

Keynote Paper

**Resilience and Sustainability in Underground Space – Embracing the
United Nations Sustainability Development Goals**

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Abstract:

Economic prosperity, happiness, and security demand effective and efficient infrastructure. As technicians we are uniquely able to deliver resilient and sustainable underground infrastructure and places to deliver these noble social outcomes notwithstanding the demands of the climate emergency, political instability, and scepticism of our peoples.

In fact, it is because we are so reliable in delivering underground solutions that our role for a stable, vibrant, and happy society has become critical in the future of modern society as we know it.

This presentation translates the United Nations Sustainability Development Goals (SDGs) into the deliverables our technological expertise is well able to reliably deliver.

There are 17 Sustainability Development Goals, each of which are usually impacted positively by underground infrastructure and development. These goals range include: no poverty; good health and wellbeing; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice and strong institutions; and partnerships to revitalise sustainable development.

Collectively these SDGs are nothing more than business as usual for the infrastructure we have created, maintain, and repurpose. We are uniquely poised to deliver even better and more responsive underground solutions to the world's problems of today by increasing our focus on better design, innovative materials, and more sophisticated optioneering and project contracting and financing.

From a design perspective our response to the climate emergency (Goal 13 - Climate Action; and Goal 11 – Sustainability Cities, and Communities; and Goal 9 – Industry Innovation and Infrastructure) can embrace modern challenges by actively pursuing higher levels of achieving SDG goals.

For example, when considering underground transportation linkage design, we can readily extend the task by including within the prescribed outcome challenges:

- Opportunities to use the new infrastructure for an alternative or novel concurrent purpose (e.g. power distribution, communications, drainage, transport, civil defence)
- Opportunities to build the infrastructure today with anticipated repurposing in the future (e.g. a road tunnel repurposed for rail, or pedestrians, or freight, or civil defence, or secure waste storage)
- Utilising novel design techniques to minimize project dimensions or materials used (e.g. deletion of secondary liners, optimisation of primary liners, use of low carbon concrete, use of polymer concretes)
- Selection of low energy consumption electromechanical systems (in coordination with novel aerodynamic designs such as passive ventilation systems)
- Elevating portal structures (when appropriate) to offer higher levels of extreme flood and storm event protection

If we fail to advocate for our own expertise – and our societies lose confidence, the great achievements of engineers and scientists to deliver clean water, sewerage, transportation, energy, safe places of refuge, and energy storage, will have been for nothing.

Our ability to respond to the intense demands of our increasingly urban population, the natural environment, and to maintain the underground infrastructure that already exists, will be the measure of our success in responding to the emergencies facing our counties and the world.