Key "Take Home" Message

Ice core data reveal that today's atmospheric CO_2 levels far exceed any present on Earth for more than the last 800,000 years.

The last time planet Earth's atmosphere was so rich in CO_2 was millions of years ago, back before early predecessors to humans were likely wielding stone tools; the world was a few degrees hotter, and sea levels were tens of metres higher.

A 1°C global mean temperature rise (above pre-industrial age) means the emergence of dangerous climatic conditions; 2°C means the onset of "*extremely dangerous*" climatic conditions; 3°C means "*outright chaos*"; and 4°C means "*incompatible with organised global community*".

1.5°C is dangerous, close at hand, possibly as soon as 2030, and now practically impossible to avoid, as there is no carbon budget remaining for 1.5°C.

To stay below 2°C, itself far from safe, requires global emissions to be more than cut in half in the next ten years, and much more in the high-emitting rich nations like Australia. This means the proposed VMEP must not proceed.

The proposed SSD-7480 VMEP facilitates ongoing greenhouse gas (GHG) emissions, that contributes to escalating the risk of civilisation collapse within this century.

Renewables are already cheaper than new coal-fired power stations in all major markets, exposing almost a trillion dollars of new investments and depressing Australia's coal exports, and that by 2030 at the latest, new wind and solar farms will be cheaper to build and operate than existing coal plants.

It makes undeniable economic sense for governments to cancel all new coal-related projects immediately and rapidly phase out existing thermal coal mines and coal-fired power plants.

CCS fails technologically, economically and for pollution reduction.

Given the overwhelming scientific evidence, why are governments delaying what must be done to mitigate the escalating existential risks of dangerous climate change, that if we fail to act urgently and effectively, would likely extinguish billions of people's lives in the coming decades; yet are willing to accept and promptly act on scientific advice, whatever the cost to economies and disruptions to people's lives, to mitigate non-existential risks to most of humanity from COVID-19?

Will an oil and gas glut now, that is supressing new resource exploration and developments, quickly flip to global shortages when the COVID-19 crisis ends?

The US oil & gas rig count, an early indicator of future output, fell by two to an all-time low of 265 in the week to 2 July 2020. That's 700 rigs (or 72.5%) below this time last year. Global oil and gas production may have already peaked.

Biofuels are unlikely to become a widespread, affordable replacement for petroleum fuels because of their poor EROI and fossil fuel dependency.

How viable is the proposed VMEP in a likely post- 'peak oil and gas' supply world? Coal transport by fossil-fuelled trucks, rail locomotives and ships would become significantly more difficult and expensive within this decade and beyond. Personnel may find travel to/from work more difficult.

Reject the proposed Vickery Mine Extension Project

Today's CO_2 levels far exceed any present on Earth for >800k years

In 1958, Charles David Keeling of Scripps Institution of Oceanography began measuring atmospheric CO_2 concentrations at Hawaii's Mauna Loa Observatory.

Keeling discovered a seasonal cycle of minimum and maximum concentrations as plants grew in spring and died back in autumn. He also detected a steady increase that he attributed to the use of fossil fuels. The chart depicting that rise is known as the Keeling Curve.

Ice core data reveal that today's atmospheric CO_2 levels far exceed any present on Earth for more than the last 800,000 years (see Figure 1 below).

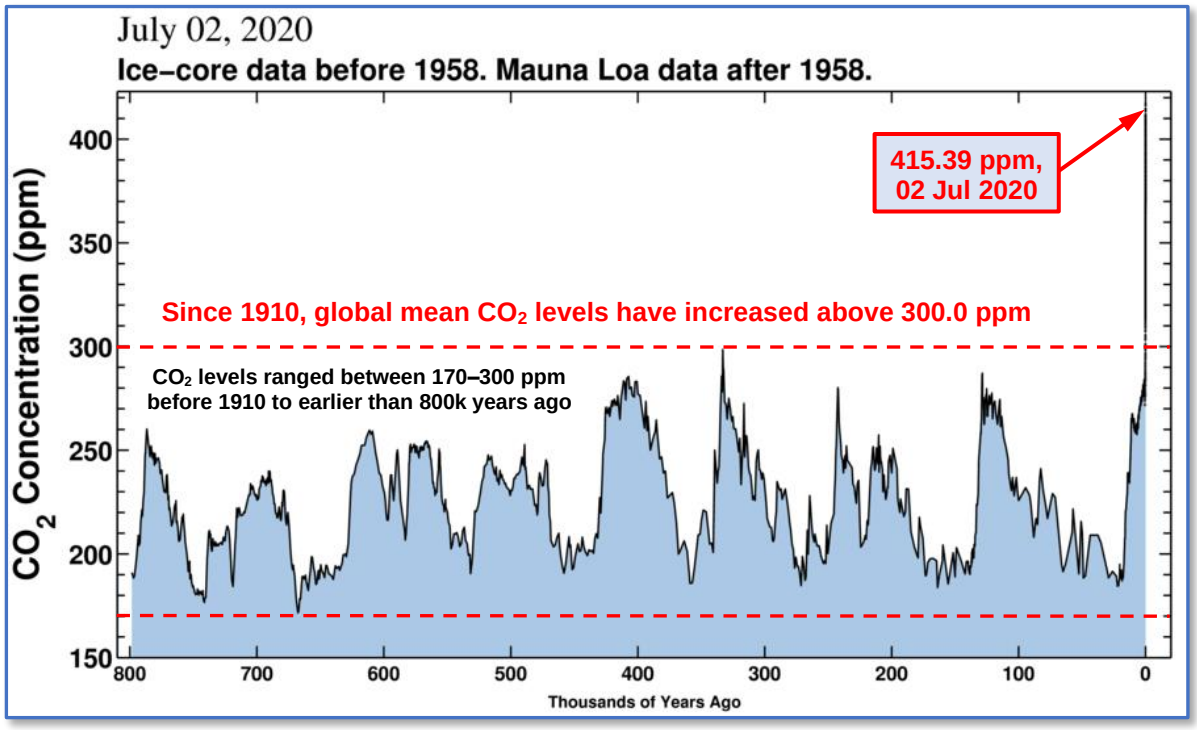

Figure 1: Atmospheric CO_2 Concentrations – 800,000 years ago to 02 Jul 2020[1]

The last time planet Earth's atmosphere was so rich in CO_2 was millions of years ago, back before early predecessors to humans were likely wielding stone tools; the world was a few degrees hotter, and sea levels were tens of metres higher.

While Mauna Loa has become the global standard for CO_2 levels, measurements taken in other places have confirmed the Mauna Loa results. NOAA's network of marine surface stations, and even a monitoring station in remote, pristine Antarctica, **all passed the 400 parts per million (ppm) threshold in 2016.**[2] NASA's Orbiting Carbon Observatory-2 satellite shows the planet's CO_2 levels now above 400 ppm, with variations from one place to another, thanks to atmospheric circulation patterns.

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[1] Accessed 05 Jul 2020, https://scripps.ucsd.edu/programs/keelingcurve/pdf-downloads/; **Global Mean CO2 Mixing Ratios (ppm): Observations**, https://data.giss.nasa.gov/modelforce/ghgases/Fig1A.ext.txt

[2] **How the World Passed a Carbon Threshold and Why It Matters**, by Nicola Jones, *YaleEnvironment360*, 26 Jan 2017, https://e360.yale.edu/features/how-the-world-passed-a-carbon-threshold-400ppm-and-why-it-matters

Where on Earth is humanity heading: Pliocene or Miocene climate?

On 17 November 2018, Professor H. J. Schellnhuber CBE, then Director Emeritus of the Potsdam Institute for Climate Impact Research, Member of the Pontifical Academy of Sciences, and Member of the German Advisory Council on Global Change, presented his Aurelio Peccei Lecture in Rome, Italy, titled "Climate, Complexity, Conversion".[3] At the beginning of his lecture, Professor Schellnhuber refers to a co-authored scientific paper titled *Trajectories of the Earth System in the Anthropocene*[4] that he described as a **"*landmark paper*"** and a **"*game-changer*"**. From about time interval **0:23:23 through to 0:26:45**, Professor Schellnhuber outlines two (2) Earth climate state possibilities that **humanity could experience within this century**, dependent upon the global human-induced greenhouse gas (GHG) emission trajectory path that ensues within this decade (i.e. the 2020s), namely Options:

A. A harsher climate state paradigm may be like in the **Mid-Pliocene age**, that occurred **3–4 million years ago**, where atmospheric CO_2 levels were in the range of **400–450 ppm**, mean global temperatures were **+2.0–3.0°C** (above pre-industrial age), and sea levels were **+10–22m higher than today** (stabilised over centuries), but requires humanity to rapidly reduce human-induced global GHG emissions now (i.e. >50% reduction by 2030, and to zero by 2050).[5]

B. The alternative highly undesirable climate state may be like in the **Mid-Miocene age**, that occurred **15–17 million years ago**, atmospheric CO_2 levels were in the range of **300–500 ppm**, mean global temperatures were **+4.0–5.0°C**, and sea levels were **+10–60m higher** (stabilised over centuries), **which is likely with our current global GHG emissions trajectory.**

Humanity and human civilisation might adapt to Option A – Mid-Pliocene climate like conditions, but human civilisation (as we know it) is highly likely to collapse in Option B – Mid-Miocene climate like conditions, with a global population likely declining below one billion people before 2100.[6]

A 1°C global mean temperature rise (above pre-industrial age) means the emergence of dangerous climatic conditions; 2°C means the onset of "*extremely dangerous*" climatic conditions; 3°C means "*outright chaos*"; and 4°C means "*incompatible with organised global community*".[7]

Humanity must stop emitting GHGs: >50% reduction by 2030; zero before 2050.

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[3] ***Keynote Debate Can the Climate Emergency Action Plan lead to Collective Action_ (50 Years CoR)***, from time interval **0:05:31 to 0:40:20**, Club of Rome, https://www.youtube.com/watch?v=QK2XLeGmHtE

[4] **Trajectories of the Earth System in the Anthropocene**, by Will Steffen, Johan Rockström, Katherine Richardson, Timothy M. Lenton, Carl Folke, Diana Liverman, Colin P. Summerhayes, Anthony D. Barnosky, Sarah E. Cornell, Michel Crucifix, Jonathan F. Donges, Ingo Fetzer, Steven J. Lade, Marten Scheffer, Richarda Winkelmann, and Hans Joachim Schellnhuber, published in the *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), vol. 115, no. 33, pp8252-8259, online on 6 Aug 2018, http://www.pnas.org/cgi/doi/10.1073/pnas.1810141115

[5] ***Existential climate-related security risk: A scenario approach***, by David Spratt and Ian Dunlop, published by Breakthrough – National Centre for Climate Restoration, May 2019 (updated 11 June 2019), https://www.breakthroughonline.org.au/papers

[6] http://www.climatecodered.org/2019/08/at-4c-of-warming-would-billion-people.html

[7] *Ibid*. 3, presentation by Ian T. Dunlop from about time interval **1:32:55 through to 1:42:20**

1.5°C temperature rise likely to be reached around 2030

On 14 February 2020, David Spratt, Research Director at Breakthrough – National Centre for Climate Restoration, made a presentation to the opening plenary, "The New Climate Reality Check", at the National Climate Emergency Summit 2020 at the Melbourne Town Hall.[8] Spratt highlighted that the world has a short-run problem, where a 1.5°C temperature rise above pre-industrial age is likely to be just a decade away, as a consequence of past GHG emissions already in the atmosphere.

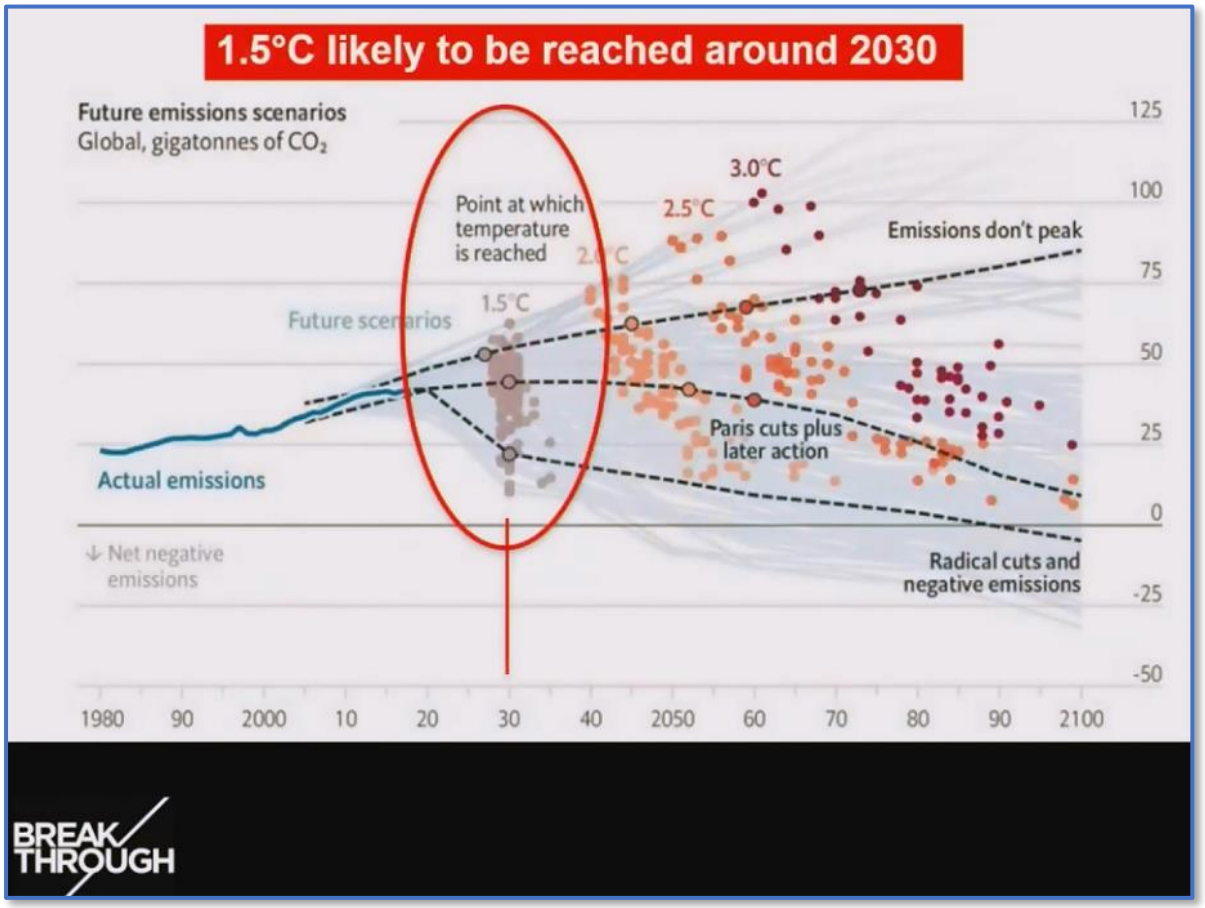

Figure 2: Future emissions scenarios, temperature rise and timings up to 2100[9]

1.5°C is dangerous, close at hand (see Figure 2 above), and now practically impossible to avoid, as there is no carbon budget remaining for 1.5°C.

To stay below 2°C, itself far from safe, requires global emissions to be more than cut in half in the next ten years, and much more in the high-emitting rich nations like Australia. **This means the proposed VMEP must not proceed.**

Climate disruption is now an existential threat to our civilisation as we know it today. This is an emergency requiring everyone making climate the primary priority of economics and politics, because slow, incremental change now means we are losing.

Australia must prepare for the consequences of an inevitable 1.5°C rise by 2030.

[8] https://www.climateemergencysummit.org/full-program/
[9] http://www.climatecodered.org/2020/02/a-climate-reality-update-at-2020.html

All coal capacity will be uncompetitive with renewables by 2030

Analysis recently published by Carbon Tracker indicates **renewables are already cheaper than new coal-fired power stations in all major markets, exposing almost a trillion dollars of new investments and depressing Australia's coal exports, and that by 2030 at the latest, new wind and solar farms will be cheaper to build and operate than existing coal plants.**[10]

It makes undeniable economic sense for governments to **cancel all** new coal-related projects immediately and rapidly phase out existing thermal coal mines and coal-fired power plants while encouraging rapid and effective deployment of renewable generation and energy storage solutions together with transmission upgrades.

CCS fails technologically, economically and for pollution reduction

There are 3 reasons why Carbon Capture and Storage (CCS) is not a viable option:

1. **It doesn't work.** Some examples that have tried and failed include:
    a. Southern Company's Kemper "clean coal" plant in Mississippi, USA – US$7.5 billion;[11]
    b. SaskPower's Boundary Dam 110 MW unit CCS plant in Saskatchewan, Canada – C$1.4 billion;[12]
    c. Queensland government's Stanwell ZeroGen CCS retrofit project abandoned – AU$96.3 million.[13]
2. **It's more expensive to produce energy with CCS than without.** Significantly more fuel is consumed, and a substantial quantity of energy diverted to operate the associated CCS equipment for a given net output, compared with a generator unit without CCS.[14] New renewables with 'firming' are now cheaper than new gas and coal electricity generator technologies without CCS, and cheaper than existing gas and coal plants with retro-fitted CCS. There's simply no economic benefit for coal- and/or gas-fired generators to utilise CCS.
3. **CCS will not stop all CO_2 emissions entering the environment.** CCS doesn't capture 100 per cent of a plant's emissions. Any emissions that are captured need to be captured forever. Any storage site will inevitably leak (whether that's in a few years' time, decades, centuries, millennia, or more) posing ongoing toxic air pollution risks to people and the environment nearby. CCS does nothing to reduce methane and dust emissions during extraction and transportation of coal and nothing to reduce dust from the disposal of fly ash.

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[10] https://carbontracker.org/reports/how-to-waste-over-half-a-trillion-dollars/

[11] **How America's clean coal dream unravelled**, by Sharon Kelly, *The Guardian*, 2 Mar 2018, https://www.theguardian.com/environment/2018/mar/02/clean-coal-america-kemper-power-plant

[12] **The fallout from SaskPower's Boundary Dam CCS debacle**, by Bob Burton, *RenewEconomy*, 12 Nov 2015, https://reneweconomy.com.au/the-fallout-from-saskpowers-boundary-dam-ccs-debacle-54803/

[13] **Coal industry's carbon capture dream is a dangerous fantasy**, by Bronya Lipski, *RenewEconomy*, 23 Mar 2018, https://reneweconomy.com.au/coal-industrys-carbon-capture-dream-dangerous-fantasy-41399/

[14] ***Carbon Capture and Storage Is About Reputation, Not Economics***, by Clark Butler, IEEFA, Jul 2020, https://ieefa.org/wp-content/uploads/2020/07/CCS-Is-About-Reputation-Not-Economics_July-2020.pdf

Climate change mitigation responses

Professor Andrew Blakers indicated at a recent 100% renewable energy workshop at ANU[15] that an effective climate change mitigation response requires:

- Renewable electrification of nearly everything – electricity generation, land transport, heating/cooling, and heavy industry;
- Zero oil, gas, and coal – this means 85% GHG emissions reduction;
- Meeting targets building new solar and wind generation at a build rate of:
  - **2.5 GW/year** (Government projections) means completion by about **2200**;
  - **6 GW/year** (current rate) means completion by about **2100**;
  - **15 GW/year** means completion by about **2050 – Not Fast Enough**;
  - **21 GW/year** means completion by about **2040 – Barely Adequate**.

Professor Blakers says there are two federal electorates in NSW which would be ideal locations for renewable energy zones:

- **Calare** – currently held by Andrew Gee MP, National Party; and
- **Hume** – currently held by Angus Taylor MP, Liberal Party.

Both are ideal for wind and solar generation, and pumped-hydro energy storage, and both have good transmission corridors. Blakers reportedly said:

- **"*We're talking about tens of billions that could come into these electorates.*"**
- **"*It's unbelievable that the local federal and state members aren't all over this.*"**

There's "***nothing to invent***" to switch the energy grid to 100% renewables.

Given the overwhelming scientific evidence, why are governments delaying what must be done to mitigate the escalating existential risks of dangerous climate change, that if we fail to act urgently and effectively, would likely extinguish billions of people's lives in the coming decades; yet are willing to accept and promptly act on scientific advice, whatever the cost to economies and disruptions to people's lives, to mitigate non-existential risks to most of humanity from COVID-19?

Ten reasons why renewable energy is the future for Australia

Professor Andrew Blakers offered ten reasons why renewable energy is the future:[16]

1. It can readily eliminate fossil fuels;
2. Solar is already king;
3. Solar and wind are getting cheaper;
4. Stable renewable electricity is not hard;
5. There's enough land;
6. Raw materials won't run out;
7. Nearly every country has good sun or wind;
8. We will never go to war over sunshine;

[15] https://www.solarquotes.com.au/blog/transmission-renewable-energy/

[16] **Really Australia, it's not that hard: 10 reasons why renewable energy is the future**, by Professor Andrew Blakers, published in *The Conversation*, 29 May 2020, https://theconversation.com/really-australia-its-not-that-hard-10-reasons-why-renewable-energy-is-the-future-130459

9. Solar accidents and pollution are small; and
10. Payback time is short.

Will 2018-19 be the time of global 'peak oil/gas' supply, then decline?

Conventional oil and gas discoveries have fallen to their lowest level in 70 years. Discoveries aren't even close to keeping pace with the depletion and loss of conventional resources. According to Rystad Energy, the current resource replacement ratio for conventional oil is only 16 percent – or alternatively put, **only one barrel out of every six consumed is being replaced with new resources.**[17]

Shale gas and tight oil from low permeability reservoirs have provided a resurgence for US oil and gas production. Tight oil has allowed US oil production to more than double from its 2008 lows, and shale gas has similarly enabled a major increase in US gas production. However, the nature of these reservoirs is that they decline rapidly, such that production from individual wells falls 70-90% in the first three years, and field declines without new drilling typically range 20-40% per year. **Continual investment in new drilling is therefore required to avoid steep production declines.**[18]

Saudi Arabia's (and the world's) single largest and best oil field, Ghawar, was estimated to be producing at levels generally above 5 million barrels of oil per day (Mb/d) between 1993 and 2008. After 2009, production declined below 5 Mb/d, and after 2016 fell further, below 4 Mb/d, with levels at around 3.8 Mb/d in 2018.[19] **This means Ghawar appears to have already peaked and future production is highly likely to decline further.** The remaining state-owned Saudi Aramco oil fields: Shaybah, Khurais, Safaniyah, Zuluf, and others; will need to increase production (after the COVID-19 crisis ends and oil demand likely increases) to offset Ghawar's likely continuing production decline. For perspective, per *BP Statistical Review of World Energy 2020*, **global oil production in 2019 was 95.192 Mb/d (annual average).**

Ghawar's Light Arab crude has an API of 34 with a sulphur content of 1.9-2.2% by weight (which the nearby Abqaiq refinery plant must remove). Much of US shale oil is very light and extra light (API >40). Therefore, much of US shale oil cannot replace Ghawar oil production directly. Unlike Saudi Arabia, the US is **not** a swing producer that can quickly (i.e. within 30 days) ramp up production, due to US shale oil legacy decline rates limiting any further production growth.

At some point soon, Saudi Arabian oil production will likely begin a sustained decline that will likely have global supply consequences.

US tight (shale) oil production ramped-up when oil prices were around US$100 per barrel but peaked in March 2015 and then declined as oil prices dropped to US$50 per barrel. Production began recovery in September 2016 but almost half of the production, mainly from Bakken, Eagle Ford, Niobrara and Anadarko, has already

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[17] **Rystad: Oil and gas resource replacement ratio lowest in decades**, *Oil & Gas Journal*, 9 Oct 2019, https://www.ogj.com/exploration-development/reserves/article/14068305/rystad-oil-and-gas-resource-replacement-ratio-lowest-in-decades

[18] ***Shale Reality Check: Drilling Into the U.S. Government's Rosy Projections for Shale Gas & Tight Oil Production Through 2050***, by J. David Hughes, Post Carbon Institute, Feb 2018, page 158, http://www.postcarbon.org/wp-content/uploads/2018/02/Hughes_Shale-Reality-Check_Winter-2018.pdf

[19] **The Attacks on Abqaiq and Peak oil in Ghawar**, *Crude Oil Peak*, 1 Oct 2019, https://crudeoilpeak.info/the-attacks-on-abqaiq-and-peak-oil-in-ghawar

peaked again in October 2019. The other half of the production, from the Permian (in Texas) was still growing (up to March 2020). Recent data are preliminary.[20]

US tight oil producers were already facing a tough 2020, but effects of the COVID-19 crisis on world economies is putting them under even more financial stress. Amid an oversupply of oil and gas, and an oil price-war stoked by Russia and Saudi Arabia, plus cuts to spending to appease investors over dismal returns, greater challenges are being imposed on a business sector where many firms are already saddled with debt.[21]

Since the 2008 oil price shock, a problem has emerged that **oil prices must be both affordable to consumers AND high enough for the oil industry to be profitable to survive** while the transition to low-emissions solutions progresses. The COVID-19 crisis is battering global economies and financial systems riddled with accumulated debt incurred during the high oil price period and after the end of the low-cost oil era.

Biofuels are unlikely to become a widespread, affordable replacement for petroleum fuels because of their poor Energy Return on Investment (ERoI) and fossil fuel dependency.[22]

Since the COVID-19 crisis, energy experts say profit margins for an increasing number of older oil wells have morphed into losses – companies cannot even cover fixed costs. Under these circumstances, it makes no sense to produce oil, and wells will have to be turned off completely – a process that's expensive to reverse and sometimes damages wells.[23]

Will an oil and gas glut now, that is supressing new resource exploration and developments, quickly flip to global shortages when the COVID-19 crisis ends?

US oil & gas rig count falls to record low

The US oil and gas rig count, an early indicator of future output, fell by two to an all-time low of 265 in the week to July 2, per energy services firm Baker Hughes Co going back to 1940.

That's 700 rigs (or 72.5%) below this time last year.

US oil rigs fell by three to 185 last week, their lowest since June 2009, while gas rigs rose by one to 76.[24]

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[20] **Impact of Corona Virus similar to some earlier peak oil scenarios**, *Crude Oil Peak*, 10 Mar 2020, https://crudeoilpeak.info/impact-of-corona-virus-similar-to-some-earlier-peak-oil-scenarios

[21] **Coronavirus May Kill Our Fracking Fever Dream**, by Bethany McLean, *The New York Times*, 10 Apr 2020, https://www.nytimes.com/2020/04/10/opinion/coronavirus-texas-fracking-layoffs

[22] ***Twenty-First Century Snake Oil: Why the United States Should Reject Biofuels as Part of a Rational National Security Energy Strategy***, by Captain T. A. "Ike" Kiefer, Waterloo Institute for Complexity & Innovation (WICI), Jan 2013, https://uwaterloo.ca/complexity-innovation/sites/ca.complexity-innovation/files/uploads/files/kiefer-snake-oil31.pdf

[23] **Oil Companies on Tumbling Prices: 'Disastrous, Devastating'**, by Clifford Krauss, *The New York Times*, 31 Mar 2020, https://www.nytimes.com/2020/03/31/business/energy-environment/crude-oil-companies-coronavirus.html

[24] **U.S. oil & gas rig count hits record low for 9th week -Baker Hughes**, by Sumita Layek and Scott DiSavino, *Reuters*, 3 Jul 2020, https://uk.reuters.com/article/usa-rigs-baker-hughes/us-oil-gas-rig-count-hits-record-low-for-9th-week-baker-hughes-idUKFWN2E90KT

US energy dominance is finished

Conventional oil production had been declining since 1970, falling from almost 10 Mb/d to about 5 Mb/d in 2008.

Since 2008, tight (shale) oil has been the foundation of US resurgent energy dominance, boosting US total oil output from about 5 Mb/d to more than 12 Mb/d in 2019.

Per *BP Statistical Review of World Energy 2020*, in 2019, USA was the world's largest oil producer at 17.9% global share, yet had an estimated Reserves-to-Production (R/P) of only 11.1 years; and also was the world's largest gas producer at 23.1% global share, yet had an estimated R/P of only 14.0 years. By comparison, Australia was a relatively insignificant oil producer at 0.5% global share; and was the world's seventh largest gas producer at 3.8% global share, with an estimated R/P of only 15.6 years.[25]

US tight (shale) oil has now peaked without making money.[26]

Approximately 600 rigs are needed to maintain 7 Mb/d of tight oil and 12.5 Mb/d of total US oil production. That's because tight oil decline rates are very high.

Based on drill rig count analysis, US total oil production will likely be about 8 Mb/d by mid-2021, or more than 4 Mb/d less than peak November 2019 levels.[27]

In an annual report published last month, Oslo-based Rystad Energy stated its estimate of "recoverable" oil resources – the volume that could be extracted from the earth, given constraints of technology, economics and demand – has fallen since 2019 by 282 billion barrels to 1.9 trillion barrels, as consumption habits change and oil companies abandon exploration plans. In context, the proven reserves of Saudi Arabia, the world's second biggest producer, are of the order of 267 billion barrels.[28]

The COVID-19 crisis and the oil price collapse are accelerating the pace of bankruptcy filings in the US shale sector this year. The number of filings had already started to trend up in 2019 after a drop in prices in late 2018, but this year, the US energy industry is establishing some grim records as debt-loaded, cash-poor producers face a day of reckoning from the borrowing enthusiasm of the past years.[29]

It seems certain that the US will not be the oil superpower it was before 2020.

There are good reasons to expect that much lower US oil production will eventually lead to higher global oil prices, unless petroleum-fuel dependency is drastically reduced.

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[25] ***Statistical Review of World Energy: 2020/69th edition***, published by BP, 17 Jun 2020, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

[26] ***The great compression: Implications of COVID-19 for the US shale industry***, by Duane Dickson, Kate Hardin and Anshu Mittal, published by Deloitte Research Center for Energy & Industrials, 22 Jun 2020, https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/covid-19-implications-for-us-shale-industry.html

[27] **U.S. Energy Dominance is Over**, by Art Berman, 18 Jun 2020, https://www.artberman.com/2020/06/18/u-s-energy-dominance-is-over/

[28] **Coronavirus will hasten 'peak oil' by three years, says research firm**, by Myles McCormick, *Financial Times*, 19 Jun 2020, https://www.ft.com/content/37551636-4d8e-4334-a7b0-64a474ba055e

[29] **$40 Oil Isn't Enough To Prevent A Wave Of Shale Bankruptcies**, by Tsvetana Paraskova, *OilPrice.com*, 1 Jun 2020, https://oilprice.com/Energy/Energy-General/40-Oil-Isnt-Enough-To-Prevent-A-Wave-Of-Shale-Bankruptcies.html

How many more Australian lives and livelihoods have to be lost?

ABC NewsRadio broadcast an interview by Glen Bartholomew with "long-time mining executive and former chair of the Australian Coal Association" **Ian Dunlop**, who said it's time to end "ill-informed debate" around an issue of such national security, saying:

> "***It's impossible now to stay below one-and-a-half degrees C – that's gone – a it'll be here by 2030, whatever we do, from here on.***
>
> ***The average temperature increase in Australia last year was 1.8 degrees C, so we're already way above 1.5.***
>
> ***Um… two degrees C; we will be extremely lucky to stay behind, unless we really start moving fast.***
>
> ***3 degrees C; which is probably going to be here by 2050, if we are not very careful, is a world where most of the... some of the... the top national security experts in the world consider will be complete social chaos.***
>
> ***Now when you... You saw the beginnings of that in the bushfires, where, we were totally unprepared, we didn't understand the risk, the government ignored the advice it was getting, and the result was, ah... enormous... damage to the community. I mean, you've got to start saying, well, how many more Australian lives and the livelihoods have to be lost, before politicians on both sides, start to realise that this is a much, much more serious situation than they're prepared to... so far been prepared to accept?***"[30]

Depending on scenarios of population growth and warming, over the coming 50 years, one to three billion people are projected to be left outside the climate conditions that have served humanity well over the past six thousand years. Absent climate mitigation or migration, a substantial part of humanity will be exposed to mean annual temperatures warmer than nearly anywhere today.[31]

Extreme heat and humidity are threatening millions of lives and economies in places where it could become fatal to work outdoors. Parts of Australia, India, Bangladesh, the Persian Gulf, China, Mexico, and the United States have experienced hundreds of previously rare incidents of extreme heat and humidity since 1979. These conditions have lasted only one to two hours, but climate change is likely to prolong them to about six hours at a time by 2060 and expand the affected areas.[32]

Humanity needs to rapidly reduce human-induced GHG emissions, or it's likely 'game over' for human civilisation as we know it, before this century ends.

Reject the proposed Vickery Mine Extension Project

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[30] **Call for end to climate wars**, *ABC NewsRadio*, 26 Jun 2020, duration 7:42, quote from time interval 4:04, https://www.abc.net.au/radio/newsradio/call-for-end-to-climate-wars/12398256

[31] **Future of the human climate niche**, by Chi Xu, Timothy A. Kohler, Timothy M. Lenton, Jens-Christian Svenning, and Marten Scheffer, published in the *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), vol. 117, no. 21, pp11350-11355, online on 4 May 2020, https://www.pnas.org/content/117/21/11350

[32] **The emergence of heat and humidity too severe for human tolerance**, by Colin Raymond, Tom Matthews, and Radley M. Horton, published in *Science Advances*, vol. 6, no. 19, eaaw1838, online on 8 May 2020, https://advances.sciencemag.org/content/6/19/eaaw1838