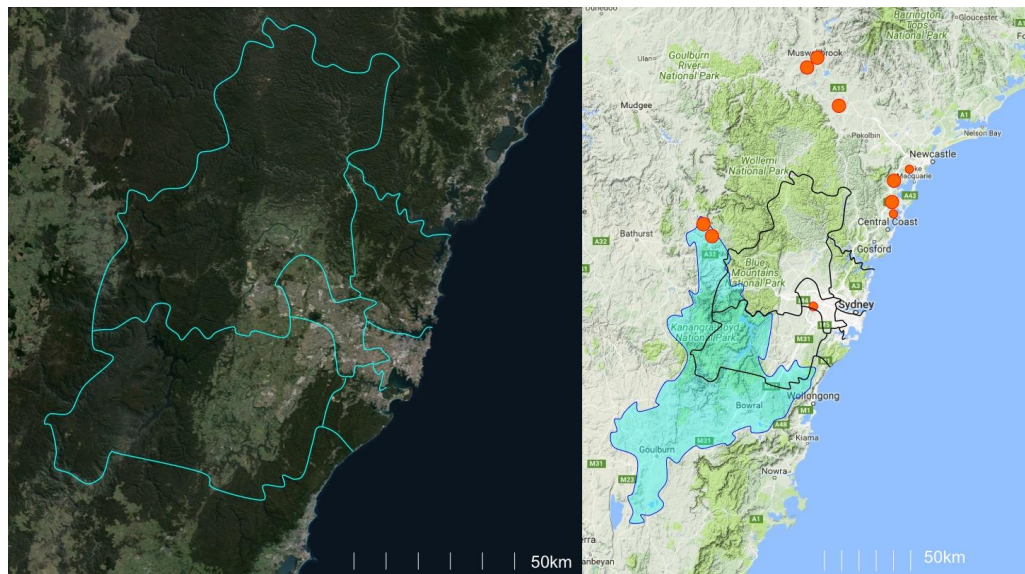




Clean Air Summit

Roderick Simpson

Environment Commissioner
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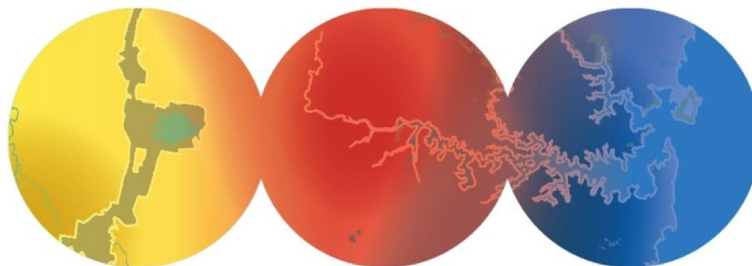


The Greater Sydney Commission is responsible for leading the planning for the Greater Sydney region that extends from almost Cessnock in the north to Picton in Wollondilly in the south and the Blue Mountains almost to Lithgow.

The city's supply chains extend across the globe, and closer, the water catchments supplying Greater Sydney extend almost to Canberra and power stations in the Hunter provide a significant proportion of the city's electricity. The city has global, regional and local impacts.

Slide 3

Three cities to rebalance the geography of the metropolitan area



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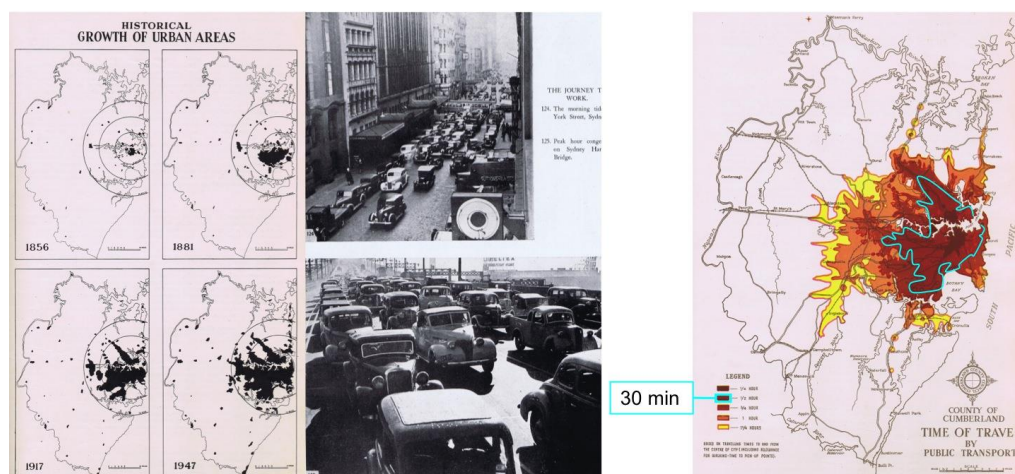
The Commission's Towards Our Sydney 2056 document that was produced to accompany the Draft District Plans put forward the idea of 3 cities.

The idea and desirability of polycentricism is not new.

Slide 4

1948 County of Cumberland Plan

Dominance of the central city...congestion



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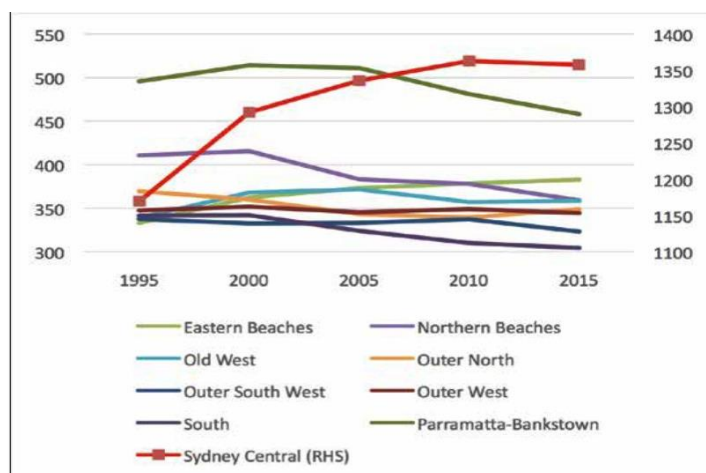
From the time of the County of Cumberland Plan the idea of developing new centres to relieve congestion in the city (yes, congestion was a concern in 1948), developing other centres to provide more localised services, and jobs closer to home has been an enduring objective but one that is at odds with the basis for investment. Businesses tend to want to locate where there is already ample infrastructure, accessibility and access to labour markets.

Simply, people and businesses want to invest in the city centre, but while this might be seen to be attractive: building on strengths, it also risks exacerbating weaknesses, in the case of Sydney, increasing inequality and lower productivity that comes from sprawl and increased travel time.

Although overall productivity increases with city size, it is not evenly distributed and the larger the city becomes, the larger the disparity, and the attraction to the city centre may be accompanied by a relative 'hollowing out' or imbalance of housing and employment in outer areas.

Slide 5

Historic employment trends



Source: NIEIR data bank

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LHScale jobs/1000 all areas other than Sydney Central, (RHScale)

This 2015 analysis shows the difficulty in balancing jobs and dwelling growth in different areas. It is hoped that idea of the third city; the 'Western Parkland City' built stimulated by the commitment to Western Sydney Airport has the potential to counter this trend. Many people quite rightly question whether the airport alone will be sufficient to achieve a re-balancing of the city. And they are right, but that is not what is proposed. Our objective is to use the airport as a catalyst for a wide range of investments in education, health and transport.

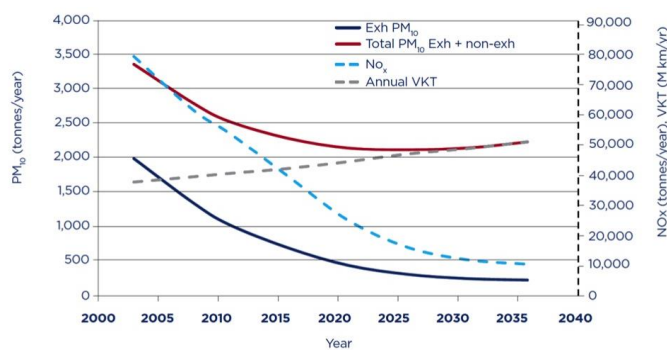
If we accept that larger cities are more productive, but less so if they spread too far without developing polycentricity; that we do want to be more productive and harness that growth and develop a more equitable distribution of opportunity in the city, then we really do have to leverage the commitment to the Western Sydney Airport.

What has all this to do with air quality?

Air quality particularly in the South West has been a concern for many years. Concerns have increased with the proposal to locate the Western Sydney Airport where there could be another three quarters of a million people living and, for many, working in the area. At the same time, we know air quality has been improving, due to higher standards, particularly for heavy diesel vehicles. As the vehicle fleet is renewed and standards are tightened more, air quality can be expected to improve further. The following graphs show estimated reductions in emissions without taking the potential of further significant reductions due to electrification and possible absolute reductions in Vehicle Kilometres Travelled (VKT) that might come from Mobility as a Service (MaaS).

Slide 6

Projected decline in GMR vehicle emissions



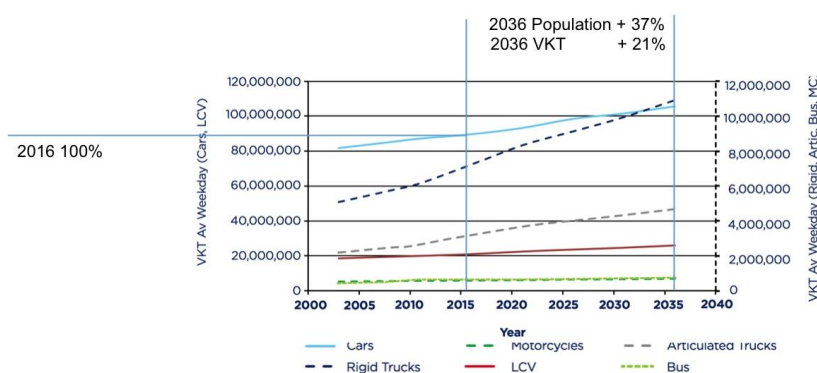
The NO_x and VKT data represented by the dashed lines are plotted against the right hand axis (note VKT is in millions of kilometres per year (M km/yr) ie. 2008 VKT is 38,800 million km per year)

Source: TP01: Trends in Motor Vehicles and their Emissions, Environment Protection Authority 2014
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Slide 7

Growth: population vs passenger and freight VKT



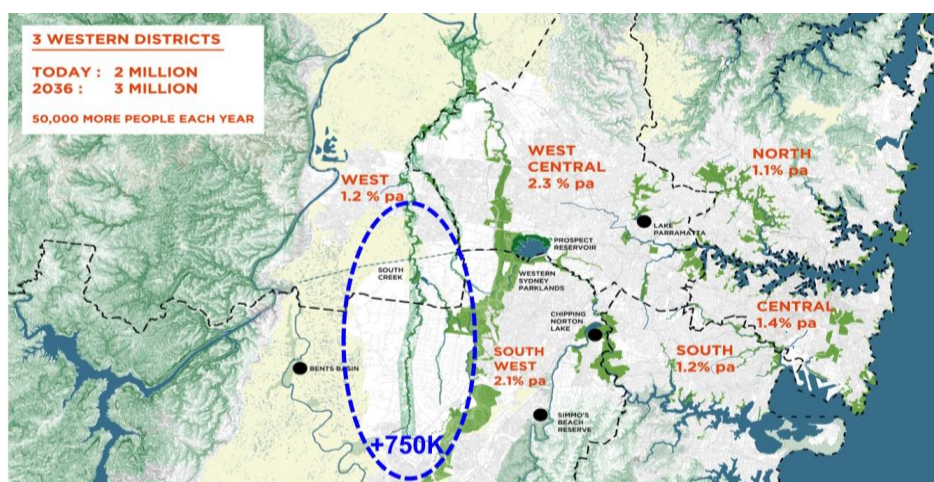
http://www.chiefscientist.nsw.gov.au/_data/assets/pdf_file/0007/54790/Road-Tunnels_TP01_Trends_inMotor_Vehicles_and_Their_Emissions.pdf
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These improvements are despite a growth in population that will outstrip the growth in VKT for cars. Note the increase in rigid truck VKT that is outstripping population growth. This would need to be offset by improvements elsewhere. At the same time, we need to be aware of the increased population that is planned for the South West. So, a critical question is how could we do more, faster to ensure improved air quality in the South West, given the airport and projected increase in freight?

Slide 8

Projected growth of approximately 750,000 people in the south west and west



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We know the single greatest improvement to air quality would come from reducing wood smoke. I don't want to go into the detail of air quality. All of these projections are based on assumptions about where and how people will live, and this is where there is a cross-over between what the Commission is doing and thinking and air quality. Understanding the city as a system of systems and how and where to act is key to planning for reduced emissions. In the past, we have tended to think and operate in silos. To illustrate a different approach, I would like to share with you some of our current thinking and some 'proof of concept' modeling that may provide a basis for integrated planning for different places and for planning for improving air quality as well.

There are four aspects to our approach to understanding the city in relation to emissions.

Slide 9

Four aspects

1. Seeing every component as a part of a system
2. Seeing the city as a 'mosaic' of different living patterns that exist and may be possible
3. Complete scenarios and trajectories.
4. Where to act; monitoring

1

Seeing every component as a part of a system

The Clean Air for NSW paper includes a range of actions. Those that are most related to spatial planning are 'examine policies and incentive to increase uptake of electric vehicles' and 'reduce toxic emissions from service stations in urban areas' and 'achieve air quality co-benefits by implementing energy efficiency, advanced energy and climate adaption actions'. The first two are directly related to electrification of the vehicle fleet, while co-benefits, by definition, need to be understood and realised through seeing the city as a system of systems. Although individual initiatives may be effective, the potential of transformational change, where the entire system is fundamentally different and more efficient with lower environmental impact, is likely to come from the interaction and mutual reinforcement between the initiatives.



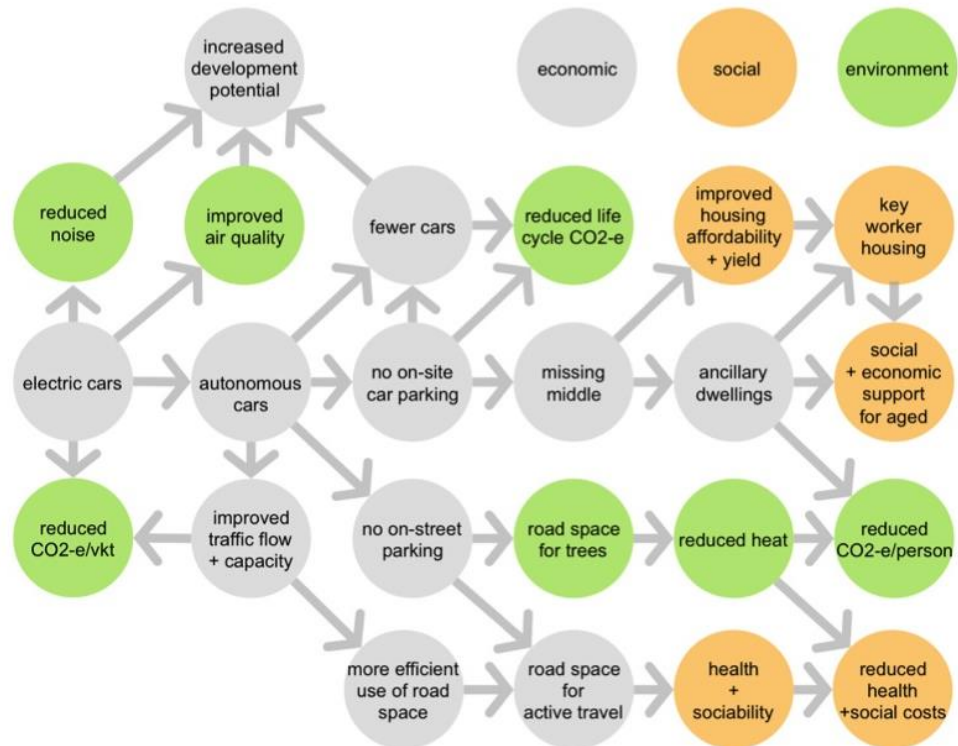
The diagram below illustrates the possible interactions between a range of initiatives that, in combination and through the way they interact and reinforce on another, could enable very different patterns of living and behavior in various parts of the city.

Without ‘tracing’ through the interactions in this way the potential impact of autonomous vehicles on the potential for ageing-in-place would not be obvious or even recognised; the connection is not obvious. It is just one example; there are many potential benefits that could be encouraged, incentivised and realised in the diagram below- and this is just one ‘mapping’ of one sub-system in the city.

Working backwards, the ‘logic’ is as follows: the greatest impediment to achieving the ‘missing middle’ both in terms of local community acceptance, physically on site and in terms of the financial feasibility, is accommodating a car. Allowing the construction of a secondary dwelling for the owner or for rental, would provide income and reduce the area to be maintained (either “downsizing” or providing income for maintenance.) This relies on reduced car ownership for the existing owner or the new resident. This would be possible in many parts of the city.

This is not hypothetical. There has been a dramatic take-up of car share in the central city, and a significant drop in car ownership where there is good walkability and alternative modes of transport available. Combined with the disincentive of congestion, these alternative arrangements, this different system, these different ways of operating in the city, are likely to become more widespread.

Urban Proposition



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We can expect a significant take-up of autonomous or driverless vehicles, electrification of the fleet powered by renewables, and the emergence of 'Mobility as a Service' (MaaS) well within our planning horizon of 20 years and certainly within 40. The driver of this change will be lower costs, but if the significant benefits can be modeled and understood, why would we not be thinking about how to speed up the transition while making sure that we do not overinvest in infrastructure, both public and private, that may not only be redundant, but may act as an impediment to the transition. Investing in car-parking would be an impediment because like any investment it would be expected to yield a 'return' in income so there would be a vested interest in maintaining the status quo.

The amount of money is not insignificant. If we continue build car parking the way we are at the moment, that is about 3 spaces for every car, including on street, we will spend about \$140 billion over the next 20 years, and at least another \$50 billion on cars to use the roads. MaaS, combined with Autonomous Vehicle technology, might ultimately reduce the need for parking by 95 percent and the number of cars by 80 percent by 2036. It would make sense to design and build car parking with this transition in mind, and to accelerate the transition.

If we add to that the possibility of 'clawing back' 80 percent of existing car parking for other uses; converting double garages to granny flats, underground parking to storage and above ground to other uses this would represent an additional conservative \$200 billion in land or building value.

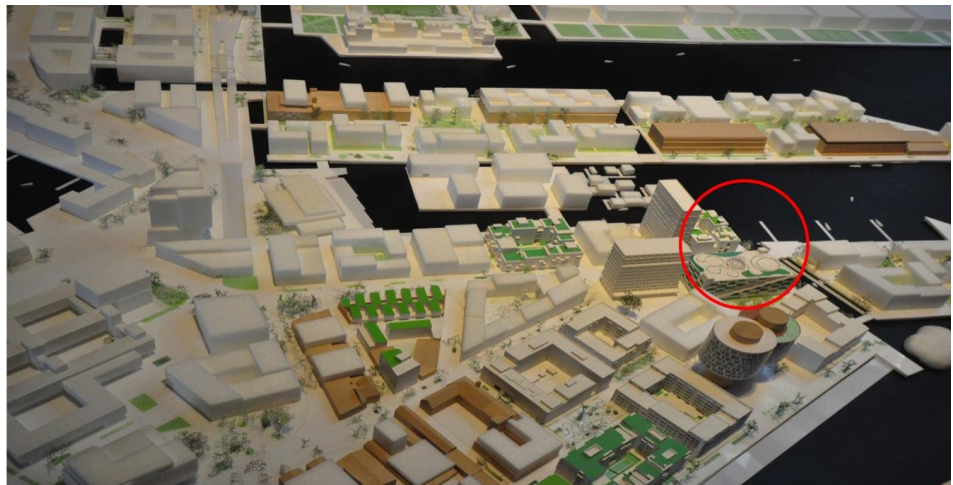
The link to air quality is that such a dramatic shift would significantly improve the urban environment for noise, congestion and liveability overall. But, it is most convincing when seen as a total package or 'urban proposition'. Just as there is little doubt that the transition will occur in major cities first, so it is likely that the transition will occur in different parts of the city where there are conducive conditions. Understanding where the 'early adopters' live and how we plan for the transition and how fast is crucial.

Seeing the potential precincts as a whole opens up new ways of planning and designing for each of the 'components' and again, car parking provides a good example.

Precinct based car parking has been used in Scandinavia in both low and medium and density development for decades. A more recent example is the dedicated car parking structure in Nordhavnen in Copenhagen.

Slide 11

Nordhavnen



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An example of precinct based approaches to car parking

Slide 12

Nordhavnen



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Slide 13

Nordhavn



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2

Seeing the city as a 'mosaic' of different living patterns that exist and are possible

While the focus of the summit might be on air quality, the foregoing discussion shows the importance and potential of integrated urban design thinking and leads to the second component of the approach; 'the urban mosaic'. It is at the precinct scale that these complex interactions can be understood, managed, designed and exploited to achieve environmental and social ends.

The following illustrations show how the city can be understood in terms of current patterns of living and where the greatest improvements in environmental performance might be achieved.

It should be noted that these illustrations are solely 'proof of concept' and do not reflect or illustrate the final content of the District plans nor the Greater Sydney Regional Plan.

Slide 14

Explanation of the mosaic- mapping of transport and stationary energy

Defining the Mosaic

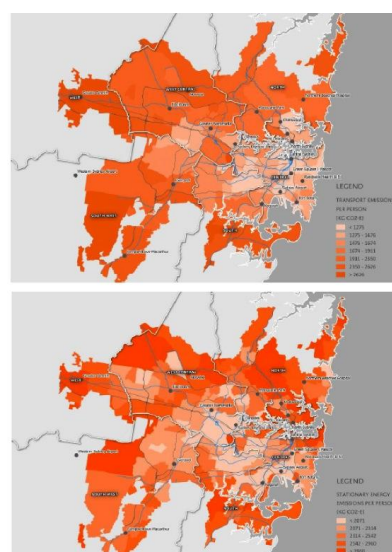
Variation in emissions

Transport Emissions per person (kg Co2-e/year)

Highlighting higher per person emissions in areas with higher car use and ownership

Stationary Emissions per person (kg Co2-e/year)

Highlighting higher per person emissions in areas with both larger dwellings, households and income



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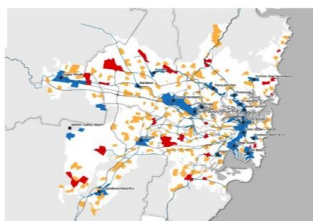
We know there are wide variations in behaviour across the city. Different places permit or facilitate different patterns of living.

Slide 15 different geographies- centres renewal areas

Defining the Mosaic

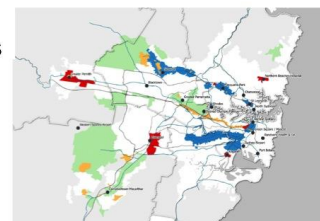
Centre type

- Strategic
- District
- Large Local



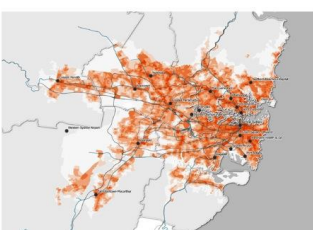
Renewal + Priority areas

- Priority Precincts (urban renewal)
- Priority Precincts (urban release)
- UrbanGrowth NSW Projects
- Collaboration Areas



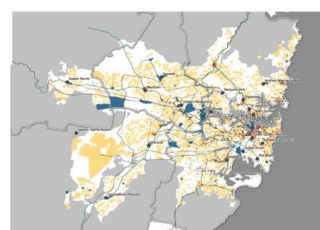
Accessibility

- (walk and wait time to public transport)
- 0-15 mins
 - 15-20 mins
 - 20-25 mins
 - 25+ mins



Zoning + density

- Commercial
- Low Density
- Medium Density
- High Density
- Super High Density



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Slide 16

final mosaic

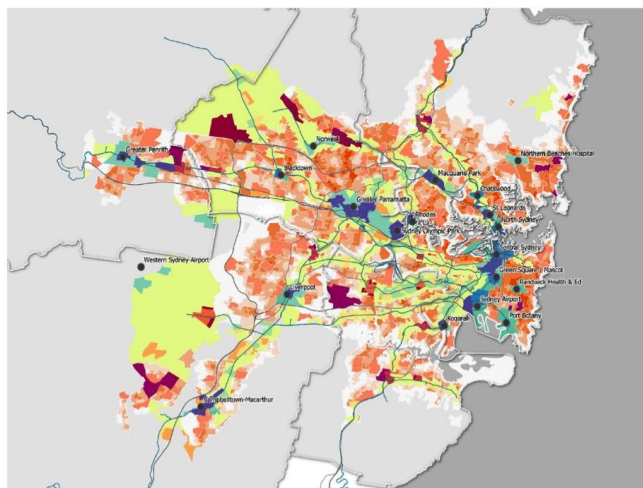
Defining the Mosaic

Combined Urban Mosaic

Urban typology attributes explored

- Centre Type
 - Strategic
 - District
 - Large Local
 - Outside a Centre
- Train Station Accessibility
 - Within 800m of a station
 - Further than 800m from a station
- Public Transport Accessibility
 - Within 800m of a high frequency stop (service min. every 15 mins in AM peak)
 - Further than 800m a high frequency stop
- New Public Transport Corridors
- Residential Density (residential lot area)
 - Low (less than 40 dwellings / ha)
 - Medium (40 to 80 dwellings / ha)
 - High (80 to 120 dwellings / ha)
 - Super High (>120 dwellings / ha)
- Zoning (more than 50% of SA1/TZ zoning):
 - Residential
 - Commercial
 - Other
- Collaboration Areas
- Priority Precincts Urban Renewal
- Priority Precincts Land Release
- Urban Growth Projects
- Age of Development
 - 1981, 1948, 1968, 1988, 2005
 - After 2005 or not currently urban

Other geographies:
LGA (2011 & 2016)
Postcode and Suburb



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3

Complete scenarios.

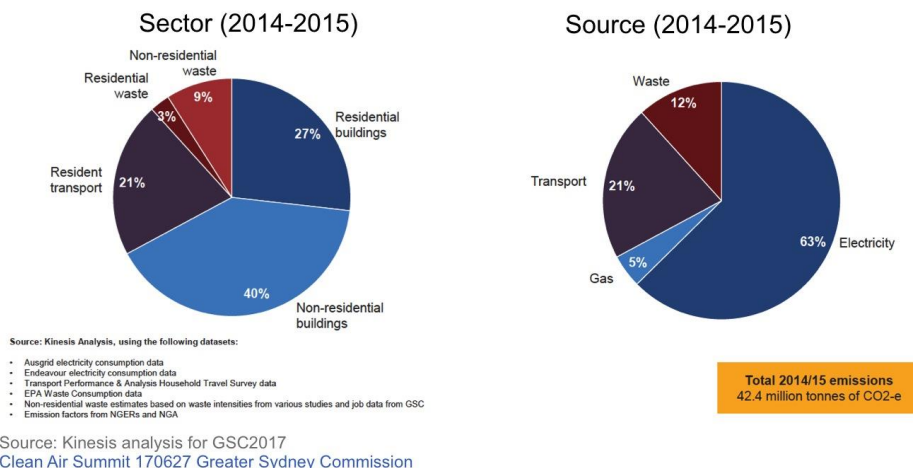
Seeing the city as a mosaic is important because averages don't really help us think about where to act most effectively.

Averages are shown in preliminary analyses of carbon emissions for the Greater Sydney Region by source and sector in the graphs below.

Slide 17

Current emissions profile for Greater Sydney (excluding freight, agriculture and consumption)

Current Emissions profile for Greater Sydney

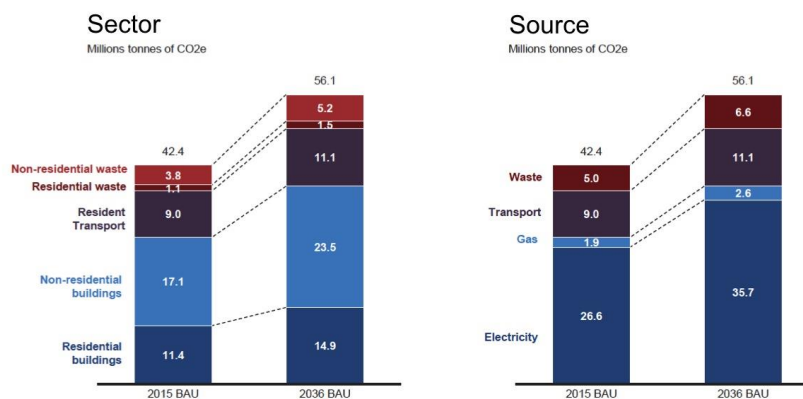


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Slide 18

Projected growth in CO₂-e for the selected sources and sectors

Business as usual (BAU) growth in carbon emissions



Source: Kinesis analysis for GSC2017
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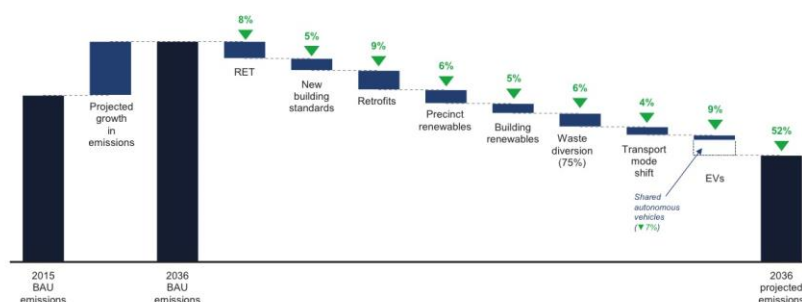
The following graph show the reduction in emissions that might result from the application of a range of measures. Characterisation of the city as a mosaic as previously described, by the geography, built form, transport availability and access to services, education and local employment, allows the combined effects to be estimated. Again, the limitation is that this is an average.

Slide 19

projections of carbon- average

Greater Sydney Emission Reduction Potential

Estimated carbon reduction potential by policy



Source: Kinesis analysis for GSC2017
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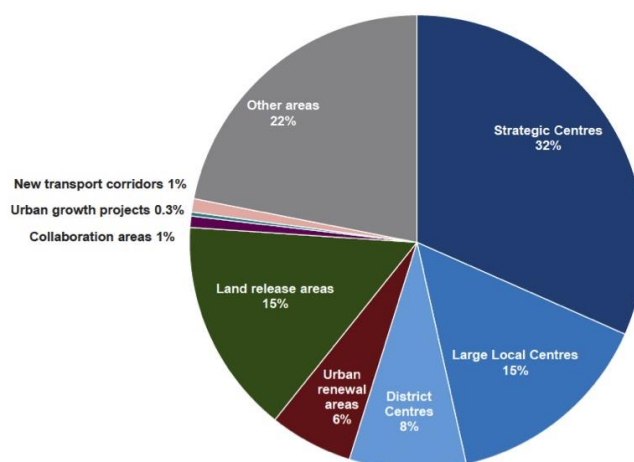
19

The graphing does not show where these initiatives are located or how strategies for lower emissions may be linked to housing affordability, liveability and the ability to live in certain areas without a car.

The following graph shows where the growth in emissions are concentrated. In the 'proof of concept' distribution, 32% of the emissions are concentrated in strategic centres and 15% in both land release areas and large local centres.

Slide 20

Growth in emissions by geography

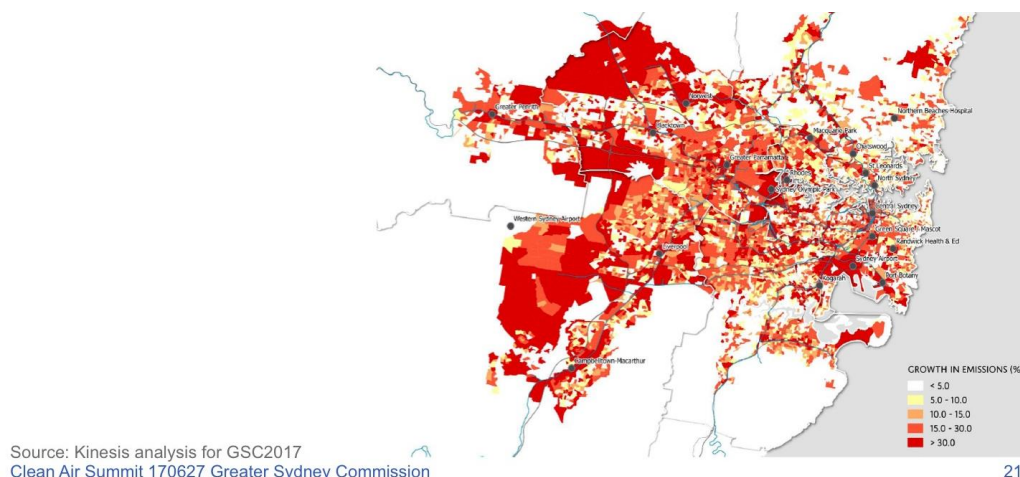


Source: Kinesis analysis for GSC2017
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This starts to suggest where it might be possible to intervene or focus our attention.

Slide 21

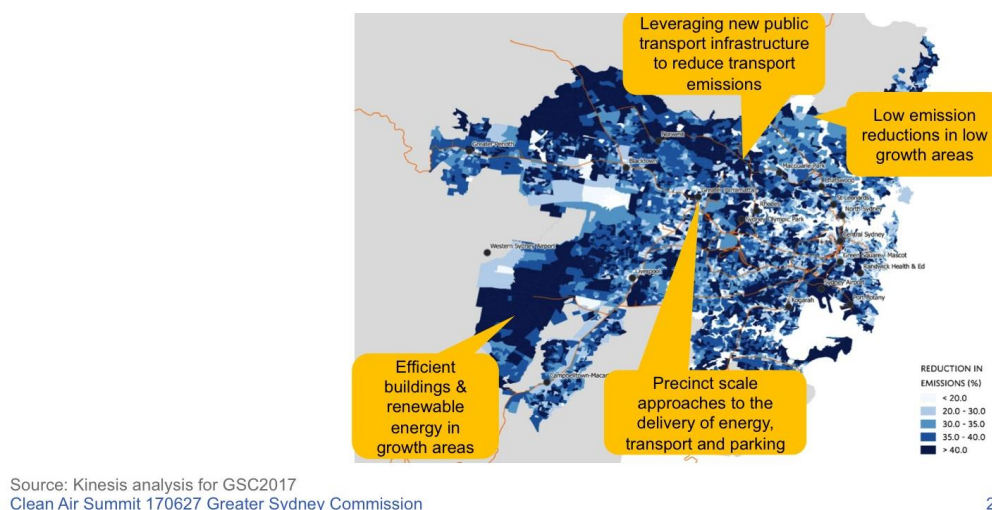
Estimated % growth in carbon emissions BAU scenario



This mapping shows where it might be most effective to develop specific strategies that are appropriate for place, and for the particular submarkets and expectations of the population.

Slide 22

Greenhouse Gas Emissions % growth BAU proof of concept scenario



This is proof of concept but I think you can see how this can close the loop between policy, planning, implementation, monitoring and check whether we are on track.

4

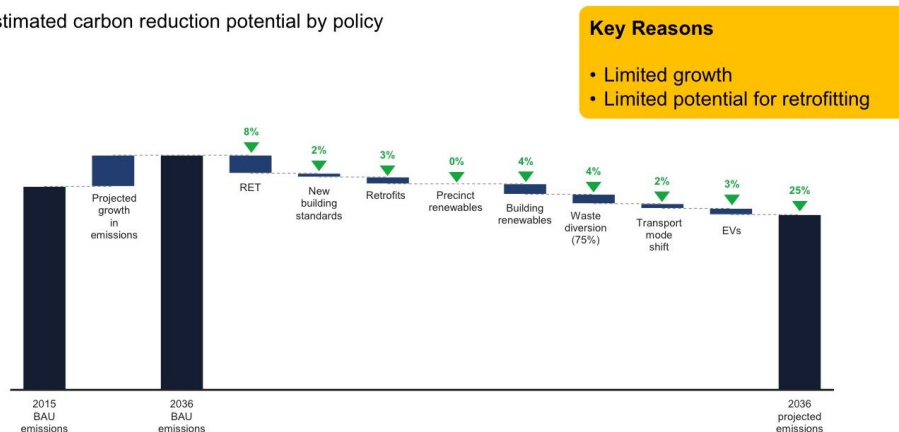
Where to act and monitoring

Although this is 'proof of concept' only, it shows where efforts could be focused and closes the loop between policy, planning, implementation, monitoring and check whether we are on track.

Slide 23

Less potential for reductions in areas not undergoing change

Estimated carbon reduction potential by policy



Source: Kinesis analysis for GSC2017
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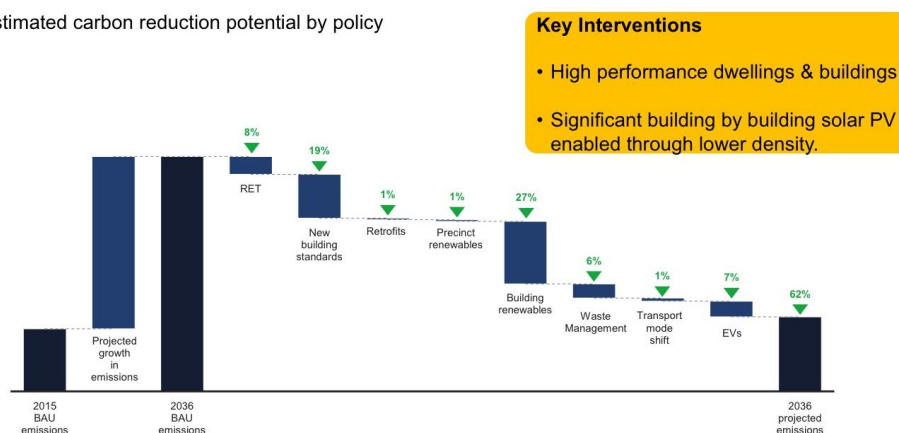
The graph above shows the relatively small impact retrofitting has in an area not undergoing change.

'Growth areas' offer the possibility of planning from scratch. Although there are great benefits in urban consolidation, through the application of higher building standards, distributed renewables and the longer-term potential to convert to electric vehicles means that we can expect new urban areas to have significantly improved performance compared to existing suburbs.

Slide 24

High performance 'growth area'

Estimated carbon reduction potential by policy



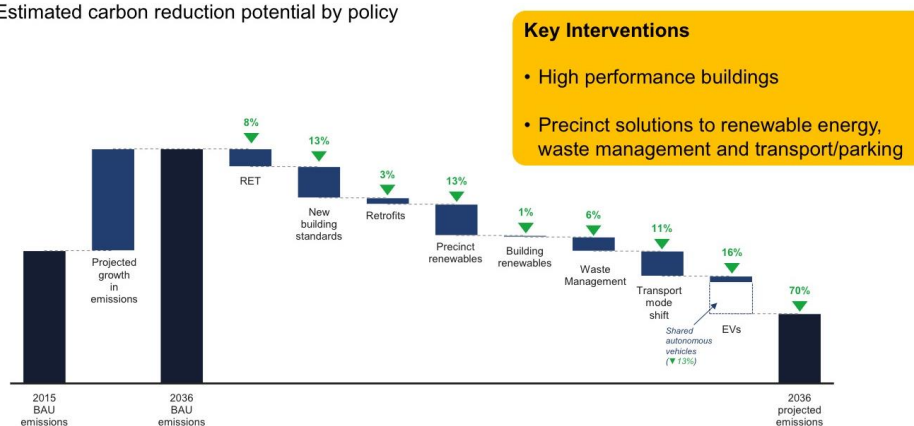
Source: Kinesis analysis for GSC2017
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Slide 25

High performance renewal area

Estimated carbon reduction potential by policy



Source: Kinesis analysis for GSC2017
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High density renewal areas have a great potential for reduced car ownership and usage.

Conclusion

I have aimed to show that it is both possible and effective to consider the city as system of systems and as a mosaic of different places that have particular opportunities to offer different patterns of living, with significantly reduced environmental impact including air quality improvements.

By developing complete urban propositions for different parts of the city, it is possible to identify and exploit synergies between policies to improve the quality of life at the same time as reducing environmental impact.

This also gives an overview of where the Commission is up to in relation to planning for reduced emissions, and our approach to developing a comprehensive understanding while allowing for contextual responses, and understanding whether we are on track overall.

It also shows why we have put so much emphasis on place based, design led planning and the identification of high performance, low carbon zones and collaboration areas in the Draft District Plans; it is because we can deal with the complexity and interdependencies more effectively by looking at the outcomes we want in particular places and then like a mosaic- building the complete picture, or dare I say vision for the city.