

IRENA WORKSHOP

Africa Clean Energy Corridor

The Strategic Network Development for Connection of RE IPPs In South Africa

Kevin Leask

Eskom, Transmission, Grid Planning

Abidjan, Ivory Coast

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STRATEGIC GRID PLAN FOR SOUTH AFRICA (2040 Transmission Network Study)

Integrated Resource Plan

- “ The Department of Energy (Energy Planner) is accountable for the Country Energy Plan as per the published regulations.
- “ The Country Plan is also termed the Integrated Resource Plan (IRP).
- “ The Integrated Resource Plan (IRP) is intended to drive all new generation capacity development.
- “ NERSA licences new generators according to this determination.

Strategic Grid Plan

- “ The Strategic Grid Plan formulates long term strategic transmission corridor requirements
- “ Plan is based on range of generation scenarios, and associated strategic network analysis
- “ Horizon date is 20+ years
- “ Updated every 3-5 years

Transmission Development Plan

- “ Transmission Development Plan (TDP) presents transmission corridor requirements
- “ Plan covers a 10 year window
- “ Updated annually
- “ Indicates financial commitments required over 10 year period

The location of the future generation to supply the load demand growth is uncertain which means long term strategic studies must be done to determine the required transmission network needs for the future.

The 2040 Transmission Network Study was undertaken to:

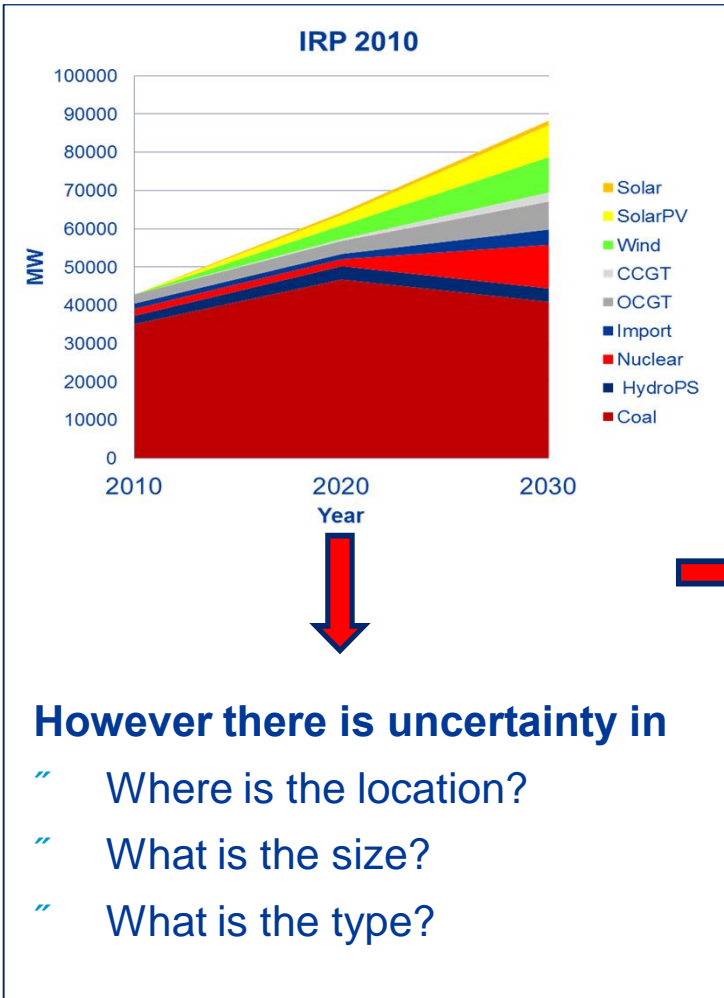
- “ **Adapt to the uncertainty of future** load and generation
- “ Identify the **critical power corridors** and constraints on the transmission network
- “ Unlock and create a **flexible and robust grid** to be able to respond to the changing future needs of the country

The 2040 Transmission Network Study was undertaken to determine the development requirements of the future transmission grid to accommodate the expected load demand needs and the potential impact of future generation scenarios using the 2010 Integrated Resource Plan (IRP) as a baseline.

2040 Tx Study – Generation Spatial Allocation

Transmission to enable the IRP requires Spatial Information

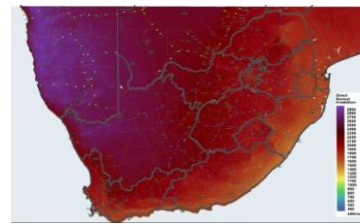
Generation Energy Resources for Electricity



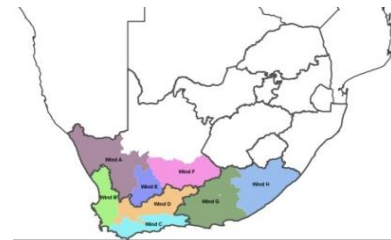
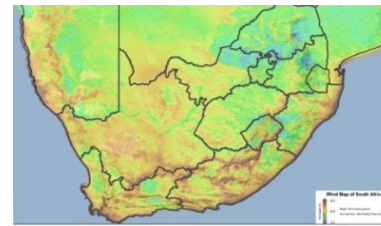
However there is uncertainty in

- “ Where is the location?
- “ What is the size?
- “ What is the type?

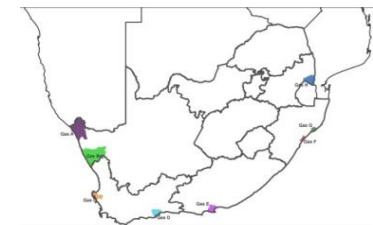
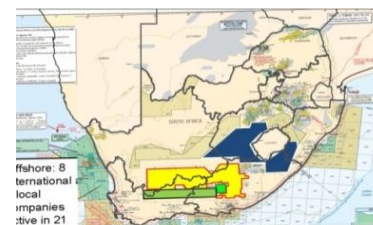
Solar



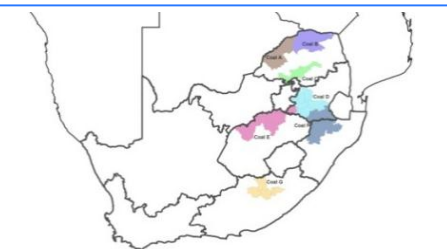
Wind



Gas



Coal



2040 Tx Study – New Generation Allocation

Generation

Energy resources for electricity

GAS

CSP

Wind

Nuclear

Coal

Significant change in Generation location

Demand

Load Demand for each area for 2020 & 2040

Load Density in 2020

77%

23%

Load Density in 2040

75%

25%

No significant change in load location

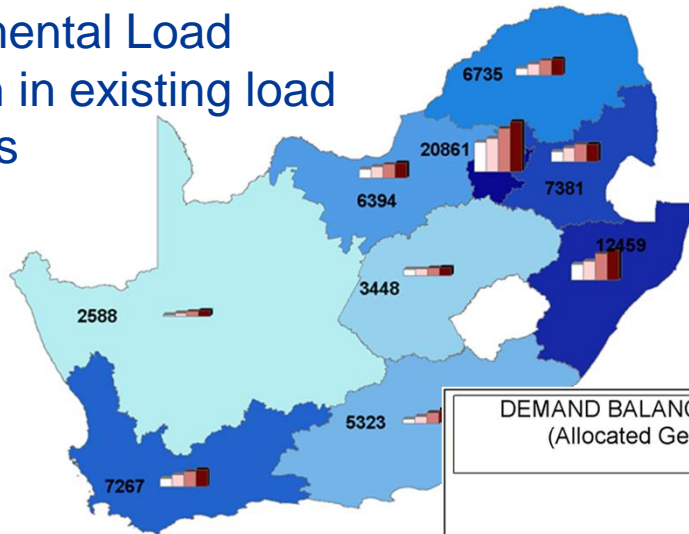
Mapping the Demand and Generation

“ Spatial Location of Load



LOAD GROWTH BY 2040 PER PROVINCE
(Maximum Demand in MW)

Incremental Load growth in existing load centres

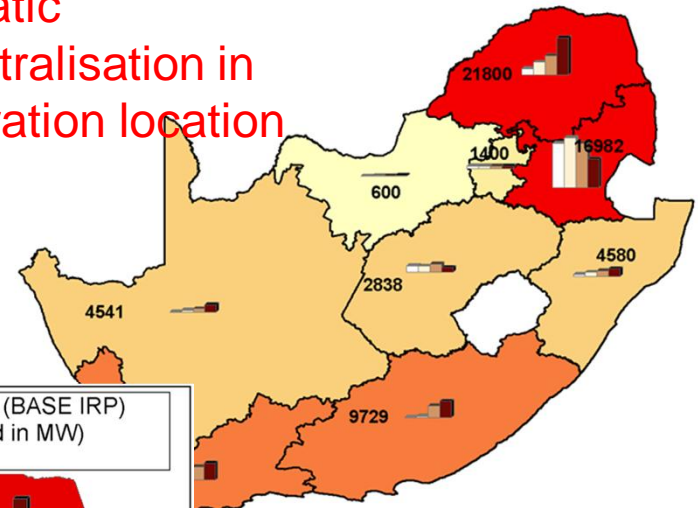


“ Spatial location Generation

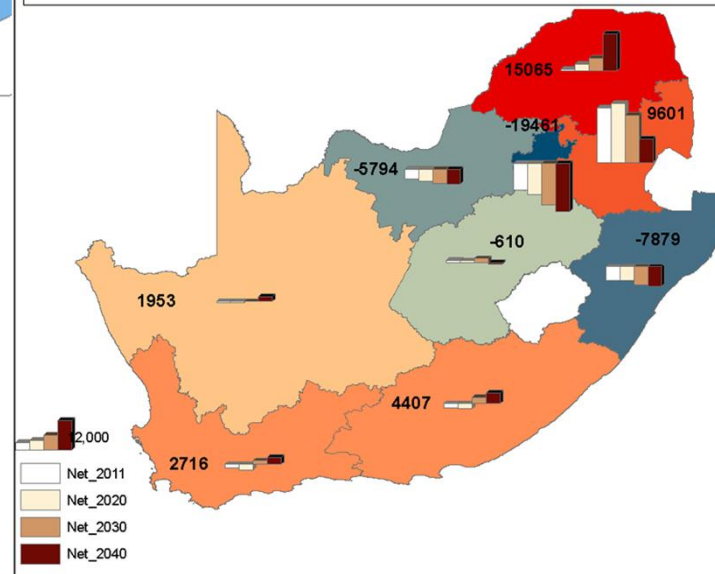


GENERATION DEVELOPMENT FOR SCENARIO A (BASE IRP)
(Maximum Demand in MW)

Dramatic decentralisation in Generation location



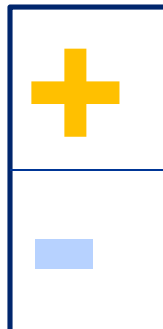
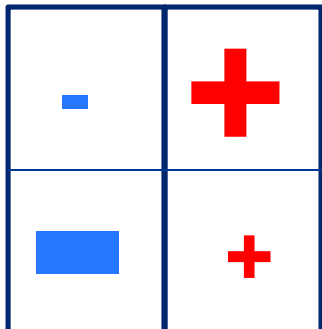
DEMAND BALANCE BY 2040 FOR SCENARIO A (BASE IRP)
(Allocated Generation less Maximum Demand in MW)



Load

Gx

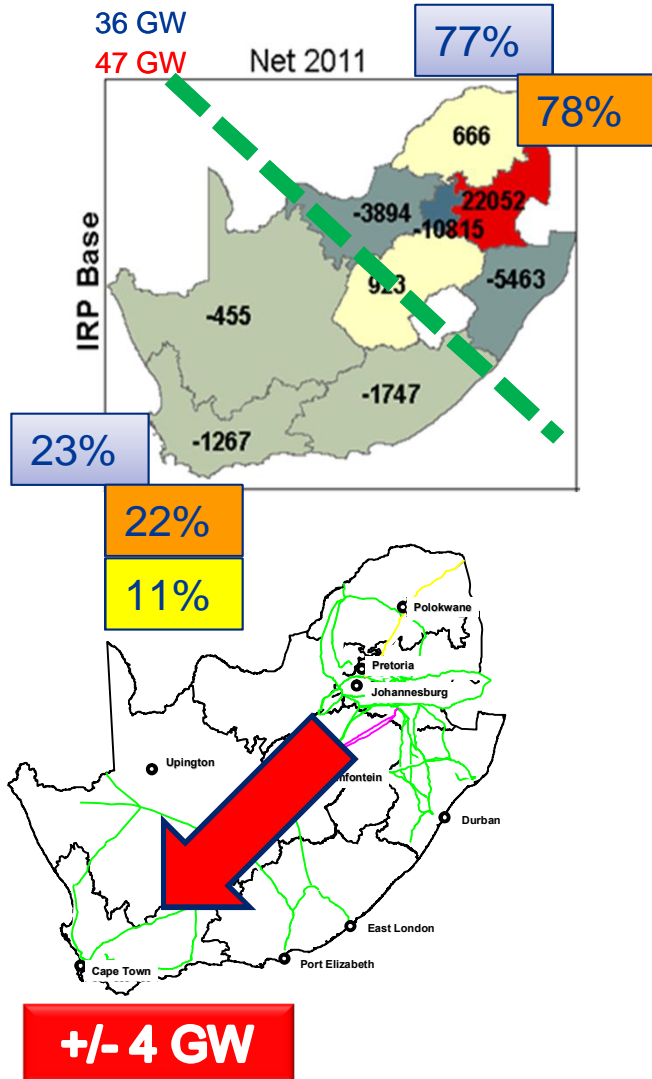
Excess / Deficit



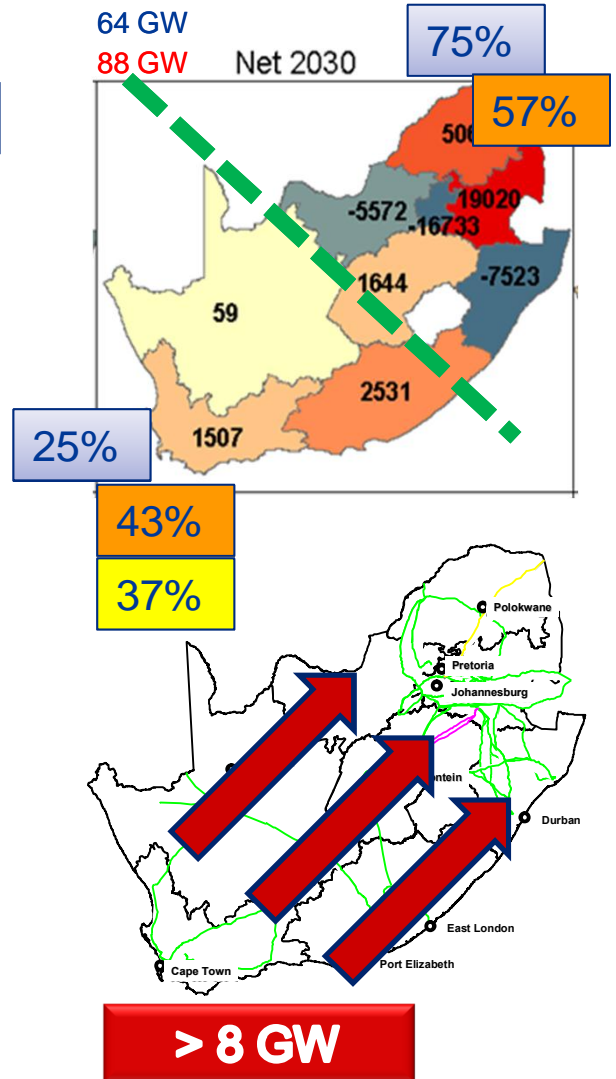
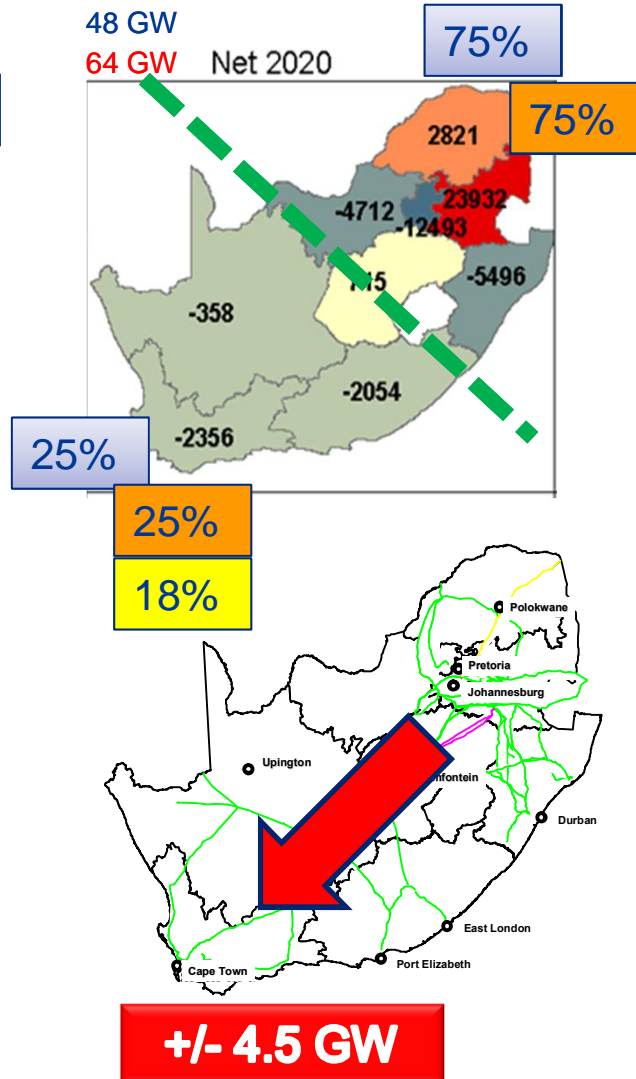
Generation Excess
 Demand Excess

Demand Balance change into the future

Current Network Transfer



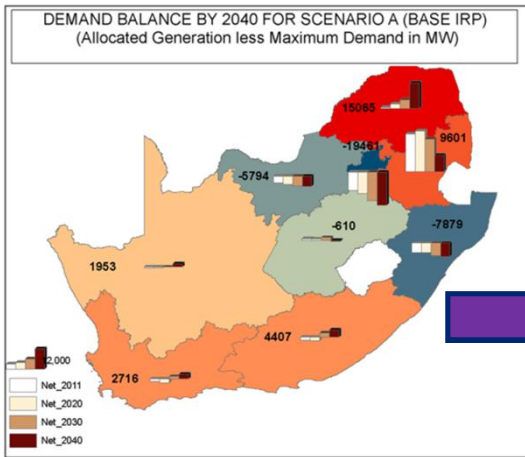
Future Network Transfer



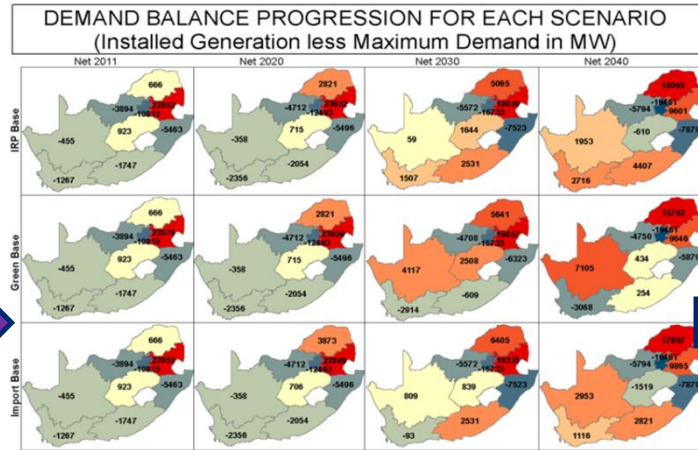
Summary of Strategic Tx Grid Study



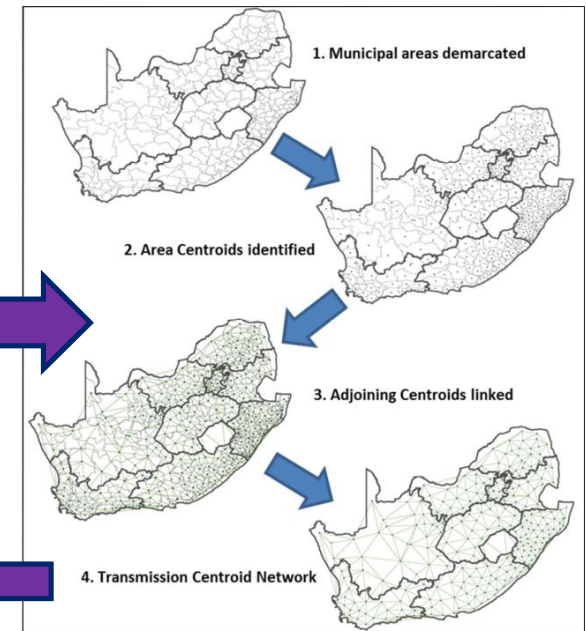
Demand Balance



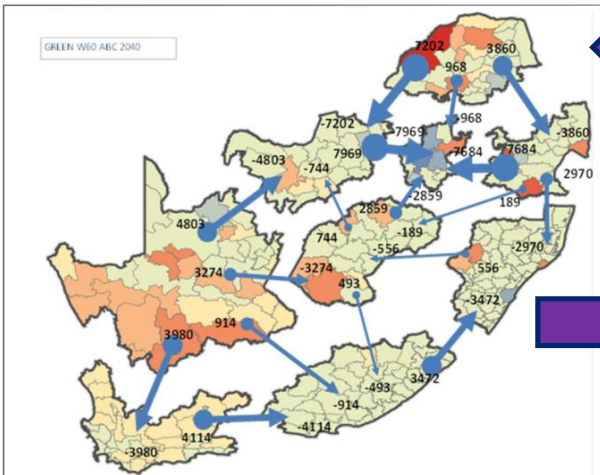
Multiple Scenarios



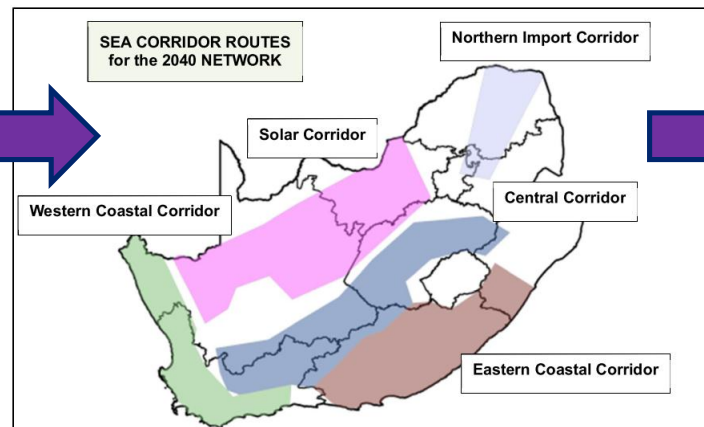
Centroid Network



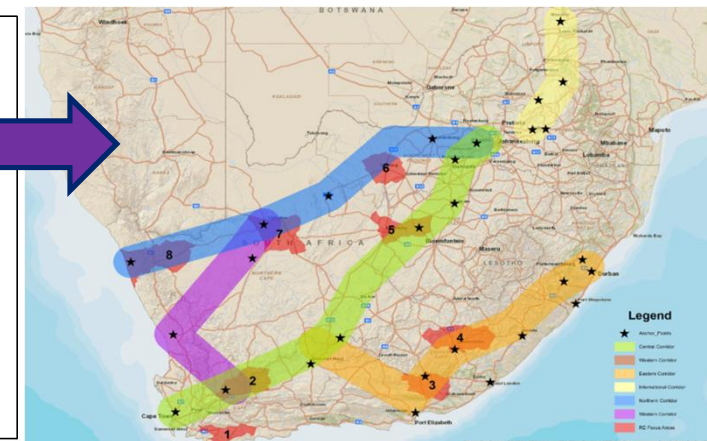
Power Flows



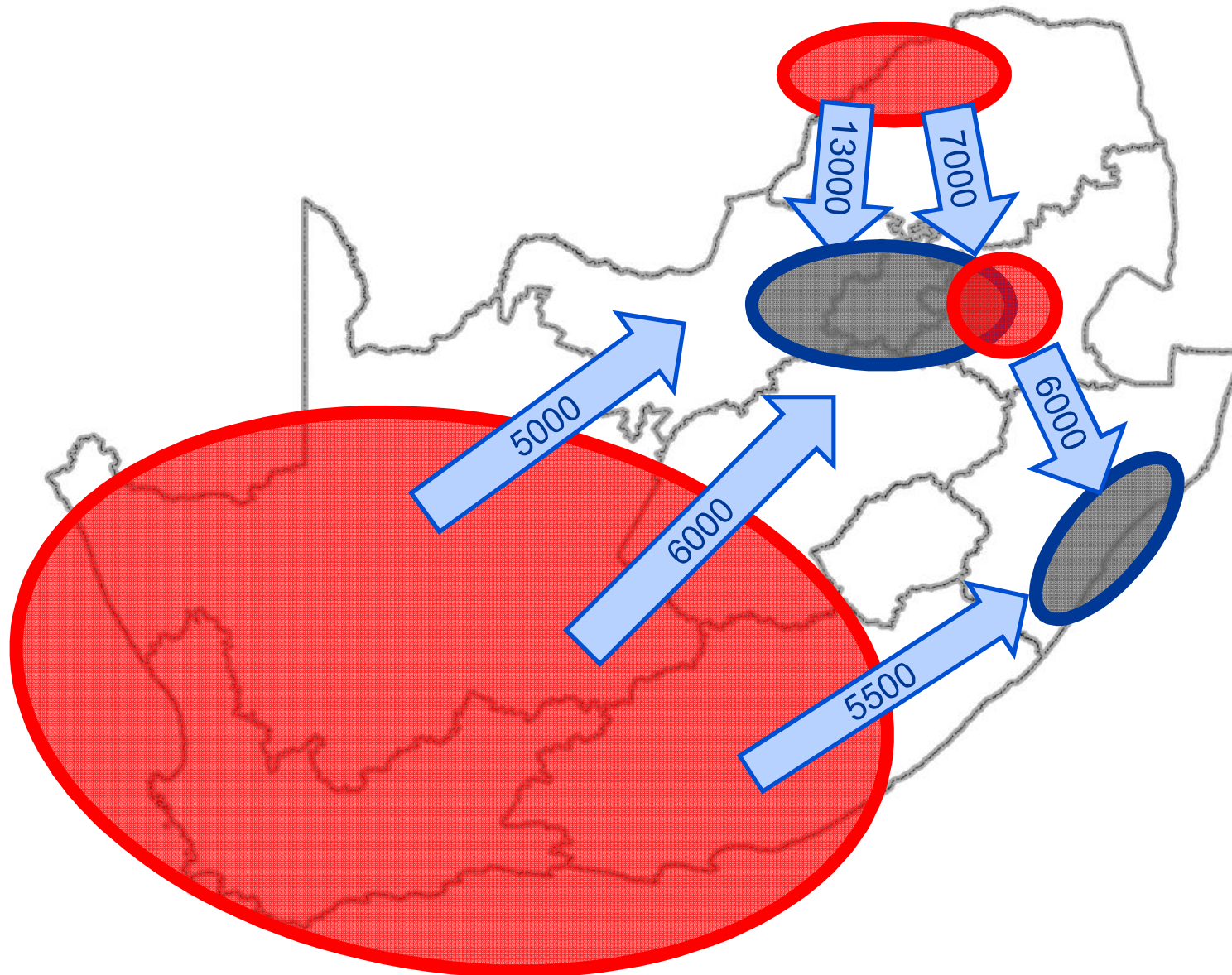
Common Power Corridors



SIP 10 SEA Study



Tx 2040 Study – Future Main Corridors Overview



LOAD CENTRES

Gauteng & Central areas

KZN East Coast areas

POWER POOLS

2 *Concentrated* areas in the North

1 large *Dispersed* area in the South

MAIN POWER CORRIDORS

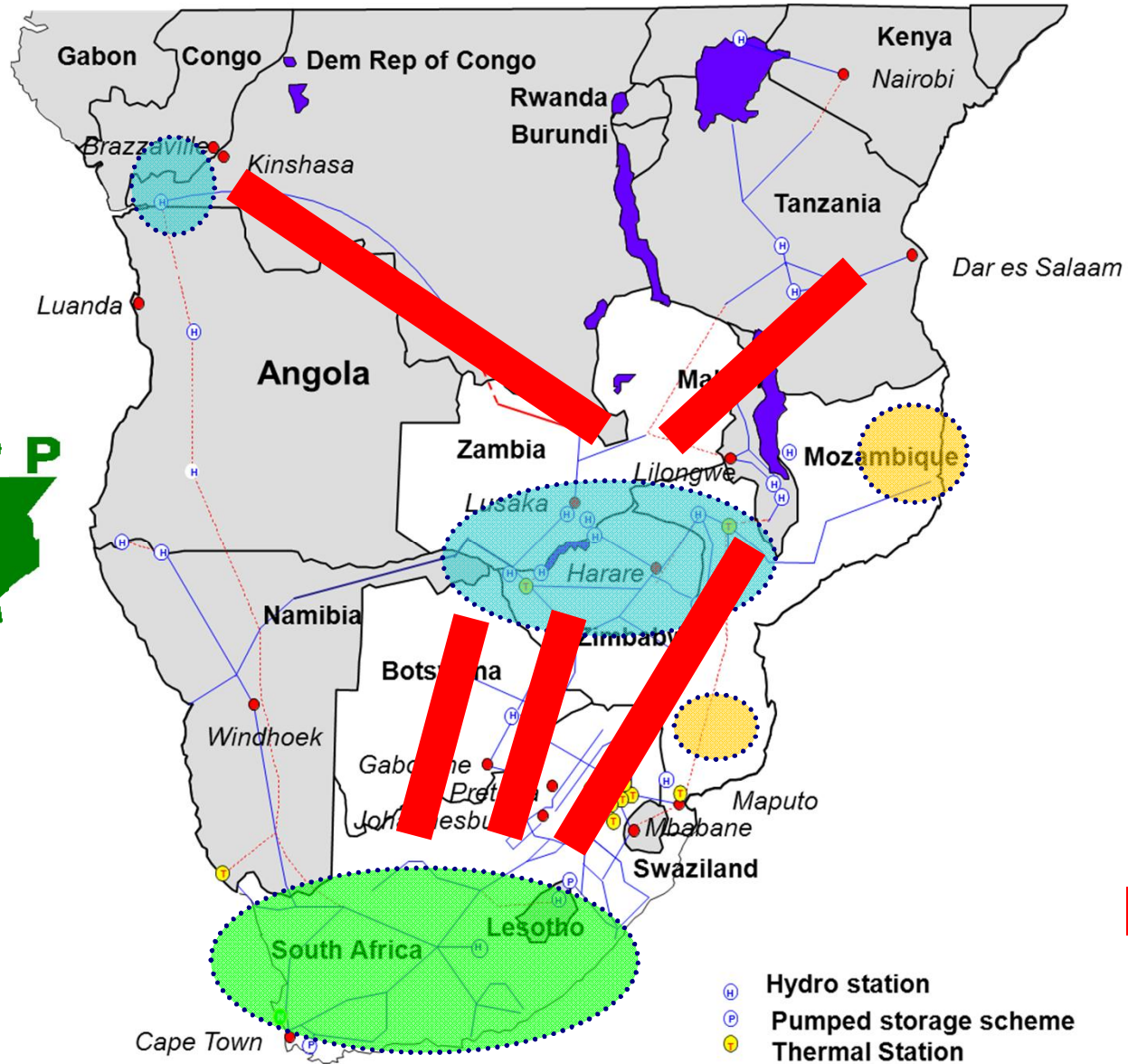
3 from the North .
two already secured

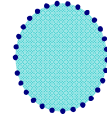
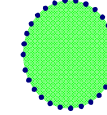
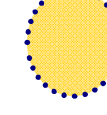

3 from the South .
only one partially secured

THE SOUTHERN AFRICAN POWER POOL (SAPP)

- “ South Africa (Eskom) part of Southern African Power Pool (SAPP)
- “ SA has large potential of RE in south of country
- “ Neighbouring countries to the north also have RE potential, but biggest potential is hydro power
- “ SA is a dry country . very limited hydro potential
- “ Challenge with RE is intermittency of supply
- “ Best solution is wide spread of connection and combination of types
- “ Opportunity for SAPP is sharing of resources
- “ Eskom proposing a long term goal of increased interconnection to allow export of RE excess in SA to allow banking of hydro to the north
- “ In times of low RE output the hydro power is imported

The SAPP Network



-  Hydro potential
-  RE Potential
-  Gas potential
-  Potential Tx Power Corridors

-  Hydro station
-  Pumped storage scheme
-  Thermal Station

NEXT STEPS

- “ Mapping of RE and other resources
- “ Policy for energy planning for each country . especially on imported power
- “ Master Plan for each country
- “ Matching of needs and availability

STATUS

- “ Measurement of water resources and RE potential started
- “ Interconnection options identified and studies initiated on some
- “ Supply and demand assessments per country required as input for new SAPP development plan
- “ Master Plans being prepared

THANK YOU