

# The Power of 3

ISSUE 17  
August  
2017

Driving the future further

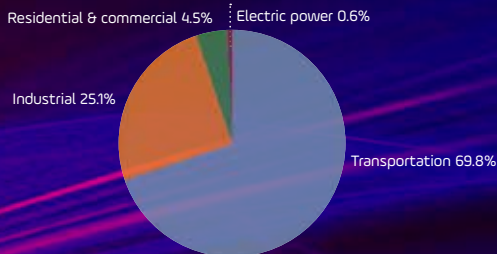
## Overview

For the past 150 years, oil has fuelled phenomenal economic and population growth right across the globe. In fact, as Michael Schirber noted in [Live Science](#) almost a decade ago, apart from water, humans have relied on "no other liquid ... more than petroleum to fuel their vehicles, heat their homes, pave their roads and manufacture countless consumer products."

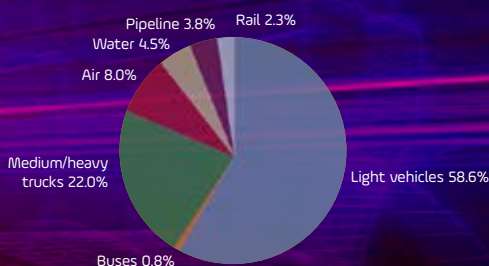
In the 1970s though, the world began to realise that oil doesn't grow on trees (the trees themselves being a whole other story), and the prospect of peak oil<sup>1</sup> has been a disquieting possibility ever since.

Nevertheless, transport remained the most rapidly expanding consumer of crude oil for many years and still dominates consumption ... but along with that consumption comes pollution.

### Crude oil consumption



### Crude oil consumption by type of transport



[Source: <https://www.c2es.org/energy/source/oil/>]

Enter the new millennium and advances in electronics and computerisation gained traction fast ... as did the perceived potential of lithium-ion batteries (LIBs) to not only power devices of all sorts but completely transform our way of life, including in the realms of transportation. The Energy Revolution had arrived.

Will EVs be  
'The cars that  
ate OPEC'?

*"The industrial  
age of energy and  
transportation will  
be over by 2030.  
Maybe before."*

~ Tony Seba

## Electrons, not oil, will drive the future

**Today, it seems, the world can't get enough of the world's lightest metal, but what's driving that demand? It is in large part powered vehicles, the very innovation that made oil so profitable in the first place ... but now minus those gas-guzzling internals. Legacy engines are fast giving way to electric motors fuelled not by hydrocarbons but by the flow of electrons from LIBs.**

Tony Seba, in his book *Clean Disruption of Energy and Transportation*, agrees.

*Exponentially improving technologies such as solar, [EVs] and autonomous ... cars will disrupt and sweep away the energy and transportation industries as we know [them]. The same Silicon Valley ecosystem that created bit-based technologies ... is now creating bit- and electron-based technologies that will disrupt atom-based energy industries.*

Seba maintains, though, that transitioning to the new energy economy (which is already under way) will have less to do with climate change, government

regulations or politics and more to do with various technological trends – renewable energy, energy storage, EVs and autonomous vehicles – among them; they're converging and reinforcing one another, which will lead, ultimately, to disruption of the existing oil and electric utility industries:

*We'll make the transition to clean energy for the same reasons we went from sail to steam, from horses to internal combustion – because the new technology is better and, eventually, [will be] very much cheaper.*

Although eclectic (electric) vehicles are far from new (see *The Power of 3* # 10), today, thanks to LIBs, EVs for private as well as commercial use offer increasingly viable alternatives to internal combustion vehicles, in terms not just of practicality, performance and cost but also the health of humankind and the planet as a whole.

And, while it's true that EVs still require more energy to manufacture than their petrol- or diesel-fuelled counterparts, this is typically offset by their much lower emissions during their useful life.

# The world is coming on board



Traffic in central London [image courtesy of flipboard.com.]

## Governments and consumers alike are dreaming of cleaner, greener cities.

Earlier this year Britain and France joined Germany, Norway, The Netherlands and India in opting to ban the sale of fossil-fuelled cars within the (very) foreseeable future, while China is stipulating that zero-emission vehicles comprise 8 per cent of sales there next year, rising to 12 per cent by 2020.

And, on the manufacturing front, automakers are rising to the challenge. Tesla, which led the charge with the release of its Roadster in 2010 (followed by several models since), has pledged to build a million vehicles by 2020. Volvo's fleet will be all-electric or hybrid by 2019, and Audi and

Mercedes-Benz are rolling out hybrid cars right across Europe. At Mercedes too, an electric version of its popular Sprinter van is on the drawing board.

Meanwhile, VW announced earlier this year that its target, like Tesla's, is a million EV sales, albeit by 2025.

Even Ford, synonymous with the internal combustion engine, will be packing LIBs into the power units of 40 per cent of its fleet within three years (could that be the ghost of Clara whispering, "I told you so, Henry!")

With a swathe of new electric models scheduled for release in 2018, including from Tesla, Nissan, BMW, Renault and Hyundai, it seems the barriers to

broader ownership of EVs – that is, availability and cost – are being broken down.

But (and it's a big but) where will the lithium for the batteries that drive these new cars come from? VW, with some 50 years of EV research under its belt, says the world will require the likes of 40 Tesla gigafactories (enough to fill Sydney Harbour five times over) to meet global demand by 2025.

Joe Lowry, aka the 'king of lithium', agrees.

*There's no longer any doubt that EVs and energy storage systems for renewables are growth markets [unless, perhaps, you're Tony Abbott]. And, while debate continues regarding EV penetration, the bottom line is that even a mere 3 per cent EV annual sales penetration, coupled*

*with conservative growth assumptions for other markets, will drive demand for lithium well over 500,000 million tonnes eight years from now.*

But, Lowry continues...

*Elon Musk seems to think if he builds cars the lithium will come. His current chaotic battery supply chain should convince him that perhaps he [ought to] dedicate a bit [more] of his creative thinking time to mundane matters like where the massive quantities of lithium he needs are going to come from.*

Recently, in *The Weekend Australian*, Greg Ip opined that for EVs to entirely displace internal combustion engines (and, by extension, for lithium to oust oil), some combination of higher oil prices and cheaper battery storage is necessary. Only time will tell.



Renault Kangoo ZE testing the wireless charging road for electric cars.

## Note

1 A hypothetical point in time when the global production of oil reaches its maximum rate, after which production will gradually decline.



And finally ... Imagine a world in which wired-up roads charge EVs while they're being driven. Well, that scenario is already being tested – by Renault, no less. As Harry Hoster, director of Energy Lancaster and Professor of Physical Chemistry at Lancaster University in the UK, **posits:** *"Standardised electrified roads could become what the railways were to the 19th century: not only a leap in transport efficiency but also the core of a [perhaps] new industry."* These are exciting times...

Which **Perth-based company** is facilitating the supply of lithium carbonate for LIBs in the EV era?

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