

Building Blocks for an Integrated Approach

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Infrastructure Futures

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COMPLEX NATURE INFRASTRUCTURE SYSTEMS

Physical infrastructure has a long lifetime and is slow to change = system inertia (Loorbach, Frantzeskaki and Thissen, 2010)

‘Evolve gradually and with only incremental changes along established paths (path dependency)’ (Markard, 2011)

Contain old and new engineering and technology

Social goods and essential services (Bolton and Foxton, 2011)



COMPLEX NATURE OF INFRASTRUCTURE SYSTEMS

Produce positive (e.g. economic growth) and negative (e.g. visual, air and noise pollution) effects

Difficult to disaggregate costs and benefits into a clear pricing regime (Bolton and Foxton, 2011)

Natural monopolies due to the large scale network infrastructure

Frequently regulated or owned or controlled publically (Bolton and Foxton, 2011)



COMPLEX NATURE OF INFRASTRUCTURE SYSTEMS

‘The stability of infrasystems provides the basis for investments, planning and in general offers a certain level of predictability to society. But in times of fundamental change in society this stability can pose a major barrier to achieve desired sustainability transitions.’

(Loorbach, Frantzeskaki and Thissen, 2010).



INTEGRATION OF SUSTAINABLE INFRASTRUCTURE

Requires a system thinking approach
Requires an understanding of the system, stakeholders, context and implications of infrastructure planning to meet requirements
Includes knowledge of:

- Life cycle of infrastructure (planning, design, construction, operation/maintenance/upgrading)
- Current and future pressures on existing infrastructure
- Influence and implications of infrastructure development
- Potential for infrastructure to meet requirements



GOVERNMENT – INTEGRATED INFRASTRUCTURE SYSTEMS

Provides key decisions and funding

Often highly siloed

Planning decisions often made without transparency

- Federal – major infrastructure decisions; providing funding incentive
- State – State wide infrastructure
- Local – Residential development, linking into state infrastructure

Sustainability often introduced without understanding implications



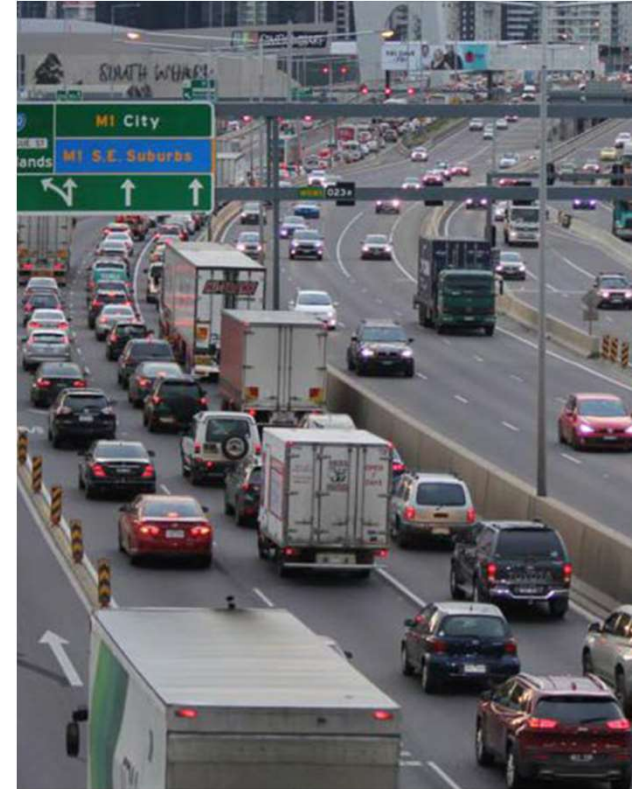
STRATEGIC APPROACHES TO INFRASTRUCTURE SYSTEMS

Existing planning and responsibility jurisdictions frequently prevents a broad strategic approach to infrastructure development

Infrastructure companies have limited full system expertise

Primary focus is usually on revenue and profit

The use of infrastructure sustainability rating tools is increasing but still primarily focused on construction and on specific projects and infrastructure



RESEARCH INSTITUTIONS - INFRASTRUCTURE SYSTEMS

Most are founded or based on specific disciplines
– engineering, planning, economics

Cross disciplinary approaches are difficult within
university structures

Increasing focus on industry engagement but
primarily with increasing detail

Current interest in pattern recognition and
algorithms can enhance and undermine
understanding of system



TERTIARY EDUCATION - SUSTAINABLE INFRASTRUCTURE

Students at undergraduate level usually struggle to understand systems

Very focused on specific disciplines

Little understanding or collaboration of other disciplines

Little integration of sustainability into disciplines

Little availability for upskilling for professionals to share learnings and knowledge regarding infrastructure systems



BUILDING BLOCKS FOR SUSTAINABLE INTEGRATED INFRASTRUCTURE

1. Coordinated multidisciplinary approach at global and country levels
2. Develop leadership and understanding of sustainable integrated infrastructure systems
3. Develop models and framework which lead to sustainable integrated infrastructure
4. Development of tools to enable a transparent integrated approach at all levels

COORDINATED MULTIDISCIPLINARY APPROACH

Provide leadership in delivering sustainable integrated infrastructure

Develop global and national strategies for urban and regional sustainable infrastructure

Key leaders in sustainable integrated infrastructure - multidisciplinary

Stakeholders from industry, consulting, government, tertiary institutions, community representatives

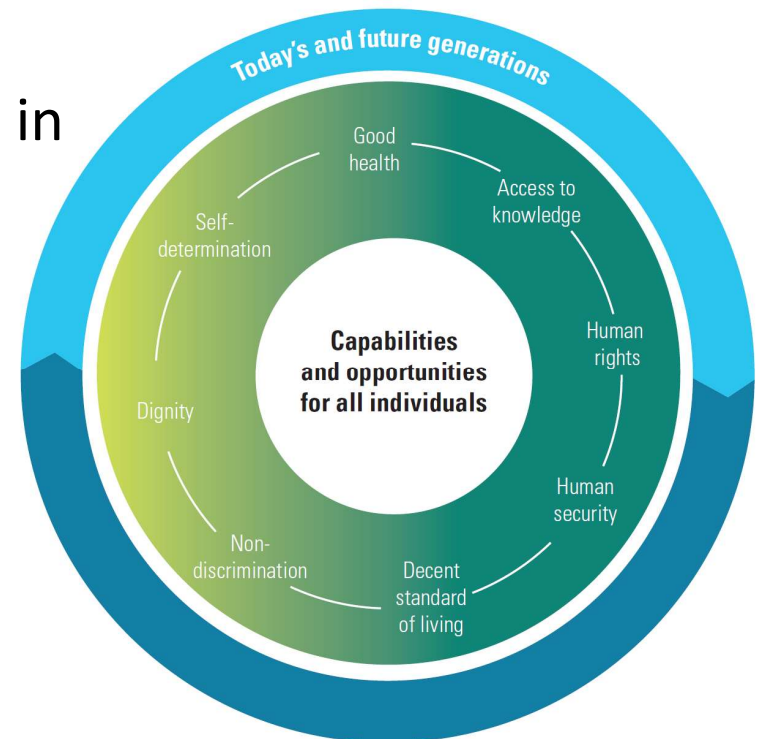
DEVELOP LEADERSHIP AND UNDERSTANDING

Develop a post graduate level leadership program focused on sustainable integrated infrastructure

Involve leadership from government, industry and tertiary institutions

Enable upskilling of those working in the infrastructure sector

Increased public education in the value and application of the sustainable development goals



FRAMEWORK AND MODELS

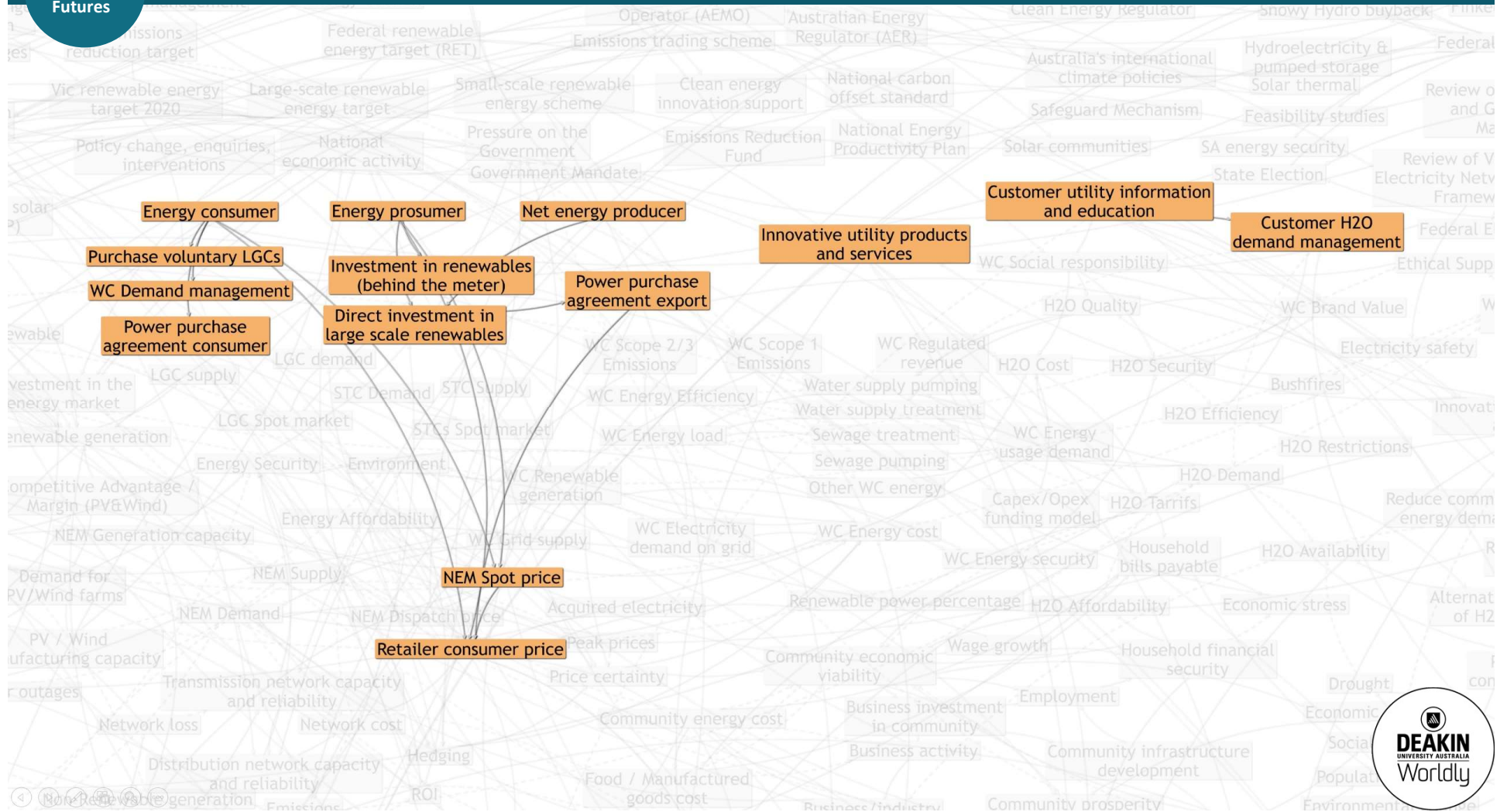
Develop a broader multidisciplinary understanding and framework for sustainable infrastructure systems

Development of systems models which assist in understanding and decision making to achieve sustainable integrated infrastructure

Development of economics model incorporating understanding of sustainable infrastructure systems and outcomes into economic assessment

Development of better PPP models to provide better outcomes for sustainability and integration

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KEY ISSUES IN ENERGY INFRASTRUCTURE

Infrastructure
Futures

OPL Goals

Objectives

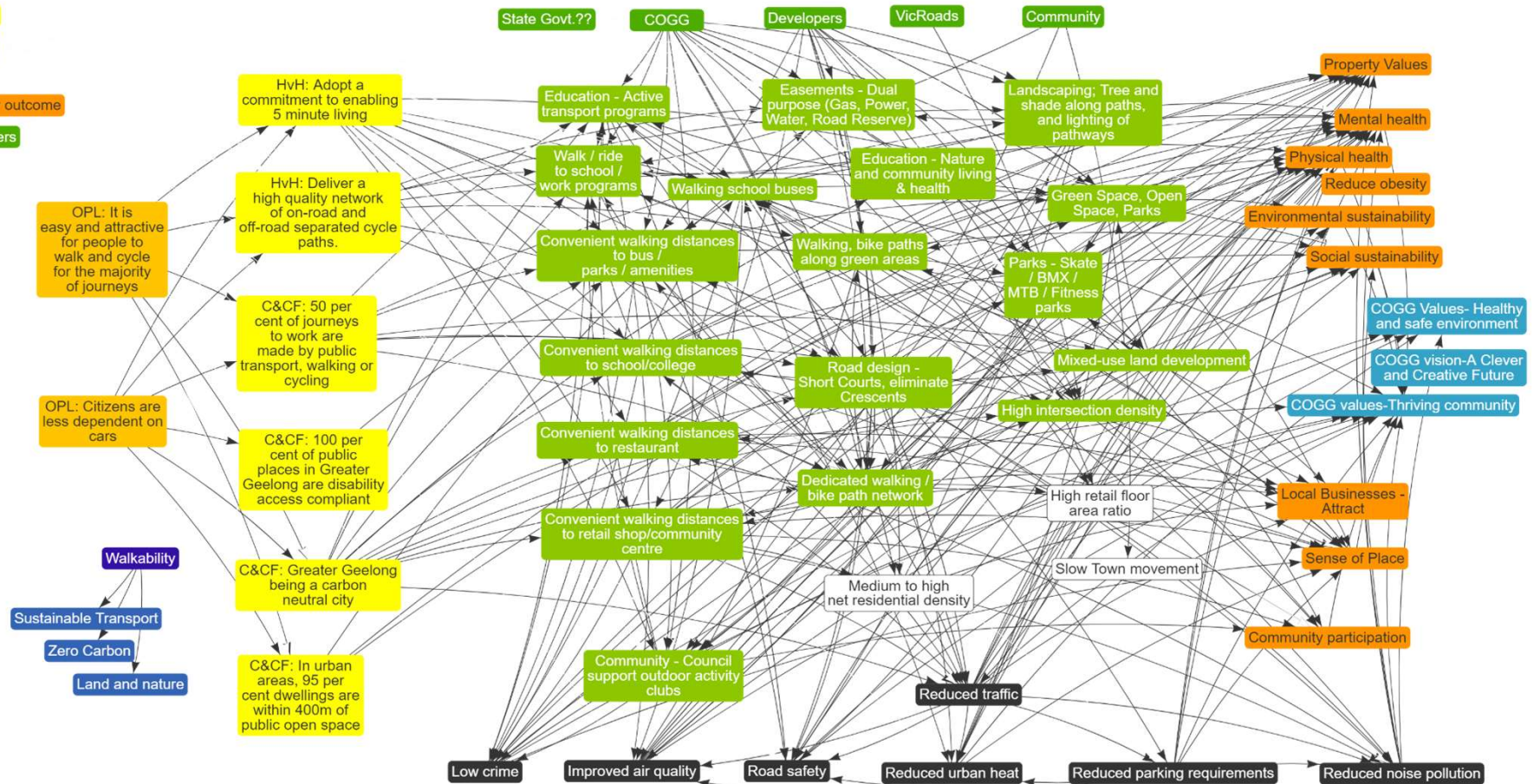
Initiatives

Risks

Secondary outcome

Stakeholders

FACULTY OF SEBE, FACULTY OF BUSINESS AND LAW, FACULTY HEALTH



TOOLS TO ENABLE A TRANSPARENT INTEGRATED APPROACH

Further development of sustainable infrastructure rating tools

Need to include assessment of infrastructure decision

Better incorporation of social and long term economic issues

Develop a life cycle integrated approach



NEXT DIRECTIONS

- The building blocks and tools need to be developed at all levels of infrastructure
- Ensuring that effective upskilling and leadership development is available will support that development
- Developing a global and country approach to integrating sustainable infrastructure will help bring together the conversations and initiatives
- Sustainable infrastructure rating tools are a good starting point but still require number of facets even at the project level