THE SUSTAINABILITY OF DESALINATION IN AUSTRALIA:

Is Renewable Energy the Answer

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Desalination in Australia

- A new rainfall-independent water supply option for coastal cities in Australia

City	Current Water Storage	Desalination?
Sydney	<40%	Designing 125 kL/d desalination plant
Perth	<35%	Constructed 130 kL/d desalination plant
Melbourne	<45%	Feasibility study of a desalination plant
SE Qld	<30%	Planning approval of a 120 ML/d plant

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Desalination and Energy

- Desalination uses significantly more energy than traditional systems
- Greenhouse gas emissions are near certain to be the major sustainability issue associated with desalination in Australia

Water Supply Option	Energy Use (kWh / kL)
Warragamba storage and pipe network	0.25
Residential greenfield wastewater reuse	1.2
Large scale indirect potable wastewater	2.8-3.8
Desalination	5.4
Residential Indoor Retrofit (that reduces hot water use)	-33

Perth Desal Plant (source ABC)

Desalination and Energy

- 85% of electricity generation in Australia is from coal-fired power stations
- Greenhouse intensity is amongst the highest in the world
- Desalination plants will be connected to the state electricity grid
- Electricity from a particular generator (eg wind) cannot be *directed* to a particular load (eg desalination) in a shared network
- Thus any greenhouse emissions offsetting is always an *abstraction*
- One definition of Greenhouse neutral: *additional* renewable generation onto the network equal to electricity consumption of the plant
- *(Note that desalination plant operation will still be driving greenhouse emissions from conventional plant on grid)*
- This renewable energy would also have to be *additional* to what would have happened *otherwise*

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Reducing Greenhouse Emissions from Energy Use

- Renewable energy schemes
  - MRET, VRET, NRET, Accredited Green Power
  - Liable parties buy then surrender tradeable certificates from renewable projects to prove compliance with legislated or Green Power targets
  - Certificates could be bought by desal plant operator and surrendered (but not used by liable parties to meet legislated targets or Green Power obligations)
  - Retrospective audit to ensure as much *new* renewable energy generated as used by desal plant
  - The renewable energy will thus be additional to legislated targets

GreenPower
Accredited Renewable Energy

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Reducing Greenhouse Emissions from Energy Use

- Emissions trading schemes
  - Currently only NSW GGAS in operation
  - Tradeable certificates (NGACs) representing notional 1 tonne CO_2 avoided
  - Low-emission generation, energy efficiency, sequestration projects
  - Some projects of questionable effectiveness (tree planting)
  - Some projects of questionable additionality (eg newly constructed coal-fired power stations)
  - Possible future carbon pricing in electricity sector
    - Possible national scheme (eg. NETS) and/or use of CDM CERs
    - Desal plant could face major C price exposure: risks in using ineffective, currently non-existent or untested schemes to offset emissions

GGAS

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Perth Case Study

Wind farm to provide power *(source Water Corporation)*

- 130 ML/d plant constructed
- It will supply 17% of Perth's water demand
- 185 GWh of energy per year
- 50% increase in energy use from BAU projected for Water Corporation
- Plant connected to SWIS with predominant gas + coal generation mix
- Claimed to be "powered" by the Emu Downs Wind Farm
- However RECs created by Emu Downs purchased by Western Power and surrendered as part of their regulated MRET requirements
- Therefore questionable additionality of renewable energy 'powering' the desal plant

Sydney Case Study

- 125 ML/d plant proposed, up to 500ML/day
- 500 ML/d will supply a third of total water demand
- 225 GWh/yr up to 906 GWh/yr
- Current non-drought energy use is ~150 GWh/yr
- Although flagged as drought measure, economic considerations may drive more continuous operation
- NSW Gov says 100% RE
- Possible that GGAS could be used

- Use of GGAS risky because emissions may be offset less than thought
- Could use MRET, VRET, NRET but if certificates also used to meet targets then no additional RE
- SUMMARY (Perth and Sydney): Likely best served by new RE plant sized to meet desal requirements with only excess RE used to create certificates

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Wider Sustainability Issues

- Not all greenhouse offset approaches are equal
- Some greenhouse offsets are highly questionable
- Renewable generation offsets are likely the least abstract and most credible
- Additionality of renewable generation is the key test
- In Australia the most robust approach is likely to be
  - accredited Green Power
  - new projects completely outside existing mandatory schemes or
  - project 'retirement' of RECs
- Broader sustainability issues still need to be addressed:
  - likely constraints on renewable generation in the longer-term
  - many valuable energy services to be delivered
- *In the future desalination may find itself competing against valuable domestic /commercial/industrial loads for renewable generation*

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