas as the 'transition' fuel for Australia as the country moves away from coal.
  - However, the Australian domestic market thinks differently.
    - Conventional or 'natural' gas use in Australia's National Electricity Market (NEM) has fallen some 59% in the last five years due to massive overpricing and supply concerns, while renewable energy has grown strongly.
    - There is currently no committed investment into gas-powered generation in Australia.
    - The Australian Energy Market Operator (AEMO) – which manages the country's electricity markets - sees a smaller role for gas in the future in a renewables rich grid.

Technology and science are catching up to the global gas industry.

The industry's carefully crafted narrative of conventional gas being a "clean" and "natural" product is being proven as almost entirely false. Similar to coal, conventional or 'natural' gas is another dangerously high emitting fossil fuel that must be urgently phased out if we are to transition to a net zero emissions world and keep global temperatures well below 2 degrees Celsius.

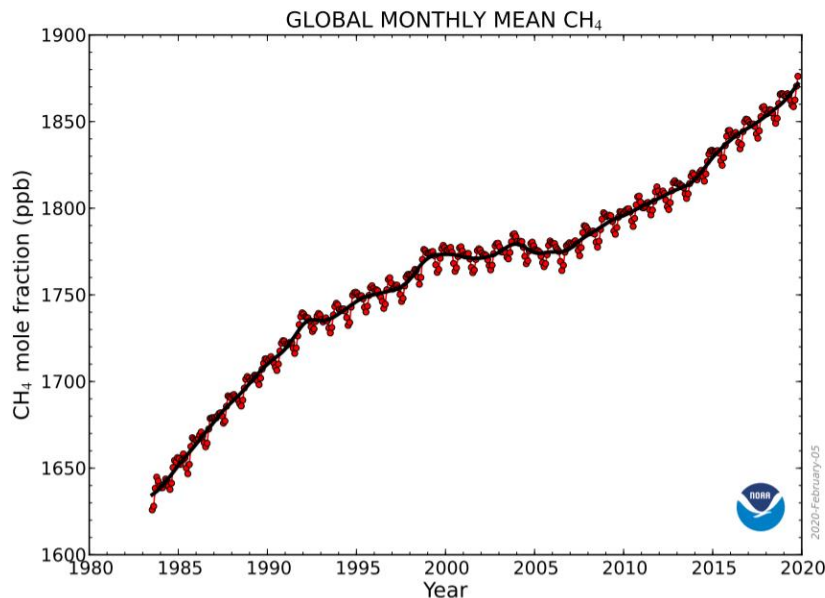
The gas industry is misleading the public, and is likely to be held accountable.

### *The Problem With Methane*

Conventional or ‘natural’ gas is made up predominantly of methane, which is a potent greenhouse gas contributing significantly to global warming.

Around 25% of the man-made global warming is caused by methane emissions that have been growing strongly since 1985, according to [data](#) from the National Oceanic and Atmospheric Administration (NOAA).<sup>1</sup> In fact methane emissions have grown by [over 150% since pre-industrial times](#). (See Figure 1)

**Figure 1: Global Methane Emissions Are Rising Strongly**



Source: [Earth System Research Laboratory](#).

Methane is exceptionally good at absorbing heat. On a 20 year timeframe, a tonne of Methane is 86 times<sup>2</sup> more effective at trapping heat in the atmosphere than a tonne of carbon dioxide, the greenhouse gas that wields the most control over Earth’s future warming in the long-term.<sup>3</sup>

Industry “convention” has it that we measure methane’s effect on the climate on a far less damaging 100-year timeframe. However, every state in Australia has already committed to a [net zero emissions target by 2050](#). That’s less than 30 years away.

If Australia is to reduce emissions, the country has to look to the shorter 20-year

<sup>1</sup> Ed Dlugokencky. [NOAA/ESRL](#). Chapter 4.

<sup>2</sup> IPCC. [Climate Change 2013: The Physical Science Basis](#). Intergovernmental Panel on Climate Change. 2013.

<sup>3</sup> National Geographic. [Natural gas is a much ‘dirtier’ energy source than we thought](#). 19 February 2020.

timeframe to assess the damage that methane is doing to the global climate. That means Australia has to turn its eye to gas – the biggest contributor of methane.

Conventional or ‘natural’ gas releases methane domestically through gas leakages all along the supply chain, and during production and via transport to customers and business.

Methane survives in the atmosphere for a shorter period than coal’s carbon dioxide, but over 20 years has 86 times the planet-warming potential. Electricity produced from LNG is arguably even worse over a 20-year time frame.

Methane is the greatest threat to the warming climate. If you leak more than 2% to 3% of methane, it is worse for the climate than coal.

Global emissions of methane are increasing rapidly as the gas industry continues to expand globally.

### *Claims From the Gas Industry’s PR Machine*

The oil and gas industry’s slick public relations machine has entrenched in the Australian (and global) psyche the notion of gas as a “bridge” or “transition” fuel and the perfect accompaniment to renewables to provide power ‘when the wind does not blow, and the sun does not shine’. This refrain has been enthusiastically taken up by state and federal governments.

Gas producers are particularly keen on reinforcing this, with Santos claiming in its [2019 results](#):<sup>4</sup>

*“Natural gas has a key role to play in a lower carbon future as it produces **50% less greenhouse gas emissions than coal** when used to generate electricity, can significantly improve air quality and is the perfect partner for renewable energy sources.” (our emphasis)*

Nothing could be further from the truth.

### *The Gas Industry Doesn’t View Itself as a Transition Fuel*

Conventional or ‘natural’ gas is currently characterised as a transition fuel in Australia, however the industry itself sees a much longer-term future for its product.

Although Australian states have committed to net zero emissions by 2050, the gas industry is proposing a long list of new gas projects around Australia, both onshore and offshore.

All of these new provinces, if they start, will be operating well beyond 2050, including Narrabri in New South Wales, the Galilee and North Bowen Basins in Queensland, shale fracking in the Northern Territory’s Beetaloo, major onshore and offshore projects in north-west of Western Australia, new provinces in the south of

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<sup>4</sup> Santos [Annual Results Presentation 2019](#). Page 8.

South Australia, and lobbying to open up onshore gas in Victoria.

The gas industry is using the transition narrative to embed itself into the energy future of Australia in the long term, and crowd out other sources of power.

### *The Gas Supply Chain*

The gas industry's claims that conventional or 'natural' gas has 50% fewer greenhouse gas emissions than coal, echoed by governments, is based on a half-truth.

To generate electricity, gas can be burned in combined cycle gas turbines (CCGT), commonly referred to as gas baseload plants, or in open cycle gas turbines (OCGT) which are also known as gas peaking plants.

According to the gas industry-funded arm of CSIRO known as GISERA<sup>5</sup>, gas consumed domestically produces:

- 50% fewer emissions than coal when burned in the more efficient combined cycle gas turbine (CCGT), or
- 31% fewer emissions than coal when burned in an open cycle gas turbine (OCGT), known as gas peakers.

In Australia, CCGT are not a large part of the national electricity system for one very simple reason – they are very expensive to run. Gas prices in Australia are simply too high and it is not economic to run the plants when there are cheaper sources of power. In the U.S. there are a large fleet of CCGT gas power stations as gas prices are at a decade low.

While we continue to build a renewables rich grid, CCGT continues to be problematic because the turbines are far less flexible than gas peakers (OCGT). Similar to thermal coal-fired power plants, CCGT are not as flexible as OCGT, and so cannot fill the gap when cleaner renewable energy is lower.

As Australia transitions away from coal and into renewables, but while still using gas, CCGT would need to be retired and more of the emissions-intensive gas peakers (OCGT) will be needed. Gas peakers are less efficient but far more flexible because they can be rapidly started and shut down to fill in the gaps when renewable power is deficient.

While gas peaking plants are needed for a renewables rich grid, not as much gas would be needed to run them. They have high capacity but low capacity *utilisation* – they are simply not turned on very often and are operated for relatively short periods. They are also very expensive to run.

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<sup>5</sup> GISERA. [Whole of Life Greenhouse Gas Emissions Assessment of a Coal Seam Gas to Liquefied Natural Gas Project in the Surat Basin, Queensland, Australia](#). Final Report for GISERA Project G2. Page viii.

As CCGT is barely used in Australia and is likely to be retired into the near future even with gas being used as a transition fuel, IEEFA notes that GISERA's claim of 50% less emissions from gas is at best dishonest and designed to mislead and deceive the public, investors and gas consumers.

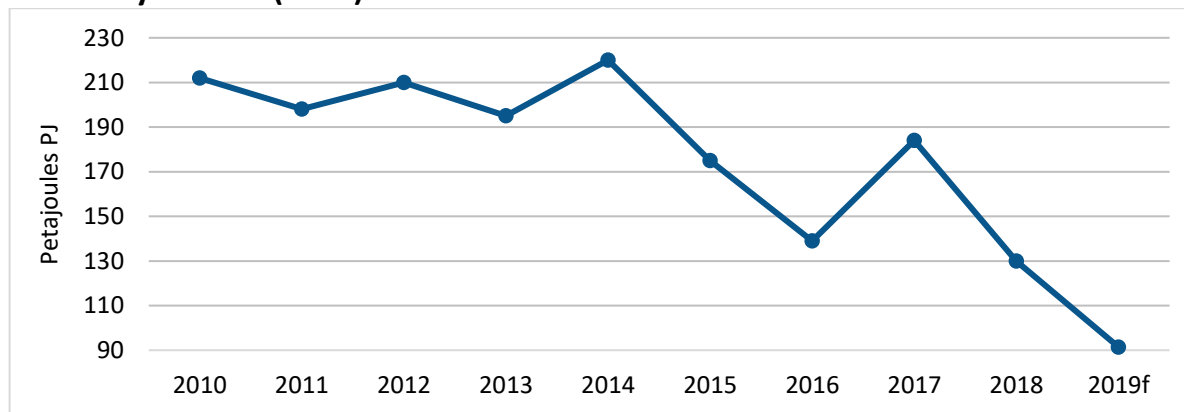
### *To Date, Gas Has Not Been a "Transition" Fuel*

Renewable energy has been growing strongly as a source of generation in the national electricity network (NEM) and now accounts for over 23%.<sup>6</sup> Gas accounts for just 8.8% of generation.

OCGT or gas peakers hardly figure in national electricity generation at just 1.8% despite accounting for 12.6% of generating capacity in the national electricity market (as outlined in Figure 3).

Far from expanding usage as renewables grow, the use of gas in electricity generation in the NEM fell by 59% between 2014-2019.<sup>7</sup> Gas is so expensive<sup>8</sup> in Australia that it has simply not been able to compete against cheaper, renewable sources of generation.

**Figure 2: Gas Usage by Gas Powered Generation in the National Electricity Market (NEM) 2010-2019**



Source: AEMO.

### *There Are No Committed Plans to Build Gas Generation in Australia*

Renewables are the only form of generation in the NEM where there are committed projects and, renewables have the lion's share of proposed projects.<sup>9</sup>

Gas has a small number of proposed projects that would need government subsidies

<sup>6</sup> [www.opennem.org.au/energy/nem](http://www.opennem.org.au/energy/nem)

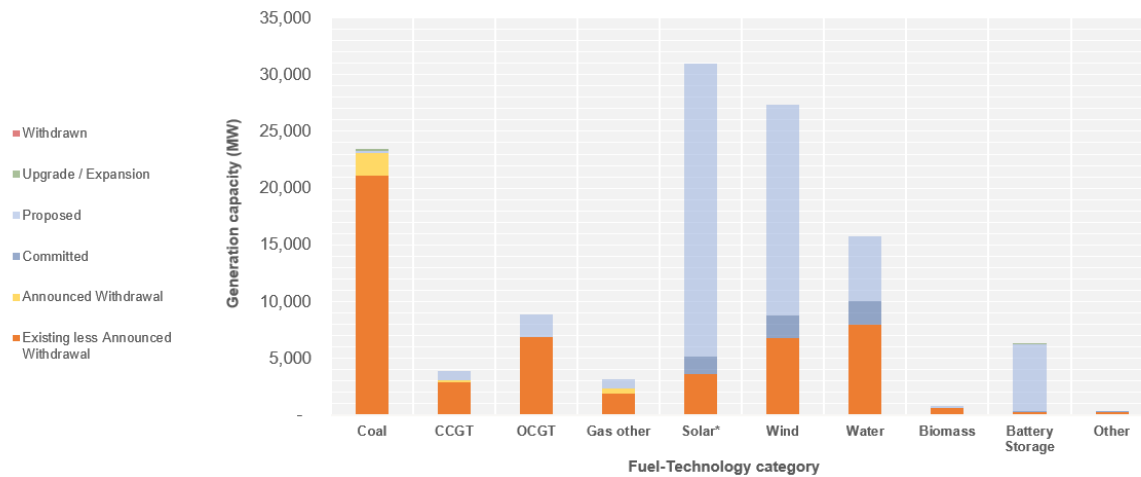
<sup>7</sup> AEMO. Gas Statement of Opportunities 2019.

<sup>8</sup> IEEFA. [Towards a Domestic Gas Reserve](#). 9 July 2019.

<sup>9</sup> Renewables Now, [Australia adds 6.3 GW renewables in 2019, similar growth expected this year](#), 27 February 2020.

to make them economic. There is one small coal-fired augmentation project that is heavily government subsidised.

**Figure 3: Generation Capacity in the NEM, Committed and Proposed Projects January 2020**



Source: AEMO.

### *The Australian Energy Market Operator (AEMO) Does Not See a Need for More Gas in a Transformed Energy System*

The AEMO has published its integrated systems plan<sup>10</sup> illustrating the “least cost” reliable future energy system under current policy settings. According to this plan the grid will be 76% renewables by 2042. This renewables rich grid will have less gas fired power generation than we have today according to the AEMO.<sup>11</sup>

<sup>10</sup> AEMO. [Draft integrated Systems Plan](#). February 2020.

<sup>11</sup> Simon Holmes a Court. [The Guardian](#). [Scott Morrison is stuck in a time warp more gas is not the answer](#). 2 February 2020.

## Figure 4: The AEMO Is Planning for Less Gas in a Renewables Rich National Electricity Market

The market operator's latest system modelling ("Central" scenario) describes a future where gas is only a bit player in balancing customer demand with wind and solar generation. (Units: TWh)

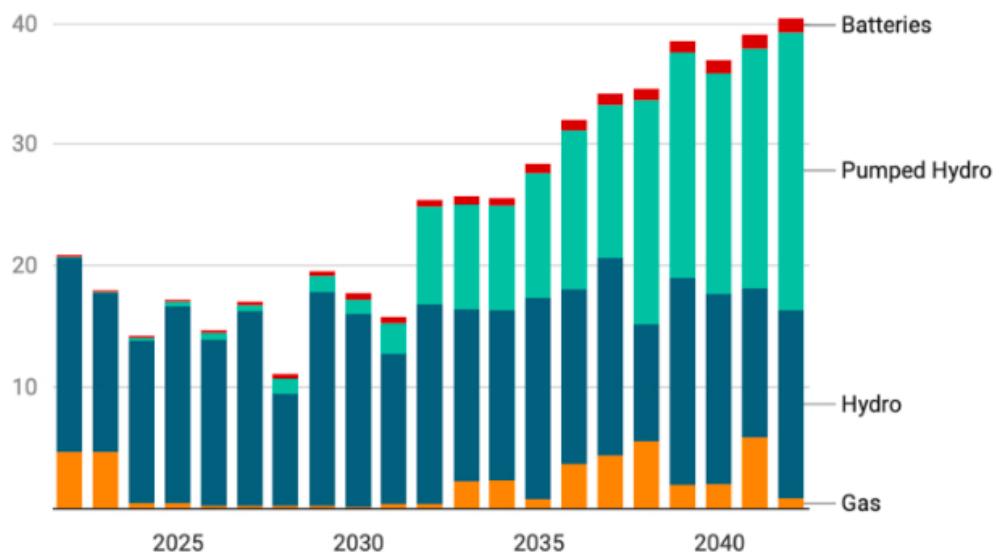


Chart: Simon Holmes à Court • Source: AEMO • Get the data • Created with Datawrapper

## Have Emissions From Gas Been Underestimated?

*Nature*, the eminent scientific journal, published a major new study in February 2020 showing that potent methane emissions from fossil fuel production are 25% to 40% higher than previously understood.<sup>12</sup>

The research measured methane levels in ice cores. The methane produced by fossil fuel extraction has a signature that can be identified. By measuring methane radiocarbon from more than 200 years ago, when there were no industrial sources, the researchers knew that all fossil methane from that era had to be emitted naturally. They found that almost all the methane emitted to the atmosphere was biological until about 1870. That is when the fossil component began to rise rapidly. The timing coincides with a sharp increase in the use of fossil fuels.

Significantly, researchers also discovered the levels of naturally released fossil methane are about 10 times lower than previous research reported. IEEFA notes gas producers can no longer blame flatulent cattle for the emissions their industry produces.

***“We’ve identified a gigantic discrepancy that shows the industry needs to, at the very least, improve their monitoring,”*** said Benjamin Hmiel, a researcher at the University of Rochester and the study’s lead author. *“If*

<sup>12</sup> *Nature*. Preindustrial 14CH<sub>4</sub> indicates greater anthropogenic fossil CH<sub>4</sub> emissions. 19 February 2020.



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*these emissions are truly coming from oil, gas extraction, production use, the industry isn't even reporting or seeing that right now."* (our emphasis)

### ***A Full Life Cycle Analysis Gives a Totally Different Picture***

The industry's claims of gas producing 50% less greenhouse pollution than coal also fails to consider a full life cycle analysis of the product.

Australia is the world's second-largest exporter of gas,<sup>13</sup> with the gas industry exporting about three quarters of the gas it produces. Gas must be liquefied for export in an extremely energy intensive process that super cools the gas to minus 160°C.

Robert Howarth, a leading Cornell University gas emissions expert, said in a submission to the Irish parliament that: "To liquefy and transport the gas requires a substantial amount of energy: to import one cubic meter of gas as LNG would require 1.2 cubic meters of gas to be produced, with 0.2 cubic meters consumed to produce and transport the LNG (Hardisty et al, 2012, *Energies*, 5: 872-897)."<sup>14</sup>

The energy intensity of the LNG process is best illustrated by the fact that 17% of the methane produced is used just to produce and transport the LNG. The direct emissions of methane in the shipping process are unknown.

"LNG is kept in liquid form by allowing some methane to "boil off," resulting in evaporative cooling. In a typical voyage, 2 to 6% of the LNG is lost as gaseous methane due to this boil off. Usually, the methane is used as fuel to help power the ship, but it seems highly likely that some is emitted to the atmosphere, although I am aware of no data on this emission," Howarth said.

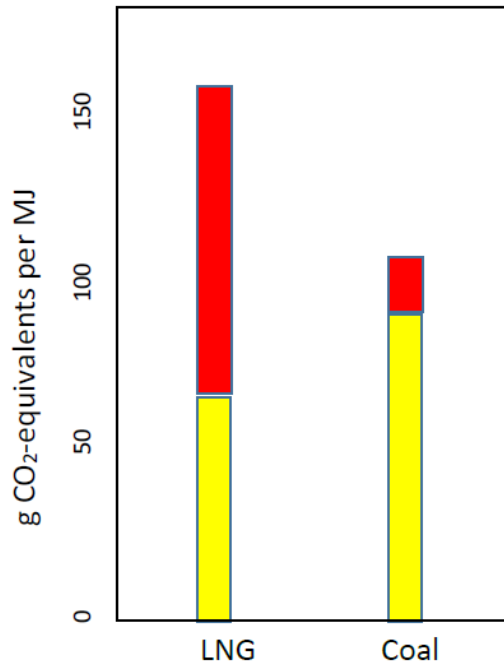
He concludes that, taking in all the emissions and burning as fuel, LNG produces more greenhouse gases than coal. (See Figure 5)

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<sup>13</sup> Department of Industry. [Resources and Energy quarterly December 2019](#).

<sup>14</sup> Testimony of Robert W. Howarth, Ph.D. Cornell University, Ithaca, NY 14853 USA before the Joint Committee on Climate Action House of Oireachtas, Ireland. 9 October 2019. Page 2.

**Figure 5: Electricity Produced With LNG Emits More Greenhouse Gases Than Coal-fired Electricity**



Source: Robert W. Howarth.

This graph shows the greenhouse gas footprint of LNG imported to Ireland from the United States compared to coal. Emissions of carbon dioxide are shown in yellow. The red bars indicate methane emissions in units of carbon dioxide equivalents.<sup>15</sup>

Because most of the gas Australia produces is exported, it is misleading of the gas industry to claim that gas emits 50% less greenhouse gas than coal. The 50% figure covers only domestic consumption. Once the effects of liquefaction, shipping, regasification and distribution are considered, LNG may well be a more damaging way of producing power than even thermal coal.

## Conclusion

Conventional or 'natural' gas is an important short-term fuel in the mix for a renewables-powered grid.

<sup>15</sup> Estimation of greenhouse gas emissions: Emissions of carbon dioxide are as reported in my 2011 paper and are based on data from the US Department of Energy. Emissions of methane from coal are as reported in 1996 by the Intergovernmental Panel on Climate Change. Methane emissions for LNG are based on a 3.5% emission rate for shale gas in the United States, as determined in my 2019 Biogeosciences paper, and the estimate of Hardisty et al. (2012) on the amount of natural gas consumed in the process of producing and transporting LNG. Methane emissions are converted to carbon dioxide equivalents using the 20-year global warming potential of 86 reported by the Intergovernmental Panel on Climate Change in their 2013 synthesis report.

However, the amount of gas needed to achieve this has been grossly exaggerated because combined cycle gas turbines (CCGT) need to close to make way for gas peaking plants (OCGT). OCGT do not use much gas as they are only operated for short periods of time.

The industry's claims that exported gas (LNG) is good for the environment will come under increasing scrutiny in the near term. Investors, regulators and consumers of gas need to be aware that they, in IEEFA's opinion, have been misled and deceived over this fossil fuel's greenhouse emissions.

Gas is neither clean nor natural, and 2020 will see the industry face its Volkswagen moment.

## About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. [www.ieefa.org](http://www.ieefa.org)

## About the Author

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Bruce Robertson has been a fund manager and professional investor for over 32 years. He has worked with Perpetual Trustees, UBS, Nippon Life Insurance and BT and is an active participant in the national debate on energy issues in Australia

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