The Autonomous Electric Vehicle Myth

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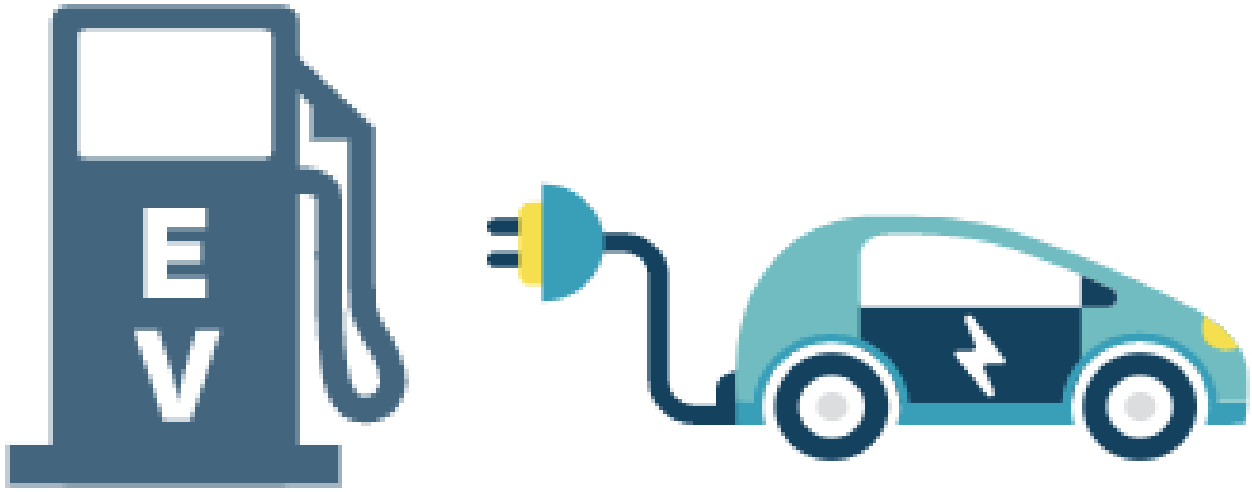
The Magic Electricity Tree?



The Magic Electricity Tree?

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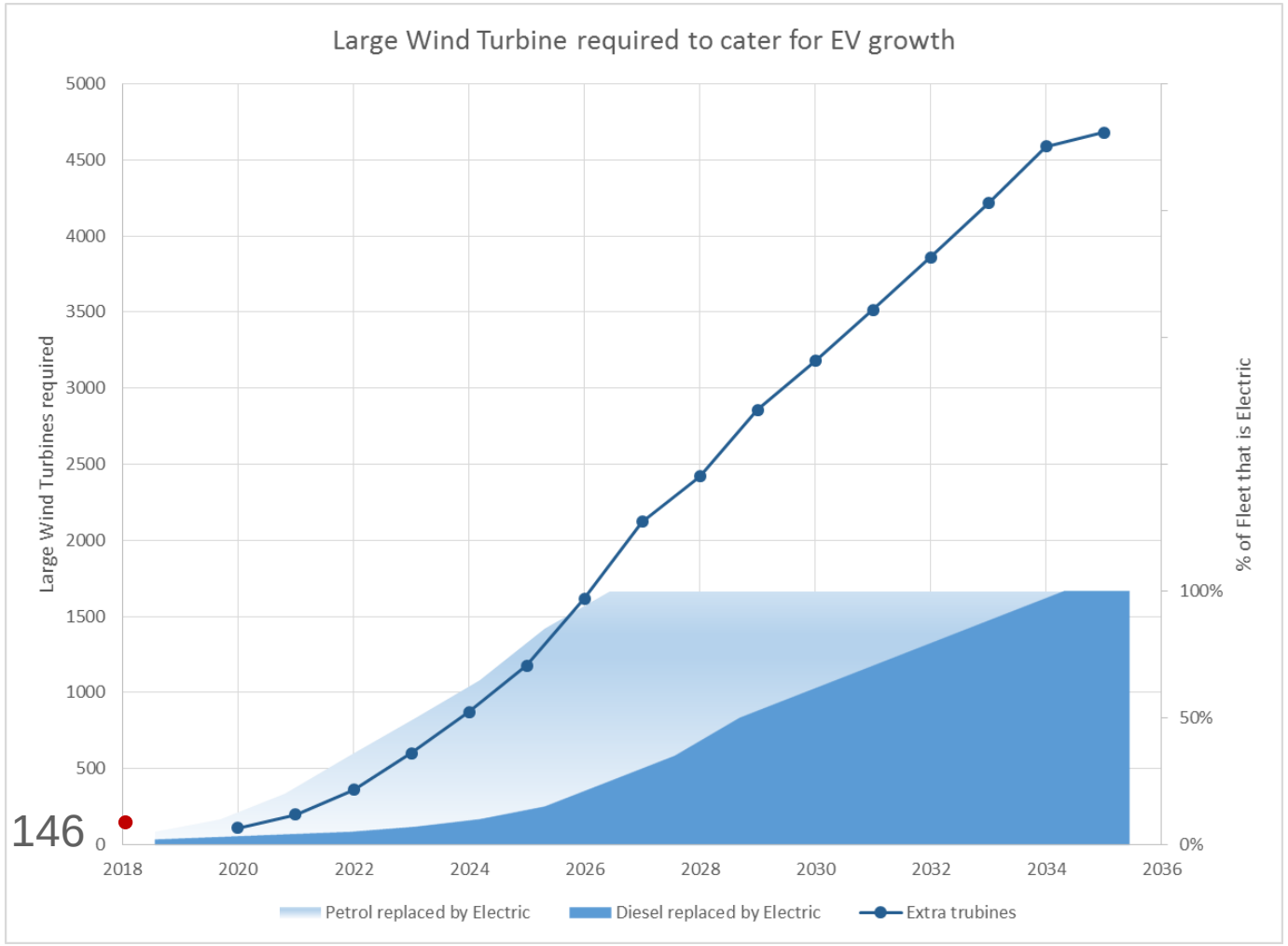
A Thought Experiment

NZ Wind Power to meet NZ EV demand

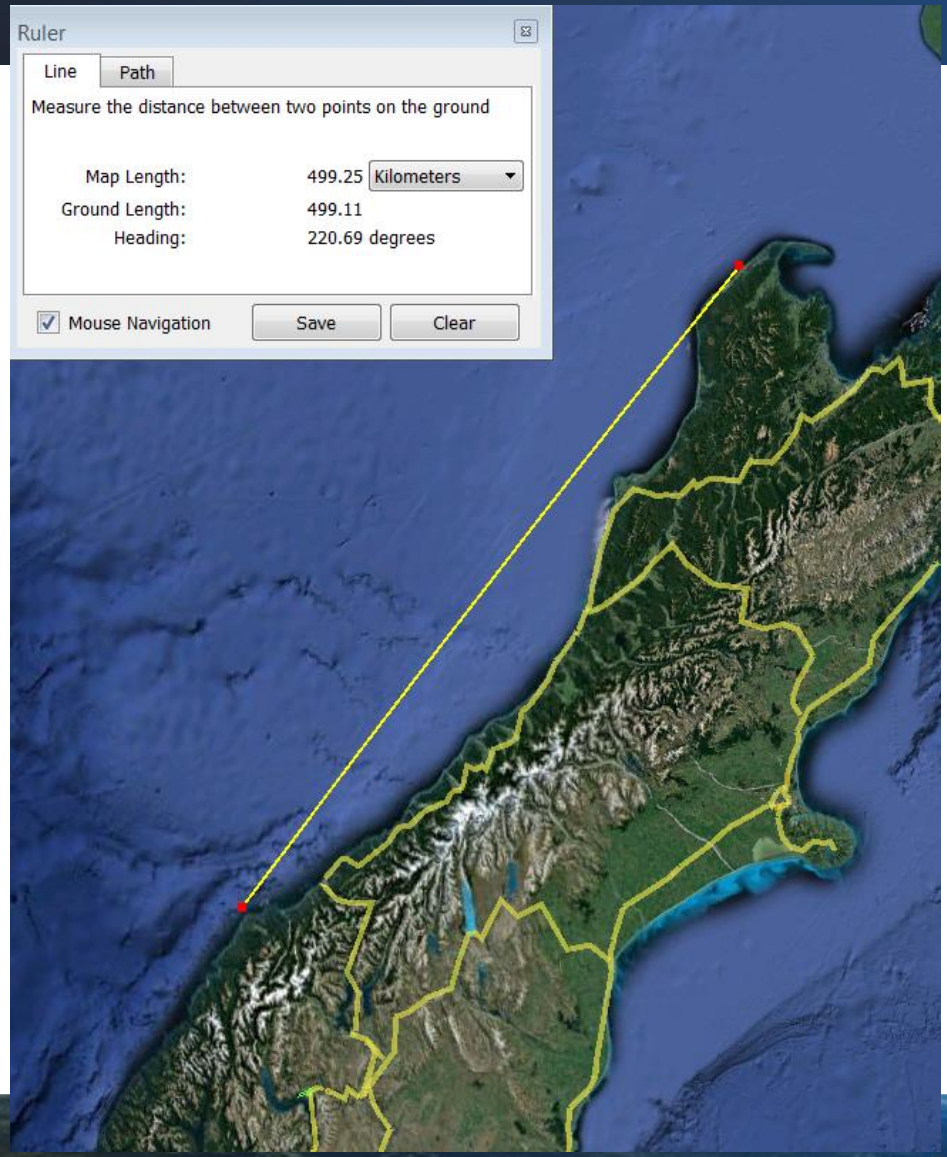


Based on

- Current NZ wind generation stats.
- No change to car sharing
- Energy requirements to move cars and vehicles
- 2% p.a. growth in vehicle numbers.
- By 2035 EVs would use 65% of current renewable Electricity production capacity.

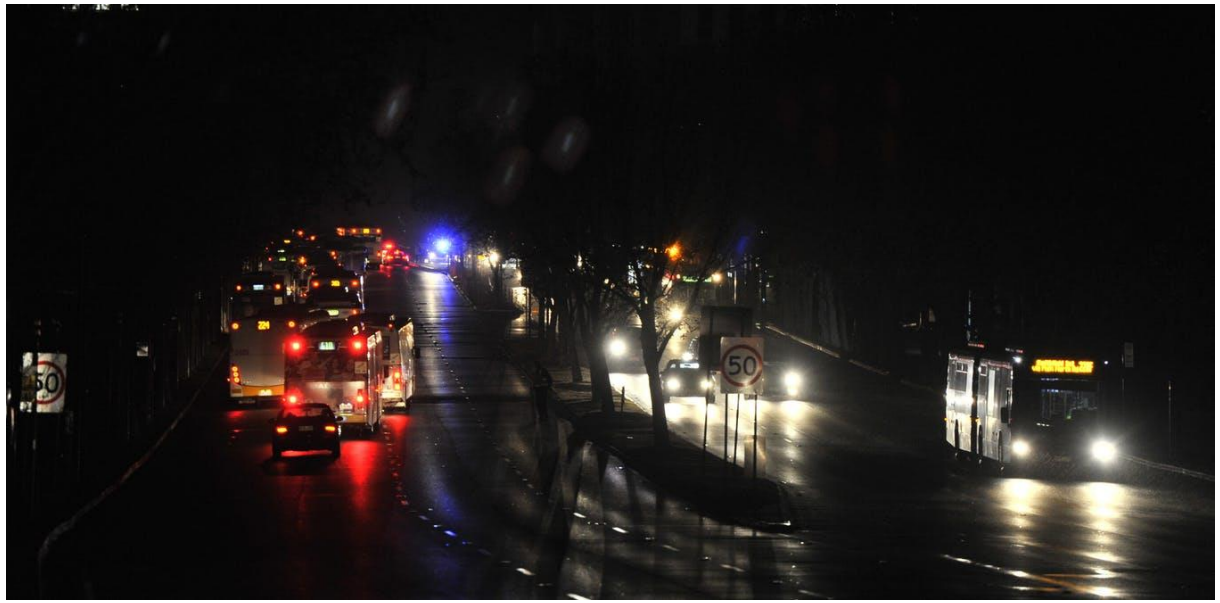
Increase in wind power to meet NZ EV demand

- If we built 5 turbines a week at 100m apart.
- It would be 450km long
- The line would cover most of the west coast of South Island



Transmission and Storage

- Power generation is one aspect,
- That power needs moving – in real time.
- Larger more resilient networks.
- Batteries can assist but they only store energy, not generate it.
- If it fails this happens,



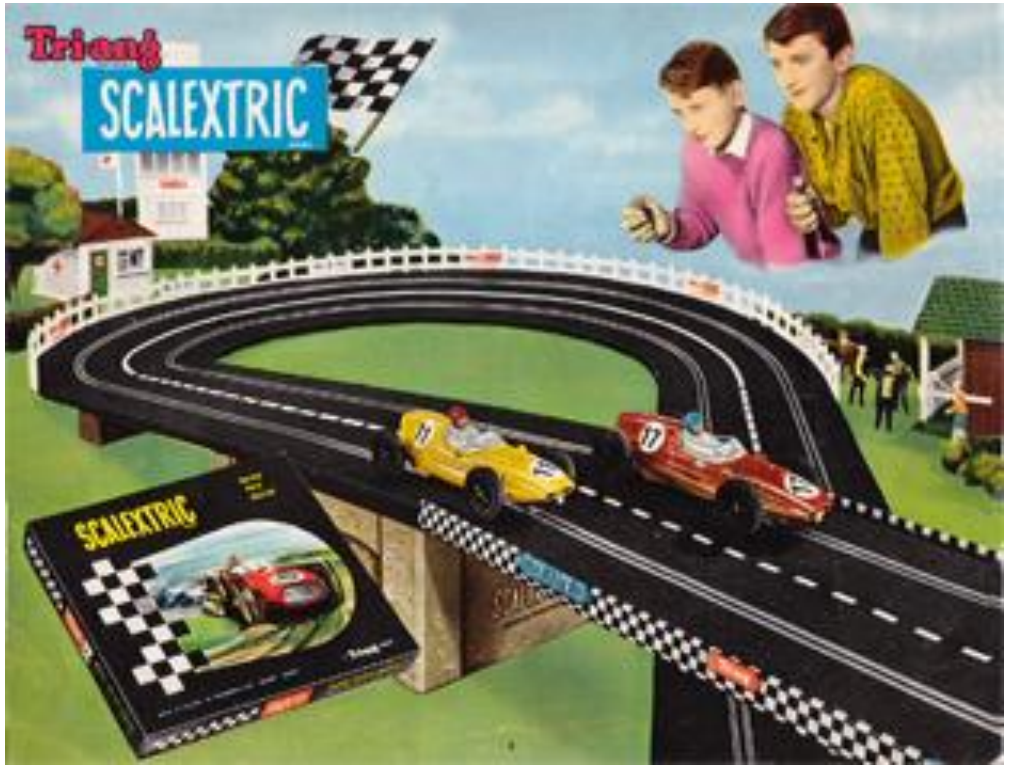
Adelaide 28/9/2016

Transmission and Storage

- Power generation is one aspect,
- That power needs moving – in real time.
- Larger more resilient networks.
- Batteries can assist but they only store energy, not generate it.
- If it fails this happens, if it isn’t fixed quickly on a calm day this may happen.

Autonomous Vehicles…

A short, and unauthorised history.



The Autonomous Vehicle Race….

The Autonomous Car Race

- Old Motor (*Ford*) vs. New Motor (*Tesla*)
- Goal – create a safe car that needs no human intervention.
- Reason – to beat the others – shareholder value.
- Budget – until the money runs out.
- Strategic plan – put the other guys out of business.
- Consequences of coming 2nd?

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The 1960's Space Race

- Russia vs. USA
- Goal – land a man on the moon and bring him back safely.
- Reason – to beat the other guys – national prestige.
- Budget – unlimited.
- Strategic plan – none.
- Consequences of coming 2nd ?

How safe do Autonomous Vehicles have to be?

Isaac Asimov's
"Laws of Robotics“ (1942)

A robot (*autonomous vehicle*) may not injure a human being or; through inaction, allow a human being to come to harm.

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Richard Young's
"Laws of Autonomous Vehicles“ (2019)

A robot (*autonomous vehicle*) may occasionally injure a driver, passenger or pedestrian; or through inaction, allow them to come to harm – but on the whole it’s a safer driver than a human.

BORDEAUX 2015

22nd ITS World Congress
Bordeaux, **France**
5 to 9 October

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25TH ITS WORLD CONGRESS
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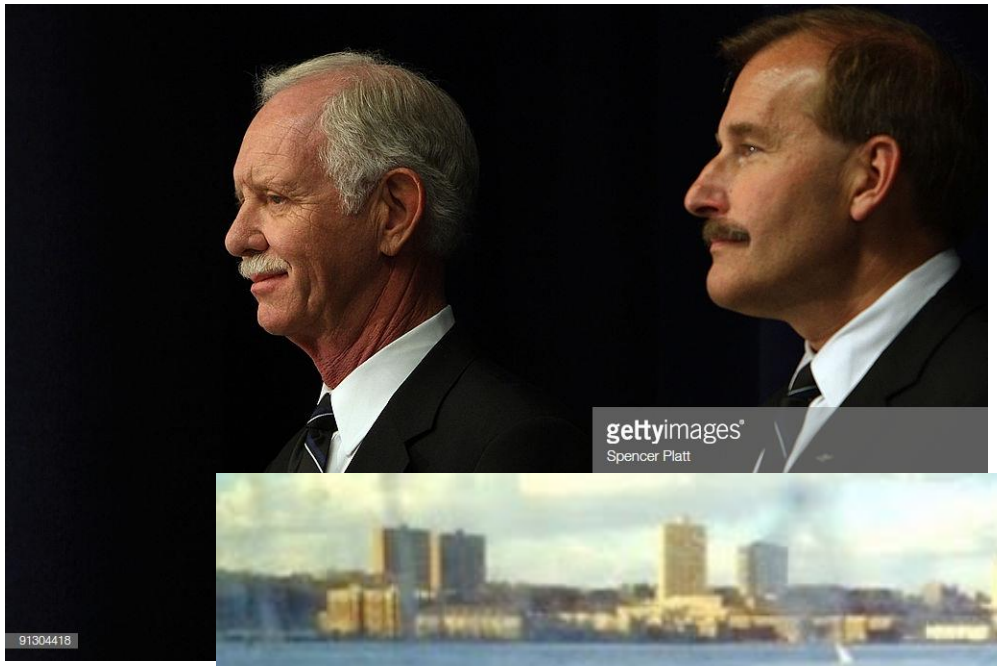
#amobility

Human Factors

- Pilots spend 1000’s of hours sitting there following check lists.
- $100,000s to train a pilot to take over at the right time and do the right thing.
- After losing both engines over New York, these two pilots took around 30 seconds to think before they decided to land in the Hudson River.



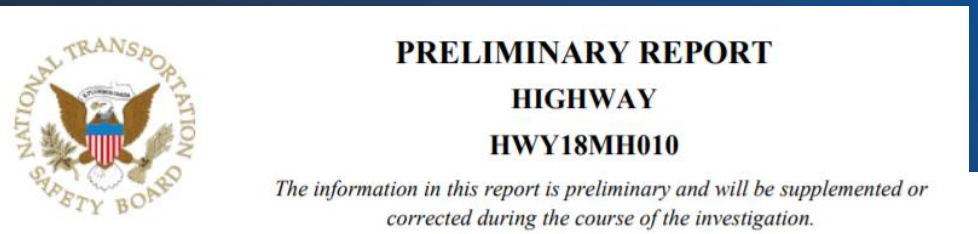
Human Factors

- Up to 17 seconds to re-engage with driving.
- If we don’t get fully autonomous vehicles how do we train drivers to be pilots?

The Arizona Uber Fatality

On 18th March 2018 Elaine Herzberg, was pushing a bike across a road in Tempe Arizona when she was killed by a self driving Uber Volvo.

NTSB Preliminary Findings



- Self driving system active, with Safety Driver present,
- Self driving at night for 19 minutes on a pre-set circuit,
- In self driving mode all of the in-built Volvo safety systems were disabled,
- 6 seconds before impact the car detected an object, (person pushing bike)
- 1.3 seconds before impact, car determined emergency braking was needed,
- Due to erratic performance, Uber had disabled emergency braking,
- No automatic system to alert driver,
- Driver acted 0.5 seconds before impact, brakes applied after impact,
- Police (not NTSB) reported that the driver was watching TV at the time.

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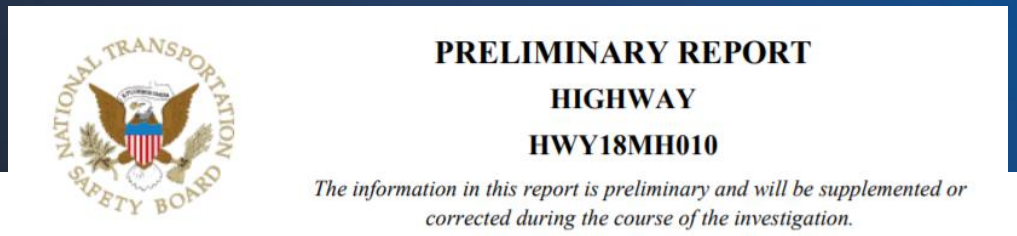

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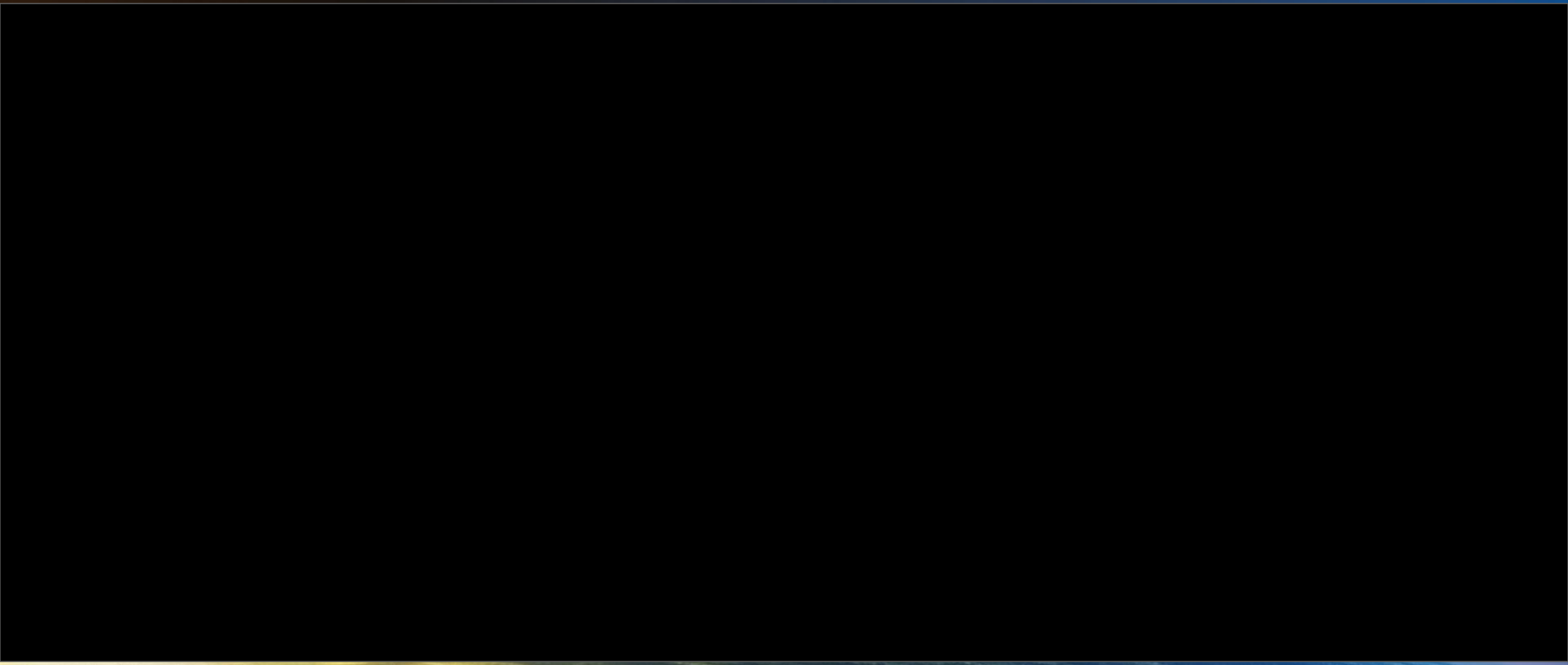
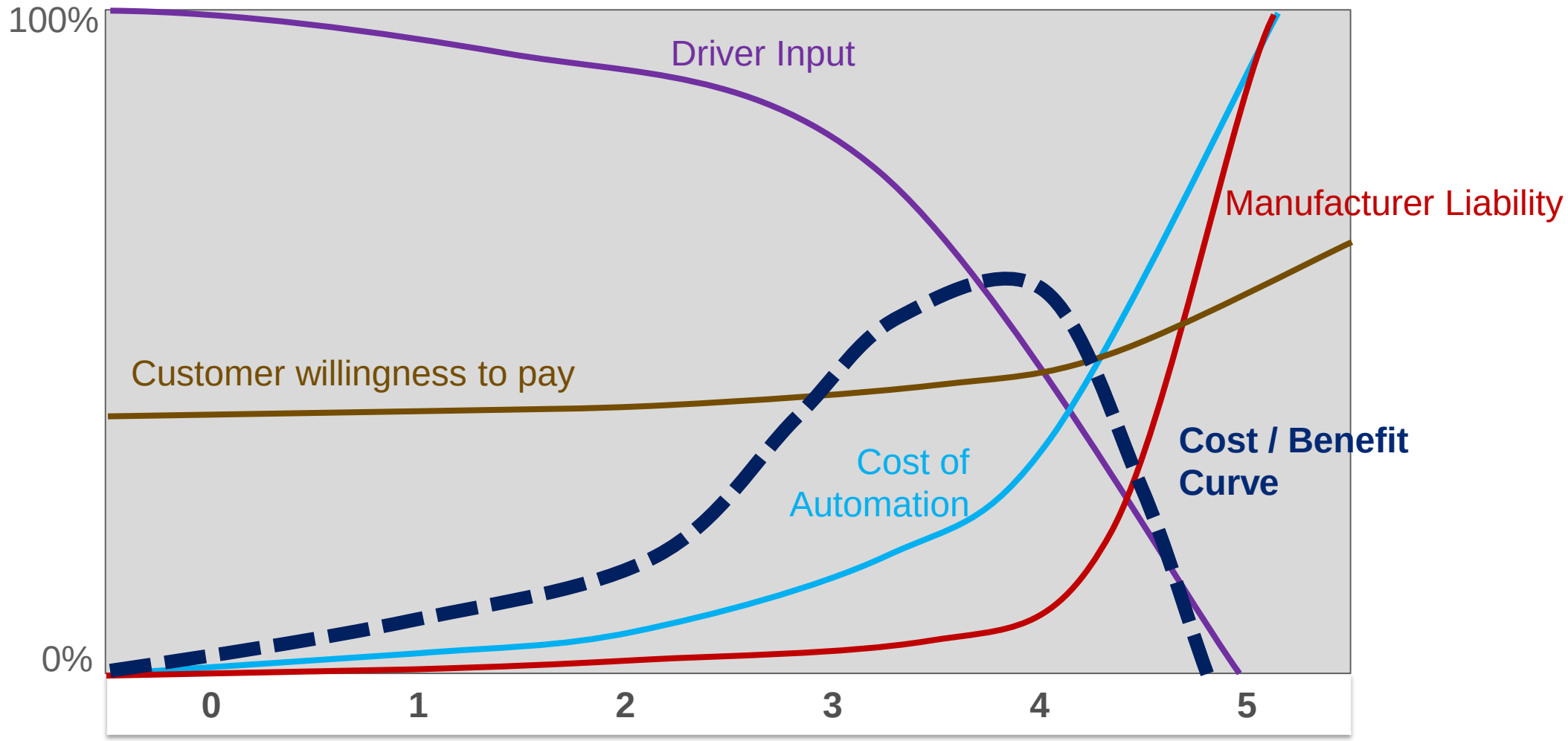
The Arizona Uber Fatality – the six seconds up to impact.

The Arizona Uber Fatality



The Economics of Autonomy – a thought experiment



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