Translation Research - Bridging the Valley of Death

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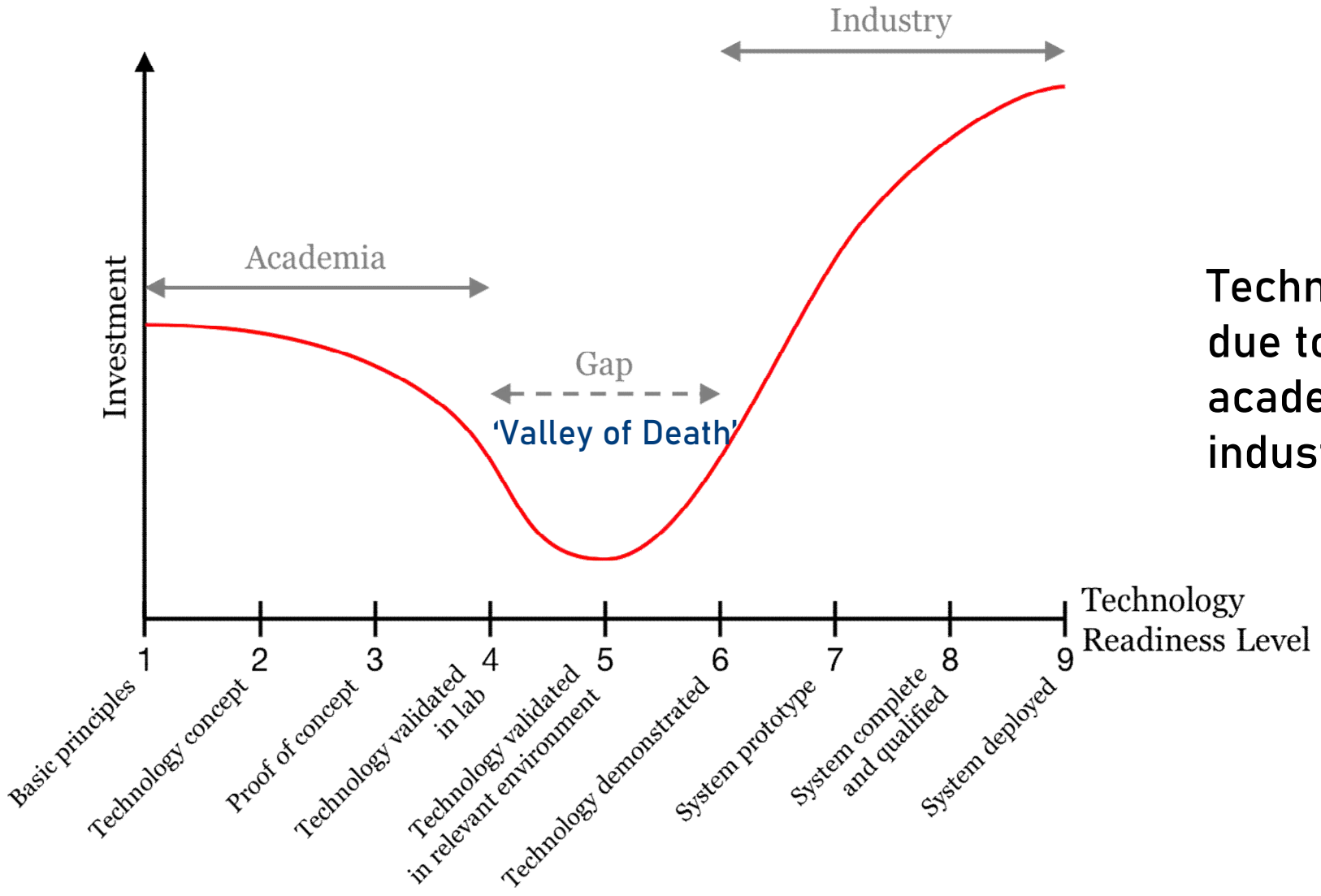
TECHNOLOGY READINESS LEVEL (TRL)

TRL 9	System deployed in an operational environment
TRL 8	System complete and qualified
TRL 7	System prototype demonstrated in an operational environment
TRL 6	Technology demonstrated in a relevant environment
TRL 5	Technology validated in a relevant environment
TRL 4	Technology validated in a lab
TRL 3	Experimental proof of concept
TRL 2	Technology concept formulated
TRL 1	Basic principles observed

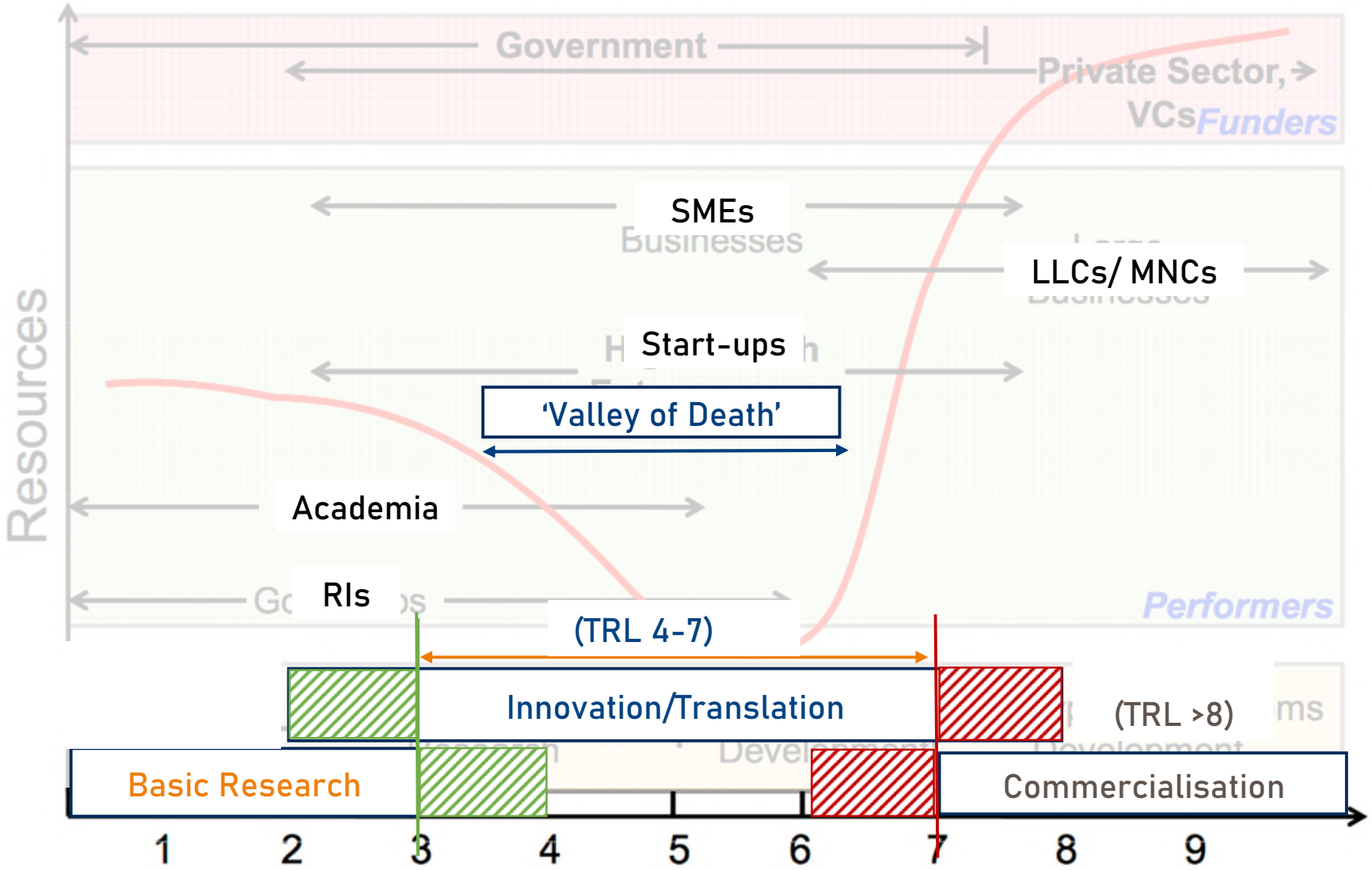
These levels were developed at NASA between the 1970s and the 1990s, and indicated the maturity of technologies.

The European Commission adopted this scale in its Horizon 2020 program.

TECHNOLOGICAL 'VALLEY OF DEATH'



Technological "valley of death" due to a gap between academic research and industrial commercialisation.



- MOE Tier 1 to Tier 3
- NRF Fellowship
- NRF Investigatorship
- RCE
- CRP

- Mid-sized Centre/ IAF-PP/ CREATE
- IAF-ICP, Corp Lab, Joint Lab
- Funding from agencies

- NUS GAP/ Central GAP
- I&E Grants
- ESG Grants

"Academia tends to focus on TRLs 1–4, whereas industry prefers to work with TRLs 7–9, rarely 6. Therefore, TRLs 4–6 represent a gap between academic research and industrial commercialization. This gap is colloquially referred to as the technological "valley of death" to emphasize that many new technologies reach TRLs 4–6 and die there."

Bridging the technological "valley of death" Alessandro Rossini Director | Business Technology, PwC Norway 06/11/18

Overlap between Basic & Translation Research

Overlap between Translation Research & Commercialization

Figure source – http://philippleitner.net/technology-readiness-levels-impact-of-science-and-the-valley-of-death/

CAMPUS AS A LIVING LAB @ NUS

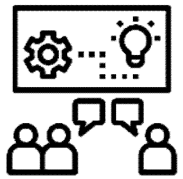
Disseminate new knowledge
Supply technology solutions & human capital
Seed new startups, businesses & economic activities

Campus as a Living Lab @ NUS

NUS National University of Singapore

Generate Knowledge & Intellectual Capital
Train Human Capital
Innovation Infrastructure & Ecosystem

Ideation & solutioning



Technologies ready for translation

State-of-the-art campus infrastructure

Digital Twin for simulation, analysis & visualization

Industry Partners

Apply Knowledge
Provide Financial Capital
Develop Industrial Capital
Provide Route to Market

… to co-create novel solutions, technologies & capabilities

Create demand for technology solutions
Generate new knowledge and new learning

NUS LIVING LAB & NUS DIGITAL TWIN

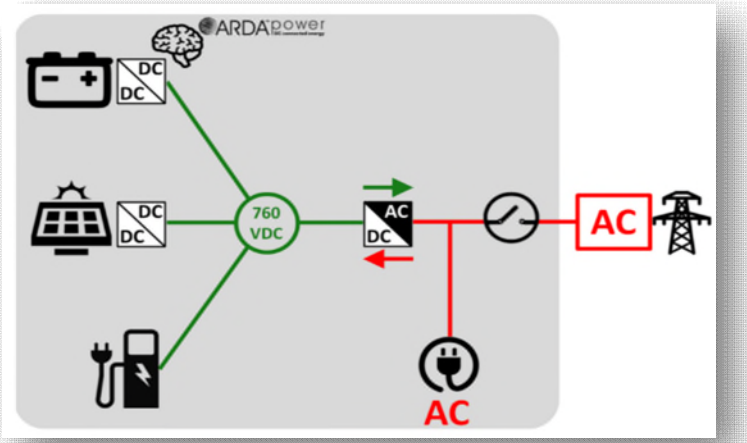
RESEARCH & INNOVATION IN SUSTAINABILITY

Digital Twin (DT)

- Anthropocene
- Critical problems

- Mitigation measures
- Nature-based solutions
- Preventive planning

Keppel Infrastructure-NUS Low Carbon Living Lab

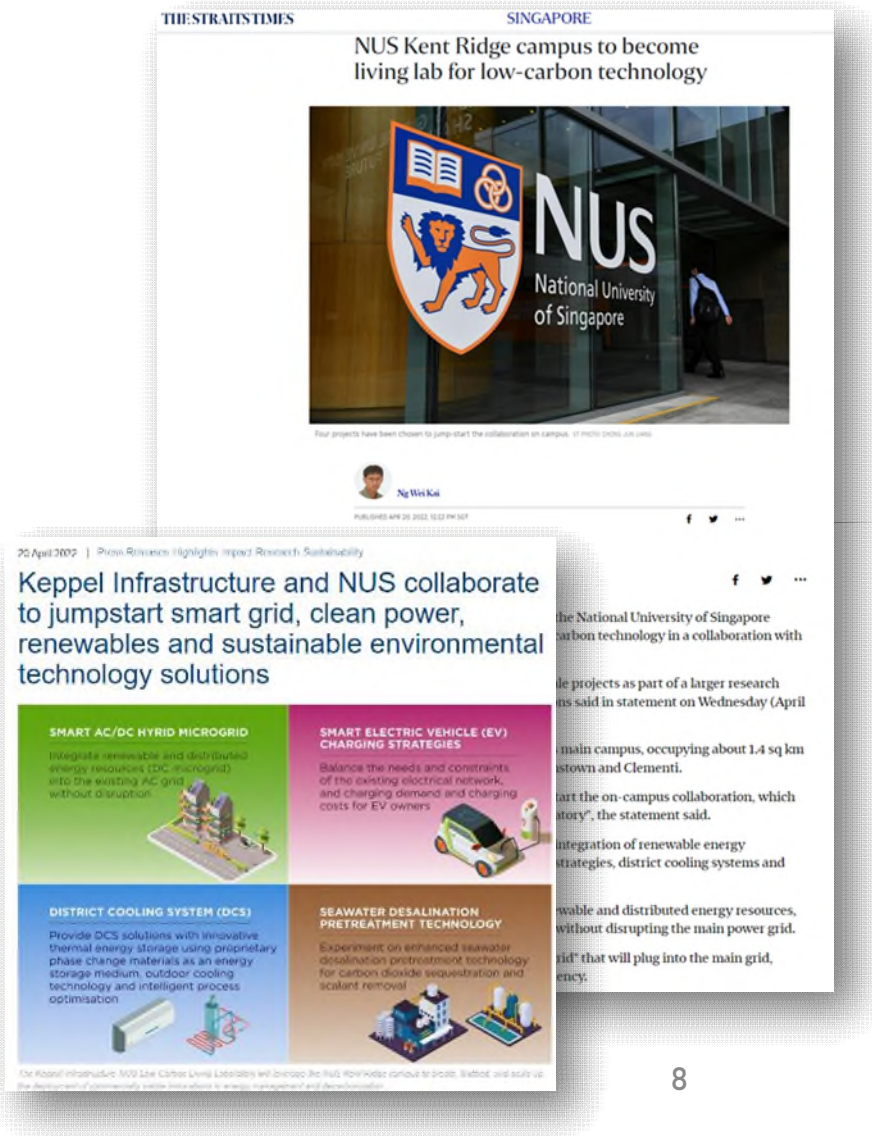


1st project: Hybrid AC/DC micro-grid

- Started in Oct 2023, we will create and test-bed the deployment of commercially viable innovations in distributed energy management, solar PV integration, energy storage and smart EV charging.

2nd project: District cooling

- Slated to start in 2H2024.
- We will create and test-bed innovative District cooling systems (DCS) for buildings integrated with thermal energy storage, outdoor cooling technology and intelligent process optimisation.


THE STRAITS TIMES SINGAPORE

NUS Kent Ridge campus to become living lab for low-carbon technology

NUS National University of Singapore

Keppel Infrastructure and NUS collaborate to jumpstart smart grid, clean power, renewables and sustainable environmental technology solutions

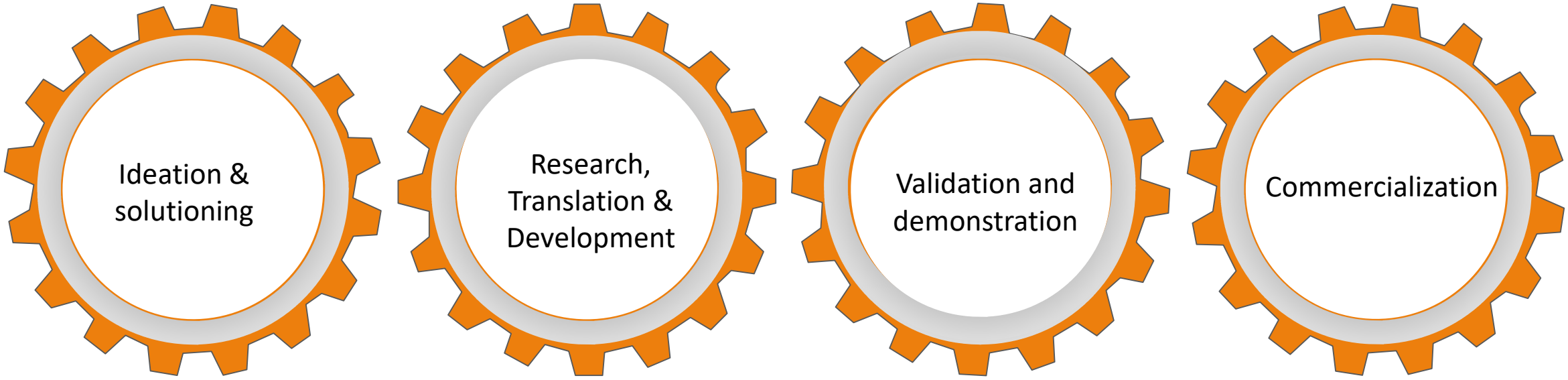
SMART AC/DC HYRID MICROGRID

SMART ELECTRIC VEHICLE (EV) CHARGING STRATEGIES

DISTRICT COOLING SYSTEM (DCS)

SEAWATER DESALINATION PRETREATMENT TECHNOLOGY

Industry-relevant Interdisciplinary Research Collaboration between NUS and Agencies/Industry



Focus on solutions aligned with use cases and user requirements of Companies and Government Agencies

Leverage on research outcomes for technologies/capabilities development of research ideas

Testbedding and demonstration of technologies and capabilities in the live tech-testbed in NUS Living Lab

Commercialization of tech/cap with companies, Incubation of startups

CAAS Civil Aviation Authority of Singapore
Enabling opportunities through aviation

National Research Foundation
Prime Minister's Office
Singapore

Singapore Food Agency

STRIDES MOBILITY

Hewlett Packard Enterprise

MINDEF SINGAPORE

CREATE
Campus for Research Excellence And Technological Enterprise

Energy Market Authority
Smart Energy, Sustainable Future

Keppel Infrastructure

PSA SINGAPORE

NUS LIVING LABORATORY

Testbedding on NUS campus and beyond

NUS Living Laboratory

Adoption of solutions in Singapore and beyond

NUS campus as a platform to test-bed and validate developed solutions

Researchers work with companies & end-users to ideate, innovate and generate ideas

Research and Innovation in Sustainability

High quality research and inter-disciplinary collaboration to create new knowledge, and develop sustainability solutions that are optimised for tropical, urban and Asian settings, as well as bring these innovations to market.

NUS National University of Singapore

THANK YOU