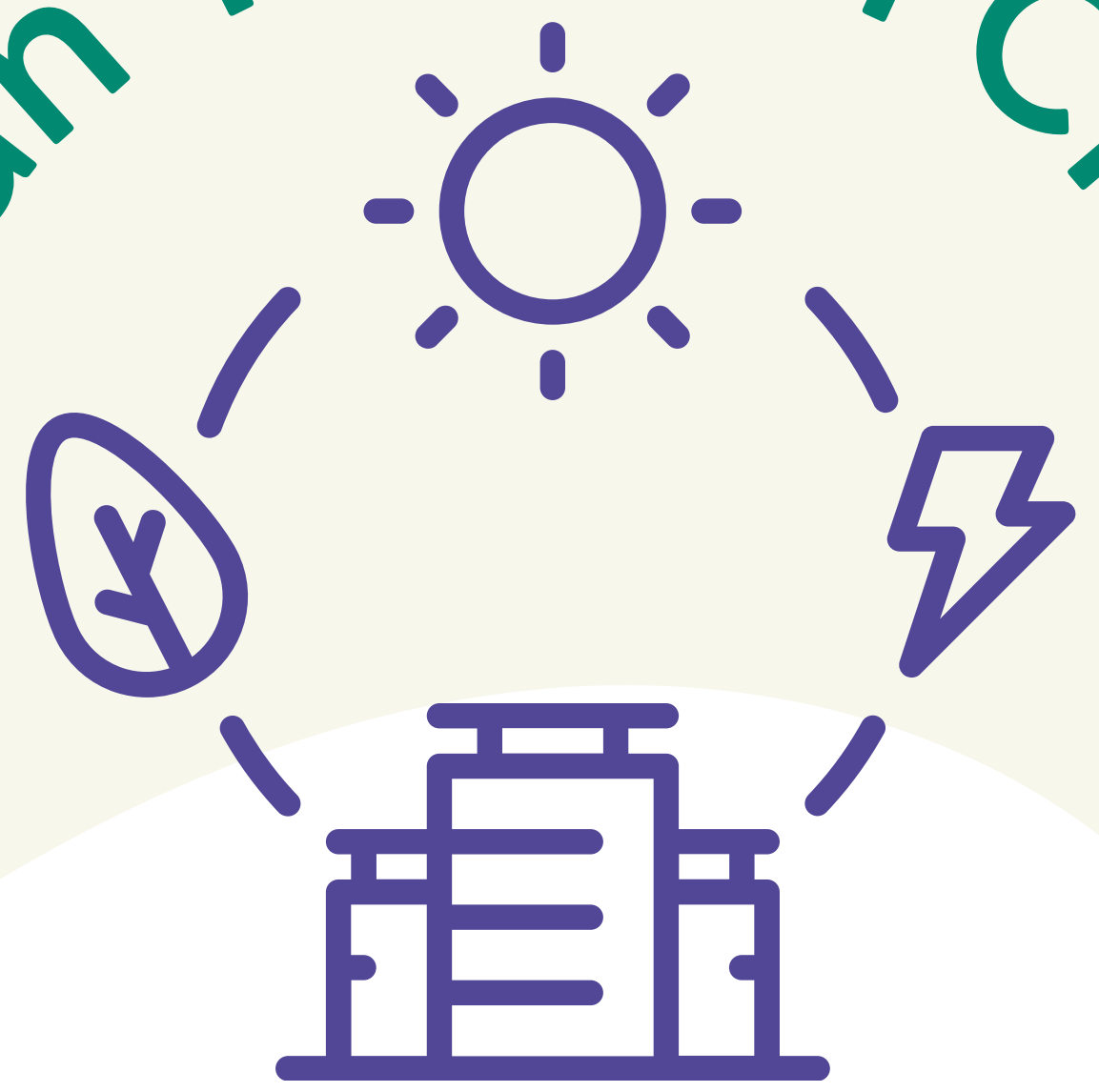


Final Presentation

# Clean Tech in Cities



Exploring Strategies and Locations for Rapid  
Decarbonization of Urban Areas

Hannah Edlund, Ryan Fischer,  
Zarrin Rahman, Nolan Warner



# Acknowledgement



We acknowledge the land of the Wurundjeri people, part of the Kulin Nation, on which we are meeting.

We pay our respects to their Elders, past and present, and the Aboriginal Elders of other communities who may be here today.

# Meet the Team



**Hannah Edlund**  
B.S. Biology and  
Biotechnology and B.A.  
Environmental and  
Sustainability Studies '25



**Zarrin Rahman**  
B.S. Environmental  
Engineering '25



**Nolan Warner**  
B.S. Biology and  
Biotechnology '25



**Ryan Fischer**  
B.S. Biochemistry  
'25



# 01. Background

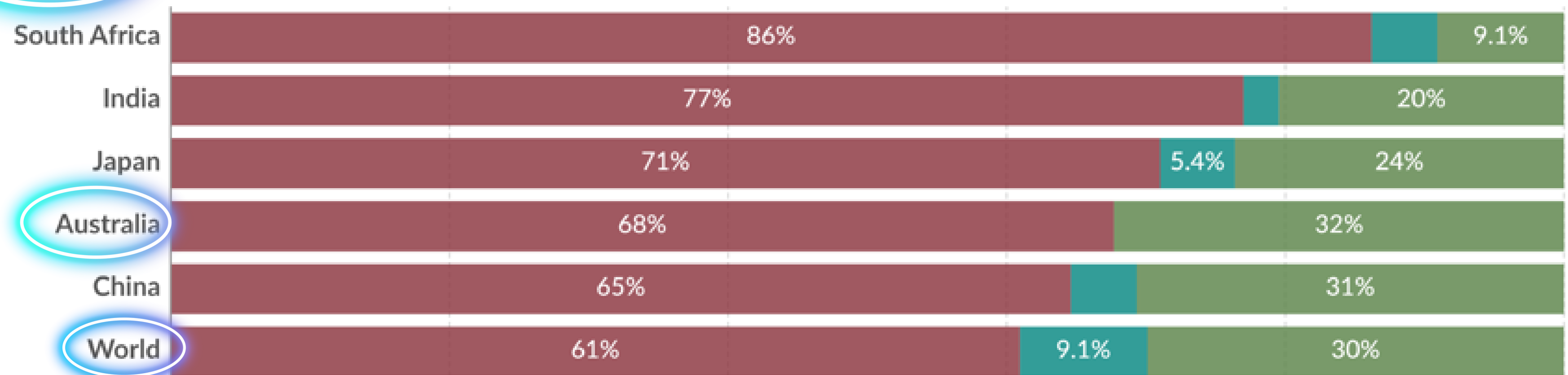


# Australia is a leader internationally in fossil fuel consumption.

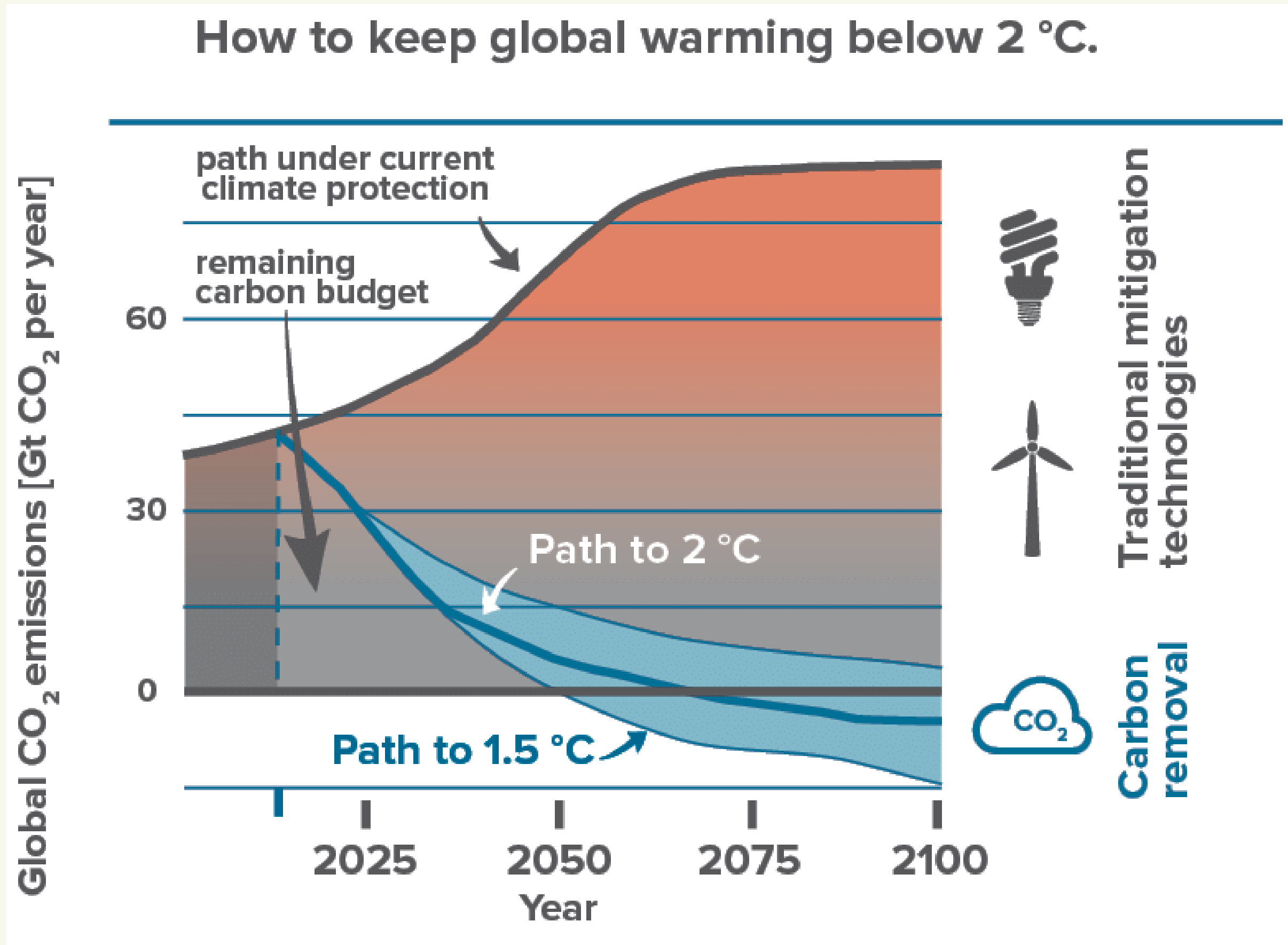
Electricity consumption from fossil fuels, nuclear and renewables, 2022

Our World  
in Data

Fossil fuels Nuclear Renewables



# Internationally, there is a need for rapid decarbonization.



Data source: IPCC, Mercator Research Institute

In Australian urban areas, energy use for buildings and transport combine for a substantial percentage of emissions.



**BUILDINGS**

**20%**



**TRANSPORT**

**19%**

Underrepresented communities **are** brushed aside  
involving policies regarding urban  
decarbonization.



Indigenous Peoples

3.8 %



30.6 %



# Project Goal



To identify promising strategies and locations to **decarbonize** urban areas **rapidly** and **equitably** in Australia.



## 02. Objectives and Methods

# Objectives

01

**Understanding Promising Rapid Decarbonization Strategies'**

02

**Analyze Relevant Case Studies that Target Urban Areas**

03

**Identifying Suitable LGAs for Urban Scale Decarbonization**

# Understanding Promising Rapid Decarbonization Methods

Conduct Archival Research & Interviews

1 Internal BZE Experts

2 External Local Experts

01  
Research and Expert Interviews

02

03

# Meeting with Experts



**Dominique Hes**  
Chair of Greenfleet



**Peter Hansford**  
Director, Deakin Energy  
Networks



**Alan Pears**  
Senior Industry Fellow at  
RMIT University



**Gill Armstrong**  
Buildings Project Impact  
Manager, Climateworks



**Elizabeth Eacott**  
Office Manager, Allume



**William Anstee**  
Housing Partnerships  
Manager, Allume



**Matthew Charles-Jones**  
President, TRY

01

Research and Expert Interviews

02

03

# Meeting with Experts: Integrated Points

- Indigenous Perspective & Community Driven Sustainability
- Emerging Clean Technologies & Importance of Microgrids
- Need for Environmental Policy Change
- Importance of Addressing Renters and Non-Owners About Decarbonization
- Intricacies of Stakeholder Mapping and Planning Renewable Solutions

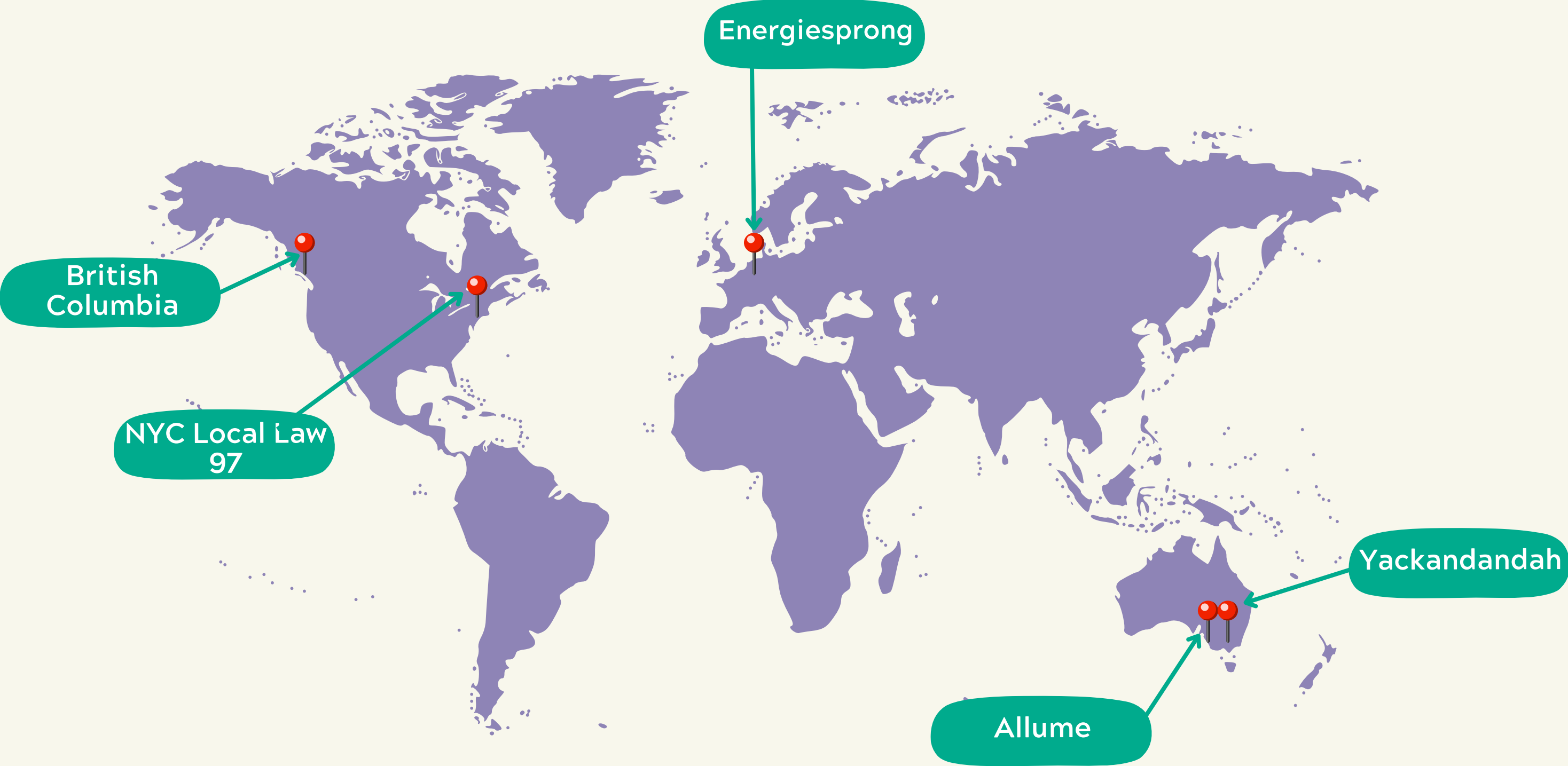
01

Research and Expert Interviews

02

03

# Identify Relevant Case Studies that Target Urban Areas

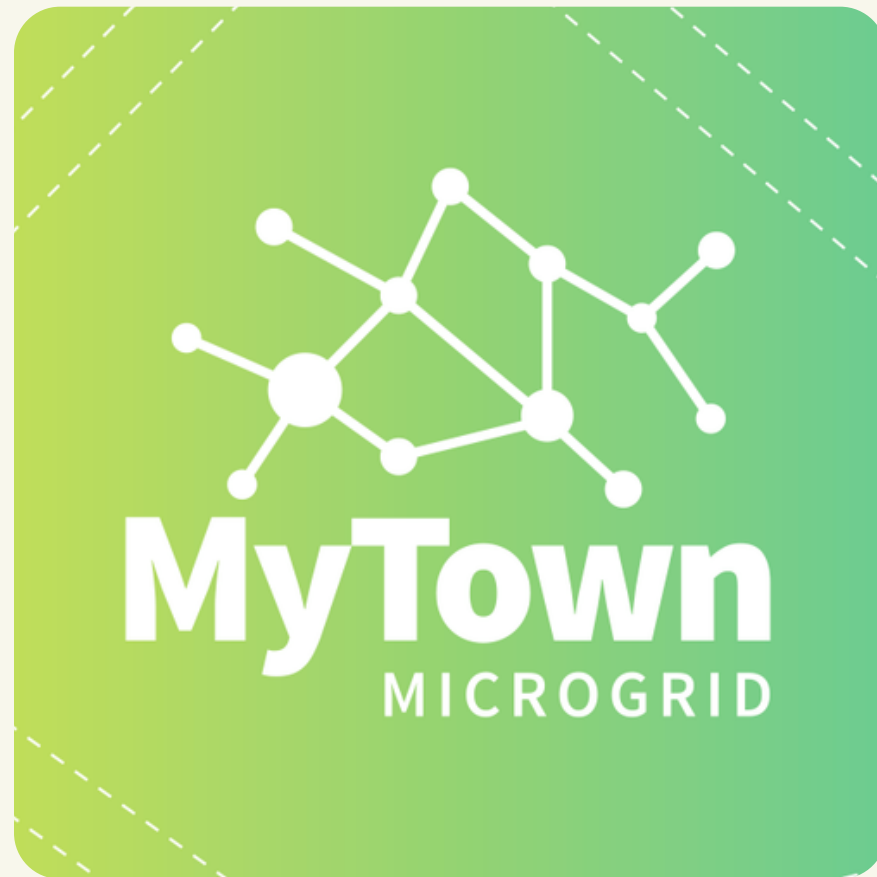


01

02  
Case Studies

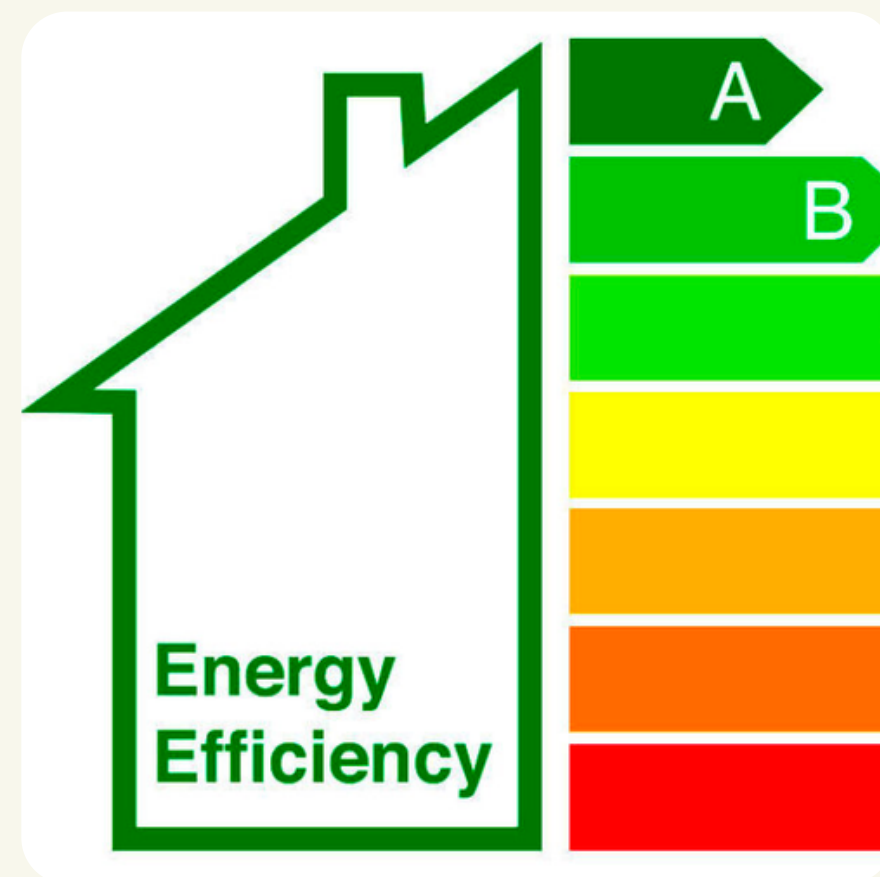
03

# Case Study Honorable Mentions



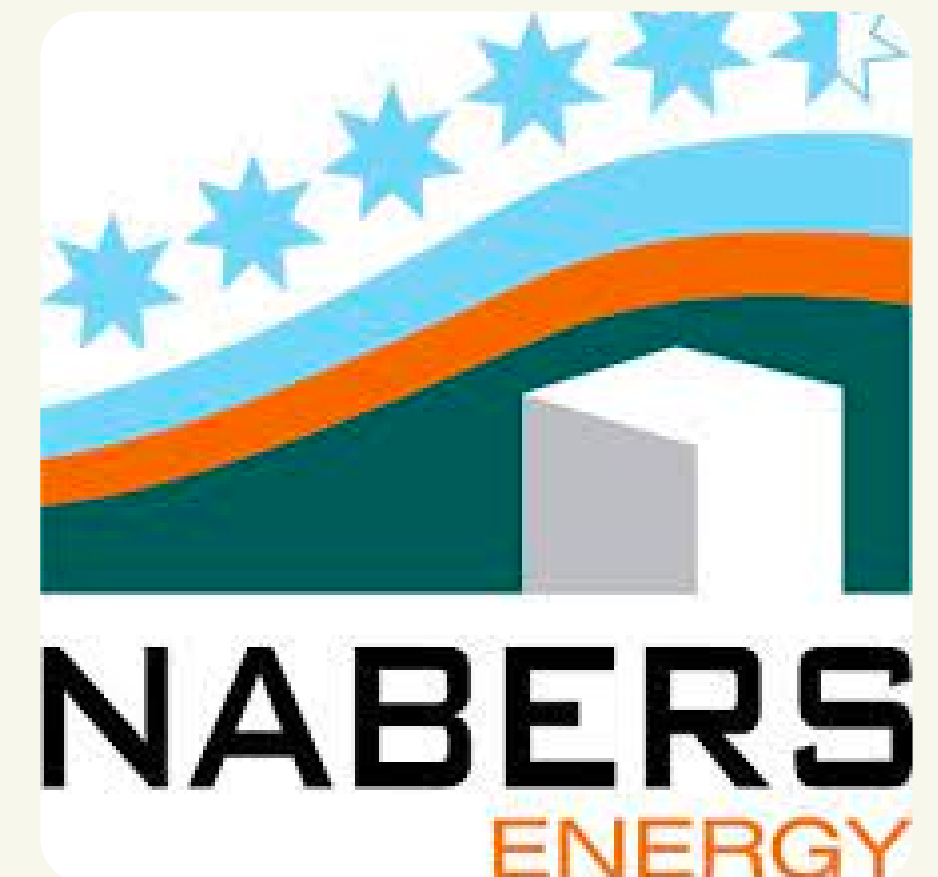
Mytown Microgrid

UK's EPC (Energy Rating) Program



Portugal Transportation Program

Australia NABERS Program





# Case Study Research Methods

1) Analyzed Building and Transport Case Studies

2) Performed Stakeholder Mapping

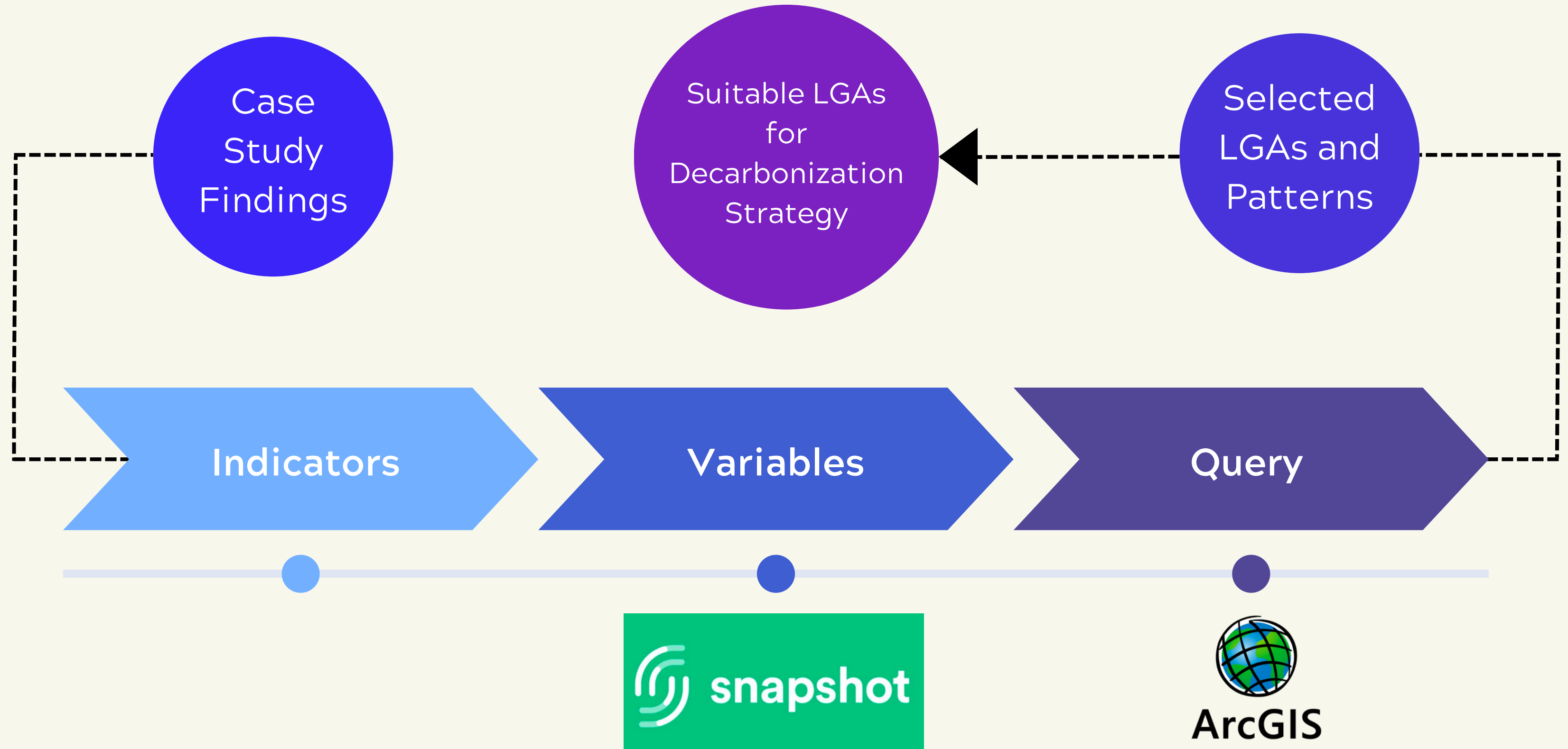
01

02

Case Studies

03

# Multi-Criteria Analysis (MCA) via ArcGIS



01

02

03

Identifying Suitable LGAs

# 03. Findings



# Energiesprong

## The Netherlands



Policy | Technology

Community | Regional | National

**RESIDENTIAL | COMMERCIAL | TRANSPORT**



## How?

- Retrofitting of buildings
  - Prefabricated Facades
  - Insulation
  - Solar Panels
  - Smart Heating
  - Updated Cooling/Ventilation

# Where?



**Buildings in Housing  
Associations**



**Future: Target  
Apartments**



## Why?

- Increase amount of Net Zero Energy Buildings (NZE)
- Increase rapid growth of NZE housing market.

# Who?



Housing  
Organizations



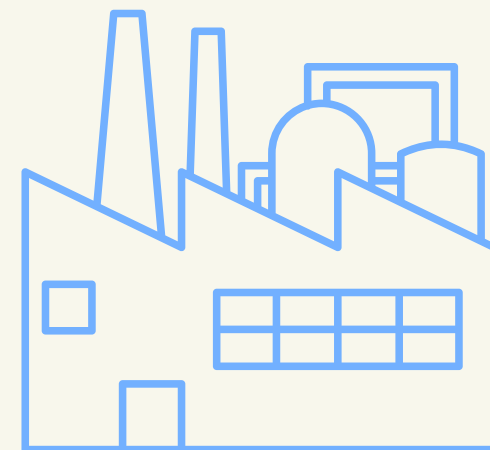
Policy Regulators



Homeowners



Financial  
Institutions



Industry



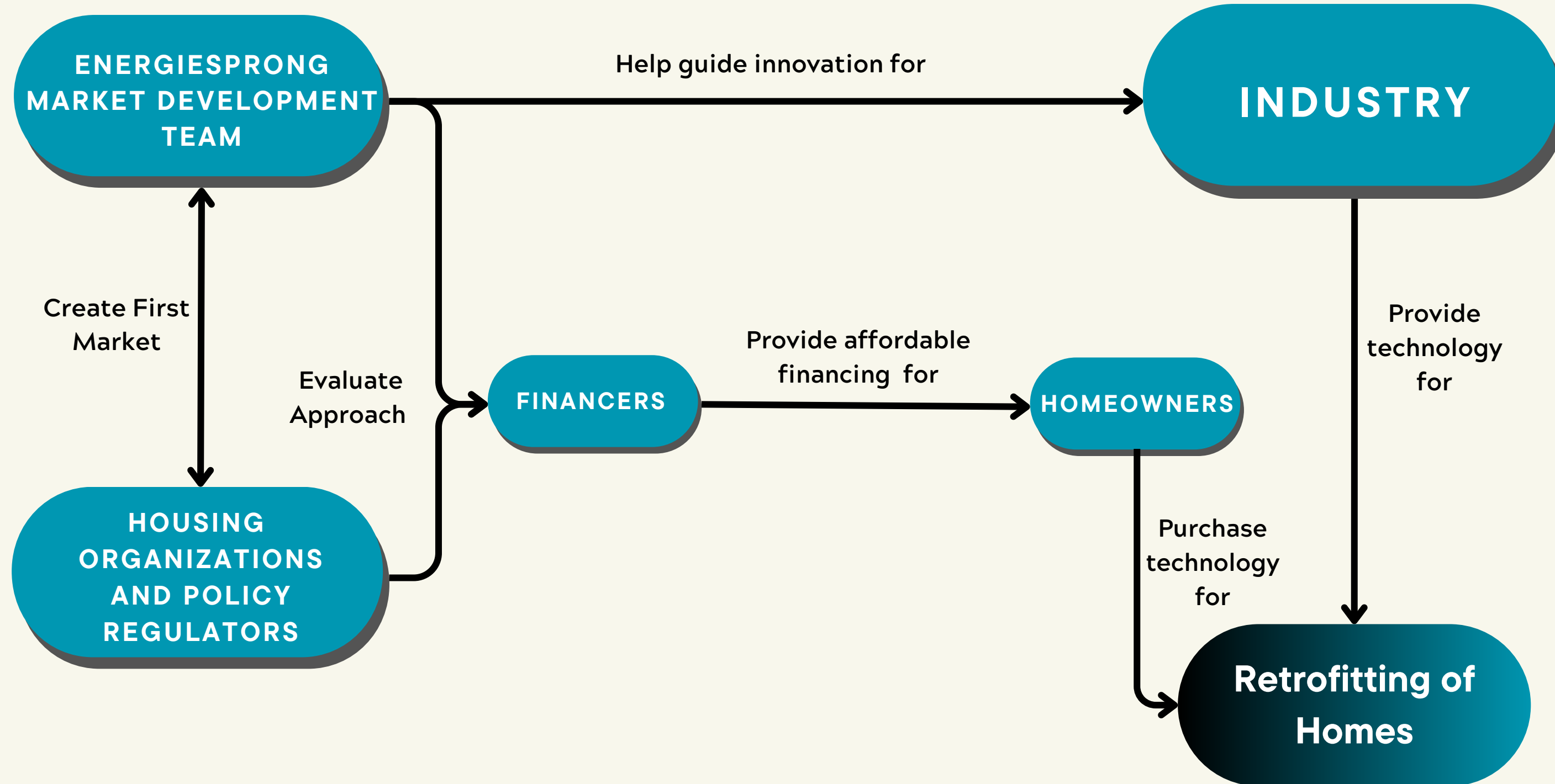
Energiesprong Market  
Development Team



# Environmental Justice

“Energy Service Plan” used where occupants **pay** the **equivalent** of their previous energy bill for the new energy and price of the **upgrades**.

# STAKEHOLDERS



# MCA

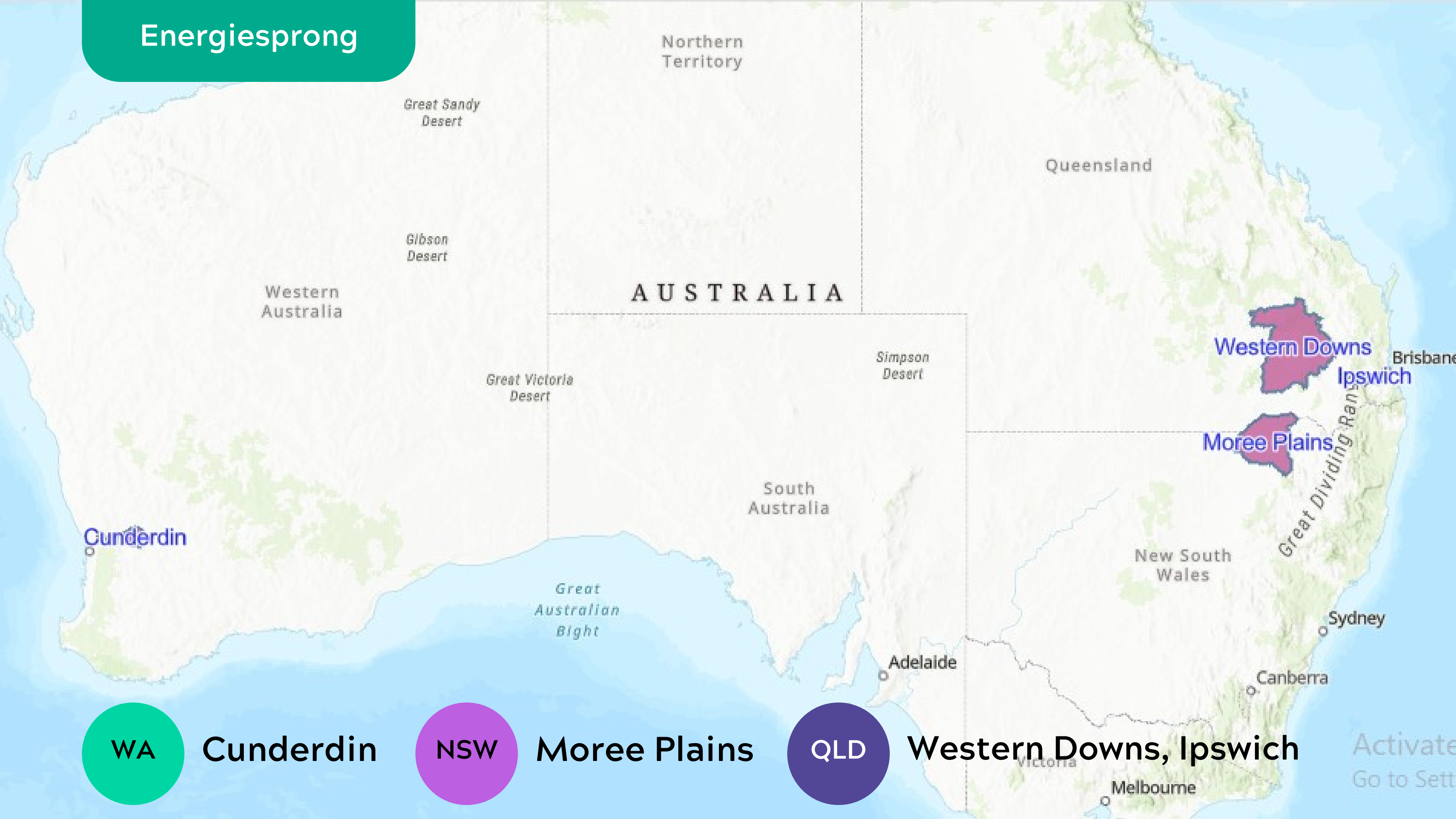
Indicators

Variables

- Extreme temperatures
- High Residential Emissions

- Average high temperatures
- Average low temperatures
- Residential emissions per capita

# Energiesprong



Cunderdin



Moree Plains



Western Downs, Ipswich

Activate  
Go to Sett

# Suggested Variables for Future Research



Temperature Range Data

# SolShare (Allume)

Australia

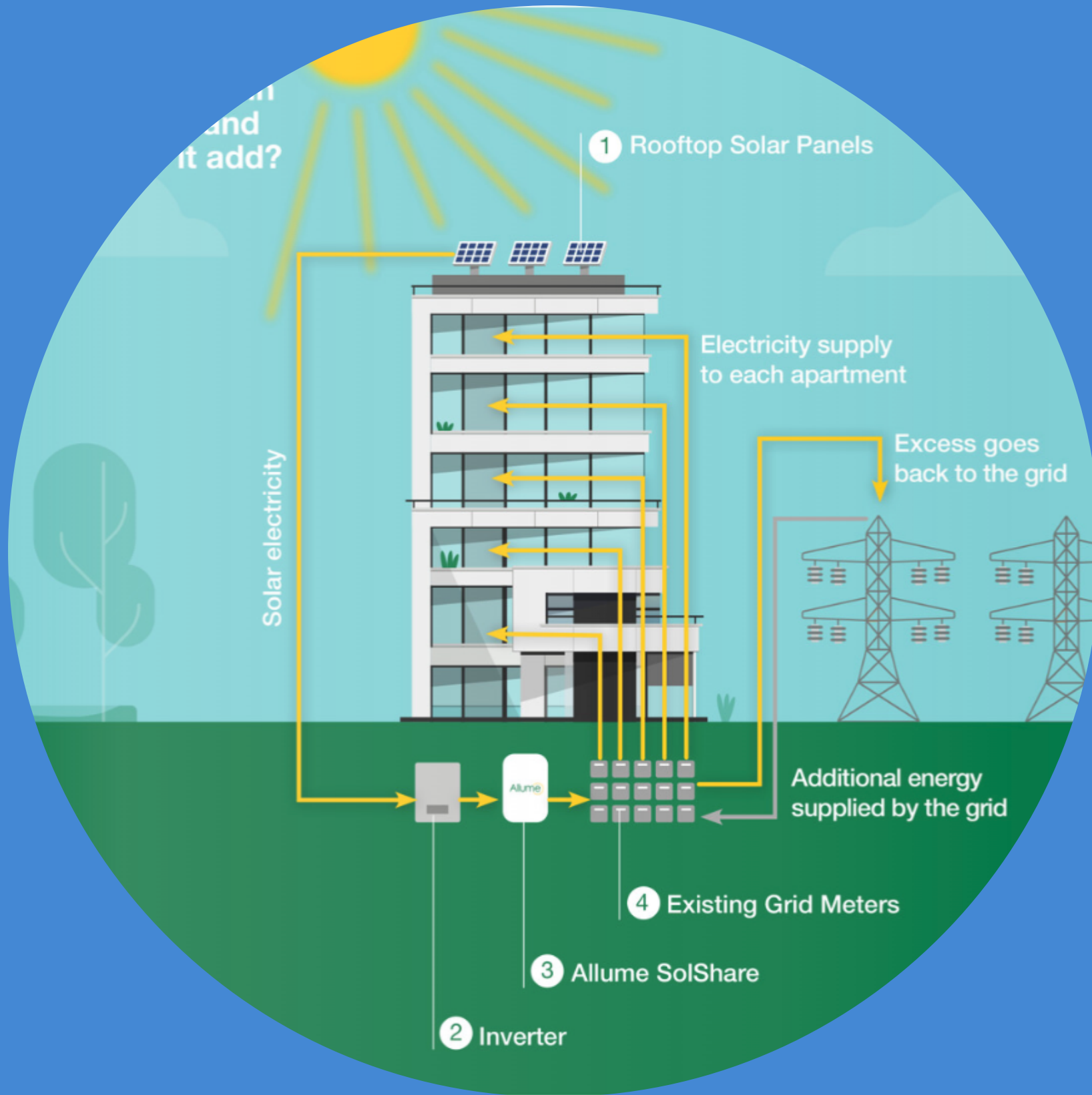


Allume

Policy | Technology

Community | Regional | National

**RESIDENTIAL | COMMERCIAL | TRANSPORT**



## How?

- Sharing of solar energy
- Behind the meter
- Distribution of power to each unit
- Compensation for excess energy

# Where?



**Apartments**

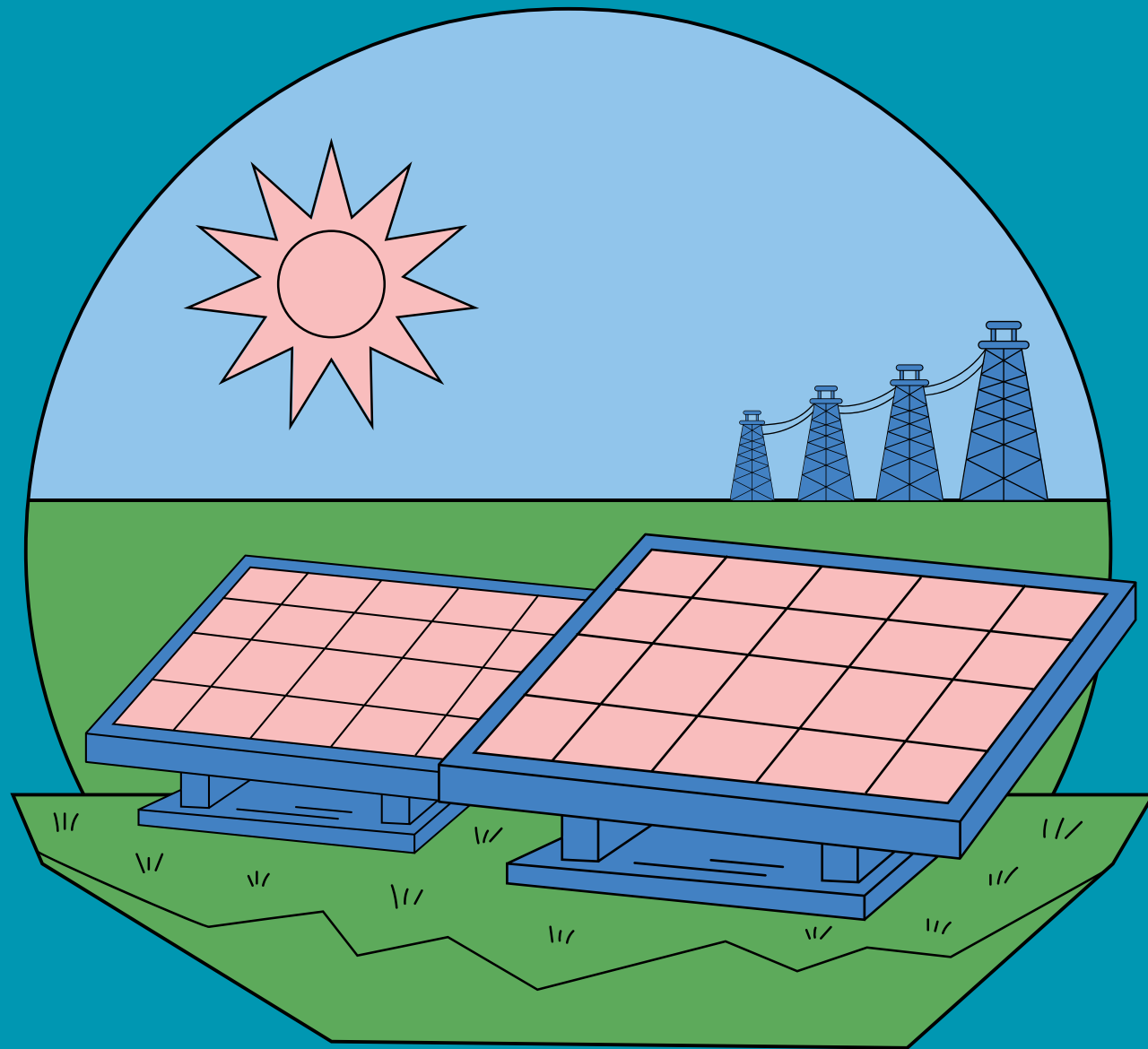


**Office Buildings**



**Retail Centers**

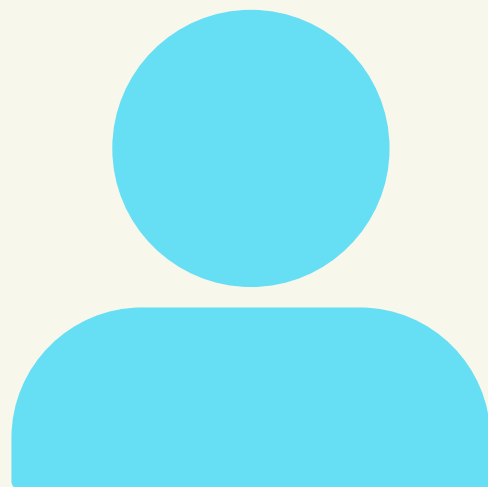




# Why?

- Bridging the gap
  - Power to renters
- Affordable and useful clean technology

# Who?



Renters



Strata Committee

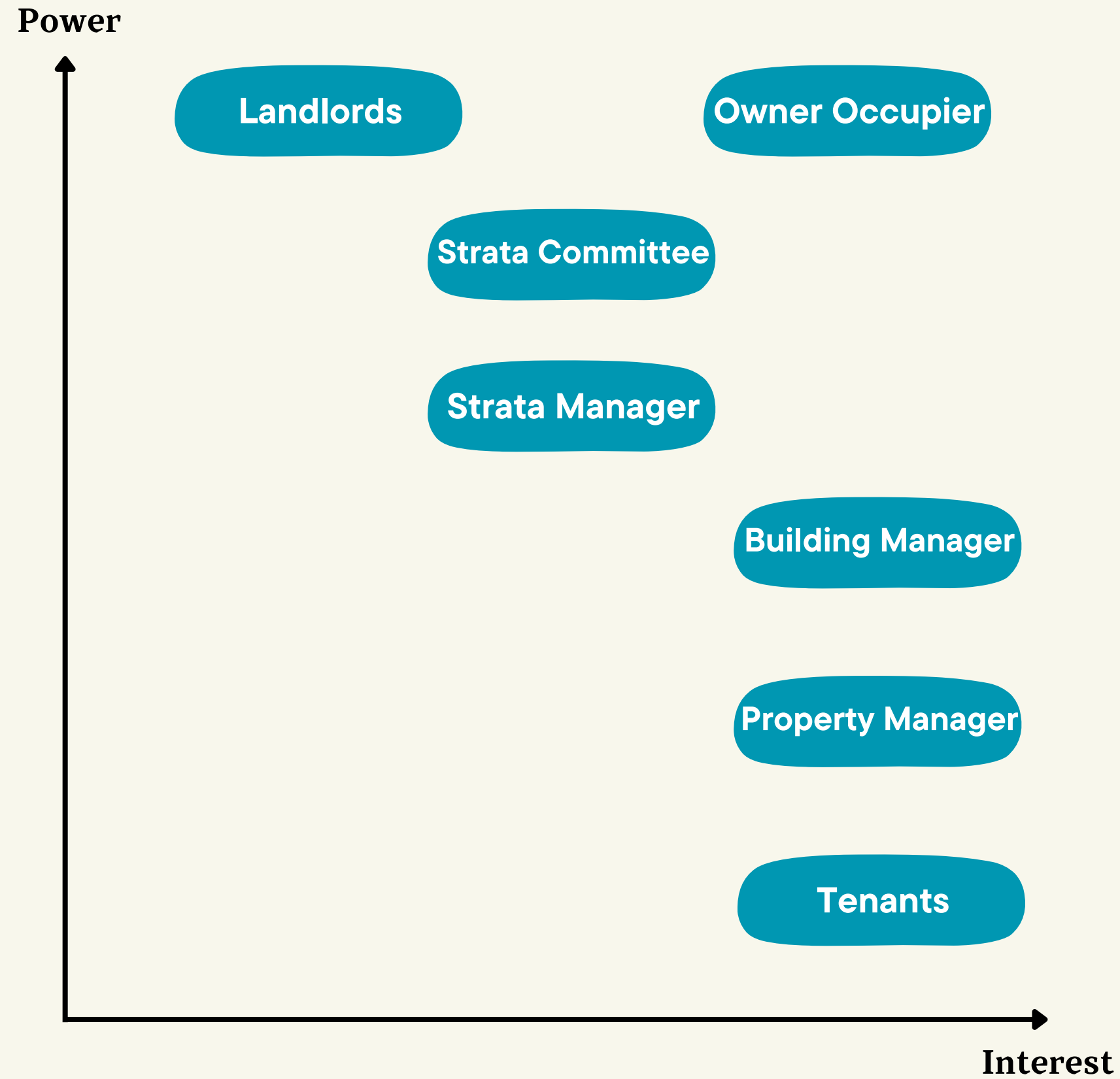


Owners Corporation

# Environmental Justice

Helping renters and people in social housing have access to solar power can help to **reduce energy bills.**

# STAKEHOLDERS



# MCA

Indicators

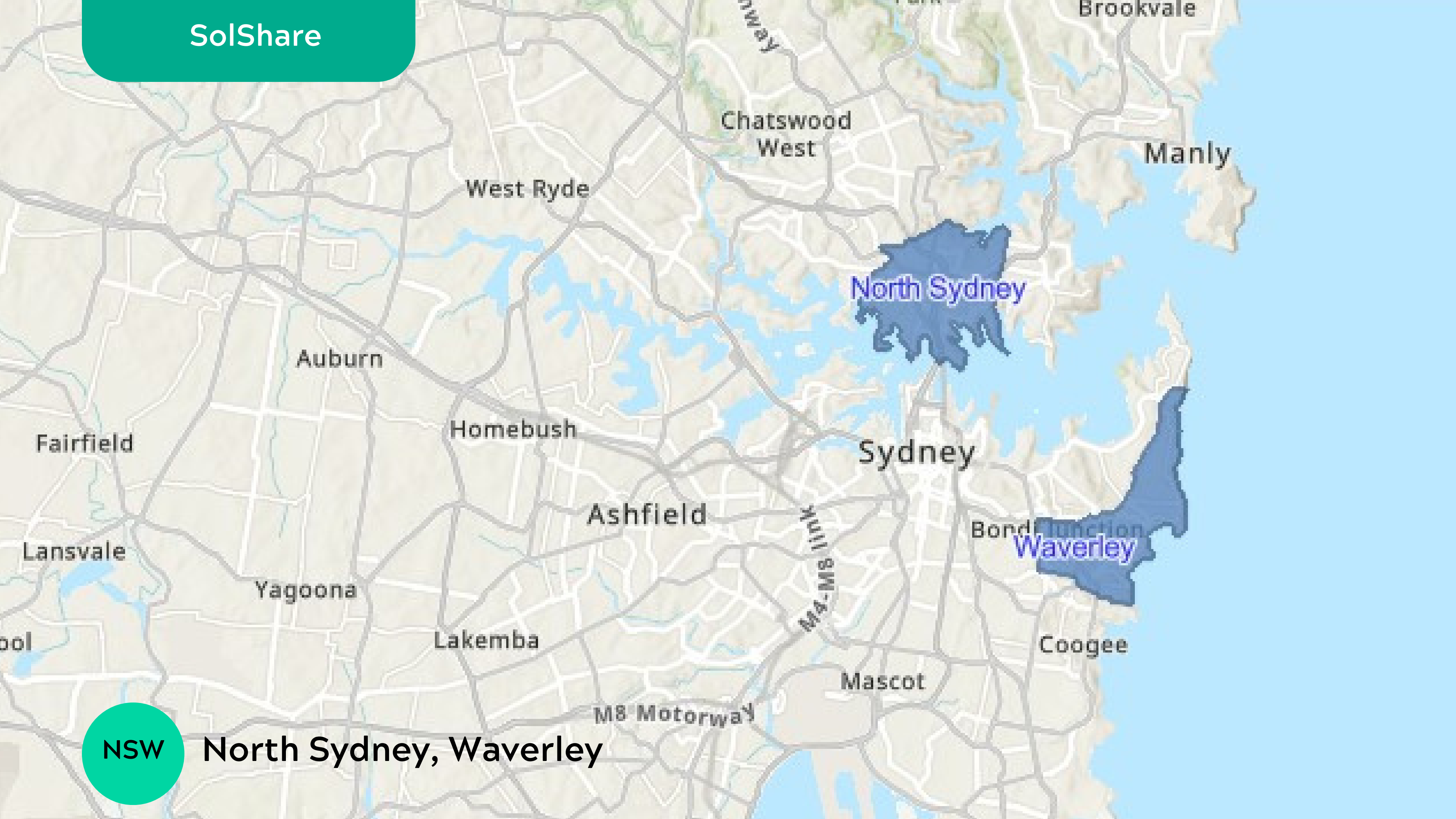
Variables

- High Residential Electricity/Gas Emissions
- High Renter population
- Sustainability engagement

- Residential Electricity/Gas Emissions
- Renters % data
- LGAs w/ Active Sustainability Teams



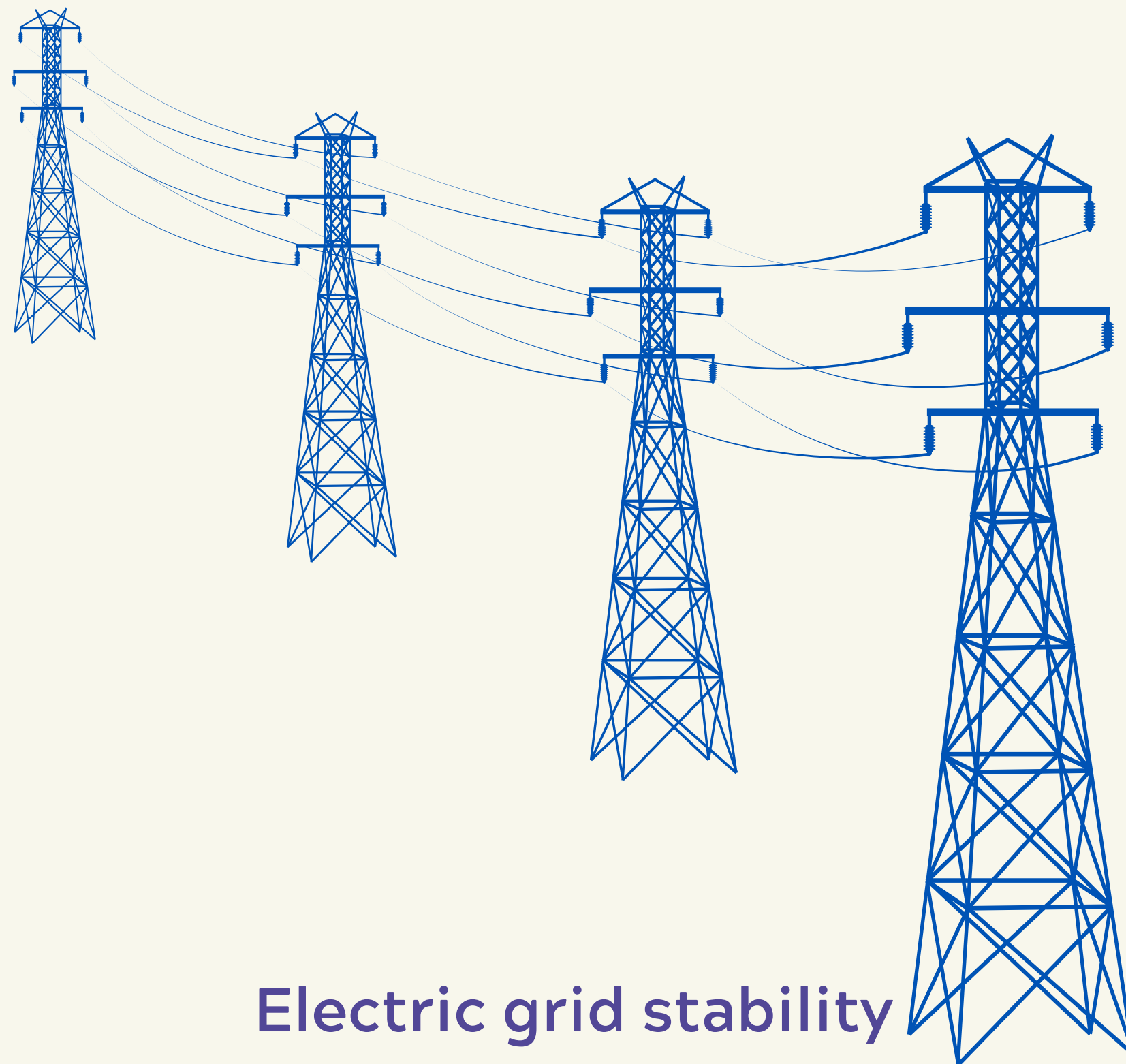
SolShare



NSW

North Sydney, Waverley

# Suggested Variables for Future Research



Electric grid stability

# Local Law 97

New York City, USA



Policy | Technology

Community | Regional | National

**RESIDENTIAL | COMMERCIAL | TRANSPORT**





**TECH FOR  
LOCAL LAW  
97**

## How?

- Increasingly stringent carbon emission limits
- Penalties in place
- Various ways to comply



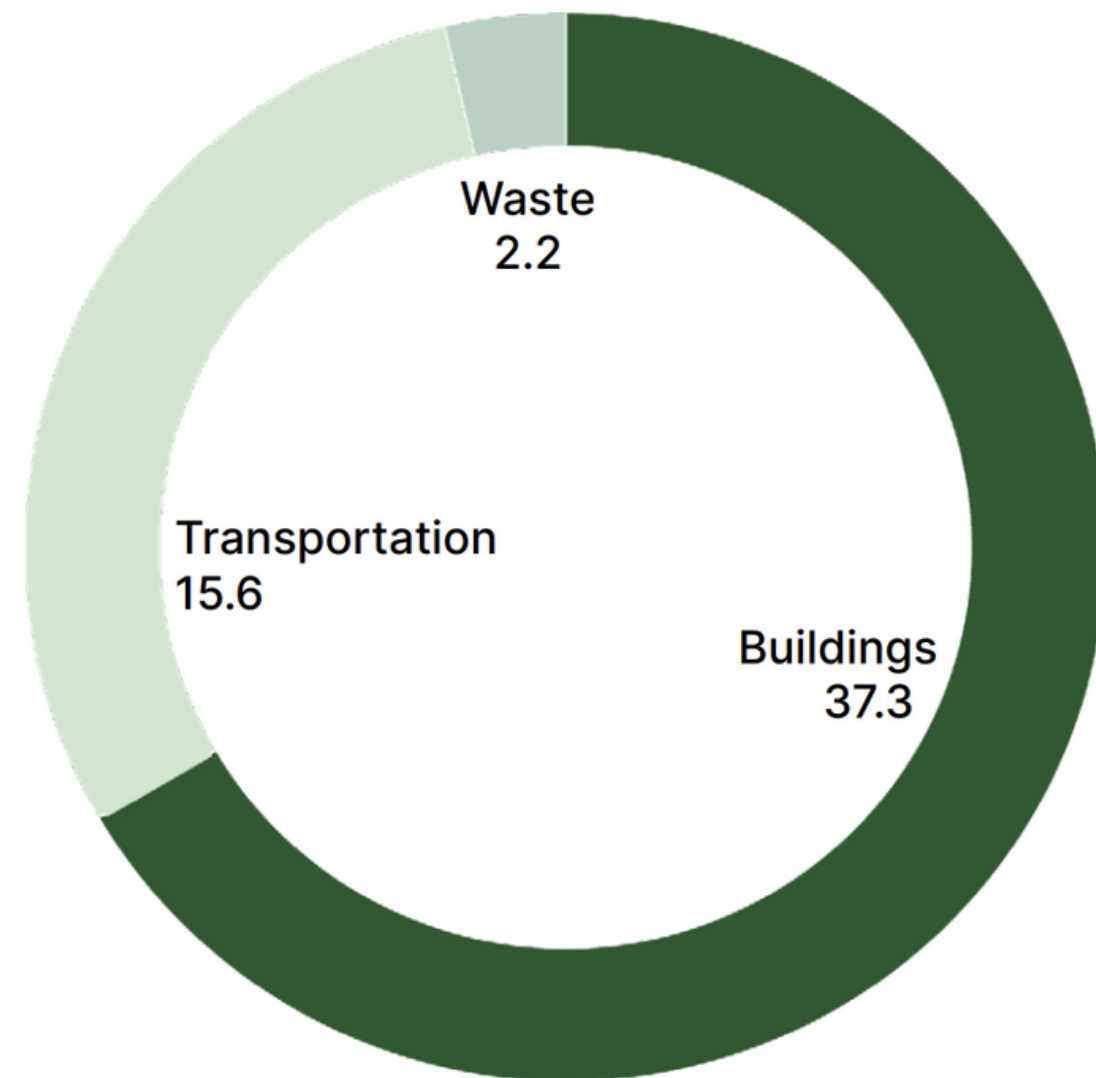
## Where?

- Affects all buildings in New York City over 25,000 sq ft

Figure 1

## Citywide Carbon Emissions Sources

*Building upgrades would transform the carbon landscape since buildings are responsible for two-thirds of NYC's annual emissions.*



*\*Millions of metric tons of CO<sub>2</sub>e by source*

Source: NYC Greenhouse Gas Inventory 2019

# Why?

- Reduce Building Emissions in NYC
- Reduced 40% by 2030
- Net Zero Emissions by 2050

# Who?

City government implements policy that affects:



**Government Buildings**

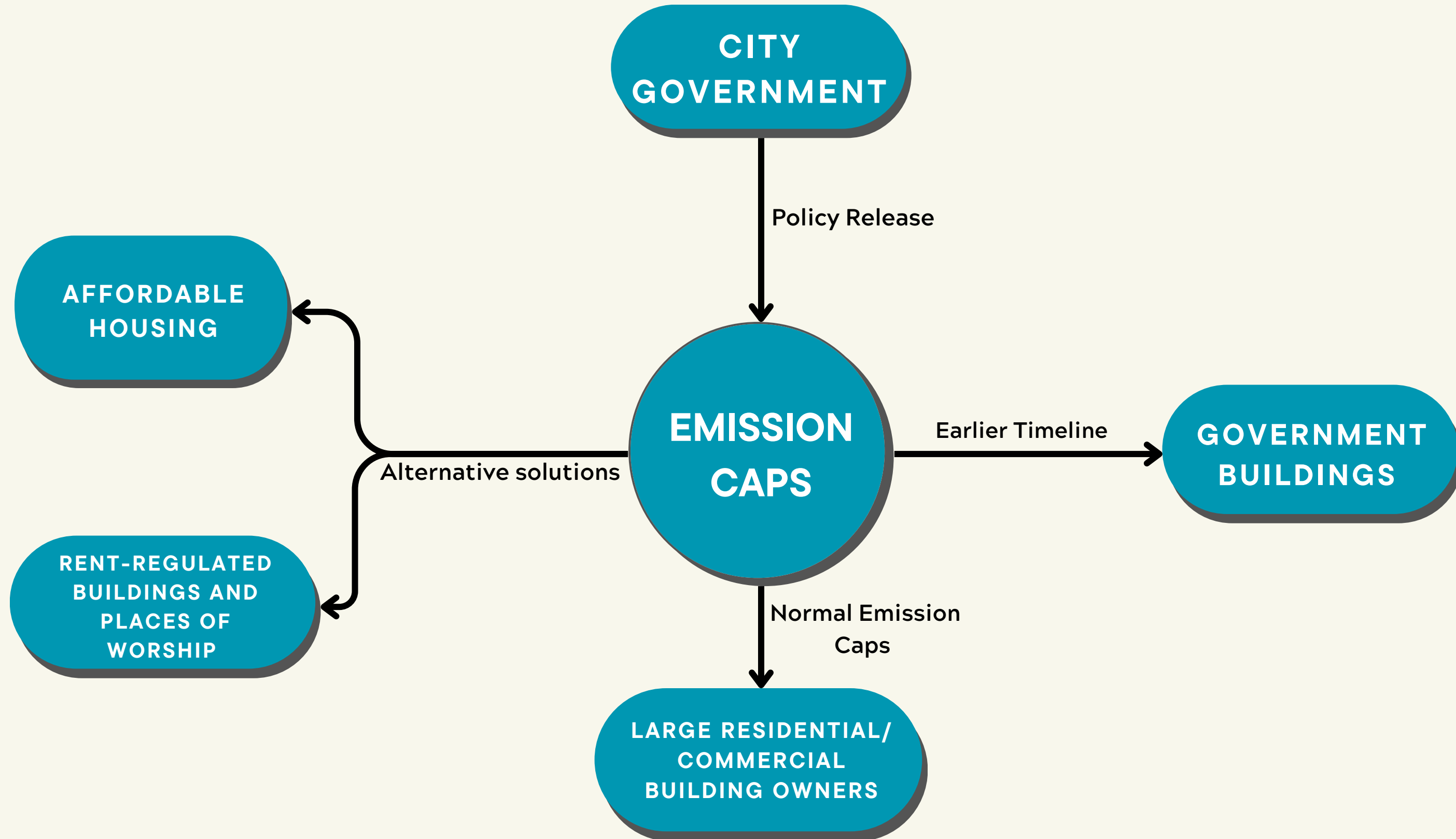


**Building Owners**

# Environmental Justice

Buildings with more than 35 percent rent-regulated units, houses of worship and some subsidized housing can implement **prescriptive energy-saving measures.**

# STAKEHOLDERS



# MCA

Indicators

Variables

- High Commercial Electricity/Gas Emissions
- High Residential Electricity/Gas Emissions
- High Population Density

- Commercial Electricity/Gas Emissions
- Residential Electricity/Gas Emissions
- Population Density

# Local Law 97



NSW

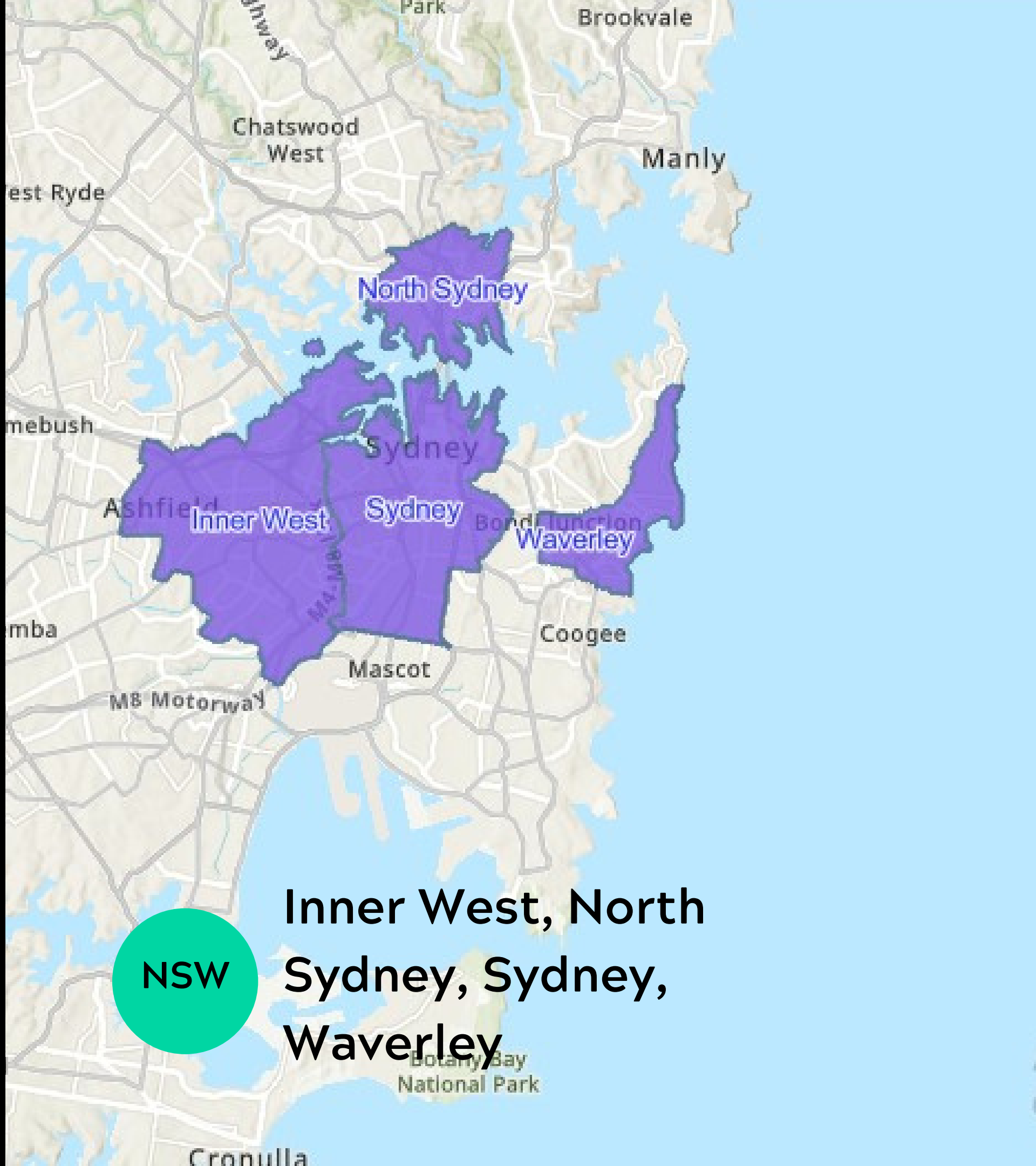
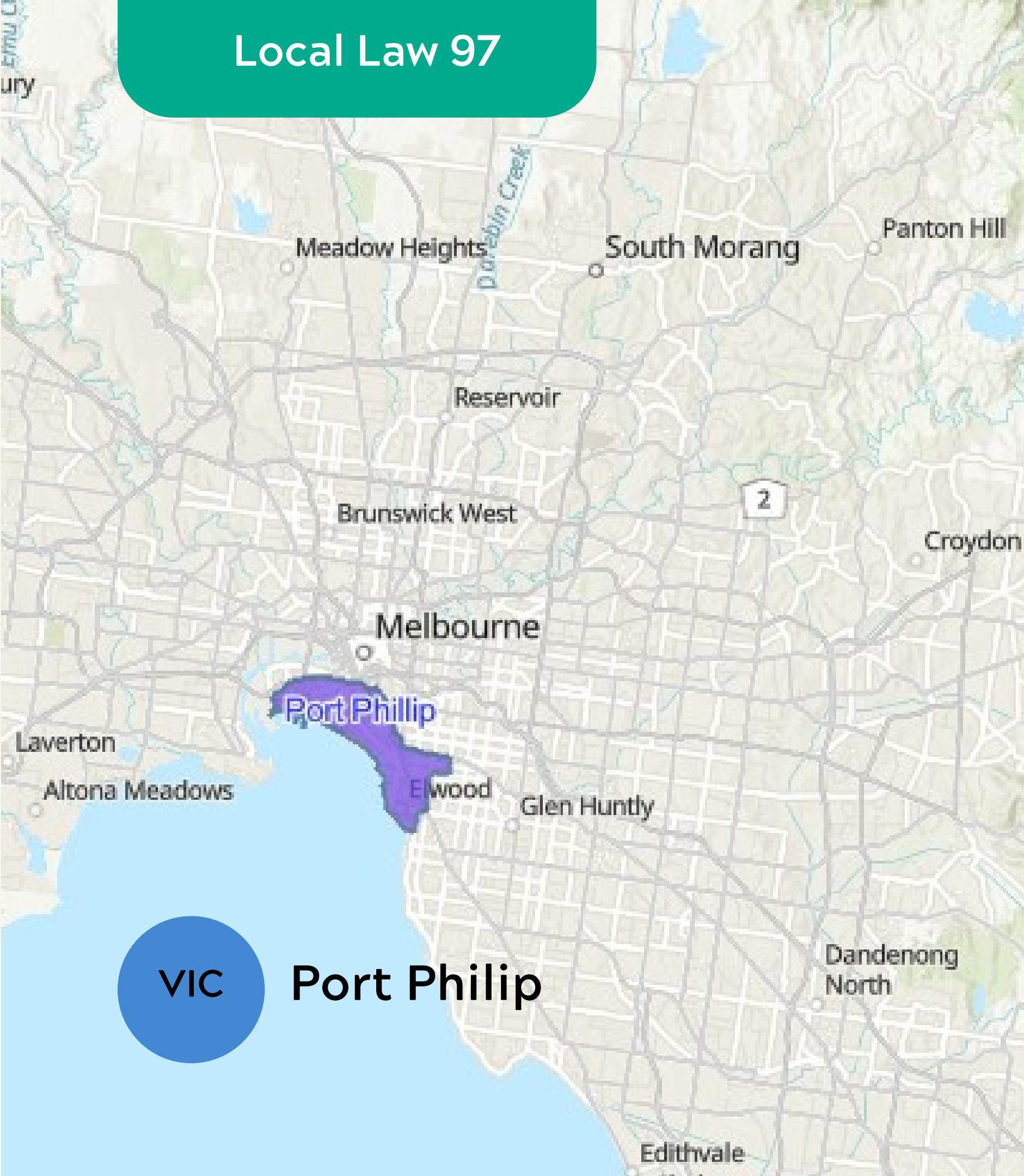
Inner West, North  
Sydney, Sydney,  
Waverley

VIC

Port Philip



# Local Law 97



VIC

Port Philip

NSW

Inner West, North Sydney, Sydney, Waverley

# Suggested Variables for Future Research



CBD Proximity & Building Dimensions

# Plug in BC

British Columbia, Canada



**Policy** | Technology

Community | **Regional** | National

**RESIDENTIAL** | **COMMERCIAL** | **TRANSPORT**



# How?

- Rebates on Electric Vehicle (EV) Chargers
- Up to 50-75% off

# Where?

## Shared Buildings:



Apartments



Hospitals



Government  
Buildings



Schools and  
Universities



# Why?

- Low amount of EV chargers per EV
  - 129,500 EVs
  - 3,800 EV chargers
- More Chargers = Promotion for more EV's

# Who?

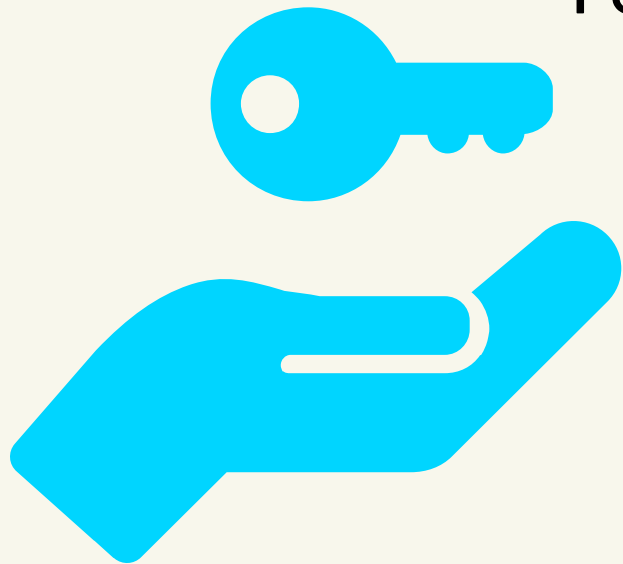


Policy of Province of British Columbia



**Natural Resources Canada**

Natural Resources Canada (NRCan)



Homeowners



Health Organizations



Government Organizations



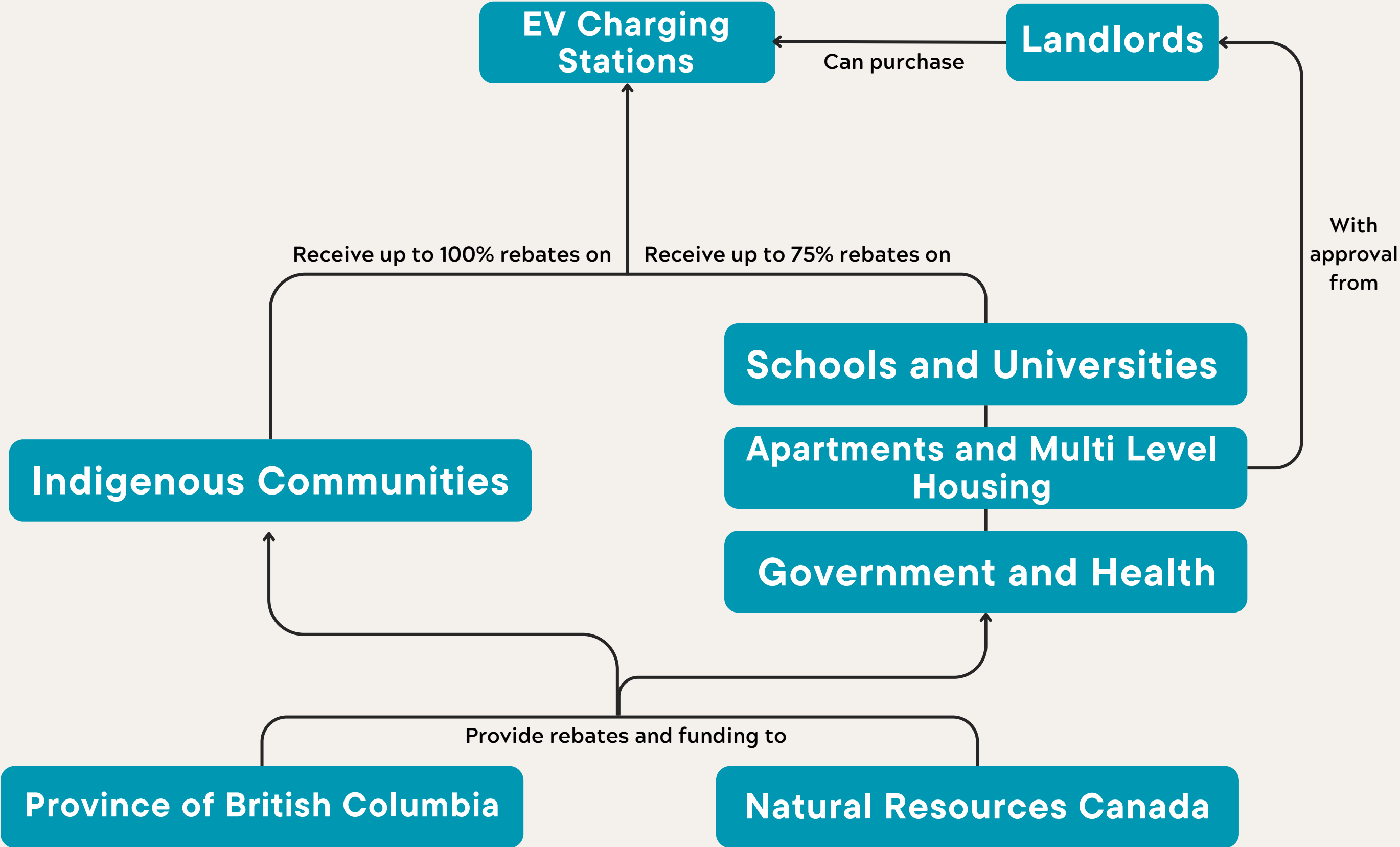
Schools and Universities

# Environmental & Social Justice

**Indigenous** communities  
and businesses can get up  
to **100%** off from their  
rebates.



# STAKEHOLDERS



# MCA

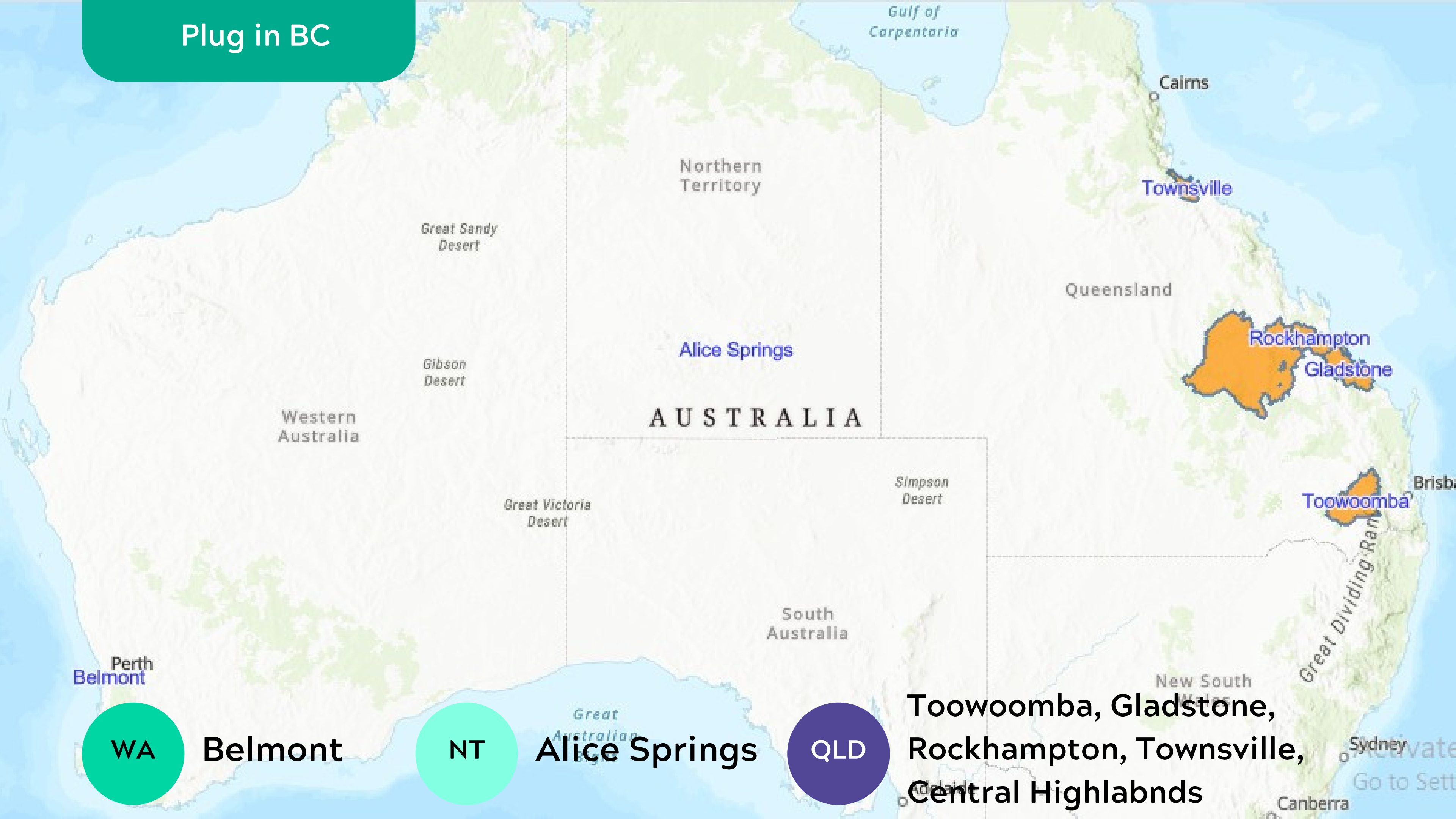
Indicators

Variables

- High proportion of indigenous populations
- Low access to public transport
- High Car Emissions

- Indigenous Renter %
- Transport Emissions
- Automotive
- Bus
- Rail
- Tram

Plug in BC



WA

Belmont

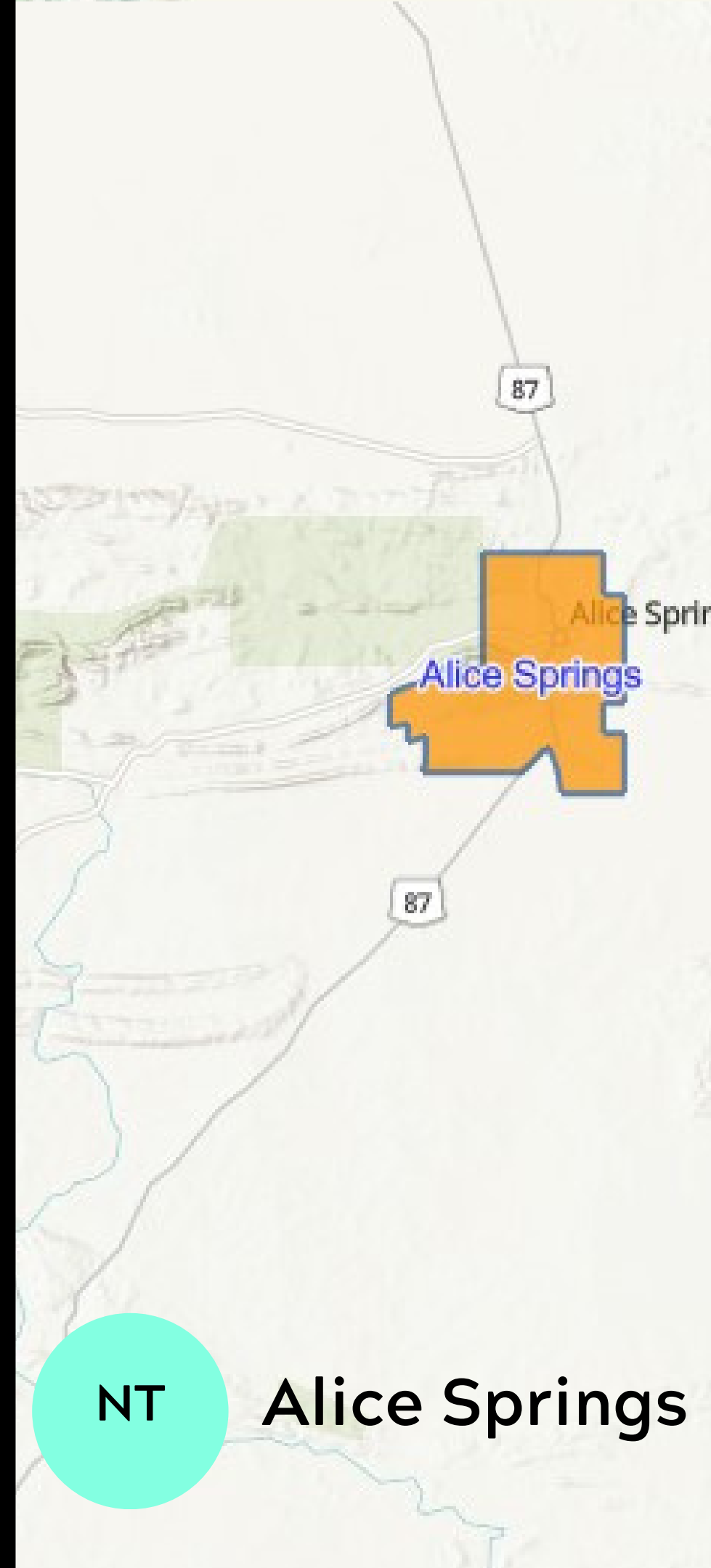
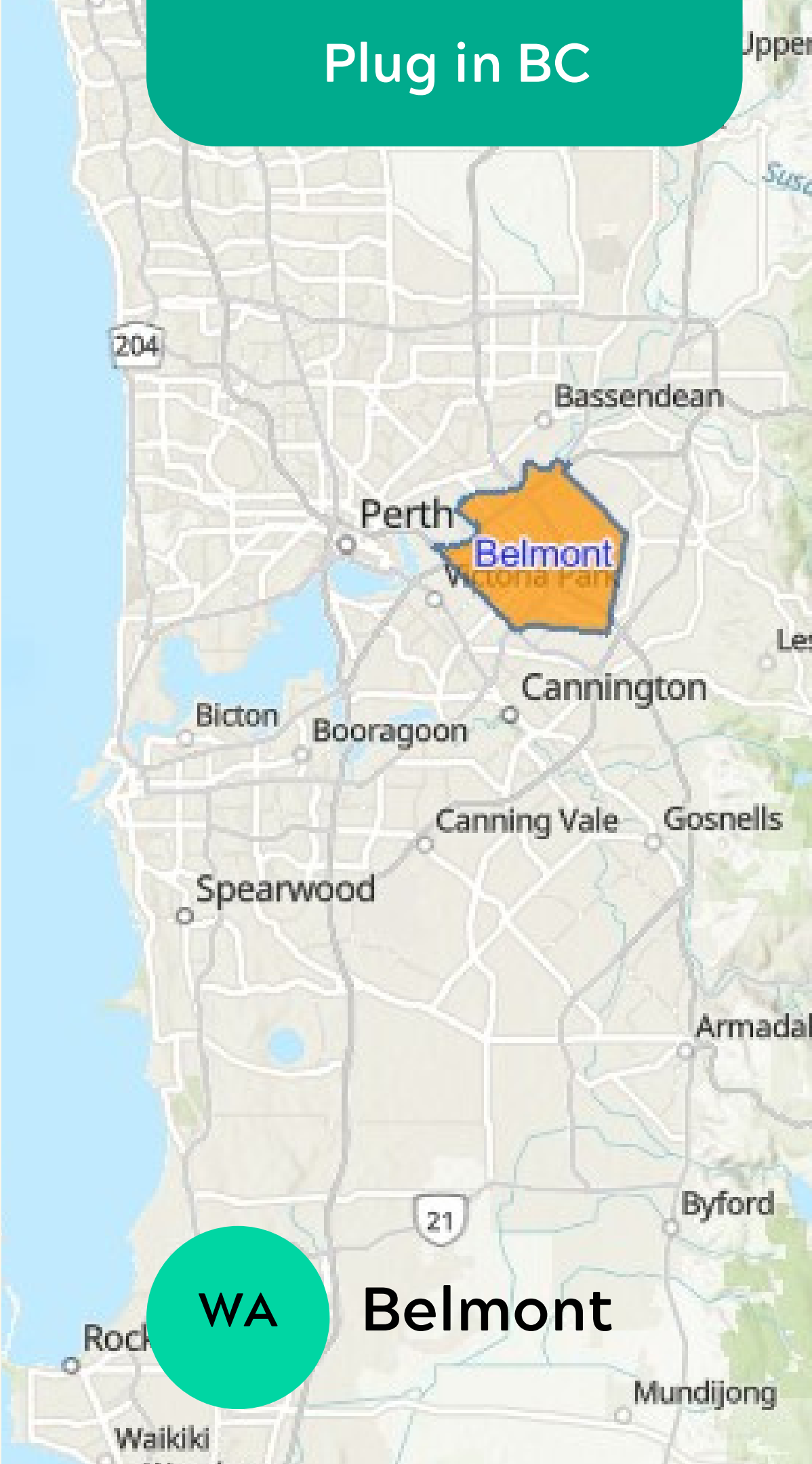
NT

Alice Springs

QLD

Toowoomba, Gladstone,  
Rockhampton, Townsville,  
Central Highlands

Plug in BC



# Suggested Variables for Future Research



Transportation grid lines

# Totally Renewable Yackandandah (TRY)

Yackandandah, Australia



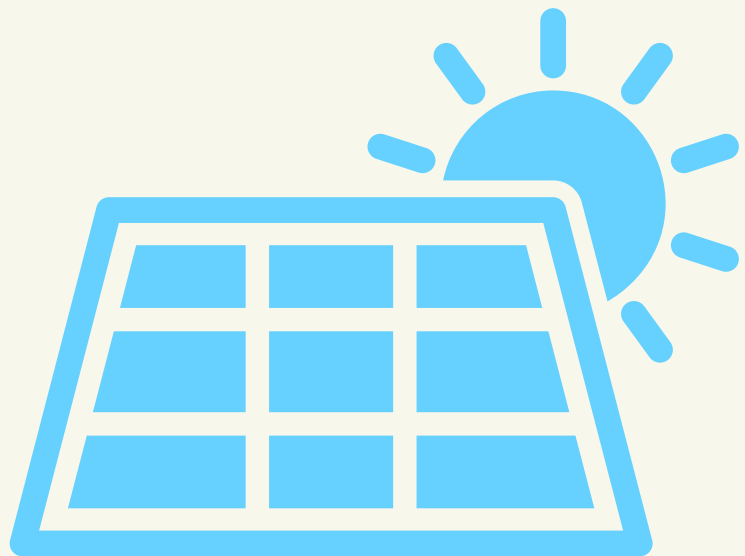
Policy | Technology

Community | Regional | National

**RESIDENTIAL | COMMERCIAL | TRANSPORT**

TRY

# How?



Solar



Wind



Heat Pumps



274-kWh community battery



Virtual Power Plant

TRY



# Where?

- Town of Yackandandah
- Supplying local properties
- Electricity facilities
  - Within feeder area



TRY



# Why?

- 100% renewable power
  - Cost effective
- Reduction of carbon emissions
- Greater resilience
  - Extreme weather
  - Natural Disasters

TRY



# Who?

- TRY
- Mach 2
- Ausnet
  - Mondo
- Residents of Yackandandah

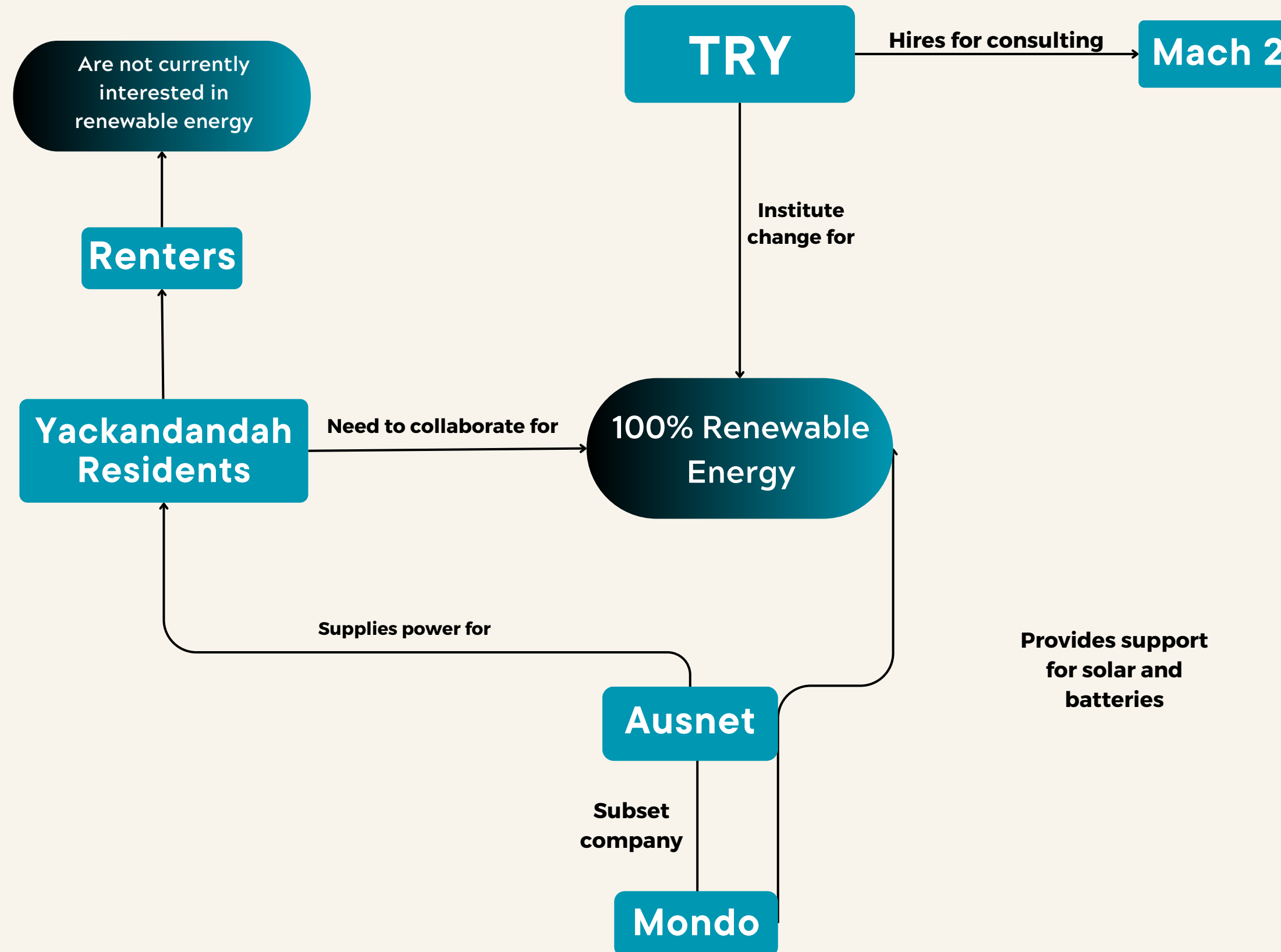
TRY

## Environmental Justice

Yackandandah being a **100% renewable energy community** will both lead as an example and be a big step in the reduction of emissions across Australia.

TRY

# STAKEHOLDERS



TRY

# MCA

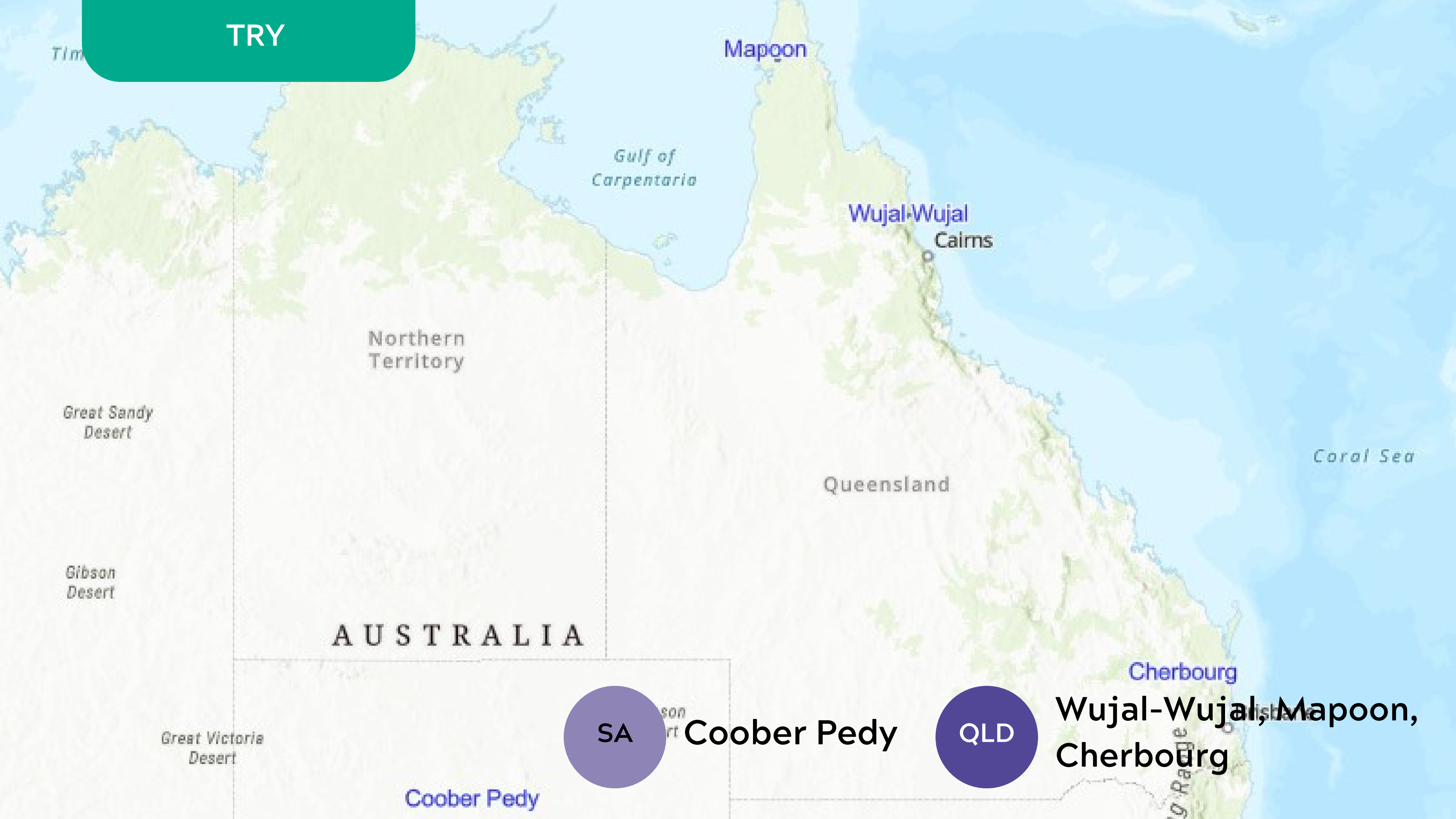
Indicators

Variables

- Far from Electric grid (>23 km)
- Small Areas
- Small populations

- Distance from Electric Grid
- LGA Population
- Area (Square kilometers)

TRY



Mapoon

Gulf of Carpentaria

Wujal-Wujal

Cairns

Northern Territory

Great Sandy Desert

Gibson Desert

Queensland

Coral Sea

A U S T R A L I A

Cherbourg

SA

Coober Pedy

QLD

Wujal-Wujal, Mapoon, Cherbourg

Coober Pedy

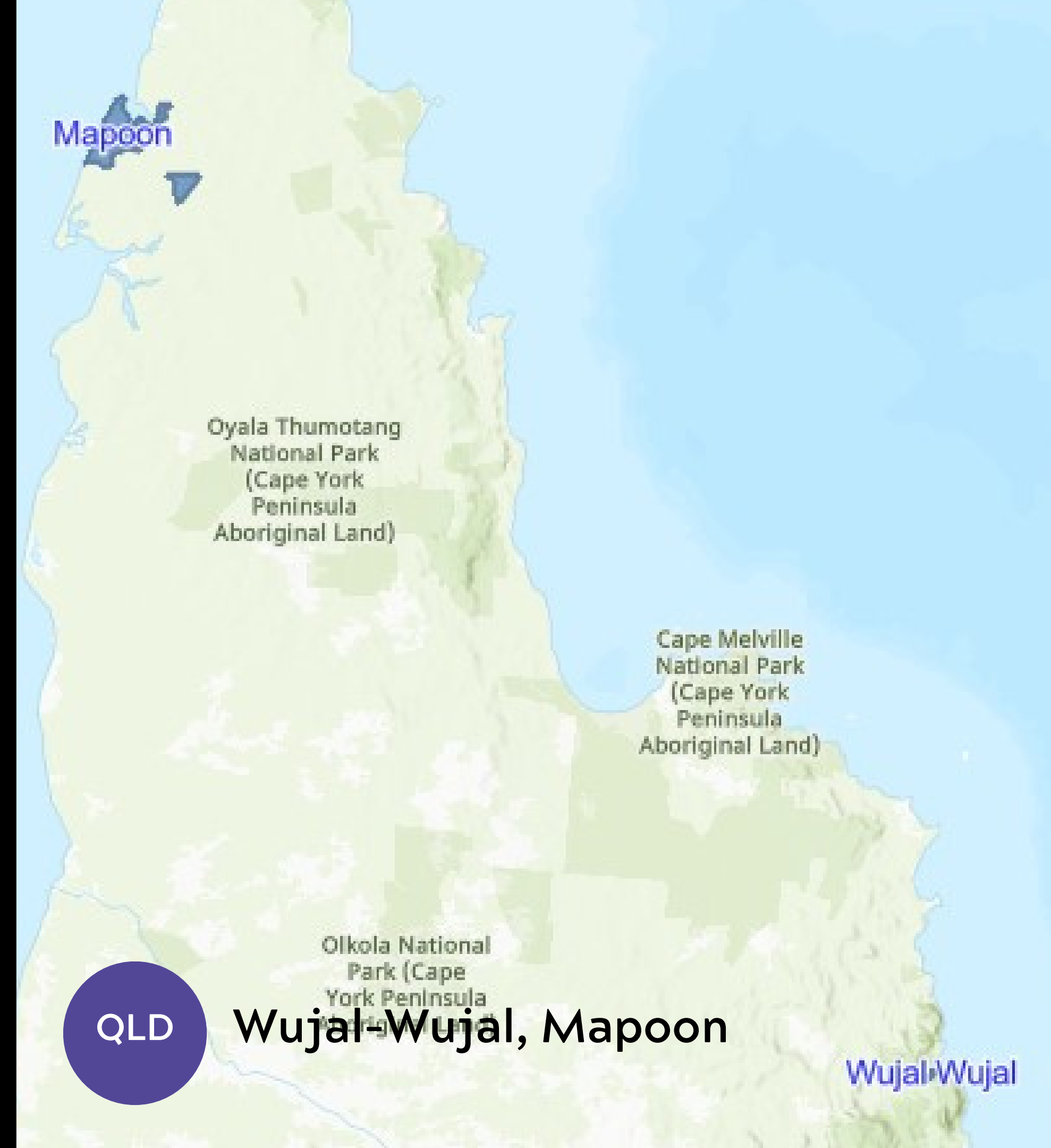
TRY



SA Coober Pedy



QLD Cherbourg



QLD Wujal-Wujal, Mapoon

Wujal-Wujal

# Suggested Variables for Future Research



## VOLUNTEERS

Volunteer Hours





# 04. Conclusions and Recommendations



# Conclusions & Recommendations

Based on our research and findings, our team recommends Beyond Zero Emissions to further explore rapid decarbonization for the building and transportation sectors.

## Local Law 97

Lowered Size limit

Could Target Capitals such as Melbourne and Sydney

NABERS Program

## EV Charger Rebates

Low Percentage

Far From Public Transport

Indigenous

# Conclusions & Recommendations

Further datasets that should be explored are:

Community  
Agency

Volunteer Hours

Voting Behavior

Spatial Data

Building Dimensions

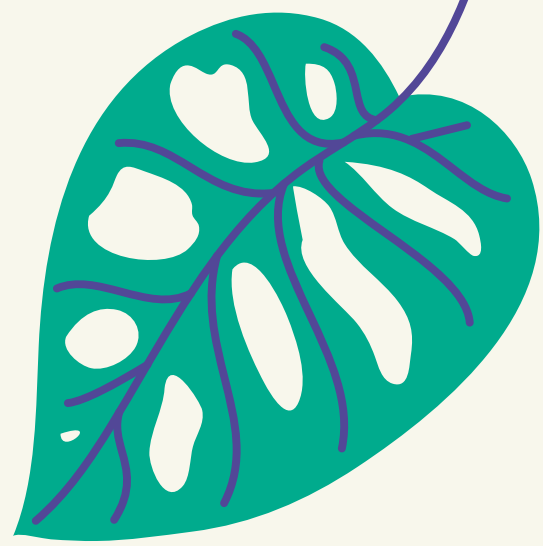
CBD Proximity

Temperature  
Range Data

Grid and Transport  
Data

Electric Grid Stability

Electric Vehicle Demand



# Acknowledgement



We would like to thank our sponsor, Beyond Zero Emissions (BZE), and their representative for this project: Anna Boin. This project would not have been possible without Anna's help and the resources BZE was able to provide.

Additionally, we want to thank our advisors, Professors Stephen McCauley and Sara Saberi, for their aid and dedication in this project.



**Thanks!**

