

The Role of Railways in Building Resilient and Sustainable Cities and Communities

By

Peter Newman AO

Professor of Sustainability

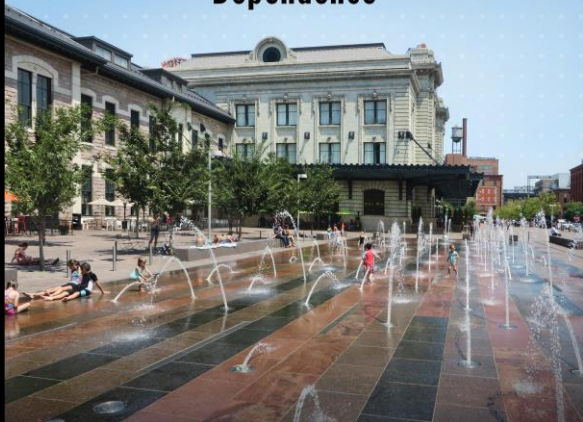
CUSP, Curtin University

Perth, Australia

RESILIENT CITIES

SECOND EDITION

Overcoming Fossil-Fuel
Dependence

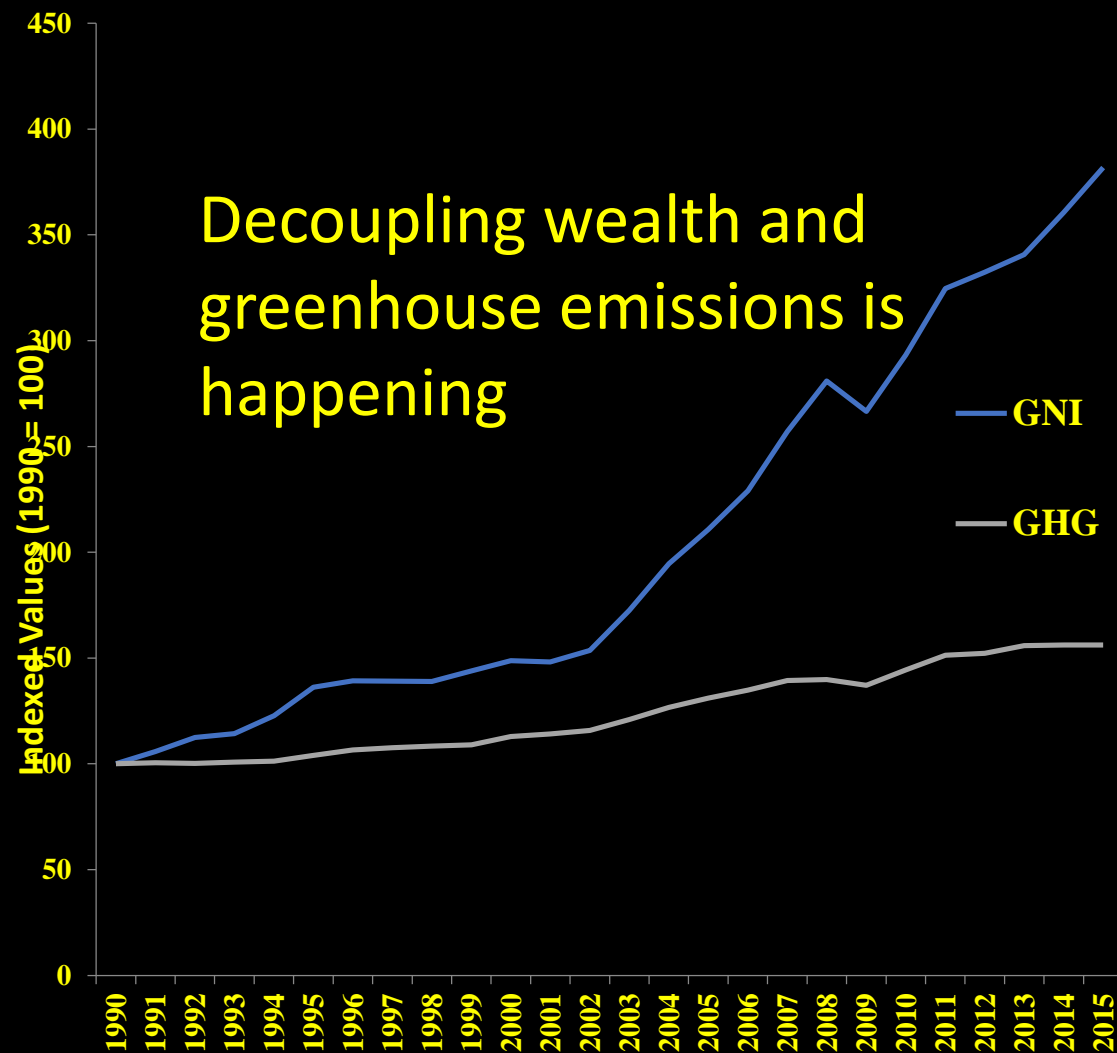


Turning
point in
**world
history....**

GHG
going
DOWN,

Wealth
going
UP

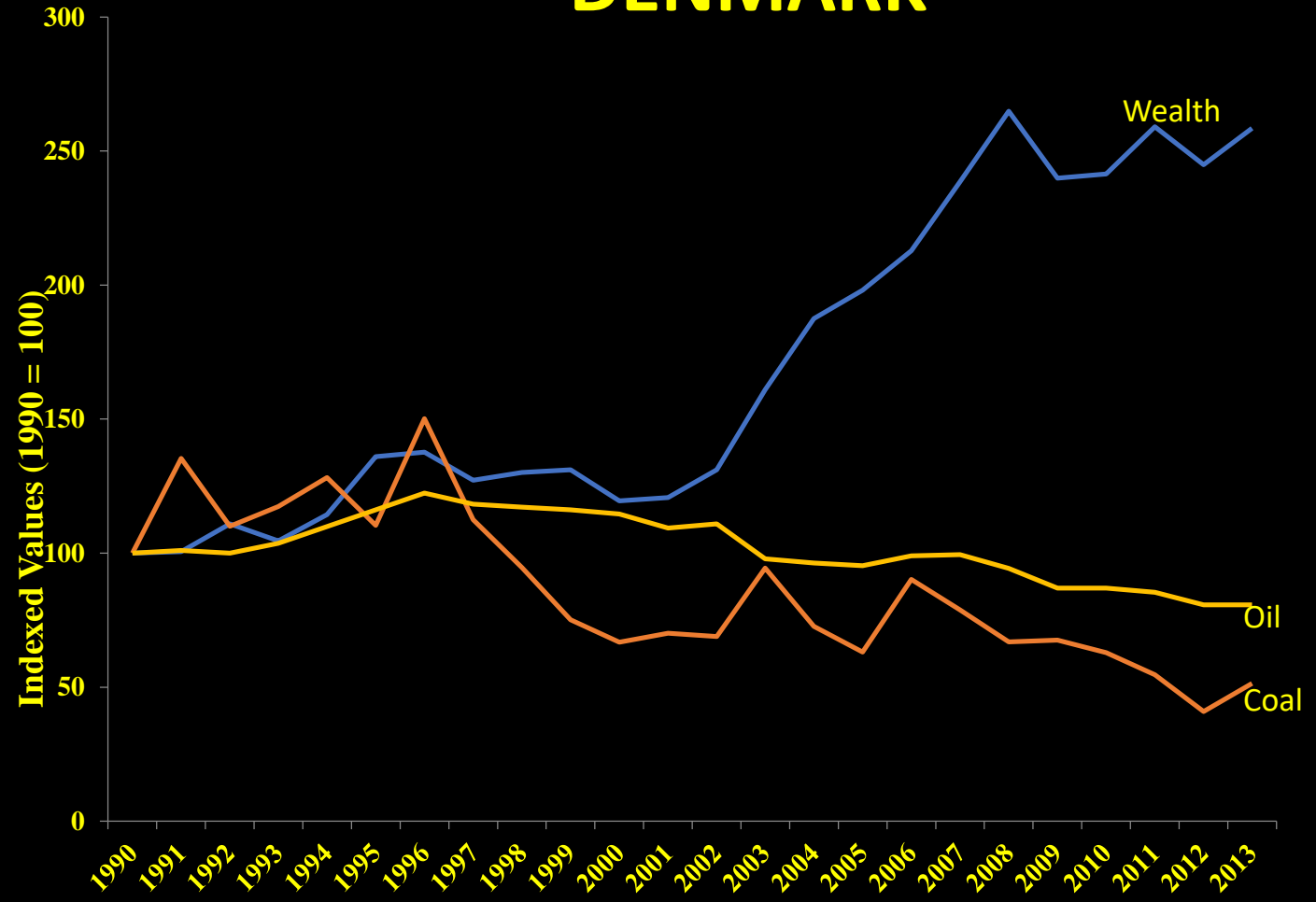
Decoupling wealth and
greenhouse emissions is
happening



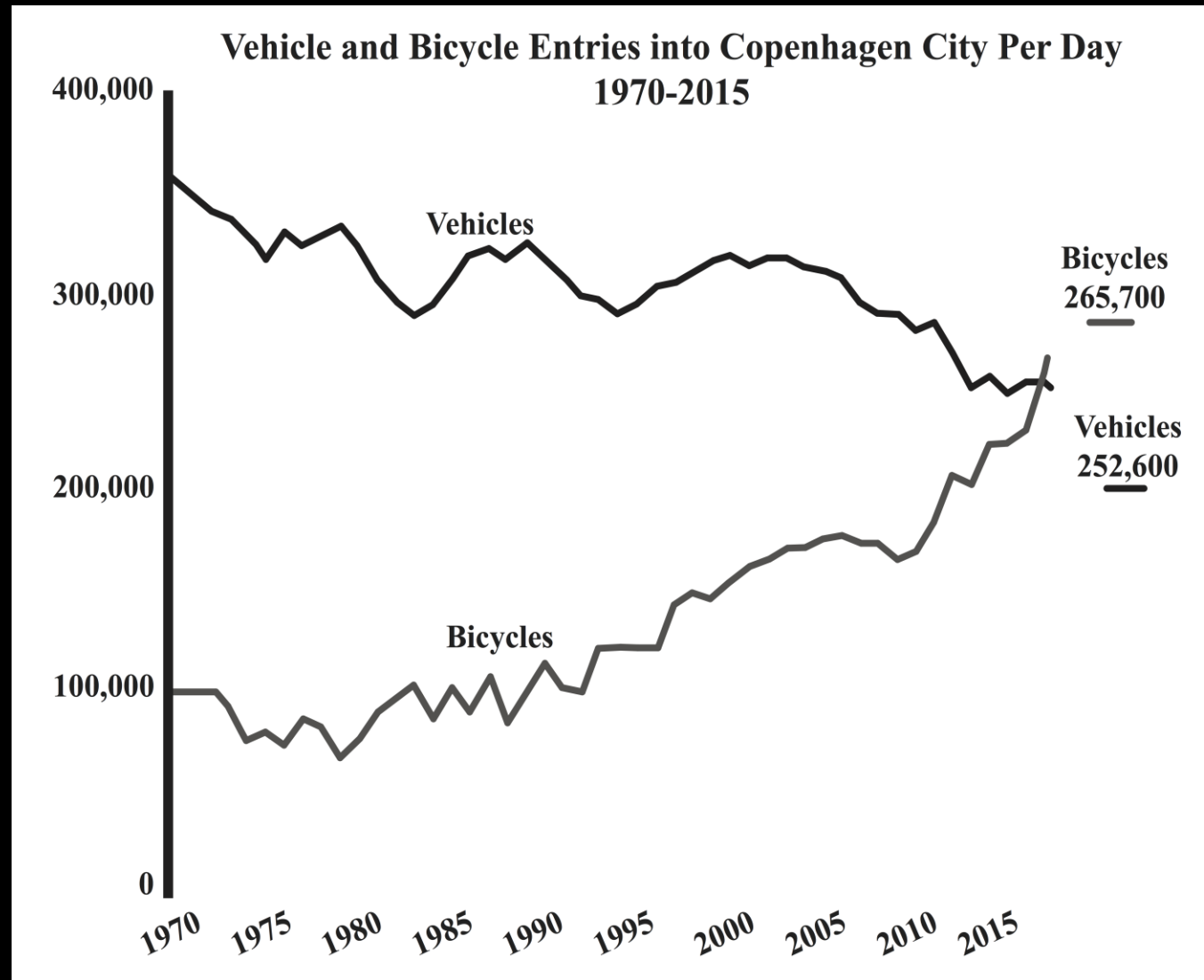
No longer is the climate and SDG agenda competing with the economic development agenda.....

Low carbon living....

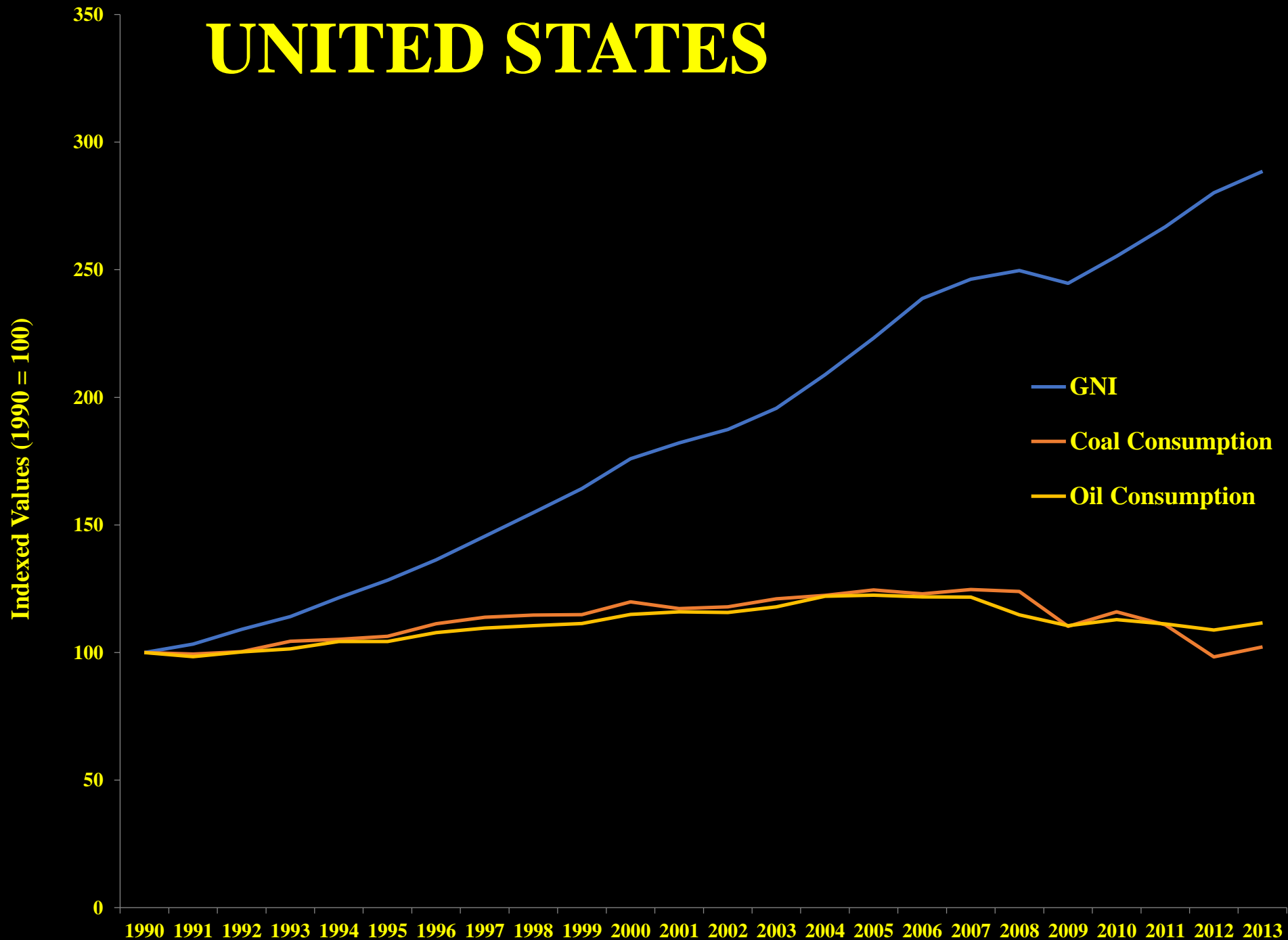
DENMARK



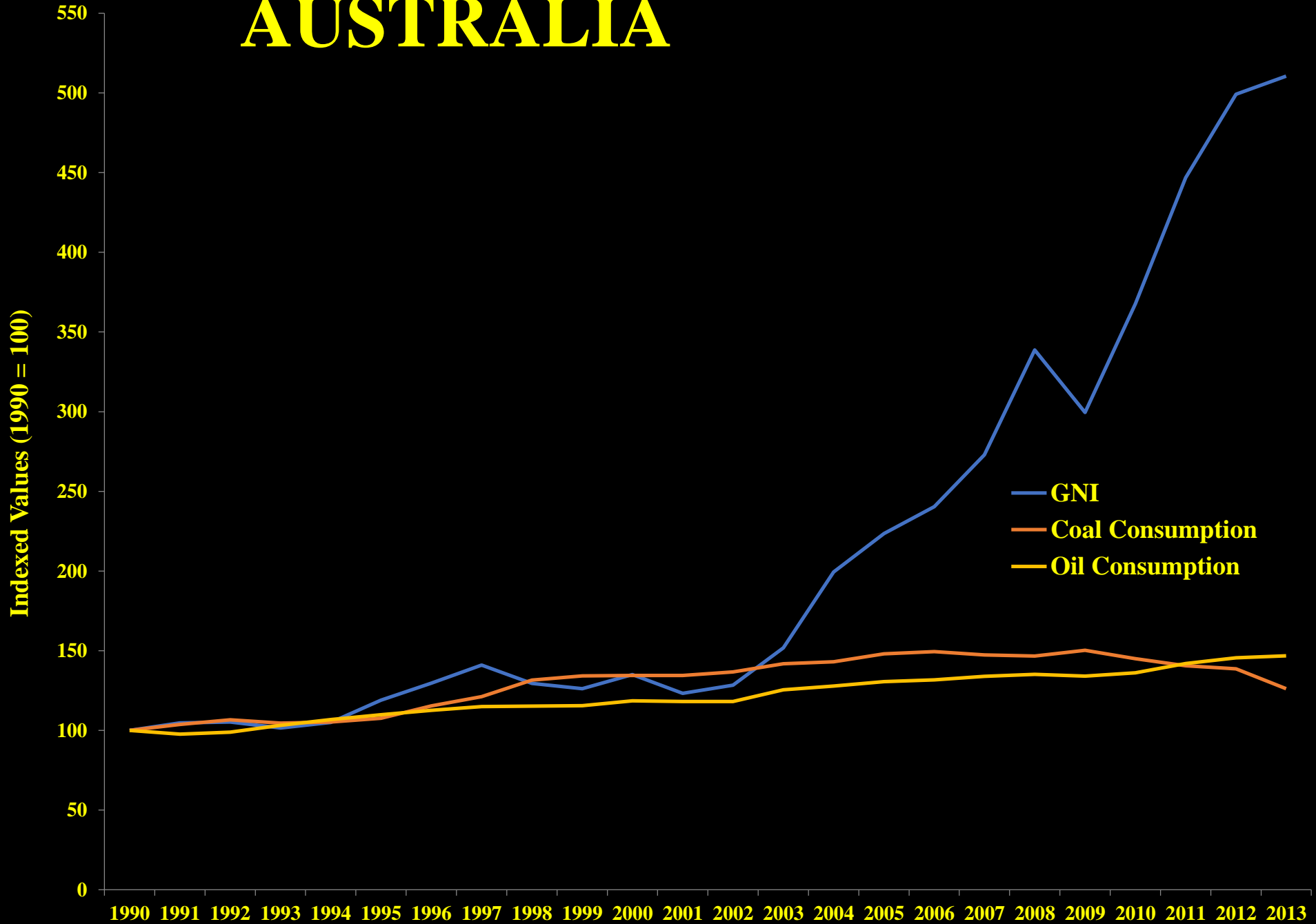
Cycling has now outstripped car use in Copenhagen and not harmed the economy



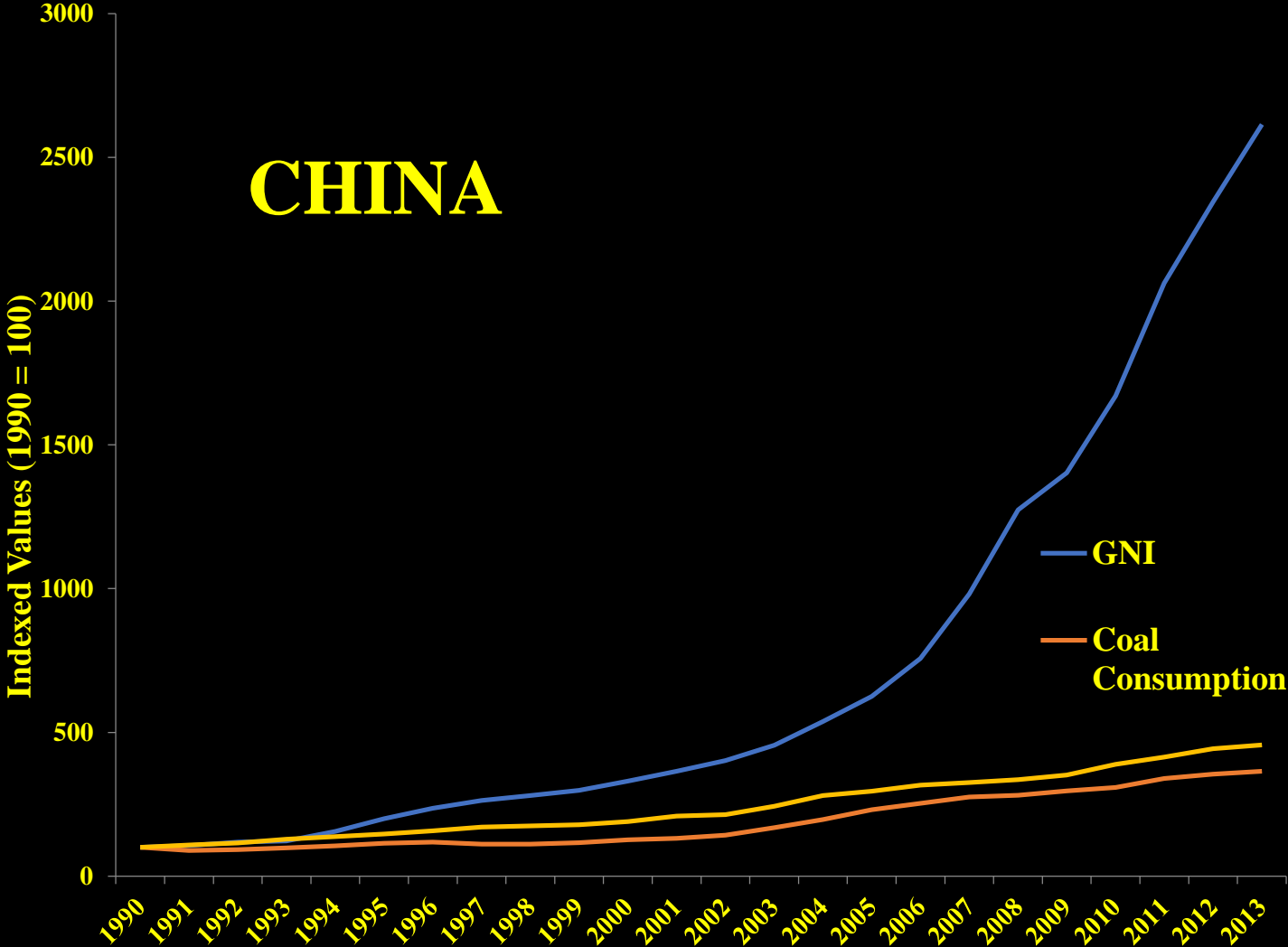
UNITED STATES



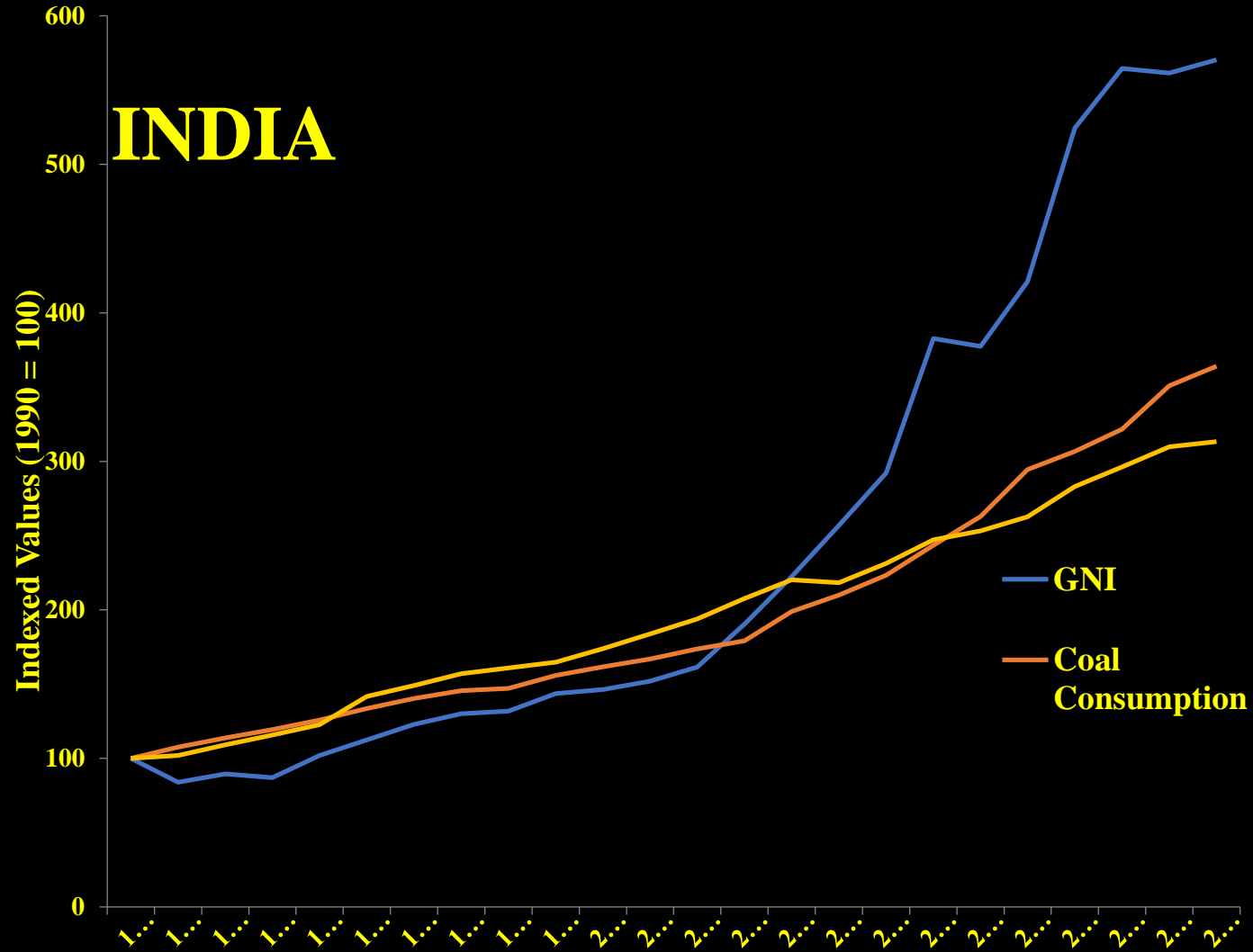
AUSTRALIA

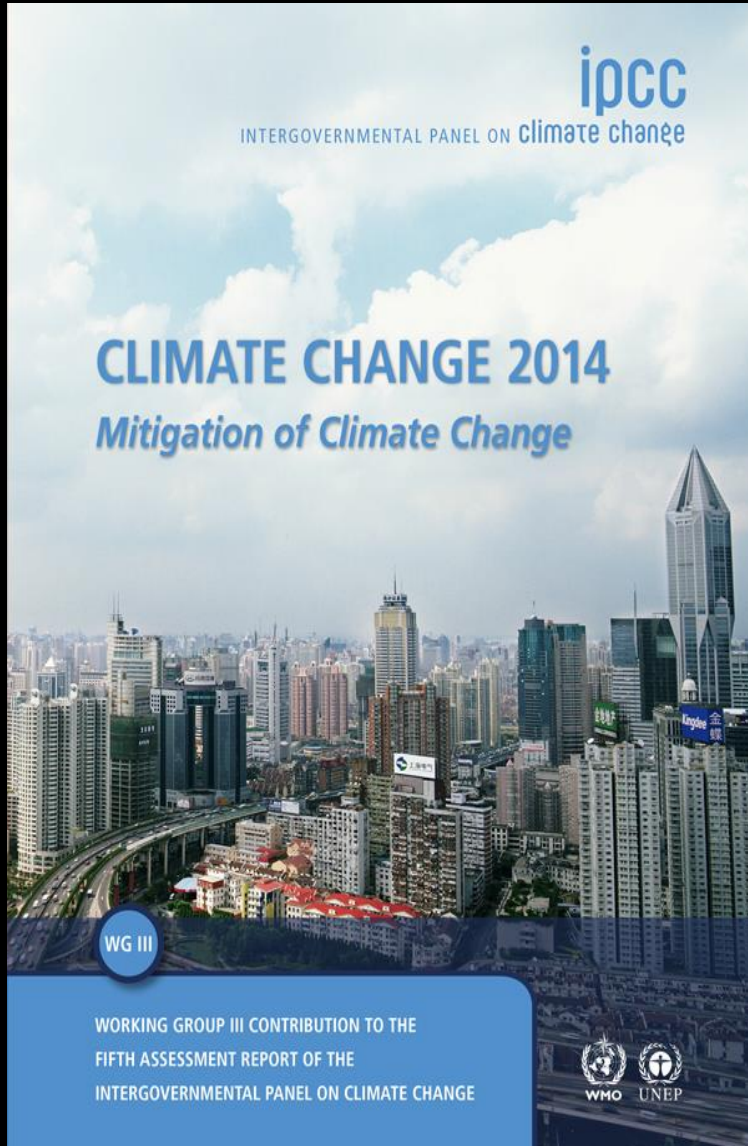


CHINA



INDIA





The challenge....

80% less CO₂
by 2050
to avert
climate
disaster

Paris
Agreement!



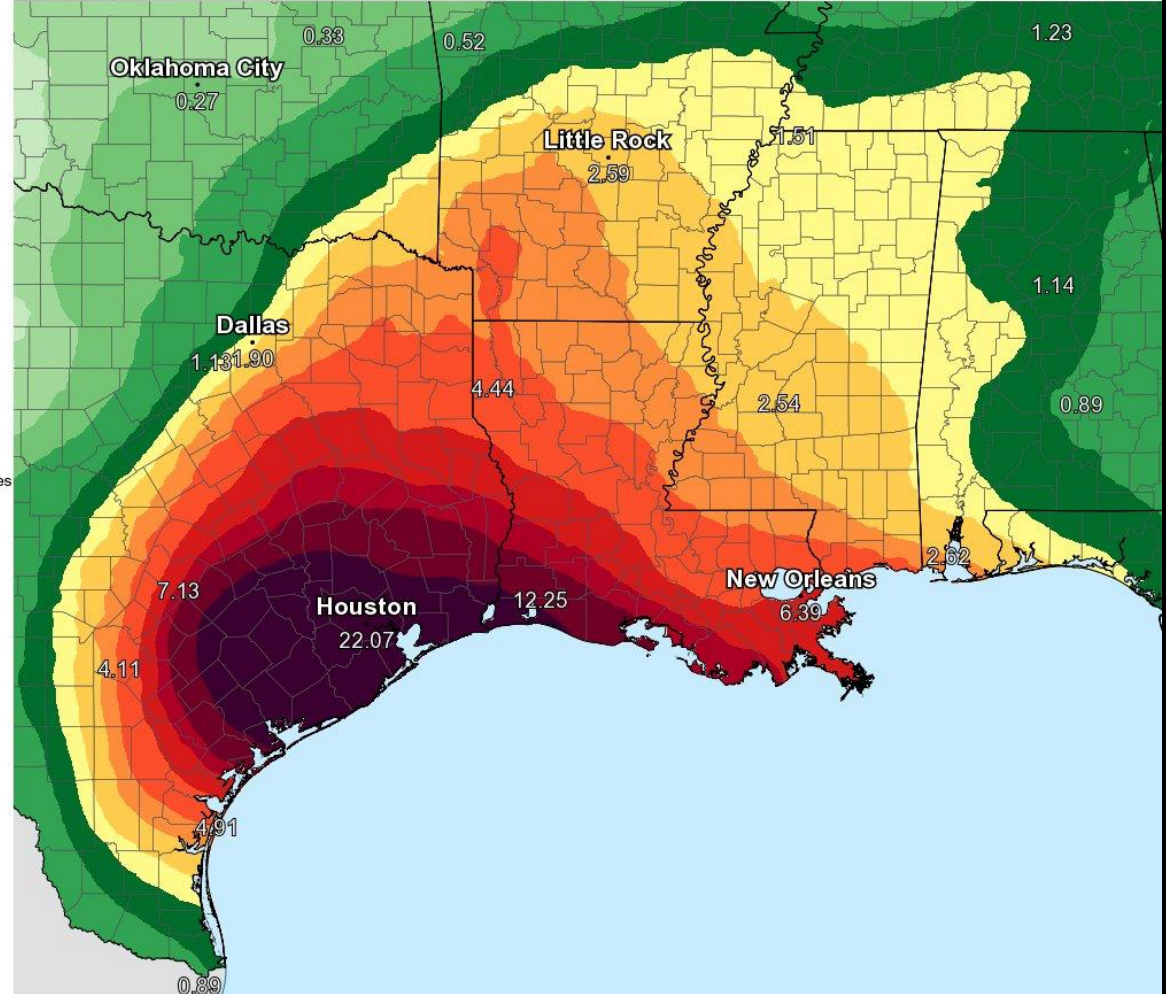
Hurricane Harvey

Forecast Precipitation



Valid Ending Sunday September 3rd, 2017 at 7 AM CDT

- Up to 0.1 inch
- 0.1 to 0.25 inches
- 0.25 to 0.5 inches
- 0.5 to 1.0 inches
- 1.0 to 1.5 inches
- 1.5 to 2.0 inches
- 2.0 to 3.0 inches
- 3.0 to 4.0 inches
- 4.0 to 6.0 inches
- 6.0 to 8.0 inches
- 8.0 to 10.0 inches
- 10.0 to 15.0 inches
- Greater than 15 inches





Bangladesh 2/3rds under water
– 40 million impacted



Even with Paris Agreement we will get
2C rise
Coral reefs will disappear



Coral Reefs...bleach due to ocean absorbing CO₂ and lowering pH.



ARC, Center of Excellence for Coral Reef Studies ©

We must do better, quicker...



UNIVERSITY OF
EXETER

IPCC Special Report on 1.5°C Global Warming

Second Lead Author Meeting
Exeter, United Kingdom

5-9 June 2017



ipcc
INTERGOVERNMENTAL PANEL ON
climate change



Now
the goal
must be
1.5C...

What will it take....

1. Continued decoupling....accelerating in emerging cities by leapfrog development.
2. Moving to 100% renewables power.
3. Electrifying everything, especially transport.
4. Industrial fuels and international transport breakthroughs.
5. Carbon sequestration in forestry and agriculture NOT SRM...

Railways must be a major catalyst and driver....in the first three, maybe the fourth too.

Green TODs for recharging EV's and Electric Transit

- Stations should be where smart grids and renewables are fully integrated with green buildings....

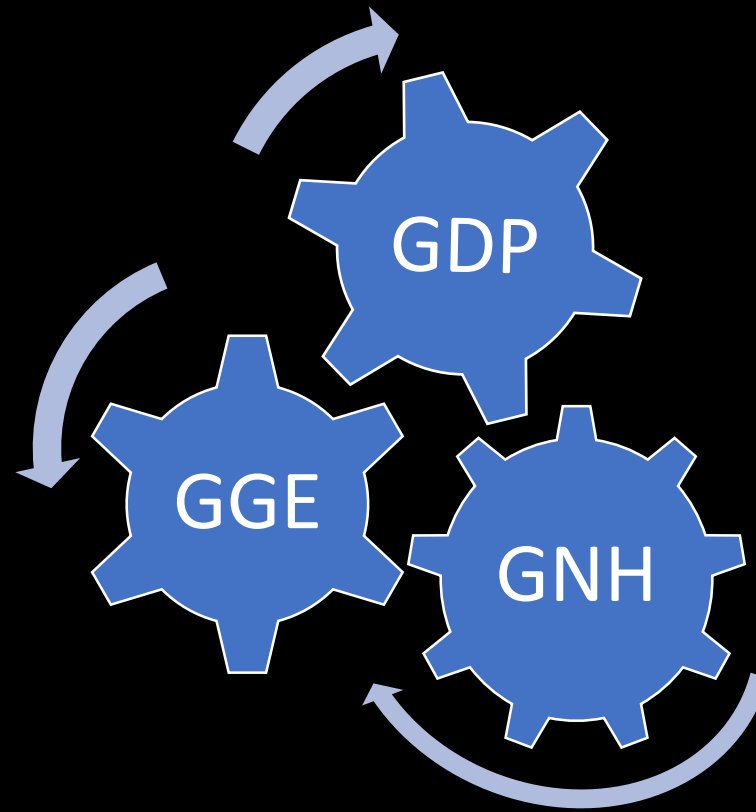


Case studies...

Bhutan – integrating GDP, GHG and GNH

Bhutan's Trilemma

- to be a self reliant economy and aid-free;
- to remain carbon neutral (expand carbon sink);
- to grow GNH status.



GNH Vs. SDGs

<i>9 domains of GNH</i>	17 SDGs
Psychological well-being	End poverty
Time Use	End hunger
Health	Ensure healthy lives
Education	Ensure inclusive and equitable quality education
Cultural diversity and resilience	Achieve gender equality
Living Standard	Ensure availability and sustainable management of water and sanitation
Community vitality	Ensure access to affordable, reliable, sustainable and modern energy
Ecological diversity and resilience	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Good Governance	Build resilient infrastructure
	Reduce inequality
	Make cities and human settlements inclusive, safe, resilient and sustainable
	Ensure sustainable consumption and production patterns
	Urgent action to combat climate change and its impacts
	Conserve and sustainably use the oceans, seas and marine resources
	Protect, restore and promote sustainable use of terrestrial ecosystems
	Promote peaceful and inclusive societies
	Global partnership for sustainable development

Gross National Happiness

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graph TD; GNH[Gross National Happiness] --> EED[Equitable Economic Development]; GNH --> EC[Environmental conservation]; GNH --> G[Governance]; GNH --> CP[Cultural Preservation];
```

Equitable
Economic
Development

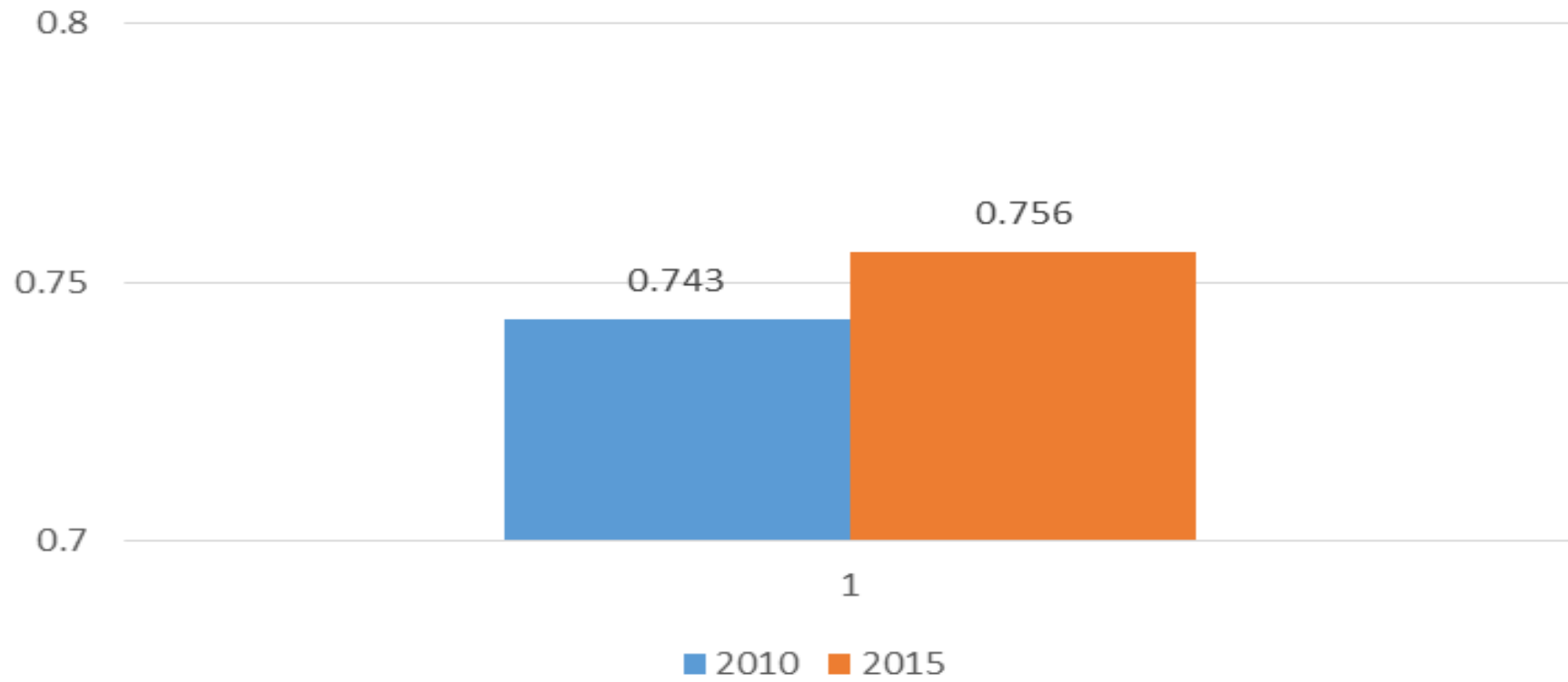
Environmental
conservation

Governance

Cultural
Preservation

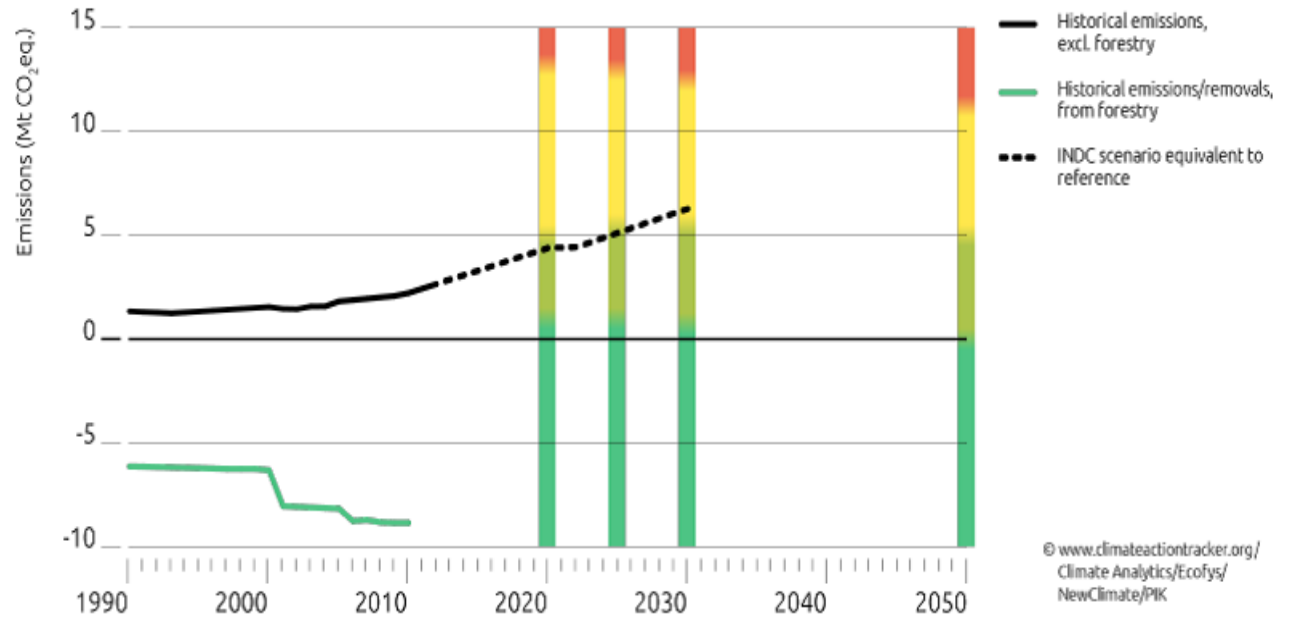
- The GNH development philosophy is the Bhutanese version of the global concept of sustainable development (RGoB, 2012).

GNH Index





Bhutan: Carbon Neutral



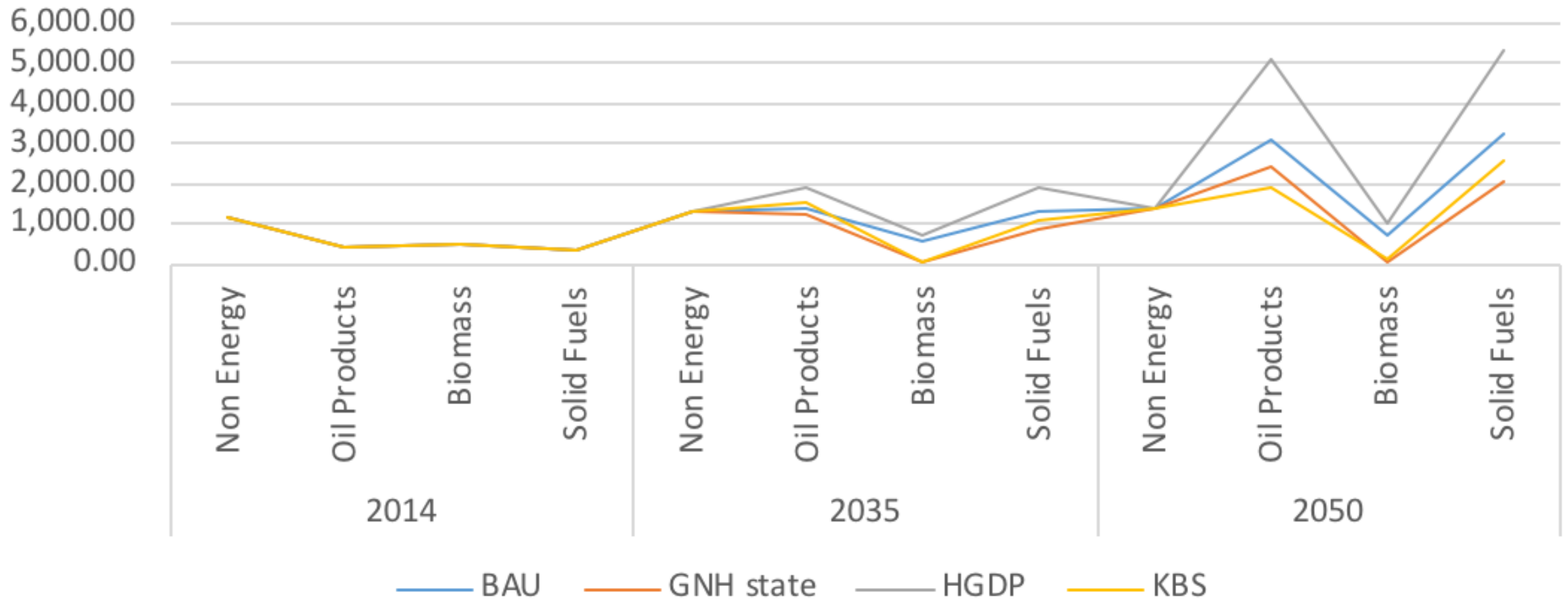
Climate Action Tracker, 2015



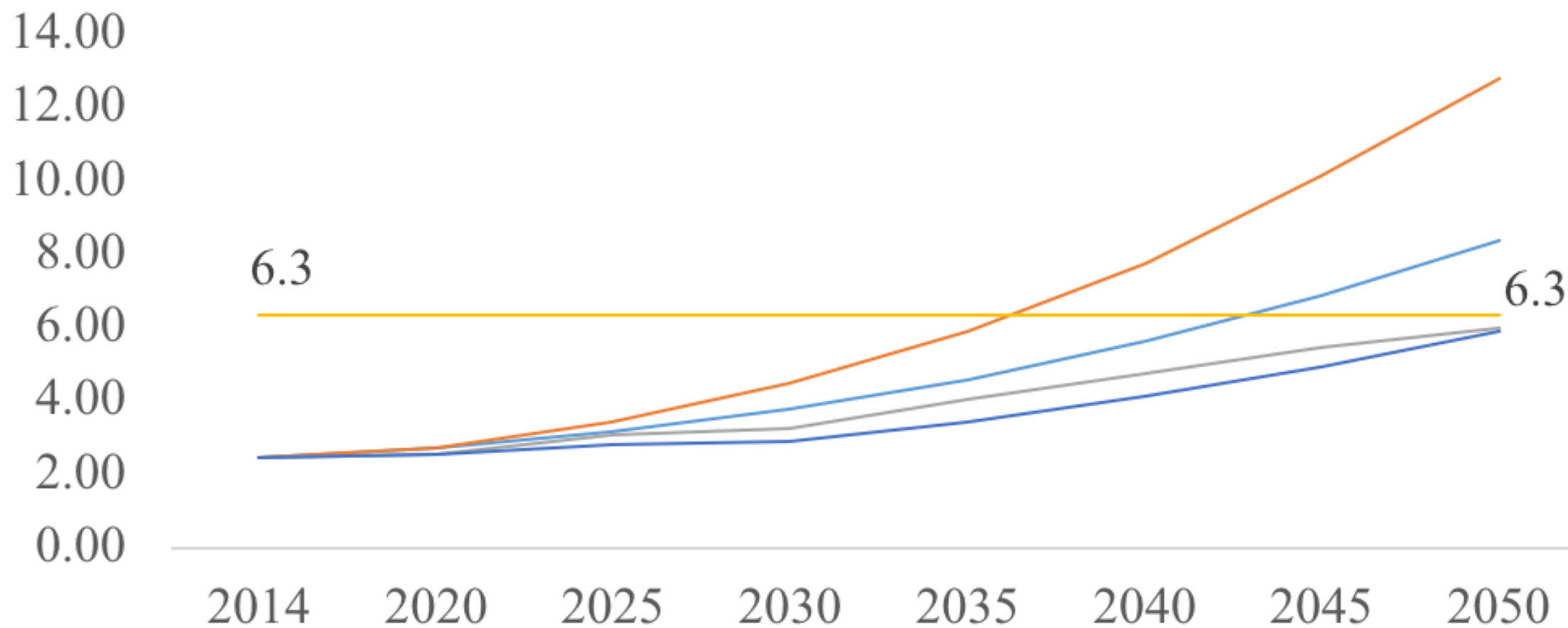
Scenarios for the future

Scenario	Residential Sector 33%	Service sector 11%	Transport sector 19%	Industry sector 37%
BAU (GDP growth rate of 5.6% and increasing to 7.8% and sustaining at 5.6% until 2050)	Energy demand increases with the increase in the number of household; Fuelwood usage is all end-uses expected to decline to 23% by 2050 following the declining rural population; Saturation level of households with heating facility increases from 50% in 2014 (NSB & ADB, 2013) to 70% by 2050;	Energy demand increases with value added of the commercial sector; Fuelwood usage expected to decline;	Energy demand in passenger transport increases with per capita GDP and that for freight increases with the value added of the transport sector; bus share increases from 15% to 25% by 2050; air transport increases from 20 to 25% by 2050; light diesel truck share increases from 17% to 30% by 2050;	Energy demand increases with value added of the industry sector.
GNH state	Firewood and kerosene used in the building sectors reaches zero by 2030 and substituted by electricity and biogas.	Service sector GDP increases from 33% to 45%.	Walking meets 10% and light rail meets 30% of the passenger travel demand by 2050. Electric vehicles were assumed to penetrate at half the rate specified in the 2DS of (IEA, 2016).	Industry sector GDP slows down from 11.70% in 2014 to 10.70% by 2050; Move towards industrial symbiosis;
HGDP	High economic outlook of 10% in the medium term and declining to 5.6% by 2050			
KBS - Knowledge based society with high economic outlook	Dirty fuels used in the building sectors reaches zero and substituted by electricity and biogas.	Share of service sector increases from 33% to 45%	Walking and light rail meets 10% and 30% of the passenger travel demand respectively by 2050; Electric vehicles assumed to reach following share by 2050: 100% for 2-wheelers; 60% for light duty vehicles; 30% for buses and trucks; (this assumptions exceeds the rate provided in the 2DS of IEA (2016).	GDP share of industry sector declines from 11.70% in 2014 to 10.70% by 2050; Move towards industrial symbiosis (Liu et al., 2011; Morrow, Hasanbeigi, Sathaye, & Xu, 2014);

Variations of CO2eq missions (kilo tons)



CO₂eq emissions (million tons)



— BAU — HGDP — KBS — sink — GNH state

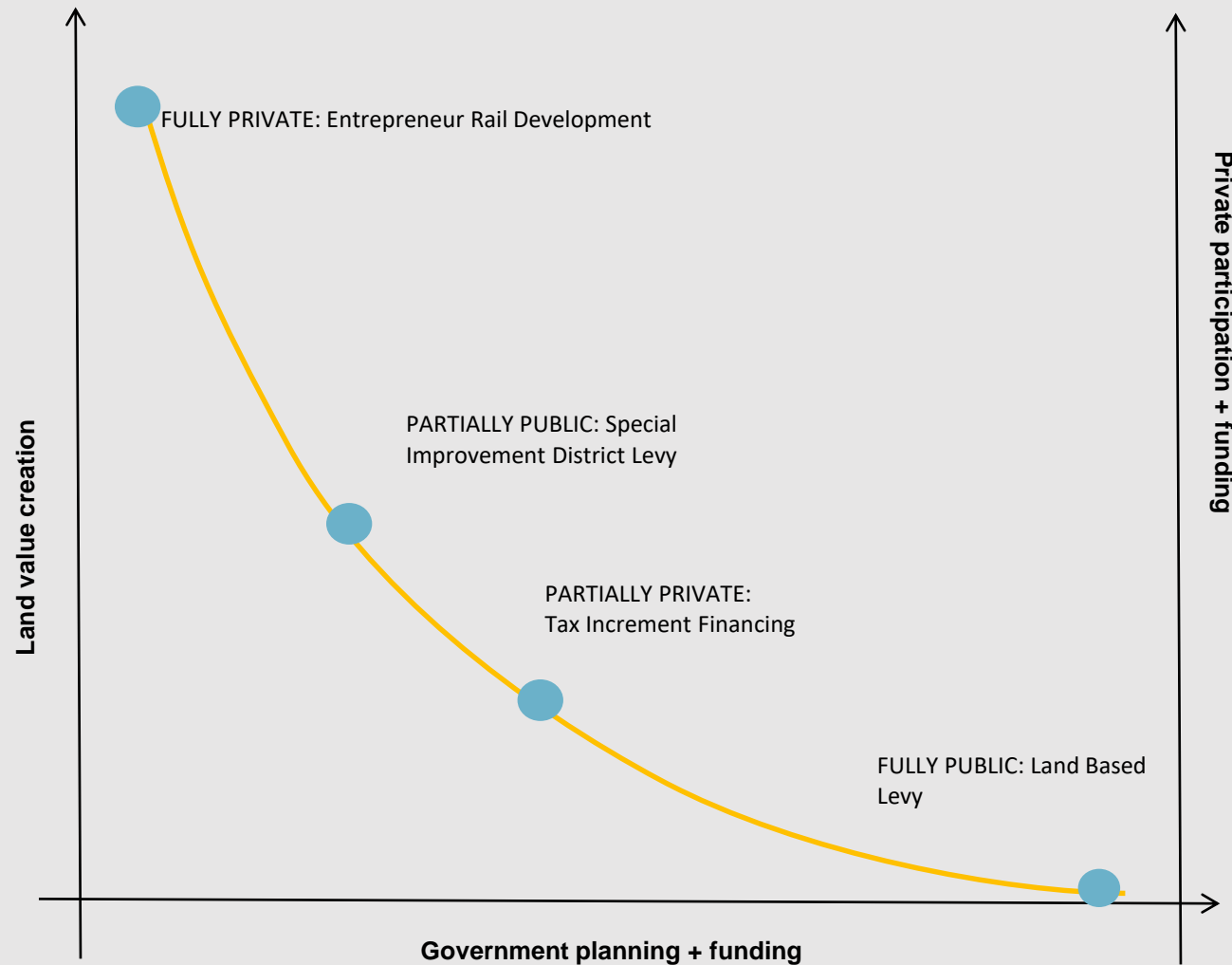
Must reduce oil growth...how?

- Electric vehicles
- Electric transit
- More focused development in TOD's.



Useful for
Thimphu as
it goes from
100,000 to
400,000?

How economic value increases with earlier involvement of private investment....



This is how we always built
railways for nearly 100
years...

Now we have a new demand
maybe we can do it again...?

SITUATED
MAGNIFICENT **NEDLANDS PARK** **SWAN RIVER**

TRAMWAY ESTATE
Between Perth & Fremantle

TERMS 1/5 Cash — Balance
to suit Purchasers

No Interest

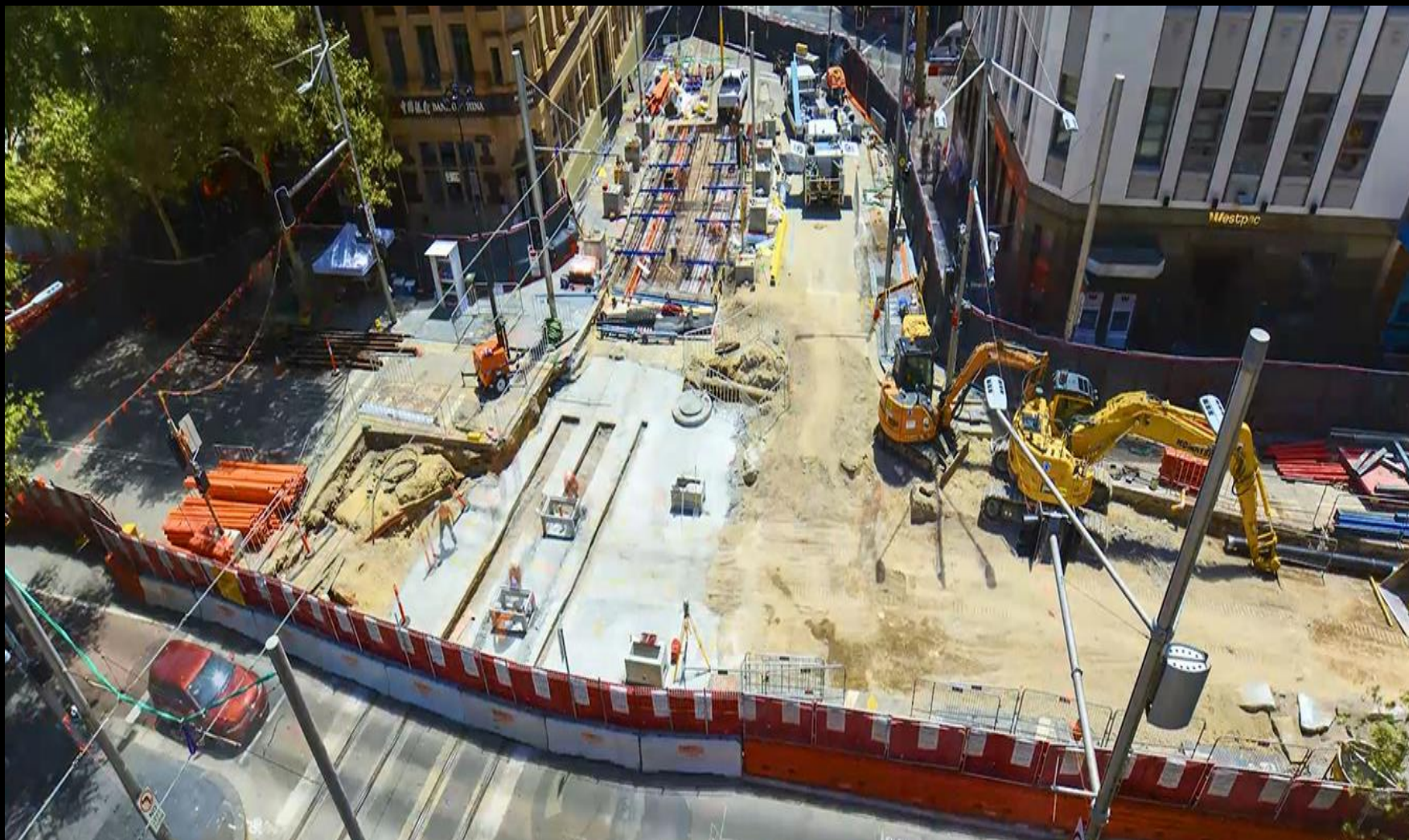
Offices —
Surrey Chambers
5th Georges Terrace Perth

Hope & Klen
Civil Engineers
100 West Street Perth

Subject to the Plan

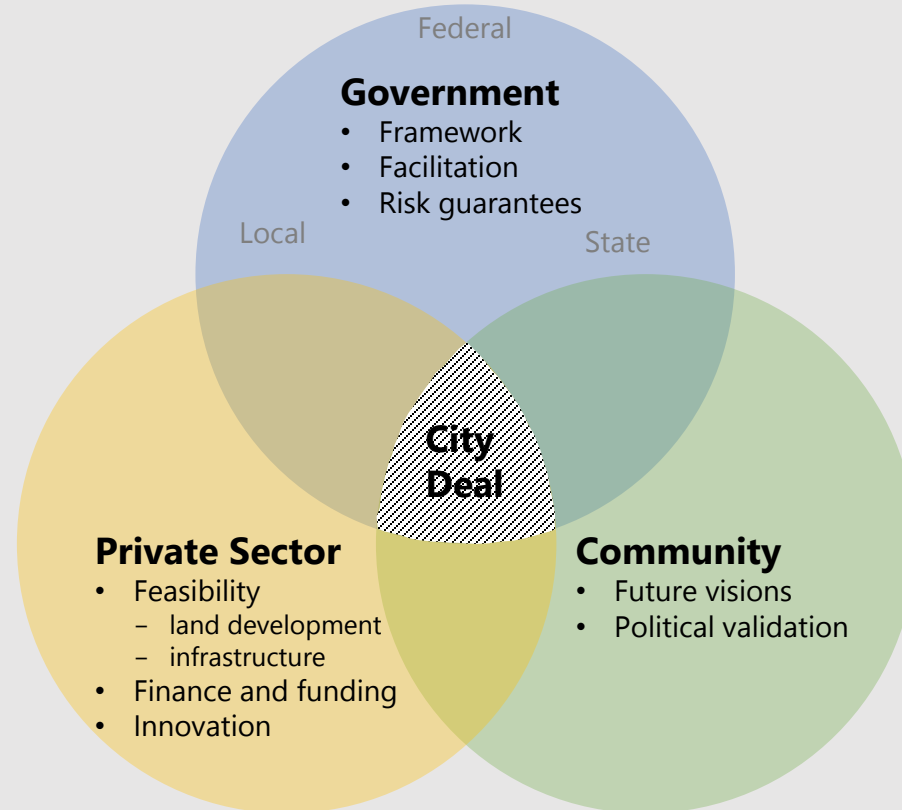
The advertisement features a large, detailed street map of the Nedlands Park area, showing a grid of streets and plots. The map is oriented vertically, with the Swan River at the bottom. The title 'NEDLANDS PARK' is prominently displayed at the top in a decorative, stylized font. Below the title, the text 'TRAMWAY ESTATE' and 'Between Perth & Fremantle' are written in a similar decorative style. The 'TERMS' section is written in a bold, sans-serif font. A small photograph of a landscape with trees and a path is located to the right of the main map. Below the photograph, the office address is listed. At the bottom right, there is an inset map showing the location of Nedlands Park relative to Perth and Fremantle. The overall design is typical of early 20th-century real estate advertisements.

And no disruption.... Sydney LRT \$120/km due to services rejuvenation



REQUIRES PARTNERSHIP....a City Deal

A new way of Building Australian cities for their long term based on partnerships...



Other private rail systems....

1. Japan
2. Hong Kong
3. Florida, Brightline

A NEW TRAVEL ALTERNATIVE FOR SOUTH FLORIDA

- ✓ First private passenger rail service
- ✓ Designed to serve tourists, business travelers and Florida residents



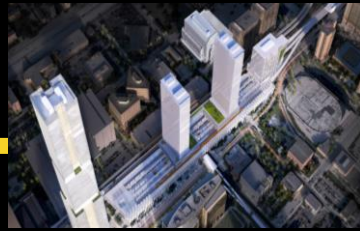
ORLANDO
(3 hours)



WEST PALM BEACH
(1 hour)



FORT LAUDERDALE
(30 minutes)



DOWNTOWN MIAMI

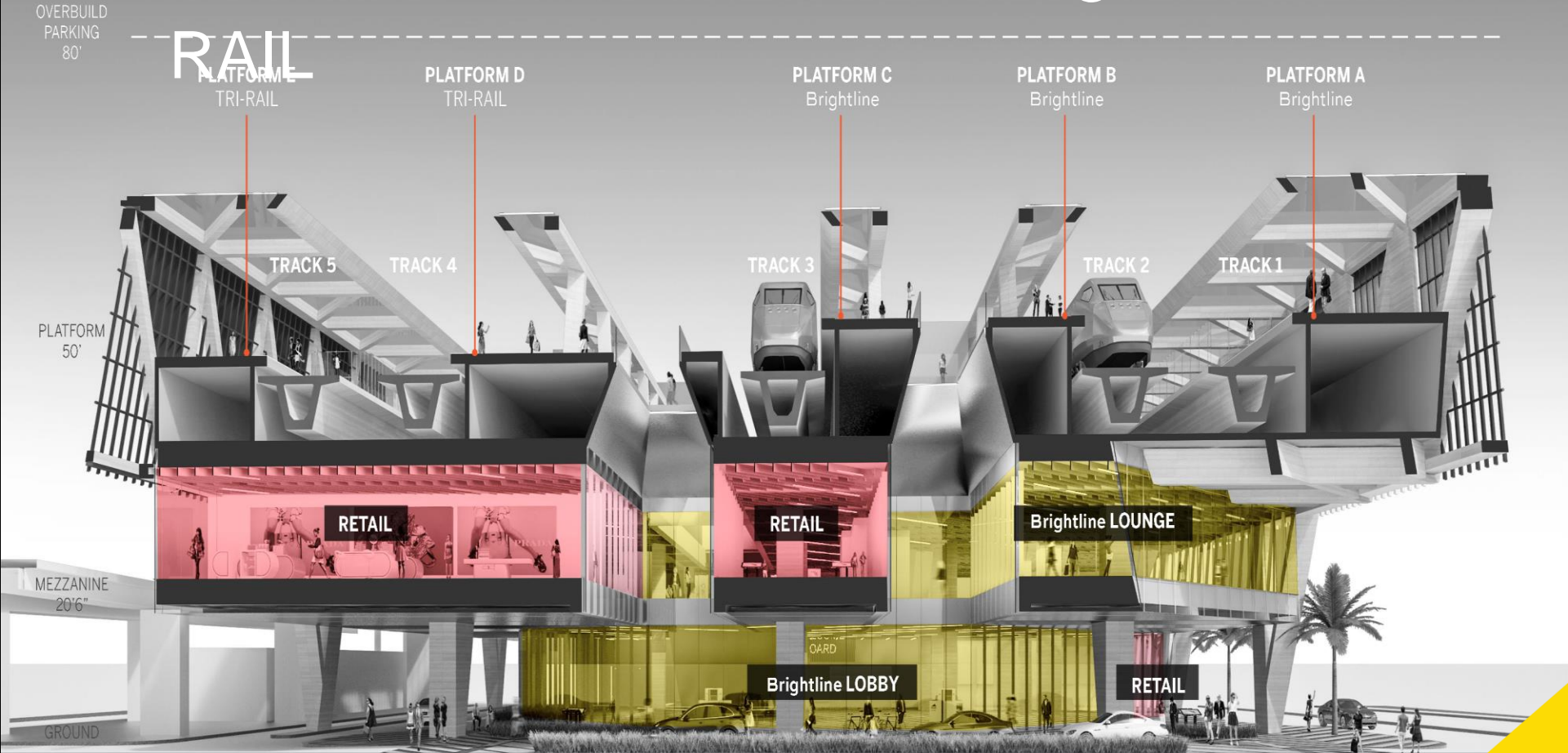


MIAMICENTRAL²

brightline

INTEGRATION OF COMMUTER

+ *brightline*



brightline

brightline



FORT LAUDERDALE STATION

Pearl District LRT paid for entirely through
land development....



Bangalore metro – how can it find alternative finance from land development



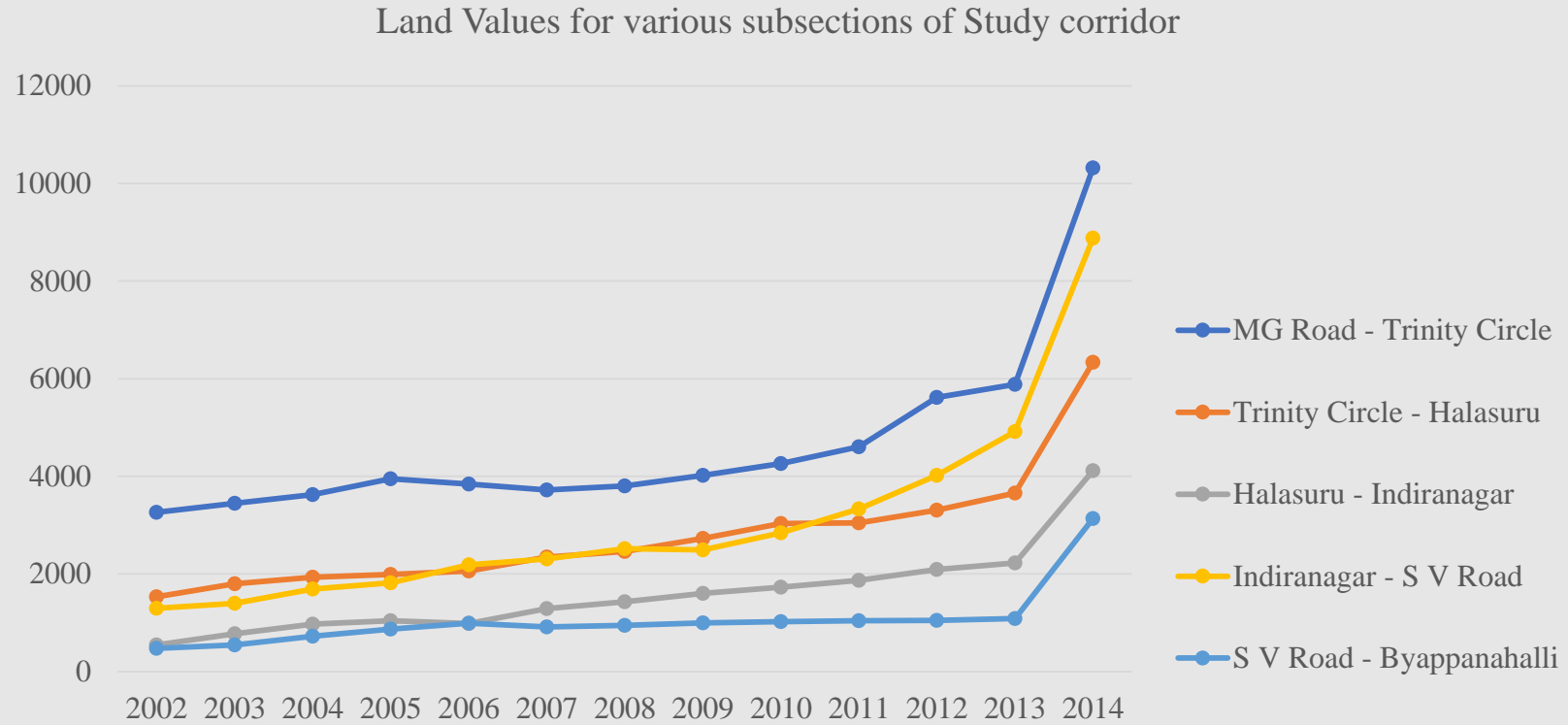
Bangalore workshop...to consider innovative funding options to extend rail and options for helping the displaced poor



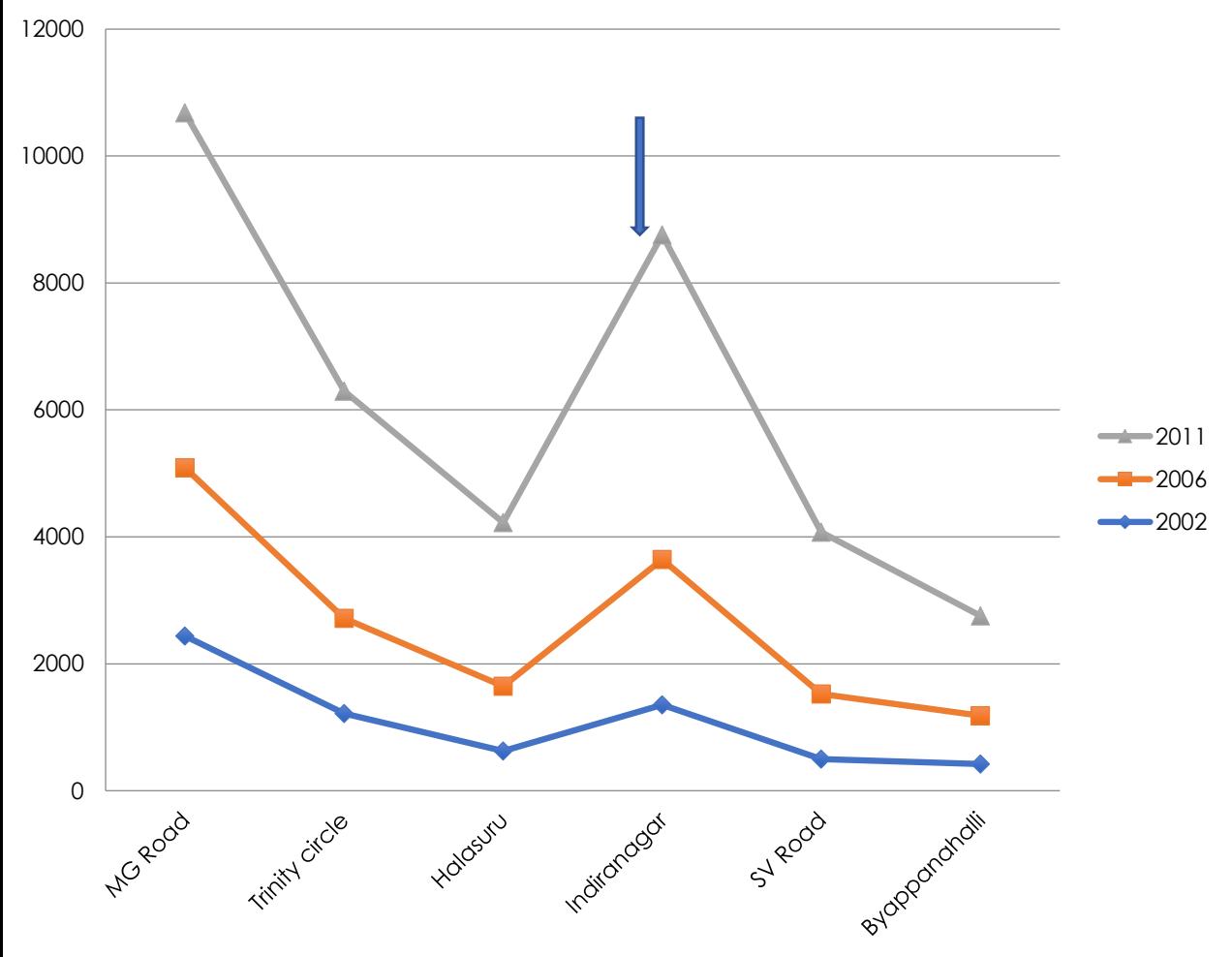
Success!



Land Values of subsections of study corridor



Multi-Nodal development around stations emerging





www.rns

RNS SHRINIKETHAN

A BLEND OF LUXURY AND CONNECTIVITY

PREMIUM APARTMENTS IN YESHWANTHPUR, ADJ. TO VIVANTA BY TAJ



Launch Offer
Rs. 1000 off
per sq. ft.
on first
24 bookings

3 & 4 BHK Luxury Apartm
264 - 333.50 sq mt.
(2850 - 3600 sq ft.).

Model flat is ready

080 - 6565 522
Mob: 94498 06







Sparsh
MASALA
ಪರಿಶುದ್ಧತೆಯ ಪುಟ್ಟ
ಕೋಶವೆಂದೆನ್ನಬಹುದು
ISO 9001:2008 & ISO 22000:2018 CERTIFIED COMPANY S.P.4
ಶುಭಂ ವಾಚ್ಯಂ
ಸ್ವಚ್ಛತೆಗೆ ಸಿದ್ಧ
SRI MANUJATHA
PONDICHERRY STREET

airtel

ALS
ಕೆ.ಎಸ್.ಆರ್.ಸಿ
CHEMISTS
DRUGGISTS

KA 02

Change in Socio economic Profile

Indicator	Local residential area	New build developments (Transit based housing)
Housing characteristics		
• Average home price (₹)	35,00,000	80,00,000
• Average rents (₹)	3300	28500
• Percentage of Owner occupied houses	30.07	66.01
Vehicle ownership rate per household		
• Two wheeler	0.30	0.34
• Car	0.05	1.11

Need policies to avoid loss of traditional areas to gentrification...



Key conclusions...Bangalore

- DESIGN worked well
- DELIBERATION worked brilliantly
- DELIVERY could now work if we can produce a template for delivery including policies to keep affordable housing and build a proportion in any new build TOD's.

Increasing density decreases car dependence
but is it greener? Case Study of Singapore

Biophilic design – greening buildings



GREEN URBANISM IN ASIA

The Emerging Green Tigers

In *Green Urbanism in Asia*, Newman and Matan have produced an impressive tour de force — the first study of its kind to document and analyze the emerging green urban trends, amazing projects and wonderful stories of innovation found in Asian cities. Thoroughly researched and with remarkable detail, this path-breaking study will be the essential starting point and standard reference for years to come for anyone interested in understanding this fast-urbanizing part of the world. Newman and Matan show us what is possible, that there are compelling models for effectively integrating nature, sustainability and quality of life. These emerging green Asian tigers, so eloquently described and celebrated by Newman and Matan, point the way for cities around the world, and offer hopeful and inspiring antidotes to the sense of global gloom that often prevails.

Dr Timothy Bentley
Teresa Heinz Professor of Sustainable Communities, and
Chair, Department of Urban and Environmental Planning, University of Virginia

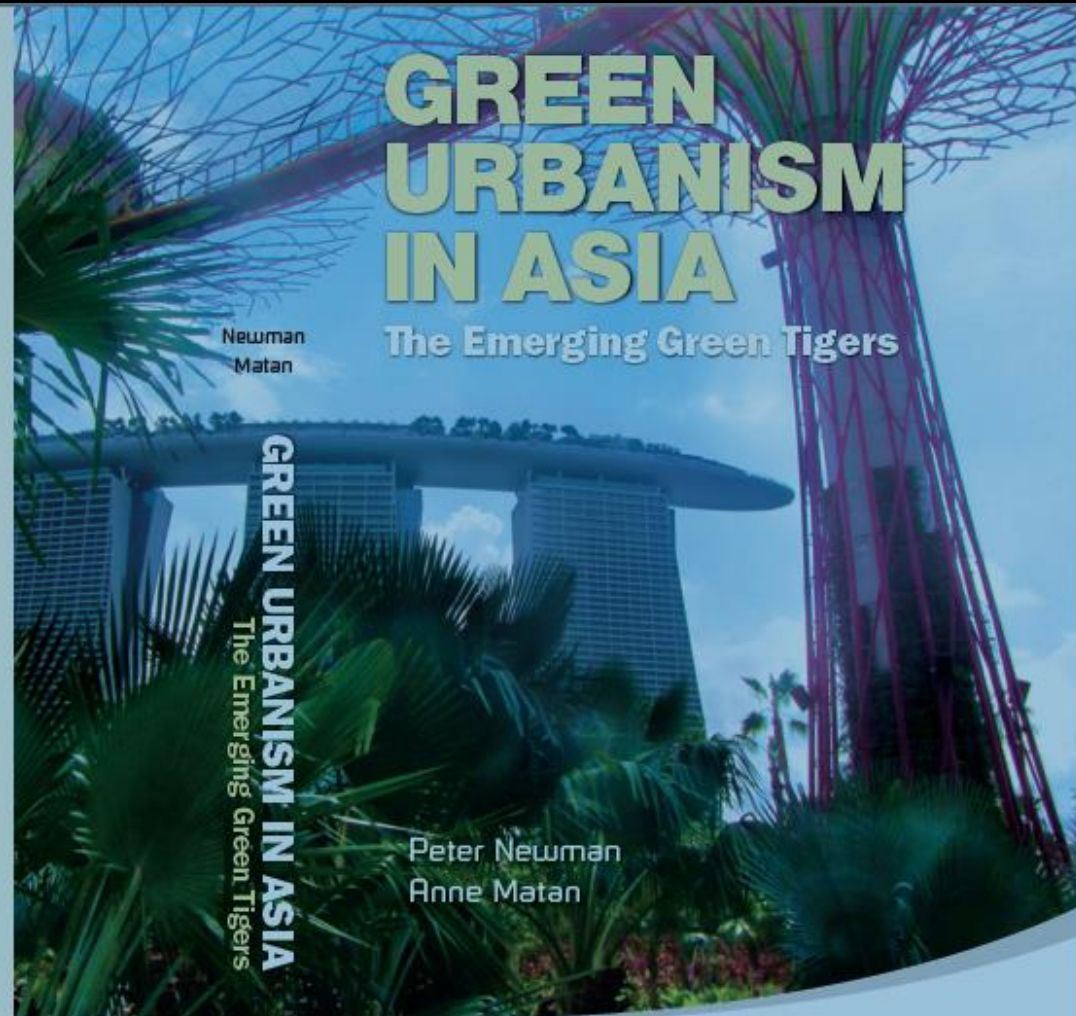
Asian urbanism is THE story of the 21st century world-system: never before in history have we seen the speed, scale, and complexity of urbanisation that we are witnessing today across the whole Asian continent and island archipelagos. To date green urbanism is an oxymoron but this book promises to be part of a new wave of innovations of ideas, policy regimes, and practices that can change that from an empty slogan of property developers flogging gated communities to transforming all our cities into liveable and sustainable ecosystems. We had better hope so for the long-term welfare of our world as a whole is now in the hands of this generation of Asian cities and their makers! This book is therefore not only timely but necessary. It is a handbook for students and practitioners of the urban alike. Let us all get cracking, book in hand!

Dr Trevor Hogan
Deputy Director, Thesis Eleven Centre for Cultural Sociology, and
Senior Lecturer, Faculty of Humanities and Social Sciences, La Trobe University, Australia

This book is in a class of its own. It shows that Asia is in the forefront. Most new breakthroughs take place here, populations ask for it, and politicians respond. The book takes the jump from telling that we should green our cities to demonstrate how it can be done. That is the core of the book: How to do it.

Dr Joerges Denstroom Moeller
Visiting Senior Research Fellow at Institute of Southeast Asian Studies, Singapore, and
Adjunct Professor at Singapore Management University and Copenhagen Business School

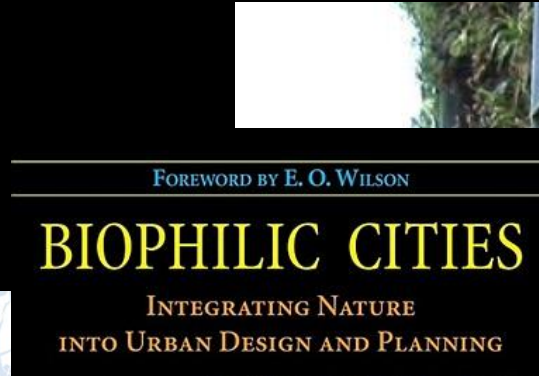
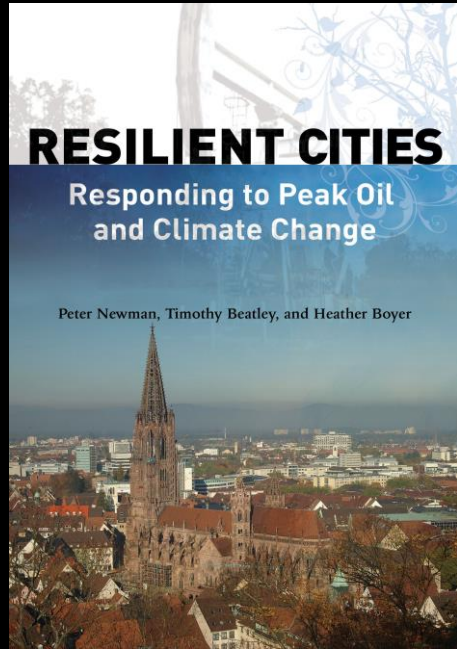
World Scientific
www.worldscientific.com
9596 hc



Curtin University

E O Wilson 'Biophilia' – human beings need nature

Tim Beatley 'Biophilic Cities' – we need a daily dose of nature



Biophillic City –
landscaping buildings,
air conditioning the
city, making beautiful
public spaces...







[CaixaForum Museum](#)

Film: 'Singapore Biophillic City'

From a Garden City to a City in a Garden – or a Forest



Singapore increased canopy cover 20% in 20 years



Every new government building had to replace floorplate with green...



R&D provided by NParks





Like a cathedral....



Creating healthy hospitals...



Healing rates went up and biodiversity improved...



Hospital gardener and visiting schools...



Community food garden on roof



A daily dose...



The \$2b park on reclaimed land..







The next phase of urban development....

1. **MUST** be zero carbon with solar-based electric vehicles and electric transit.
2. **CAN** be accelerated and improved by involving private sector funding partnerships and municipal management to create TOD land development opportunities.
3. **CAN** be done with 'inclusive, resilient, safe and sustainable' outcomes as long as they are built into projects from the start.