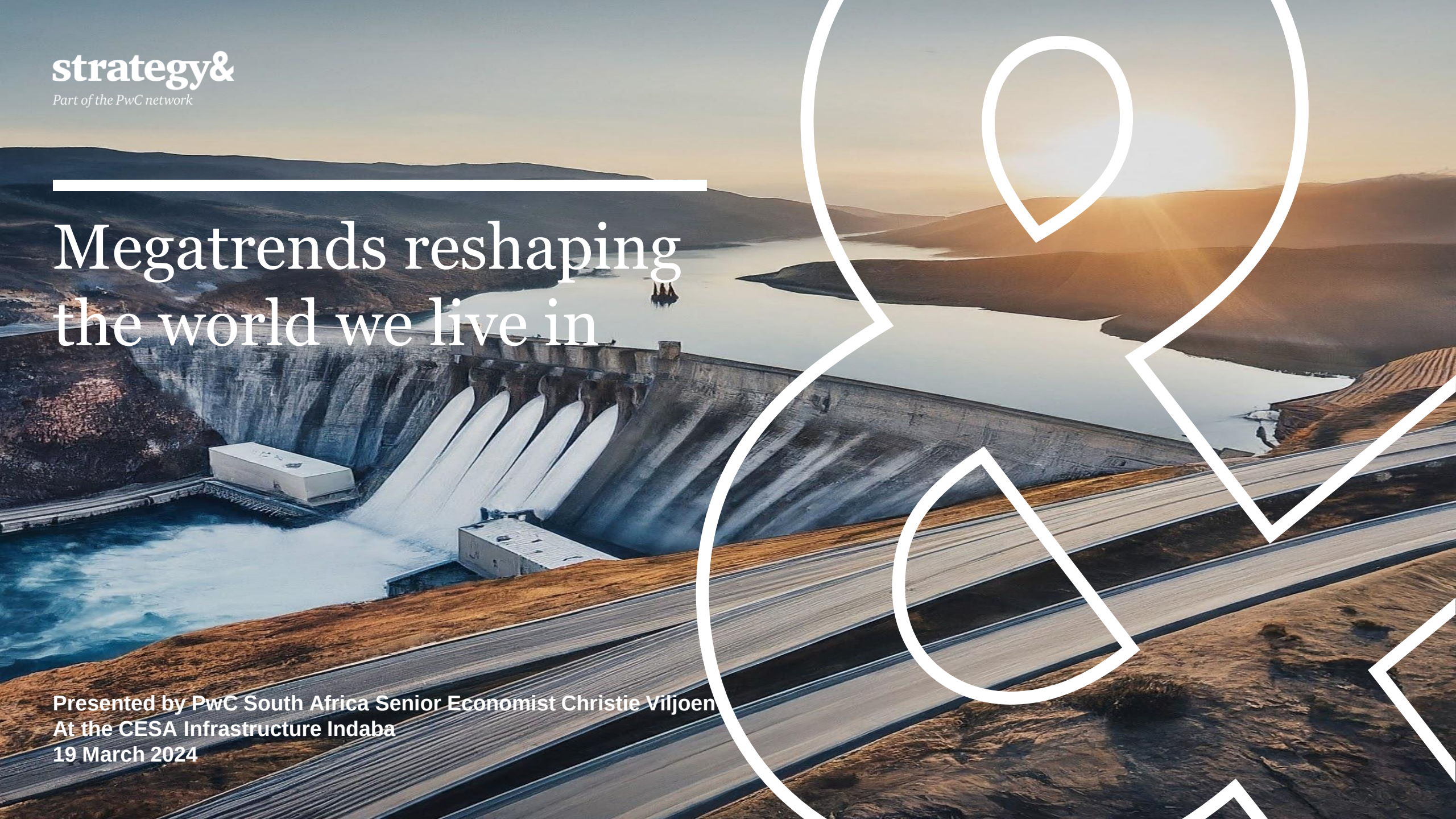

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Megatrends reshaping the world we live in

Presented by PwC South Africa Senior Economist Christie Viljoen
At the CESA Infrastructure Indaba
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Many of today's disruptions and crises - across the world and in SA - can be linked to the Megatrends shaping society's long-term outlook

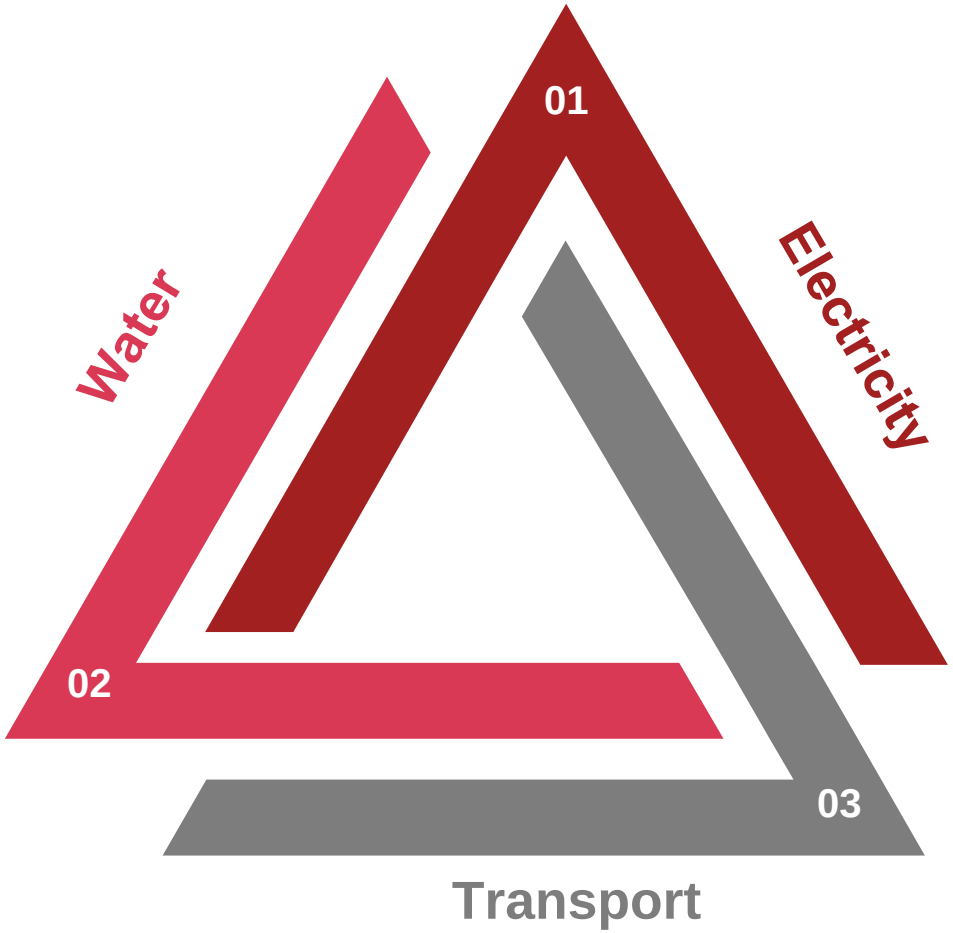
We expect these five Megatrends to amplify in frequency and impact over they long term

Climate change	Technological disruption	Demographic shifts	Fracturing world	Social instability
Extreme weather events and environmental phenomena are driving unprecedented people and infrastructure demands. Mitigation and adaptation to climate change present opportunities for engineered solutions. *eg. coastal flooding, forced migration and extreme heat*	Advancements in technology will changes how we perceive and engage the world. **Disinformation, innovation, cyber-vulnerability** and obsolescence will disrupt established systems. *eg. artificial Intelligence (AI), robotics, data-harvesting, deep fakes*	Several highly developed countries will experience **steep population declines** while some developing nations **struggle to absorb youth** effectively. Despite, the median age range in all countries increasing, resource distribution remains strained. *eg. aging populations, un/underemployment, brain drain, lowering fertility rate*	Climate change, economic strife, **political instability** and **societal polarisation** will antagonise relationships. Empowered by technology, disagreements will become war, disrupt supply chains and **create a multi-regional world** as more nation states are compete for influence. *eg. breakdown of diplomatic relations, cross-border conflict*	Social and economic polarisation, disruption, demographic change, and eroding societal trust create economic scarcity that lead to greater social unrest. Socio-economic scarcity ultimately leads to **violence, loss of lives, infrastructure damage** and governance breakdown. *e.g gang violence, mass kidnappings, increased austerity measures*





South Africa’s biggest infrastructure challenges are hampering key industries and overall economic development.



01 **Citizens experienced approximately 7,000 hours of load shedding in 2023**

- Eskom's aging infrastructure coupled with the increasing levels of demand has resulted in wid speak outages and disruptions.
- The current electricity supply gap sits at around 4 to 6 GW, causing load shedding of up to 10 hours daily.[1]

02 **19% of the rural population lacks access to a reliable water supply and 33% do not have basic sanitation services.[2]**

- Poor maintenance and low investment into this sector has left current infrastructure deteriorating
- 70m litres of treated, clean, drinkable water is lost daily due to leaks that characterise South Africa’s water piping system.[3]

03 **The rail and ports operator's loss of R5.7bn last year is attributed to worsening operational performance, with rail volumes falling 13.6% to 149 million tonnes.[4]**

- Outdated infrastructure has resulted in South African goods and produce being less reliable and affordable, which has also had a negative impact on foreign earnings.

1. World Bank, 2. Greaenpeace 3. Earth.org 4. The East African

Megatrend 1 - Climate Change

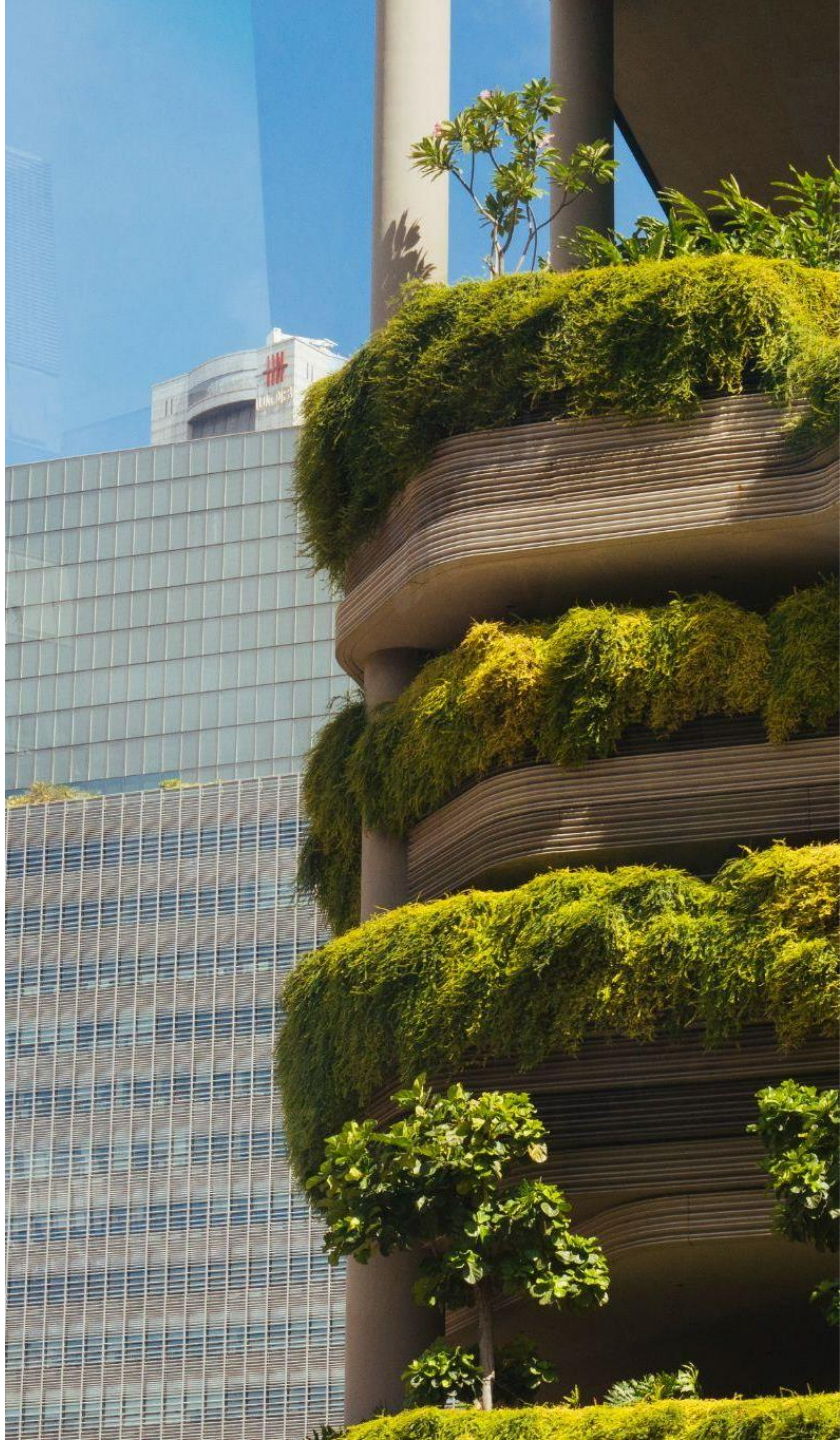
While humanity is trying to figure out ways to reduce carbon emissions, greenhouse gas levels in the atmosphere are worsening, global temperatures are rising, and extreme weather events are becoming more frequent and more severe.

- Global temperatures expected to reach 1.5 C over pre-industrial levels by 2030.
- Global mean sea level likely to rise at least 0.3 meters above 2000 levels by the end of the century
- Increased precipitation and storm surges will lead to more frequent and severe flooding events
- Extreme weather will damage infrastructure, disrupt essential services and force people to move away from their homes.
- Infrastructure faces damage, increased demand for resilient design, and the need to adapt to changing environmental conditions.

Megatrend 1 - Climate Change

Environmental phenomena poses significant risks to South Africa's ecosystems, economies and communities.

- Exacerbate existing infrastructure challenges and hinder efforts to address poverty, unemployment, food insecurity, and inequality.
  - KZN floods in 2022 forced thousands to leave their homes and caused damages with the cost of around R7 billion.
- Impact on industry will be through increased maintenance costs, disruptions and outages and the need for new infrastructure
- Opportunities for the industry and engineers include:
  - designing and implementing sustainable infrastructure solutions,
  - developing renewable energy technologies, and
  - integrating climate resilience into urban planning and construction projects



1. Reliefweb

What do these Megatrends mean for infrastructure and engineers in South Africa?

Challenges and opportunities

MegaTrends	Climate Change	Technological disruption	Demographic shifts	Fracturing world	Social instability
Existential question	*What will it take to solve the climate crisis before the damage is irreparable?*	*What does it mean to be human in a world in which technology increasingly overlaps with and augments what humans do?*	*How to help groups of people with different needs when money, experience, power, ambition and capacity are distributed differentially?*	*What does it mean to live and thrive in a multi-nodal world?*	*How to create a thriving economy and simultaneously remediate the significant social issues in the world?*
Challenges for infrastructure:	• Extreme weather events • Rising sea levels • Increased maintenance costs • Disruptions and outages	• Infrastructure obsolescence • Cyberattacks • Data storage concerns	• Aging population create strain on health care • Rapid urbanisation • Aging workforce • Shortage of skilled labour	• Supply chain disruption • Shortage of resources • Cyber security threats to critical infrastructure	• Damage to infrastructure • Disruption in services • Dis-investment into infrastructure
Opportunities for engineers:	• Designing infrastructure that is resilient to natural disasters • Developing green infrastructure • Adaptation and retrofitting	• Designing smart infrastructure • Developing autonomous systems • Integrating new technologies	• Designing age friendly infrastructure • Developing sustainable cities • Skilling the workforce	• Designing Resilient Infrastructure • International Collaboration • Focus on Regional Infrastructure	• Rapid Repair and Reconstruction • Community Engagement & Social infrastructure Projects

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Thank you

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