Net Zero Corridors
A final webinar from
SBEnrc 1.84

By

Peter Newman, Marie Verschuer, Dean Economou, Cheryl Desha

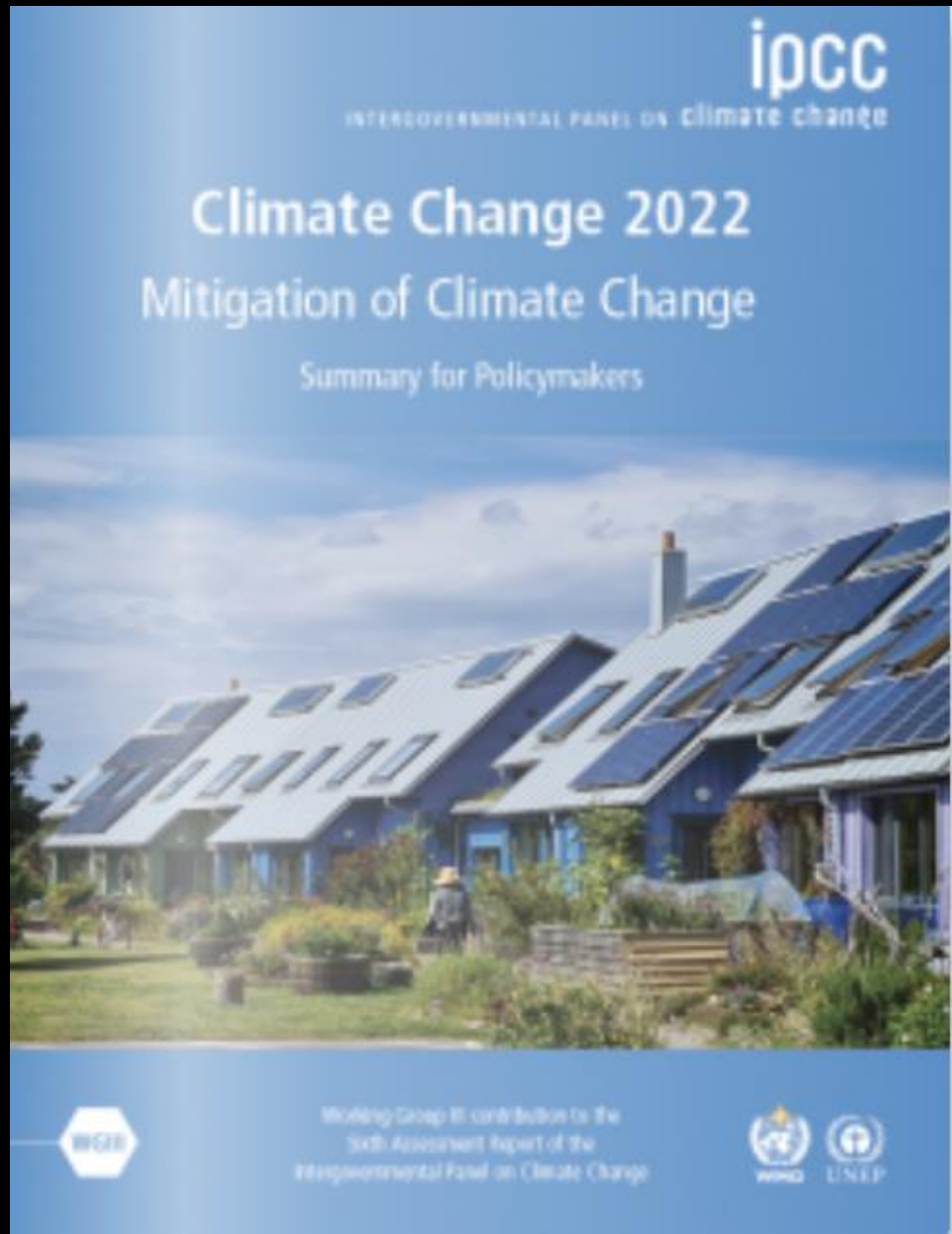
Asked GPT 4: A realistic picture of a transport corridor with self -guided road vehicles, e-scooters, trees, solar power and shops and apartments, with more people and shared use

1. The concept of net zero corridors – Peter Newman
2. The business case for mid-tier transit – Marie Verschuer
3. The trial and path to market for trackless trams – Dean Economou
4. The application to Sunshine Coast – Cheryl Desha

IPCC 2022 Mitigation Report

‘We are on a fast track to climate disaster….’

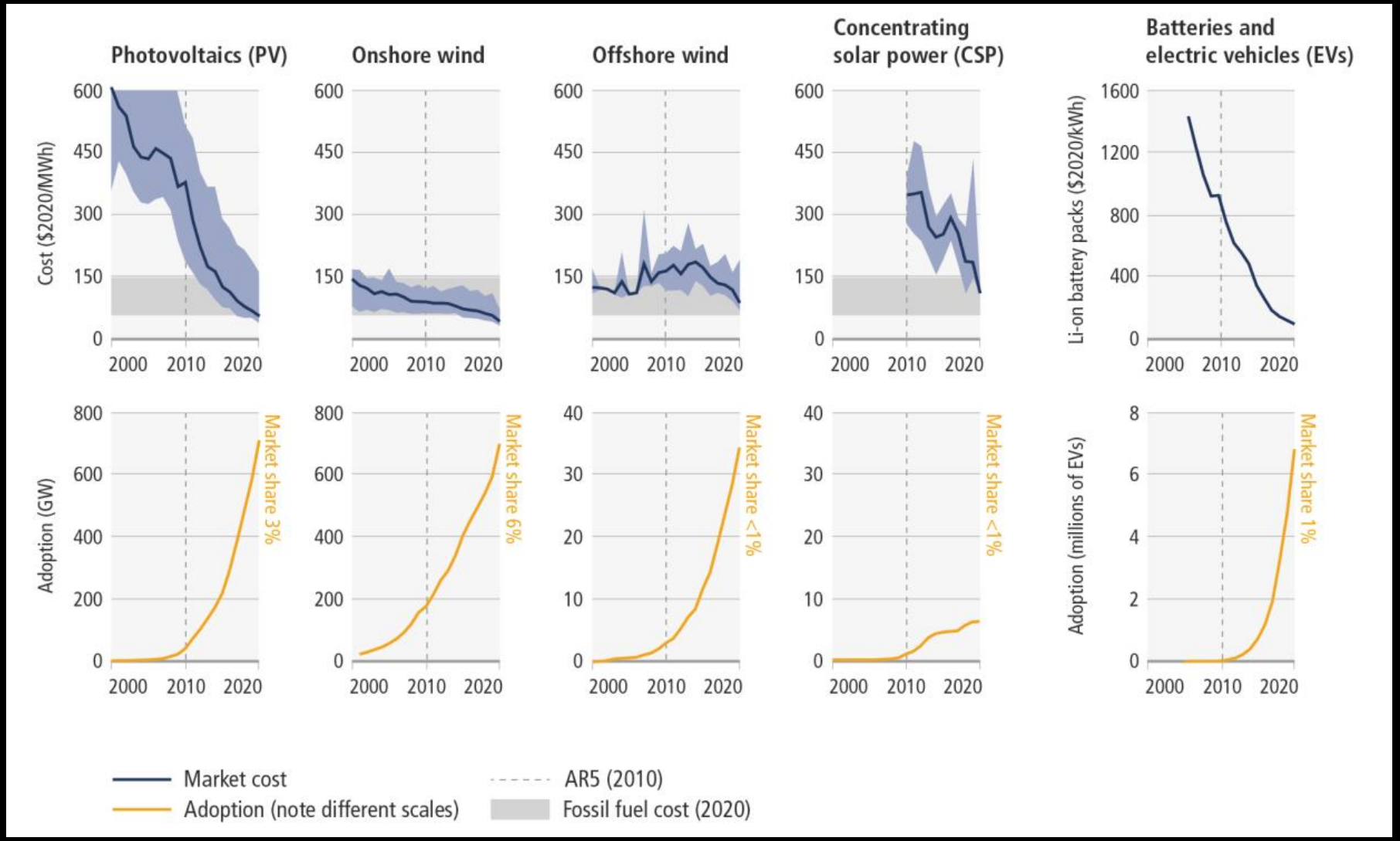
IS THIS ALL?



THE GOOD NEWS –

IPCC MITIGATION REPORT

The unit costs of key low-emission technologies have fallen continuously since 2010 and their adoption continues to rise…

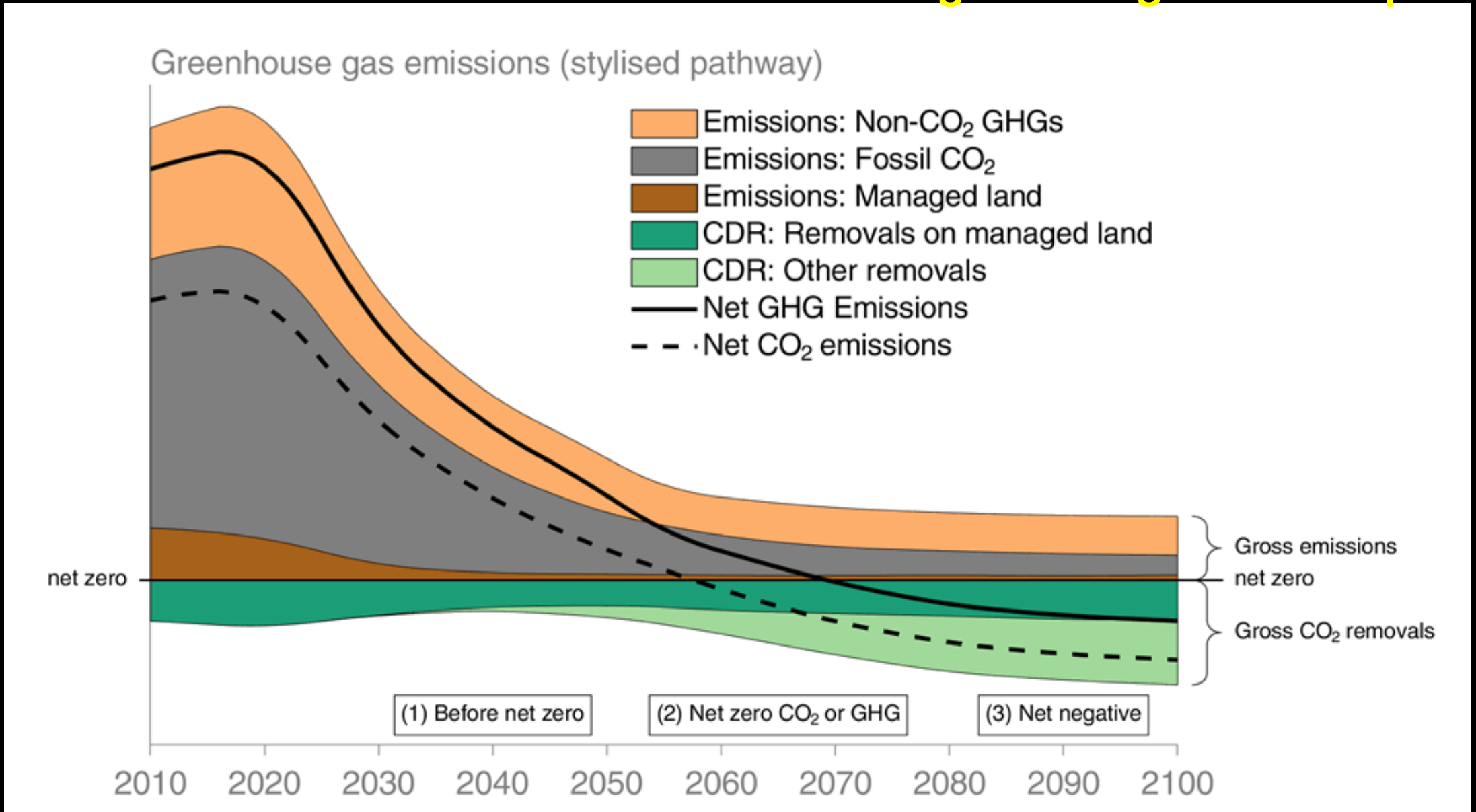


Need to integrate With smart technologies

- Figure SPM3

Trajectory to net zero –

removes fossil fuels and continues with offsets regenerating the atmosphere



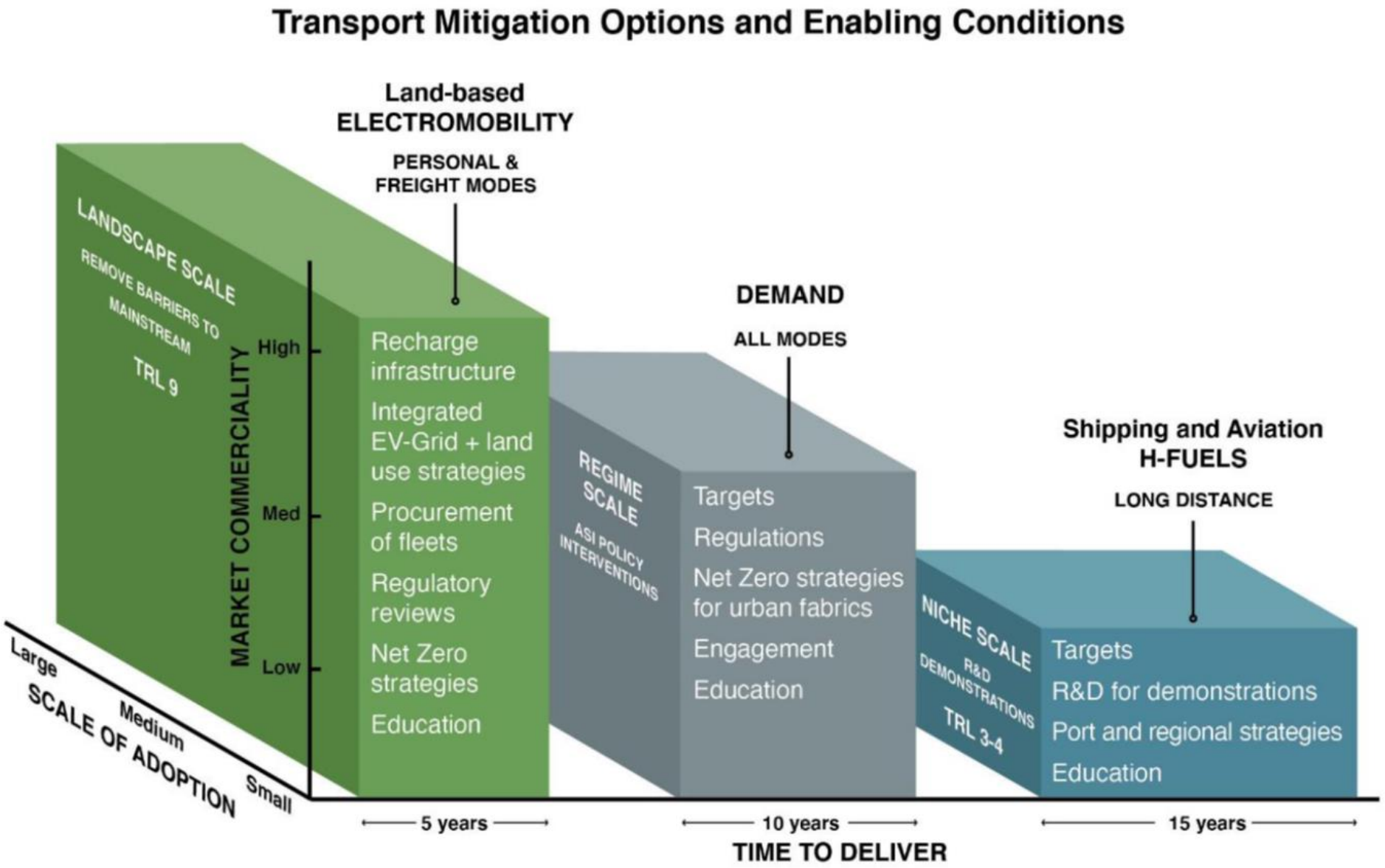
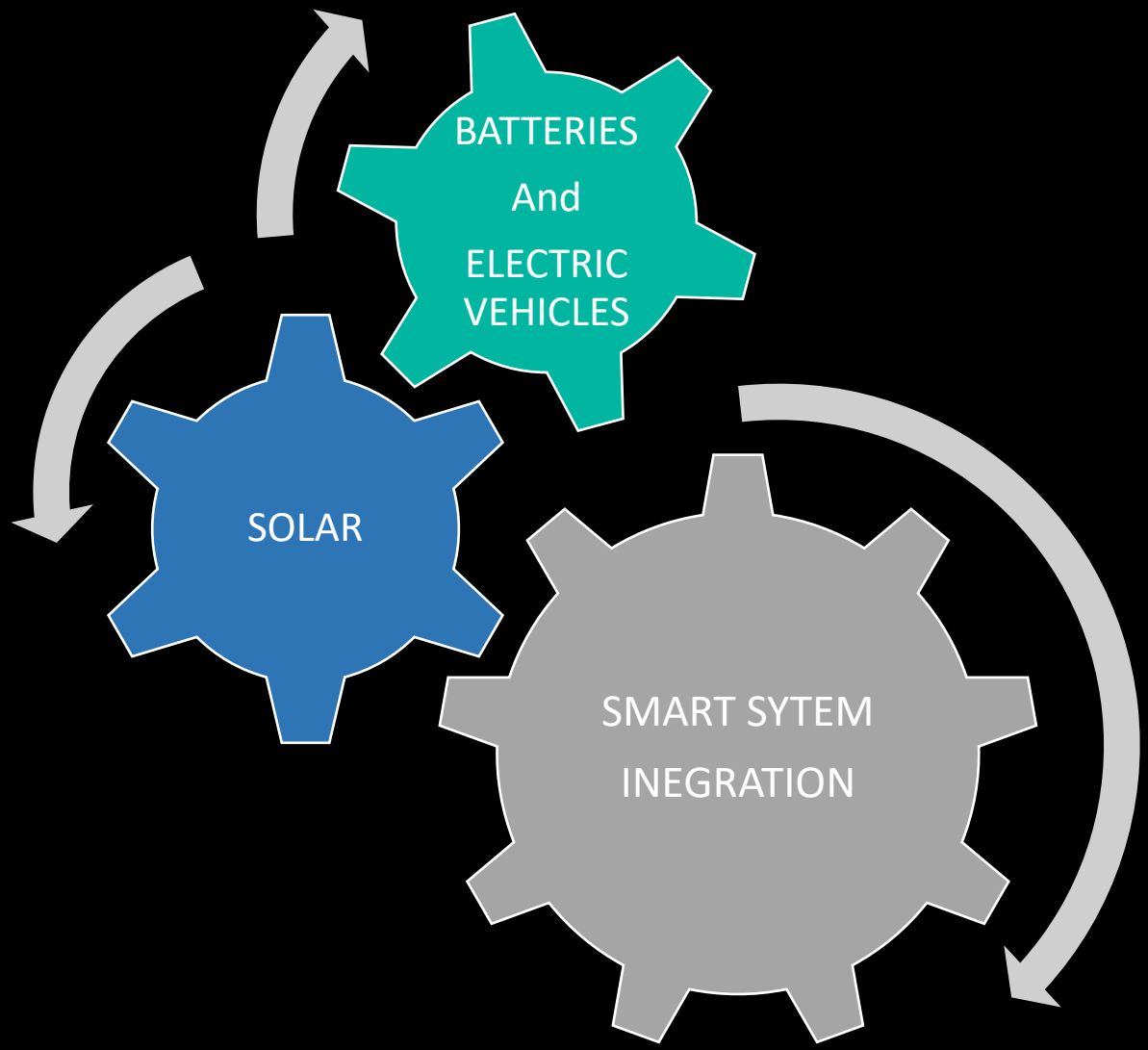


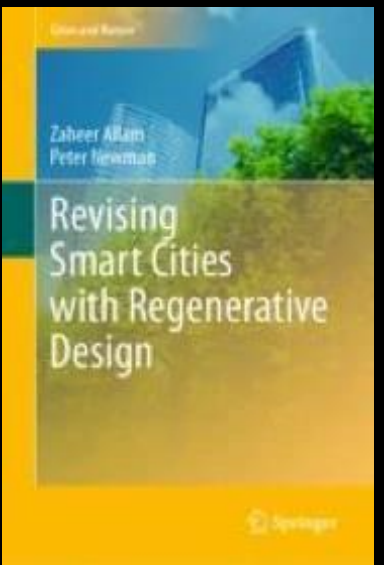
Figure 10.22 Mitigation Options and Enabling Conditions for Transport. Niche scale includes strategies that still require innovation.

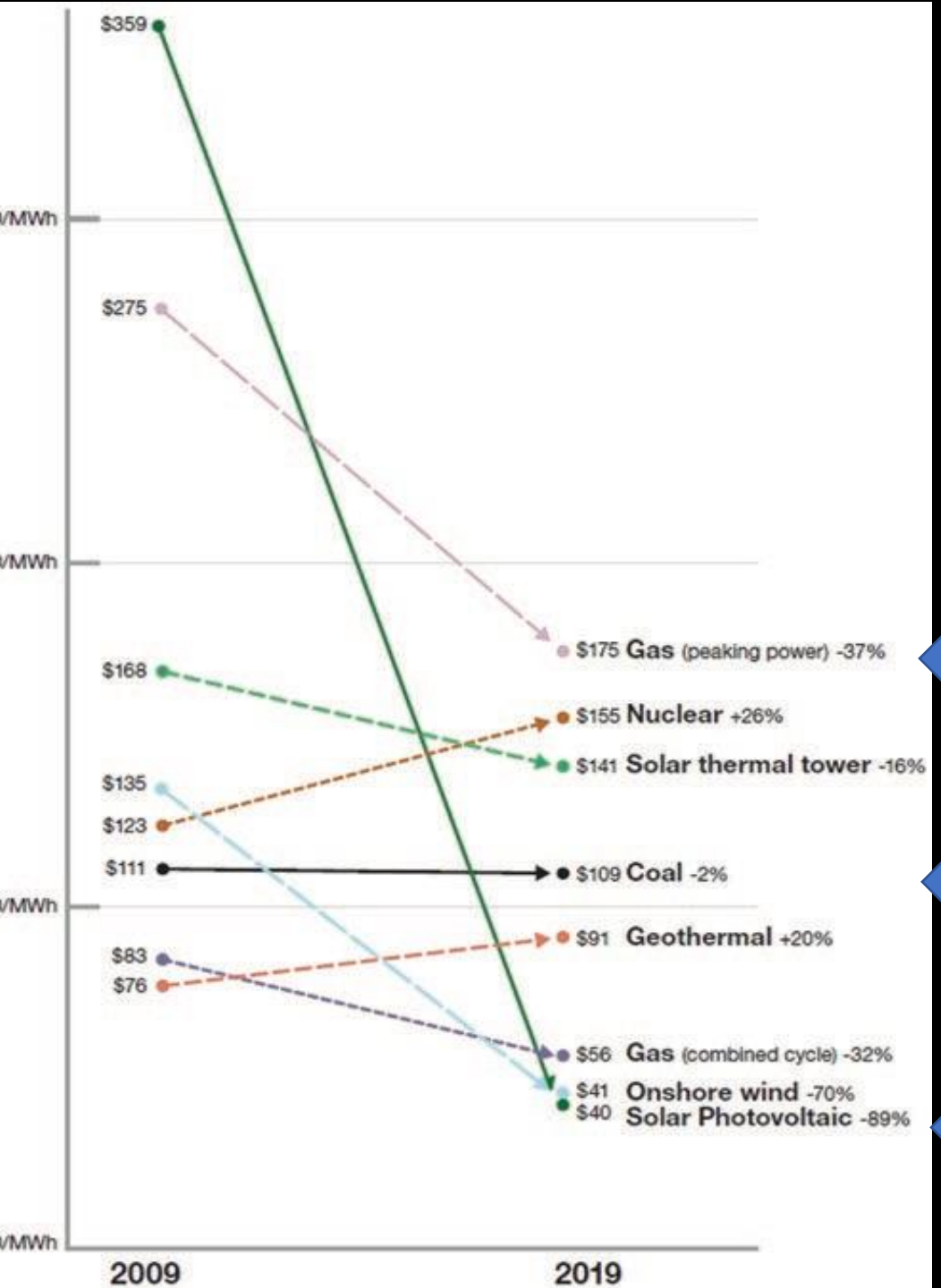
Critical role of INNOVATIONS in SMART SYSTEMS



NET ZERO EVERYTHING

GRIDS
INDUSTRIES
CITIES
And
CORRIDORS





Cost of power

Solar is cheaper than any source of power in history

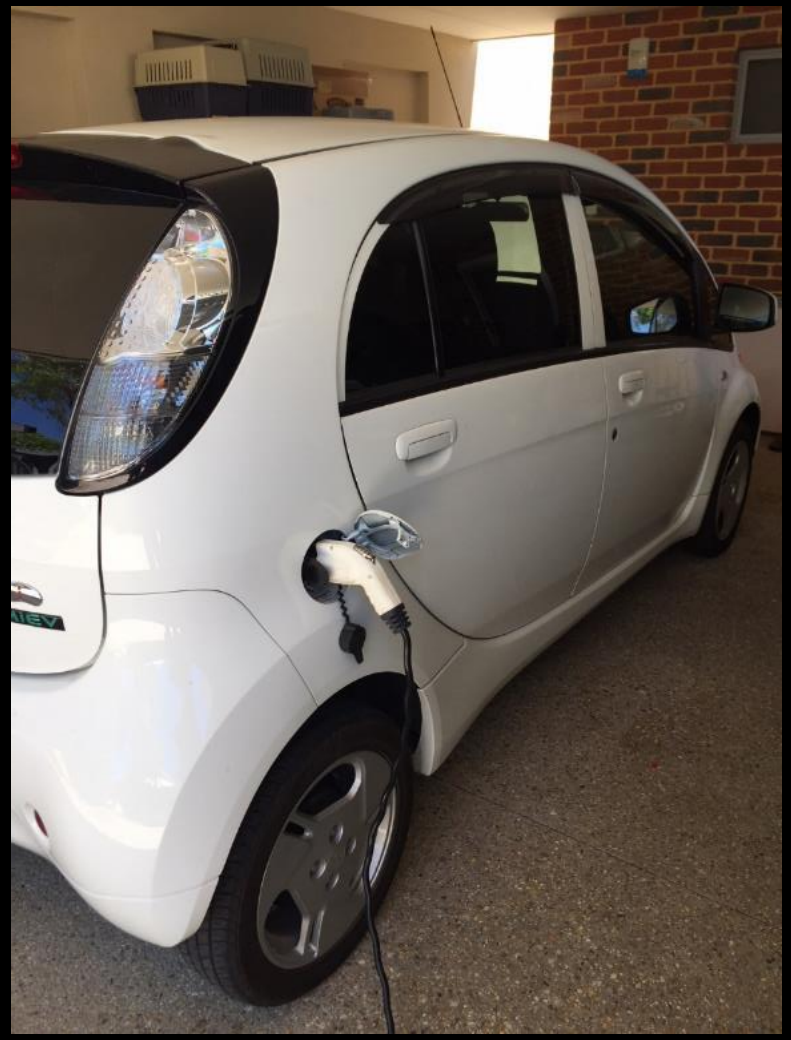
GAS

COAL

SOLAR

Rooftop or Solar Farm?

Solar, Batteries and EV's *integration*



HOW DO WE SHARE SOLAR EQUITABLY and PRODUCTIVELY in medium density or social housing?

WGV: Solar-Battery-EV-**Blockchain**

85 staff
Projects in
25 nations

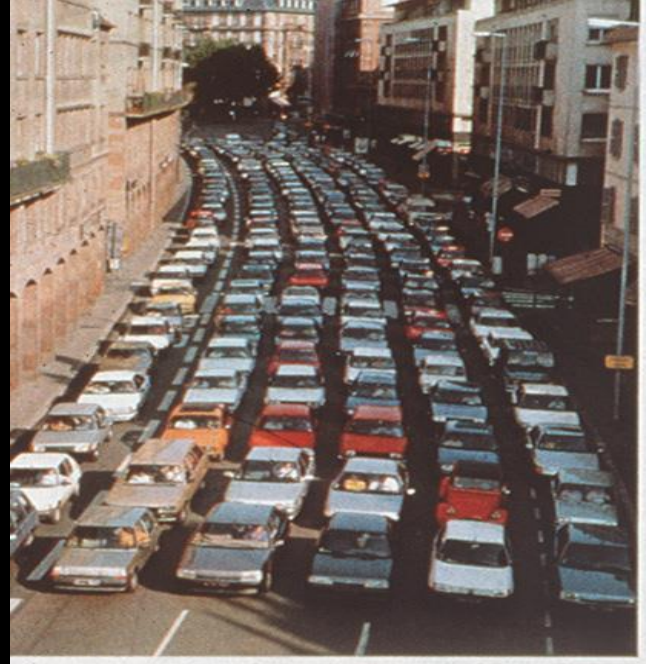
Jemma Green

Powerledger develops software solutions for the **tracking, tracing and trading of renewable energy**. We believe in the democratisation of power, for a sustainable future.'

Its not just technology…DESIGN MATTERS

What if these were all EV's?

ONE LANE - people per hr:
Freeway 2,500
Busway 5000
LRT 10-20,000
Train 50,000

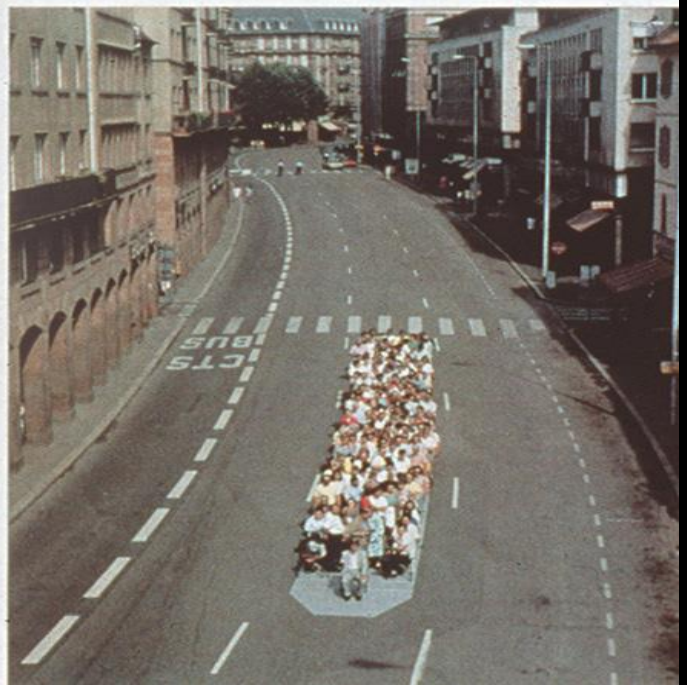


240 Persons travel to work:

-- in 177 Cars

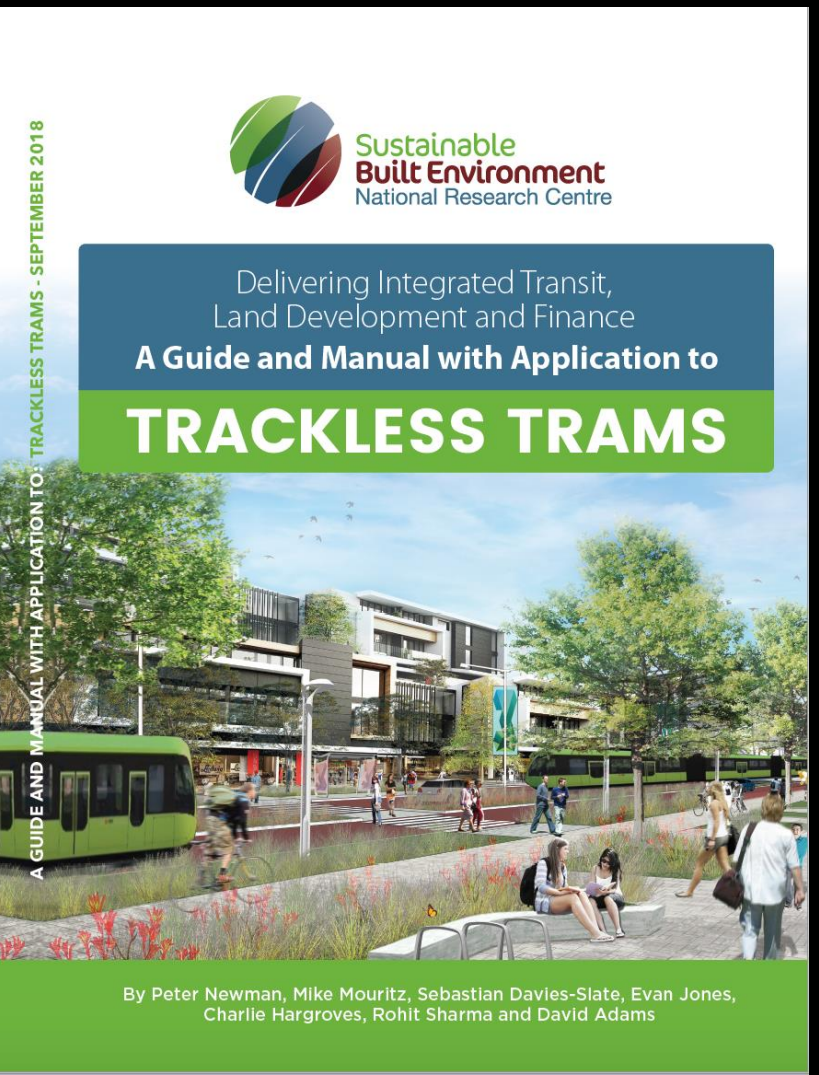
-- in 3 Busses

-- in 1 Tram



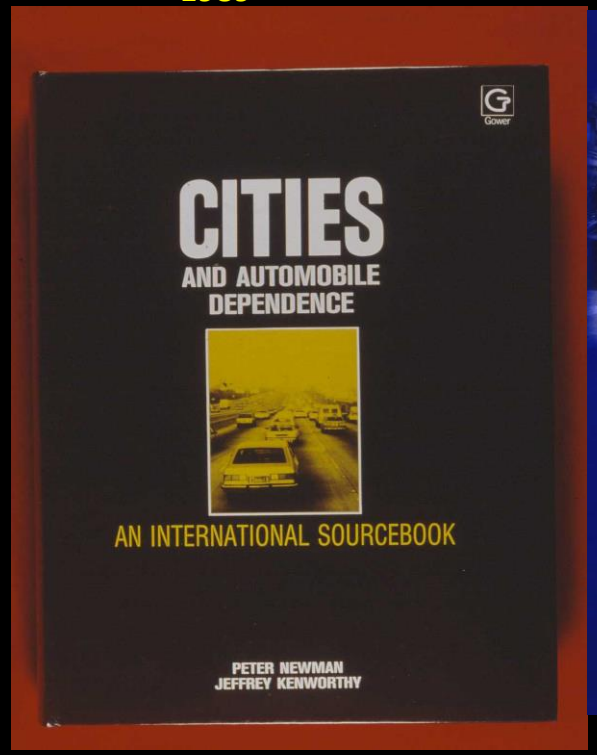
Net Zero Corridors – 5 year SBEnrc project

TRACKLESS TRAMS…batteries on roof, sensors guiding it along a ‘track’, mid-tier capacity.

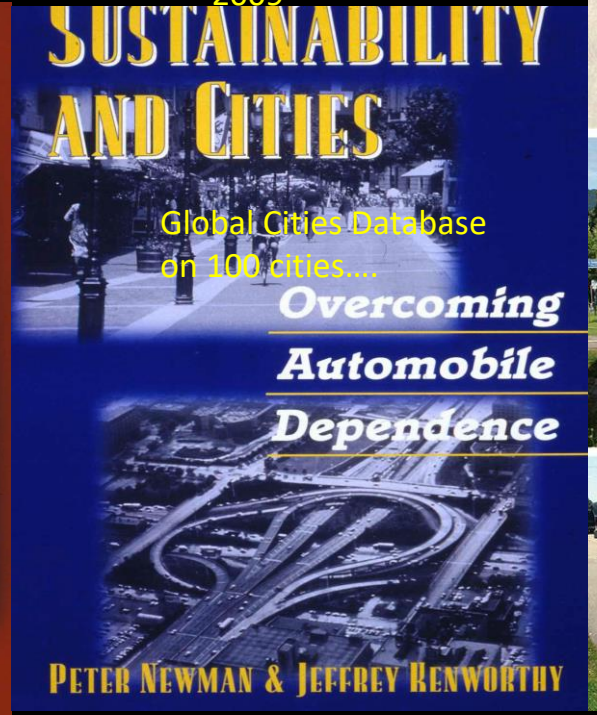


The Rise and Fall of an Empire – a Trilogy

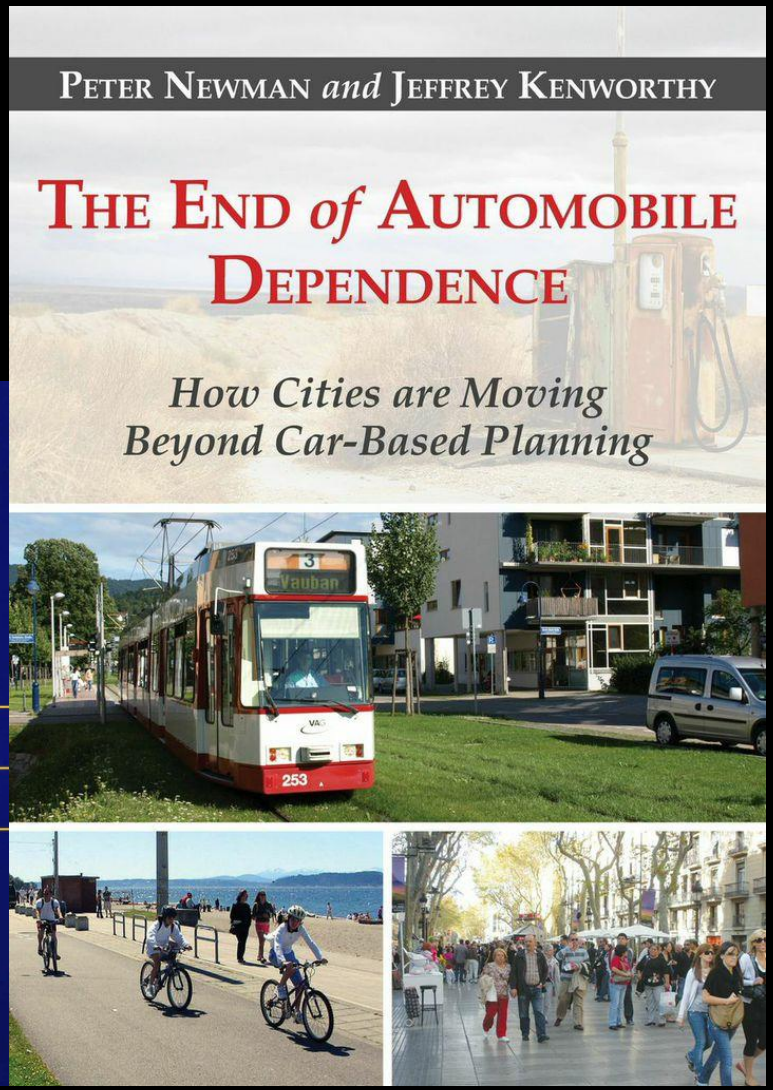
1989



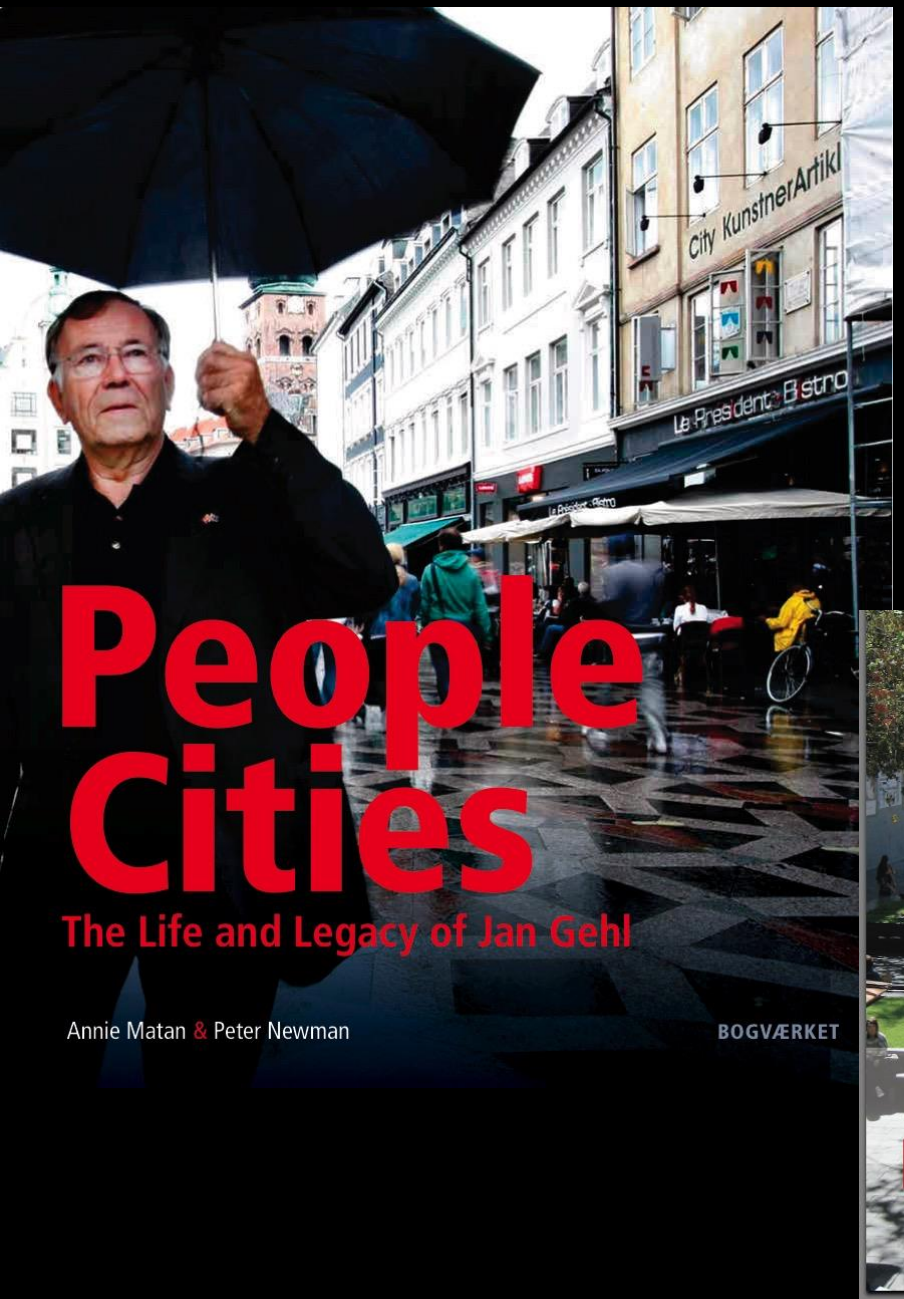
2009



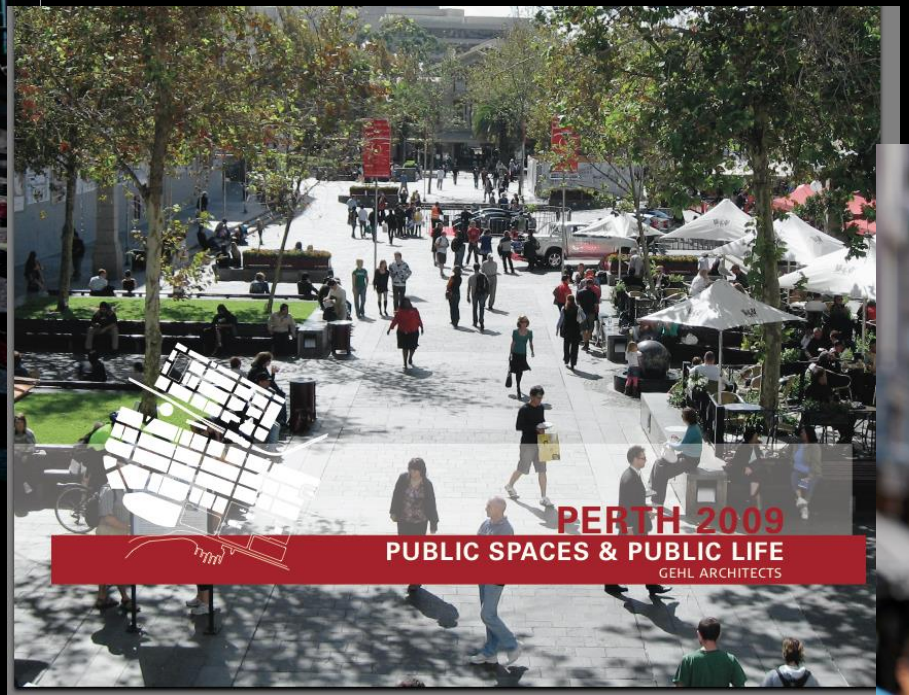
2015



The walkability specialist…



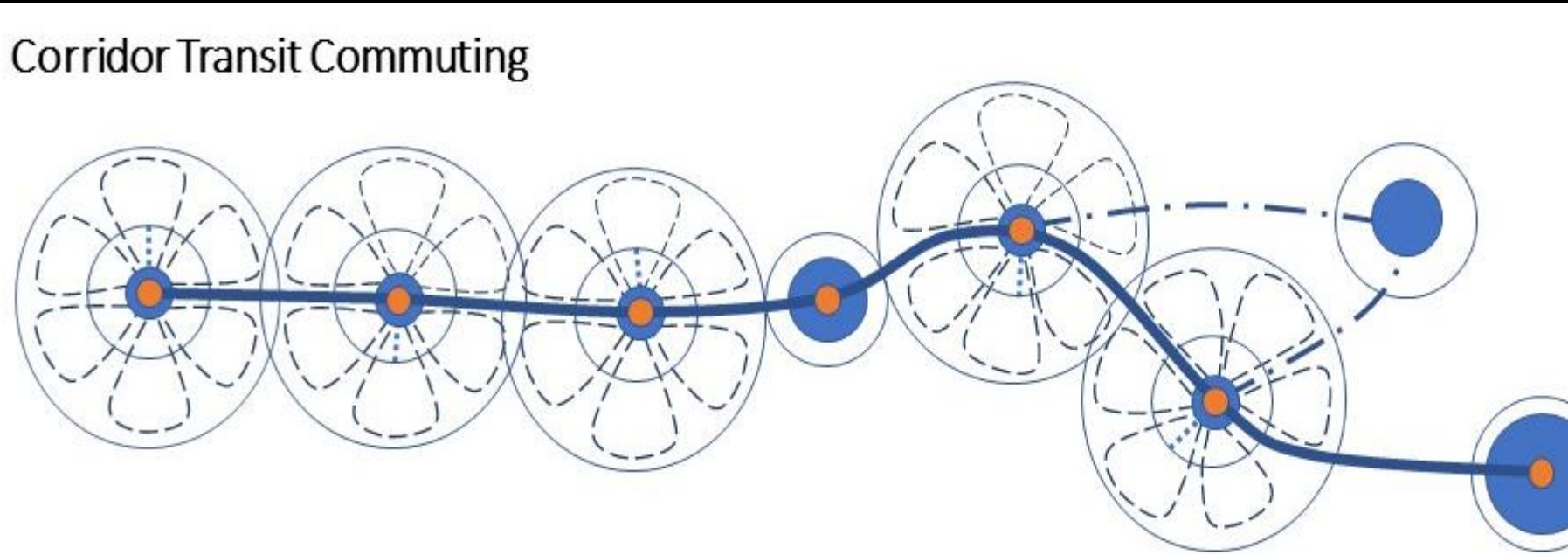
Smart Growth America recent study shows only 1.2% of their largest 35 cities are walkable but create 20% of US wealth!



How do we make walkable urban centres that are net zero?

Create Net Zero Corridors
- along a string of ***net zero precincts***

Micromobility feed-in, shared and private.



What can a Trackless Tram do to a Corridor?
Imagine the Possibilities

Transformation of a city…

Greening the Greyfields along trackless tram routes…eg Cecil Avenue, Cannington!

EVERY LOCAL AREA WANTS TO BE LIKE THE INNER CITY….

This is what most local governments are trying to build….

Mid-Tier Transit makes it possible

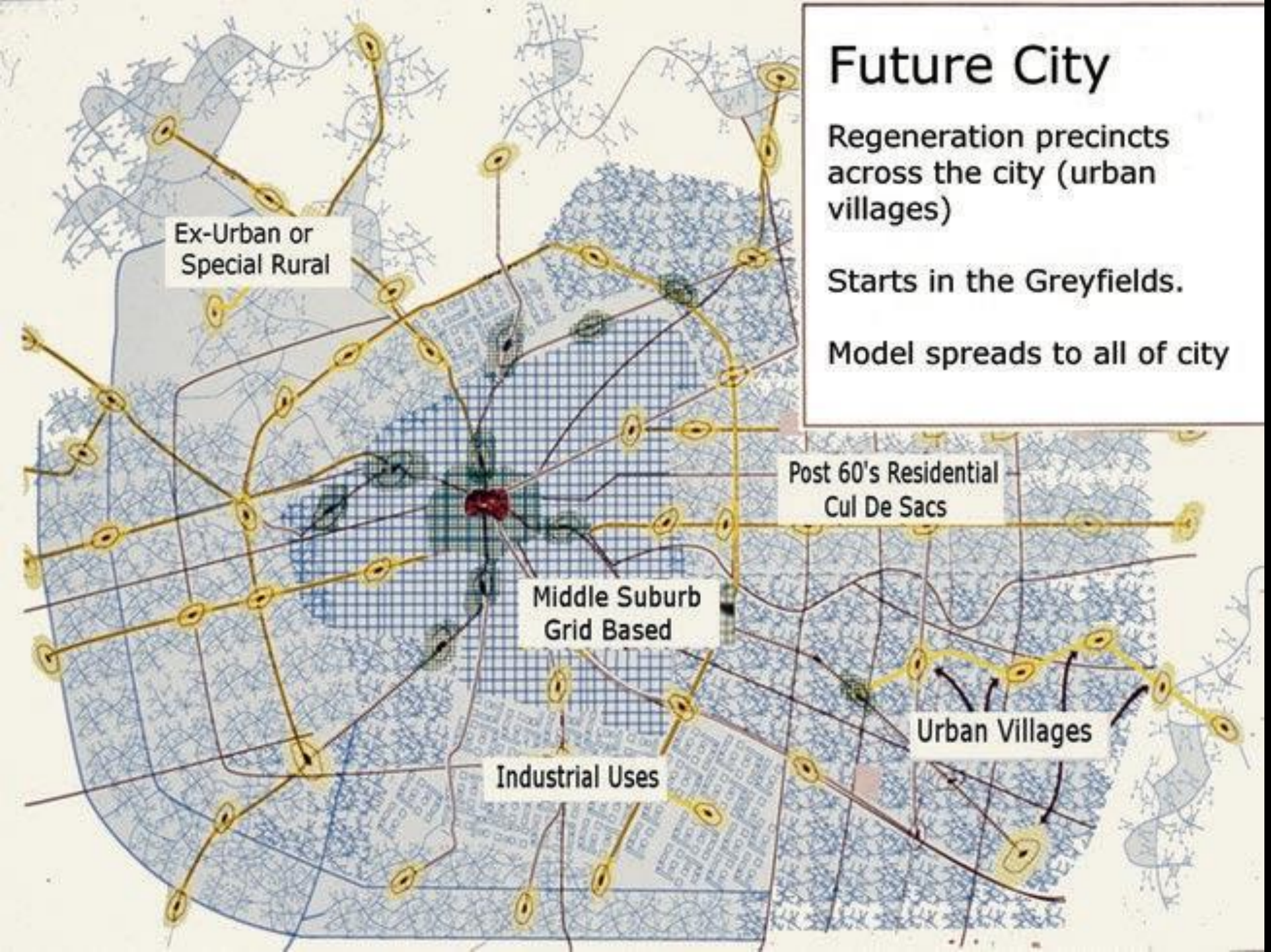
Transit Activated Corridor –
Trackless Tram with net zero station precincts

Microgrids in precincts spread into surrounding suburbs like tentacles….

NET ZERO CORRIDORS:

Solar buildings in precincts based on shared microgrids that can expand to surrounding areas…integrating EV's into recharge hubs with e-transit accessibility across the city.

Proposed TT in City of Liverpool (Sydney)…

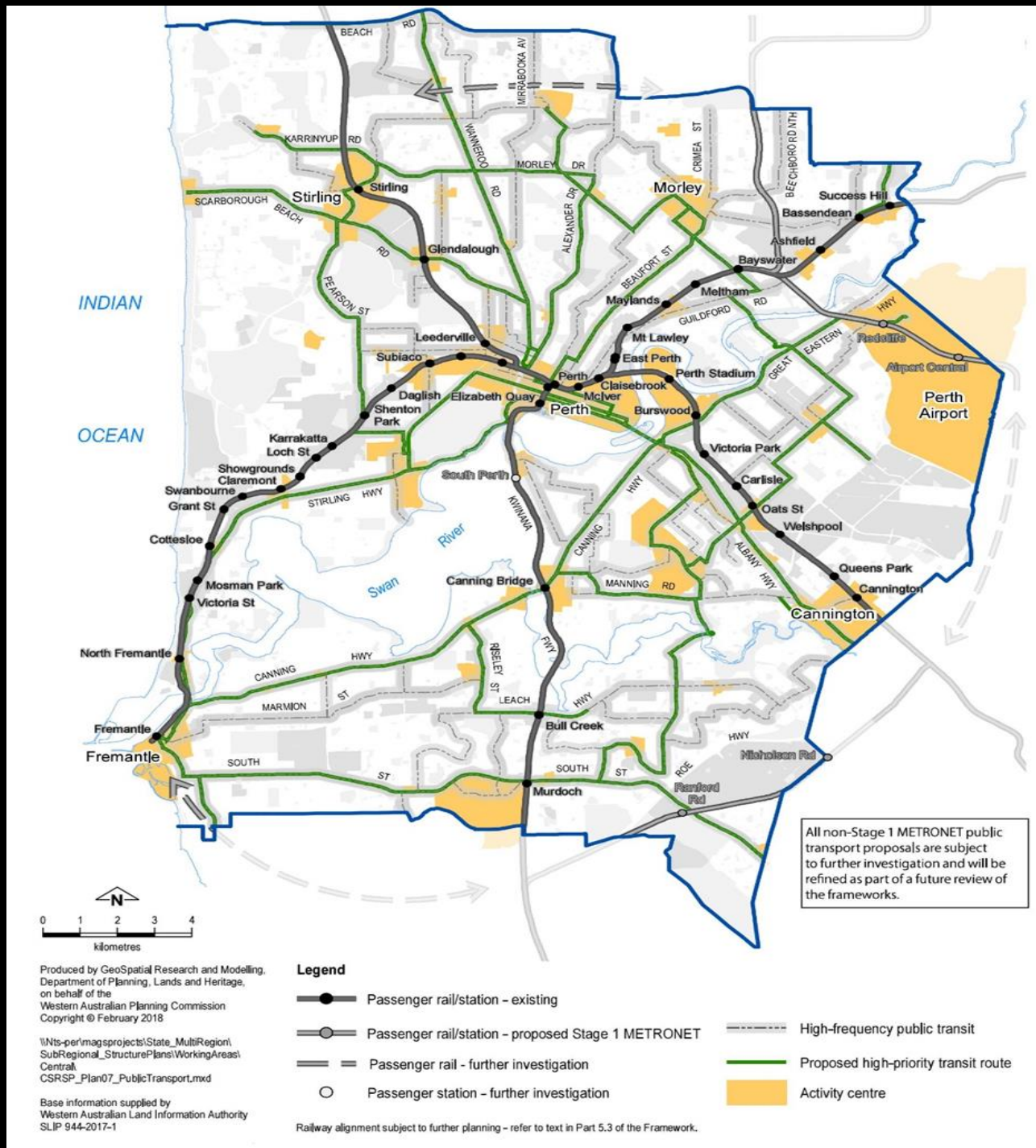


Net Zero Corridors needed to create net zero cities

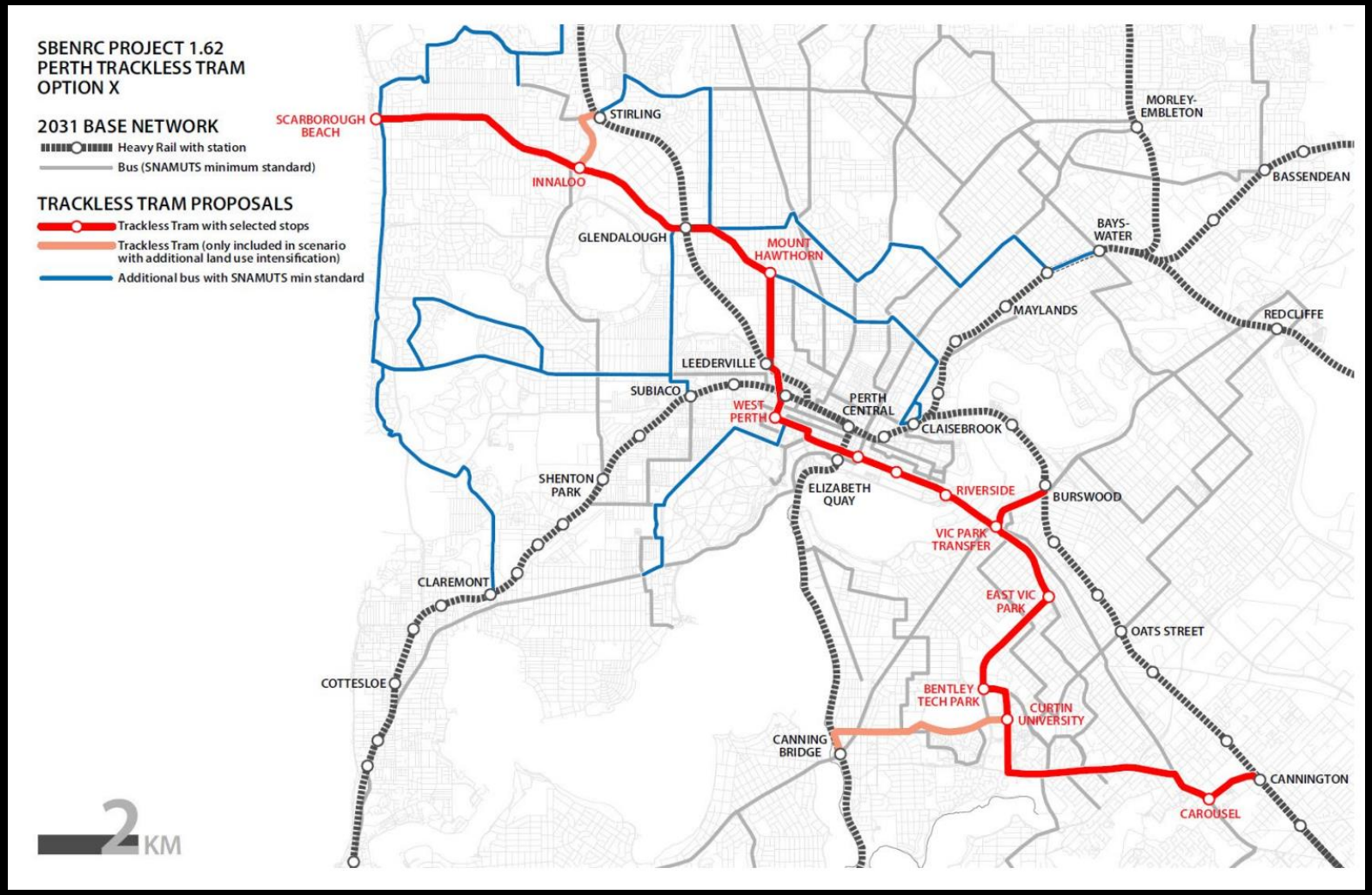
Marie Verschuer: the business case

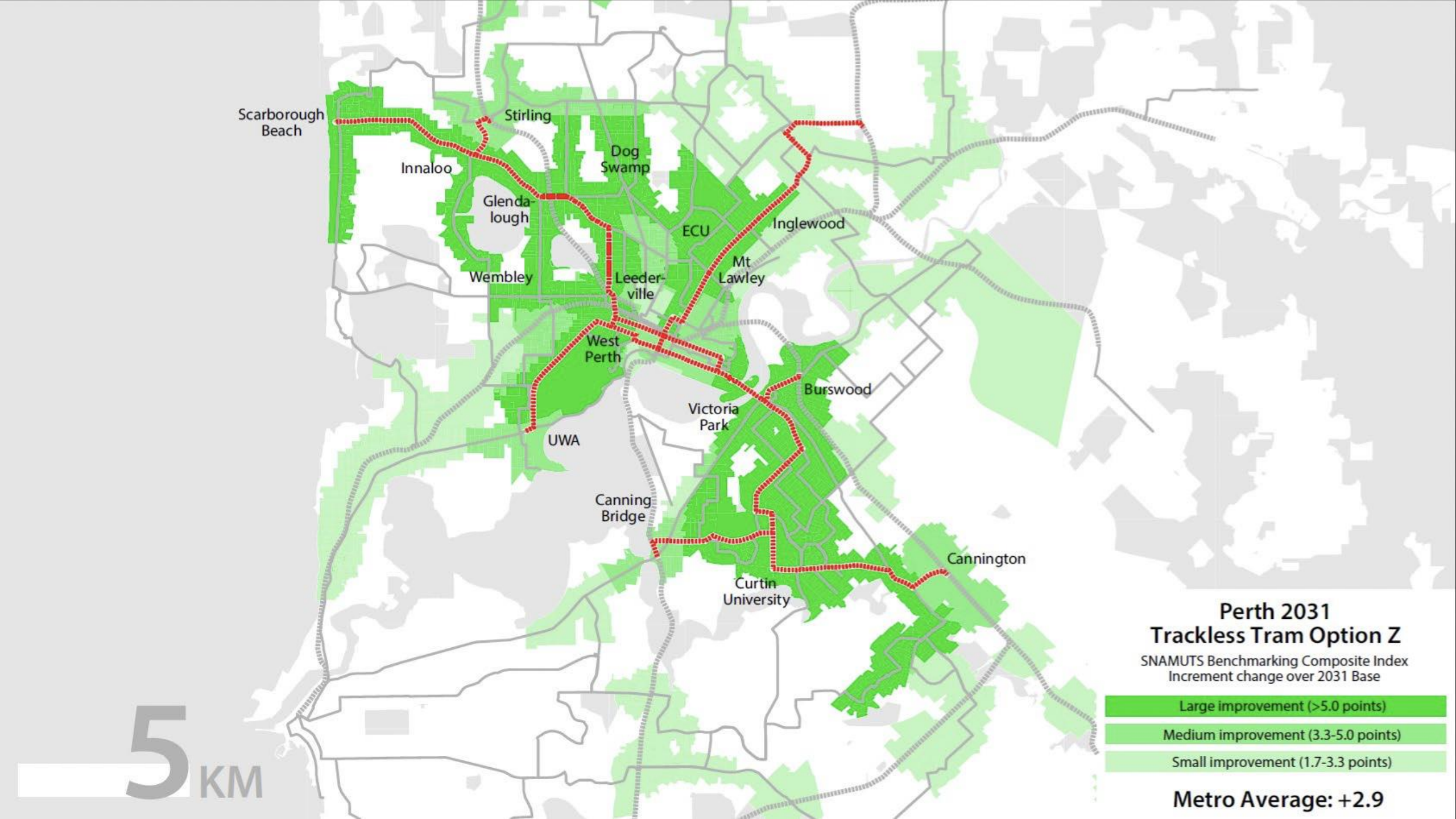
Green routes…
Transit and Density priority…not car capacity

Movement and Place



Now we need to start down a main road corridor and look for the best redevelopment sites for stations…



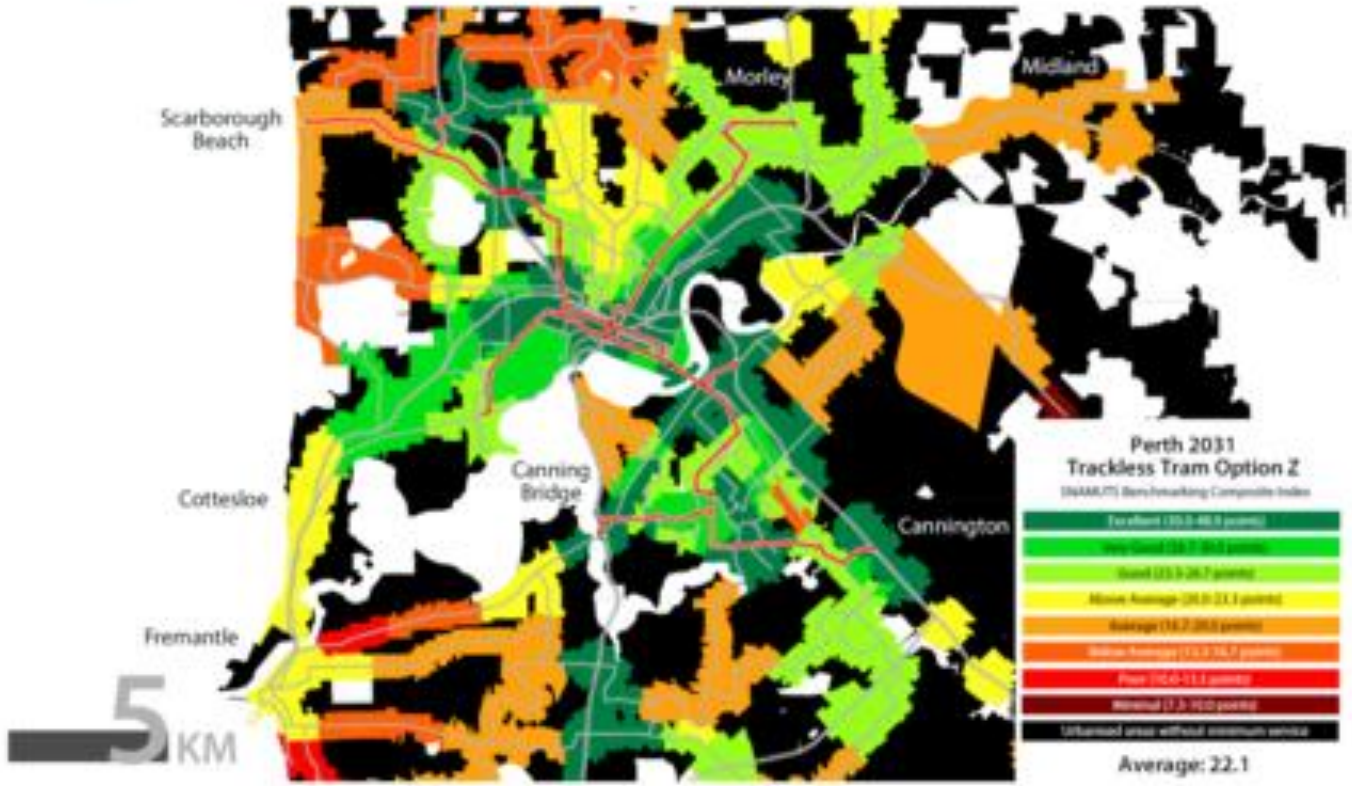

Scarborough Beach
Stirling
Innaloo
Dog Swamp
Glenda-lough
ECU
Inglewood
Wembley
Leeder-ville
Mt Lawley
West Perth
Burswood
Victoria Park
UWA
Canning Bridge
Cannington
Curtin University
5 KM
Perth 2031
Trackless Tram Option Z
SNAMUTS Benchmarking Composite Index
Increment change over 2031 Base
Large improvement (>5.0 points)
Medium improvement (3.3-5.0 points)
Small improvement (1.7-3.3 points)
Metro Average: +2.9

Perth Accessibility Map

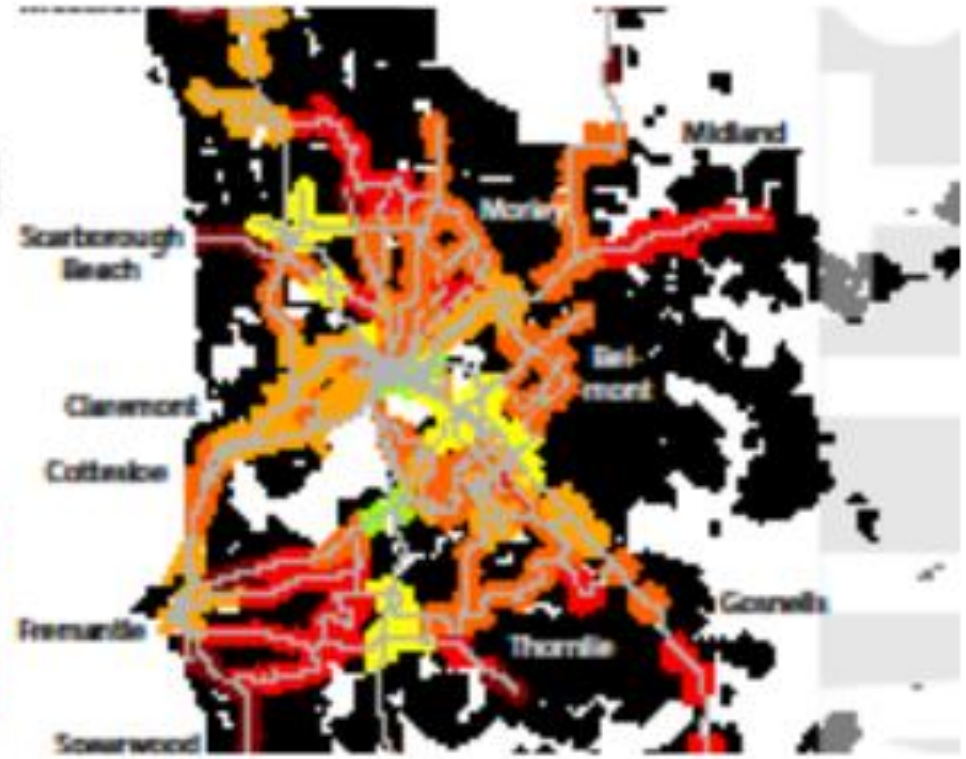
Mid Tier Transit Opportunities 2018

SNAMUTS composite accessibility modelling with and without mid tier transit based on 2016 data needs updating

After



Before



Stirling City Centre

Riverside Project

Bentley Technology Precinct

CUSP research project with local governments

Project stage	Public Investment	Private Investment	Land Investment and Jobs Created
	Vehicles, Recharge and Depot facilities ($4.33m/km) Roadworks ($19.2m/km)	Station precincts with 200m of road around it ($6m each precinct)	Land development, (estimated value of land; with 9/37 jobs per $1m)
Stage 1. Cannington to Scarborough 30 kms	Stage 1: Vehicles $130m Stage 1: Roadworks $576m	30 station precincts $180m	$19.8b with 178,000 jobs directly and 732,600 jobs indirectly over 10 years, 10% per year so 17,800 direct and 73,260 indirect.
Stage 2. Whole of Perth Metro 112 kms	Stage 1: Vehicles $485m Stage 2: Roadworks $2.150b	112 station precincts $672m	Not researched in detail but likely to be three times above.

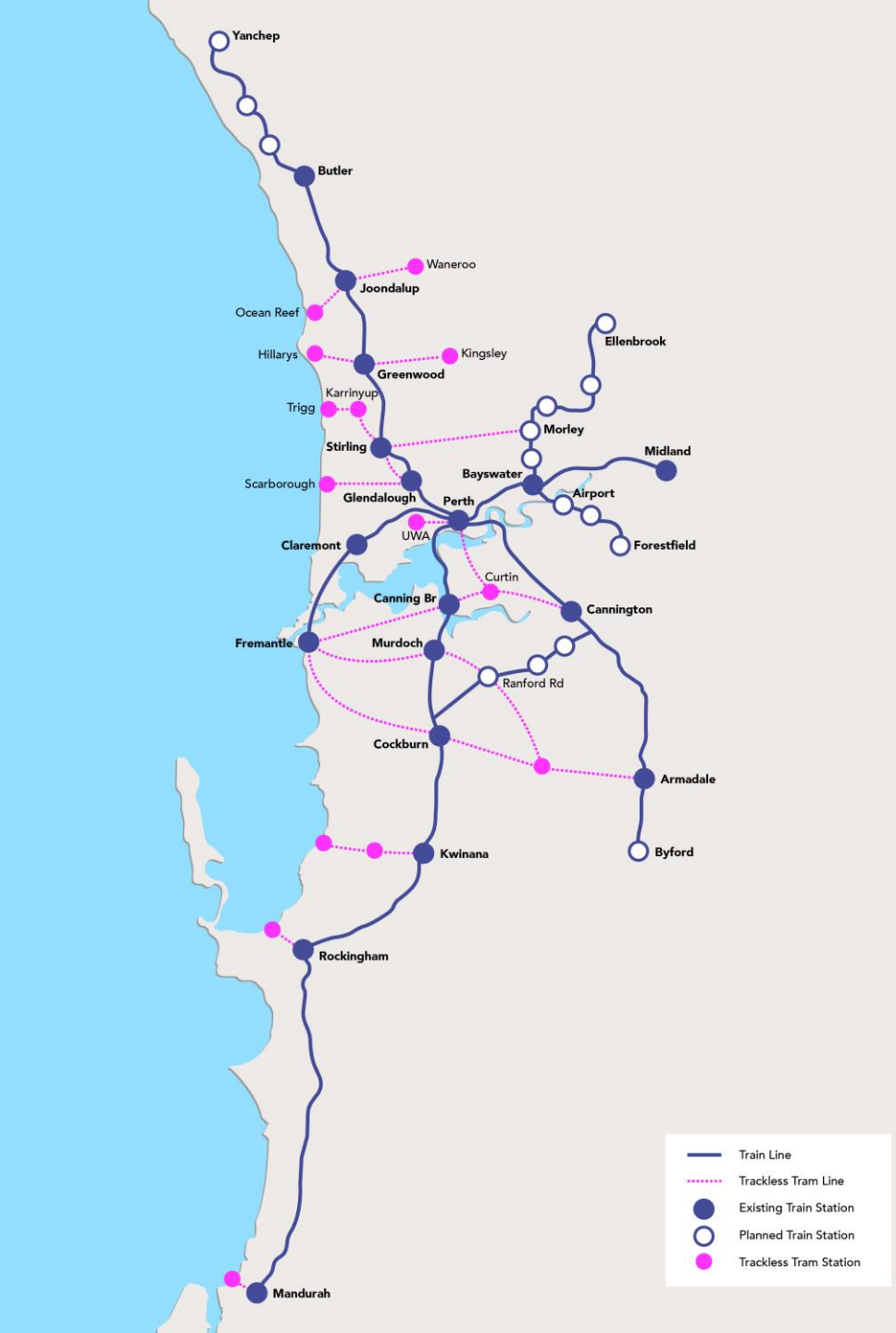
Business Case will be improved considerably if

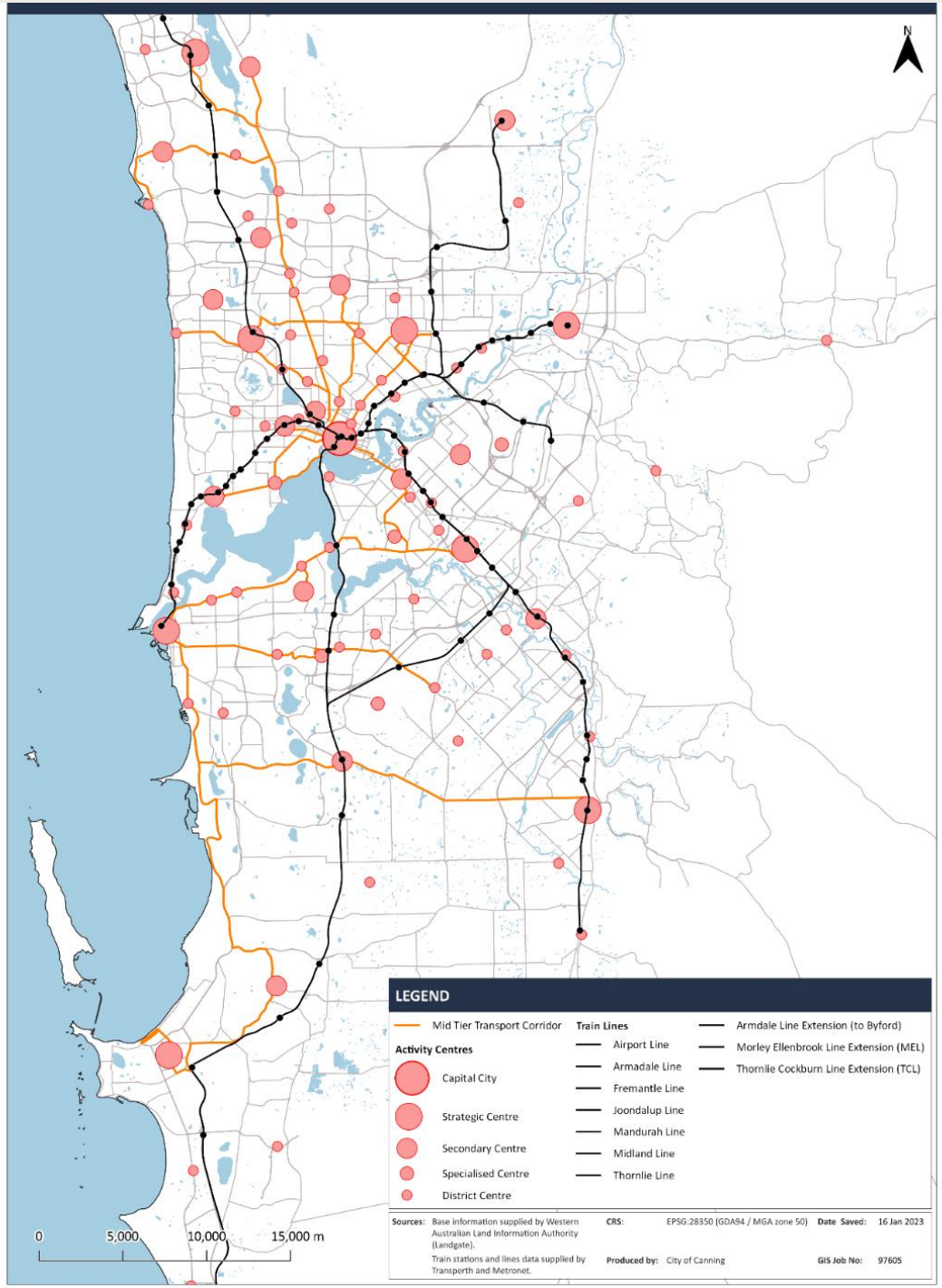
- There is private investment in helping build stations into each precinct – helps create walkable environment
- Land value uplift included - 20% as in McIntosh et al 2018.
- The jobs created due to agglomeration economies from land investment can be estimated – direct and indirect.

Mid-Tier Connections across the corridors.

Urban regeneration opportunities

Movement and Place Strategy





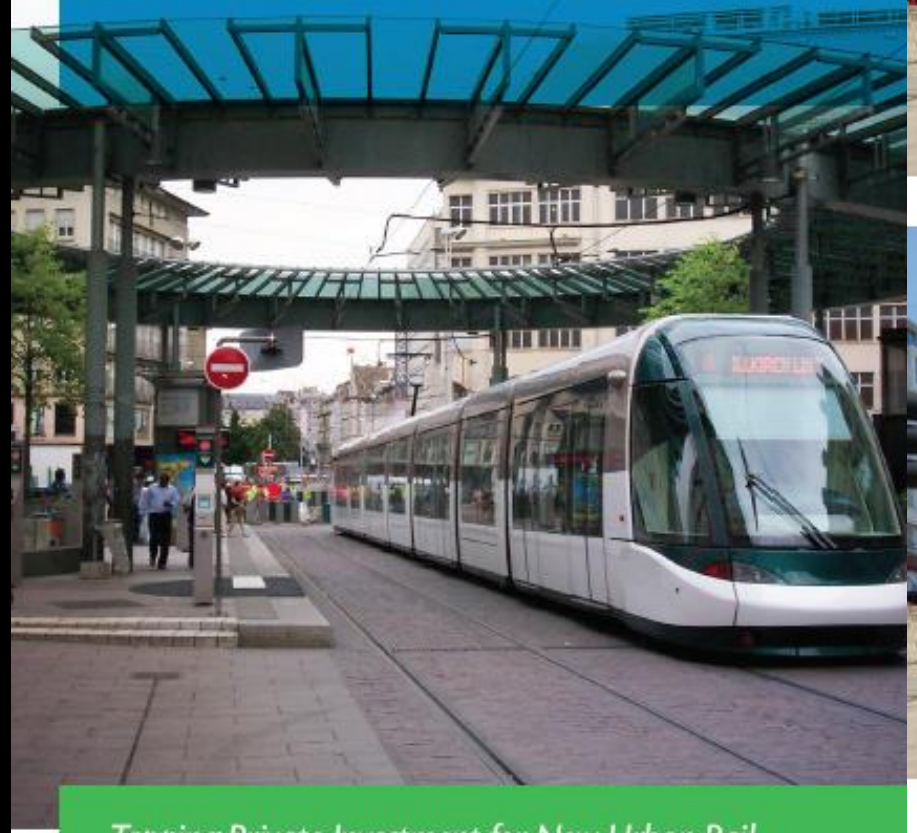
Five Steps to a Net Zero Corridor

1. Collaborative visioning
2. Declare a Corridor as High Density with Mid-Tier Transit as part of Movement and Place Strategy
3. Choose where best stations and urban precincts should be in consultation. ‘Greenlined’.
4. Procure through a partnership to provide the transit line and precincts guided by an entrepreneurial land development agency.
5. Spread the microgrid from the net zero precinct into surrounding suburbs.

FEBRUARY 2016

ENTREPRENEUR RAIL MODEL

A DISCUSSION PAPER



Tapping Private Investment for New Urban Rail

Prepared by Peter Newman, Evan Jones, Jemma Green and Sebastian Davies-Slate for Curtin University

East Fremantle Now and After Light Rail – Images by Cole Hendrigan

Trial and path to market

Dean Economou

Engaging stakeholders – business case

New technology leads to understandable skepticism – decision makers need first-hand experience of the technology - show vehicle is safe, operational characteristics must be known

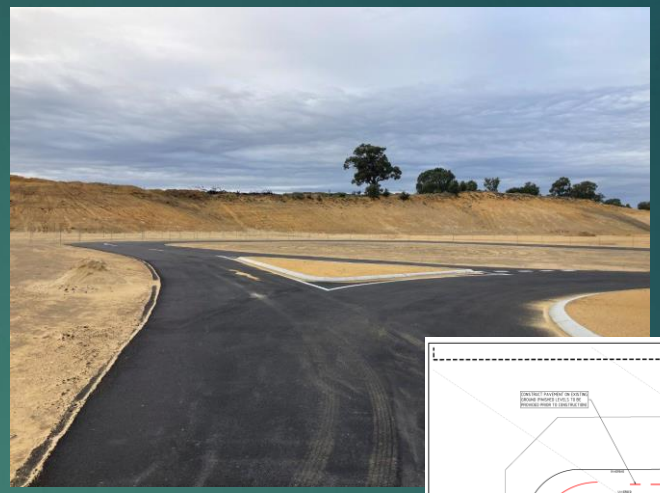
A trial is needed.

Engaging stakeholders – business case

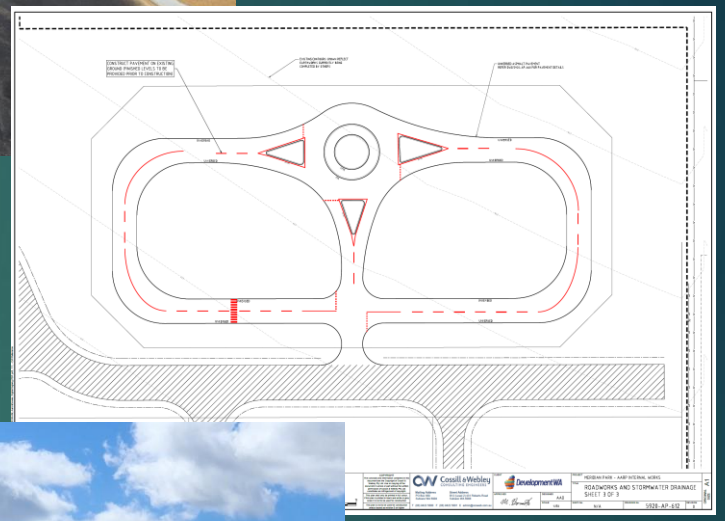
- First-hand physical experience for stakeholders
- Technology due diligence – safety, performance, systems, pavements, operations, standards
- Show compelling value proposition for transport and urban regeneration for cities and regions, vendors, developers, operators
- Need credible market estimations for vendors, operators and investors (i.e., it's worth investing)
- A consortium of stakeholders – create a receptive ecosystem
- Start the path to certification for wider deployment – computer modelling, testing protocols, state and federal levels regulatory pathways, ADRs

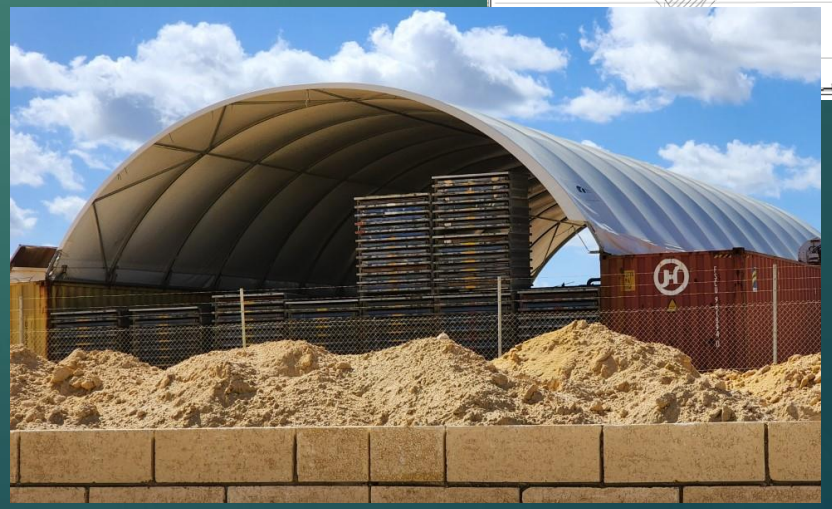
A trial - what

- Test site preparation - security, charging, guidance (CRRC visiting)
- Logistics – vehicle arrival, transport to the test site, commissioning
- Validate Performance-Based Standards tests with assessor, check Australian Design Rule compliance.
- Test areas not already verified by the manufacturer or modelling
- Passenger and operator experience
- Report to stakeholders - real-world operating needs for Net Zero Corridor development.



Australian Automation and Robotics Precinct at Neerabup (Perth)





A consortium of stakeholders

Core Partners	Role
City of Stirling	Project concept and core facilitation funding
Curtin University (includes SBEnrc)	Research lead and project facilitator
Manufacturers and distributors	
CRRC China PZ	Manufacturer - Digital Rail Transit vehicle
CRRC TEC	Tram manufacturer - Autonomous Rapid Rail Transport Vehicle
CRRC TEC Australia	Manufacturer representative in Australia
Shanghai Electric	Provider of guidance technology for the Digital Rail Transit vehicle
Infrastructure Technology Solutions Group (ITSG)	Distributor and investor for the Digital Rail Transport vehicle
Pacific Power Development (PPD)	Distributor and investor for the Autonomous Rapid Rail Transport Vehicle
Government Partners	
Australian Automation and Robotics Precinct (AARP)	Test site
Development WA	Site provision, urban development advice
Main Roads WA	Advice on road certification, support for imports approvals, road engineering advice
National Heavy Vehicle Regulator (NHVR)	Peak national regulator for large road vehicles, road certification
WA Department of Transport	Advice on road certification, support for imports approvals
Engineering and Operations	
Arup	Road engineering advice, assist with testing
Australian Roads Research Board (ARRB/NTRO)	Road technology research agency, PBS modelling (moving to wider transport research)
Keolis Downer	Operator, provide drivers for tests
Tiger Spider	Vehicle modelling, assessor for Australian Design Rules
Stantec	Planning a trial in Victoria, knowledge sharing

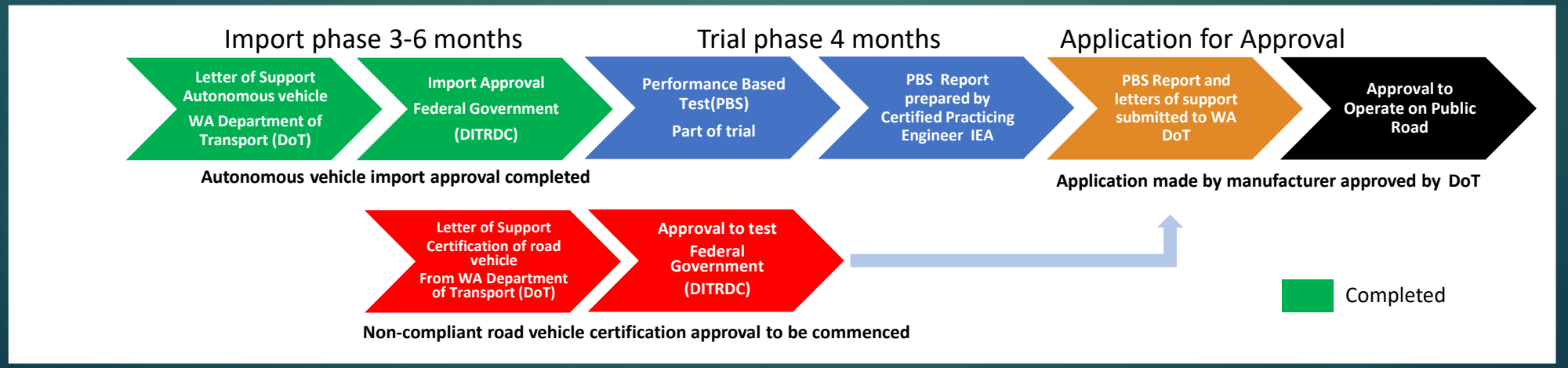
Addressable market estimation

Location	Route	Route km	#Vehicles	Sales AUD (m)
Western Australia (Perth Metro)	City of Stirling**	9	9	27
	City of Rockingham**	4	4	12
	City of Cockburn**	12	12	12
	Fremantle-Melville South Street**	10	10	30
	City of Nedlands (UWA-QE2)**	6	6	18
	City of Cannington**	10	10	30
	Rest of Perth	100	100	300
Western Australia (regional)	Southwest WA**	300	12	36
New South Wales	Liverpool-2nd Sydney airport**	21	21	63
	Sydney to Green Square**	4	4	12
	Sydney to Strathfield**	20	20	60
	Rest of Sydney	300	300	900
	Newcastle**	10	10	30
Victoria (Melbourne)	Werribee**	20	20	60
	Fisherman's Bend**	6	6	18
	West Melbourne	200	200	600
Queensland (Brisbane)	Sunshine Coast**	20	20	60
	Townsville**	10	10	30
	Rest of Brisbane	100	100	300
South Australia	100km (Adelaide metro)	100	100	300
Tasmania	Hobart metro	20	20	60
Canberra	Stage 2 LRT	20	20	60
TOTAL Australia		1302	1014	3018
New Zealand	Auckland metro**	60	60	180
	Christchurch	20	20	60
	Wellington metro**	20	10	30
	Queenstown metro**	20	5	15
TOTAL New Zealand		120	95	285
TOTAL Australia-New Zealand		1422	1109	3303
**Near term opportunities		582	259	753

- Market in Australia and New Zealand for rolling stock in excess of 1100 3-carriage vehicles
- Near-term opportunities in excess of 250 3-carriage vehicles
- Multi-billion dollar opportunity.

Path to market - certification

- Curtin - mapped path to deployment – import approval, AV procedures, federal and state authority liaison, ADRs
- Working with ARRB, CRRC, ITSG, NHVR on certification – computer modelling, testing protocols, regulatory pathways at state and federal levels, homologation
- Two stage process - certify as a manual vehicle, then certify self-guided features
- Experienced consultant now engaged to take over this process
- Local manufacture.



Timeline

- DRT in manufacture – expect arrival in Perth August
- CRRC senior executives visiting Australia next week
- Event planned around the vehicle arrival for October
- Vehicle to tour NSW (AusRAIL)
- Detailed certification process underway
- Next stage of research
  - *Net Zero Corridors: Governance and Procurement - Integrating transit with urban development*

Cheryl Desha: the Sunshine Coast Case Study

Closing remarks from Peter and Rob