



ShapingSEQ 2023 Update



Engineers Australia's submission
September 2023

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About Engineers Australia

Engineers Australia is the peak body of the engineering profession representing the collective voice of over 115,000 individual members nationally, which includes over 26,000 members in Queensland. Constituted by Royal Charter, our mission is to advance the science and practice of engineering for the benefit of all Australians.

Engineers and engineering are indispensable contributors to Australia's prosperity and lifestyles. Engineering services are embodied in almost every good or service consumed, used, or traded by Australians, now and in the future. Engineers are the enablers of productivity growth because they convert 'brilliant ideas' into new commercial products, processes, and services. Engineers also ensure society gets the most out of existing facilities by optimising their operations and maintenance.

Engineers are passionate participants in public discourse, contributing to meaningful community and policy discussions that impact the economy and society. Engineers Australia formulates its policy positions through engagement with members and non-member engineers, industry, educators, government officials, and other experts across Australia and internationally. By synthesising these diverse perspectives, we develop evidence-based policy aligned with the highest professional standards.

This submission has been developed by members through Engineers Australia's member-delivered policy and advocacy initiative.

Executive Summary

Engineers Australia provides this submission to the Queensland Government compiling the thoughts of leaders in the engineering industry in response to the ShapingSEQ 2023 document. This submission addresses the themes and topics where Engineers Australia has an existing position. Engineers Australia broadly supports the objectives and thoughts defined in the draft document and has provided responses, recommendations and identified omissions for further consideration and development.

The draft ShapingSEQ 2023 documents that it maintains the fundamental elements of *Shaping SEQ 2017*, including the five themes underpinning the 50-year vision for SEQ: Grow, Prosper, Connect, Sustain and Live. All these themes are linked together, an approach supported by Engineers Australia.

Collaborative strategic planning across sectors is essential to address population growth sustainably. It ensures efficient resource allocation, infrastructure development, and environmental protection. Coordination among government, industry, and civil society fosters long-term solutions that balance economic growth with environmental and social well-being, ensuring a sustainable future for all.

Infrastructure systems should demonstrate resilience and possess the capacity to promptly rebound from failures. These systems encompass critical sectors, including energy, transportation, utilities, communication, healthcare, finance, food supply, cybersecurity, environmental, and community infrastructure.

It is crucial to establish a comprehensive policy and financial framework that fosters substantial investments and resource allocation, thereby ensuring the maintenance of an acceptable standard of resilience with clearly defined key performance indicators (KPIs)

In considering the themes in turn, Engineers Australia sees the need for some validation on the population assumptions in theme Grow and a timely integration opportunity between concurrent policy developments in the Queensland Energy and Jobs plan and the ShapingSEQ Update in the theme Prosper.

In terms of theme Connect, Engineers Australia believes there is still an opportunity to broaden the emphasis of this theme to 'An efficient and safe movement system'. As per Engineer Australia's Road Safety discussion paper (2019)¹, road safety for all users should be a primary objective of road planning. Engineers Australia also foresees a juncture between transport planning and energy as electrification occurs at scale.

The linkages and alignments with other policies appear unclear, and it is essential to demonstrate these connections to illustrate how they mutually support one another for improved outcomes. For instance, it is crucial that the Queensland Water Strategy, which is currently in draft form, aligns with and complements this plan. Compared to the population forecast adopted for the ShapingSEQ 2017, the Water Security Program Annual report (2017)², this draft ShapingSEQ 2023 update is based on an additional 500,000 in population growth.

Water is at the core of sustainable development and is critical for socio-economic development, healthy ecosystems and for human survival itself. Water can pose a serious challenge to sustainable development but if managed efficiently and equitably, water can play a key enabling role in strengthening the resilience of social, economic, and environmental systems in the light of rapid and unpredictable changes. This makes it essential to acknowledge the pressing need for new water sources and the associated infrastructure to accommodate the expected demand within the ShapingSEQ 2023 update. Due to this, there is concerned about the limited time available for preliminary planning before finalising the Draft SEQ Infrastructure Supplement.

When determining land use and zoning, it is uncertain whether sufficient consideration has been given to restricting developments in natural hazards, flood-prone areas, and those at risk of dam failures. Additionally, we should aim to prevent exacerbating flood vulnerabilities and to avoid the increase of risk and consequences of dam failure due to increased population downstream of the dam.

In a forward-looking strategy spanning five decades, acknowledging three additional vital domains is crucial. Firstly, decarbonisation is a global imperative requiring immediate action to achieve carbon neutrality by 2050, with profound economic and environmental consequences. Secondly, ecosystem restoration and biodiversity preservation are urgent, necessitating active efforts, especially in regions like Australia which are facing ecological challenges. Lastly, embracing digital transformation, including AI and data analysis, is vital for innovation and resilience. Neglecting these areas in long-term strategy risks missed opportunities and pitfalls. Proactively addressing them ensures a holistic approach to future challenges and opportunities.

Engineers Australia calls on all governments to lift the voice of engineering and establish additional senior engineering roles within government. This will enable greater 'in-house' technical support for policy, strategy and decision-making. To support the ShapingSEQ 2023 plan, the Queensland Government needs chief engineers and qualified engineers to deliver the numerous initiatives ensuring that decisions made for the community are informed by sound engineering principles, delivering robust and fit for purpose infrastructure.

¹ Road Safety, transport Australia Society Discussion Paper, October 2019. [Road safety: discussion paper \(engineersaustralia.org.au\)](#)

² 2017 Water Security Program Annual report, December 2017. [Corporate - Report Template \(seqwater.com.au\)](#)

In summary, Engineers Australia recognises the positive challenges ahead and is open to working with State Development, and the Queensland Government more broadly to achieve the best outcome for Queenslanders now and into the future.

1. Grow

1.1. Efficient land use

Engineers Australia understands that the themes (such as Grow and Live) covering the Draft ShapingSEQ 2023 relate to each other which is also supported by the National Urban Policy (2011)³. The report outlines the Australian Government's objectives and directions for cities over coming decades and the intention is to improve the productivity, sustainability, and liveability of major urban centres. This is also supported by Australian Infrastructure Plan (2021)⁴ which promotes an increase in density around our cities too. Further, the National Urban Policy (2011)⁵ notes that the land use and infrastructure need to be integrated and the proposed integration is by Integrating planning of land use, social and economic infrastructure, investing in urban passenger transport and Protecting corridors, sites, and buffers for the environment.

However, there is a gap of detail between the draft ShapingSEQ 2023 population forecasting and the Intergenerational Report (2023)⁶. The Intergeneration Report 2023 documents the demographic growth and investments required by 2062-2063. This report forecasts a population increase from 26.5m to 35.3m (FY2046-2047) nationally for the same period of the draft Shaping SEQ. Assumptions can be made using the draft Shaping SEQ 2023 population forecasts for the same period (3.8m to 6m) that the SEQ region is to take half of the national population growth. Whilst outside of Engineers Australia policy position, we believe this needs further examination.

The draft ShapingSEQ 2023 recognises this challenge, and aligns with this need, with a general push in all areas to increase the density of housing around our economic centres.

It is recommended that an elaboration on policies and guideline updates to increase density around the cities is recommended. An updated regional plan will lead to an updated Queensland Government Statisticians Office (QGSO) with low/medium/high series projections, which will be useful to understand and potentially of EA interest, as it has implications on Prosper, Connect and Sustain.

³ Our Cities, Our Future – A National Urban Policy for a productive, sustainable and liveable future, January 2011. [Our Cities, Our Future – A National Urban Policy for a productive, sustainable and liveable future, 2011 | Infrastructure Australia](#)

⁴ Reforms to meet Australia's future infrastructure needs, 2021 Australian Infrastructure Plan, August 2021. [2021 Australian Infrastructure Plan \(infrastructureaustralia.gov.au\)](#)

⁵ Our Cities, Our Future – A National Urban Policy for a productive, sustainable and liveable future, January 2011. [Our Cities, Our Future – A National Urban Policy for a productive, sustainable and liveable future, 2011 | Infrastructure Australia](#)

⁶ Intergenerational Report 2023, Australia's future to 2063, August 2023. [Intergenerational Report 2023 \(treasury.gov.au\)](#)

2. Prosper

2.1. Knowledge and technology precincts

As per the Engineers Australia's document "Our position on Climate change"⁷, a managed transition is needed. Climate change is a complex and multifaceted problem. It requires an ambitious and effective national strategy for emissions reduction and the development of clean industries underpinned by renewable energy. Substantial investment is needed, which will create new social and economic opportunities in all sectors and regions. Dedicated support must be provided to vulnerable industries, communities, and workforces so they can take advantage of the opportunities the transition will deliver.

Engineers Australia supports ongoing planning and incentives to develop renewable energy hubs. Many renewable technologies such as bio-digestion, green hydrogen, gasification, and sustainable liquid fuels are complimentary. Renewable energy hubs can lower the establishment and operating cost overall through common utilities and feedstocks.

2.2. Special uses

The Draft ShapingSEQ 2023 document provides an overview of the growth and expansions that are foreseen for the future of Queensland. This growth must be underpinned with a sustainable growth in the electricity networks that will be needed to supply the energy needs for the future.

The 2023 Intergenerational Report (IGR)⁸ predicts the National Energy Market (NEM) will need to double its generation capacity by 2046. The IGR also predicts that wind, solar, and storage will account for almost four times the generation capacity in 2046 than they do today.

The draft ShapingSEQ 2023 – Sustain: with horizon year 2046 sets a state-wide target of 70 per cent renewable energy by 2032 and 80 per cent by 2035. However, the draft does not specify SEQ's role in meeting this target or how it translates into energy units in terms of gigawatts generated or required. Furthermore, the IGR projects that the NEM will need to add 170 gigawatts of new generation capacity by 2046. Of this, 100 gigawatts are expected to come from wind and solar. Similarly, the ShapingSEQ 2023 should also provide targets for different energy sources in gigawatts.

Engineers Australia notes the Queensland Government has provided strategy documents such as the Queensland Energy and Jobs Plan and 2023 Queensland Renewable Energy Zone Roadmap (2023)⁹ which do not appear to be sufficiently linked to the ShapingSEQ 2023 or supplements. Engineers Australia considers this roadmap must be integrated into the Shaping SEQ connect energy supplies and usage can be considered, with transmission corridor requirements as a specific land use and planning example. We note the consultation currently under way for Sustainable Liquid Fuels Strategy¹⁰ and whilst not likely to be at odds with the update may have implications. The growth highlighted in the ShapingSEQ 2023 needs

⁷ Our position on climate change, October 2021. [Our position on climate change \(engineersaustralia.org.au\)](https://engineersaustralia.org.au)

⁸ Intergenerational Report 2023, Australia's future to 2063, August 2023. [Intergenerational Report 2023 \(treasury.gov.au\)](https://treasury.gov.au)

⁹ 2023 Queensland Renewable Energy Zone Roadmap, July 2023. [2023 Queensland Renewable Energy Zone Roadmap \(epw.qld.gov.au\)](https://epw.qld.gov.au)

¹⁰ Sustainable liquid fuels strategy - options and opportunities paper, May 2023, https://www.epw.qld.gov.au/_data/assets/pdf_file/0022/34636/sustainable-fuels-strategy-consultation-paper.pdf

to consider how energy supplies are going to be provided for the proposed growth of domestic and industrial regions given the substantial change unfolding in this sector.

It is widely discussed that the future of domestic dwellings will be based on “Smart Homes” and for industrial and commercial buildings the same changes are being touted as the future for supporting the climate change and net zero emissions targets. To achieve these objectives, it is necessary to consider how Smart Homes will be developed, the energy sources needed to provide reliable power and manage further growth. With the uptake of EV’s, new technologies and other energy driven devices it is imperative that due consideration to be given to how energy supplies will be provided for the proposed growth.

The “2023 Queensland Renewable Energy Zone Roadmap¹¹” discusses the setting up of regions for energy storage or generation. ShapingSEQ 2023 therefore, needs to recognise that there must be corridors for transmission of the GigaWatts of energy that will be required if the proposed levels of growth are achieved. These areas for storage and generation are vital for growth however, the aesthetics of living near such infrastructure is always divided. Careful consideration of locations for this infrastructure is needed given the long-term horizons for generation sites and transmission that can service the large SEQ power demands into the future. In the past large coal-fired power stations were strategically positioned near fuel sources and the regions with the highest energy usage. The energy transition to renewables is fast changing the way we generate power and careful consideration to the long-term future needs of Queenslanders is required.

When siting renewable generation sources, it is also imperative that the likely land use footprints be considered. If the ShapingSEQ2023 proposed growth levels are achieved and as the impact of climate change and net zero emissions targets are achieved, there will be a greater demand on energy resources. That is, public transport, rail and road freight, and other utilities are all likely to be large users of renewable energy and the ability to provide this reliably will be paramount to ensuring the success of the Shaping SEQ Sustain.

Engineers Australia has been active throughout Australia in not only promoting the energy transition to renewables but has developed several discussion and position papers that provide considered directions for such future growth.

Engineers Australia’s discussion paper on Integrating DER in the Grid (2022)¹² provides guidance on how to best utilise Distributed Energy Resources (DER) when planning large scale expansions within urban, rural, and industrial regions. This paper provides the Queensland government with clear guidelines on how to sustainably manage this growth.

3. Connect

Engineers Australia believes that State Infrastructure strategy and Regional Infrastructure (land use and transport) must be prepared to inform implementation of integrated land use and transport infrastructure. This planned implementation could be staged or sequenced if needed. Transport infrastructure needs to take into consideration equity, diversity, and inclusion to ensure safe, affordable, and accessible transport for all.

¹¹ 2023 Queensland Renewable Energy Zone Roadmap, July 2023. [2023 Queensland Renewable Energy Zone Roadmap \(epw.qld.gov.au\)](https://epw.qld.gov.au)

¹² Integrating distributed energy resources in the electricity grid, Energy EVP discussion paper, March 2022. [Integrating distributed energy resources in the electricity grid \(engineersaustralia.org.au\)](https://engineersaustralia.org.au)

The integration of land use and transport needs to be recaptured as they cannot exist in isolation. It is further required to also address who are the qualified personnel to be engaged in the development of any transport strategies etc. For example, RPEQ requirements favours those with civil engineering degrees whereas broader skill set from transport and land use planners and data analysts would be more appropriate.

In terms of technology, Electric Vehicles (EV) provide an opportunity and challenge for land use planning in Southeast Queensland (SEQ). The risk that the predominance of the private car as a method of transport remains albeit the polluting internal combustion vehicle is replaced with a less directly pollution vehicle. The opportunity is to embrace the change that is coming in a positive way and seek to ensure polices and regulations are in place to capture the benefits of a less pollution and more connected transport system. Engineers Australia has been at the forefront in providing advice to government on policy and regulation. For example, Engineers Australia's Fuel Emissions Standard Submission (2023)¹³ advocates for a strong and rapid uptake of international fuel emission standards to promote the updates of EVs.

However, infrastructure associated with the energy transition for the proposed growth needs careful consideration as we have noted under Special Uses and be clearly articulated within the document. The proposed changes to rail, public transport, increases in electric vehicle uptake all will have a profound impact on the power supply network and thus planning requirements.

3.1. An efficient movement system

Transport Main Roads (TMR) and Economic Development Queensland (EDQ) are progressing ways to tailor public transport provision that is more targeted to meeting actual local user need and avoid the one fits all and coverage model that is currently used. This approach needs to be encouraged and more explicitly addressed within the Plan.

It is recommended to consider options that make inter-regional travel from new communities attractive for high quality public transport to reduce reliance on the private vehicle. Engineers Australia's Road Safety discussion paper (2019)¹⁴ states road safety should be a primary objective of road planning. There could be an opportunity to broaden the emphasis of this section to 'An efficient and safe movement system'.

Engineers Australia suggests additional emphasis should be placed on road safety and applying Safe System principles to transport planning, traffic assessment and upgrades to transport infrastructure. Operations of existing roads should be reviewed, and target speeds used to create more forgiving environments for vulnerable road users (Road Safety Discussion Paper, 2019)¹⁵.

¹³ Engineers Australia Fuel Efficiency Standard Submission, May 2023. [Engineers Australia fuel efficiency standard submission VIC](#)

¹⁴ Road Safety Transport Australia Society Discussion Paper, October 2019. [Road safety: discussion paper \(engineersaustralia.org.au\)](#)

¹⁵ Road Safety Transport Australia Society Discussion Paper, October 2019. [Road safety: discussion paper \(engineersaustralia.org.au\)](#)

3.2. Active transport

Engineers Australia welcomes the inclusion of active transport infrastructure as part of the Regional Plan and Supplements and further suggests to emphasis the powerful role active transport has for enhancing urban areas as stated in Engineers Australia’s “Active Transport Discussion Paper (2019)¹⁶”.

Active transport infrastructure is one of the most powerful urban planning tools for enhancing the safety, accessibility, and liveability of a city. Effective and efficient active travel facilities have been proven to transform the relative attractiveness of precincts within many cities across the world (Active transport discussion paper (2019)¹⁷).

Engineers Australia supports the strong emphasis in the plan to prioritise active transport in the centres. The ShapingSEQ document needs to have more clarity around how active transport will be provided for in neighbourhoods surrounding city centres, including inner and outer suburbs. Engineers Australia’s Urban Transport Systems Policy and Planning Advice (2023)¹⁸ identifies the following components as key for providing liveable streets, places, and precincts throughout our cities:

- 30kph maximum speed on streets with high numbers of walkers and cyclists.
- More frequent, safer road crossings, including conveniently place zebra crossings.
- Safer walking routes to schools, train stations, bus stops, shops, parks etc.
- Taking opportunities to make walking routes more comfortable (for example more tree shade) more interesting and more direct.

Twenty five percent of Queensland’s population comprises children under 19 and 50 per cent of the population is of females (Queensland Population 2022/2023 (populationu.com) ⁽⁹⁶⁾). One of the objectives of Engineers Australia’s Transport Australia Society Women in Transport working group is to raise awareness of the issues that impact women and children’s transport experiences. Given that one in four Brisbane morning peak hour trips are for school travel, Engineers Australia suggests greater emphasis is needed on planning for destinations, used by children, to be proximate and safely connected by active and public transport. (The simple change that could slash travel times during school terms (2023)¹⁹).

3.3. Vibrant and connected regional activity centres

Engineers Australia recognises the important role regional activity centres have in reducing trip lengths across SEQ which is a measure of success for the ‘Connect’ theme of ShapingSEQ 2017. Engineers Australia supports Regional Activity Centres that have prioritised active and public transport infrastructure and services.

Due to the urban density and form of successful regional activity centres, they are more conducive to low-speed road environments which also supports safer outcomes for people’s journeys.

¹⁶ Active Transport, Transport Australia Society Discussion Paper, April 2019. [Active transport: discussion paper \(engineersaustralia.org.au\)](https://engineersaustralia.org.au/active-transport-discussion-paper)

¹⁷ Active Transport, Transport Australia Society Discussion Paper, April 2019. [Active transport: discussion paper \(engineersaustralia.org.au\)](https://engineersaustralia.org.au/active-transport-discussion-paper)

¹⁸ Urban Transport Systems Policy and planning advice, August 2023. [Urban Transport Systems Report August 2023 \(engineersaustralia.org.au\)](https://engineersaustralia.org.au/urban-transport-systems-report-august-2023)

¹⁹ The simple change that could slash travel times during school terms, July 2023. [Getting kids to walk or ride to school could slash travel times during school terms \(brisbanetimes.com.au\)](https://brisbanetimes.com.au/getting-kids-to-walk-or-ride-to-school-could-slash-travel-times-during-school-terms)

3.4. Integrated planning

Better public transport connectivity will support thriving communities and successful precincts in SEQ. Communities will also benefit from integrated, dense, and mixed land use precincts with such infrastructure as shared user paths for cycling and walking, public transport links, including affordable and easily accessible parking places.

Engineers Australia recommends that integrated planning includes access to public transport for those who are reliant on public transport for mobility due to their disability, including in regional areas of SEQ (Universal Design for Transport: Transport Australia Society Discussion Paper (2022)²⁰).

3.5. Region-shaping infrastructure

Engineers Australia welcomes the inclusion of significant public transport and active travel investments as part of ShapingSEQ 2023 to connect the planned future land use patterns of SEQ.

3.6. Movement and Place

Engineers Australia has covered the recommendations in Section 3.4 and 3.5.

4. Sustain

4.1. Water sensitive communities

Water is at the core of sustainable development, serving as a critical component for socio-economic progress, the health of ecosystems, and human survival. However, in the entire draft document, there is just one mention of water-sensitive urban design, as follows:

'Support water-sensitive urban design principles in planning and innovation in catchment-wide water management (such as total water cycle management planning) that enhances the efficient use of water (including stormwater and wastewater), bolsters supply security, addresses climate change, and manages impacts on waterways and Moreton Bay.'

This singular mention falls short in addressing the multifaceted challenges we face in achieving integrated water management that contribute to meeting water, public health, environmental and urban amenity outcomes.

Total Water Cycle Management (TWCM) is a broader concept compared to Water Sensitive Urban Design (WSUD). TWCM encompasses the entire water cycle, addressing water sourcing, treatment, distribution, consumption, and wastewater management on a regional or even global scale. WSUD, on the other hand, focuses on designing urban areas to efficiently manage water within a specific locality, often at the city or neighbourhood level. While both concepts aim to enhance water sustainability, TWCM has a wider scope and can incorporate WSUD principles as part of its approach.

As a guide, it is recommended that the following approaches could be considered for analysis and recommendations:

²⁰ Universal Design for Transport, Transport Australia Society Discussion Paper, April 2022. [Universal design for transport: discussion paper \(engineersaustralia.org.au\)](https://engineersaustralia.org.au)

- (a) Strategic Triangle, item (a)²¹, and
- (b) TWCM (or Integrated Water Cycle Management) Approach, item (b)²².

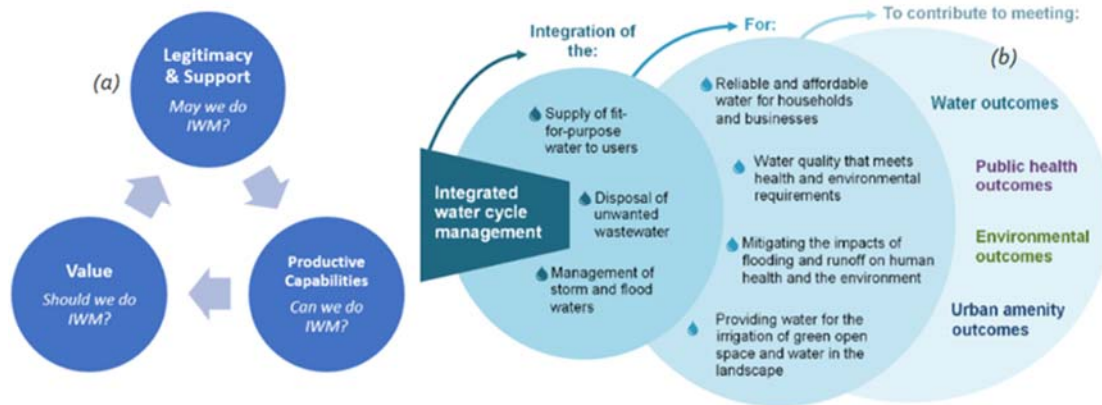


FIGURE 4-1 WATER SENSITIVITY ANALYSIS APPROACH AND RECOMMENDATION

While Total Water Cycle Management (TWCM) finds mention in this and other government plans, there appears to be a lack of successful TWCM cases currently operational in Southeast Queensland (SEQ). Some water reuse systems have been decommissioned or replaced with potable water due to various reasons. Additionally, water reuse, in many instances, is limited to irrigation purposes rather than augmenting potable water supplies.

We recommend conducting a gap analysis to strengthen the implementation of TWCM as outlined in the plan. Examining the successful TWCM practices in Victoria and New South Wales, and the governance model of water in Western Australia, Tasmania and overseas could provide valuable insights into effective policies, governance structures, frameworks, and incentives that might be adapted for Queensland.

Beyond TWCM, it is imperative to adopt a circular economy approach to water. This approach offers the opportunity to fully recognize and harness the value of water as a service, an input to processes, a source of energy, and a carrier of nutrients and other materials. Furthermore, there is limited evidence of linkages and alignment with other policies. It is essential to demonstrate these connections to illustrate how they mutually reinforce one another for improved outcomes. For instance, the Queensland Water Strategy, also in draft form, should align with and support the objectives outlined in this plan.

In addition, the draft document does not address the identification of a new water source, even though it is expected to be finalized by the end of December 2023. This could pose challenges for responsible organisation.

Several significant government decisions are pending that will impact the determination of a new water source:

²¹ Creating public value: Strategic management in government, Mark Moore, 1995 Harvard University Press. (<https://anzsog.edu.au/research-insights-and-resources/research/what-is-public-value/>)

²² Integrated Urban Water Management - Why a good idea seems hard to implement, Australian Government Productivity Commission, Page 29, 2020, <https://www.pc.gov.au/research/completed/water-cycle>

- The potential utilisation of the existing Western Corridor Recycled Water scheme for drought management and water security.
- The decision regarding the potential upgrade of Somerset Dam and/or Wivenhoe Dam to increase flood storage capacity.

Delays in making these decisions could lead to a situation similar to the Millennium Drought, where the government was pressed for urgent water infrastructure to combat drought conditions. Thoughtful planning, design, and execution will enable the development of infrastructure at a lower cost with enhanced effectiveness.

Engineers Australia has developed a Queensland Water Policy Statement to suggest a way toward a prosperous, sustainable, and resilient future (Queensland Water Policy (2023)²³).

We recommend taking the One Water approach to manage all water sources and the uses and discharge of water in a holistic manner. It is envisaged this approach will be supported by the centralisation of governance and management of water by a single Queensland Water Department. This would function similarly to the Department of Transport and Main Roads in the oversight of roads and traffic. A single Water Department would provide a suitable framework for:

- Better governance and management of all water sources, water uses and discharge in a sustainable manner,
- Improvements in water security, drought response and systems resilience to cope with future trends and major shocks,
- Better use of data, science, research, and technologies as the basis for defensible decision making, and
- Ensuring suitably qualified and experienced engineers are leading and coherently undertaking professional engineering services to protect our community and to secure a better future.

4.2. Climate change

The State Government should continue its financial commitment to establish reliable, renewable electricity in the state. This includes investing in solar, wind, hydrogen, and hydro power projects, as well as transmission and distribution infrastructure. The government should continue to provide incentives for the purchase of electric vehicles (EVs) removing the EV purchase price limit and extend the incentives to e-scooters and e-bikes. These are zero-emission personal travel vehicles that can help to reduce greenhouse gas emissions. However, it is important to note that most EVs are charged at night when the demand for electricity is low. This means that renewable electricity must be available at night for EVs to achieve substantial greenhouse gas savings.

The Queensland Government should adopt a technology agnostic life cycle analysis-based approach to address climate change. This means the government should not favour any particular technology but should instead consider the overall environmental impact of each technology, from its manufacture to its disposal. This approach would allow the government to select the most effective technologies for reducing greenhouse gas emissions, while also considering other environmental factors, such as air pollution and water quality.

Liquid fuels will still be required beyond 2050 for long-haul trucks, aviation, mining, marine, and even passenger cars. Sustainable liquid fuels, such as those produced from biomass or waste, have a long-term future in these applications. Queensland Government has a particular opportunity here given the feedstocks in the State and we note the recent announcement between Queensland Government, Ampol

²³ Queensland Water Policy: Water Governance for a resilient future, February 2023. [Queensland Water Policy - Water governance for a resilient future \(engineersaustralia.org.au\)](https://www.engineersaustralia.org.au/queensland-water-policy-water-governance-for-a-resilient-future)

and INEOS to explore opportunities on biofuels, which emphasise that industry in SEQ is likely to participate in these emerging sectors and retain heavy industry as a regional activity, centred around the Port of Brisbane.

The circular economy and waste-to-energy should be incorporated into the production of these fuels, such as through anaerobic bio digestion. Engineers Australia's National Hydrogen Strategy Review²⁴ recommends Hydrogen development to be prioritized for applications where there is no alternative, such as ammonia and fertilizer manufacture and refining.

Engineers Australia's Transport Australia Society (TAs') Climate Change Discussion Paper²⁵ presents a range of proposed recommendations for engineering practitioners in the field of transport engineering. These recommendations are intended to guide engineering professionals who may be engaged in the planning, design, construction and operation of transport systems and infrastructure. They are intended to identify good engineering practice in respect of climate change.

Short Term Priorities proposed in the discussion paper noted that to meet 2050 emission reduction targets, action is required between now and 2030 for the following transport network aspects:

- Regulatory and financial incentives to encourage a market shift from ICEs to EVs.
- Develop mixed land-use transport plans for urban areas that reduce the need for car travel.
- Prioritise delivery of active and public transport projects over road capacity in urban areas.
- Update traffic control systems to give priority to public transport and maximise person flow.
- Develop and implement travel demand management strategies for all Australian cities.

4.3. Resilience

Infrastructure systems should demonstrate resilience and possess the capacity to promptly rebound from failures. These systems encompass critical sectors, including energy, transportation, utilities, communication, healthcare, finance, food supply, environmental, and community infrastructure.

It is crucial to establish a comprehensive policy and financial framework that fosters substantial investments and resource allocation, thereby ensuring the maintenance of an acceptable standard of resilience with clearly defined key performance indicators (KPIs) (Wellington Water: Emergency Water²⁶). The goal of this strategy is to provide 80 per cent of customers, within 30 days of a reasonable seismic event, with 80 per cent of their normal water needs. It is also important to create a safer, more prepared, and adaptable community that can effectively respond to and recover from adversity, whether it be natural disasters, economic downturns, public health emergencies, or other crises.

To enhance resilience, integrating long-term planning, sustainability, and a 'OneWater' approach is essential. Comprehensive long-term planning entails risk assessment, scenario planning, stakeholder engagement, and clear resilience goals. Sustainability practices include water efficiency, green infrastructure, renewable energy adoption, and ecosystem restoration. The OneWater approach treats all water sources as interconnected, promoting integrated water management, water reuse, and smart technology use. Education and public outreach raise awareness, while adaptive management ensures

²⁴ National Hydrogen Strategy Review, Engineers Australia, August 2023. [Engineers Australia's response to the national hydrogen strategy review](#)

²⁵ Climate Change and Transport, Transport Australia Society Discussion Paper, October 2020. [climate-change-transport-discussion-paper.pdf \(engineersaustralia.org.au\)](#)

²⁶ Wellington Water: Emergency Water. [Emergency water \(wellingtonwater.co.nz\)](#)

continuous assessment and learning from experiences. This combined strategy fosters greater resilience to water-related challenges and ensures a sustainable future for communities.

The concept of resilience is about the capacity of a system to recover after a failure (The Future of Decentralized Electricity Distribution Networks (2023))²⁷. This is important in power supply system as well.

As per International Energy Agency, Energy use from cities account for around 75 per cent of global energy use and 70 per cent of global emissions. Around 50 per cent of global population lives in cities (2021) and this is expected to increase to 70 per cent by 2050²⁸. At present energy (electricity) supply to cities and regions is via the established Grid. The 2022 Engineers Australia Discussion Paper (EVP)²⁹ on integrating Distributed Energy Resources (DERs) in Australia, looked at how communities can utilise DERs in the move towards Net-Zero. DERs can provide communities with the option to reduce the reliance on the Grid, this in turn may help to alleviate extra investment in power generation, transmission, and distribution assets as SEQ grows in population in the time period outlined in SEQ 2023. Furthermore, DERs provide for resilience when disruptions such as storms, and other events occur. DER can operate 'off-grid' to ensure power is maintained when the Grid suffers prolonged outages caused by the events mentioned.

The Discussion paper on DERs³⁰ suggested there are potential roles for Engineers Australia to engage, in line with the SEQ 2023 some of these might include:

- Engineers Australia can provide easily understood information on DERs and how these may align with the SEQ 2023 Plan
- Awareness amongst Engineers Australia members to be involved in the SEQ 2023 Plan
- Engineers Australia can provide technical input on matters of resilience and risk engineering.

5. Draft SEQ Infrastructure Supplement

The supplement identifies an infrastructure pipeline which it hopes will address the projected population growth across several sectors including transport, housing, water, health energy and so forth. Focussing on the transport infrastructure, the following topic areas are identified:

5.1. Governance

The SEQ Regional Plan and its Infrastructure Supplement will need to be implemented with the support of several internal state government agencies and external key stakeholders, especially local government. However, in this plan the idea around how the proposed infrastructure items and actions are to be

²⁷ Sioshansi, F. (Editor), 2023. *The Future of Decentralized Electricity Distribution Networks*, Elsevier Inc., Cambridge, MA, USA. [The Future of Decentralized Electricity Distribution Networks - 1st Edition \(elsevier.com\)](https://www.elsevier.com)

²⁸ Empowering Cities for a Net Zero Future: Unlocking resilient, smart, sustainable urban energy systems, IEA, Paris, July 2021. [Empowering Cities for a Net Zero Future \(windows.net\)](https://www.windows.net)

²⁹ Integrating distributed energy resources in the electricity grid, Energy EVP discussion paper, March 2022. [Integrating distributed energy resources in the electricity grid \(engineersaustralia.org.au\)](https://engineersaustralia.org.au)

³⁰ Integrating distributed energy resources in the electricity grid, Energy EVP discussion paper, March 2022. [Integrating distributed energy resources in the electricity grid \(engineersaustralia.org.au\)](https://engineersaustralia.org.au)

delivered is unclear. Greater clarity is needed as to which department or agency will lead this and which department will oversee scheme.

Engineers Australia recommends the following:

- A well-defined governance structure.
- Expansion of the stated 2-year review process by outlining the governance and implementation of the plan.
- Identification of a risk management strategy

5.2. Timing and tracking

Previous SEQ Infrastructure Plans have detailed the general timeline for planning, delivery, and construction of infrastructure over the 20-year horizon, with budgets and timeframes included, such as in an easy-to-read table format as per the previous plan. Although both the supplement and the main document provide nice graphical tables on projects, they lack the detail on time, status, and budget. Engineers Australia recommends following:

- Apply the level of transparency the previous published documents had to the SEQIS, and at the very least to the full SEQ Infrastructure Plan due in 2025.

5.3. Accessibility

In the current draft document, although reference is made to passenger/mass and active transport, there is a lack of targeted specifics. Engineers Australia recommends:

- Prioritisation of personal mobility within the listings of different transport modes. Encourage walking/rolling/ public transport before car usage.
- Expanding the single walking initiative to include other local government areas to fortify and promote the new and sustainable transport paradigm of movement and place. Make any active transport corridors/ planned corridors explicit in the scheme so they are recognised.
- Bring forward long term planning of key public transport infrastructure ie Varsity Lakes to Gold Coast airport appears in long term timeframe just as 'planning', into the medium term for implementation into the long term.

5.4. Freight Task

Considering the projected population growth and the existing known challenges to the freight task at the bulk level – port, internodal terminal, rail freight access, and the ongoing revolution of personalised freight, Engineers Australia feels that this topic is not addressed in detail or to the required level of urgency. For example, outside of falling under 'strategic planning' or some tick under 'Key Regional Infrastructure' column or general references to long standing issues such as the form and function of IMT's there is not the level of discussion and planning one would hope for and its relationship to land use planning. In particular, access to the port, freight management and storage in and around the port and the function of Inland Rail are only given cursory mentions. Engineers Australia recommends:

- Provision of a more comprehensive and informed analysis of the freight task and discussion around its role in the urban footprint
- Expand, detail, and identify timelines and funding to key infrastructure items.

6. Missing elements/additional comments

Engineers Australia would like to highlight a few main missing elements which are discussed as follows:

In a forward-looking strategy document spanning the next five decades, it is a glaring omission not to explicitly acknowledge the critical significance of three key domains that will profoundly shape our future. These are:

- **Decarbonisation:** Achieving carbon neutrality by the year 2050 stands as a global imperative. Forward-thinking strategies must prioritise this objective, given the pressing urgency of the matter. The path to decarbonisation demands immediate action rather than solely relying on future plans. The repercussions of inaction are substantial, encompassing both economic and environmental dimensions.
- **Ecosystem Restoration and Regeneration:** The degradation of ecosystems and the alarming loss of biodiversity constitute some of the most urgent environmental challenges of our time, particularly in regions like Australia. As we advance into the future, safeguarding ecosystems alone will not suffice. Vigorous efforts towards active restoration and regeneration are imperative. This becomes even more poignant in the context of Australia's unique biodiversity and the pronounced challenges it has encountered in recent years, such as devastating bushfires.
- **Digital Transformation and Accelerated Computing:** The rapid advancements in technology, notably in the realms of artificial intelligence, machine learning, and data analysis, are catalysing revolutionary changes across various sectors, including infrastructure. Overlooking the potential of these transformative technologies would mean missing out on opportunities for optimisation, innovation, and resilience. Tools like ChatGPT and other generative AI models represent just the beginning of this technological revolution. The seamless integration of these cutting-edge technologies is destined to become indispensable in the years to come.

Neglecting these pivotal domains in a long-term strategy could expose us to potential pitfalls and lead to missed opportunities. Taking a proactive stance in addressing these issues will ensure a holistic approach that is finely attuned to the dynamic challenges and opportunities that lie ahead.

Workforce planning: Whilst not directly addressed in the ShapingSEQ Update, Engineers Australia would highlight the professional and technical workforce requirements in delivering the policy and would look to assist Queensland Government more broadly on this matter. Engineers Australia has strong positions on technical competency, how to address the current technical skills shortages and recommendations to develop a more diverse workforce through programs such as Women in STEM, and Migrant Engineer pathways. Some of the reference links as follows:

- [Strengthening the Engineering Workforce](#), Engineers Australia 2022
- [Women in Engineering Report](#), Engineers Australia 2022
- [Gender Equity in STEM](#), Department of Industry, Science and Resources
- [Barriers to Employment for Migrant Engineers](#), Engineers Australia 2021

Engineers Australia is already engaged in lifting participation rates in the professional jobs sector and is acutely aware of emerging critical skills shortages. In this context, the provision of key skills will be vital to ensuring the ongoing success of the policy objectives.

Need for Chief Engineer and qualified engineers: Government agencies, departments and other statutory authorities suffered from a lack of engineers for many years due to the loss of many positions by

the previous government. To support the ShapingSEQ 2023 plan, we need chief engineers and qualified engineers to deliver the numerous initiatives ensuring that decisions made for the community are informed by sound engineering principles, delivering robust and fit for purpose infrastructure.

Engineers are a key profession when it comes to strategic planning for our cities. It is important, and valuable for governments, to have senior leaders in their executive team who have a technical/engineering background, who can influence and support good government decision making.

Engineers are trained problem solvers (irrespective of the issue) so they can be valuable contributors to any process. Engineers, with their STEM background, also provide diversity of thought and experience that complements other decision makers such as public policy experts.

ACT's Chief Engineer Adrian Piani FIEAust CPEng EngExec NER outlined his role and how the Territory is planning to grow the capability and capacity of its engineering workforce³¹.

“As the ACT Chief Engineer my objectives are to provide strategic advice on infrastructure projects, to advocate for the role of engineering and to ensure the ACT Government has the relevant engineering skills to deliver high quality engineering outcomes to make Canberra one of the world's most liveable cities. I have two main priorities:

- to develop and implement a workforce plan for engineers in the ACT Government
- to provide strategic support to government in infrastructure decision making.

³¹ The role of engineering in government, September 2023. [The role of engineering in government | Engineers Australia](#)