

# South African energy model: a system dynamics approach

Josephine K. Musango<sup>1</sup>, Alan C Brent<sup>1</sup> & Andrea Bassi<sup>2</sup>

<sup>1</sup> Council for Scientific and Industrial Research (CSIR), South Africa

<sup>2</sup>Millenium Institute, Arlington (VA)

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# Introduction

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- South Africa dual challenge
- Alternative energy technologies in South Africa
- Developing alternative energy not simple
- T21 provides framework for analysis



# Objectives

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## Project goals

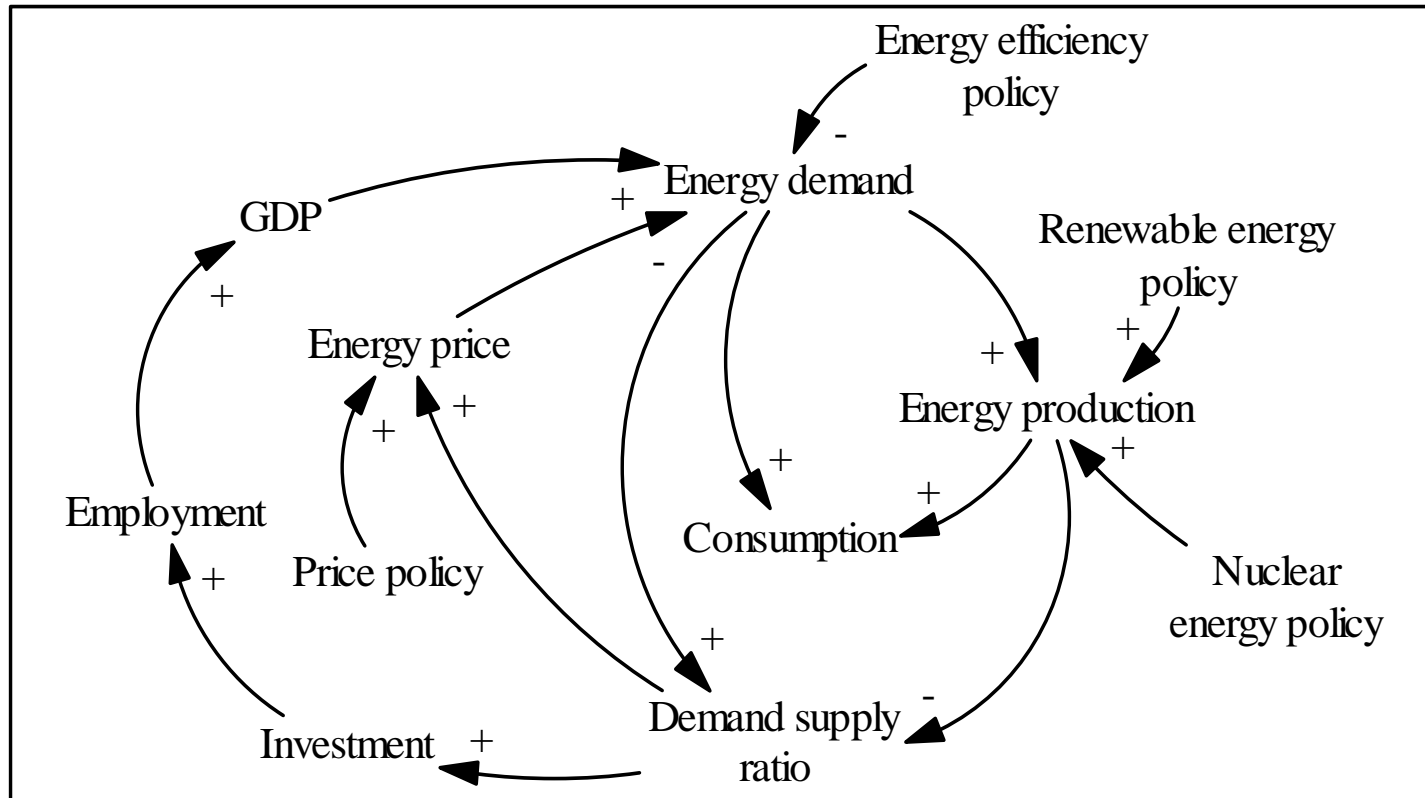
- Understanding SA energy issues and the supporting energy policy

## Research questions

- What are the energy demand patterns, supply constraints and opportunities
- How the current policy proposals affect these patterns
- Provide an initial step of developing South Africa T21 model, focusing on the energy modules

# SA energy modules of T21 model

- National energy demand & supply
- Causal loop diagram

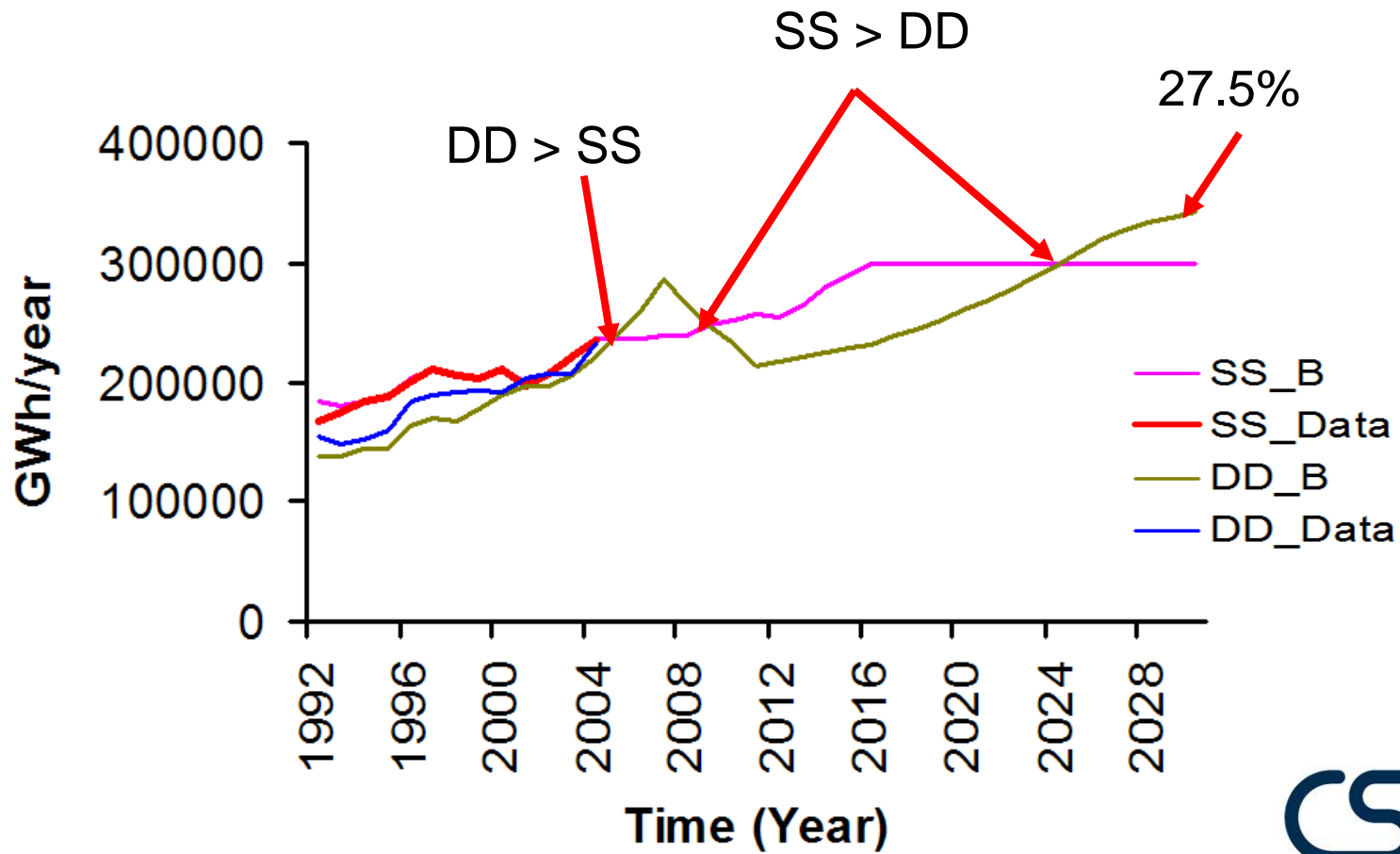


# Scenario development

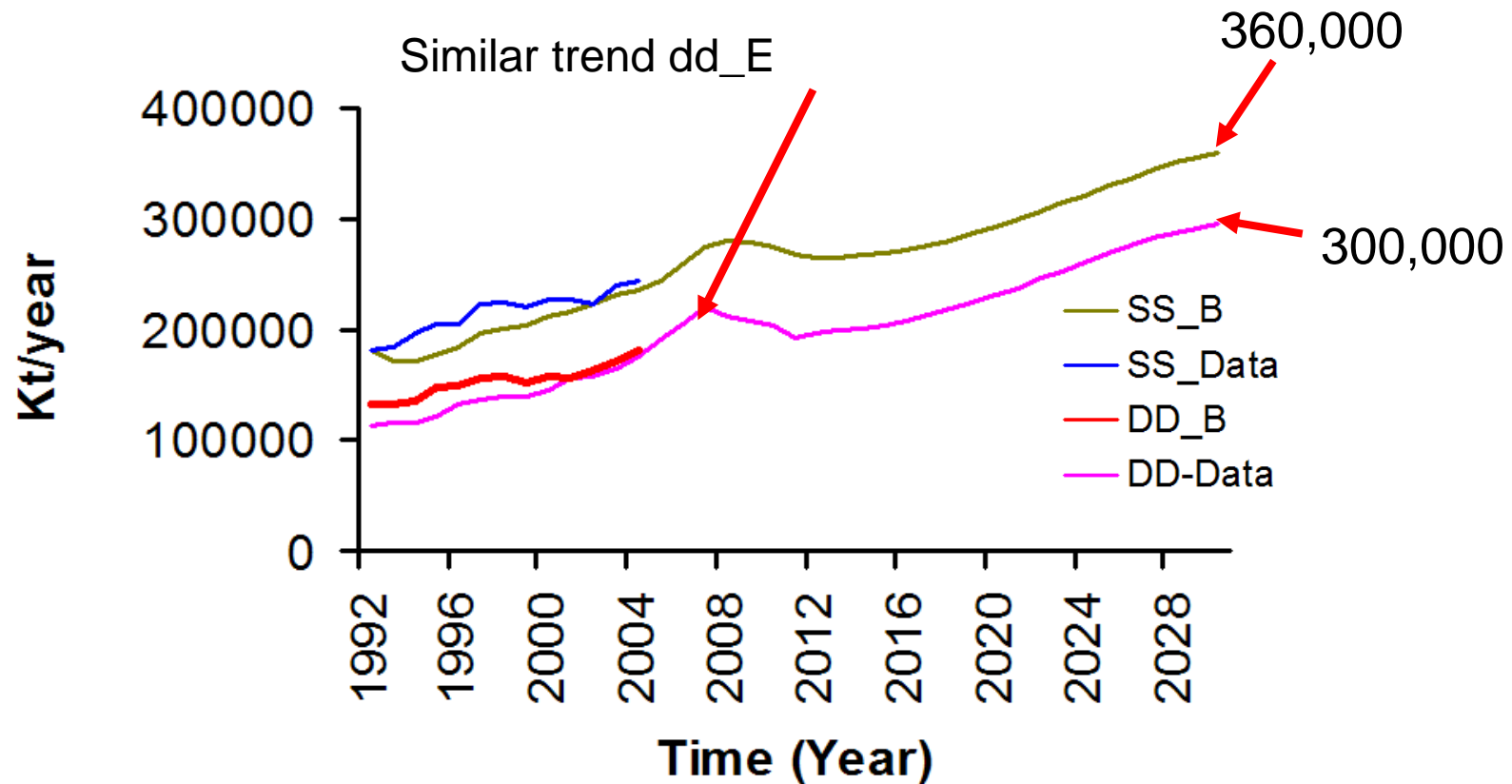
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Scenario	Energy efficiency (EE)	Yearly price change (after 2011)	Nuclear expansion
<i>Baseline</i>	1% for the period 2005-2030	3%	N
<i>Nuclear expansion</i>	1% for the period 2005-2030	3%	Y
<i>Energy efficiency1</i>	2% for the period 2005-2030	2%	N
<i>Energy efficiency2</i>	1.5% for the period 2005-2015	2.5%	N

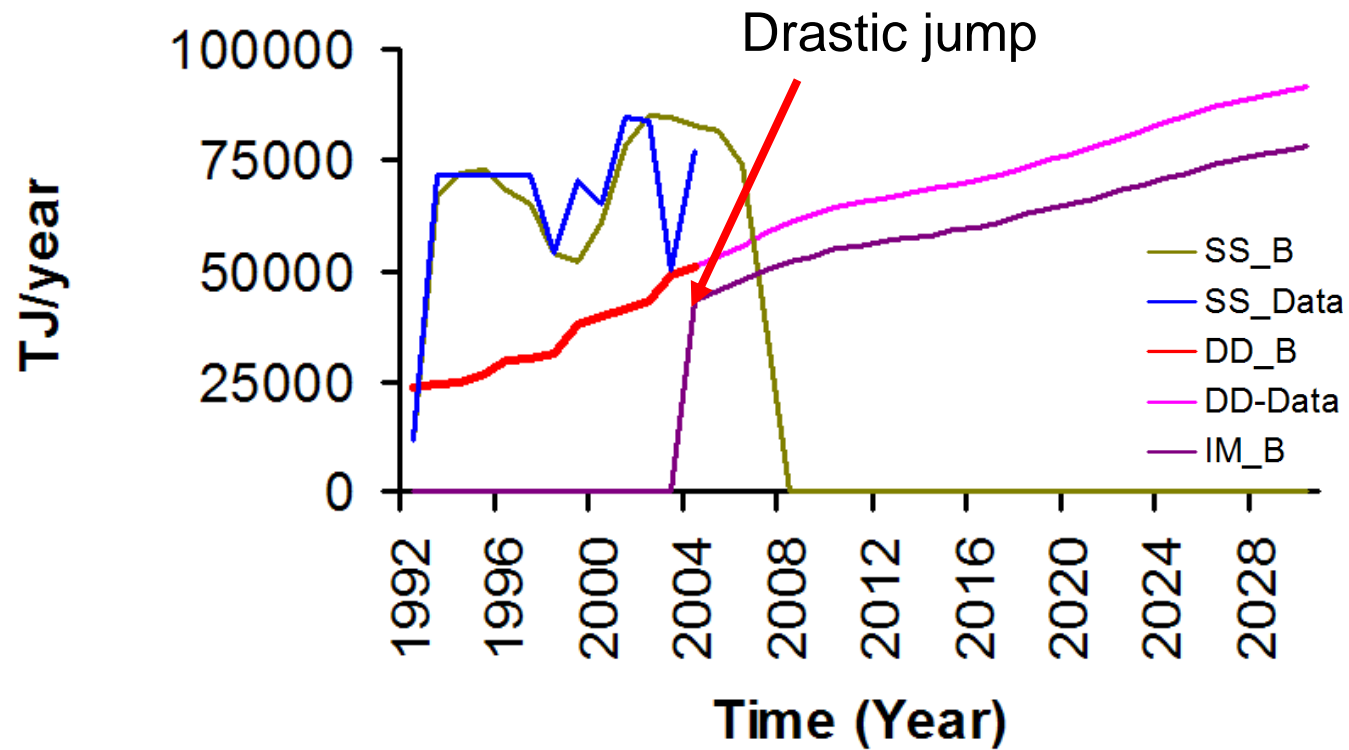
# Baseline results: Electricity



# Baseline results: Coal

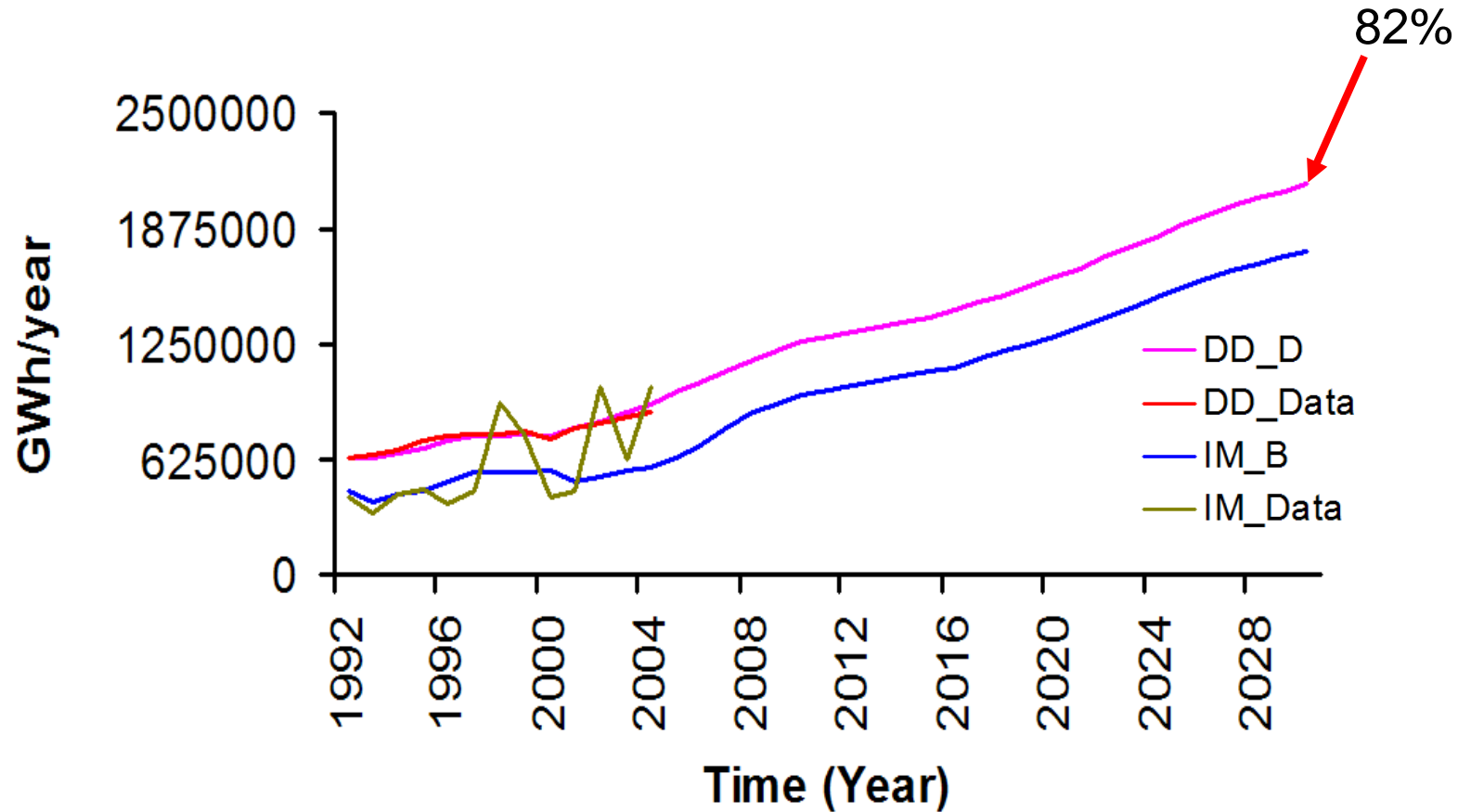


# Baseline results: Gas

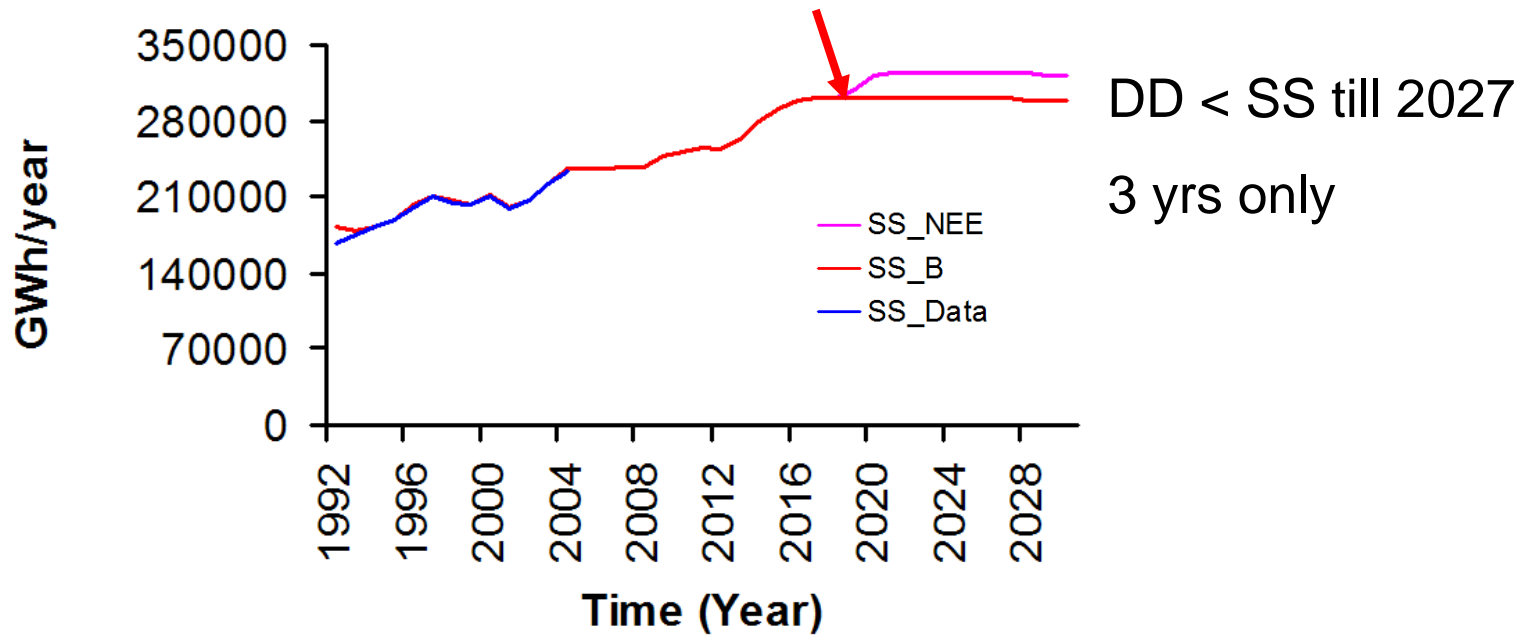




# Baseline results: Oil

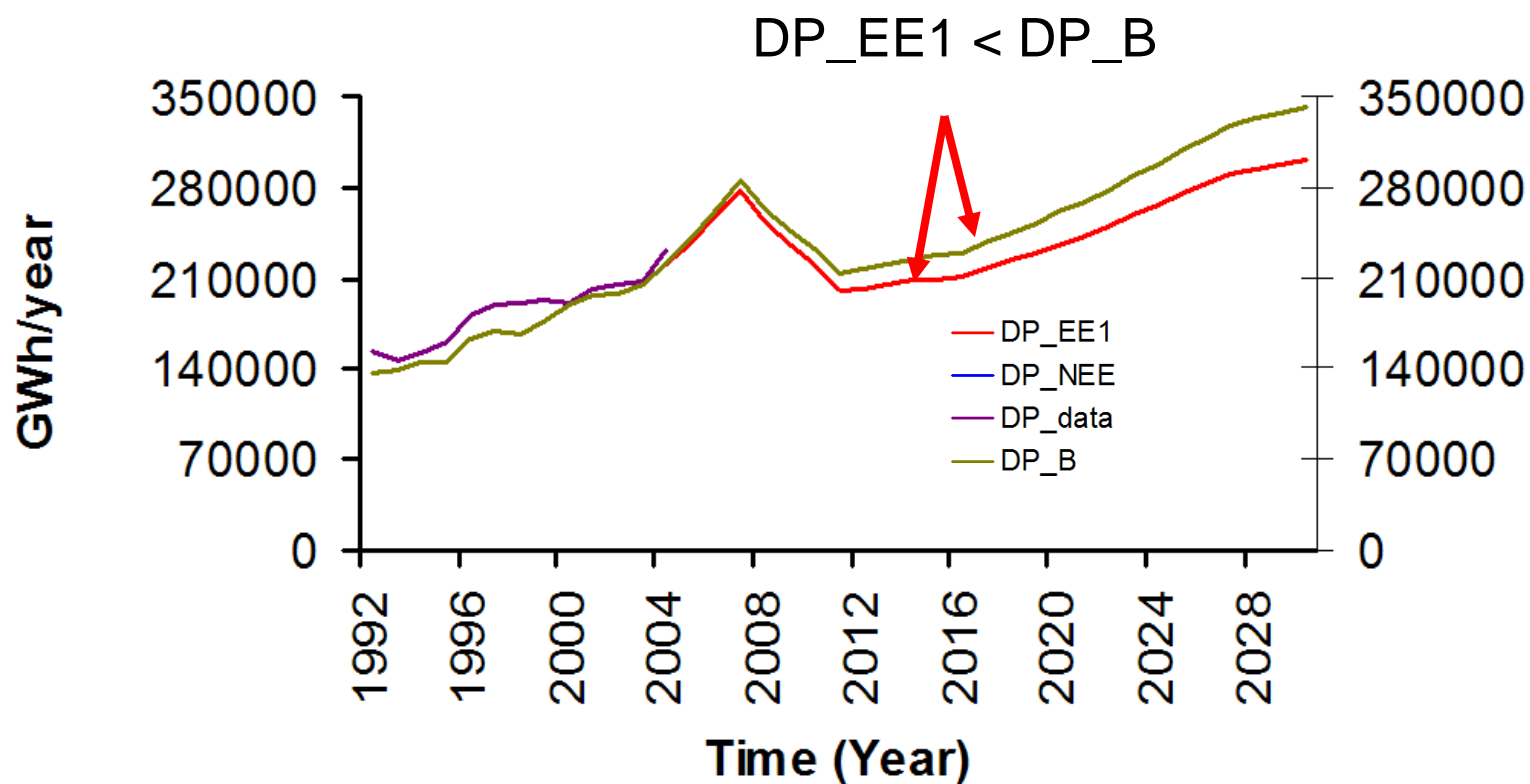


# Scenario analysis: NEE

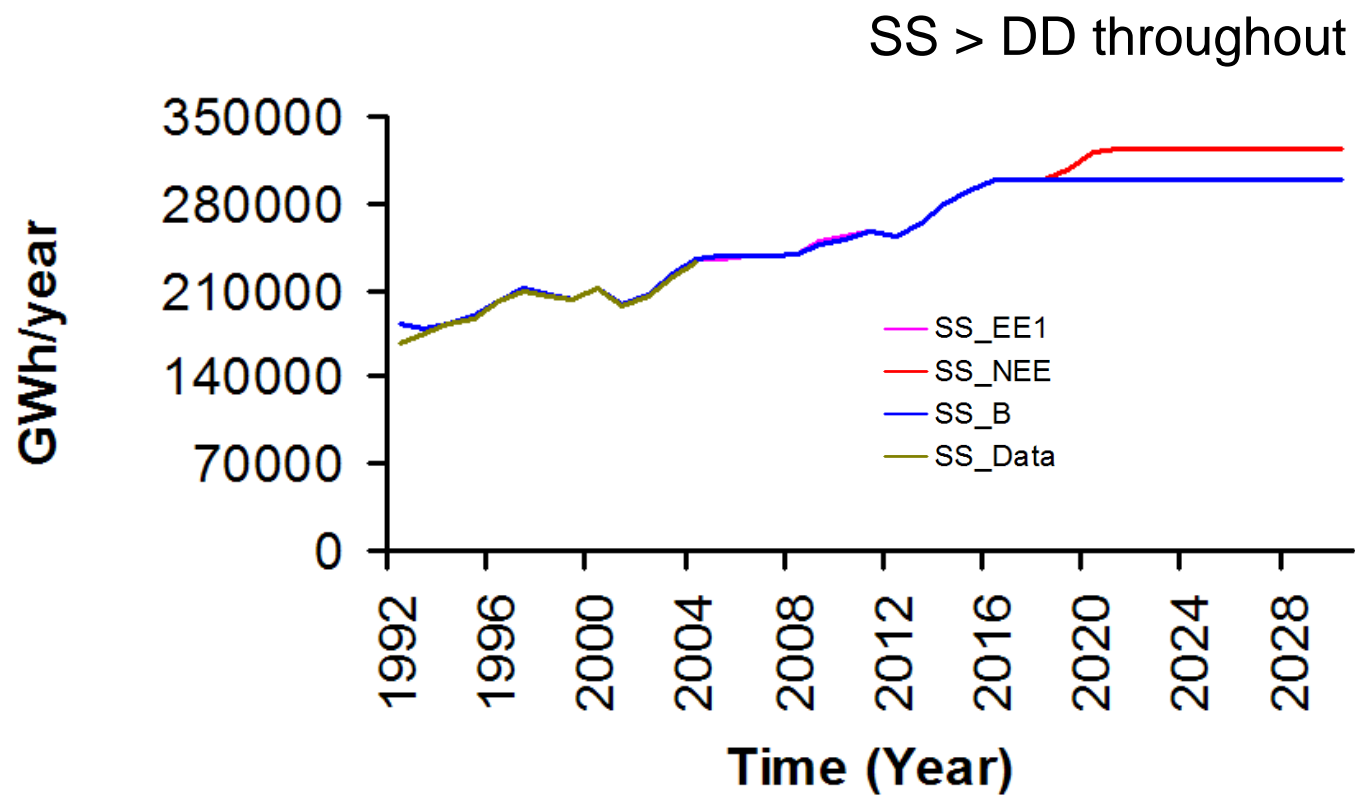


- Nuclear electricity production share 5% - 11.5%
- Coal electricity production share 93.7% - 85%

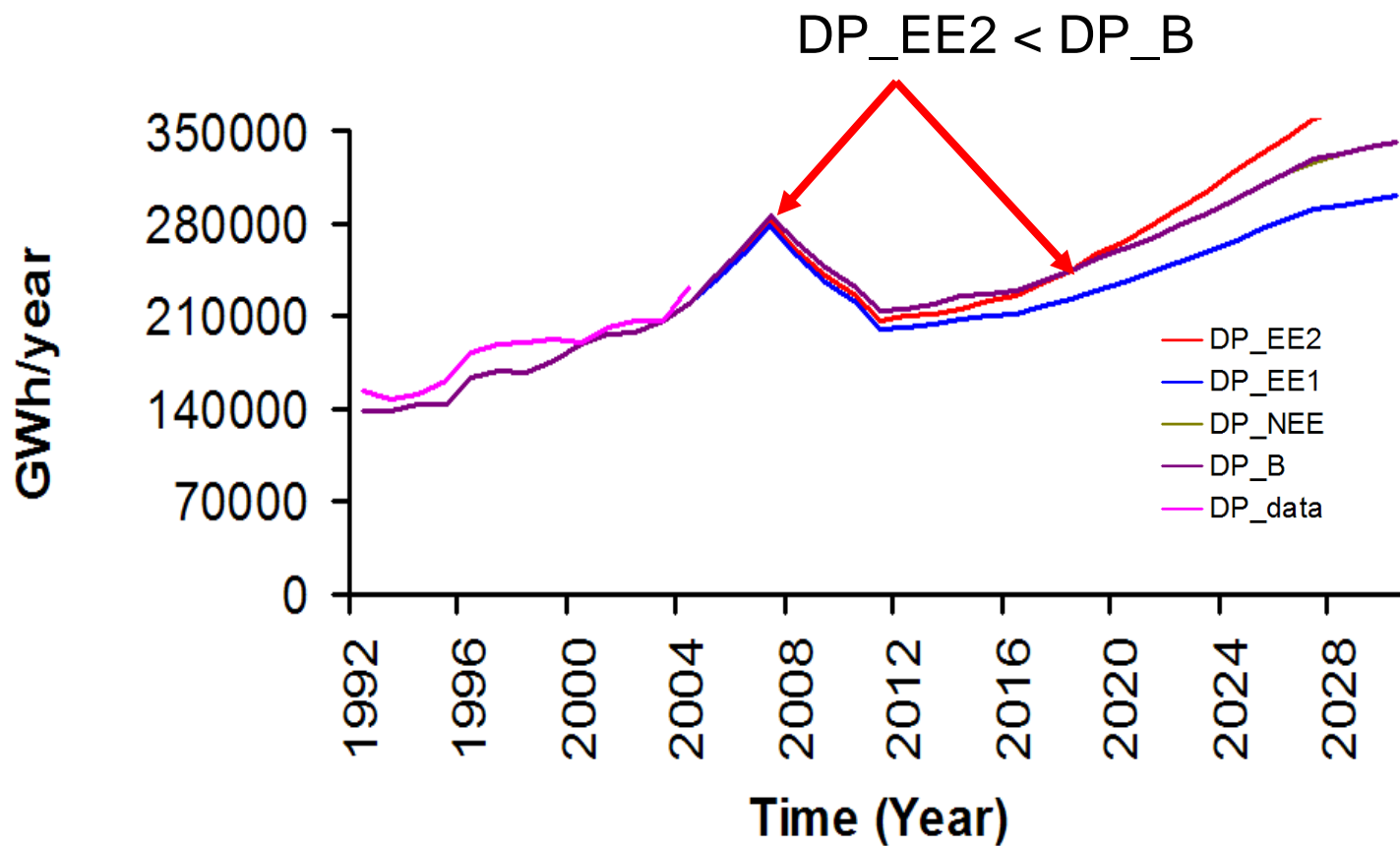
# Scenario analysis: EE1



# Scenario analysis: EE1

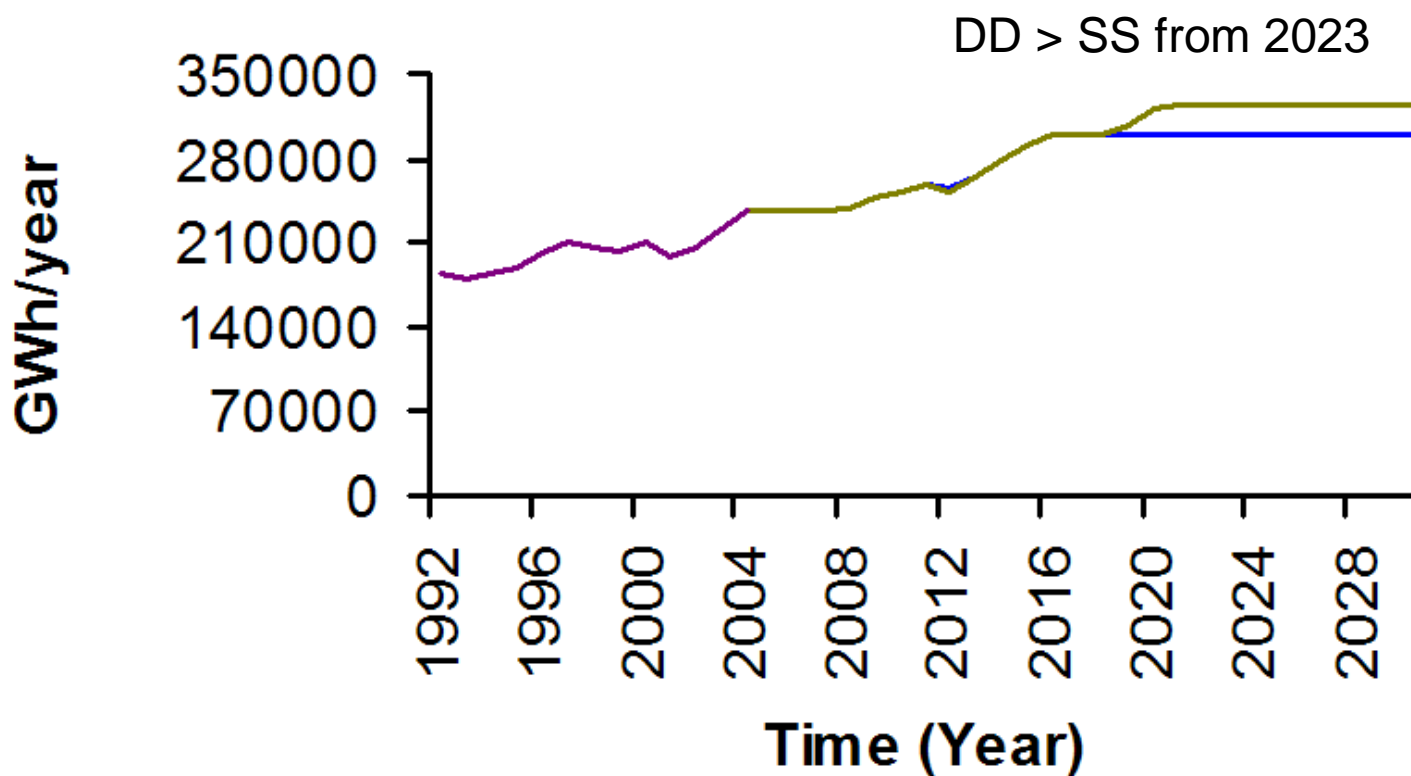


# Scenario analysis: EE2



# Scenario analysis: EE2

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# Discussion and Conclusions

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## Findings

- Stringent energy efficiency measure best for SA
- ## Model
- Energy modules of SA T21 framework
  - Validation using historical data and statistics
  - Limitations: limited data availability

## Future research

- Expand the model to incorporate cross sectoral impacts

*Thank you*

[jmusango@csir.co.za](mailto:jmusango@csir.co.za)

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