

When electric vehicles are cheaper than petrol equivalents, and refuelling of the electric vehicle is done free at home, you will cease to see service stations as we know them today. You would not have noticed that the number of service stations in Australia have declined from 8357 in 2006 to 6600 in 2013.

Currently the electric motor scooter/car is already about the same cost as a petrol equivalent. By 2022 they will be cheaper than the petrol car/bike. You will soon see the acceleration of the trend to electric vehicles which is under way right now. Tesla and Bzoooma will see to that.

Right now there is a glut of oil on the world market. There will be a drastic reversal of that if there is another Middle East war, which is an ever-present danger. Cheap petrol may only delay the inevitable, but as solar power gets cheaper by the day people will move. Petrol can never be free. Electricity from the sun is free. Disruption will occur. Children born today will never drive a petrol car except for the enthusiast who loves collectors' items. They will eventually find it difficult to afford to buy petrol to make their collectors piece run.

Electric vehicles today cost about 10% the cost to refuel than petrol vehicles, and that is paying big business for coal fired electricity. Imagine when your electricity is free from your own home source. Pretty soon you will forget what a petrol station was. That will be most evident in five short years from now.

Today the electric motor cycle has a range of about 150 kilometres on a single charge, however that will increase with time. One must understand that there are currently **11.2 million** places you can charge your vehicle in Australia. A vehicle is parked 96% of its life, so keeping the battery charged is not too challenging. There's a mere 6600 places you can buy petrol at present, and soon there will be fewer. It is hard to believe, but very soon finding a petrol station will be a challenge.

Solar power is 154 times cheaper than it was in 1970 and oil is 35 times more expensive. Solar gets cheaper year by year by 22%, as oil, coal, nuclear, and gas get more expensive. (Solar energy installation worldwide is growing at a rate of 43% PA). It is about now that solar became cheaper than those fossil fuels. The market will sort out the winners, and it is clear that fossil fuels are history. This seems hard to believe.



Figure 1 New York 1900. Can you see the car?



Figure 2 New York 1913. Can you see the horse?

Who would believe that if you invested in horses or horse feed in 1900 you would be broke by 1913?

Recommended reading/viewing Tony Seba Futurologist, Author, Speaker, Advisor, and Educator (Stanford University)

[https://www.youtube.com/watch?v=E7Jg1IJ68\\_g&feature=youtu.be](https://www.youtube.com/watch?v=E7Jg1IJ68_g&feature=youtu.be)

**Extract of the published works of Tony Seba:** -The keynote, based on the book 'Clean Disruption of Energy and Transportation' assert that four technology categories will disrupt energy and transportation by:

- 1- Batteries / Energy Storage
- 2- Electric Vehicles
- 3- Self-Driving Vehicles
- 4- Solar Energy

## CLEAN DISRUPTION OF ENERGY & TRANSPORTATION

The Stone Age did not end because we ran out of rocks. It ended because a disruptive technology ushered in the Bronze Age. The era of centralized, command-and-control, extraction-resource-based energy sources (oil, gas, coal and nuclear) will not end because we run out of petroleum, natural gas, coal, or uranium. It will end because these energy sources, the business models they employ, and the products that sustain them will be disrupted by superior technologies, product architectures, and business models. This is a technology-based disruption, reminiscent of how the cell phone, Internet, and personal computer swept away industries such as landline telephony, film photography, publishing, and mainframe computers. Just like those technology disruptions flipped the architecture of

information and brought abundant, cheap and participatory information, the clean disruption will flip the architecture of energy and transport and bring abundant, cheap and participatory energy and transport. Just like those previous technology disruptions, the clean disruption is inevitable and it will be swift.

Solar is a disruptive technology and, when combined with other disruptive technologies such as electric vehicles and self-driving cars it will disrupt the energy infrastructure.

PV **dematerializes energy**. To understand this concept, think of how digital photography disrupted film photography. With digital imaging, photography went from atoms (film) to bits (digital), from something material that you had to manufacture for every single picture to something immaterial that is essentially free. Today energy is like film photography was in the 20<sup>th</sup> century. Every time you flip a switch you burn fossil fuels or uranium. Every time you hit the car pedal you burn petroleum. Solar PV dematerializes energy by turning the sunshine photons directly into electrons and bits. You don't burn anything to charge your computer. The same thing happens if you charge your electric vehicle with solar energy. As PV costs keep going down, the solar disruption around the globe will accelerate even more.

Clean Disruption projections (based on technology cost curves, business model innovation as well as product innovation) show that by 2030:

- All new energy will be provided by solar or wind.
- All new mass-market vehicles will be electric.
- All of these vehicles will be autonomous (self-driving) or semi-autonomous.
- Gasoline will be obsolete. Nuclear is already obsolete. Natural Gas and Coal will be obsolete.

Car manufacturers will continue to push petrol cars as long as they can. Their business model is to make money on the maintenance and repairs," It makes economic sense for them to push the gasoline car and not the Electric Vehicle."