Sustainable Access for Sydney

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Sustainable Access for Sydney

1. Introduction
2. Emerging Trends
3. World Class Public Transport
4. A Strategy for Sydney
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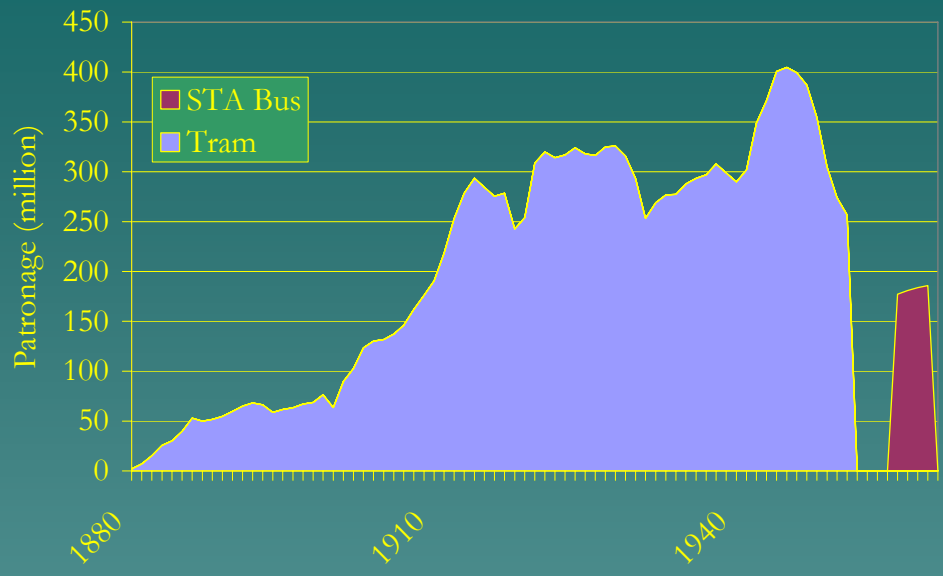
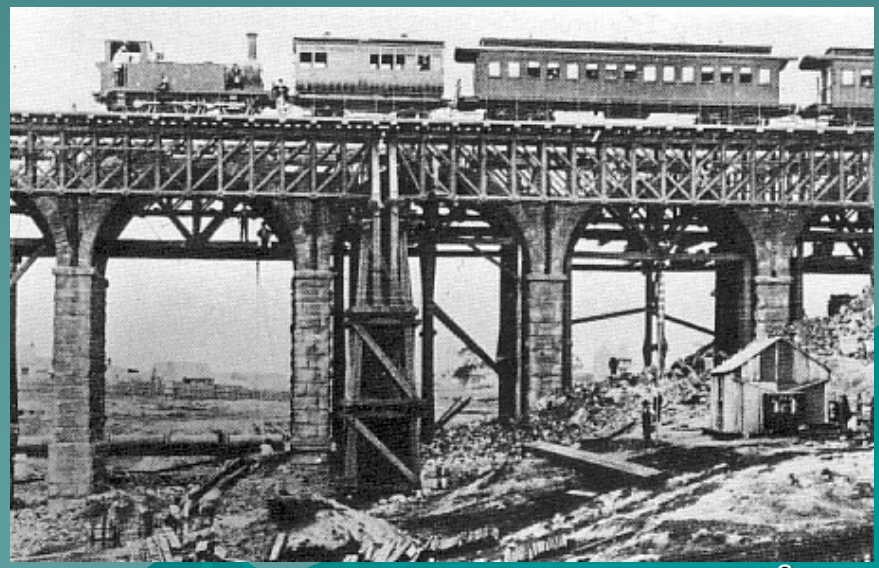
1 Introduction

- Sydney has less public transport capacity across the harbour bridge than it did 75 years ago.
- STA buses carry less than half the number of people carried on trams in 1948
- Cityrail trains are now almost back to the steam age in terms of travel times…..
- Is it any wonder we've become more car dependent?



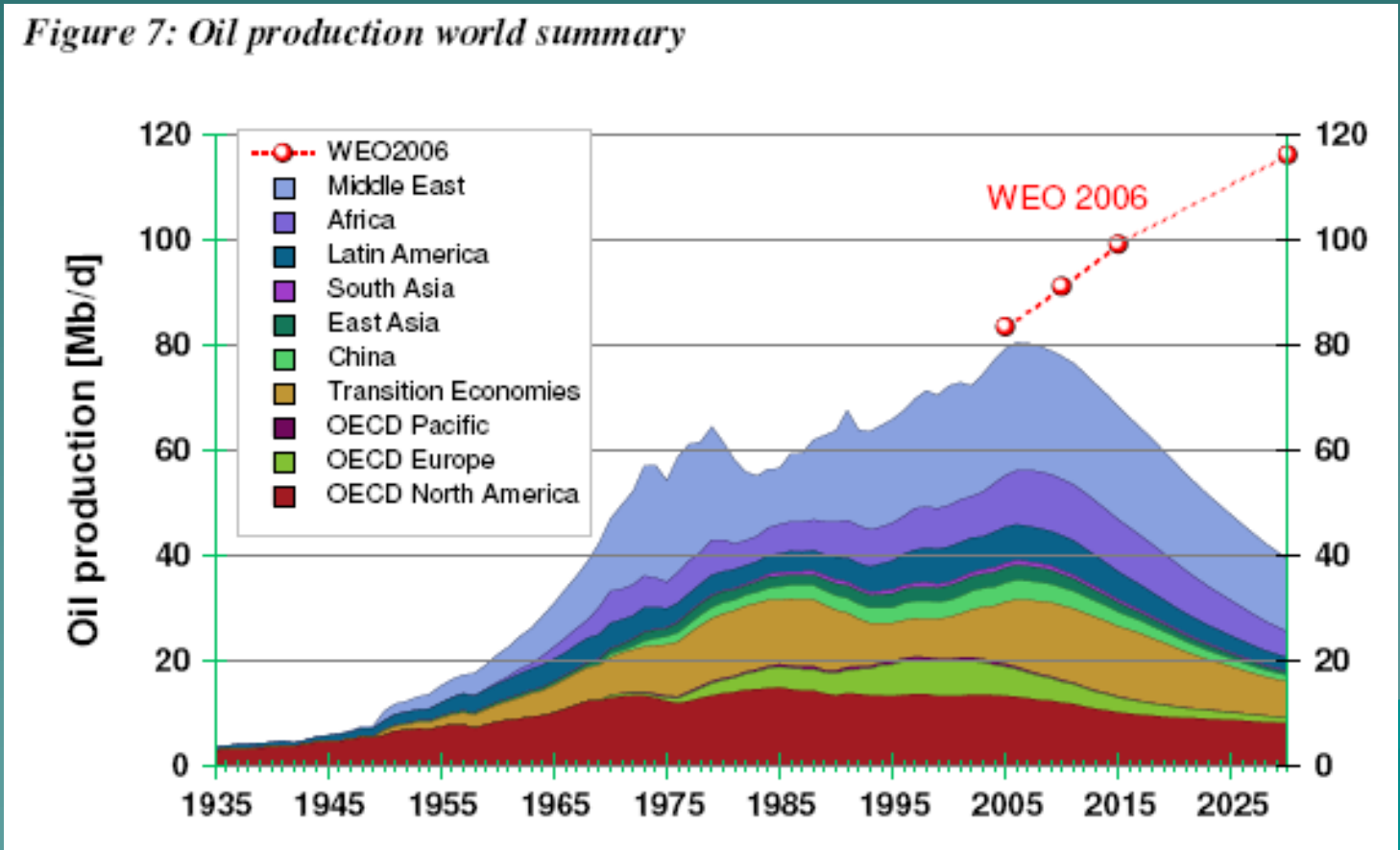


Why Sustainable Access?

- Peak Oil
- Global Warming
- Healthy City
- Economic Prosperity

Peak Oil: Supply

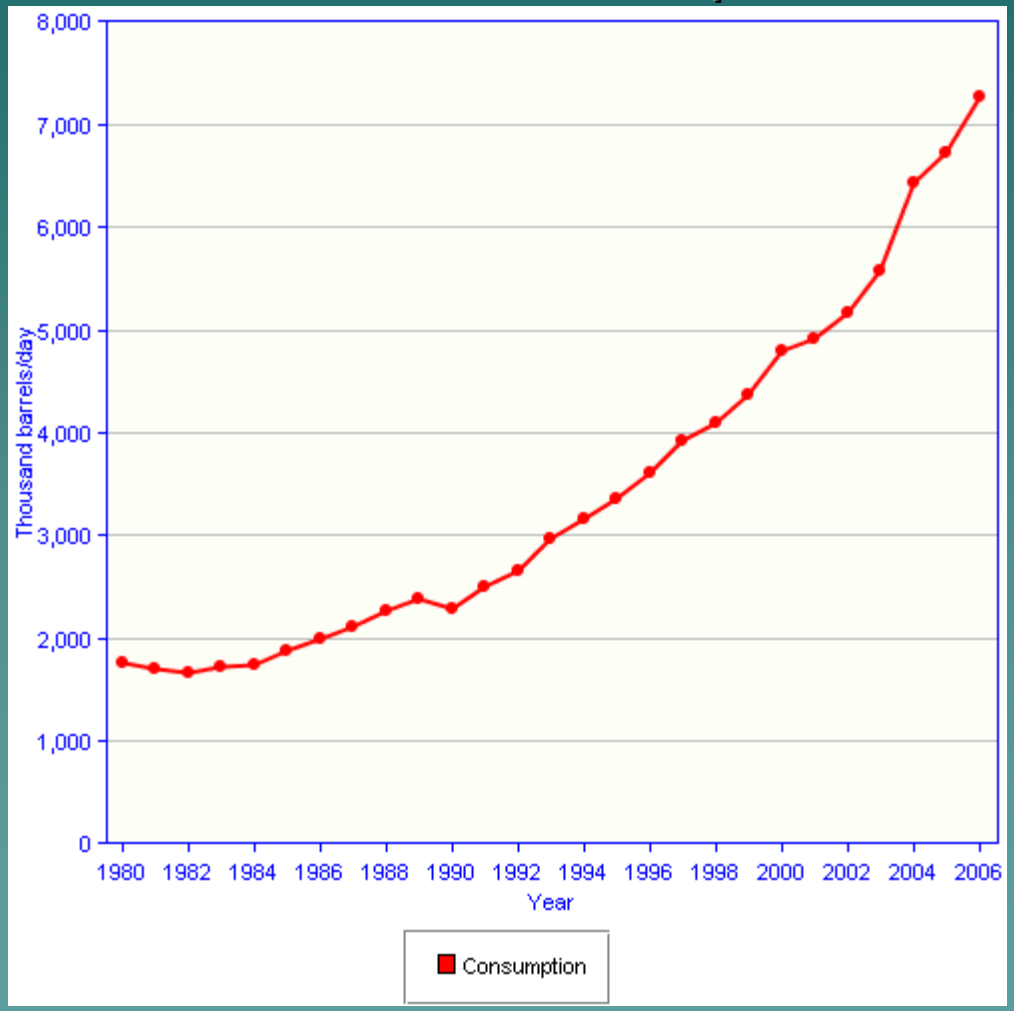
- Peak oil. Oil supply could fall to 1/3rd demand under BAU by 2030. Large cuts needed by then in oil consumption



Source: Energywatch (2007)

Peak Oil: Demand

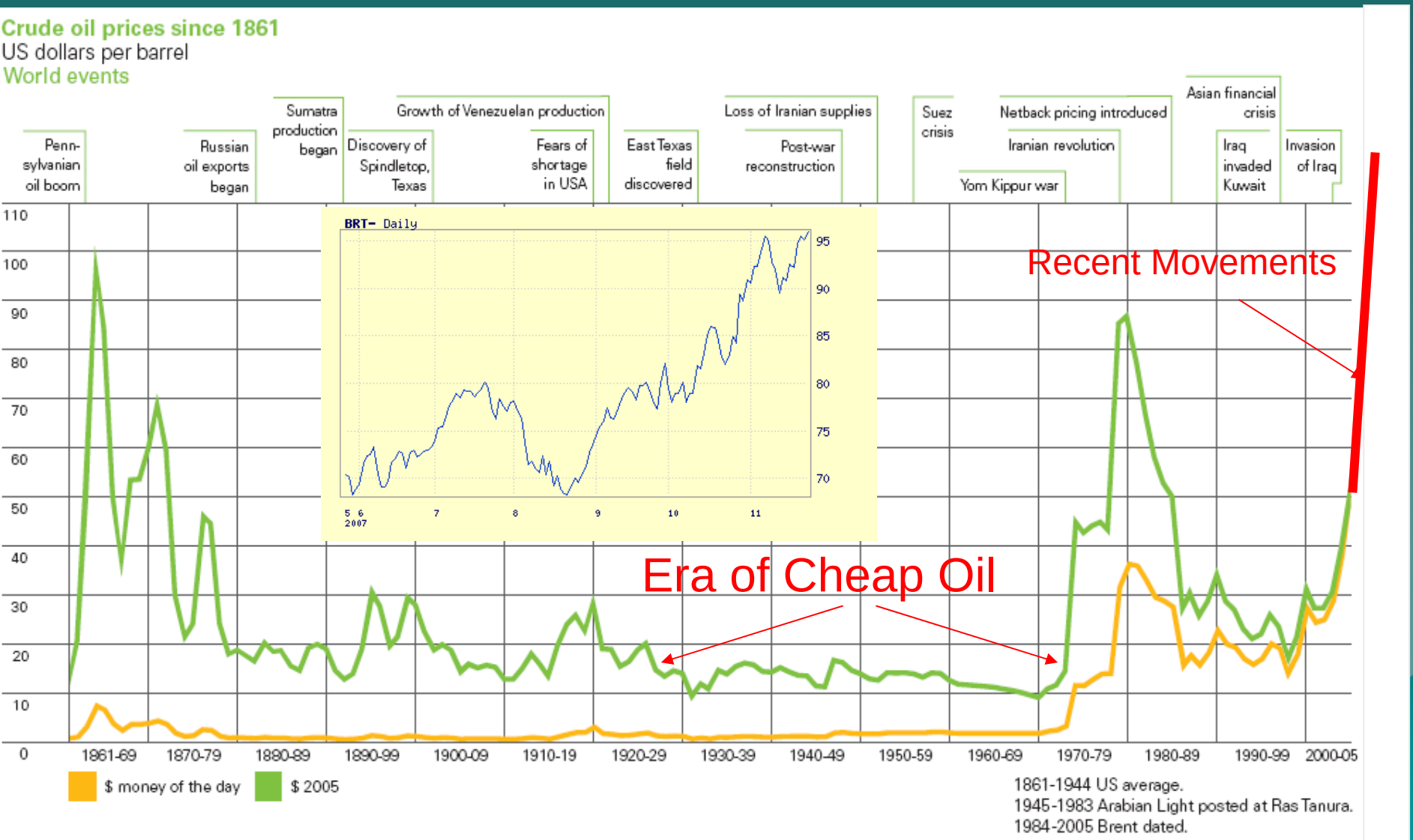
Chinese Oil Consumption



Source: EIA (2007)

- 9% of world's oil demand in 2006/7 (7.7m b/day)
- 53% increase in consumption in last 6 years
- World's third biggest oil importer (after US and Japan)

Peak Oil: Long term oil prices



Peak Oil: Implications

- Americans drove 4.3% fewer km in March 2008 compared with a year earlier – biggest year on year decline since DOT records began in 1942 (AFR, 26/5/08, p13)
  - This is at a price below $4 a gallon (90cpl)
- $200 a barrel oil will add 70cpl to today's pump price. Carbon trading could add 10cpl more
- Petrol could be $2.25 a litre within two years - $160 to fill up a Commodore
- Do we really want a lot more mega road projects in future, like the M4 East?

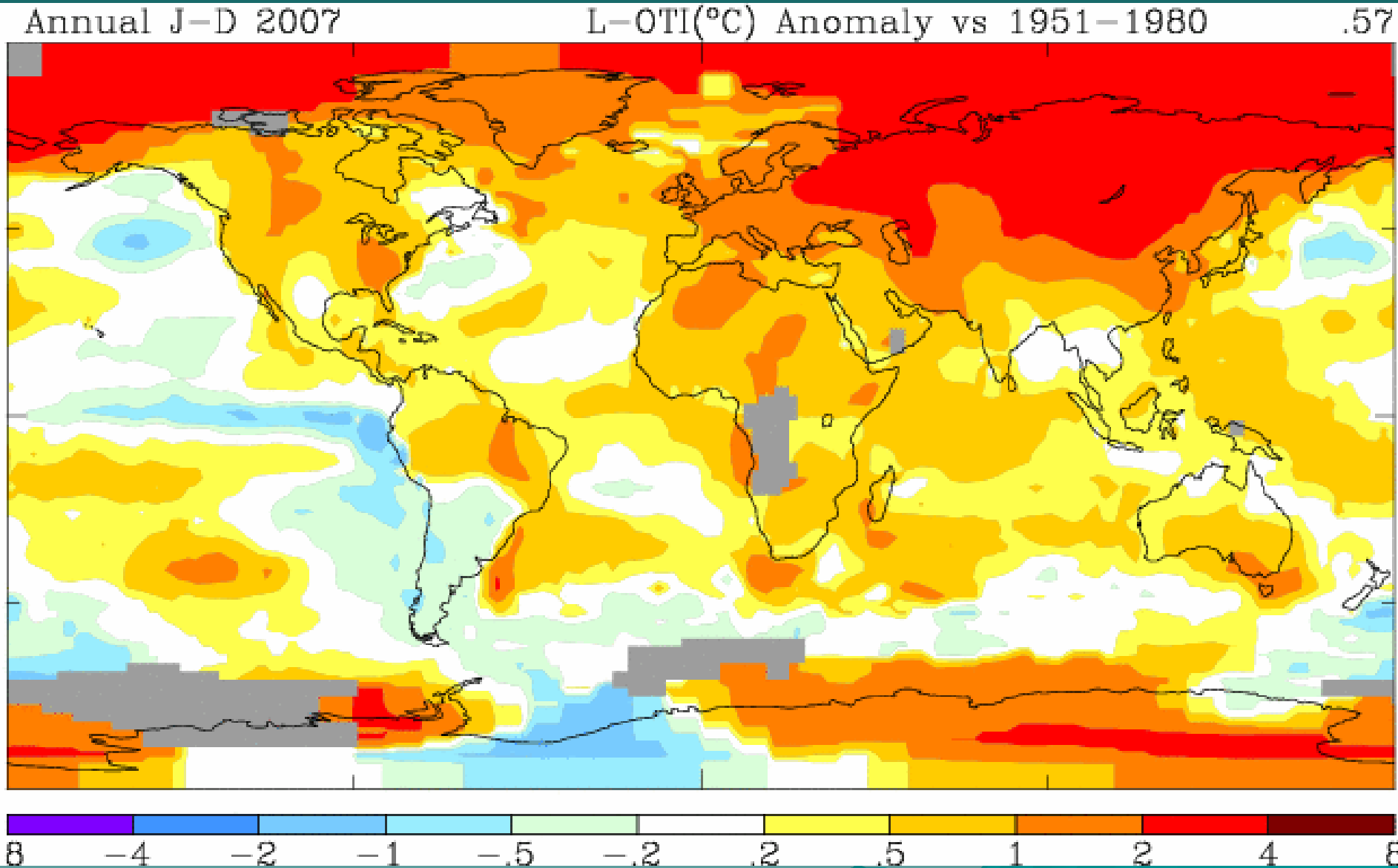
Climate Code Red

Philip Sutton and David Spratt http://www.carbonequity.info/climatecodered/5keys.html):

- **Hansen "safe" level of CO_2 is 300 – 350 ppm. Already at 386 ppm**
- **CO2 rose 30 ppm in the last 17 yrs. Previous fastest 1000 yrs.**
- **Last time global temp was 3°C above today in the Pliocene, sea levels were 25m higher**
- **Past records show sea levels have risen up to 20m in 400 years - ie 1m every 20 years on average.**
- **Threats include loss of sea ice; acidification of oceans; strain on ecosystems when temp change >0.3 degree per decade**

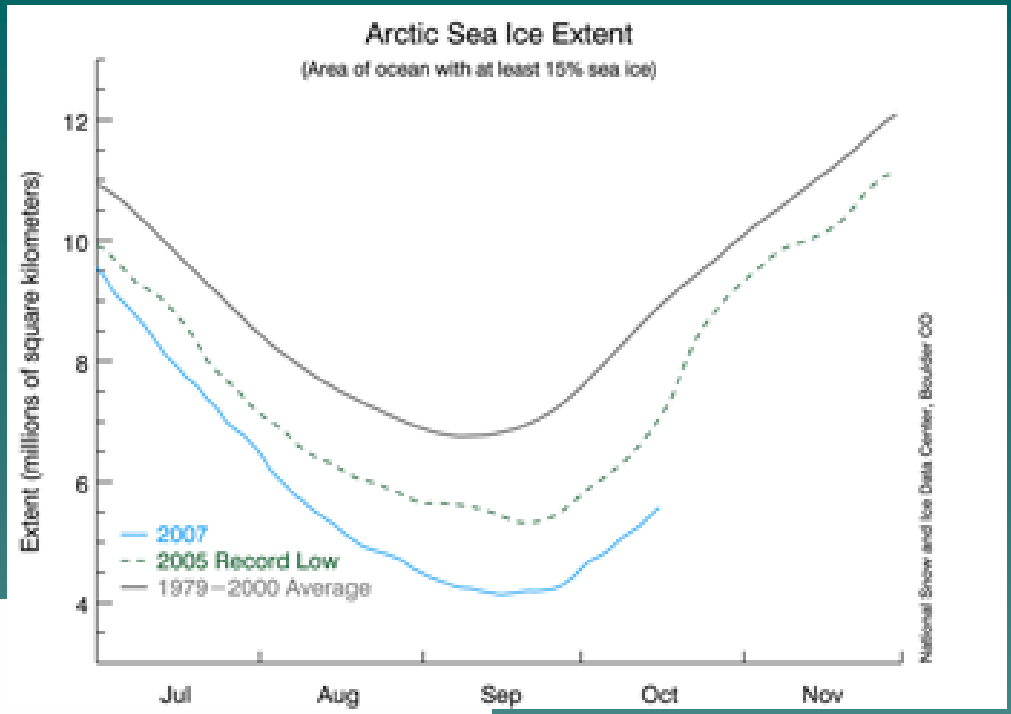
Global Temperature anomolies: 2007 cf average 1951-1980

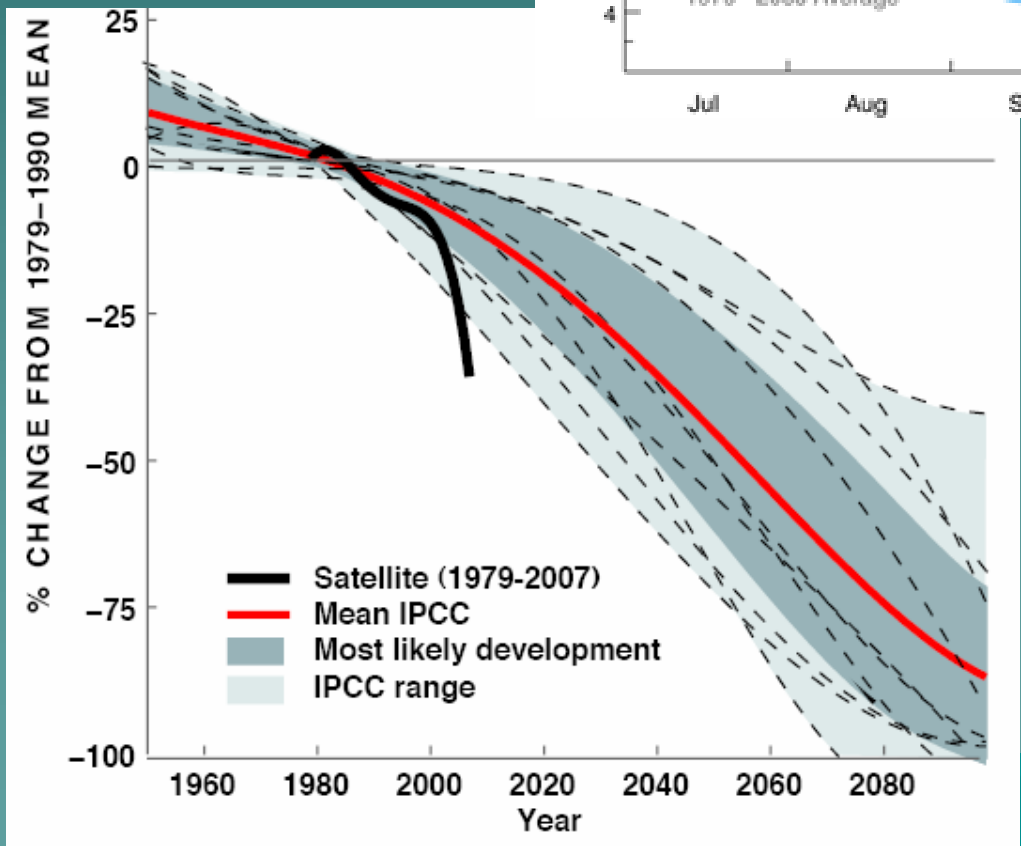
Source http://data.giss.nasa.gov/gistemp/maps/



Source: http://nsidc/org

Area of Sea Ice in Arctic in Sept 2007 was 22% less than previous low in Sept 2005, and 40% less than the 1979-2000 average

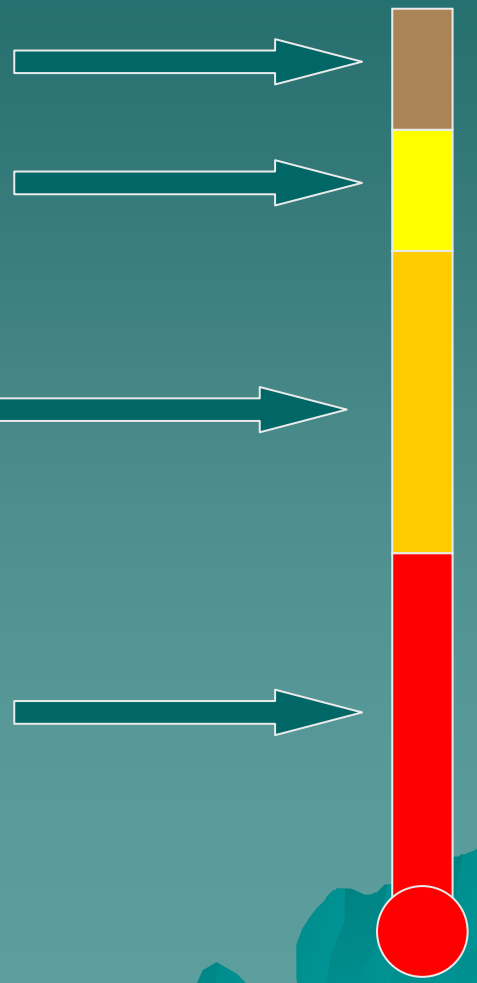




IPCC 2007 forecast that the Arctic would be ice-free in around 90 years. Latest data suggests it could occur in 5 years. Source: IPCC (2007) p 529 and Climate Code Red

Global Warming: 2 Degrees of freedom?

- 0.3 degrees to “safe level?”
- 0.3 degrees if Arctic Sea Ice melts
- 0.6 degrees “locked in” from delayed response to past CO2 emissions
- 0.8 degrees rise already measured since pre-industrial times



Why we need *sustainable* access..

- **Climate Change and Peak Oil have arrived**
- **Ageing** of society adds an extra challenge. We will need access options for more and more people who can't drive and have mobility difficulties
- **It would cost $300-400 billion to replace every car in Australia with a hybrid car.**
- Even if we could afford it, it wouldn't solve **congestion, accidents, health & mobility problems**

How do we get there?

- ***Reduce travel demand*** through better land use planning, appropriate pricing, information and other measures
- ***Greenway network*** for walking / cycling / personal access devices
- ***100% Greenpower*** for rail, metros and light rail, *more efficient cars and buses*
- ***Less emphasis*** on cars and motorways
- ***World class*** public transport

2 Emerging Trends

Emerging Trends..

Cheonggyecheon Area
before Restoration (Seoul)
(http://www.metro.seoul.kr/kor2000/chungaehome/en/seoul/2sub.htm/)

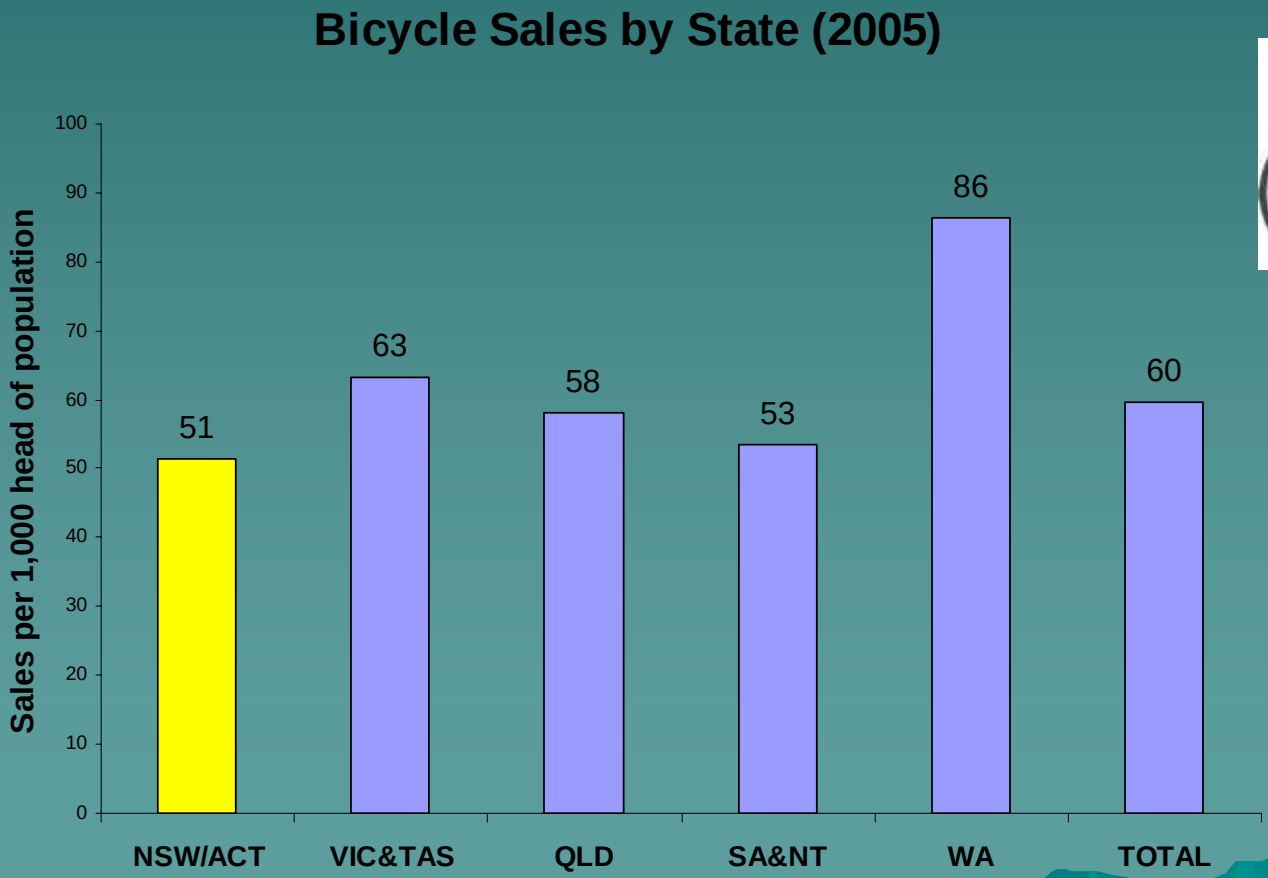
Cheonggyecheon Area after Restoration

(http://www.metro.seoul.kr/kor2000/chungaehome/en/seoul/2sub.htm/)

Brisbane's "Green bridge" is just for buses, cyclists and pedestrians..

Flexible Access

- Australia is experiencing a boom in bicycle sales, with 1.2 million sold in 2004 and in 2005, more than new cars. But NSW lags rest of the country.



Public Access Bicycles

- Major schemes now operating in Lyon, Paris, Barcelona etc
- Special bicycles (cost around $1700) fitted with GPS devices.

- Hundreds of secure lock up locations and thousands of bicycles mean people just pick up and drop off anywhere in the area served (eg whole of inner Paris)
- In Lyon, each bike is used 12 times a day. During train strike in Paris, each bicycle was being used 17 times per day.

Providing specific space for cyclists is catching on..

Other Personal Mobility Devices

- There is also a mini-boom in sales of other Personal Mobility Devices including:
  - Electric Mobility Scooters ("Gophers")
  - Petrol and electric Scooters

Car sharing is also taking off (GoGet, Charter Drive)

Public Transport

- More than 100 cities world with new light rail
- Many now building metros, commuter rail or busways
- PT growing faster in the US than car traffic since 1995
- Big shifts to PT in Australia
  - Trains in Melbourne up **30%** in last 3 years
  - Buses in Brisbane up **30%** in last few years
  - Trains in Perth up **40%** in last year

- **Successful cities in the future will need world class public transport systems**

3 World Class Public Transport

- Convenient
- Comfortable
- Capacity
- Coverage
- Cost-effective

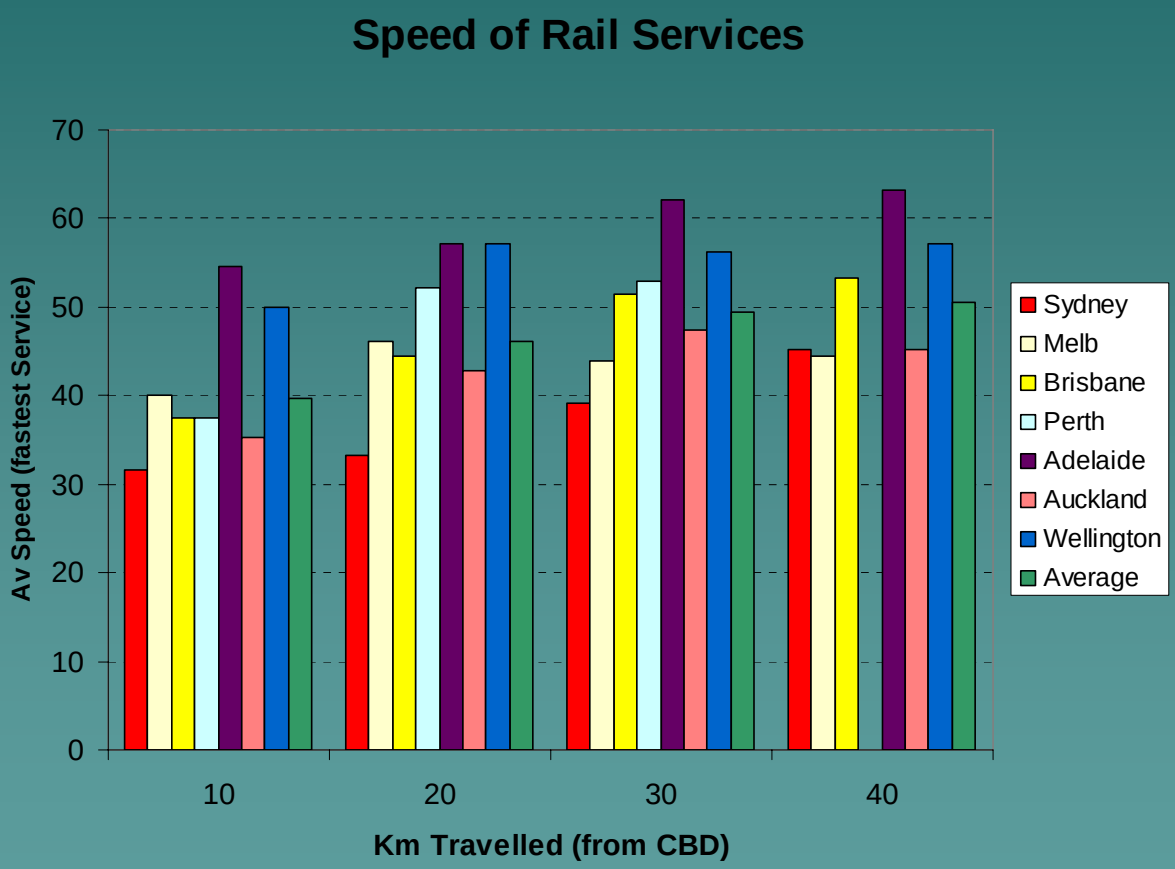
Where are we now?

Convenience	**Low frequencies** **Slow Services** **Access variable** **Integration poor**
Comfort	**35% of Sydney's trains still not air conditioned** **Ride comfort in buses poor** **Overcrowding**
Capacity	**Rail and bus close to capacity** **Growth potential limited unless expanded**
Coverage	**Poor coverage of NW and SW Sydney** **Some major job generators not well-served**
Cost - Effectiveness	**Low cost recovery and inefficiencies for rail** **Buses impacted by traffic**

What we need to do: Frequency and Access

- ***Strategic public transport network***
  - every 12 minutes in peaks and 15 minutes off peak from 7am to 10pm, Monday – Sunday
  - Re-design rail services for higher frequency and fewer service patterns
  - Improve bus frequencies and amalgamate to key routes
- ***Demand Responsive services*** for late night and door-door services for ageing population (eg Netherlands “treintaxi”, Gothenberg’s “flexroutes”).
- ***More park and ride*** (esp for bikes, scooters) and improved local bus services

Speed up our Trains and Buses



- Bring speeds on Cityrail up at least 5-10%
- Fast metros
- Buslanes, busways

Source: Isaacs (2006), p359

Integrate Fares, then Integrate Ticketing

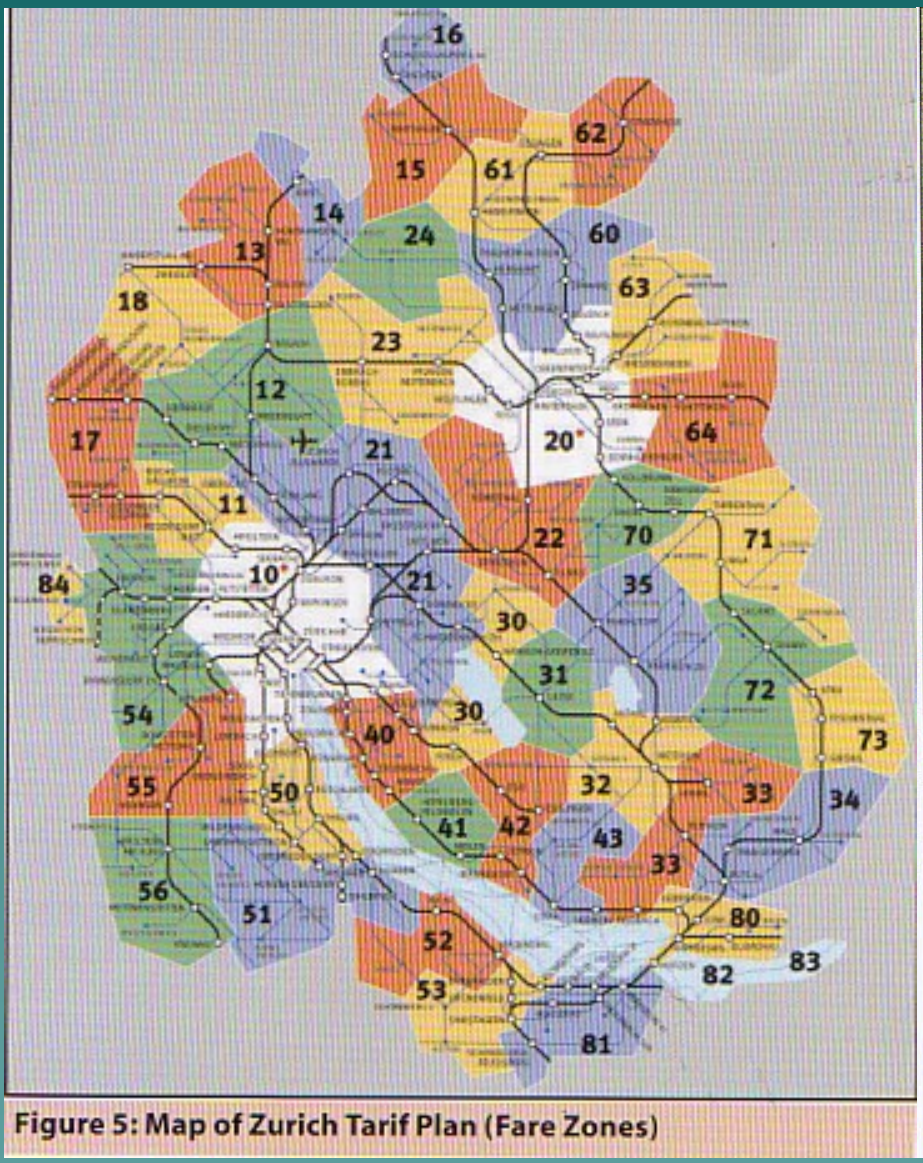
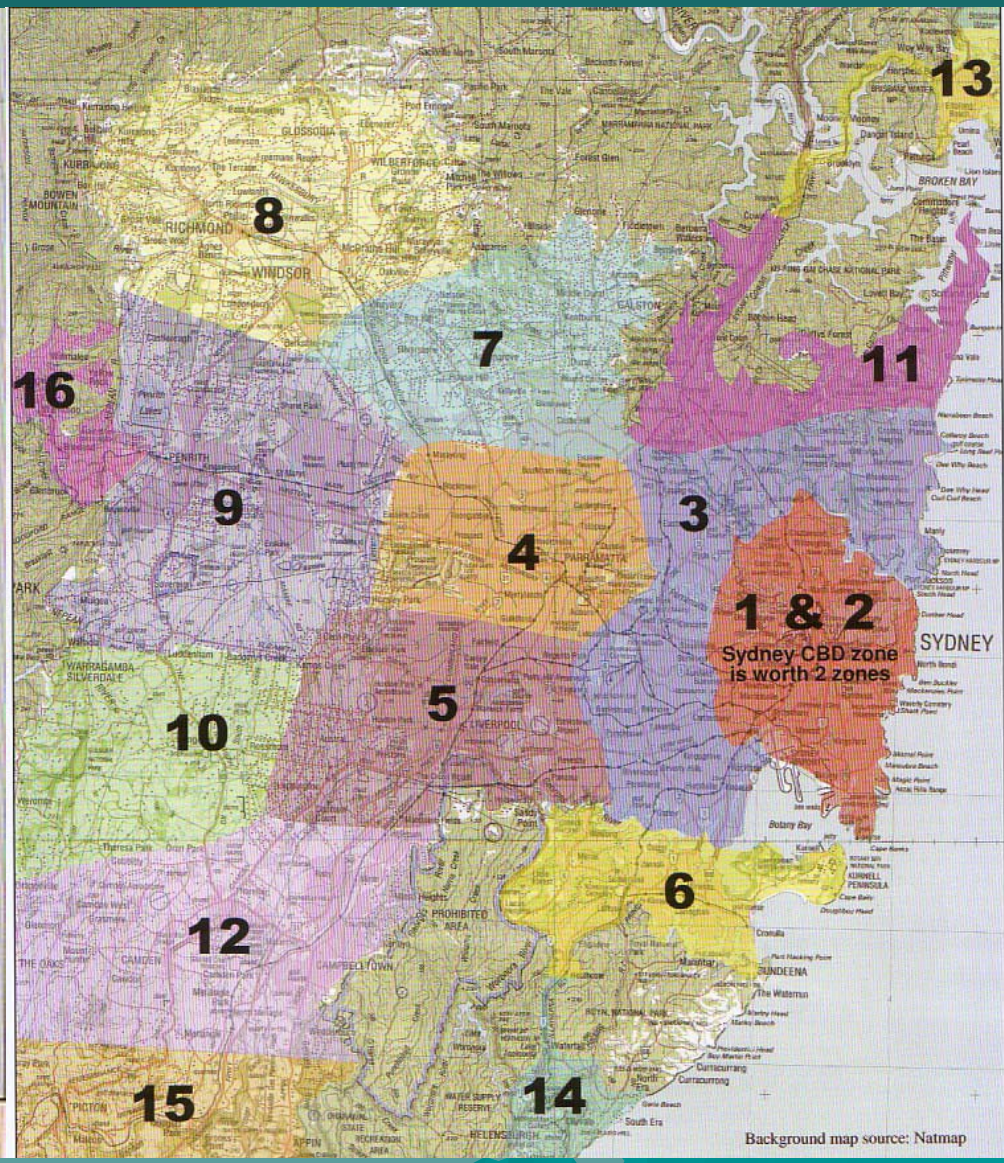


Figure 5: Map of Zurich Tarif Plan (Fare Zones)



Source: David Caldwell (2008):.

Seamless Integration - *Interchanges*

Southern Cross Railway Station, Melbourne

- Sydney has been adding some quite good major interchanges (Parramatta, Liverpool, Blacktown, Chatswood etc)
- Program now needed for smaller interchanges
- Major opportunity to revamp Central, like St Pancras (London) or Southern Cross (Melbourne).

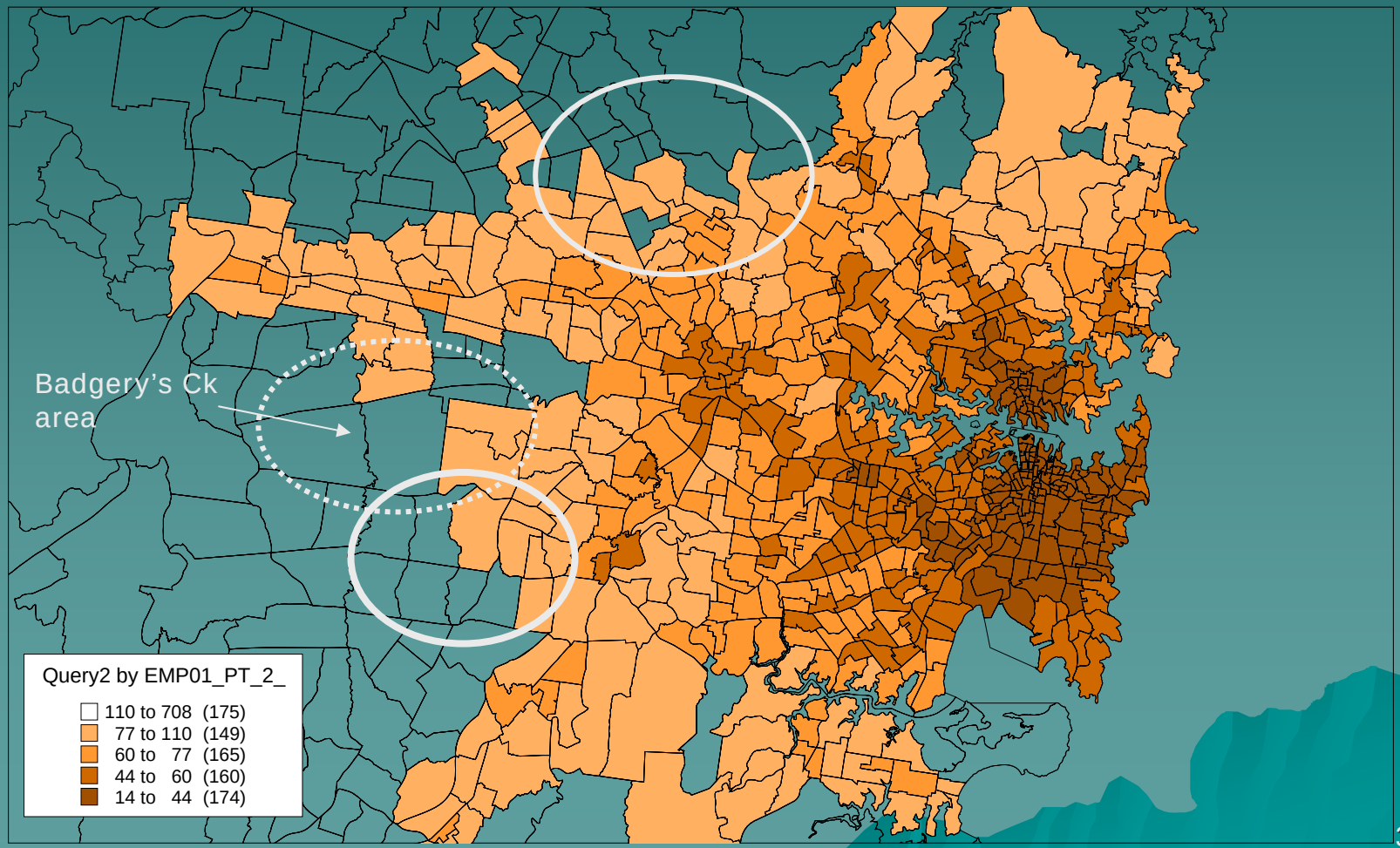
Comfort and Capacity

- Sydney's latest suburban trains are among the best in the world for comfort.
- Last non-airconditioned trains ("R" and "S" sets) due to be replaced by 2012 by new PPP cars
- Light rail in Sydney is highly regarded for its comfort
- Latest buses are reasonable, but ride quality variable due to poor quality road infrastructure. Requires light rail or high quality busway
- Introduction of metros poses a comfort dilemma (seating capacity)

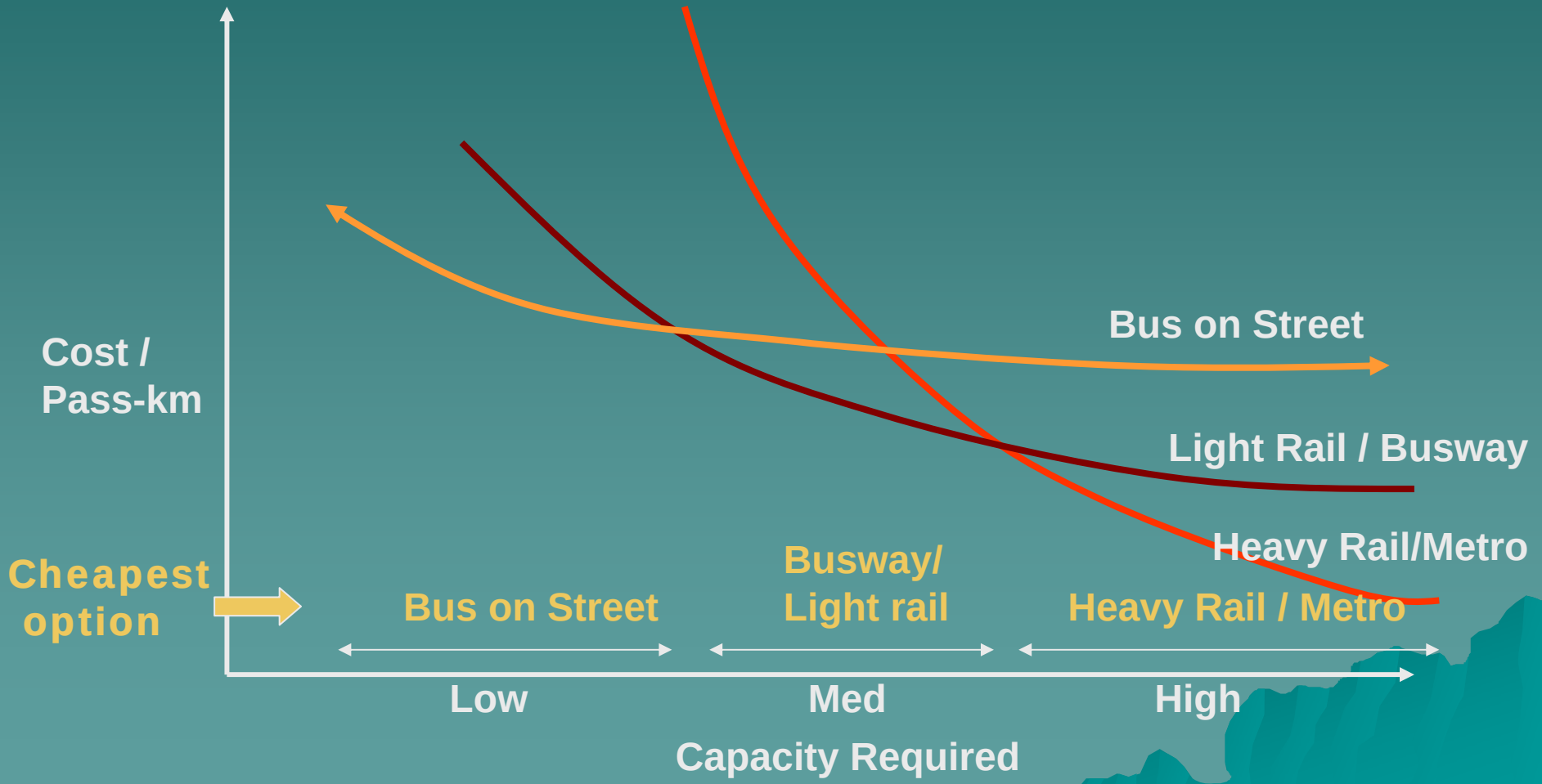
Coverage – Residential Areas

- In a general sense, the residential areas with worst PT access are the NW and SW suburbs, which are the most remote from major rail corridors.
- Better access needed for some job areas

Accessibility to employment by public transport in Sydney, darkest areas have highest accessibility



Cost-Effectiveness:



4 A Strategy for Sydney

a) *Consider geography and land use*

b) *Consider network design options*

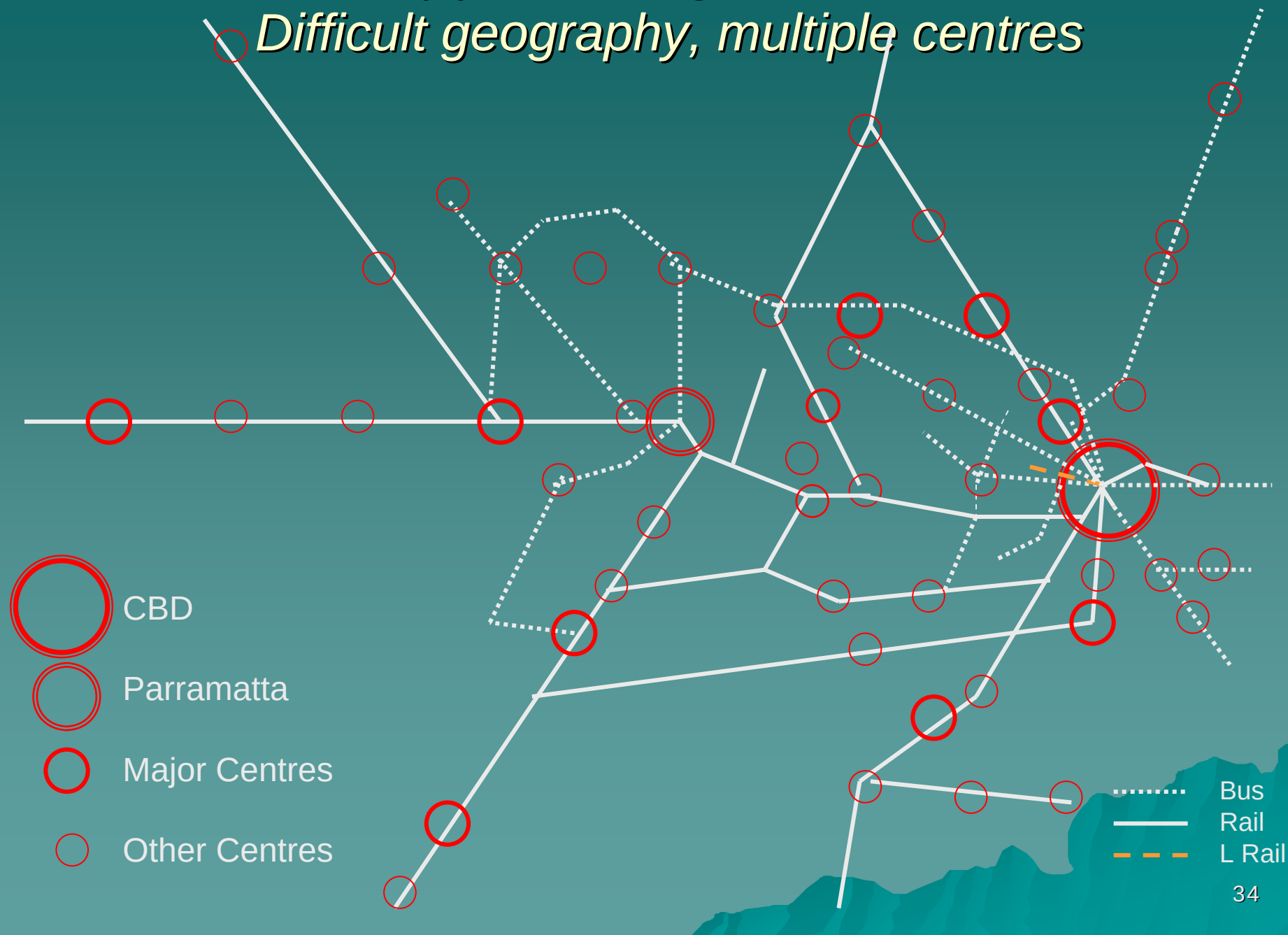
c) *Identify key links (new or upgrade)*

d) *Select most appropriate modes*

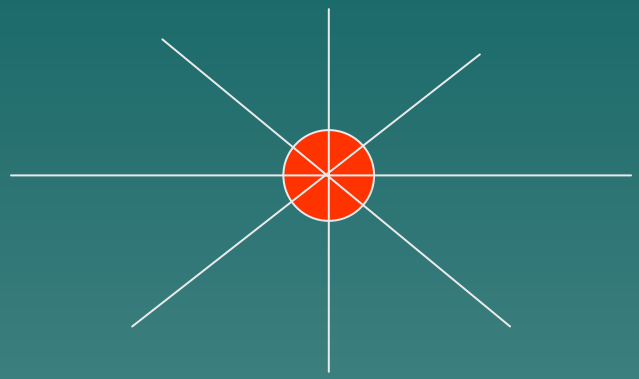
e) *Use appropriate funding and pricing*

(a) Existing Situation:

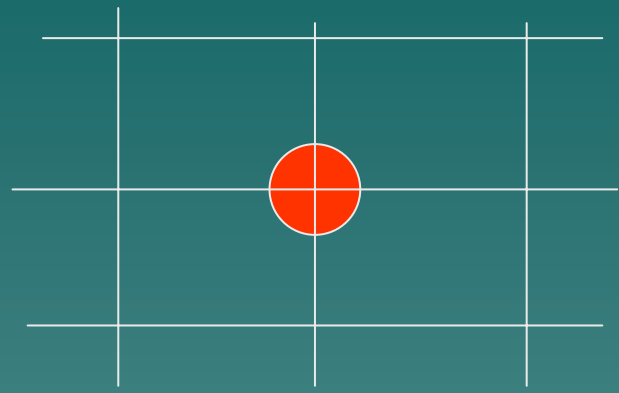
Difficult geography, multiple centres



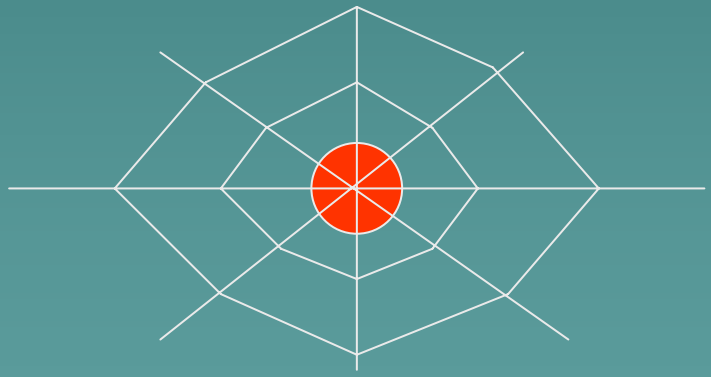
(b) Public Transport Network Designs



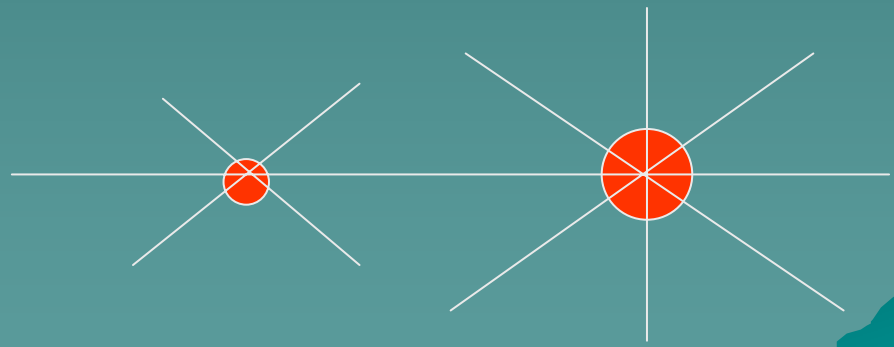
Radial: Most common system. Good access to centre, poor cross-suburb



Grid: Works if grid road network. Poor access to centre, better cross-suburb

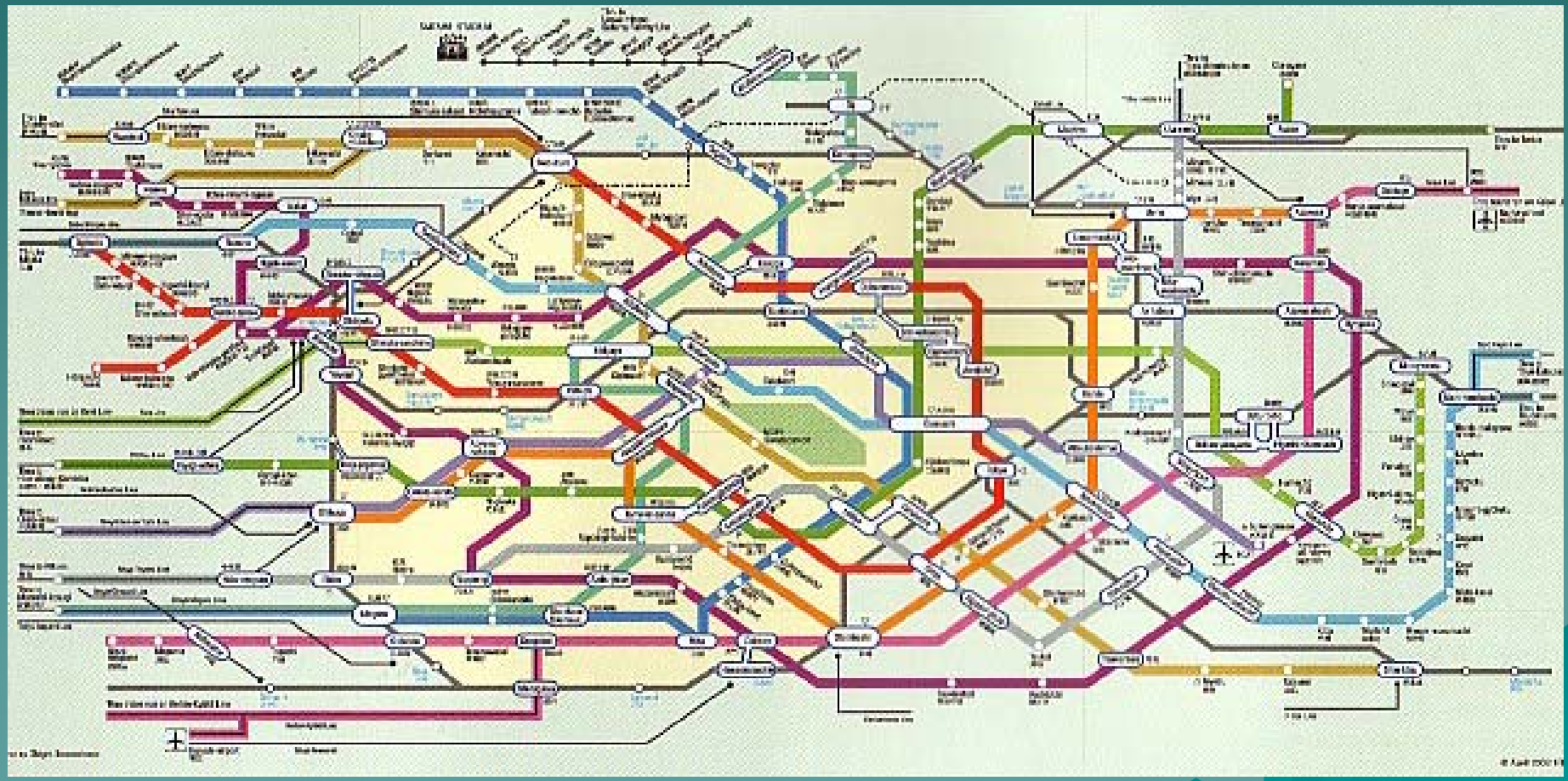


Cobweb: Adds circumferential links. Highest demand on radials

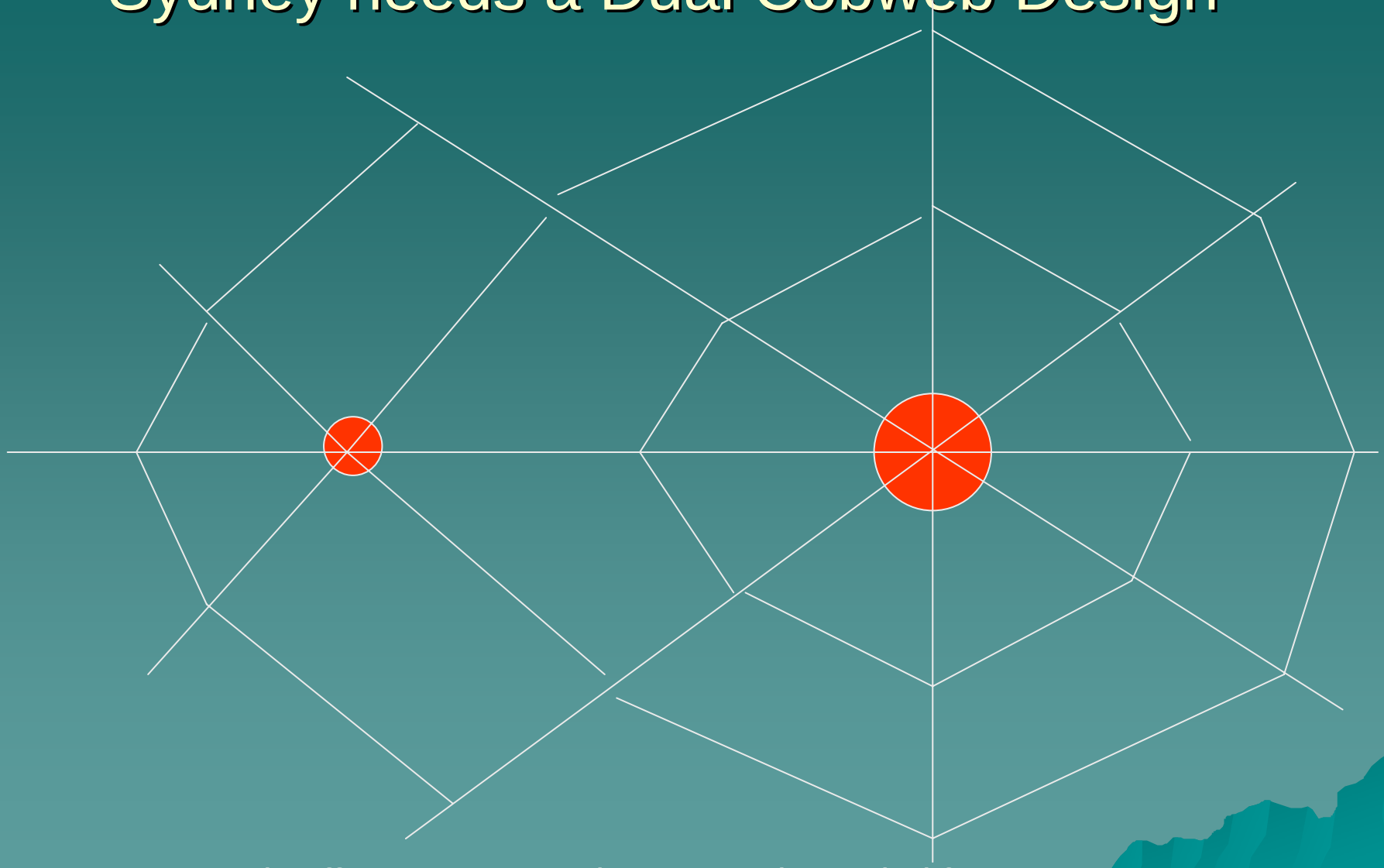


Dual Radial: Serves secondary CBD

Tokyo – the ultimate network…

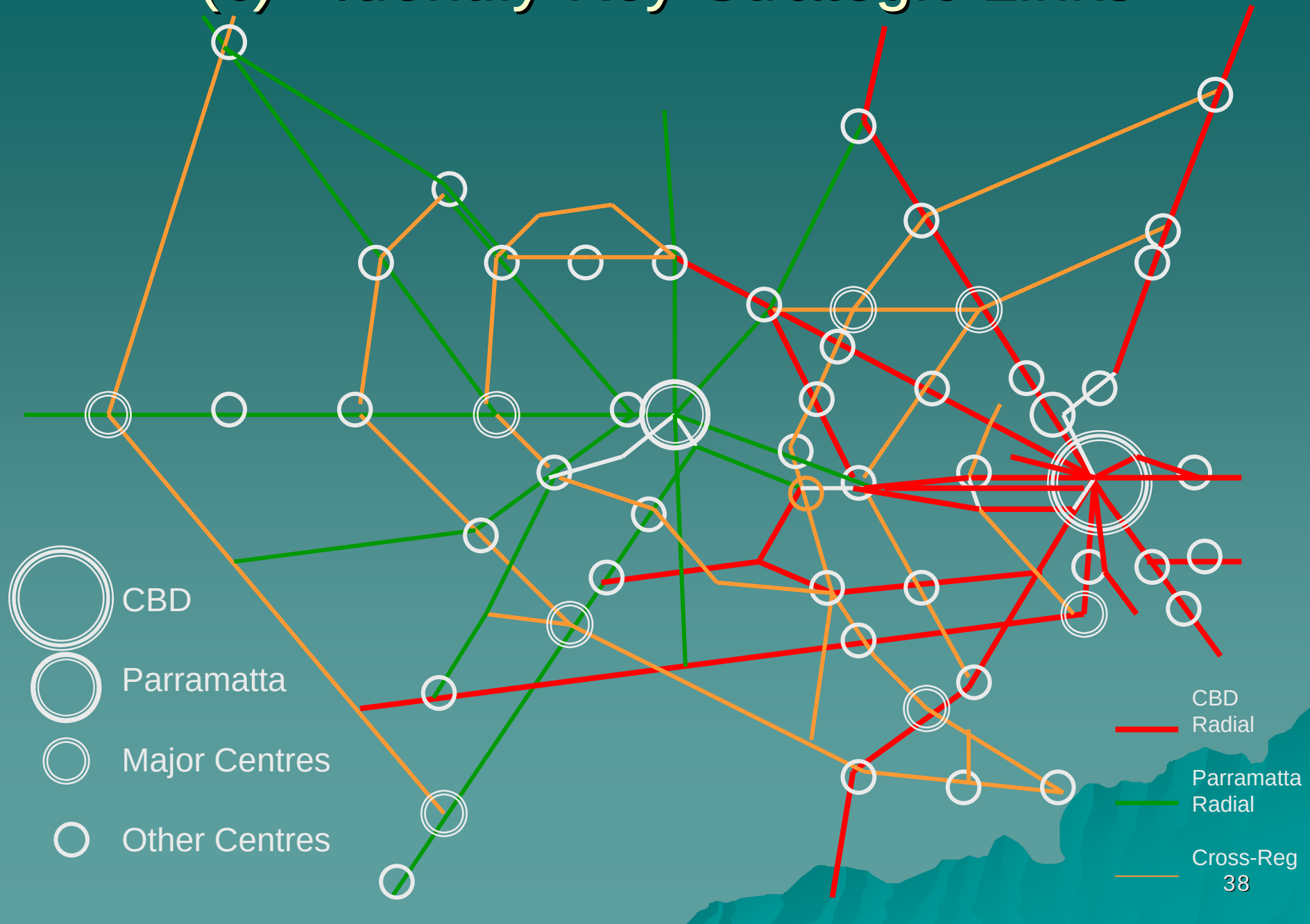


Sydney needs a Dual Cobweb Design

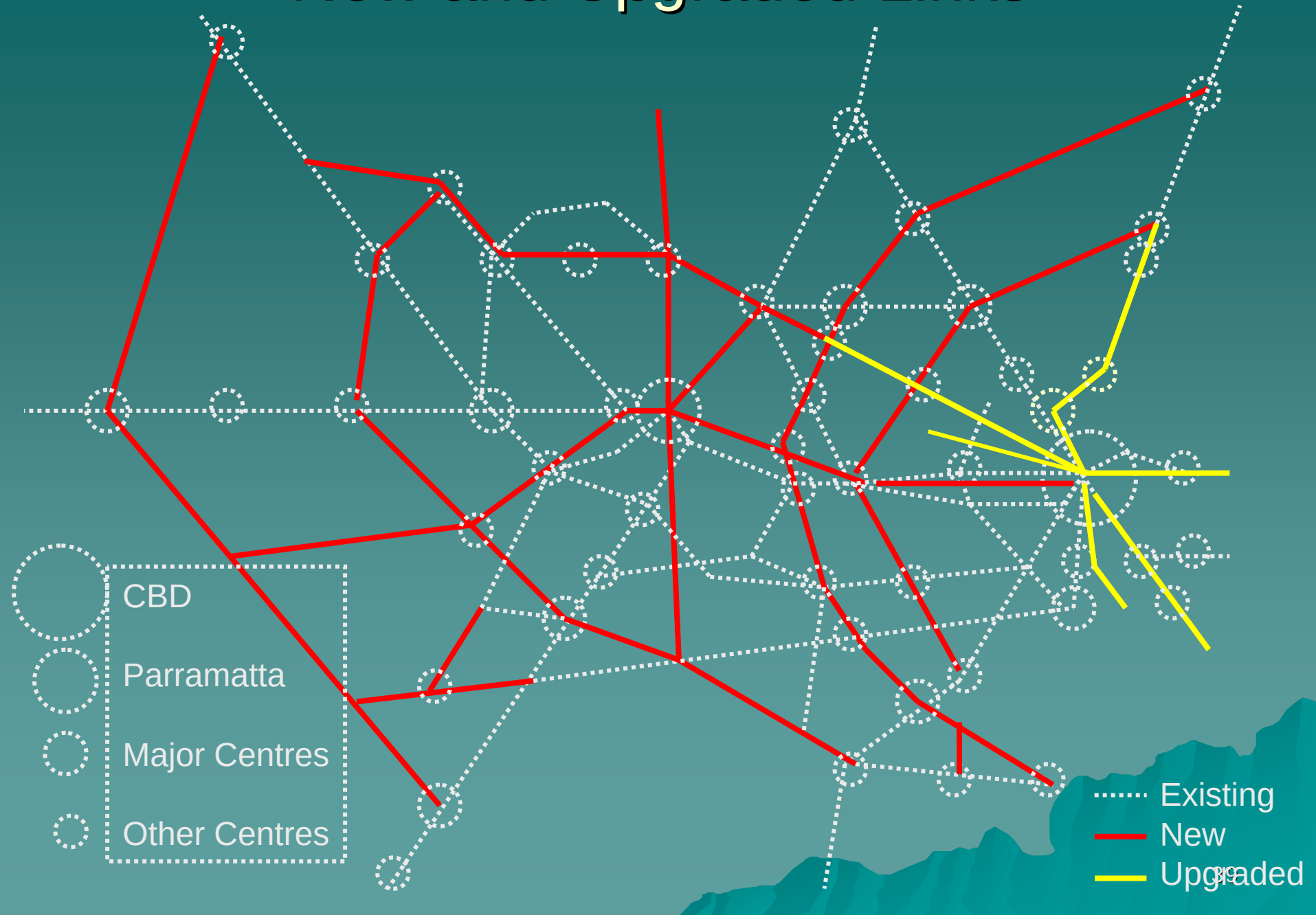


CBD is off-centre. Secondary network needed for Parramatta.
Road system and topography make grid system impractical

(c) Identify Key Strategic Links



New and Upgraded Links

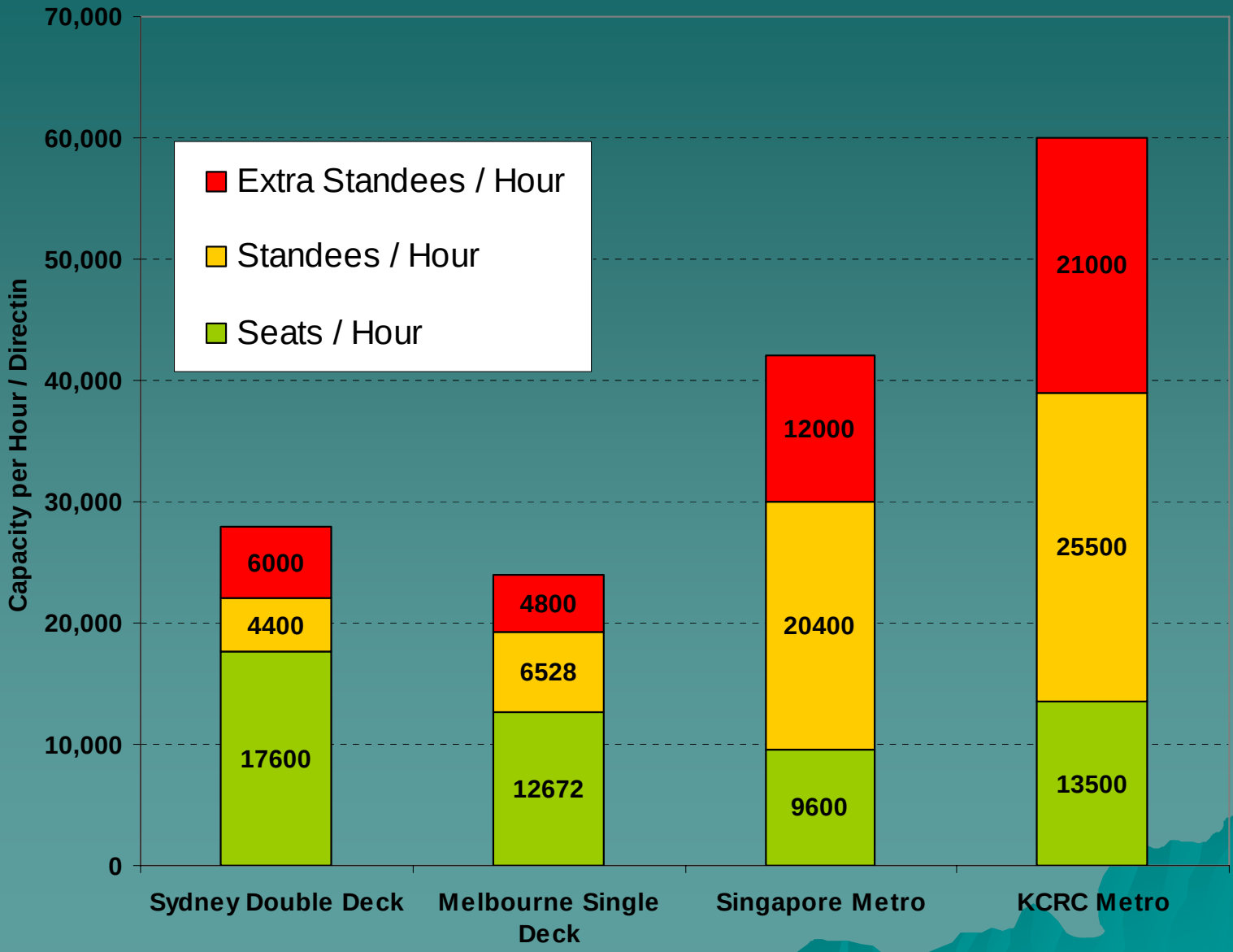


(d) Select Most Appropriate Modes

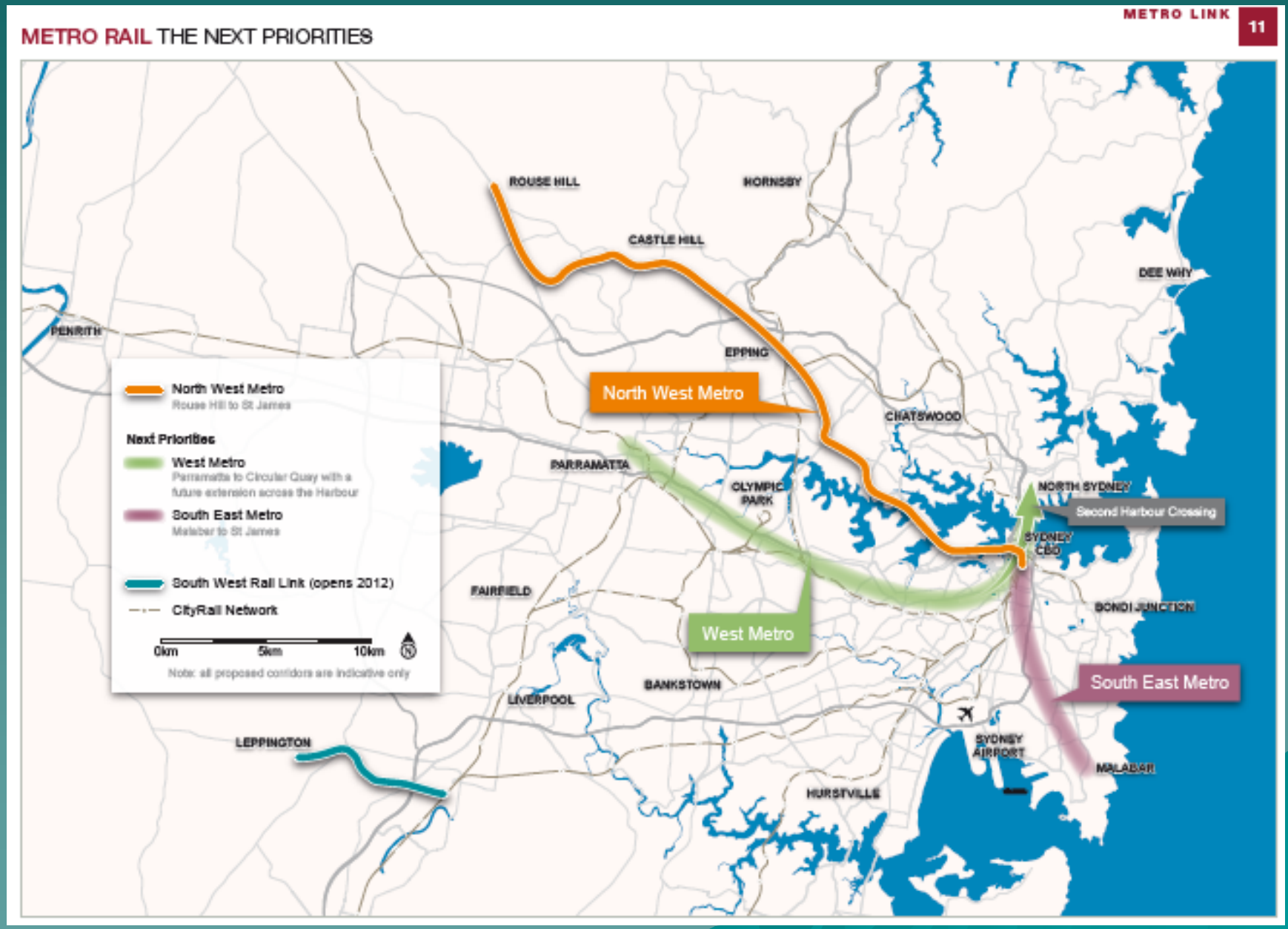
Mode	Capacity (pass/hr/direction)	Corridor Length	Serving CBD
Metro	High – Very High (20,000 / hr +)	Medium	Yes
Suburban Rail	High (10,000 / hr +)	Long	Yes
Light Rail	Med (2,000 – 10,000/hr	Short	Yes
Busway	Low- Med (500 – 10,000/hr	Medium	No

Selecting Modes: Heavy Rail vs Metro

Metros vs Heavy Rail



Government Metro Visions



Metros vs Current Cityrail Double Deck Trains

- Advantages of metros
  - More total capacity
  - Faster (short dwell times, fast acceleration)
  - Smaller tunnels
  - Automated operation
- Disadvantages of metros
  - Less seats
  - Potentially more expensive stations (Platform doors)

* Depends on number of trains required, cost of automated control systems etc.

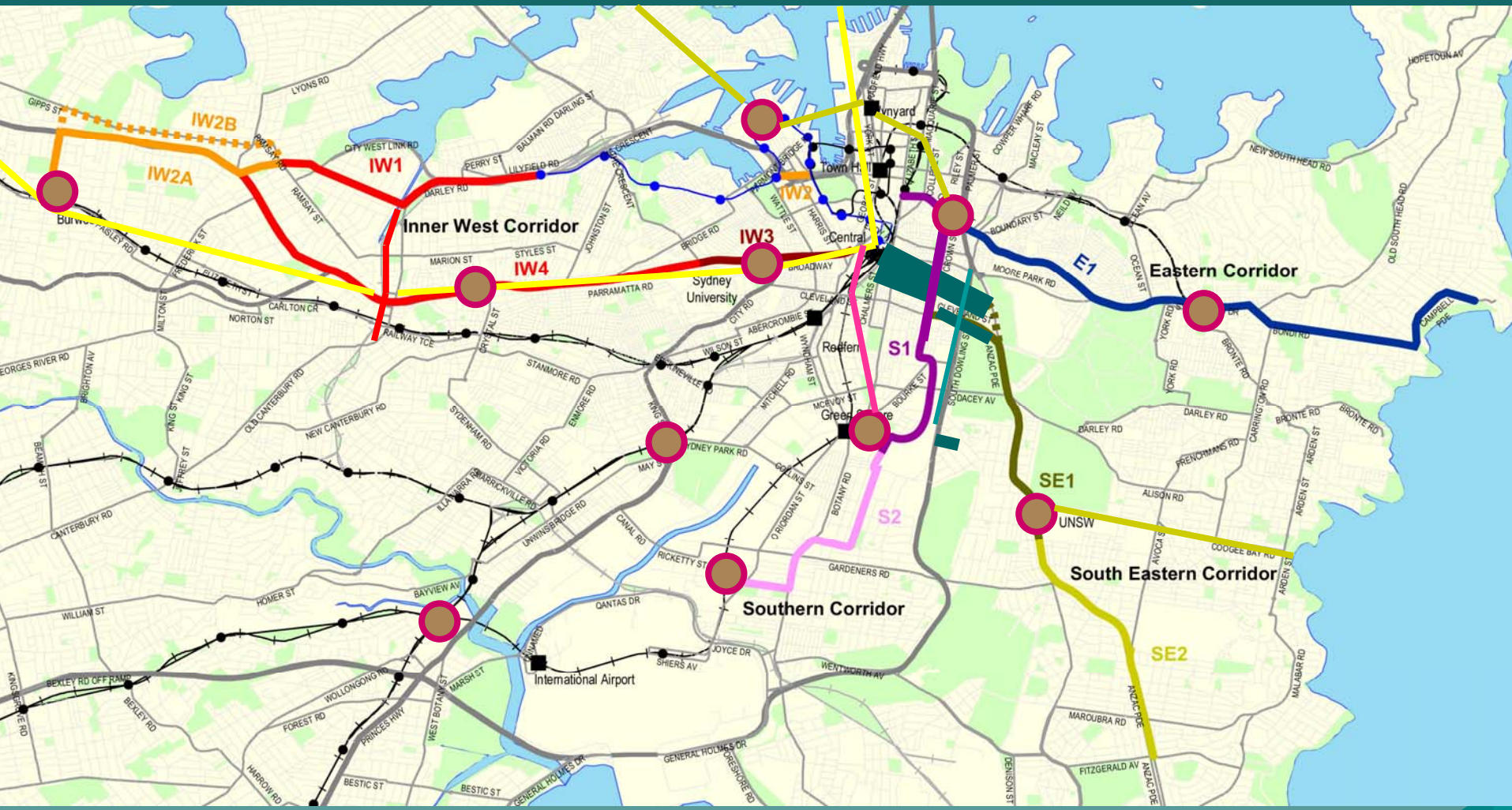
Other Issues – NW Metro cf MREP

- Engineering and cost uncertainties
  - Four river crossings vs one
  - Deep stations?
  - Interchanges at Epping and Wynyard
  - Route through the CBD
- Doesn't relieve T Hall and Wynyard
- Doesn't provide capacity for N Ryde
- Doesn't provide capacity for more trains from south of the harbour

Light Rail

- Low floor and semi low floor and articulated designs now standard
- Catenary – free operation possible where desirable (eg historic city centres). Capacity up to 12,000 pass / hour. Over 400 cities worldwide
- Ideal for serving city centres and inner suburbs, bus can be suitable for other applications

Light Rail - Inner Suburbs



Light Rail

Inner West

South

East

Metro Rail

Heavy Rail

Interchanges

Busways

Parramatta – Rouse Hill T-Way in Western Sydney

Brisbane's SE Busway

Adelaide O-Bahn

Busways – application to Sydney

- Best for the cross-regional routes
- Typically service patterns of at least
  - Express bus at least every 10 minutes in peaks
  - Plus local services from major centres
- Opens up many more network connectivity options. For example:

TOD and Park and Ride

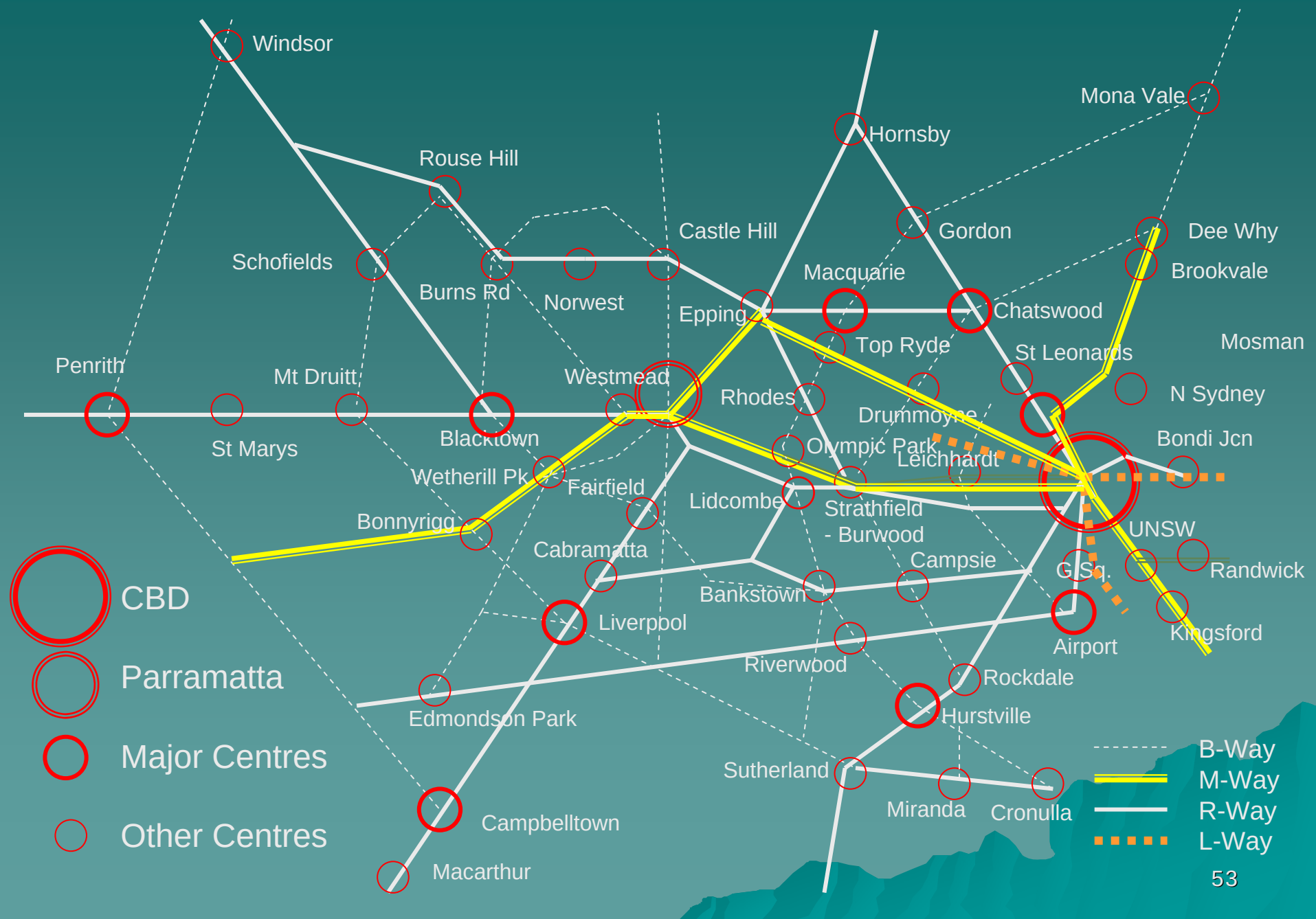
- Both the NW metro and the West Metro open up new areas to rail
- This can (and should) support some consolidation in those corridors
- But there is also scope to add park and ride at selected stations
- This can “soak off” traffic from the motorways and major arterials long before it gets near the CBD or inner suburbs, reducing or eliminating the need for major road projects like the M4 East
- **These road projects should be deferred until after the next major public transport projects are built**

Potential Long Term Network for Sydney

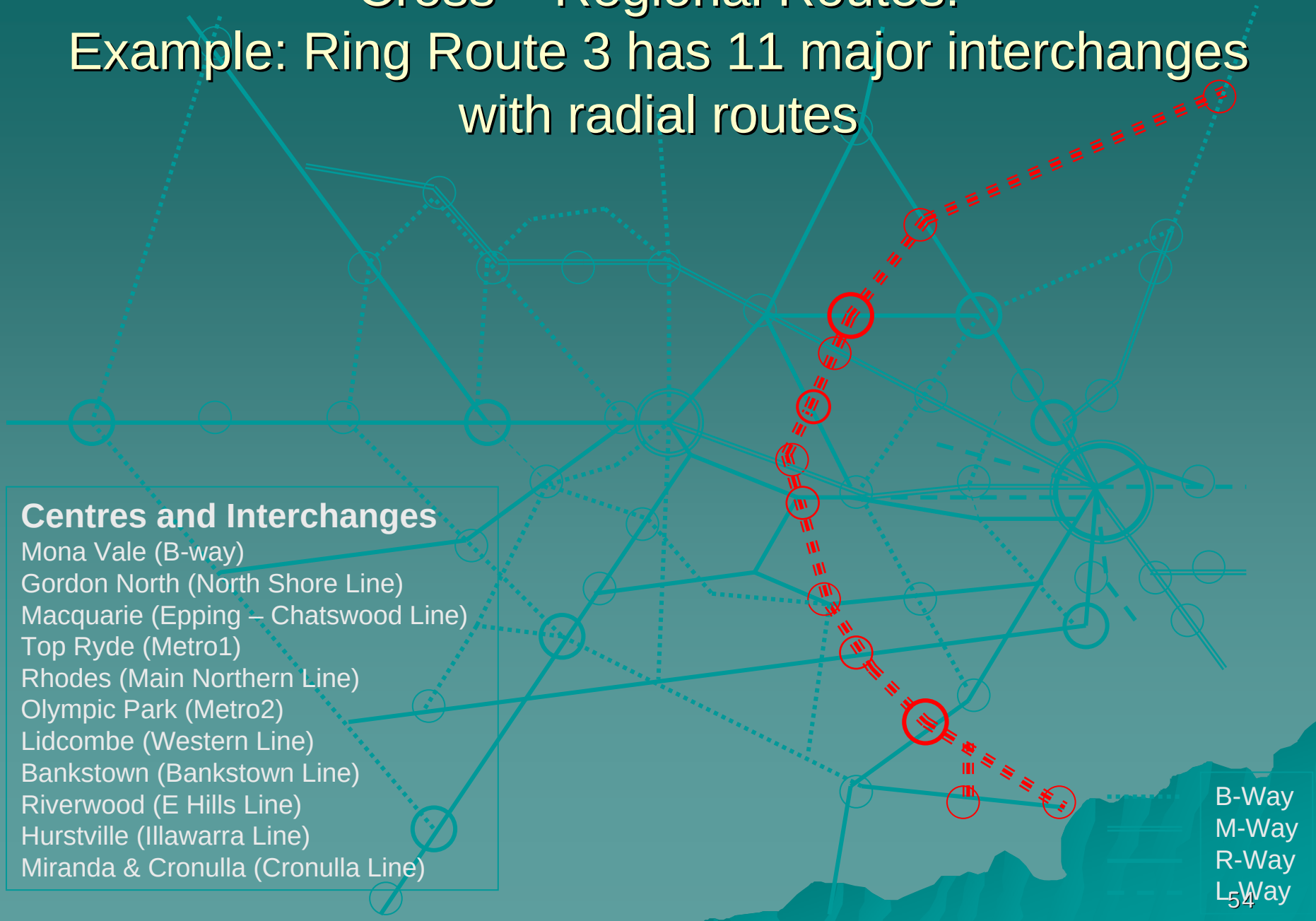
- Upgraded radial routes to CBD (bus to metro or light rail)
- New Cross Regional routes (mostly bus)
- Some new Heavy Rail routes
- Full Integration
- Includes revamped Parramatta – Epping route

Overall Strategic Public Transport Network – Option (1)

Overall Strategic Public Transport Network – Option (2)



Cross – Regional Routes:
Example: Ring Route 3 has 11 major interchanges with radial routes



Funding and Pricing

- **Proposed network would handle**
  - **30% of weekday passenger travel** in Sydney (cf 15% now)
  - **50% of peak period passenger travel** in Sydney (cf 30% now)
- Major reduction in oil use and greenhouse gases
- $1.0 b pa additional investment for next 25 years (cf $23b pa on cars and $3.5b pa on PT now)
- At least $10b in road expenditure savings
- **Supported by land use (TOD, Metro Plan), road congestion pricing (peak surcharges to current toll roads, and for CBD),**
- **Could be funded from part of carbon taxes on transport in Sydney (could generate $13b pa across Australia for energy and transport CO2)**

5 Conclusions

- Cities across the world are moving more towards sustainable access
- Designing a sustainable access system for Sydney is complex. No one solution fits all needs
- Funding is not extreme given current spending on cars, potential savings on roads and potential from carbon reduction scheme
- Requires political will and technical excellence
- Those cities which don’t achieve this will face a declining future.