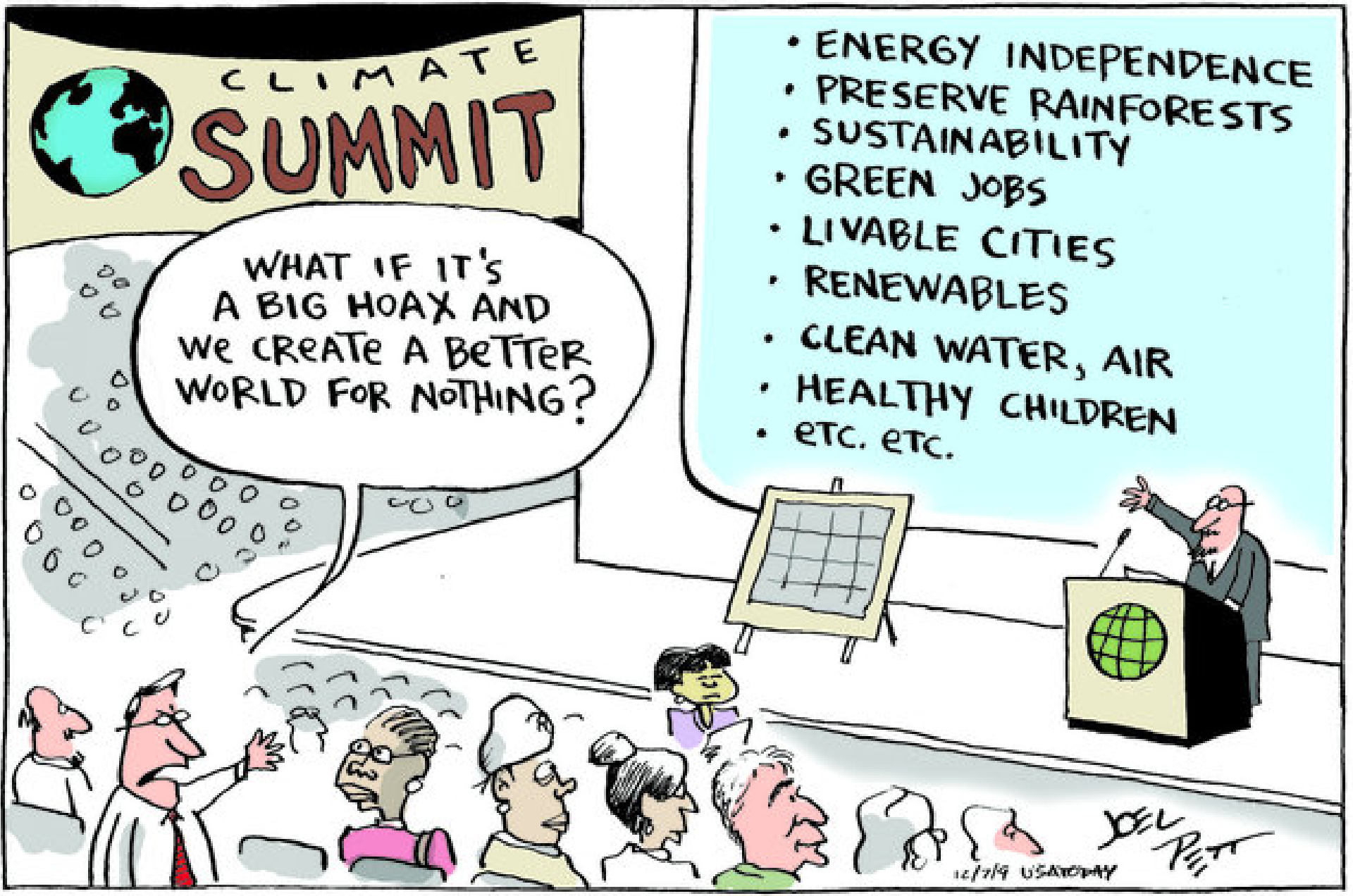
CLIMATE
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• ETC. ETC.
12/7/19 USATODAY
JOEL PETT

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Coal and the W-E-F Nexus in South Africa: Policy Considerations

Panel 7: 22 November 2016

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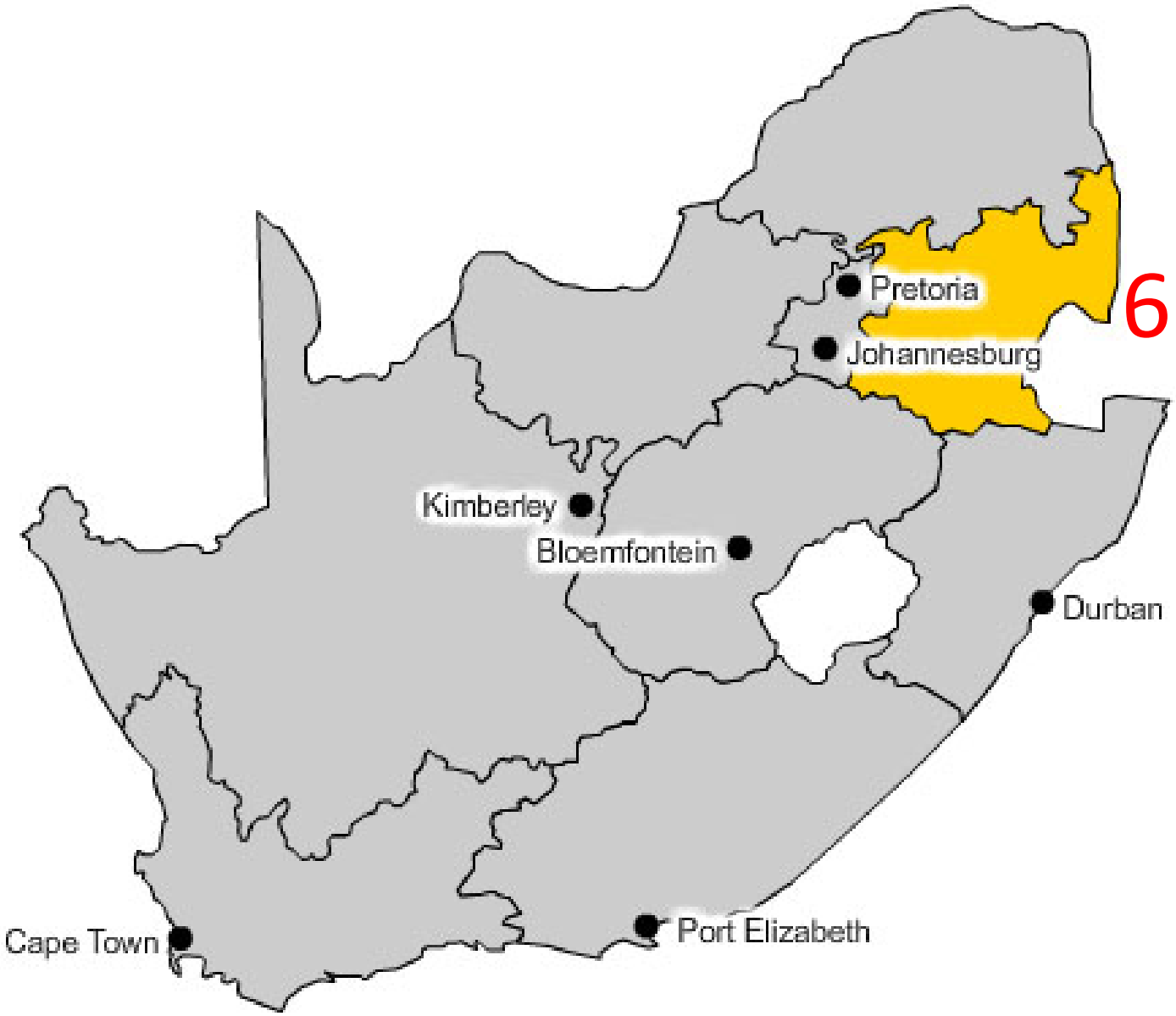
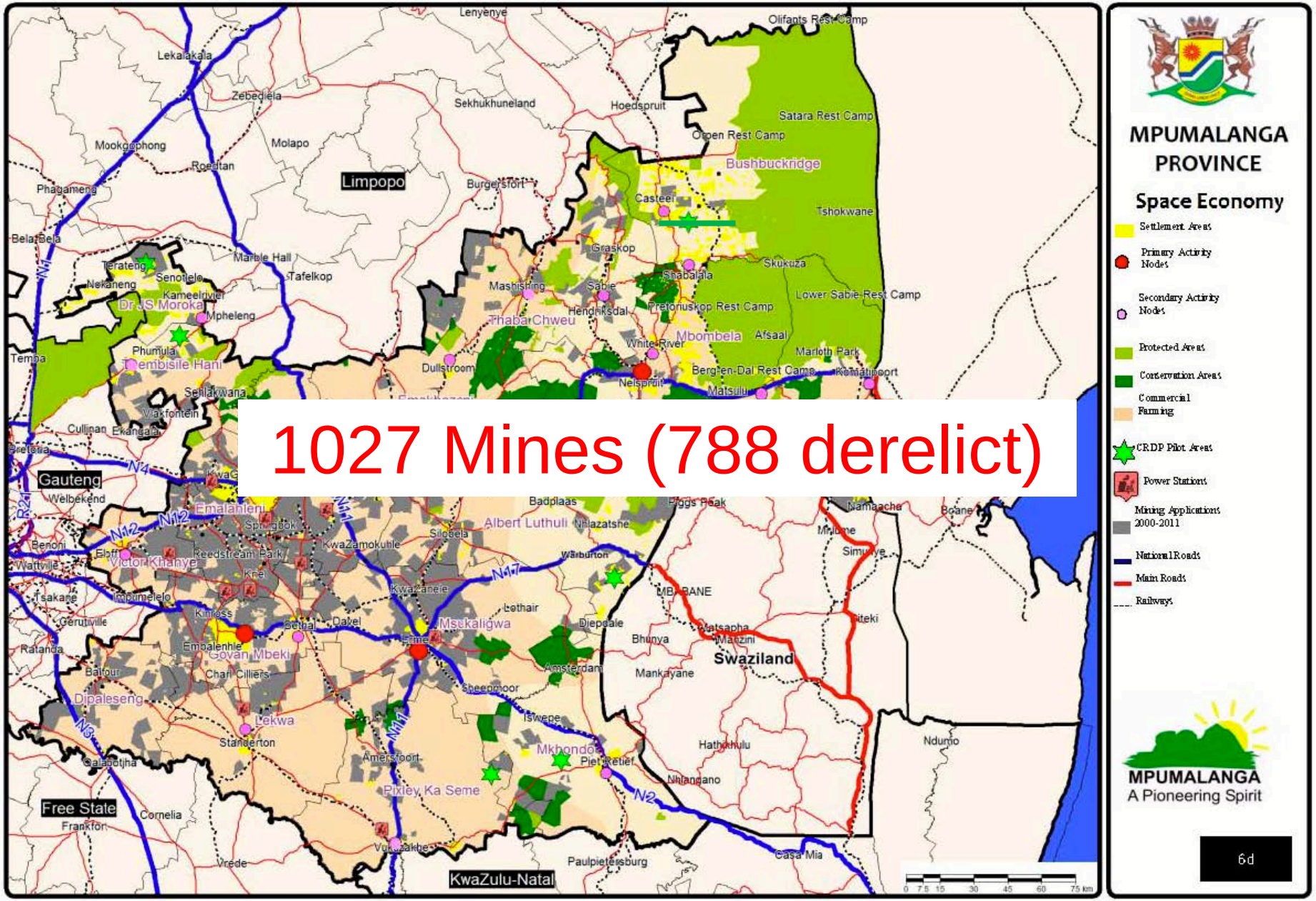

Pretoria
Johannesburg
Kimberley
Bloemfontein
Durban
Cape Town
Port Elizabeth

61.3%



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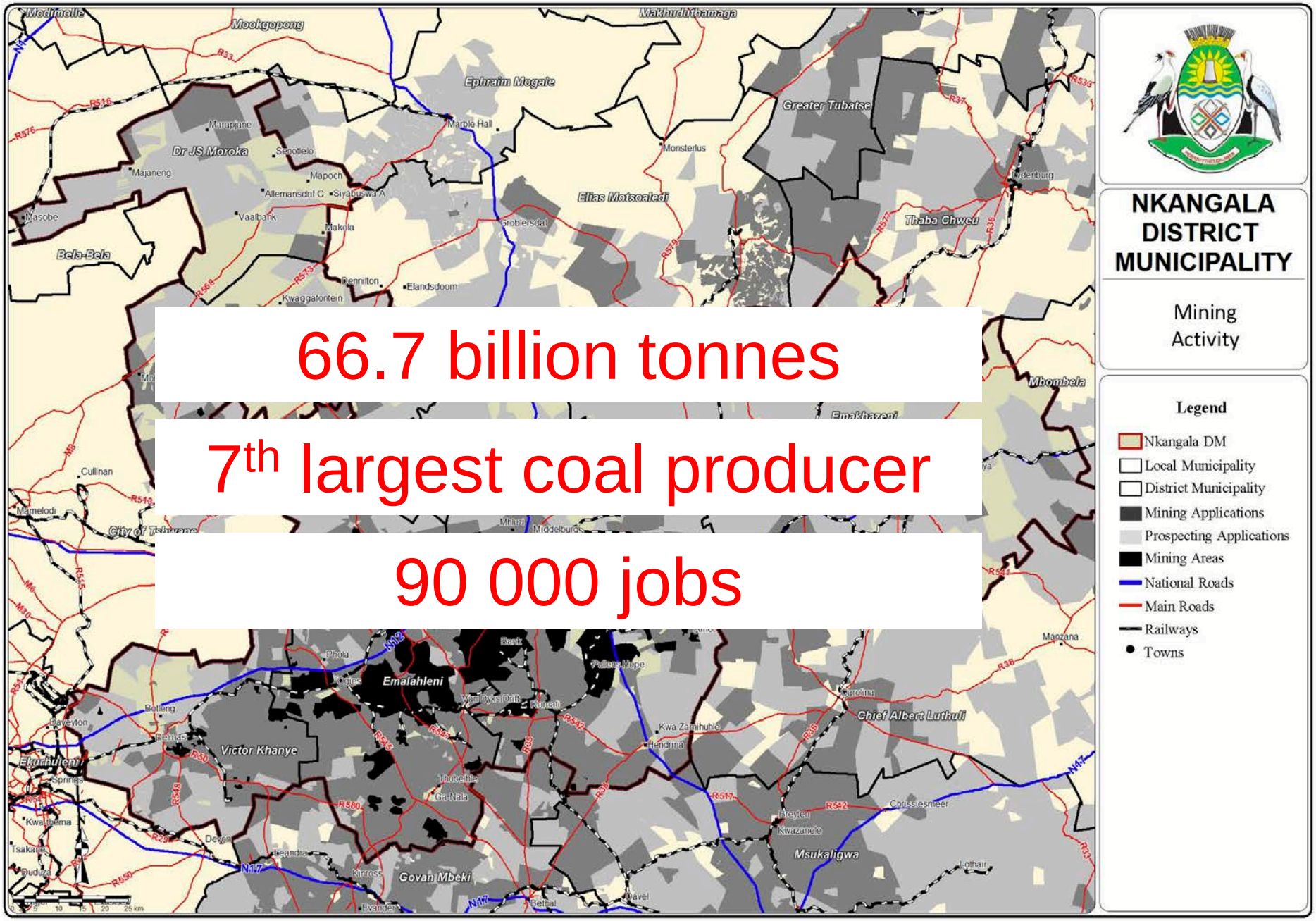

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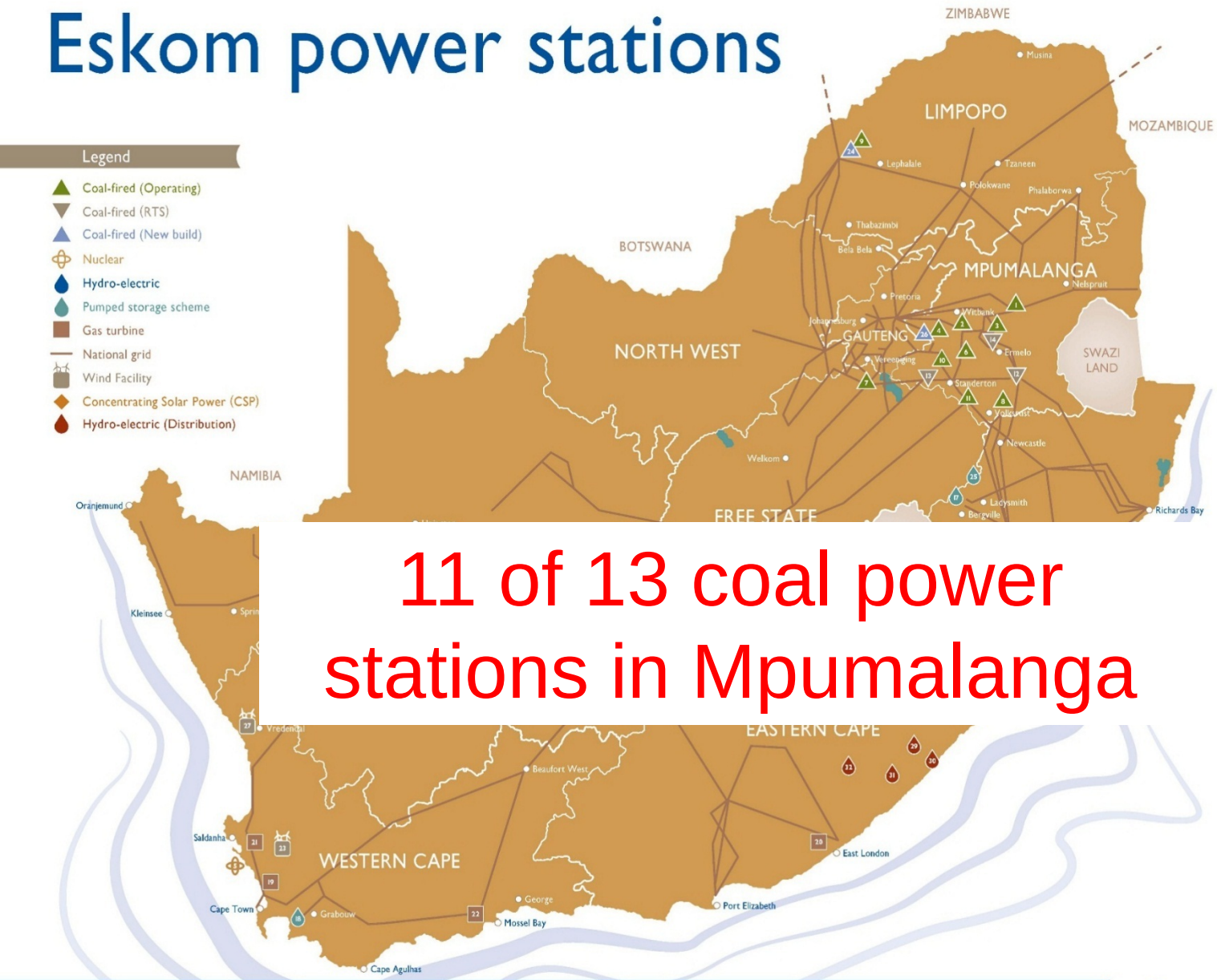
Eskom power stations



11 of 13 coal power stations in Mpumalanga

Base load stations

1	Arnot	2 352 MW	7	Lethabo	3 708 MW
2	Duvha	3 600 MW	8	Majuba	4 110 MW
3	Hendrina	2 000 MW	9	Matimba	3 990 MW
4	Kendal	4 116 MW	10	Matla	3 600 MW
6	Kriel	3 000 MW	11	Tutuka	3 654 MW

Coal

Nuclear

5 Koeberg 1 940 MW

Return-to-service stations

Coal

12	Camden	1 510 MW
13	Grootvlei	1 200 MW
14	Komati	940 MW

The return-to-service (RTS) stations were mothballed in 1990 and are in the process of being recommissioned due to the growing demand for electricity. The return-to-service project for Camden power station ended on 31 March 2010 with the entire station fully commercial.

Peak demand stations

Hydro-electric	15	Gariep	360 MW
	16	Vanderkloof	240 MW
Pumped storage scheme	17	Drakensberg	1 000 MW
	18	Palmiet	400 MW
Gas turbine	19	Acacia	171 MW
	20	Port Rex	171 MW
	21	Ankerlig	1 338 MW
	22	Gourikwa	746 MW

The peaking stations can generate electricity within a few minutes of start-up, making them ideally suited to supply power during peak periods. They also assist in regulating the system voltage and frequency to ensure stability of the national transmission network.

Renewable energy

Wind Facility

23 Klipheuwel Wind Facility 3 MW

New build

Coal	24	Medupi	4 788 MW
	26	Kusile	4 800 MW
Pumped storage scheme	25	Ingula	1 332 MW
Wind Facility	27	Sere Wind Facility	100 MW
Solar	28	Concentrating Solar Power (CSP)	100 MW

Distribution

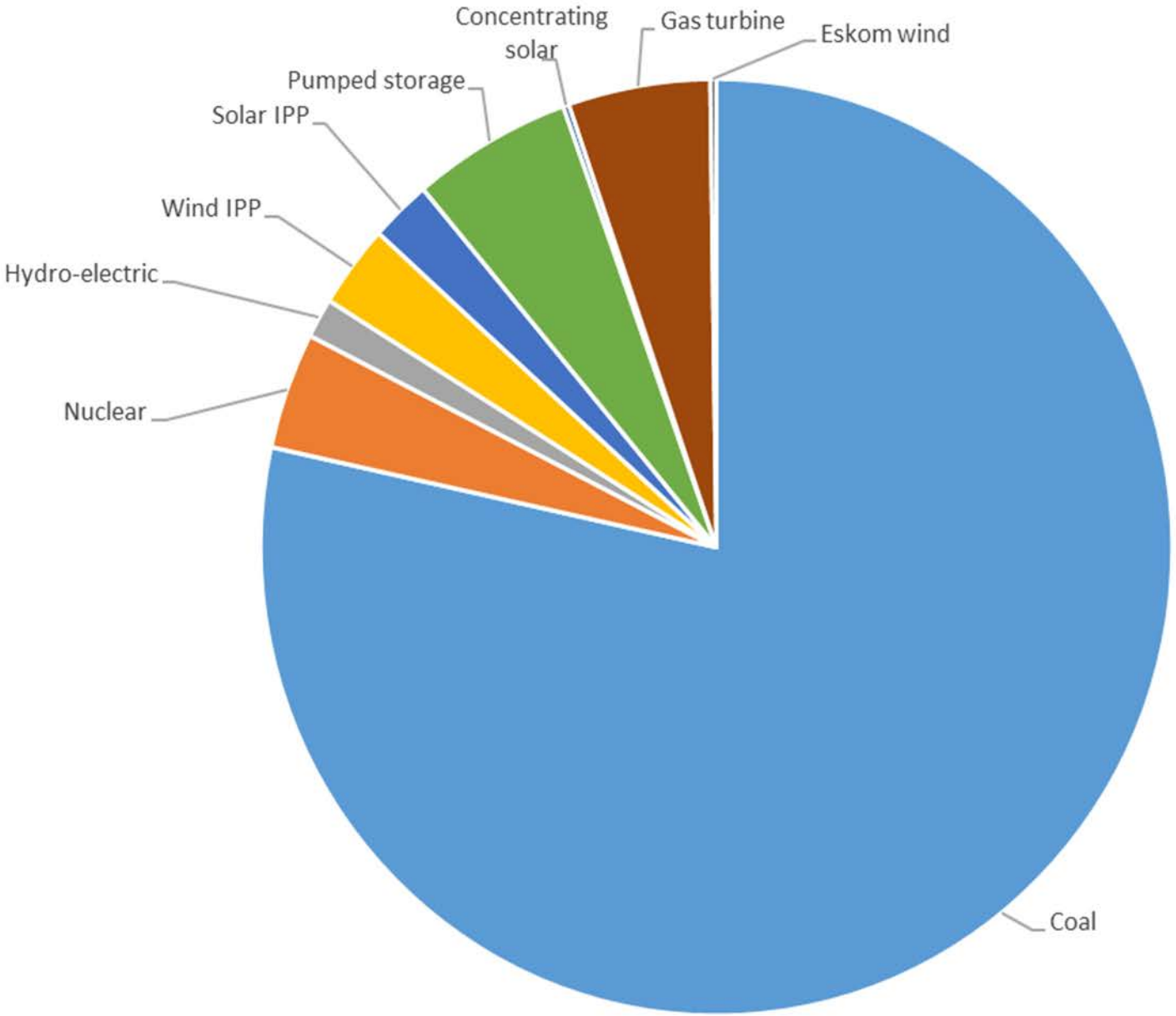
Hydro-electric	29	First Falls	6 MW
	30	Second Falls	11 MW
	31	Colley Wobbles	42 MW
	32	Ncora	2 MW

These hydro-electric power stations fall within the Distribution Division in the Eastern Cape operating unit and are used to stabilise the distribution network in that area.

Issued by: Generation Communication Department, February 2013

Eskom | Powering your world

www.eskom.co.za


Concentrating solar
Gas turbine
Eskom wind
Pumped storage
Solar IPP
Wind IPP
Hydro-electric
Nuclear
Coal

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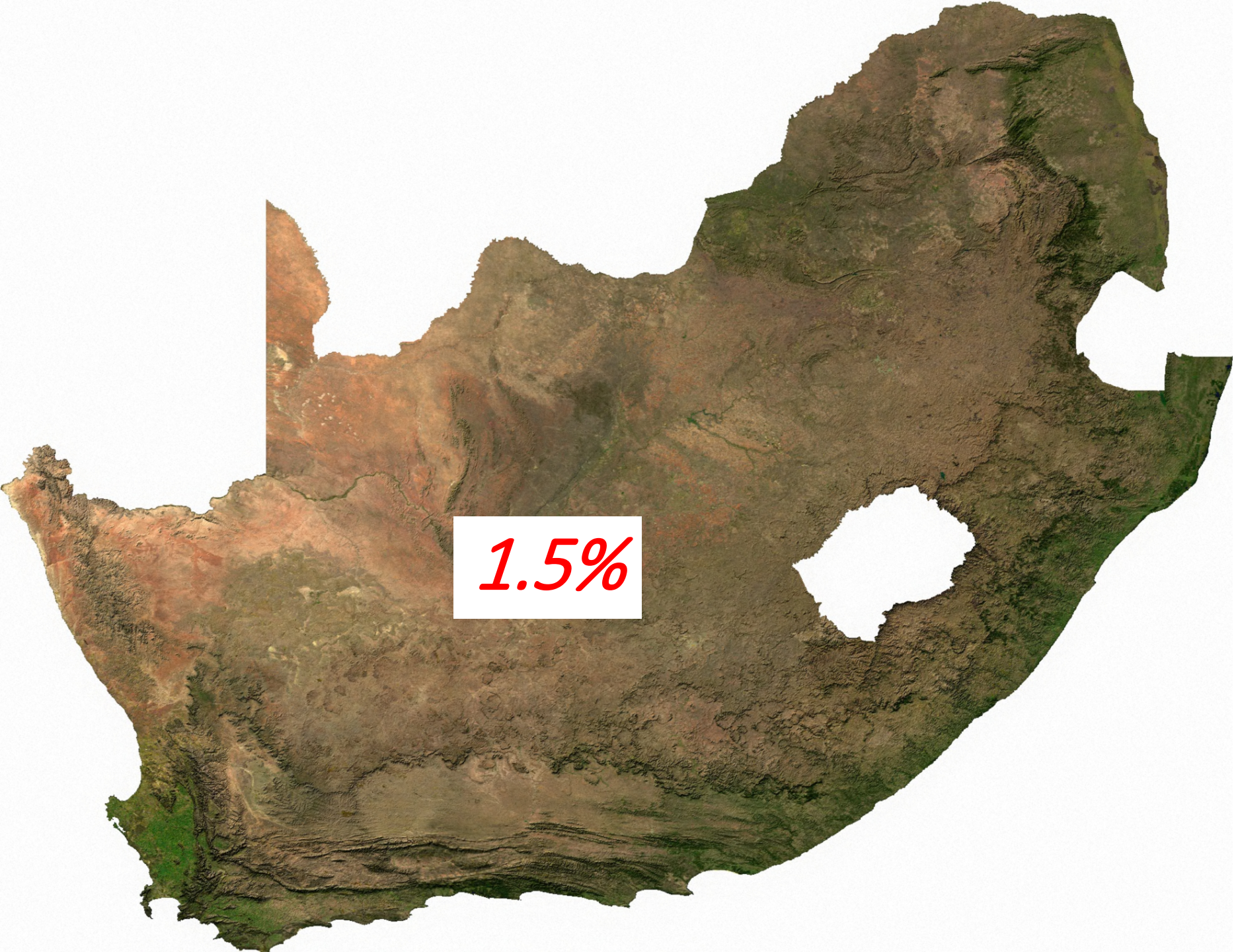
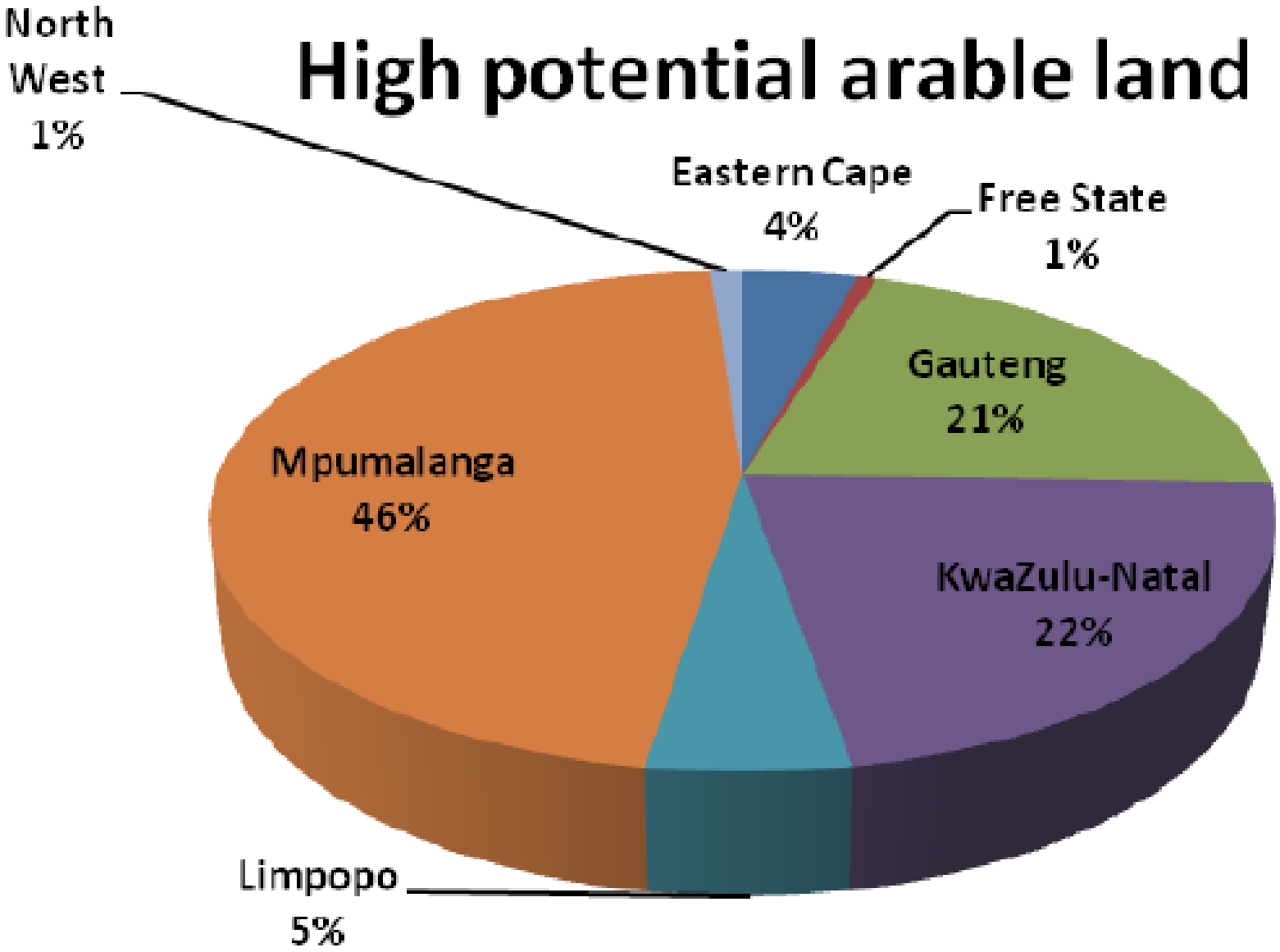

1.5%

High potential arable land



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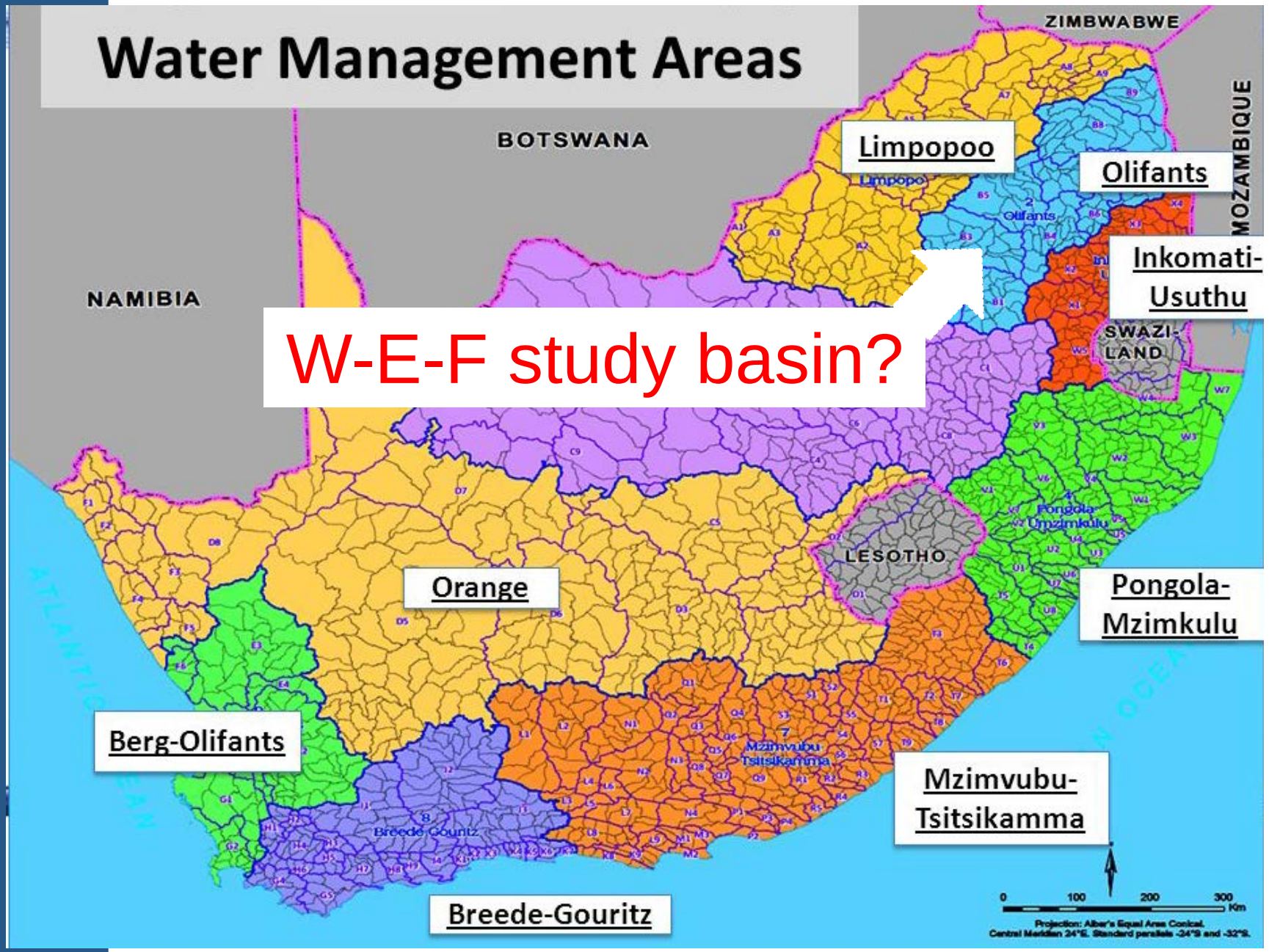

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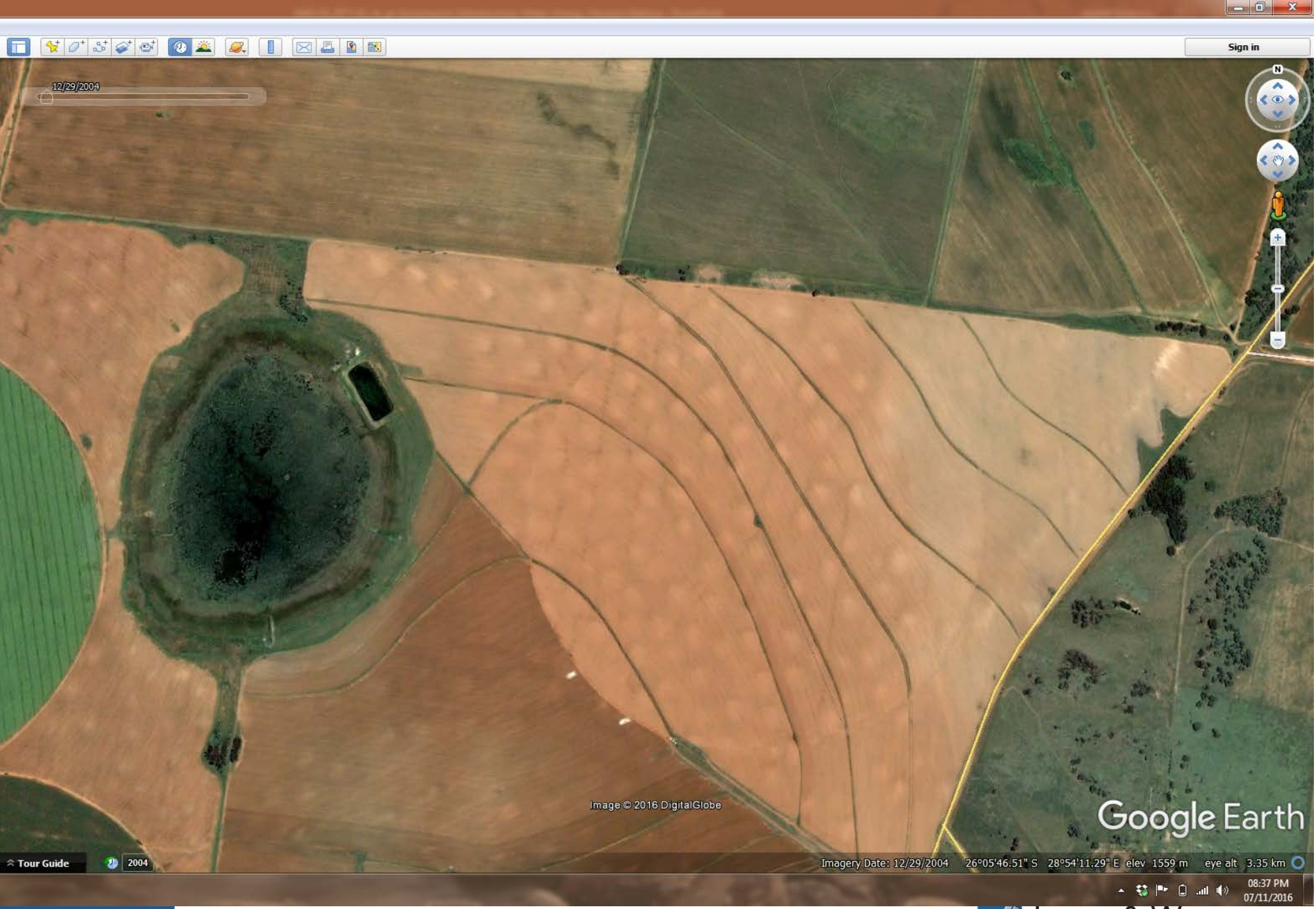
Eilandsmeer



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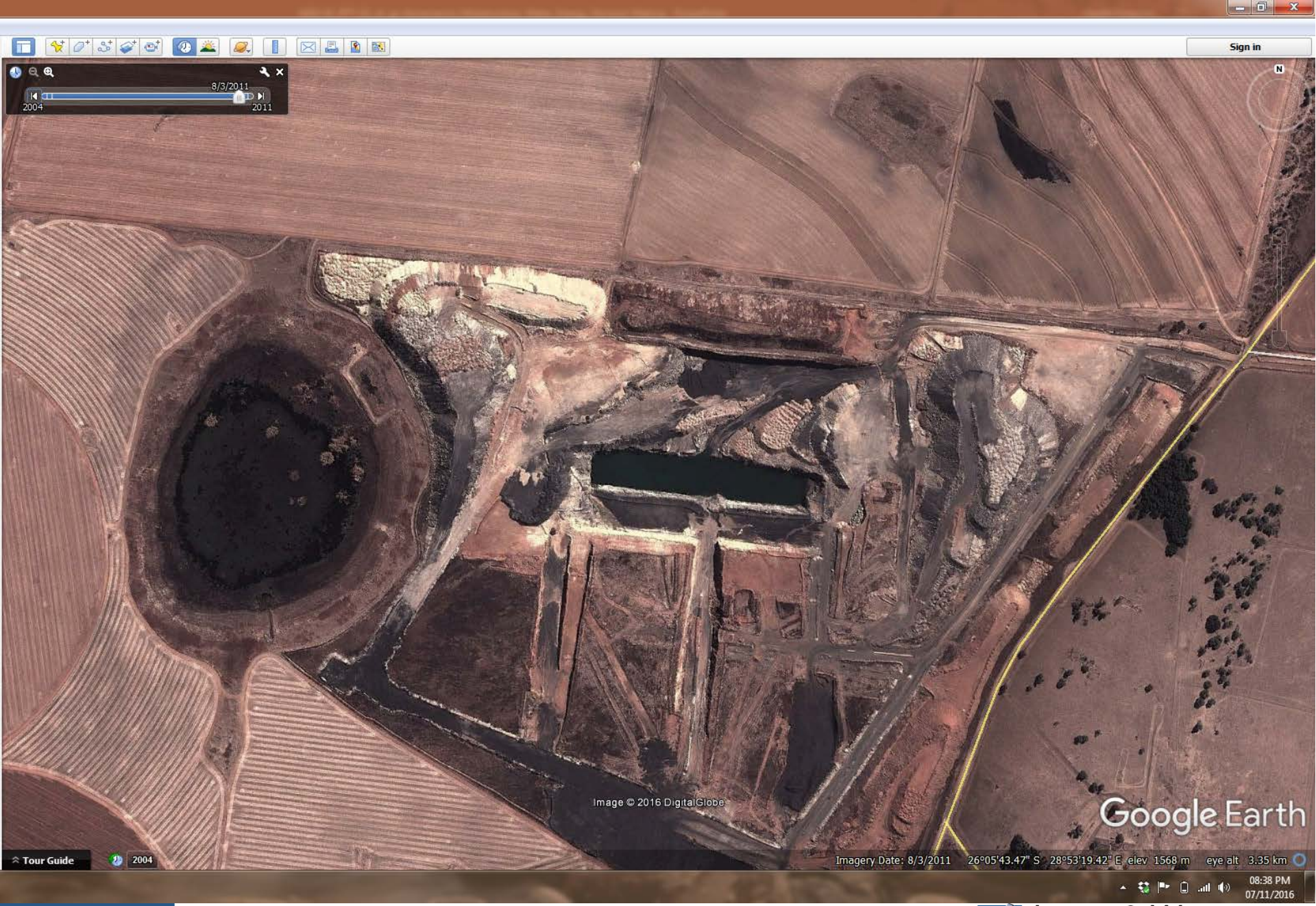

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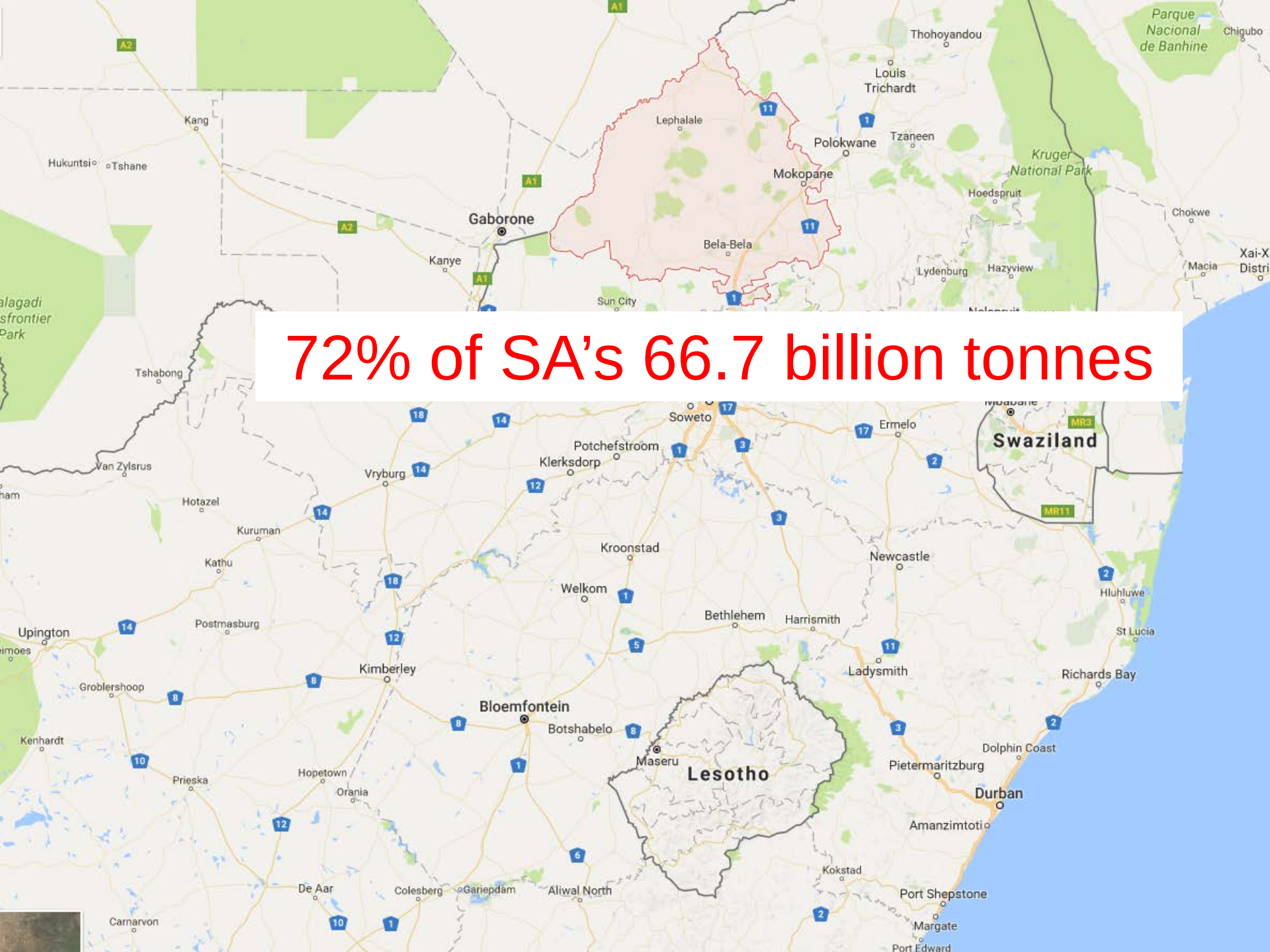
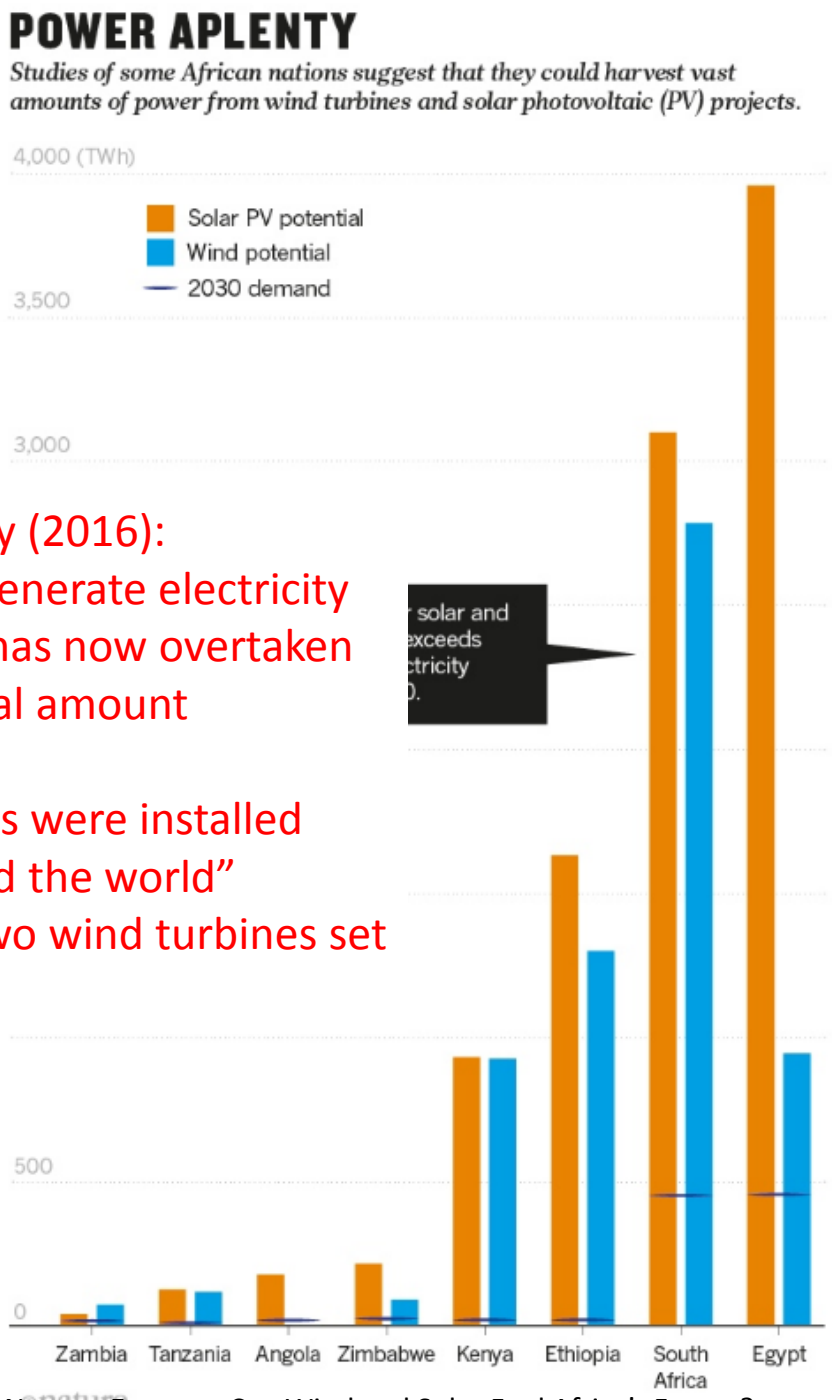
W-E-F Nexus related policy considerations relating to the SDGs:

- Protection of selected zones of biodiversity rich wetland systems and prime agricultural soils within the Mpumalanga Province,
- The development of the Waterberg coalfields,
- Underground verses opencast coal mining,
- R&D relating to a “Desertec” for southern Africa,
- R&D into offshore wind generation potential for southern Africa, and
- R&D into carbon capture and storage mechanisms.


72% of SA's 66.7 billion tonnes
Thohoyandou
Parque Nacional de Banhine
Chigubo
Louis Trichardt
Lephalale
Polokwane
Tzaneen
Kruger National Park
Hukuntsi
Tshane
Kang
Mokopane
Hoedspruit
Chokwe
Gaborone
Bela-Bela
Kanye
Lydenburg
Hazyview
Macia
Sun City
Tshabong
Soweto
Ermelo
Swaziland
Potchefstroom
Klerksdorp
Van Zylsrus
Vryburg
Hotazel
Kuruman
Kathu
Kroonstad
Newcastle
Welkom
Hluhluwe
Bethlehem
Harrismith
St Lucia
Upington
Postmasburg
Kimberley
Ladysmith
Richards Bay
Groblershoop
Bloemfontein
Botshabelo
Maseru
Lesotho
Dolphin Coast
Pietermaritzburg
Kenhardt
Prieska
Hopetown
Orania
Durban
Amanzimtoti
Kokstad
De Aar
Colesberg
Gariepdam
Aliwal North
Port Shepstone
Margate
Carnarvon


DESERTEC-EUMENA
Concentrating Solar Power
Hydro
Photovoltaics
Biomass
Wind
Geothermal
DESERTEC FOUNDATION
CSP collector areas for electricity
World 2005
EU-25 2005
MENA 2005
TRANS-CSP Mix EUMENA 2050



International Energy Agency (2016):

- "the world's capacity to generate electricity from renewable sources has now overtaken coal" – capacity, not actual amount generated!
- "half a million solar panels were installed every day last year around the world"
- "In China … there were two wind turbines set up every hour"

Scientific America: Nature: Energy – Can Wind and Solar Fuel Africa's Future?

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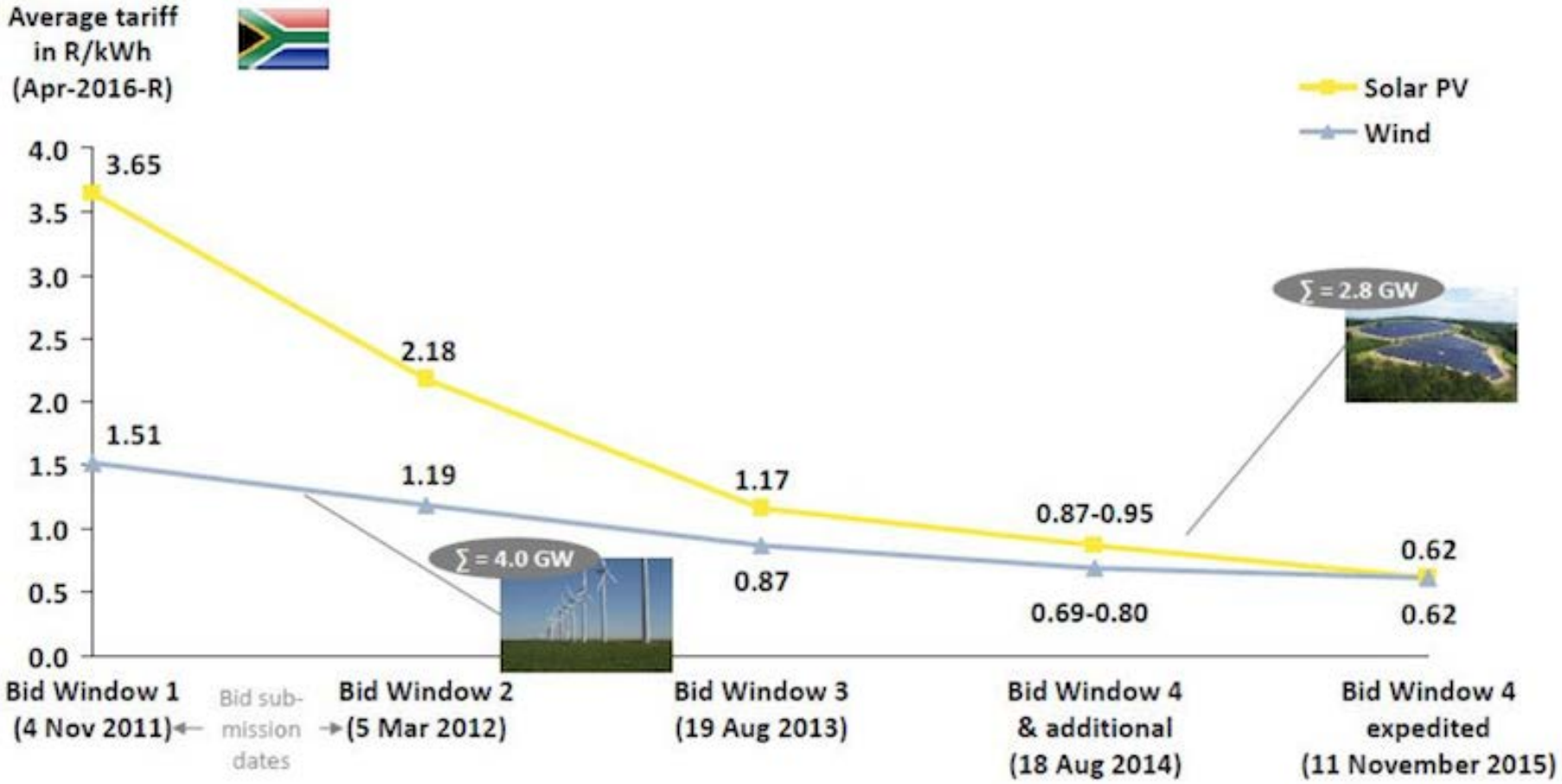

Source: CSIR presentation, 14 October 2016

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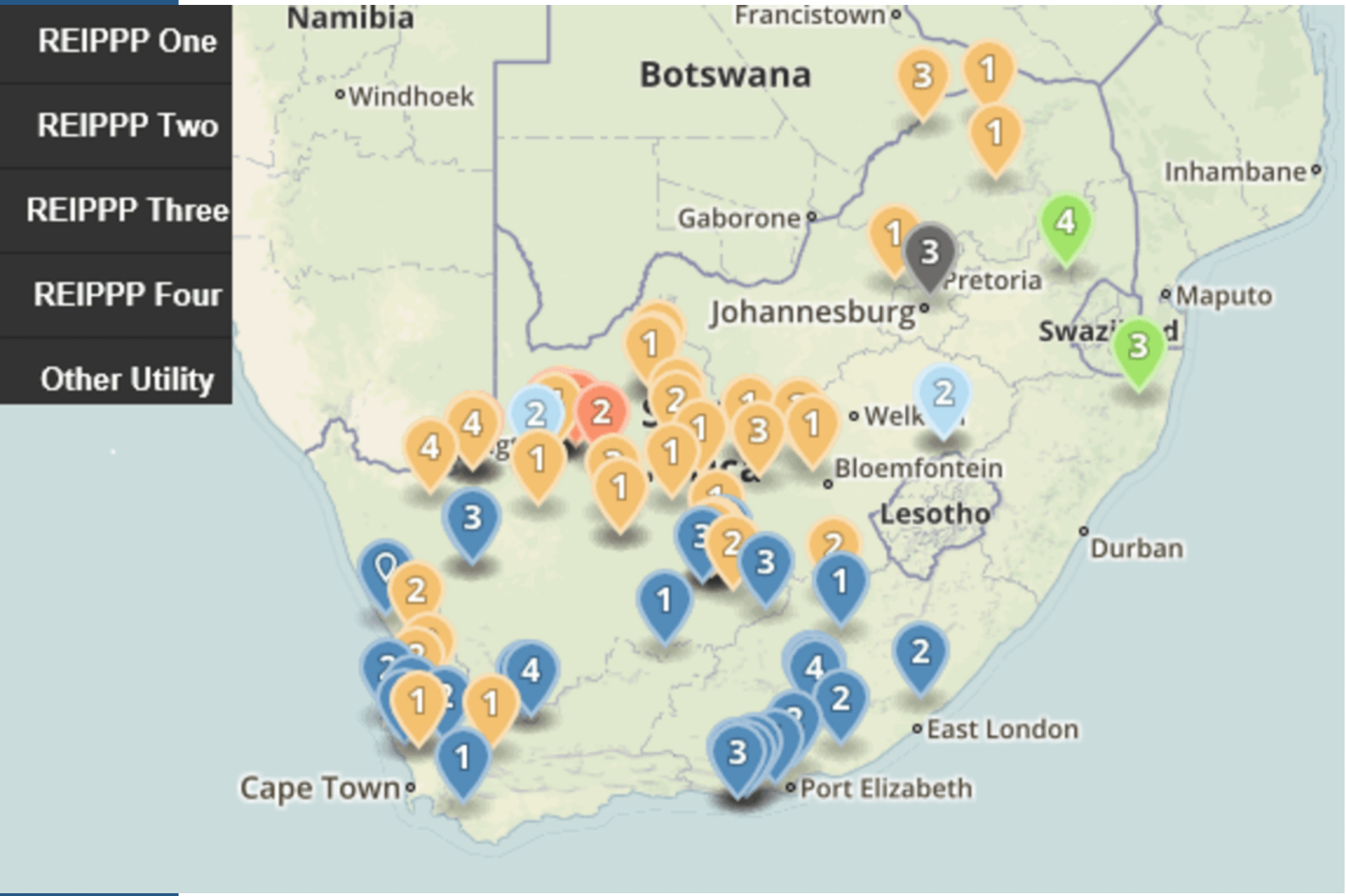

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SDG Indicators?

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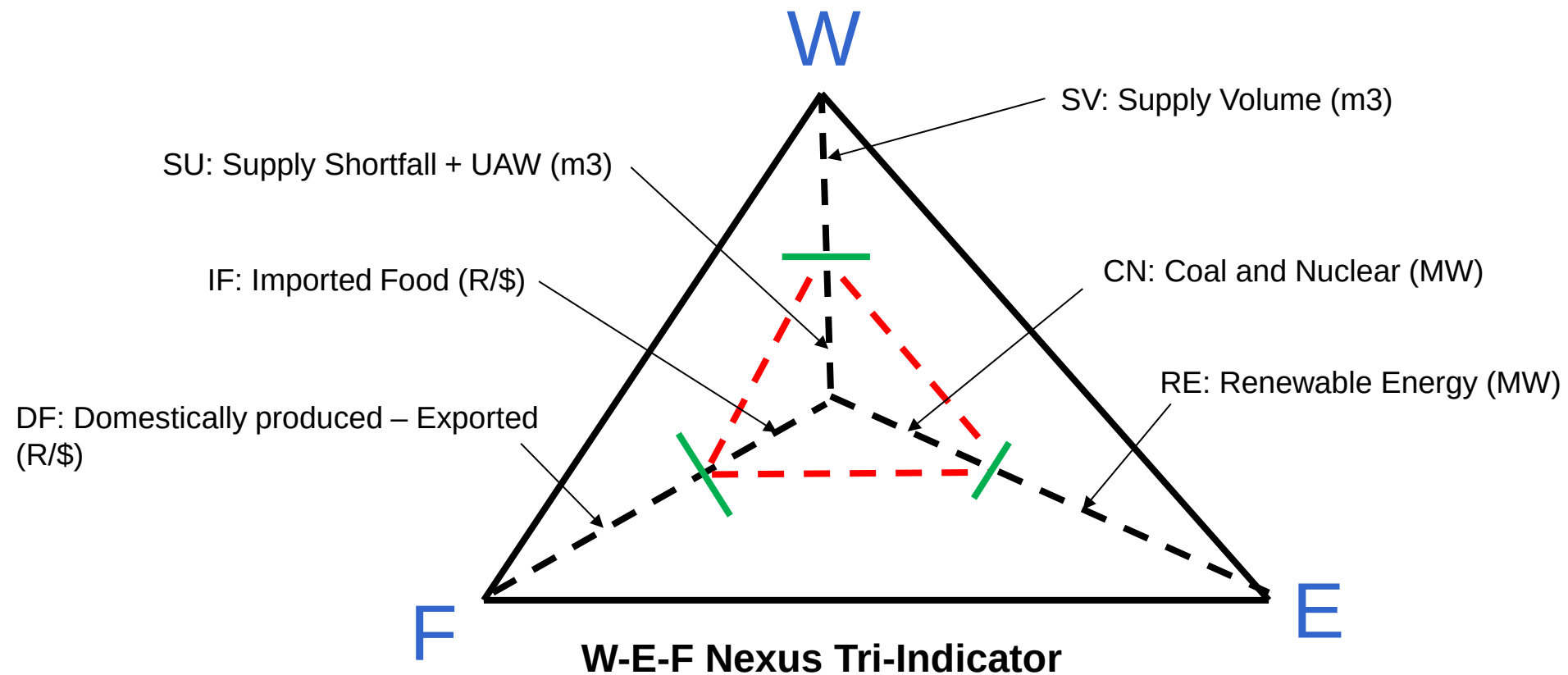

W-E-F Nexus Tri-Indicator

- SDG I(W) = SV / (SV + SU)
- SDG I(E) = RE / (CN + RE)
- SDG I(F) = DF / (DF + IF)

- SDG I (WEF) = Area **Δ** – Area **Δ**

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- Ref 1: Ilan Solomons, *Mpumalanga paying huge enviro price owing to poor regulation by govt departments – report*, www.miningweekly.com (2016-06-17)
- Ref 2: Charles Ainger and Richard Fenner (Eds.) (2016) *Sustainable Water*, Institution of Civil Engineers publishing
- Ref 3: *Evaluating the impact of coal mining on agriculture in the Delmas, Ogies and Leandra districts – With a specific focus on maize production*, Bureau for Food and Agriculture Policy (2012)
- Ref 4: *Coal 2015*, published by Creamer Media's Research Channel Africa (August 2015)
- Ref 5: Martin Ferreira, PHD Thesis: *The development of methods to assess the ecological integrity of perennial pans*, University of Johannesburg
- Ref 6: http://www.energy.gov.za/files/electricity_frame.html
- Ref 7: Voos gemyn – Beeld 22-03-2012
- Ref 8: Risk Assessment Of Pollution In Surface Waters Of The Upper Olifants River System: Implications For Aquatic Ecosystem Health And The Health Of Human Users Of The Water - Summary Report: 2009 To 2013 - J.M. Dabrowski (Editor)
- Ref 9: Exxaro developing pilot digital mine – CEO. Mining Weekly
- Ref 10: "What can engineers do to ensure that South Africa meets its 21st century water needs?" (Civil Engineering, June 2016:12)
- Ref 11: Jeffrey, LS. Characterisation of the coal resources of South Africa (SAIMM, 2004)

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