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ZERO EMISSION TRANSPORT

ZERO-AS-A-PLATFORM (ZAAP): ZAAP TO CLEANER FUTURE

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THIS PAPER ADDRESSES HOW PLATFORMS CAN BE UTILISED AS A CATALYST FOR MASS ADOPTION OF ZERO EMISSION VEHICLE TECHNOLOGY IN THE TRANSPORTATION SECTOR



OVERVIEW

Platforms have been widely studied as a corporate strategy to enhance market presence, however, platforms are also an important piece of the puzzle to significantly accelerate adoption and further innovation of new technologies that are critical for the future of our existence. This article explores a case for the establishment of a new platform to accelerate mass adoption of Zero emission technology

INTRODUCTION AND ISSUES

Adoption of new technology to the point of prevalence has always been an offshoot of the advent of its marketplace platforms that facilitates seamless consumer adoption and further innovation. The dawn of the information age was heralded by the invention of the internet, but the true impact was not fully realised until platforms, such as Google, Apple and Microsoft to name a few, enabled access to the marketplace for both developers and consumers to create, consume, and distribute content, as well as collect information. It was platform that accelerated innovation and development of new features and broader adaptation.

Platforms have been applied in various markets and industries, including public transportation through ride sharing platforms such as Uber, Didi, and Lyft; accommodation through Airbnb; retail sales through E-commerce sites such as Amazon; music distribution through iTunes and Spotify; and Multimedia through Netflix and Youtube, to name just a few.

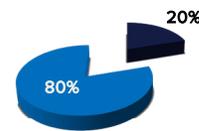


These markets have experienced tremendous growth upon the advent of platforms that underpin their market ecosystems. Unfortunately, there are crucial technologies where dedicated platforms for their markets are non-existent, and this hinders mass adoption

and realisation of their full potential and one such technology is zero emission technology.

Zero emission technologies, such as electric vehicles, are critical for global sustainability and to create resiliency against climate change. Road transportation is a major contributor of greenhouse emission, accounting for about 20% of energy related CO₂ global emission (Albuquerque et al., 2020), mainly because most road vehicles today still operate on fossil fuels. In Australia, the transport sector is the third largest polluter (Department of the Environment and Energy Australia, 2021)

Energy Related CO₂ Global Emission



■ Road Transportation ■ Others sources

There are many benefits associated with mass adoption of Zero emission technologies in our society: it is significantly more energy efficient, about four times more than conventional combustion engine technology (Lutsey, 2012) and it can reduce air pollution which can increase health benefits to large proportions of the population who suffer from respiratory illnesses.

Zero emission technology has garnered significant attention over the last few years, in 2020 there are 10 million electric vehicles in operation globally, a 43% increase over

2019 (International Energy Agency, 2021). Despite this, penetration rate of zero emission vehicles (ZEV) is still very low, only representing 1% share of global vehicle stock in 2020 (International Energy Agency, 2021). In Australia, the transition to electric vehicle is even slower, with 2020 electric vehicle sales accounting for only for 0.78% of all vehicles sold in Australia (Electric Vehicle Council, 2021).

This trend highlights a pressing need to accelerate the adoption of electric vehicle fleets, especially in Australia, given the tremendous benefits that it offers, and a dedicated platform for zero emission technology is a critical need to address this issue.

The potential of zero emission fleets market in Australia is extensive. As of 2021, there are more than 674,000 buses and trucks registered in Australia (Australian Bureau of Statistics, 2021) and almost all of these fleet vehicles are powered by diesel engine. Australian Government has made significant commitment to transform their bus fleets into electric. As detailed in the Transport for NSW “Zero Emission Bus Transition Strategy”, the New South Wales Government aims to completely transition their bus fleet

to zero emission by 2030 (Transport for NSW, 2021). Similarly, a commitment has also been made by the Australia Capital Territory Government to adopt full zero emission bus fleet by 2040 (Transport Canberra, 2021).

Furthermore, Victoria’s Bus Plan (Victorian Department of Transport, 2021) revealed that, from 2025, all new buses purchased in Victoria will be zero emission.

Despite the ambitious intention to transition into zero emission fleet and its tremendous potential, realisation of this plan is still technically difficult as zero emission technologies are still developing rapidly and complex to implement. The transition process is even more challenging for private businesses which want to integrate zero emission technologies into their operation. This highlights critical needs for a facilitator platform that streamlines the transformation into zero emission technologies.

We highlight some critical aspects of a new zero emissions platform, also referred to as Zero-as-a-Platform (ZaaP) which will facilitates transformation of transportation sector, from “brown” industry, which emits high CO₂ emission into a more environmentally friendly “green” industry.

BROWN INDUSTRY



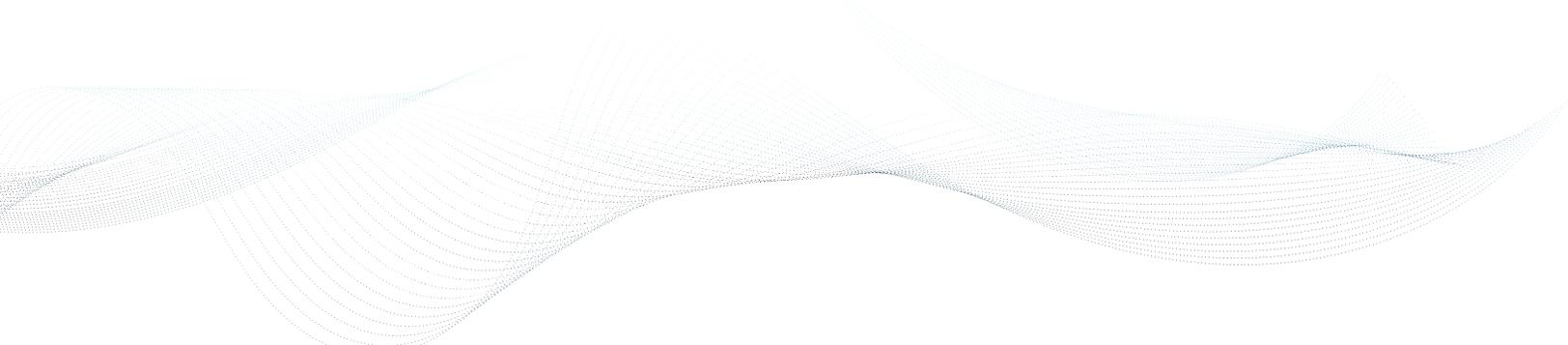
Emits High CO₂

Transformation through
ZaaP

GREEN INDUSTRY



Environment Friendly



FRAMEWORK

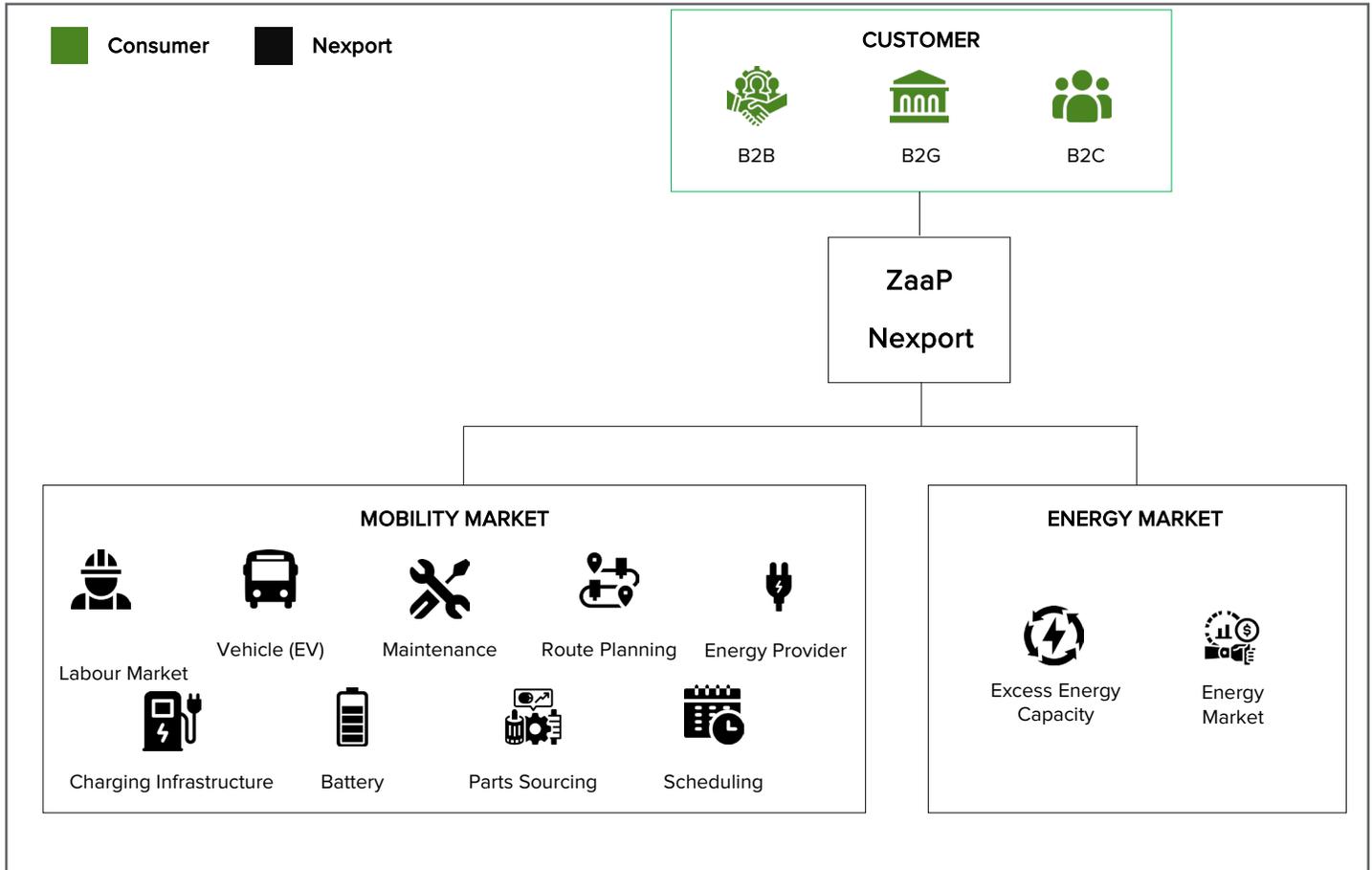
Widespread adoption of potentially transformative technology is hindered by excessive transaction and search costs. In most traditional vertically integrated markets, these transaction costs often manifest as costs associated with searching for information regarding a new product or service, or to assist with transition to new technologies. These search costs include cost to negotiate with suppliers, cost to integrate a new technology into the existing workflow (including infrastructure upgrades, new assets, training etc.) These significant transaction costs often result in asymmetric information for customer, which makes it more difficult for them to make transformative decisions that otherwise could maximise their utilities due to the tremendous investment cost, risk, and uncertainty. Consequently, inefficiency is created in the whole market ecosystem creating barriers to adoption of the new technology, in this case the transition towards zero emission fleet.

“Two sided” business models (Eisenmann et al., 2006; Parker & van Alstyne, 2005; Waller et al. 2021) , which introduce an open platform to the market and can capture the

benefits of the “network effect” (Parker et al., 2016) provides a potential solution to reduce transaction costs by minimising barriers to entry for new players in the markets. Network effects in marketplaces refer to a situation where the attraction to a marketplace increases merely by the number of suppliers and consumers, and therefore further increasing the size of the marketplace.

In the context of zero emission fleets, the ZaaP platform aims to reduce transition costs and risks for traditional businesses in their transformation to embrace zero energy technologies. In the ZaaP platform, one side of the market is an assemblage of suppliers which produce zero emission technologies, infrastructure and services as their trade products. These suppliers will include vehicle manufacturers, Original Equipment Manufacturer (OEM) parts suppliers, battery and charging station providers, software algorithm developers, electricity and energy providers, research and development companies, depot design firms, and many others. On the other side of the market are the consumers who are looking to incorporate electric mobility assets into their fleet. These consumers might be bus

SEAMLESS INTEGRATION | ASSURED SUPPLIERS
 ASSURED COMPATIBILITY | LOW RISK | COST & TIME SAVINGS



operators, taxi companies, mining companies with a heavy-duty haul vehicle fleet, logistic providers which operate prime mover trucks, airport ground handlers, port operators, or even local government looking for “green” transit buses.

The introduction of a ZaaP model will result in benefits for both sides of the market (suppliers and consumers) by being able to engage in the ecosystem and eventually reducing the transaction costs. Suppliers of the technologies will be able to benefit from having an open market access across numerous potential customers while

obtaining feedback on market “preference” and direction provided by the nature of open information of the platform. By establishing a direct communication channel between suppliers and their potential consumers, the platform will also help reduce the cost of acquisition of customers. Furthermore, ZaaP suppliers will also be able to benefit by being able to provide complementary product and service offerings that will provide value to all suppliers, while simultaneously leading the market place by offering consumers a holistic solution with minimal risk.

The key characteristics of ZaaP is that it would lead to an accelerated growth of zero emission technologies, and enables “network effects” for suppliers and consumers through the following features:

HIGH INTEGRATION OF SUPPLY CHAIN.

Having one single platform that accommodates many suppliers means that it will be easier for technology providers to come to an agreement to adopt the same standards across the whole ecosystem. For customers, this means that ZaaP is a one-stop-shop, where all components in the supply chain in ZaaP are able to work seamlessly and integrate with each other. Furthermore, ZaaP can also provide end-to-end solution throughout the whole vehicle life cycle by including after sales services such as maintenance and insurance. Instead of approaching and negotiating with individual component suppliers (with no guarantee that each will work with each other), a customer on ZaaP will experience reduced transaction costs, operational uncertainty and streamlined set-up effort.

TRUSTED SYSTEM

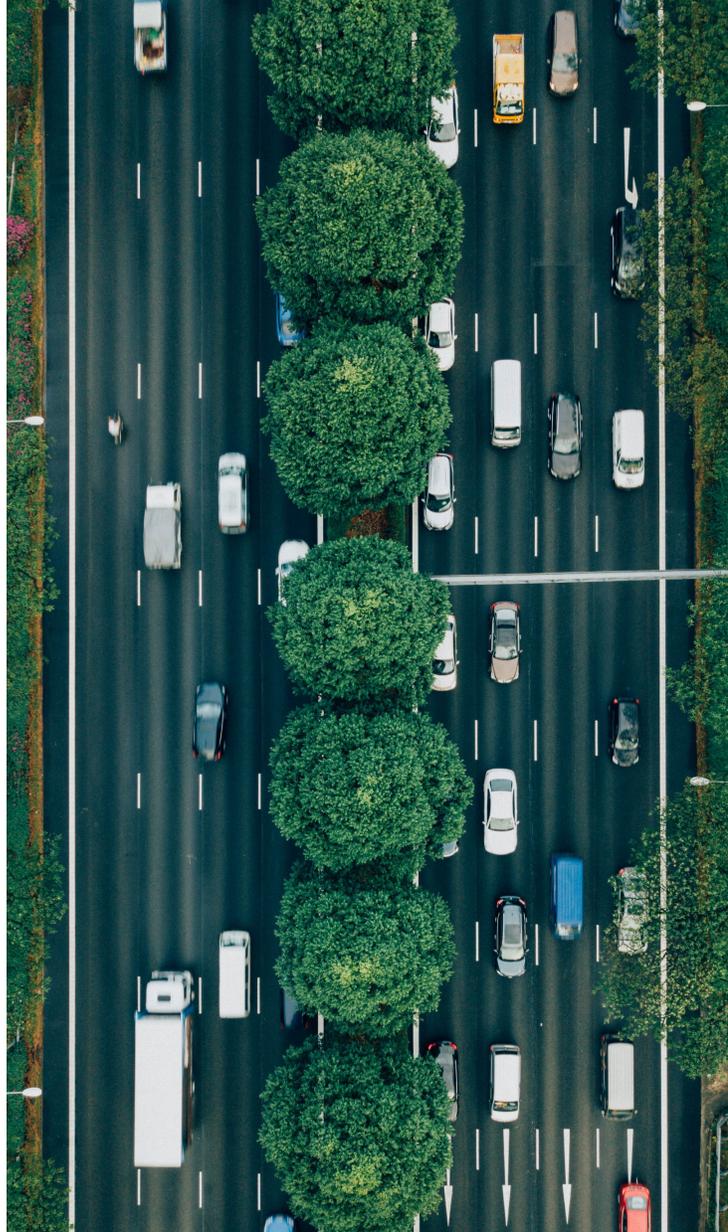
Reduction of uncertainty in both technical and legal frameworks can be achieved by having a single point of contract, i.e. ZaaP. As the platform provider, ZaaP will negotiate legal and contractual arrangements with each individual suppliers so that customers are able to have a single contract agreement with a ZaaP provider ensuring that that they will be covered by legal uncertainties and minimise risks to their business.

ENABLING SEAMLESS MARKET ACCESS

Barriers to entry to markets have a significant impact on efficient utilization of societal resources. The ZaaP model allows the possibility to access new opportunities beyond the traditional market, for example, battery charging software, supplied by ZaaP, will assist operator of electric mobility asset to optimise their charging strategy so that they can sell excess energy, generated in their facility, to the energy market for an additional revenue stream. Given the zero emissions in terms of noise and pollution, additional value can also be captured by accessing property market through value capture; specialised depot planning consultant in ZaaP can advise electric fleet operators to develop mixed-use depot building. Excess capacity in the property can be leased out to property market for other utilisation such as commercial, office, and/or advertising spaces and generate additional revenue streams.

With the introduction of ZaaP in the market, customer will be able to seamlessly transform their mobility assets into zero emission fleets by choosing the vehicle's specifications and components that suits their business operation, aided by expert advice from ZaaP consultants, amongst a list of suppliers with technologies that are compatible with each other. ZaaP can be offered through a subscription/leasing service which can spread their upfront investment cost. In this way, total cost of ownership can be minimised and thus reducing barrier of entry into zero emission business. To further ease the transition, ZaaP will also handle the takeover off old assets and replace it with zero emission fleets.

As more suppliers and customers come on board the ZaaP model, further positive benefits and externalities of zero emission technologies can be further realised from the “network effect”, i.e. situations in which the utility of a user is affected by the number of users. By opening up ZaaP to all suppliers and customers, new players can easily join the market because entry is fundamentally frictionless. More users of the platform will enable chain reaction from positive feedbacks loops through “aggregated wisdom of the entire marketplace”, i.e. better technologies will attract more customers. As suppliers introduced better zero emission technologies that are more efficient, reliable, and cost-effective, more customers will be attracted to adopt them and this in turn will drive competition and encourage further innovation in the industry.



Better technologies are also expected to increase the appeal of zero emission fleets and attract new adopters and by having more users of the technology in the marketplace. In addition, economies of scale in the whole industry landscape can be achieved, leading to lower cost and draw in even more users. In this way, the Platform will have prominent impact in shaping the development of zero emission technologies and drive wider adoption and faster transformation of the technologies into the future.



ROADMAP FOR ZERO EMISSION FLEETS

There are significant barriers to transition existing assets like buses to zero emissions. State Governments and Operators have heavily invested in owning assets based on fossil fuel technology, and have established ecosystems and supply chain to services and their maintenance and after sales needs effectively. This significant investment into inventories, infrastructure, long established relationships with supplier networks, and manpower expertise have been built around conventional fossil fuel technology and an industry that largely belongs in the 20th century.

The perceived need to scrap current assets

and re-invest in brand new assets, and the ensuing cost and effort to transform existing operations into zero emission business are perceived to be large, lengthy and complicated processes. Inevitably, this perception introduces a significant barrier of entry for incumbent industry players in the adoption of green technologies. This points to the lack of an integrated supply chain that would help customers seamlessly transform their fleet.

This perception is further exacerbated by the lack of standards for “green” technologies with varied offerings creating friction and confusion in the market



which results in uncertainty and unnecessary business risks. Without innovation in the marketplace that helps foster trust, seamless integration and provision of value added services, customers and governments will struggle to transition to a zero emission fleet.

Introduction of ZaaP that is enabled by data from Zero Emission Fleet, Electricity Markets and suppliers of charging infrastructure will be provide a one-stop-shop to effectively transition to “trusted systems” that integrate across the supply chain. Furthermore, the access to data can create add-on services for predictive maintenance, insurance, and other needs across the life cycle of the vehicle. This will also enable products based on subscription-based models that would increase accessibility to use of these

vehicles by removing barriers to upfront investment and uncertainty. This will reduce the overall cost of ownership and provide a point of inflexion to accelerate the adoption of zero emission fleets.

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