

Urban Water Security Research Alliance



Energy and Greenhouse Gas Emissions for the SEQ Water Strategy

Murray Hall

Life Cycle Assessment and Integrated Modelling

18 August 2009



LCA PROJECT TEAM

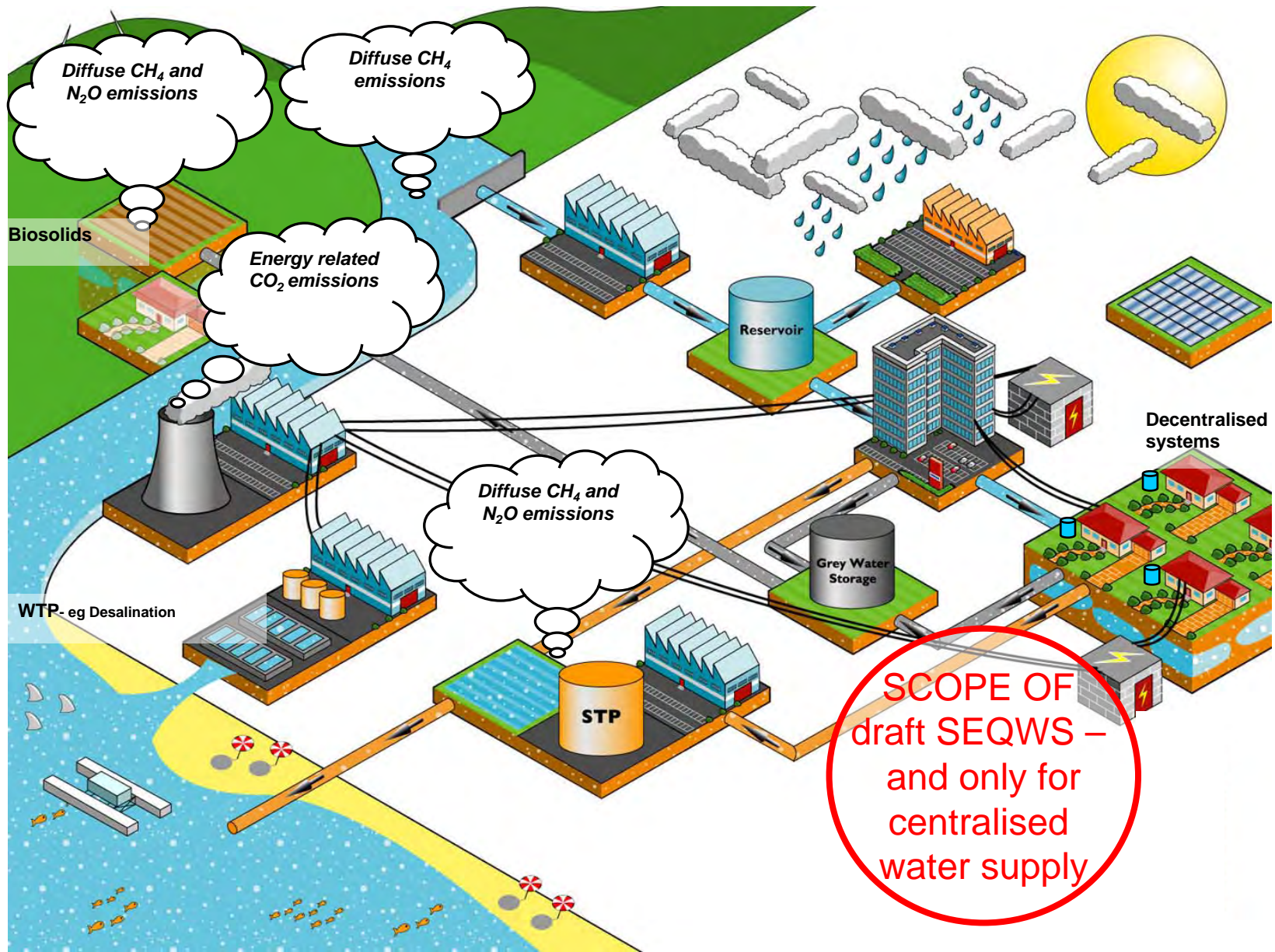
- Joe Lane, DERM
 - water balance and rainwater tank energy
- David de Haas, UQ
 - wastewater treatment
- Jeff Foley and Paul Lant, UQ
 - diffuse wastewater emissions
- Jim West, CSIRO
 - energy and data management
- Brad Sherman CSIRO
 - reservoir methane emissions
- Tim Baynes, CSIRO
 - end use and modelling
- Steve Kenway, CSIRO/UQ
 - energy data and initial project management

OUTLINE

1. Aims
2. Scope
3. Results
4. Other outputs
5. Future direction

- To inform the SEQ Water Strategy of the largest contributors and long term trends for operational energy and greenhouse gas emissions for urban water and wastewater services, including:
 - centralised water and wastewater services
 - decentralised water and wastewater systems
 - diffuse emissions from wastewater treatment and handling and urban water reservoirs
- To provide data to
 - set targets for improved performance,
 - identify opportunities for mitigation and
 - address potential liabilities from new greenhouse gas regulation.

SCOPE



**SCOPE OF
draft SEQWS –
and only for
centralised
water supply**

UNCERTAINTY - Methodology

- IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
 - Triangular distribution, upper and lower range of likely values by expert judgement supported by references and documentation



“Uncertainty is the only certainty there is, and knowing how to live with insecurity is the only security.”
John Allen Paulos

Uncertainty clarifies
what to do next!

(and how to
overcome my
insecurities)



UNCERTAINTY - Estimates

Cause for insecurity?

	Interval from mode	Data accuracy*	Summary of data sources
GHG emissions from reservoirs	+1000% - 50%	Poor	Very limited SEQ data available and worst performing reservoir extrapolated for upper uncertainty based on catchment and reservoir characteristics. Data provided by Alan Grinham UQ pers. comm. 2009. Calculated uncertainties of a similar order of magnitude as estimated for emissions factors by (IPCC, 2006) – ppAp 3.6
GHG emissions from wastewater treatment and biosolids N2O and biosolids CH4	+300%	Poor	SEQ plant data collection by UQ and emission factors and assumptions outlined in (De Haas et al., 2009) and largely based upon literature review from (Foley and Lant, 2007). Literature review by UKWIR was also considered (Andrews et al., 2008).
GHG emissions from wastewater treatment CH4	+50% -50%	Poor	SEQ plant data collection by UQ and emission factors and assumptions outlined in (De Haas et al., 2009) and largely based upon literature review from (Foley and Lant, 2007). Literature review by UKWIR was also considered (Andrews et al., 2008).
Energy for rainwater tanks and decentralised wastewater	+/- 50%	Poor	Monitoring of a few SEQ sites (Beal et al., 2008 , Lane and Gardner, 2009) and a number of others across Australia (Retamal et al., 2009) (Beal et al., 2003)

* GHGPROTOCOL (2001) GHG Protocol Corporate Standard, GHG Protocol guidance on uncertainty assessment in GHG inventories and calculating statistical parameter uncertainty.

UNCERTAINTY - Scenario

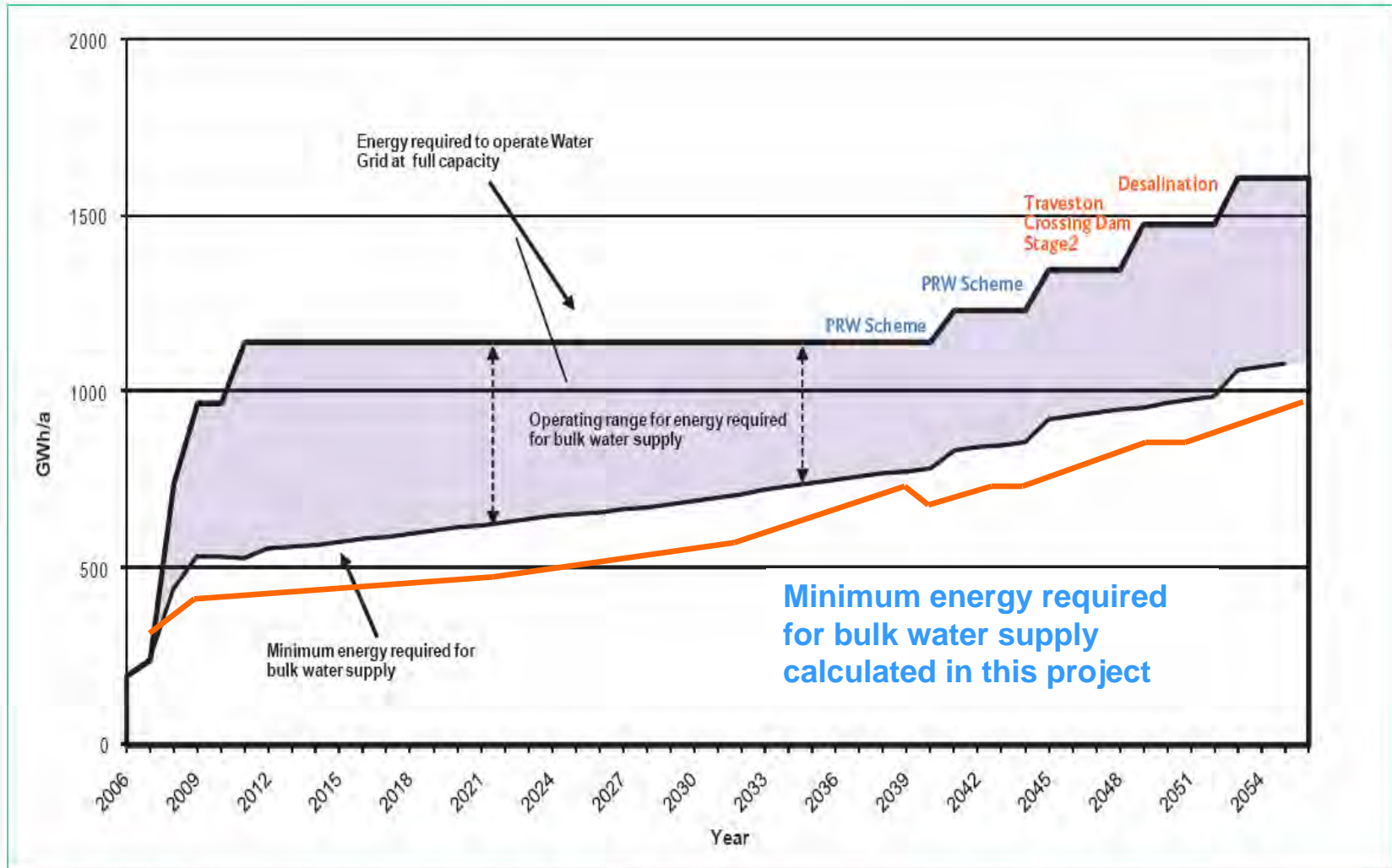
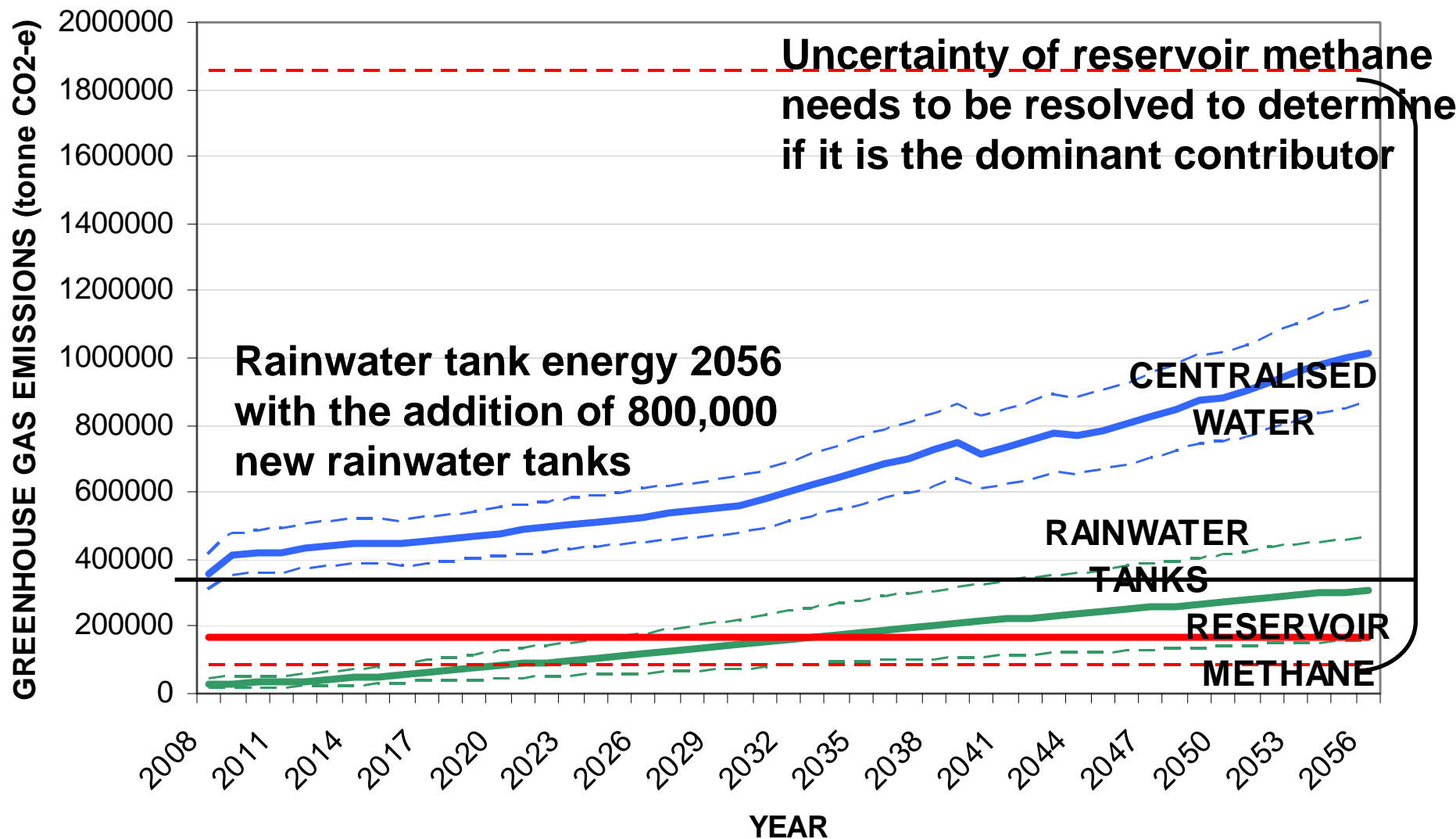
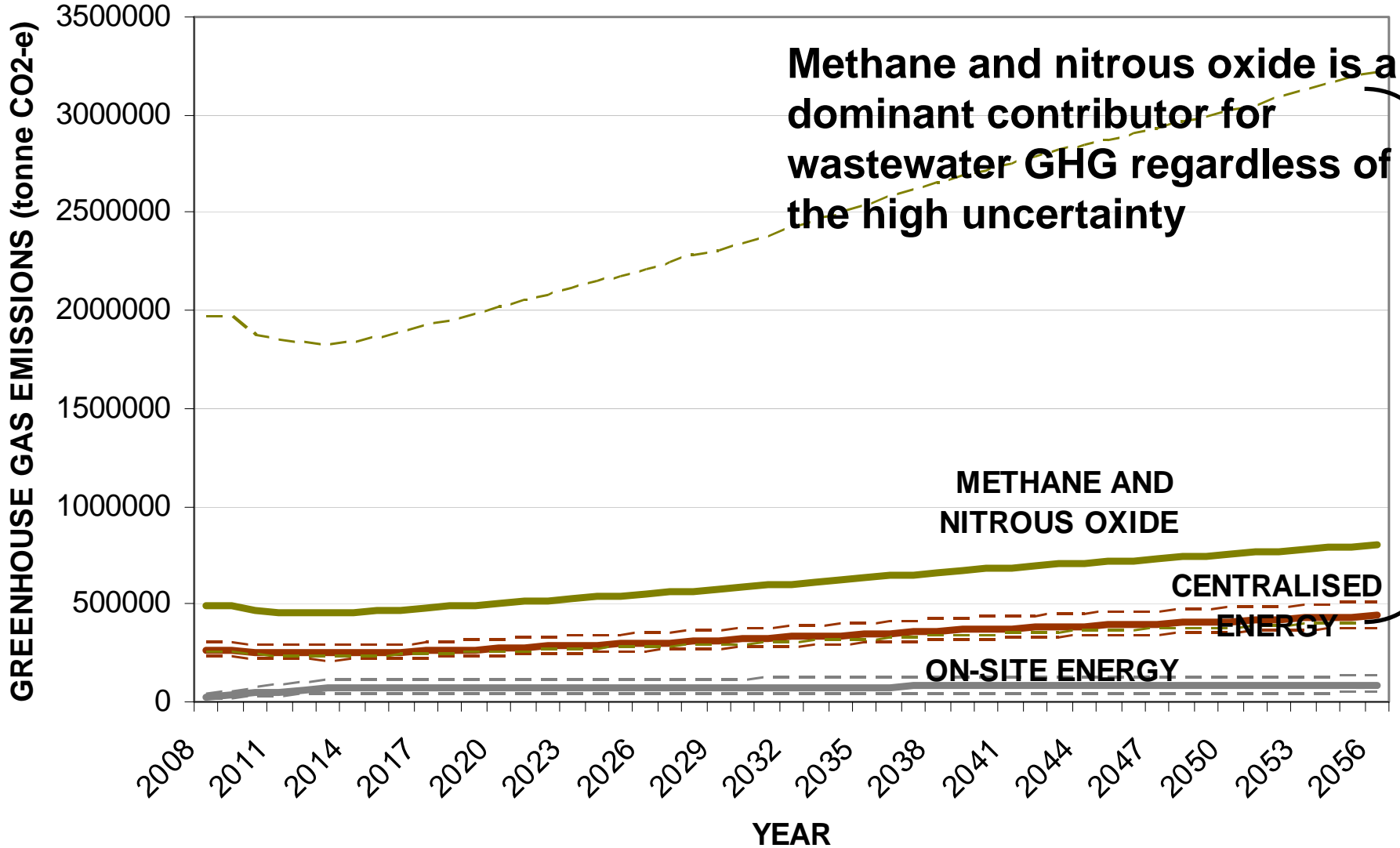


Figure 6.13 Possible energy consumption for bulk water supply (medium series population growth and no allowance for climate change)

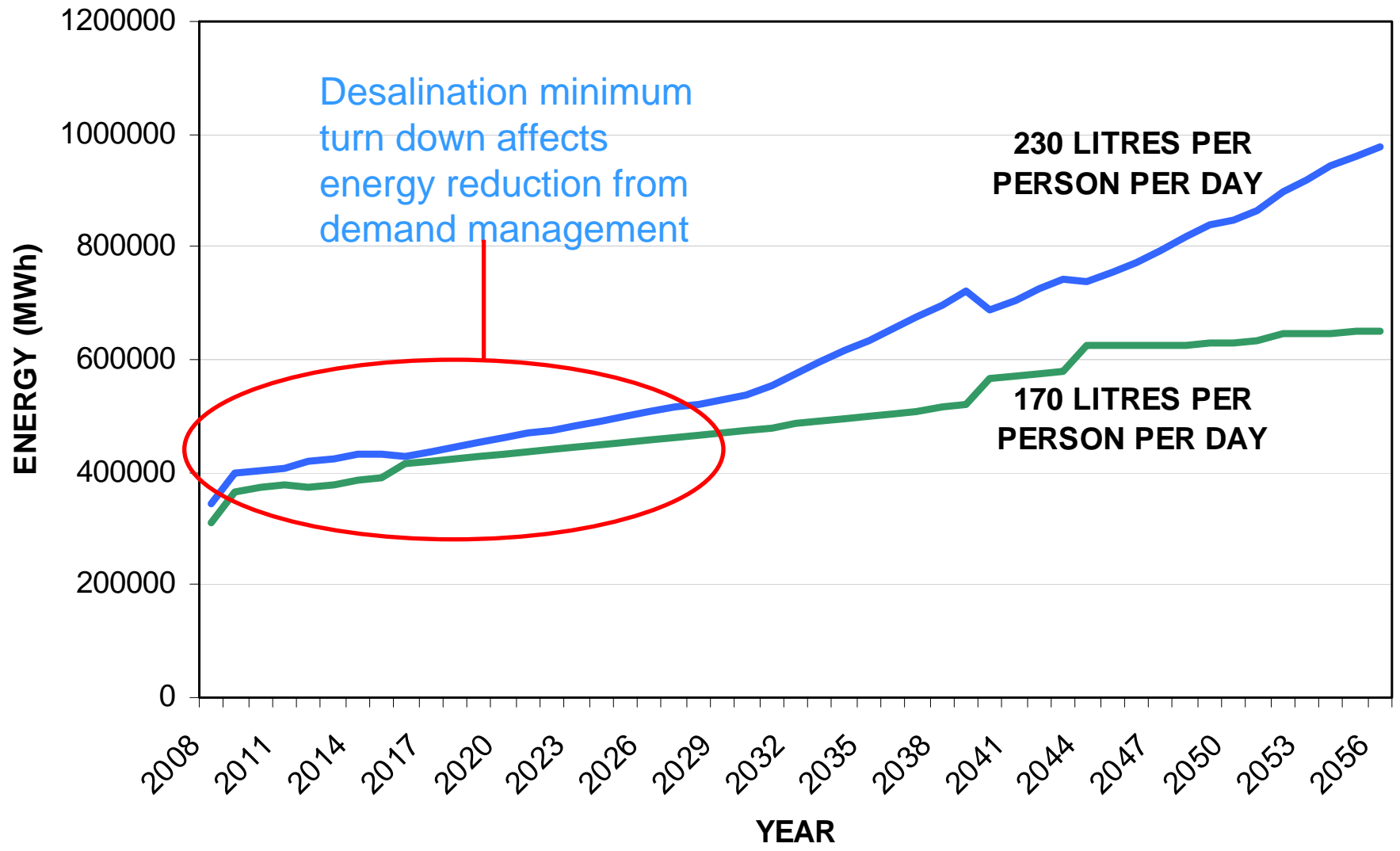
RESULTS – Water GHG



RESULTS – Wastewater GHG



RESULTS – Alternative demand



RESULTS – Further details

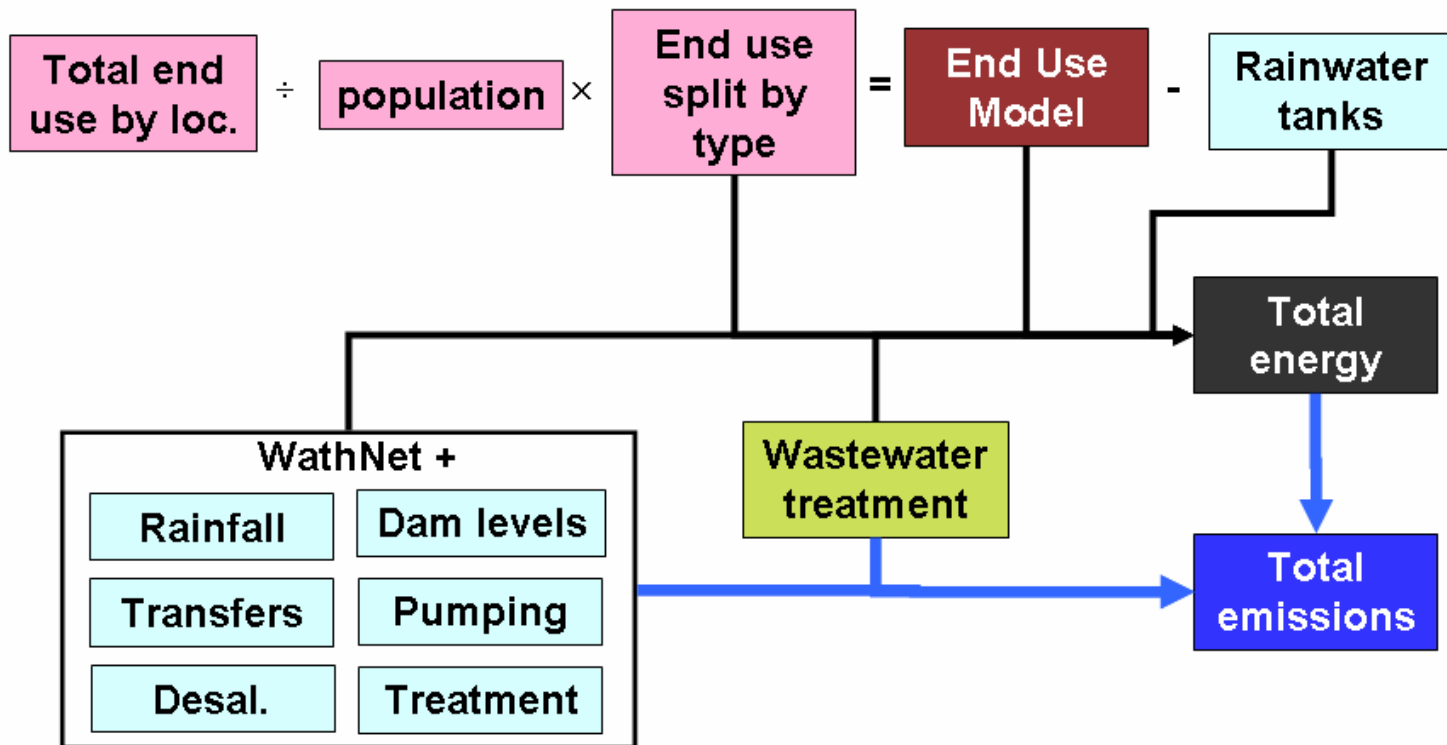
UWSRA REPORT (CSIRO PEER REVIEWED):

Hall, M., West, J., Lane, J., de Haas, D., Sherman, B. (July 2009). Energy and Greenhouse Gas Emissions for the SEQ Water Strategy

OTHER OUTPUTS- Alternative scenarios

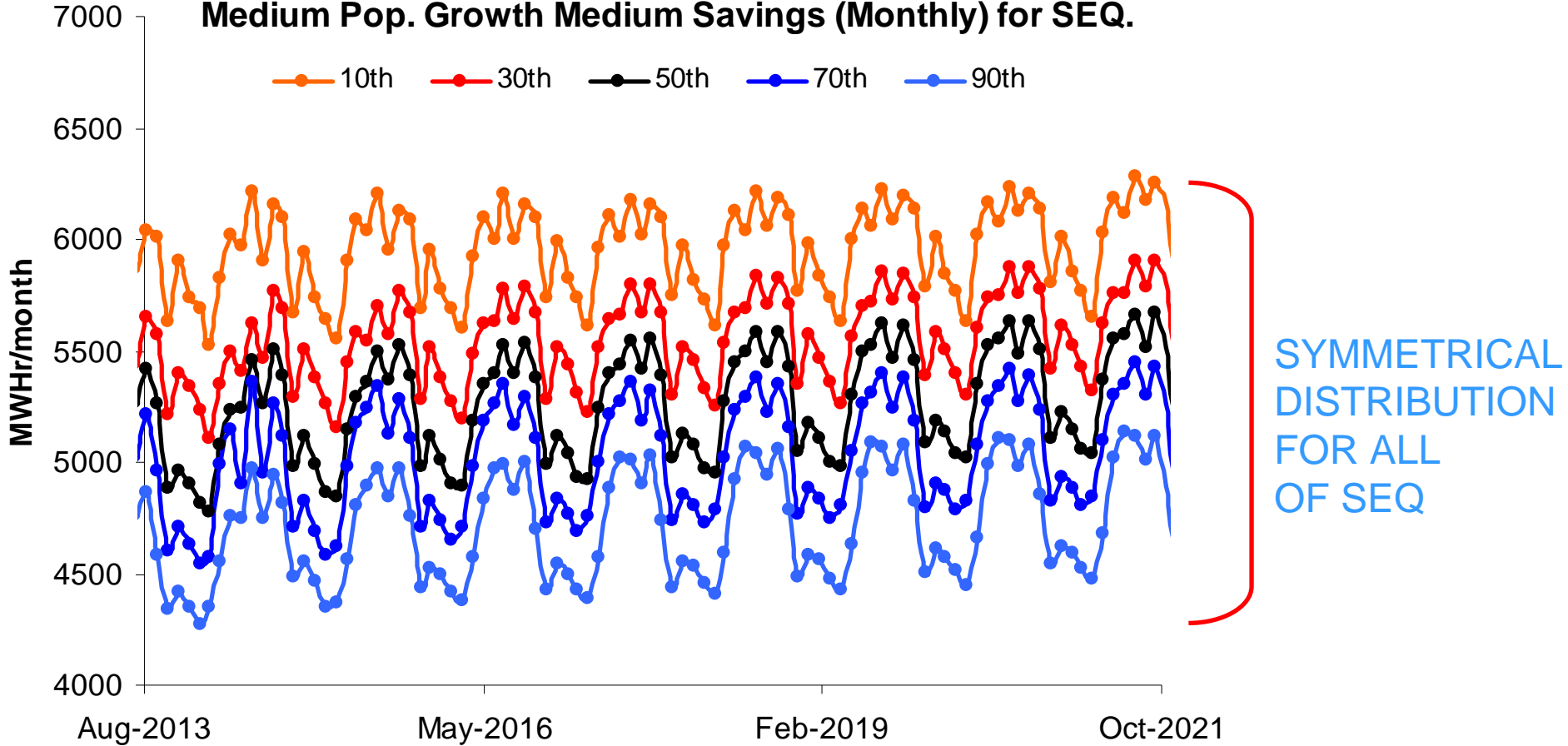
UWSRA REPORT:

Tim Baynes, Jim West, John Vitkovsky and Murray Hall (June 2009). A Framework for Modelling the Energy and Greenhouse Implications of Water Demand and Supply Scenarios

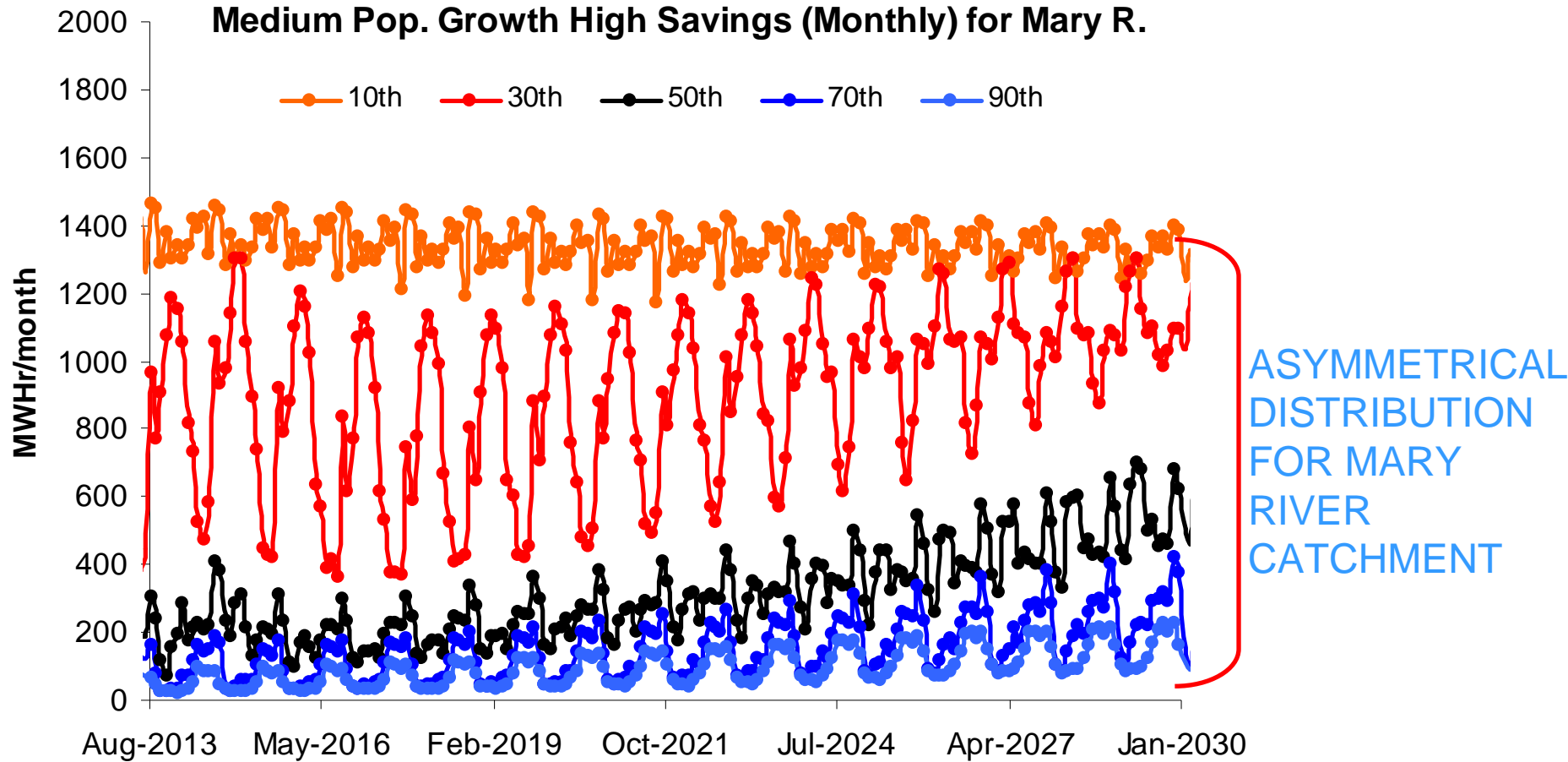


ALTERNATIVE SCENARIOS

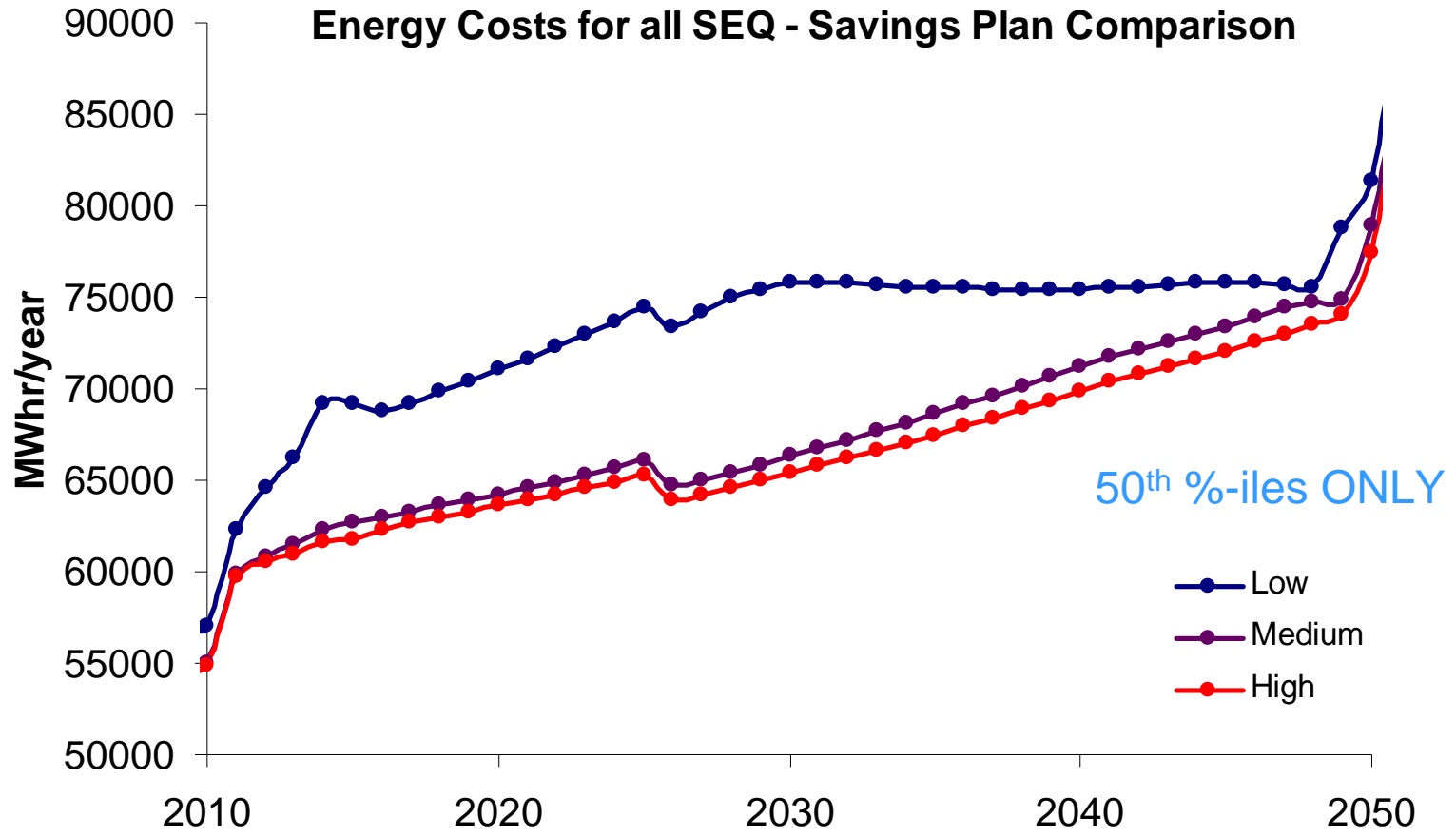
Medium Pop. Growth Medium Savings (Monthly) for SEQ.



ALTERNATIVE SCENARIOS



ALTERNATIVE SCENARIOS



RESEARCH DIRECTION

- Reservoir methane monitoring and mitigation
 - **UWSRA REPORT** Sherman (July 2009). Potential for mitigation of methane emissions from thermally stratified storages in SEQ 09
- Costing of externalities
 - Stage 1 use of existing energy and nutrient cost data applied to Logan Albert options and scoping of further research
- Logan Albert case study
 - adding energy and greenhouse data to integrated modelling
 - consideration of recycled water, rainwater tank and stormwater options

Urban Water Security Research Alliance



THANK YOU

www.urbanwateralliance.org.au

Email: Murray.Hall@csiro.au

