

Western Australia's Energy Future

2030 and 2050

Team Members:

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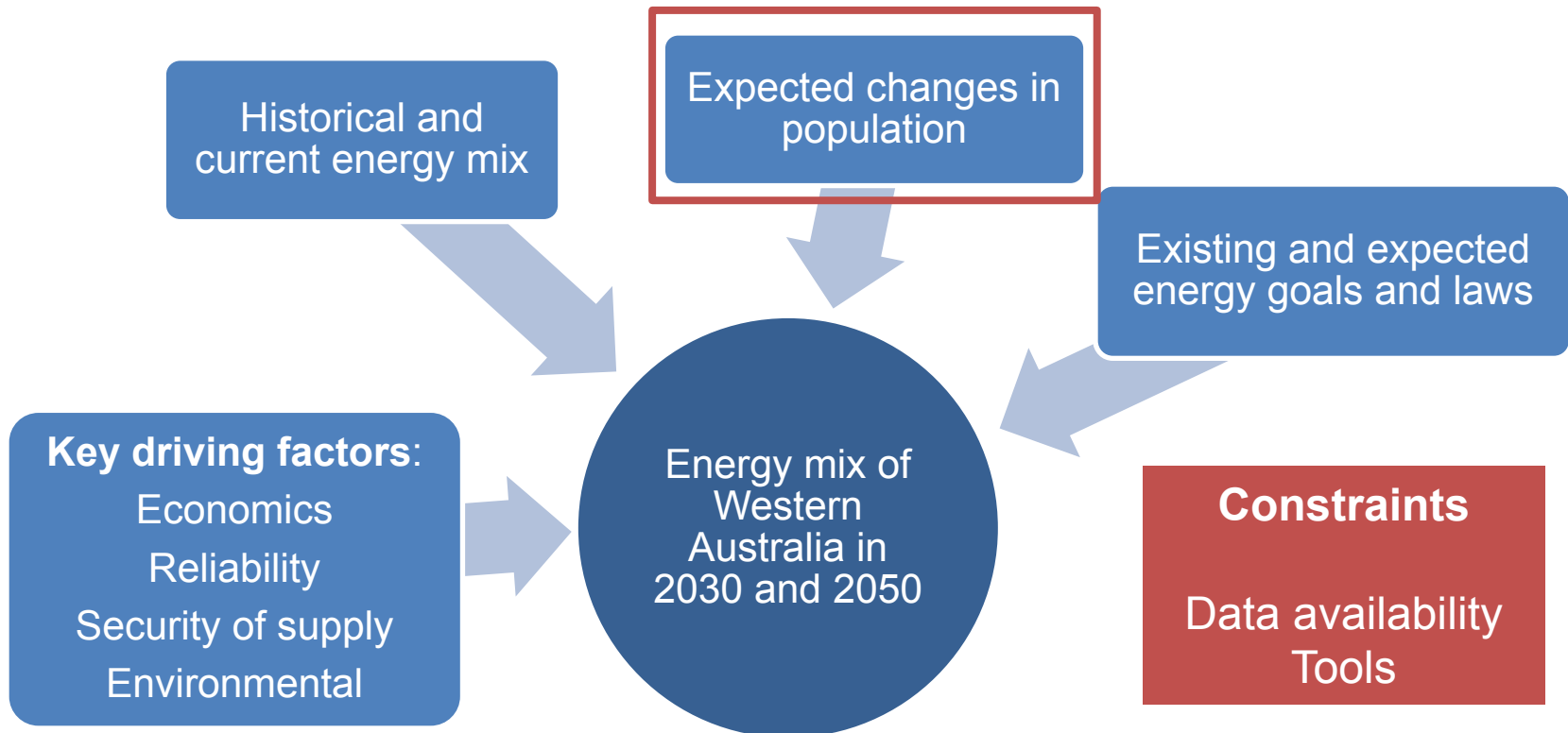
NREL ESI 101 Course

21-25 July 2014



Population: 2.6 million (Sept 2013)
Area: 2.5 million square km (~4 times the size of Texas)

Approach and Problem Structure



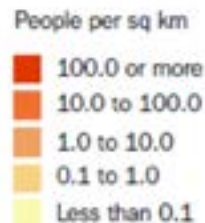
Data was easily available for 90% of the Australian power market



Population increase in the last 7 years was seen to be concentrated around Perth.

Assumption: By 2030 and 2050, the population hotspots will not change.

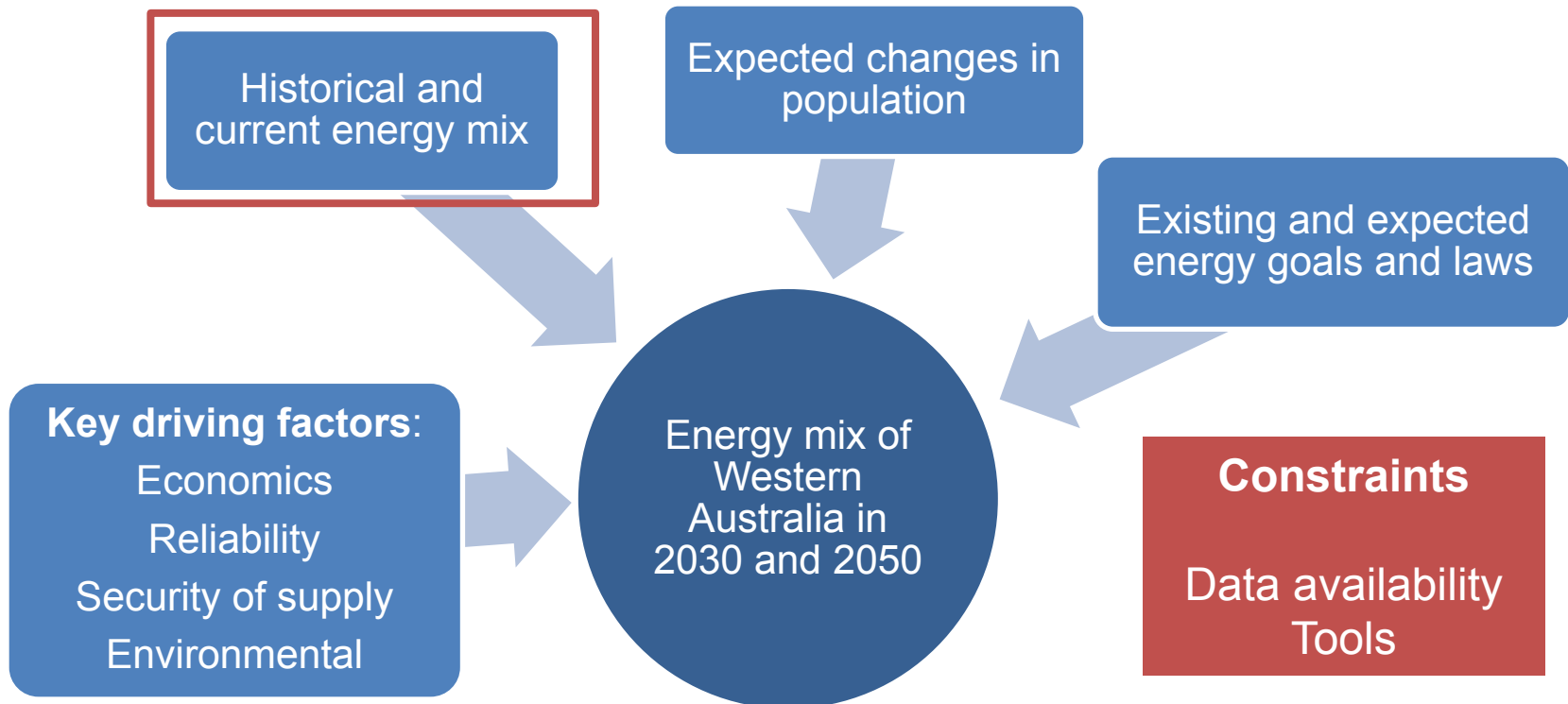
Southwest Interconnected System (SWIS): 90% of Western Australian power market



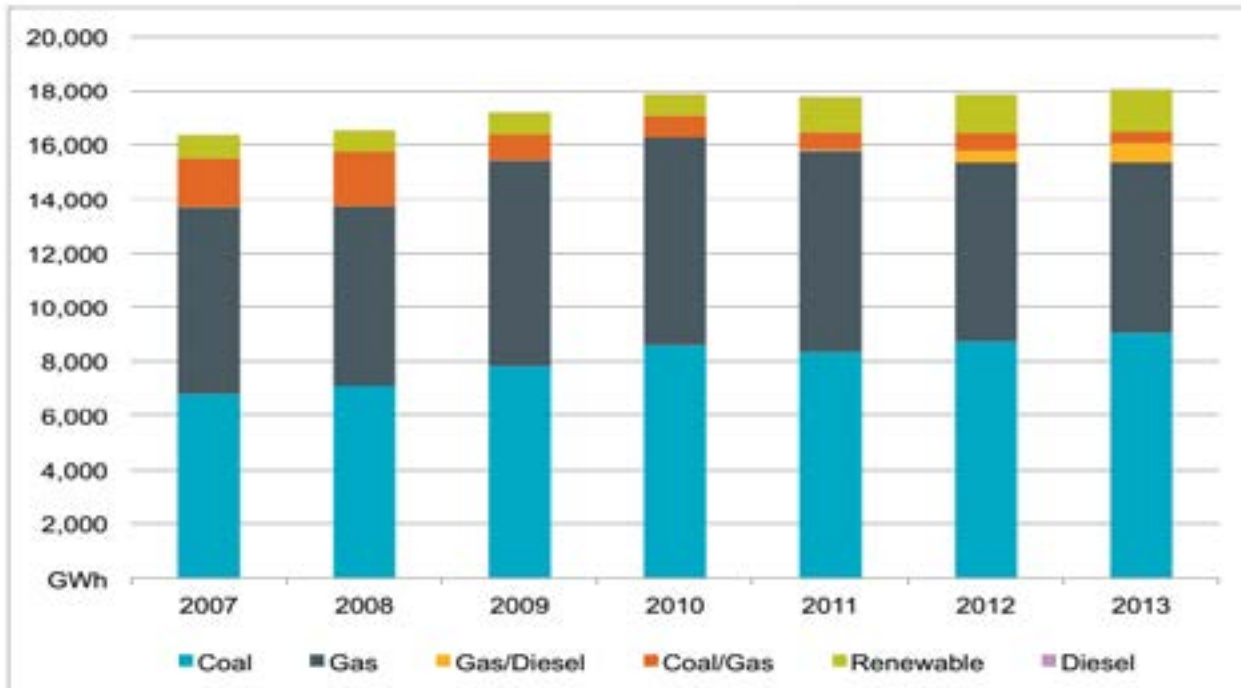
<http://www.energyaction.com.au/wa-electricity.html> last accessed 24 July 2014

<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Geographic%20Distribution%20of%20the%20population~49> last accessed 24 July 2014

Approach and Problem Structure

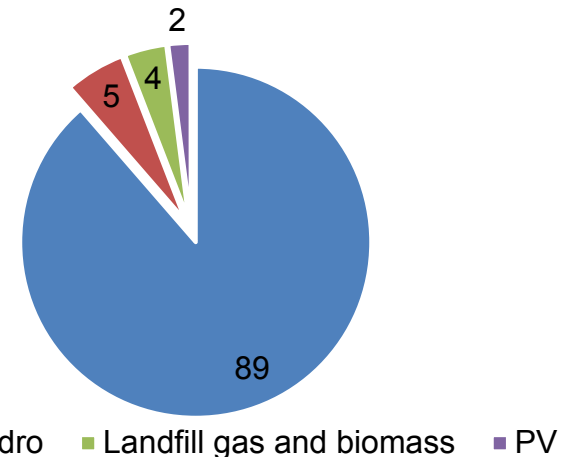


Historically, electricity has been generated primarily from coal and gas



Source: IMO

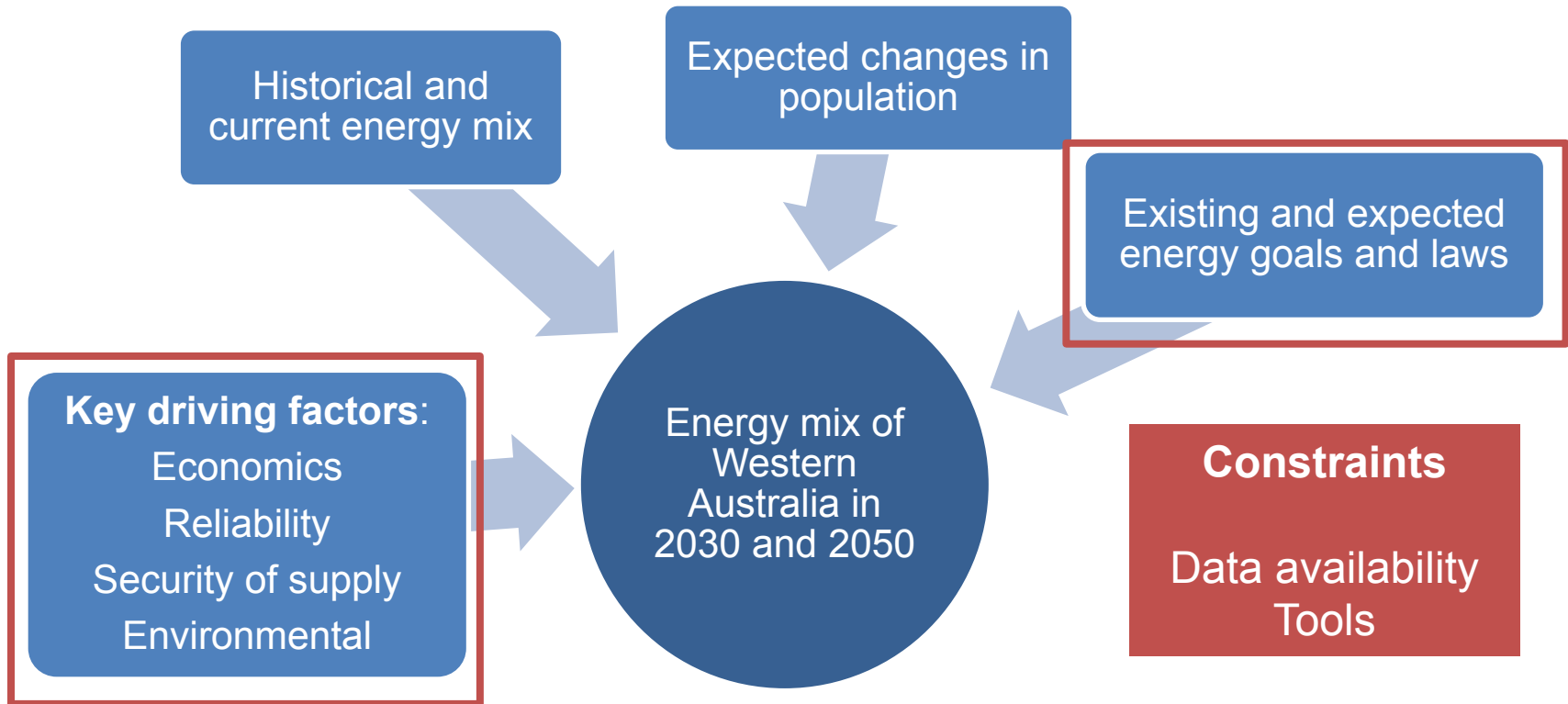
Renewable energy breakdown (%), 2012



http://www.finance.wa.gov.au/cms/TwoColumns_Content.aspx?PageId=17638&id=17546 last accessed 24 July 2014

■ Wind ■ Hydro ■ Landfill gas and biomass ■ PV

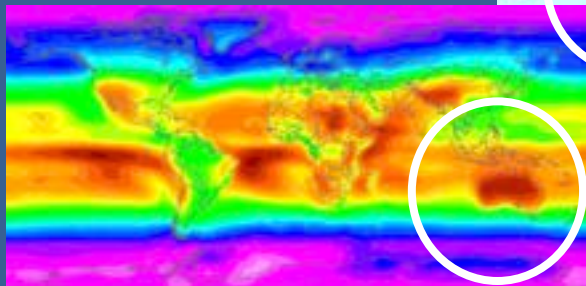
Approach and Problem Structure



Key drivers influencing future generation mix

Security of supply/Reliability

1. Varanus Island explosion cut off a third of WA's gas supply for 2 months. Complete restoration took a year.
Cost: \$3billion
2. By 2030, WA is expected to contribute 2/3rds of the increased gas production.
3. High wind and solar resources.



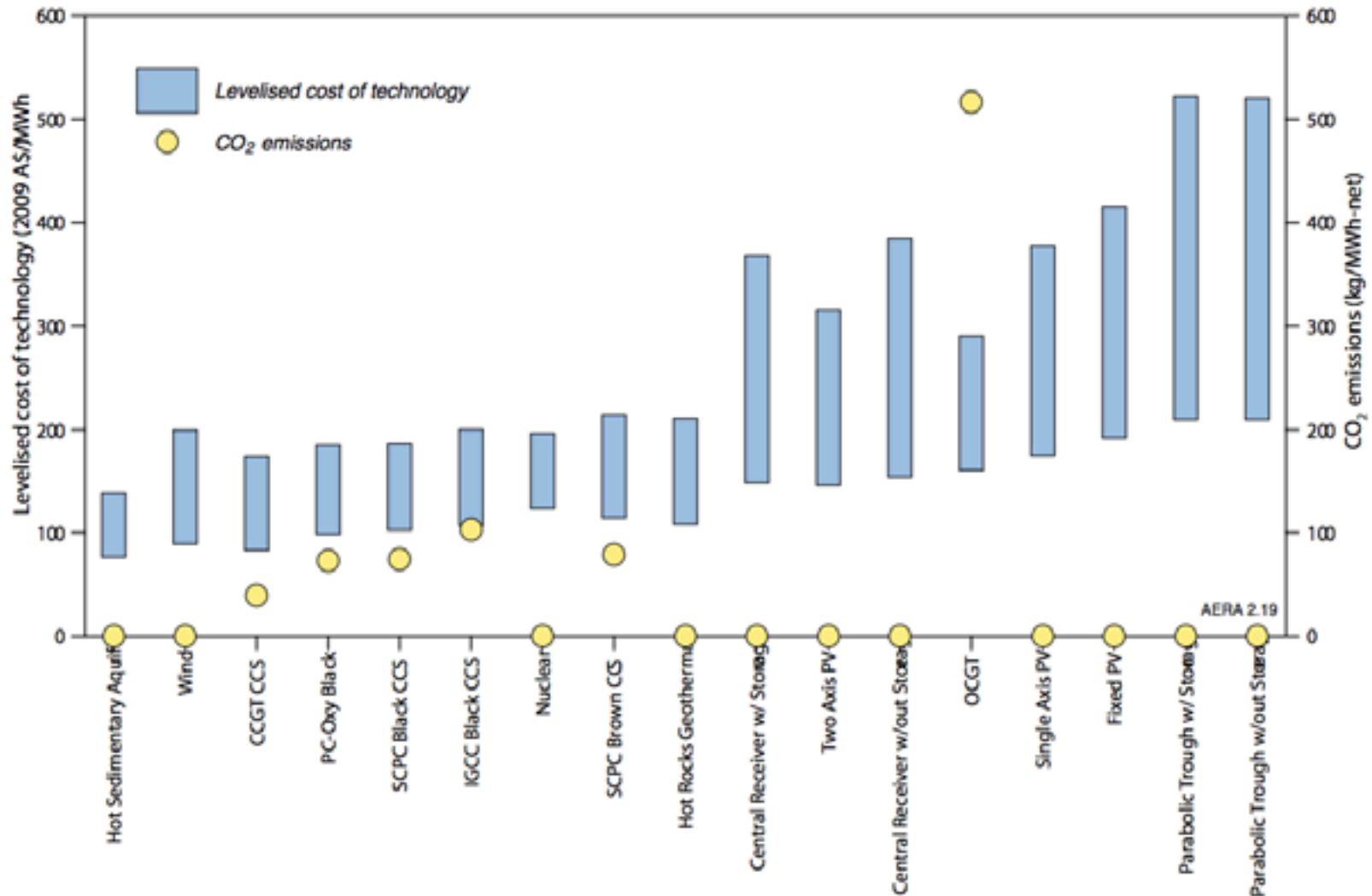
Environmental/Other laws/Economics

1. Reduce Australia's carbon emissions by between 5 and 25 percent from 2000 levels by 2020.
2. 80 percent from 2000 levels by 2050.
3. 20% electricity from renewable energy sources by 2020
4. RET is mostly encouraging wind farms.
5. PV incentives are mostly for roof-top residential PV

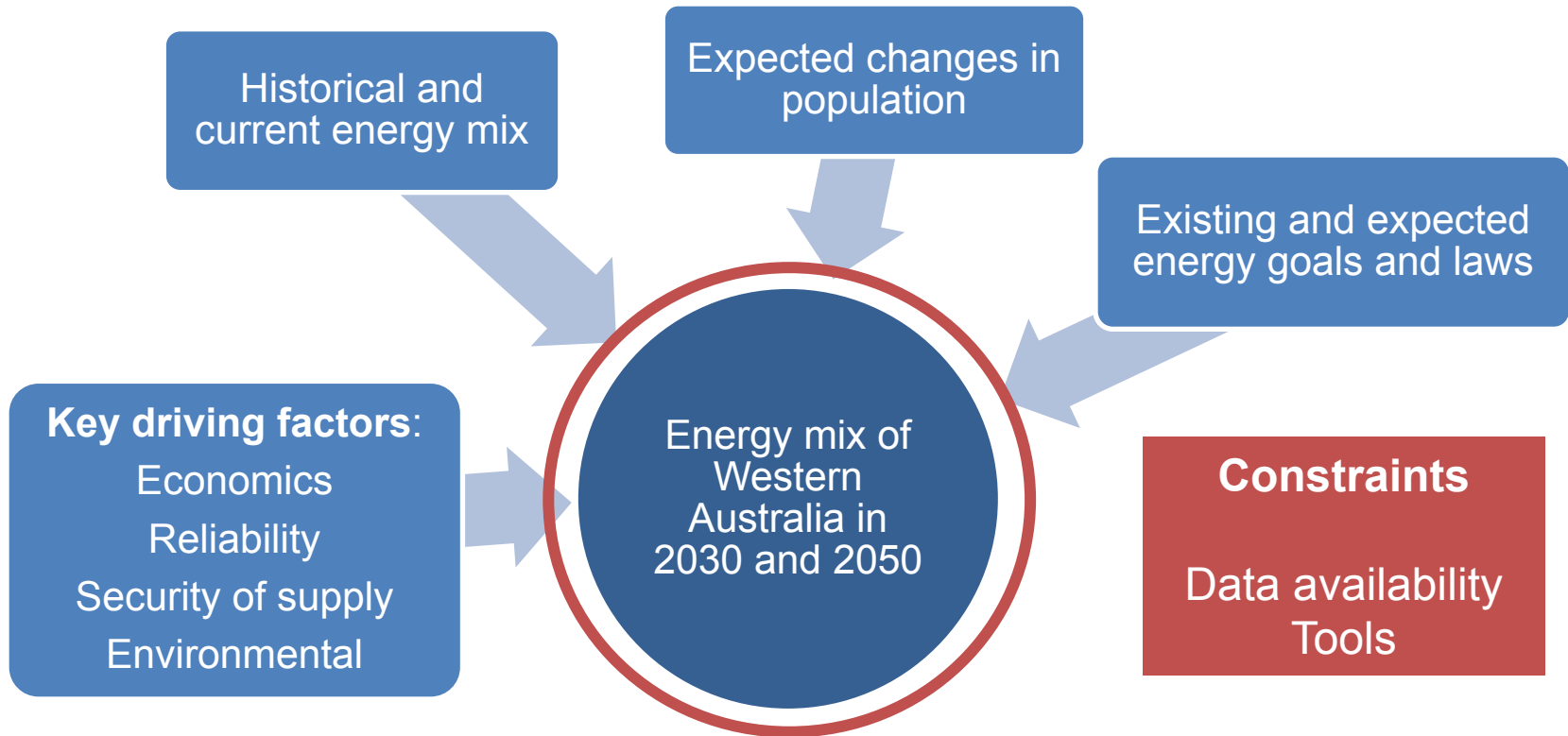
Western Australia has good wind and solar resources.



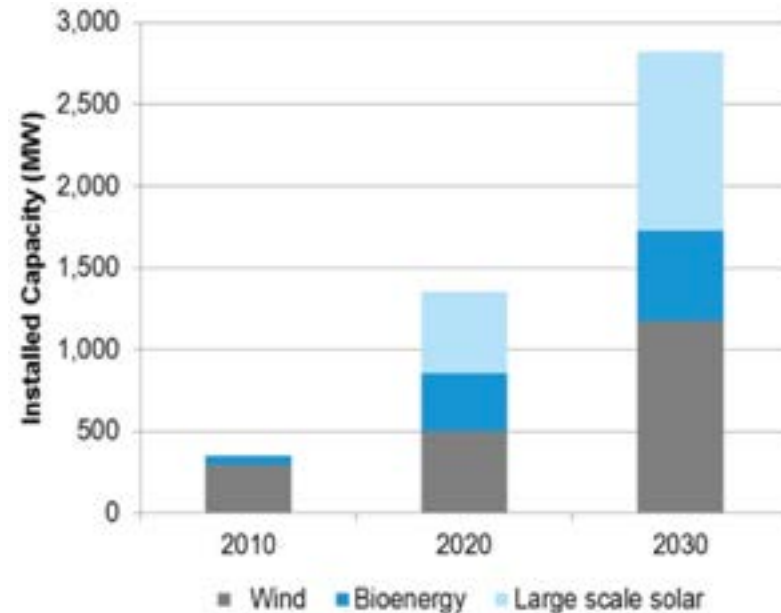
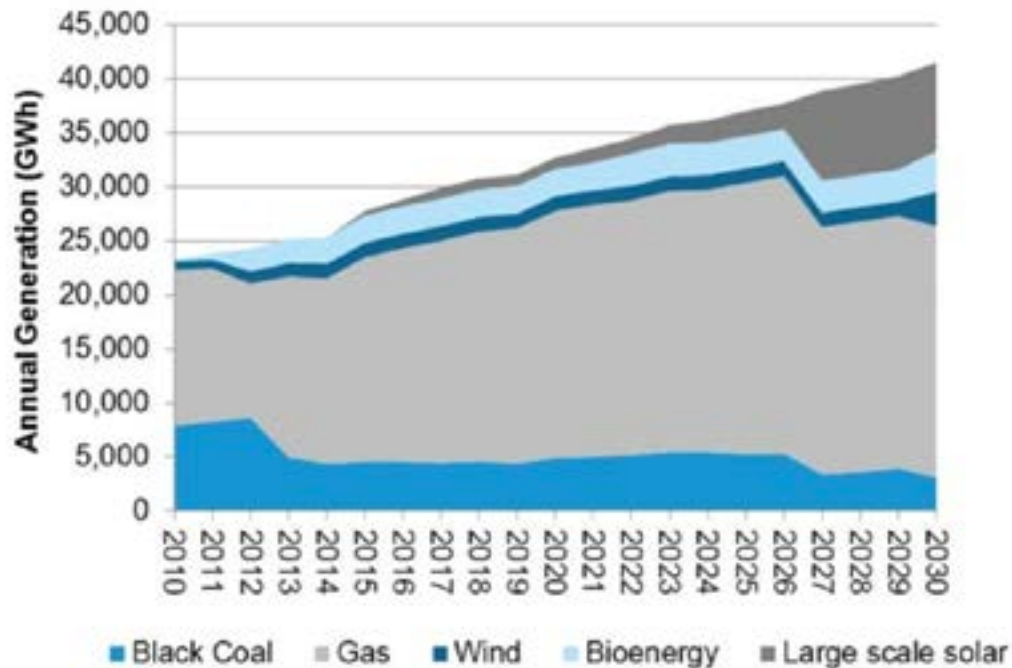
Wind energy is amongst the cheaper, lower-emission energy sources



Approach and Problem Structure

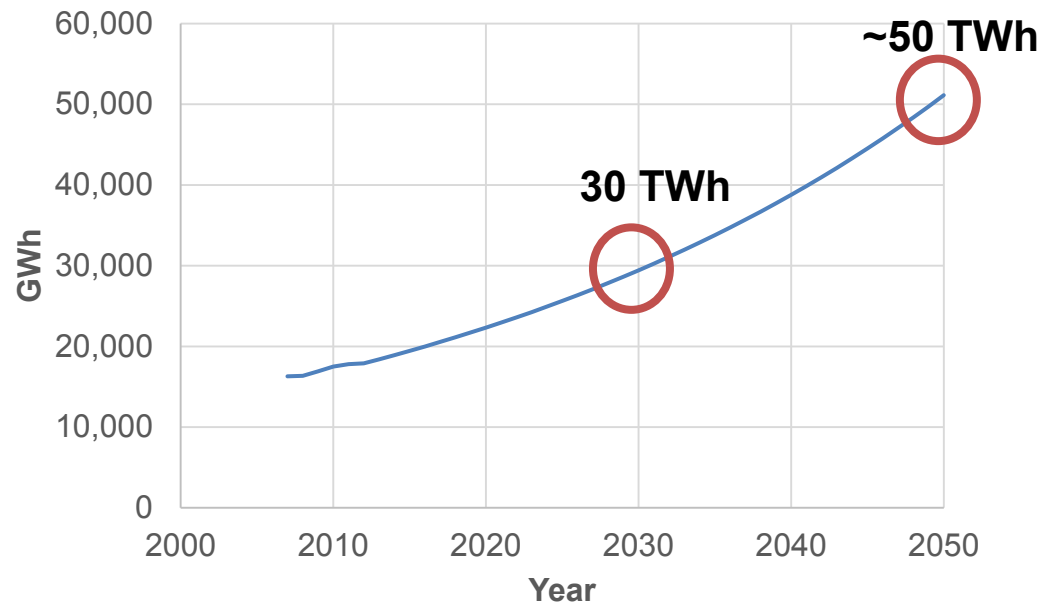


Literature shows continued reliance on gas as the major source of electricity



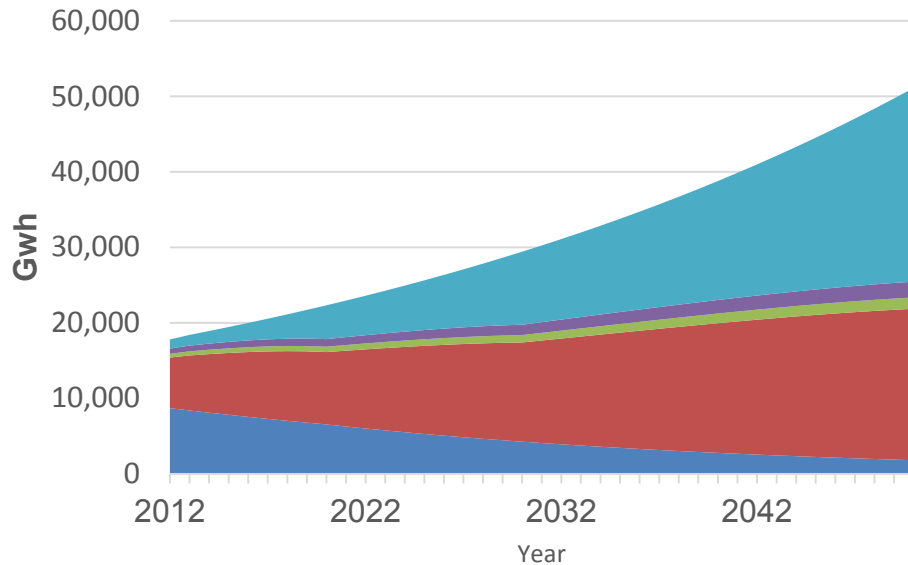
http://www.climateinstitute.org.au/verve/resources/cleanenergyjobssnapshot_westernaustralia.pdf last accessed 24 July 2014

Projected Power Generation in Western Australia to 2050



Considering 3% growth per year (ABARES)

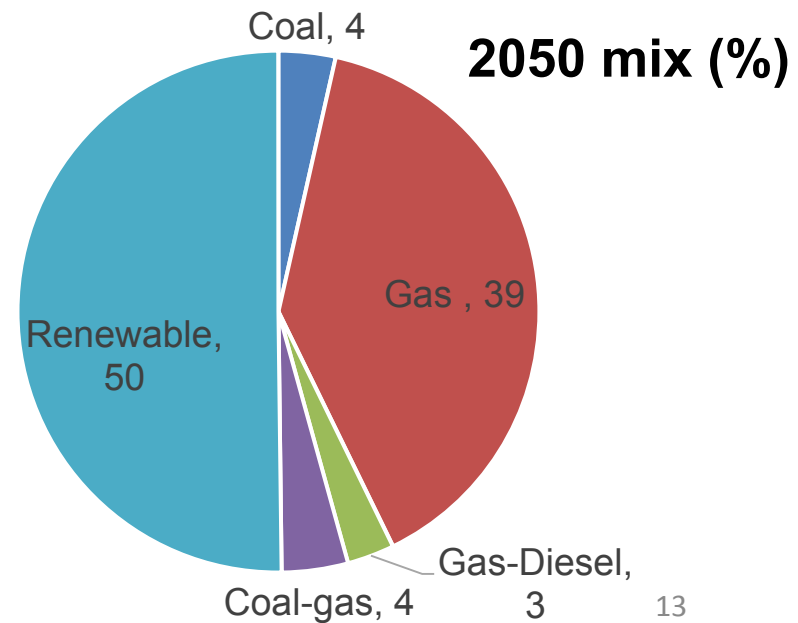
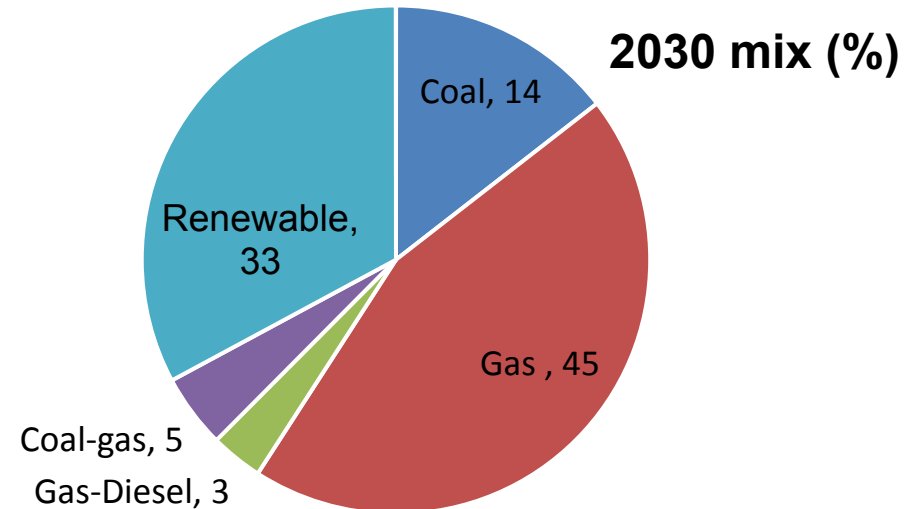
Generation mix for 2030 and 2050



■ Coal
 ■ Gas
 ■ Gas/Diesel
 ■ Coal/Gas
 ■ Renew

Assumptions

- 25% reduction in coal based generation by 2020 (goal).
- 80% reduction in coal based generation by 2050 (goal).
- 30% renewables penetration by 2030.
- 50% renewables penetration by 2050.



Limitations

- Results presented are a very basic back of the envelope calculation
- A better analysis will include:
 - Improved data and an energy generation/consumption model based on that
 - Model (tool) validation using prior data
 - Detailed accounting in the model for near and medium term developments especially in the policy arena, both for Western Australia and in an international context.

