12 June 2021

Andy Burgess
Head of Energy, Airports, and Dairy Regulation
The Commerce Commission
PO Box 2351
Wellington 6140

Feedback on Fit for Purpose Regulation
in response to your Open Letter of 29 April 2021

Dear Mr. Burgess,

Thank you for the opportunity for Amazon Web Services (AWS) to provide this feedback on your forthcoming "Fit for Purpose Regulation" review in response to the open letter from Sue Begg dated 29 April 2021. Appended to this letter is a brief introduction to AWS.

AWS welcomes the opportunity to provide input at this time and we look forward to remaining engaged as a partner as the Commerce Commission deliberates on the emerging issues and evolving energy sector technologies, business models and methodologies that will support New Zealand's transition to a low carbon economy and its wider energy transition objectives such as promoting innovative approaches to providing customers the least cost energy service they demand across reliable and resilient networks. In particular, we look forward to engaging in any future consultations on the upcoming Input Methodologies (IM) Review.

A fast-changing landscape

Even since the Commerce Commission's last IM Review, the energy and technology landscape has advanced rapidly. Fast-expanding renewable energy development, the increasing adoption of electric vehicles and other distributed energy resources (DERs), smart metering technology, and improvements in energy storage all present new opportunities but also greater complexity for next generation grid management. Energy consumers, as with consumers in all sectors, continue to demand better visibility and choice in how they manage their residential and business energy needs. Policy and societal expectations have evolved too, particularly around issues of sustainability, efficiency and decarbonisation.

New Zealand's grid of tomorrow will continue to grow in scale and complexity, requiring more sophisticated tools to help with forecasting of demand and supply as well as in the planning and management of grid operations. In an era of increasingly distributed generation and millions of connected devices, big data and advanced analytics are becoming indispensable for more effective grid

management. Harnessing data-driven insights and use of cloud-enabled digital tools such as machine learning and Internet of Things (IOT) applications will enable scalable peak load management and demand response programmes. More and better managed data will inform load-shifting decisions and even help to unlock new opportunities such as peer-to-peer trading. Grids underpinned with advanced cloud computing capabilities will help to empower consumers by delivering a greater variety of services and significantly enhance their interactions with energy providers. Better analytics will help manage and avoid market distortions and support predictive maintenance across the grid. These new digital tools will also support the pursuit of longer-term grid-wide regulatory and policy objectives such as decarbonisation, energy equity, and grid reliability, efficiency and resiliency.

For the 21st century grid, industry investments in digital technology will become as central to utilities' operating models as investment in traditional "poles and wires" physical infrastructure. The innovations needed going forward will require industry to continuously evolve their capabilities, offerings and business models. Sound regulatory and incentives frameworks that support industry in this evolution will be key to a successful energy transition.

As the New Zealand Climate Change Commission has advised in its just delivered report, *Ināia Tonu Nei*, regulatory regimes must continue to adapt and respond to innovations. The Climate Change Commission has noted that traditional ways of operating may not deliver the most efficient solutions at the pace required for the required transition. Notably, recommendation 20.3 proposes that Government commit to a strategy for decarbonisation of energy systems and to ensure the electricity sector is ready to meet future needs, including by:

"*supporting the evolution to a low-emissions electricity system fit for technology evolution. This should include work to increase the participation of distributed energy resources including demand response, and determining whether lines companies can integrate new technologies, platforms and business models by:*

a. Assessing whether they have the necessary capacity and capabilities to support climate resilience and the transition;

b. Evaluating whether the current regulatory environment and ownership structures of lines companies are fit for future needs."[1]

In the context of a fast-changing energy and technology landscape, pressing climate concerns and ambitious national policy goals, the Commerce Commission's seven-yearly IM review is extremely timely. Your forthcoming review will be an important inflection point in New Zealand's energy transition trajectory.

AWS submits that Commerce Commission's upcoming IM review is a critical opportunity for incentivising the technology evolution that will be needed to realize the objectives of identifying cost-effective means of decarbonising the grid and supporting an energy transition that increases resiliency while empowering consumers through improved demand-side management.

[1] New Zealand Climate Commission, *Ināia tonu nei: A low emissions future for Aotearoa, 2021*, see recommendation 20, p.286-7.

Experiences in other markets

The upcoming review process is an opportunity to review and potentially take inspiration from leading practices globally that have the potential to support the Commerce Commission's desired outcomes. In this section we share our perspective on some important trends in other markets in which regulators and utilities have found new means of utilising digital technology to unlock cost savings, scalability and performance, and customer satisfaction while limiting capital outlay on new physical infrastructure.

A digital first energy vision: New York's REV initiative

One compelling example is New York's Reforming the Energy Vision (REV) initiative, which seeks to incentivise utilities to lower costs and increase customer centricity through better digitally-enabled energy management, and seek "non-wires alternatives" to expensive, capital-intensive physical infrastructure projects. This pioneering regulatory framework encourages use of digital tools and analytics to provide greater insight into energy supply and demand, in addition to scaling the deployment of distributed energy resources (DERs) across the grid—both as a means of promoting the use of cleaner energy as a decarbonisation and climate risk mitigation strategy, as well as ensuring greater resiliency (in the face of increasing natural disasters) as a climate risk adaptation strategy.

This regulator-led encouragement has fueled the ambition of utilities like the New York Power Authority (NYPA) to put forward a blueprint for transformation that includes the explicit goal of becoming the first end-to-end "digital utility" in the United States. As recently described by NYPA President and CEO Gil Quiniones, "these outcomes are already being realized through our New York Energy Manager facility, which links thousands of New York buildings on a digital platform – combining the power of big data, advanced analytics, and machine learning."[2]

Incentivising decarbonisation and digital technology adoption: Ofgem and Octopus Energy

A similar approach can be seen in the United Kingdom, where, to meet the changing expectations of consumers and society, the Government, the regulator, and industry have come to the common conclusion that addressing the challenge of decarbonisation will require new regulatory approaches and market designs that put decarbonisation at the centre of decision making across the whole system. This is why the UK's Office of Gas and Electricity Markets (Ofgem) has moved to promote a shift in regulatory accounting standards towards a more favourable view of the total expenditure approach (totex), which combines a portion of utility capex and opex into one regulatory 'asset'. This approach allows a regularised rate of return on both opex and capex (based on a preset percentage split), in order to incentivise utilities to innovate and seek cost-effective solutions to modernising the energy system, unlocking flexibility, and driving clean growth towards net zero emissions by 2050.

This sort of "digital-first" approach has already enabled Octopus Energy, a leading UK energy retailer (and the UK's largest investor in solar generation), to provide electricity sourced from 100% renewable resources to their customers—all while reducing customer service costs by more than 50% compared

[2] AWS, *Cloud Computing and Digital Transformation in Power and Utilities*, p.12.

to other energy providers. Building its industry-leading customer service platform entirely on the cloud (rather than taking the time and uncertain capital outlay to procure, build, and experiment with their own on-premises infrastructure) has enabled Octopus Energy to analyse and understand energy consumption rates quickly across the business, down to the household level, and to return these insights to their customers in the form of clear, personalised advice that saves their customers money according to their usage profile.[3]

An innovation-enabling "digital first" approach in New Zealand could help to accelerate achievement of the Commerce Commission's goals and regulatory mission. Whereas previous approaches that privileged capital outlays and long-term use of physical hardware/infrastructure (which had limited capacity to begin with, and diminishing utility over time), cloud computing services enable utilities to build more resilient digital grids while strengthening their customer relationships and lowering costs by accessing a range of innovative tools and digital environments to experiment in cost-effectively, while only paying for IT resources as they are consumed.

DERs, IOT and artificial intelligence: Enel, OVO Energy and Puget Sound Energy

Around the world, the proliferation of rooftop solar photovoltaic (PV) systems, electric vehicles (EVs) and energy storage, along with the increase of "connected" homes and businesses (marked by rapid adoption of devices such as smart speakers and smart thermostats), is creating opportunities for utilities to provide products and services that empower and delight customers, while ensuring safe and reliable delivery of power. Enel, a global utility with more than 60 million customers, saw digitalisation not just as an ambition but rather as a necessity, and moved more than 10,000 servers in 30 countries to the cloud in a matter of months.[4] The time and cost savings that were achieved with this move (storage cost savings of up to 60 percent, in addition to computational power savings of more than 20 percent) have enabled Enel X, the company's new solutions group, to focus on transforming energy services. Enel X is accelerating adoption of DERs using "Internet of Things" (IOT) data analytics to engage residential and business customers at scale with voice-enabled utility services.

EVs are seen as offering great promise for grid resiliency, but they can also add a lot of stress on the grid, with fast charging by EV owners temporarily doubling the energy needs of typical residences or businesses. Grid operators, who can see most directly how charging at the "wrong" time increases the stress on the grid, nonetheless have little control over when their customers decide to charge. As an example of how to address this challenge, OVO Energy have used cloud-enabled machine learning to support two-way energy flows for vehicle-to-grid applications in Europe, where the company's V2G charger dispenses energy back to the grid at peak times to the benefit of customers' pocketbooks and boost grid reliability, while another application uses artificial intelligence to charge EVs in off-peak periods to save customers money.[5]

Whether customers are fully-fledged "prosumers" with solar-plus-storage systems installed or simply have a smart device in the home, new opportunities abound for IOT-enabled services that, in line with

[3] AWS, *Octopus Energy Fuels Global Growth with AWS*, 6 August 2020.
[4] AWS, Enel Case Study at https://aws.amazon.com/solutions/case-studies/enel/ (accessed 02 June 2021).
[5] AWS, *Whitepaper on Enabling the Connected Energy Customer Through Cloud and Voice Services*, 2018.

the Commerce Commission's focus on delivering consumer value, will enable consumers to make informed choices and control when and how they consume electricity. The good news is that meeting customers where they are has never been easier thanks to cloud-enabled artificial intelligence and machine learning applications. AI applications enable the leveraging of data sets from existing grid infrastructure to foster services like load control, dynamic pricing, and alerts tied to peak periods and billing. The marriage of AI with voice services will enable further advances in utility-provided customer-centric initiatives. Puget Sound Energy in the Pacific Northwest of the United States, for example, is improving their responsiveness to customers by creating cloud-enabled applications that can be used with smart speakers/smart thermostats, as well as connected water heaters/HVACs and other smart appliances that can be responsive to both a homeowner's comfort needs and their desire for energy/cost savings.[6]

As seen by these examples, for utilities, for end-use consumers, and for the grid as a whole, there are substantial benefits to encouraging (and potentially even financing) the deployment of DERs and smart home technologies that provide more visibility into customer energy use. Demand response is just one example of a major hidden benefit of EVs and other DERs to both the utility and consumers, which allows utilities to shift loads and address peak demand without building "peaker" plants or other infrastructure that is more expensive and carbon-intensive—and which may become a stranded asset. Through its coming review process, the Commerce Commission has an exciting opportunity to examine closely the impact of DERs on grid reliability, as well as capture the economic value of DERs for both power distribution systems and for end-use customers.

Managing renewable energy and reporting through cloud analytics: Portland General Electric

An example of how utilities are leveraging cloud-enabled capabilities to manage greater prevalence of solar generation by end-use customers—and give a better customer experience at the same time—can be seen in Portland General Electric (PGE) in the United States.[7] PGE recently combined a cloud-based data lake and analytics platform with machine learning to create a highly predictive tool for solar generation. This tool was originally created with the goal of aiding their own grid management, but PGE found that when they shared these insights with end-use customers, it also had the added benefit of increasing customer satisfaction among current solar customers, as well as reducing application timelines and increasing the number of sign-ups among prospective solar customers. PGE have also developed a decarbonisation dashboard, which was originally intended to track PGE's carbon footprint across their own fleets and facilities. PGE customers - who are increasingly subject to carbon reporting requirements themselves, which traditionally required a great deal of manual input time and effort - have found great value in this tool as well, as it automatically calculates and generates reporting of energy use and associated emissions, all formatted according to common U.S. Environmental Protection Agency (EPA) standards.

[6] See AWS, *Cloud Computing and Digital Transformation in Power and Utilities*, p.10.
[7] AWS, *Portland GE Delivers Exceptional Customer Experiences on AWS*, April 2021.

The opportunity to incentivize timely technological evolution

AWS is of the view that the Commerce Commission's forthcoming review presents an extremely important and timely opportunity to put in place the incentives that will allow the industry to embrace the technology evolution needed to better realize the Commerce Commission's objectives of identifying cost-effective means of decarbonising the grid and supporting an energy transition that increases resiliency while empowering consumers through improved demand-side management.

We respectfully submit that, as part of the upcoming Inputs Methodologies Review, the Commerce Commission consider novel approaches for incentivising the sector to invest in the technologies that will help enable a successful energy transition. One such example, described above, is Ofgem's totex model for determining a rate return for both capex and opex. We have seen the potential of this progressive approach in encouraging utilities to embrace cost-effective solutions for modernising the energy system. Such incentives models can support regulatory objectives around supporting New Zealand's transition to a low carbon economy and wider energy transition objectives and innovative approaches to providing New Zealand consumer with the low cost energy service they demand across reliable and resilient network.

Thank you again for the opportunity to provide input here, and we look forward to serving as a thought partner on these issues and more as the regulatory review process continues. We stand ready to provide additional input.

Should you wish to discuss the views above in further detail, please do not hesitate to reach out to me by email at: pdkeatin@amazon.com.

Yours sincerely,

Paul Keating
Head of Public Policy, New Zealand
Amazon Web Services

Appendix: Introduction to Amazon Web Services (AWS)

Introduction to AWS

For over 15 years, Amazon Web Services has been the world's most comprehensive and broadly adopted cloud platform, powering businesses in 190 countries around the world. AWS continually expands its services to support virtually any cloud workload, and now has more than 200 fully featured services for compute, storage, databases, networking, analytics, machine learning and artificial intelligence (AI), Internet of Things (IoT), mobile, security, hybrid, virtual and augmented reality (VR and AR), media, and application development, deployment, and management. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—trust AWS to power their infrastructure, become more agile, and lower costs. To learn more about AWS, visit aws.amazon.com.

AWS opened its first office space in Aotearoa eight years ago to support the nation's digital transformation by helping Kiwi businesses harness the benefits of cloud technology. Using the AWS cloud, governments and businesses of all sizes have access to a secure, flexible and cost-effective environment for their IT services, which helps Kiwis innovate quickly, take their ideas to the world, and level the playing field. Today, AWS employs more than 100 employees in New Zealand to support the tens of thousands of customers in New Zealand using AWS each month. These customers range from startups and fast-growing small to medium-sized businesses like Classic Group, Halter, Sharsies, Soul Machines, Tainui Group Holdings, UneeQ, and Yellow, to larger organisations such as Air NZ, BNZ, Ministry of Health, TVNZ, University of Auckland, Vector, Vodafone, and Xero. AWS recently expanded its presence in New Zealand with new offices in Auckland and Wellington.

Our Climate Pledge to achieve net zero emissions

As part of Amazon's Climate Pledge, Amazon (and AWS as part of it) is committed to reach net zero carbon emissions across its business by 2040, and ten years ahead of the Paris Agreement goals. This commitment is closely aligned with the New Zealand Government's climate targets. We see ourselves as strong partners in working with the Government and New Zealand businesses to help achieve emissions reduction targets.

A key component of our commitment to net zero is powering Amazon's infrastructure with 100 percent renewable energy, and the company is now on a path to achieve this milestone by 2025, five years ahead of the initial 2030 target. To support the development and construction of new renewable energy, Amazon procures renewable energy beyond the existing grid mix. This includes our investments in off-site renewable energy contracts for wind and solar farms, and site energy contracts and green tariffs with local utilities that result in new projects being added to the grid. As of April 2021, Amazon has 206 renewable energy projects across the globe that have the capacity to generate over 8,500 megawatts (MW) and deliver more than 23 million megawatt hours (MWh) of energy annually—enough to power more than 2 million U.S. homes.

Achieving emissions reductions on the AWS cloud

At Amazon Web Services (AWS), we are committed to running our business in the most environmentally friendly way, and our scale allows us to achieve higher resource utilization and energy efficiency than the typical on-premises data centre. In addition to helping our customers increase agility and reduce costs, moving to AWS is also much more sustainable, as customers no longer have to provision for peaks, and AWS's infrastructure is designed to operate efficiently at scale.

AWS is continuously working on ways to increase the energy efficiency of its facilities and equipment, and innovating the design and manufacture of its servers, storage, and networking equipment to reduce energy use. The AWS Global Infrastructure is built on AWS's own hardware, which includes purpose-built servers, routers and silicon optimized for workloads run by AWS customers.

A forthcoming study by 451 Research, a unit of S&P Global Market Intelligence, finds that AWS's infrastructure is five times more energy efficient than the median of surveyed enterprise data centres in the Asia-Pacific region, with more than two thirds of this advantage due to a more energy efficient server population and higher server utilization. The average enterprise business would see a nearly 80% reduction in the carbon footprint of workloads moved from on-premises data centres to the AWS cloud.

We are able to achieve these outcomes as a result of efficiency advantages at both the server and facility levels in our cloud infrastructure. This translates into dramatically less energy used to perform the same unit of work. On the server side, AWS designs server systems with great attention to power optimization, using the very latest technology components. We run servers to higher levels of utilization, leveraging the ability to share and dynamically allocate resources on the cloud. Facility-level efficiency gains include data centre designs that use lower energy methods and a leaner electrical infrastructure, resulting in lower energy losses to power distribution.

How AWS is powering the Digital Utility

AWS empowers utility customers to transform generation, transmission, and delivery networks to improve reliability, enhance customer satisfaction, lower operating costs, and safe guard the security of grid infrastructure.

With AWS, utility customers transform and converge IT (information technology) and OT (operational technology) system architectures to gain agility and to unlock business innovation, strengthen the resilience of asset delivery networks, and engage consumers to unlock the efficiency and market power of distributed energy resources.

AWS and its partners equip utilities to confront ubiquitous challenges from megatrends that include energy supply **decarbonisation**, system **decentralization**, and energy value chain **digitalisation**.