

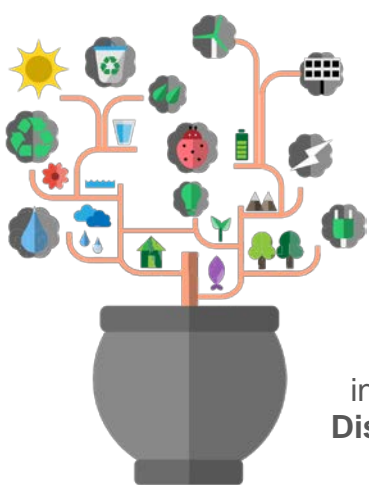
# NP5004 POST-CARBON RESILIENT FUTURE CITIES

## CHANGES ON GHG EMISSIONS AND URBAN RESILIENCE FROM INTEGRATED DISTRIBUTED SYSTEMS AT PRECINCT SCALE

### Research Question

*Distributed, localised and networked infrastructures can potentially reduce our GHG emissions. Moreover, the synergies of critical infrastructure for service provision such as water, energy, food, and waste represent an opportunity to achieve carbon emission targets and improve the resilience of our urban ecosystems.*

*This is why it is important to know how to quantify changes of GHG emissions from low carbon initiatives and assess urban resilience at precinct level.*



Answering these questions will help to analyse the type of low carbon initiatives currently available and potentially applicable to the Melbourne context, including **Integrated Distributed Systems (IDS): distributed infrastructures and system synergies (energy-water-waste-food nexus).**

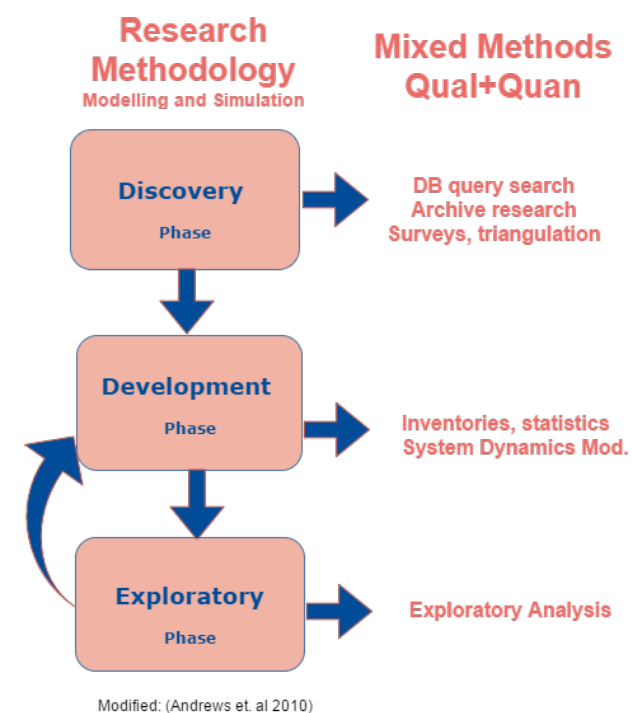
Therefore, the aim of the research is to quantify the changes on GHG emissions from IDS's implementation and assess urban resilience. This can serve as a decision-making tool for communities, the industry and the government.

### Precincts and tailor-made solutions

In precincts, likeminded communities might easily engage and collaborate with initiatives. Also, a precinct represents an operational unit where low carbon strategies can be developed accordingly to the site characteristics and requirements, taking into account the physical and socio-economic relationships *even outside its immediate boundaries.*

### Methodology and Methods

This research combines qualitative and quantitative methods. Since the research involves transition from carbon intensive to low carbon practices, theories of **sustainability transitions** will help in the conceptualization and diagnosis of the Melbourne precinct context.



Modified: (Andrews et. al 2010)  
Figure 1 Methodology and Methods.

**Systems thinking** and **complex system** approaches, along with the narrative from **sustainable transitions** theories, will inform a **System Dynamics (SD)** model to quantify changes of GHG emissions and assess urban resilience of Integrated distributed systems in Melbourne precincts.

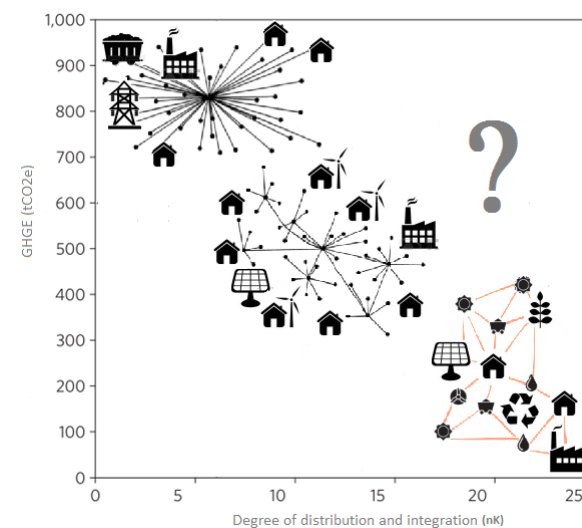


Figure 2 Changes on GHG emissions from integrated distributed systems. Only for illustrative purposes.

Future transitions to low carbon living and resilient precincts are uncertain in nature, therefore the use of **exploratory modelling and analysis** represent an opportunity to discover *what could happen*, even if the scenarios are generated externally or strategically for decision making.

### Conclusions

This research will help uncover the most appropriate interventions to decrease GHG emissions in Melbourne precincts. However, a low carbon intervention does not mean it would necessarily improve urban resilience, therefore, the research will help to evaluate this relationship.

### Anticipated impacts

*The results from this research will back up decisions of industry, government and community on how to transition to a low carbon and resilient living.*

*Industries will be able to identify new roles in a low carbon society, local governments will be able to visualise tailor made solutions for areas under their administrative authority and people will be empowered from distributed infrastructures and system synergies.*

*Future research should assess the impacts of up scaling these integrated distributed infrastructure.*

*“We can’t solve problems by using the same kind of thinking we used when we created them” (Albert Einstein)*

### Further information

<https://msd.unimelb.edu.au/future-cities-node-project>

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