UNDERSTANDING TRADE-OFFS BETWEEN DEVELOPMENT AND RESOURCES

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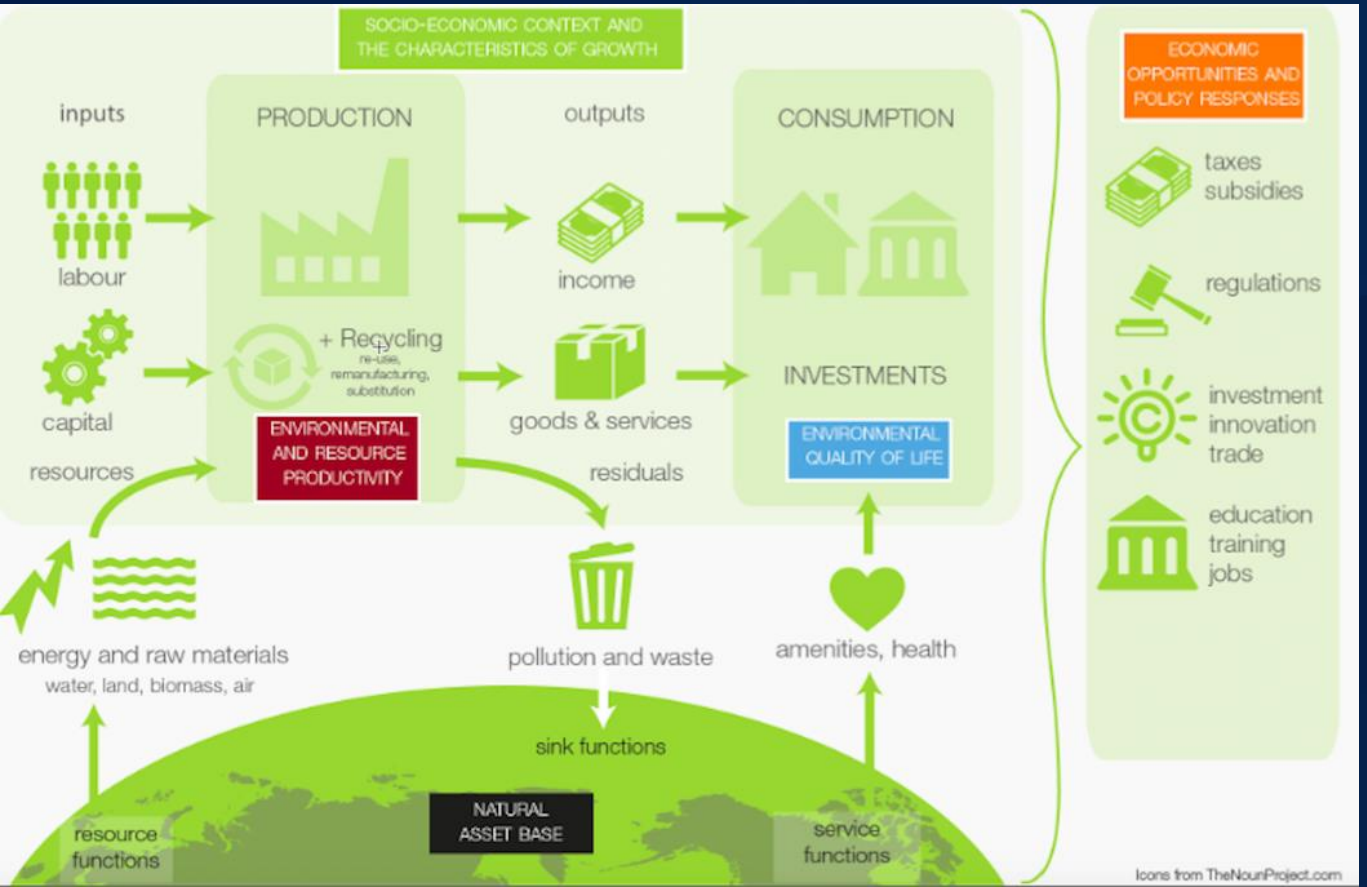
WHY UNDERSTAND RESOURCE TRADE-OFFS WITH INDUSTRIAL DEVELOPMENT?



- Industrial Development is a Nexus question with different spatial and temporal resolutions
- Industrial development should address both feedstock + production aspects
- Are there limits to growth?

WHAT ARE PRIORITIES?

UNEMPLOYMENT

- 24% in 2011
- 27% in 2016

INEQUALITY

- Gini Coefficient:
  - 0,69 in 2011
  - 0,68 in 2015

POVERTY

Lower Poverty Level

- 36,4% 2011
- 40% in 2015

STATSA

6% GDP Growth – NIP

- 3,5% IN 2011
- 0,3% IN 2016

Reduce Gini Coefficient:

From 0,7 in 2010 to 0,6% in 2030

STATS

WHAT IS REQUIRED ?

- Can the required growth be achieved by available resources?
- What options do we have to increase resource availability?
- What are the production possibilities in light of climate change?

HOW DO WE GET THERE?

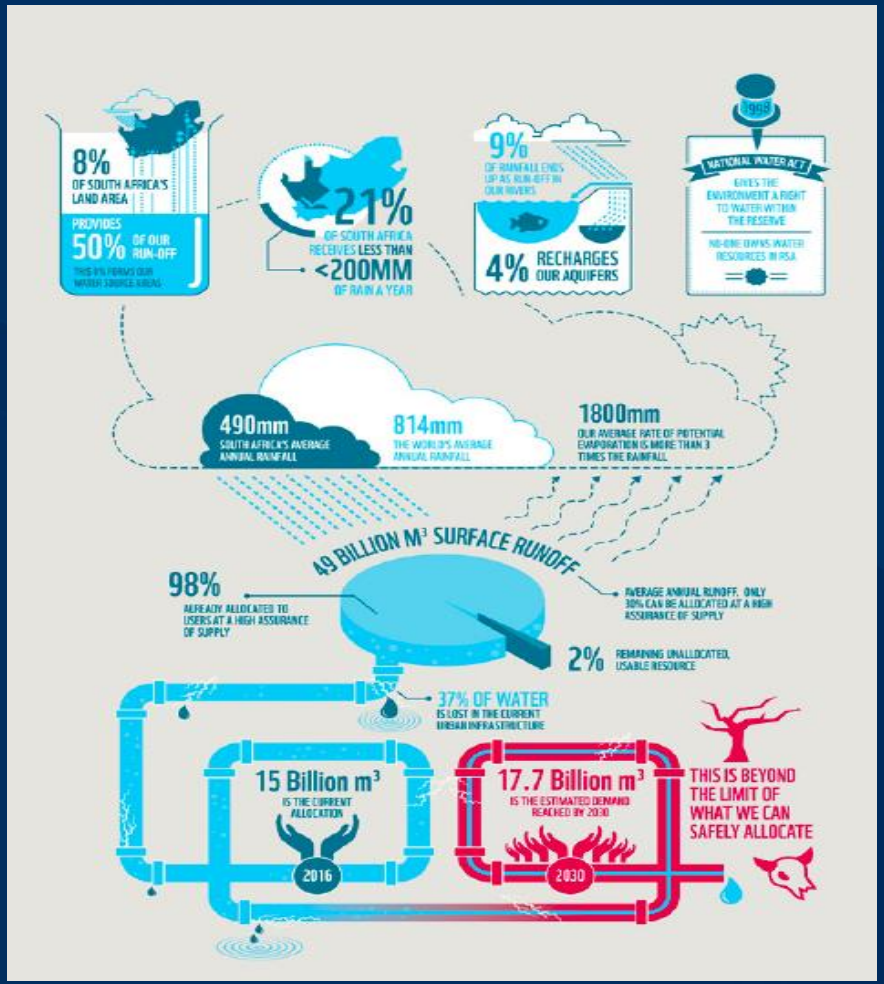
INDUSTRIALISATION DRIVEN BY IPAP

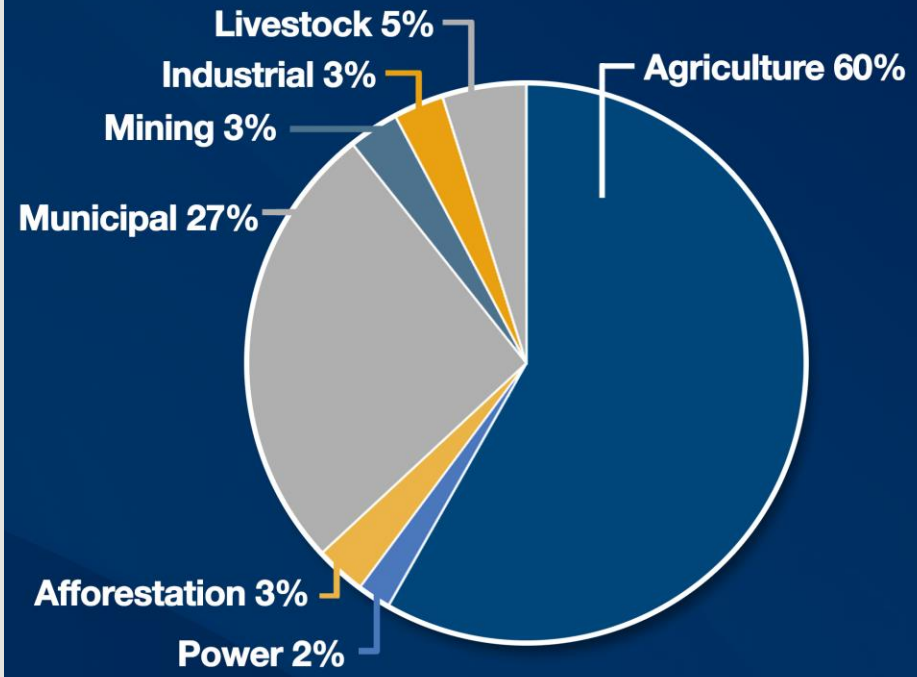
- Automotive
- Metal Fabrication Capital, Rail Transport
- Agro-Processing
- Clothing, Textiles, Leather & Footwear
- Plastics, Pharmaceuticals, Chemicals
- Timber, Paper, Pulp, Furniture

IPAP

WHAT ARE OUR RESOURCE ENDOWMENTS?

- Land, Biodiversity
- Water
- Energy





CONSUMPTION PER UNIT

Goldfield	- 119 Million m3 / Ounce Gold in 2014/15
Ford	- 20,4 m3 Per Vehicle
Platinum	- 201 m3/Kg
Textiles	- 2,7m3 / Shirt
ESKOM	- 370 GL by 2020
Refined Sugar	- 1,5m3 / Kg

Energy

Coal – 70%
Oil – 23%
Natural Gas – 3%
Nuclear – 3%
Renewables – 1%

DMR 2015

- 22 000 GW/hr electricity Production Average

DRIVERS OF ENERGY USE

- Process Energy
- Compressors
- Material Handling
- Pumps
- HVAC / Cooling
- Equipment

Technology Options through RD&I to increase availability

- Mining 15% Electricity Output, Gold 47%, Platinum 33%
- Industry 36%
  - Mining & Quarrying 16%
  - Iron & Steel 15%
  - Chemicals & Petrochemicals 11%
  - Non-Ferrous Metals
  - Non-Metallic Minerals 8%
  - Other Industry 3%
  - Non-Specified 39%

IEA 2012

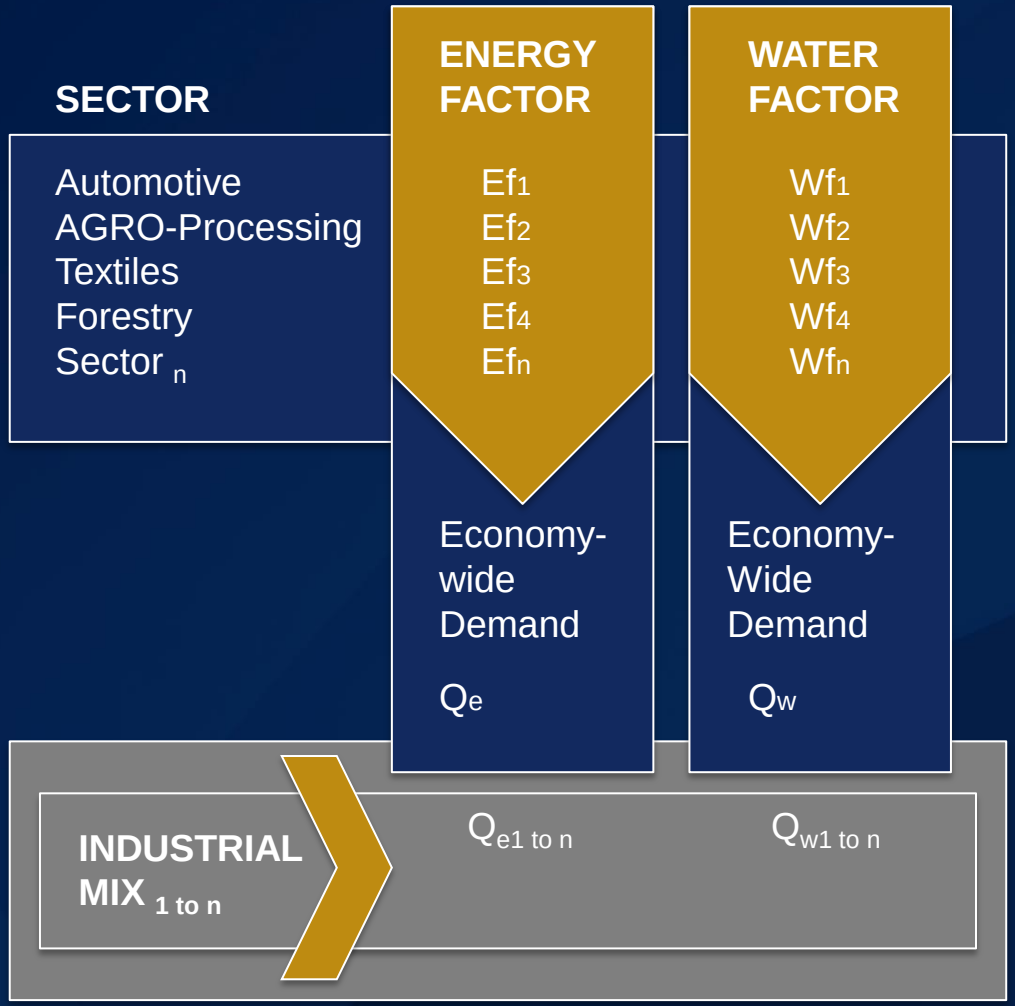
CONSUMPTION PER UNIT

- Steel 5,72 K – 6,56 Mwh/t
- Cement 110 Kwh/Ton
  - Value Chain from Quarrying – Finish
  - 3,882 – 6343 MJ/Ton by 2006

Otterman 2011

- Textiles
  - Yarn Spinning 3,24 – 3,47 Kwh/Kg
  - Weaving 1,58 – 2,24 Kwh/Kg
  - Wet Processing 0,79- 1,05 Kwh/Kg
  - Clothing Production 0,065 – 0,195 Kwh/Kg

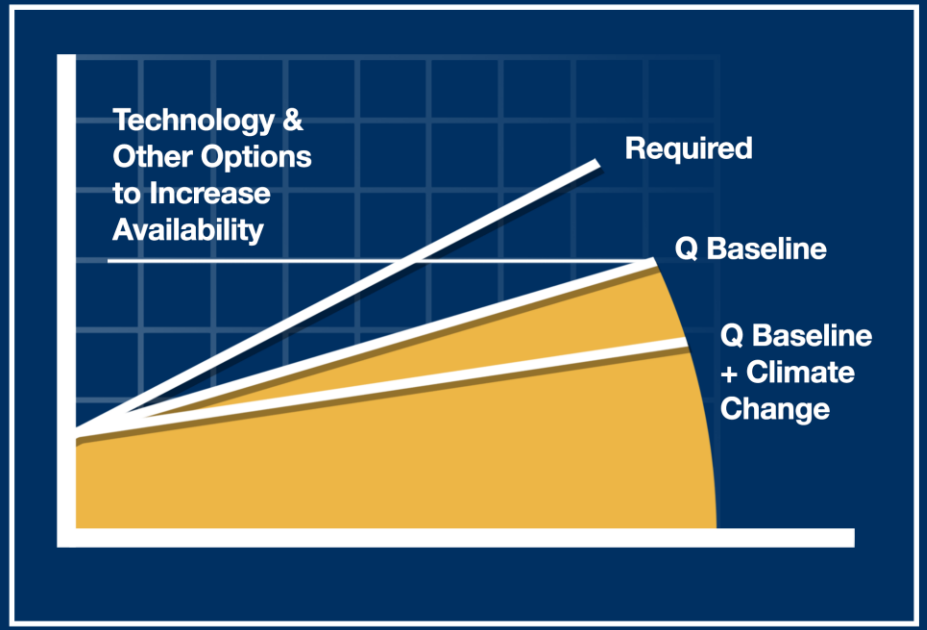
Palamactu 2010

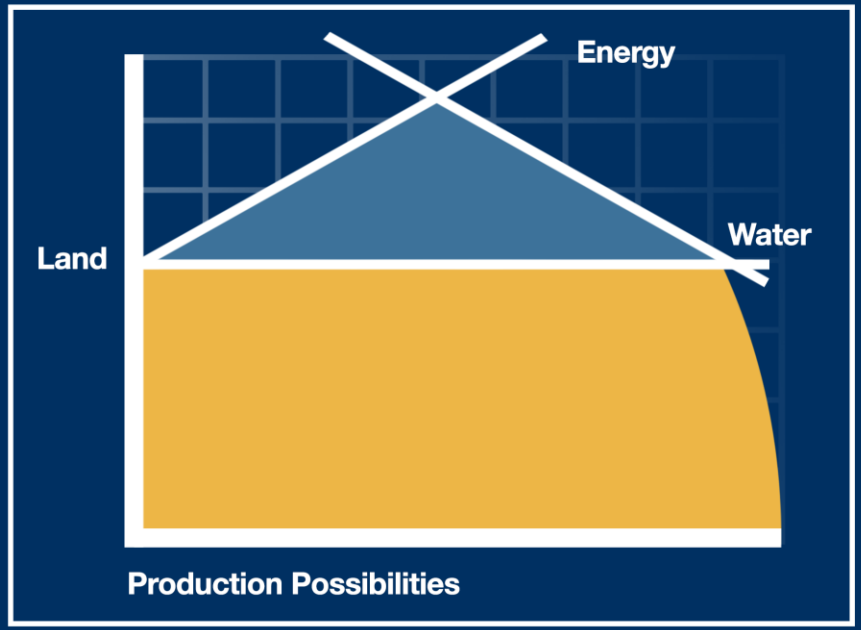


Trade-off questions for the Nexus

- What is the carbon constraint and decarbonisation rate?
- What are surface water futures, in light of climate change?
- Which industrial options optimise priorities?
- What is the appropriate mix of industry?
- What technological options can address availability?

CONCEPTUAL APPROACH TO UNDERSTANDING TRADE-OFFS





WHAT IS THE WAY FORWARD FOR SOUTH AFRICA?

- Defines the ‘production possibilities envelope’ in light of resource futures, including the associated choices
- Informs development and investment decision making by both public and private sectors, as such an integral tool going forward
- Identifies key RD&I questions for the National System of Innovation, including and the CSIR in light of resource and industrial futures
- Impact of policy options on resources and development, both domestic and international policies, as such more operational
- CSIR is well positioned to lead this work as value add to industry and policy makers, whilst sharpening its research focus

THANK YOU

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