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South African National Energy
Development Institute (SNC) Ltd.



The Sun: a double barreled energy source. How are we utilising this in South Africa?

Who is SANEDI?



Department of
Mineral Resources
and Energy



- Research & Development of technology
- Data Management
- Capacity Building
- Project Management
- Demonstration & Pilot Projects

South Africa is....



- 🇿🇦 Responsible for 1.9% of global Green House Gas (GHG) emissions
 - very few emit more than 6%
- 🇿🇦 The highest GHG emitter in Africa
- 🇿🇦 Within top 20 GHG emitters per capita in the world (ranked 14th in Oct 2018) while our GDP in 2018 is ranked 34 of 196
- 🇿🇦 Home to the largest point source of CO₂ emission in the world

Effects of all this GHG on SA...



- 🌱 Impact on international uptake of manufactured goods market
 - Amount of content in packaging
 - Tax cost
 - Emitter bears cost > economic impact
 - CBAM

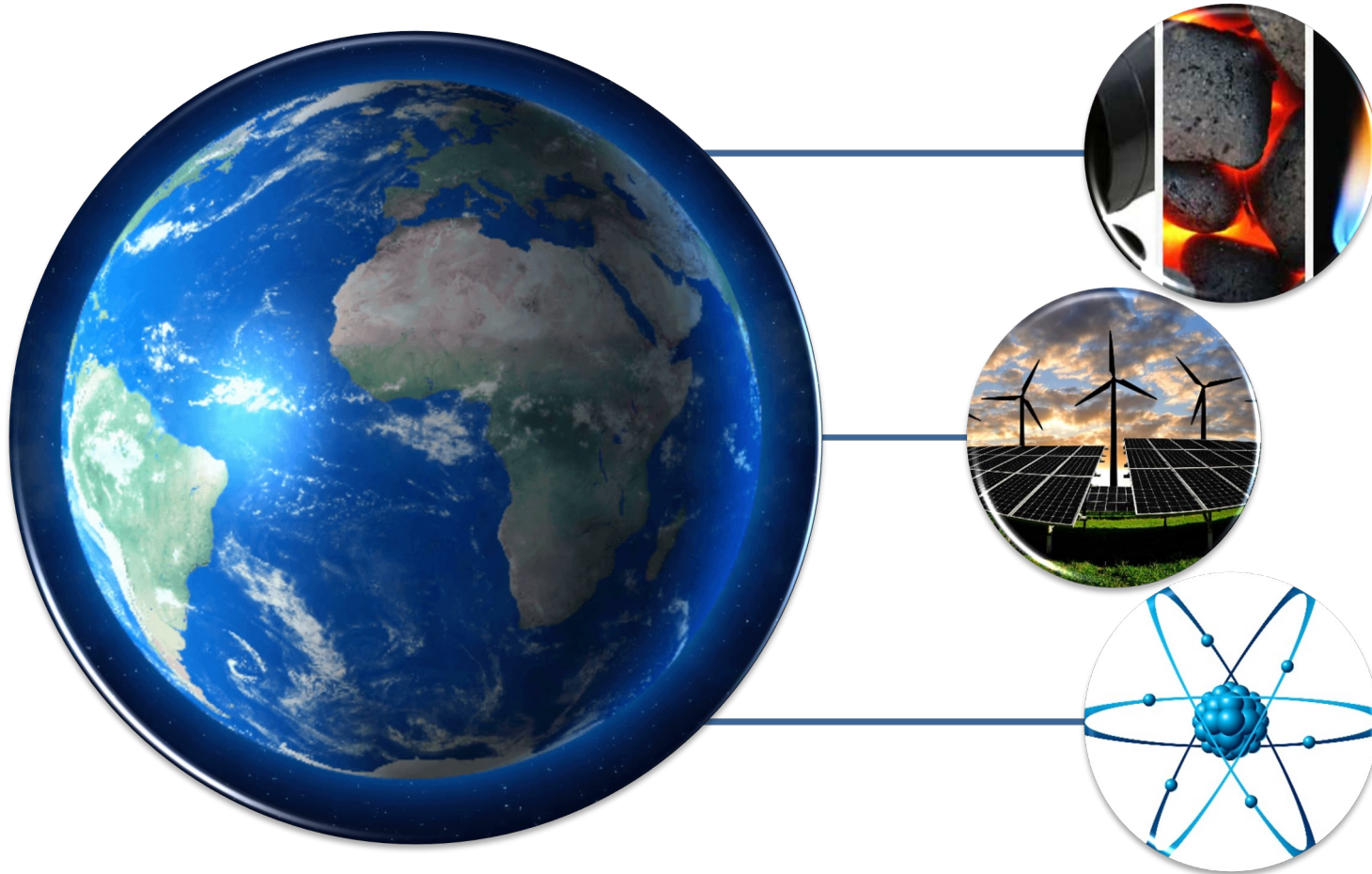
🌱 Adaptation

- Industry impact > stranded assets
- Resulting electricity price impact > effects all
- International competition

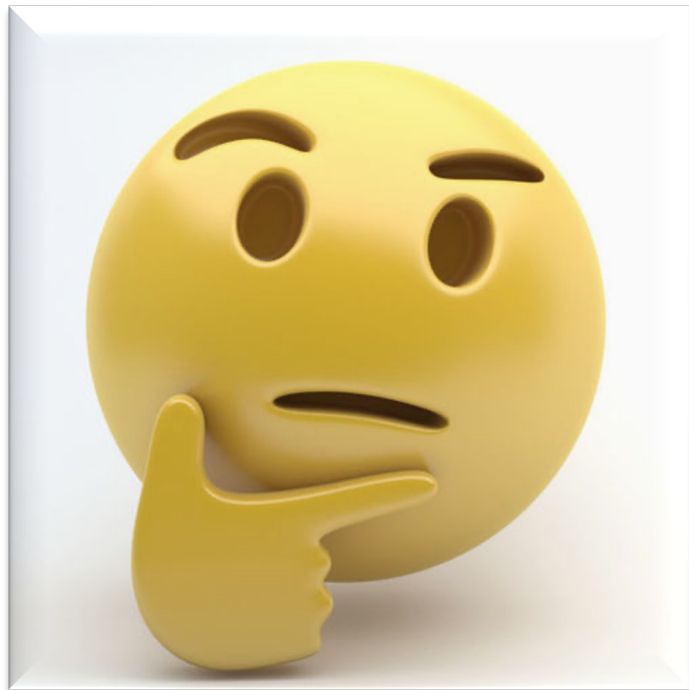
ENERGY



Types of Energy Available on Earth



IRP 2019



ENERGY INNOVATION FOR LIFE

GOVERNMENT NOTICES • GOEWERMENTSKENNISGEWINGS

DEPARTMENT OF ENERGY

NO. 1359

18 OCTOBER 2019



energy

Department:
Energy
REPUBLIC OF SOUTH AFRICA

Integrated Resource Plan (IRP2019)

October 2019





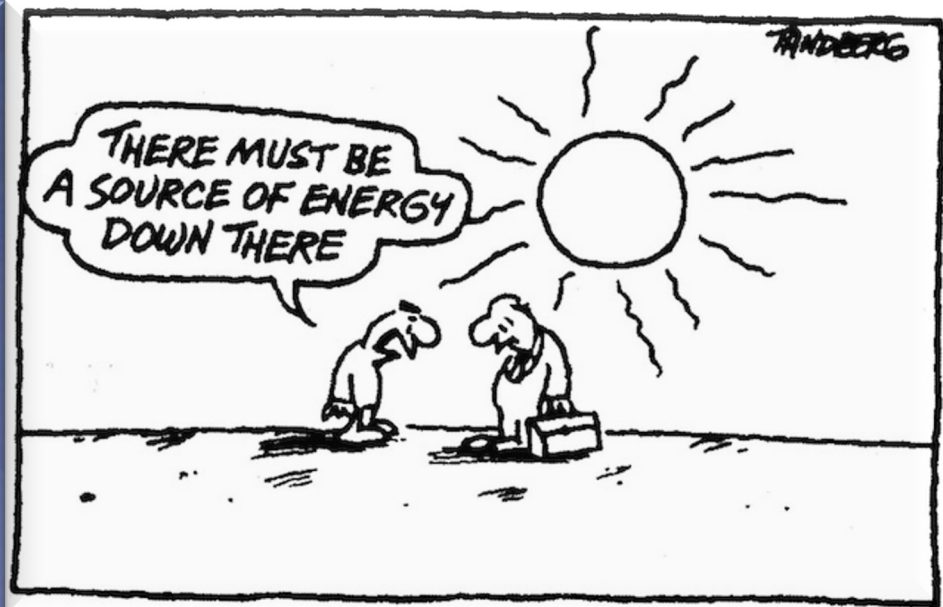




RENEWABLE ENERGY?



I'M A BIG FAN



When there's
a huge solar energy spill



it's just called
a "nice day"



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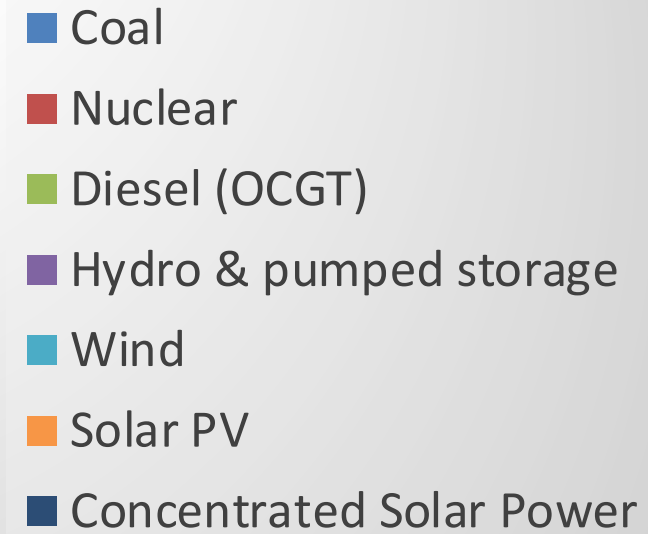
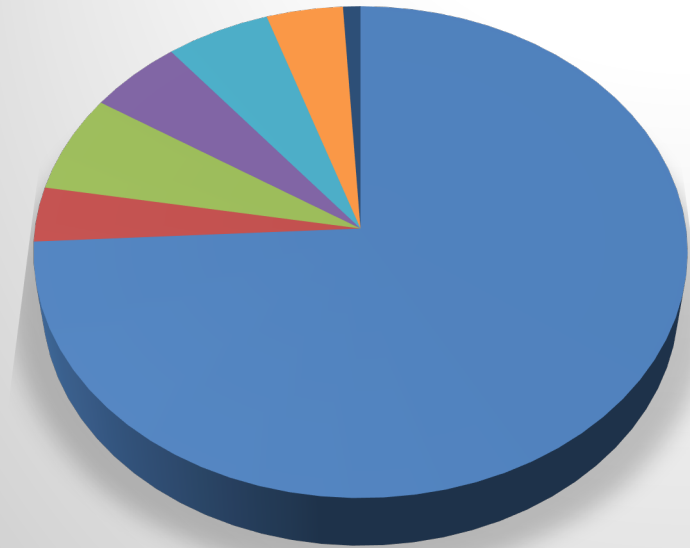
Electricity in SA



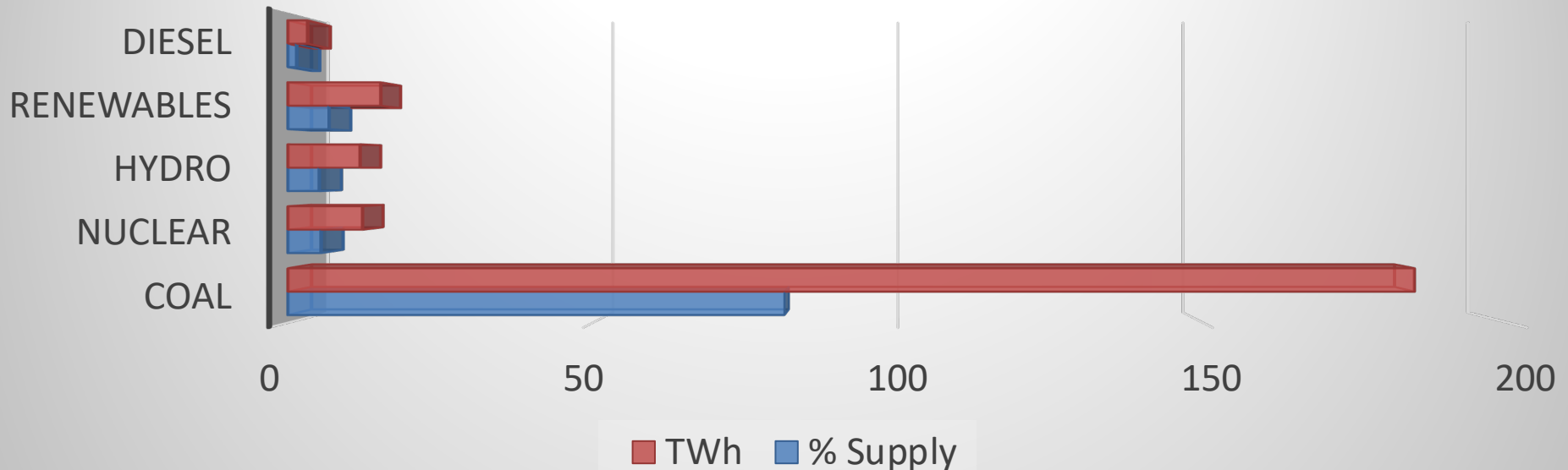
**IF YOU DON'T SCHEDULE
TIME FOR
MAINTENANCE, YOUR
EQUIPMENT WILL
SCHEDULE IT FOR YOU**

ENERGY INNOVATION FOR LIFE

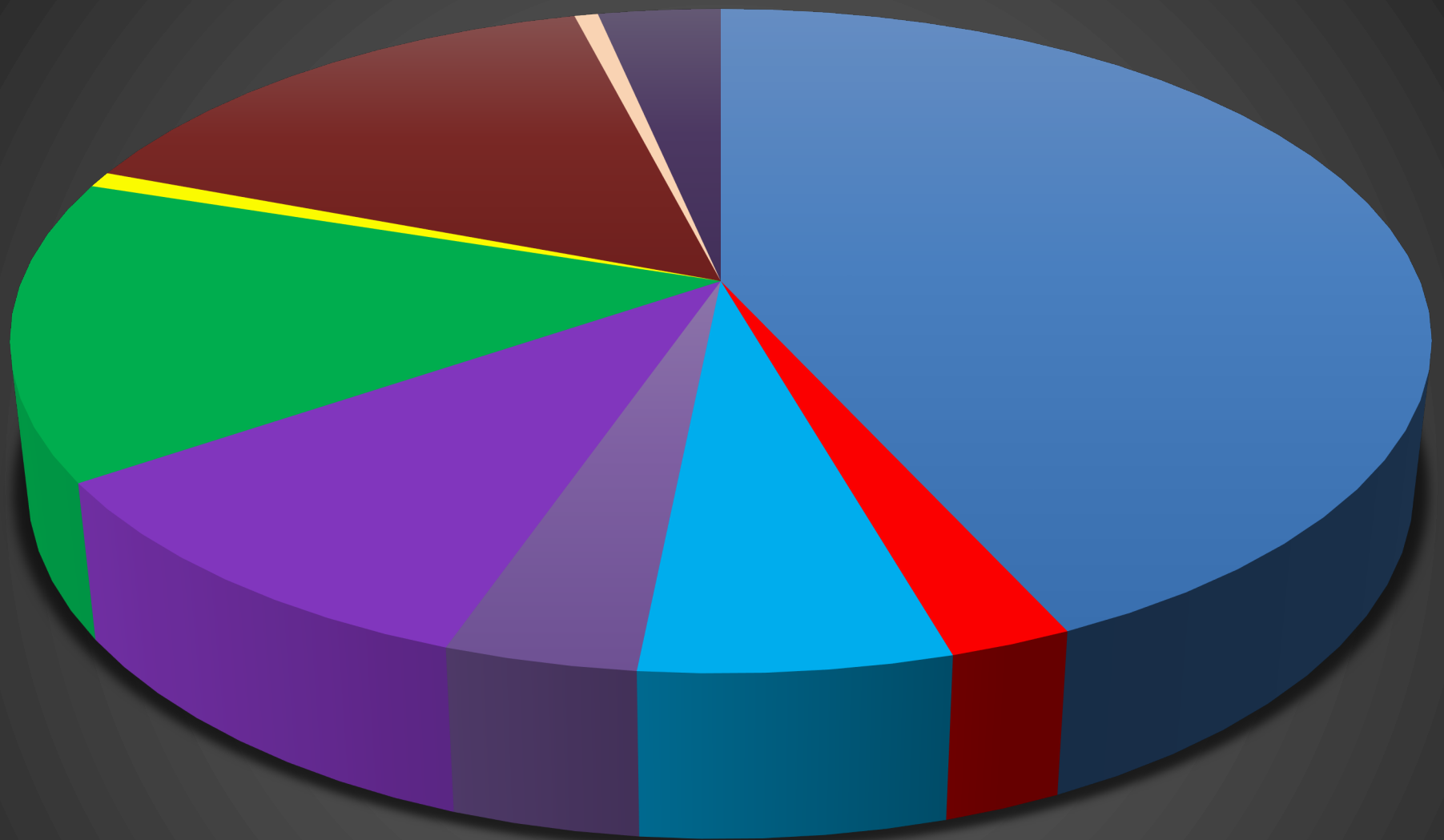
GW installed capacity



Electricity Supply

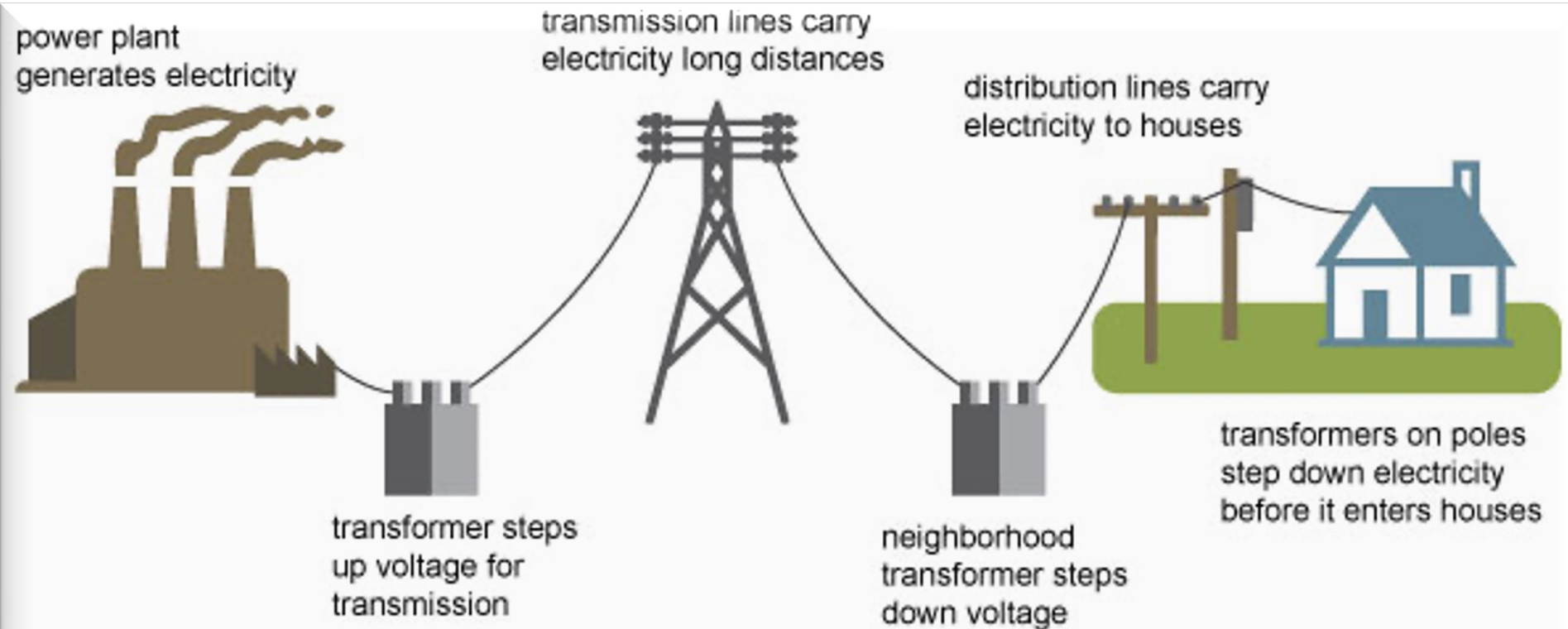


IRP 2019 Allocations Projected for 2030 Energy Mix



- Coal
- Pumped Storage
- CSP
- Embedded Generation
- Nuclear
- PV
- Gas/Diesel
- Hydro
- Wind
- Other (CoGen, Biomass, Landfill)

Electricity Generation, Transmission & Distribution



Source: Adapted from National Energy Education Development Project (public domain)

Eskom Generation fleet is aging

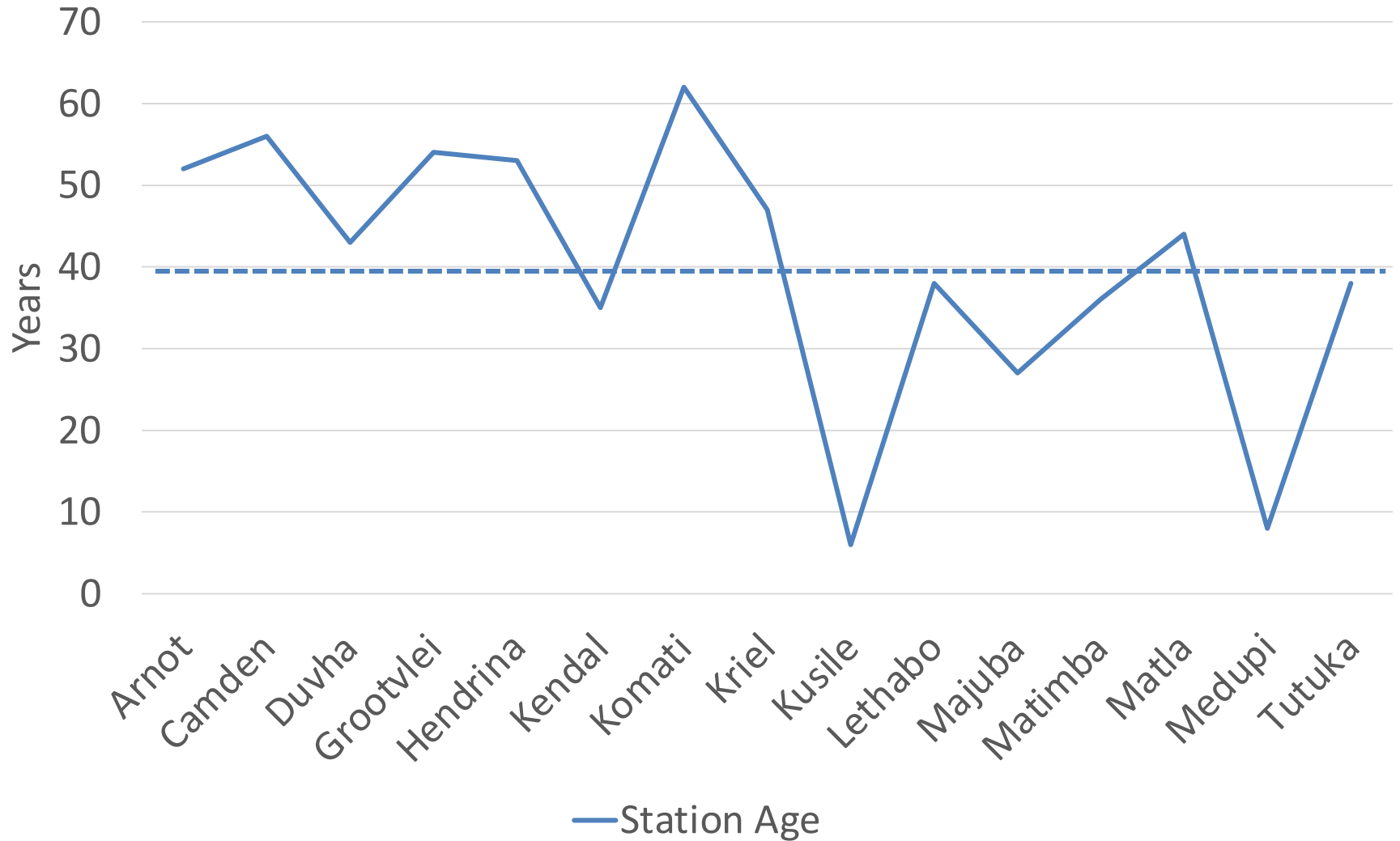
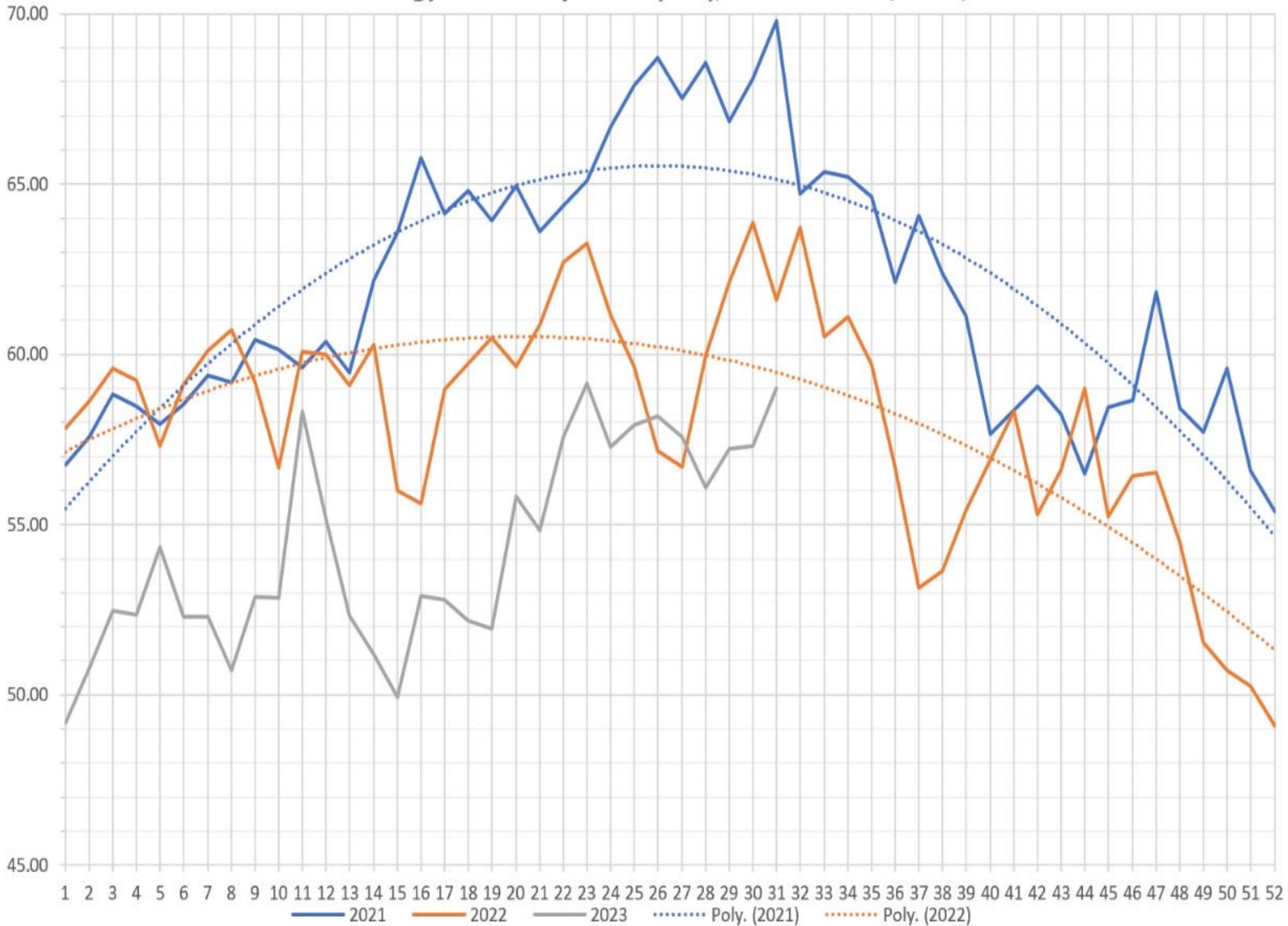


Figure 1: South Africa produced less electricity in 2021 than it did in 2004
Volume of electricity generated by year



Source: Electricity generated and available for distribution

Eskom energy availability factor (EAF), from week #1, 2021, to date



52 Week Outlook

This is the forecast demand vs. available generating capacity for each week for 52 weeks ahead. Colour codes ranging from Green (no shortage) to Red (worst case) are used to indicate the absence or presence of a capacity constraint.

Week Start	Week	MW RSA Contracted Forecast	MW Residual Forecast	MW Available Dispatchable Capacity	MW Available Capacity (Less OR and UA)	MW Planned Maintenance	MW Unplanned Outage Assumption (UA)	MW Planned Risk Level (-17200 MW)	MW Likely Risk Scenario (-18700 MW)
27-Mar-23	13	30192	27975	42311	25111	6880	15000		
03-Apr-23	14	30054	28526	42606	25406	6585	15000		
10-Apr-23	15	30863	29216	43246	26046	5945	15000		
17-Apr-23	16	31228	29581	43981	26781	5210	15000		
24-Apr-23	17	31577	29931	44516	27316	4675	15000		
01-May-23	18	31824	30642	45056	27856	4135	15000		
08-May-23	19	32574	31392	45812	28612	3379	15000		
15-May-23	20	33257	32075	46584	29384	2607	15000		
22-May-23	21	33213	32031	47177	29977	2014	15000		
29-May-23	22	33681	32499	47377	30177	1814	15000		
05-Jun-23	23	33170	31890	47229	30029	1962	15000		
12-Jun-23	24	33184	31903	47377	30177	1814	15000		
19-Jun-23	25	33465	32184	47377	30177	1814	15000		
26-Jun-23	26	33853	32572	47100	29900	2091	15000		
03-Jul-23	27	33675	32184	46503	29303	2688	15000		
10-Jul-23	28	33441	31950	46753	29553	2438	15000		
17-Jul-23	29	33806	32315	46563	29363	2628	15000		
24-Jul-23	30	33869	32378	46215	29015	2976	15000		
31-Jul-23	31	33172	31681	45640	28440	3551	15000		
07-Aug-23	32	32921	31227	45924	28724	3267	15000		
14-Aug-23	33	32522	30828	45508	28308	3683	15000		
21-Aug-23	34	32669	30975	45746	28546	3445	15000		
28-Aug-23	35	32154	30475	45851	28651	3340	15000		
04-Sep-23	36	32329	30642	45201	28001	3990	15000		
11-Sep-23	37	32319	30633	46023	28823	3168	15000		
18-Sep-23	38	31676	29989	45773	28573	3418	15000		
25-Sep-23	39	31623	29936	44925	27725	4266	15000		
02-Oct-23	40	31635	29659	44545	27345	4646	15000		
09-Oct-23	41	31372	29395	44635	27435	4556	15000		
16-Oct-23	42	31286	29309	44351	27151	4840	15000		
23-Oct-23	43	30991	29015	43538	26338	5653	15000		
30-Oct-23	44	30837	28860	43708	26508	5483	15000		
06-Nov-23	45	30480	28381	43100	25900	6091	15000		
13-Nov-23	46	30439	28371	42359	25159	6832	15000		
20-Nov-23	47	30288	28220	42756	25556	6435	15000		
27-Nov-23	48	30059	27991	42355	25155	6836	15000		
04-Dec-23	49	30063	27880	43132	25932	6059	15000		
11-Dec-23	50	30109	27927	41939	24739	7252	15000		
18-Dec-23	51	28935	26752	40390	23190	8801	15000		
25-Dec-23	52	26312	24130	40190	22990	9001	15000		
01-Jan-24	1	27954	25810	41203	24003	7988	15000		
08-Jan-24	2	29548	27404	41303	24103	7888	15000		
15-Jan-24	3	30300	28156	42362	25162	6829	15000		
22-Jan-24	4	30273	28129	43230	26030	5961	15000		
29-Jan-24	5	30490	28346	43512	26312	5679	15000		
05-Feb-24	6	31030	28940	43121	25921	6070	15000		
12-Feb-24	7	31154	29065	43268	26068	5923	15000		
19-Feb-24	8	31289	29199	43763	26563	5428	15000		
26-Feb-24	9	31095	29006	43148	25948	6043	15000		
04-Mar-24	10	31120	29552	44306	27106	4885	15000		
11-Mar-24	11	30804	29236	44563	27363	4628	15000		
18-Mar-24	12	31048	29480	45476	28276	3715	15000		
25-Mar-24	13	30924	29276	45826	28626	3365	15000		

Notes - Assumptions critical:

The maintenance plan included in these assumptions includes a base scenario of outages (planned risk level). As there is opportunity for further outages, these will be included. This “likely risk scenario” includes an additional 1500 MW of outages on the base plan.

The expected imports at Apollo is included.

Avon and Dedisa is also included.

The forecast used is the latest operational weekly residual peak forecast, which excludes the expected renewable generation.

Operating Reserve (OR) from Generation: 2 200 MW

Unplanned Outage Assumption (UA): 15 000

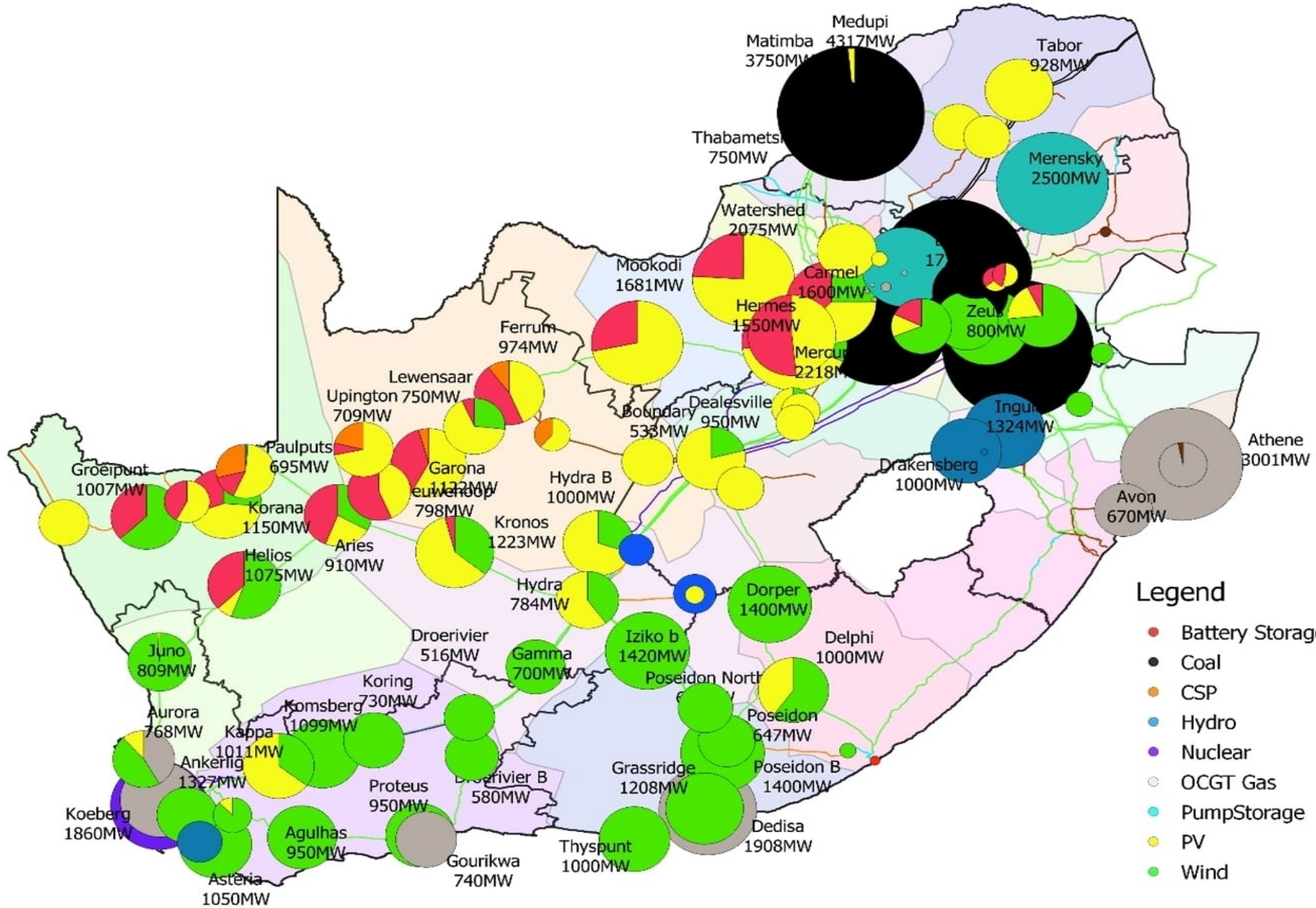
Reserves: OR + UA = 17 200 MW

Eskom Installed Capacity: 48 186 MW.

Installed Dispatchable Capacity: 49 191 MW (Incl. Avon and Dedisa).

Key:

Risk Level	Description
Green	Adequate Generation to meet Demand and Reserves.
Yellow	< 1 000MW Possibly short to meet Reserves
Orange	1 001MW – 2 000MW Definitely short to meet Reserves and possibly Demand
Red	> 2 001MW Short to meet Demand and Reserves



- ### Legend
- Battery Storage
 - Coal
 - CSP
 - Hydro
 - Nuclear
 - OCGT Gas
 - PumpStorage
 - PV
 - Wind



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Renewable Energy

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What renewable energy do we have in SA that we can easily use?



Sun

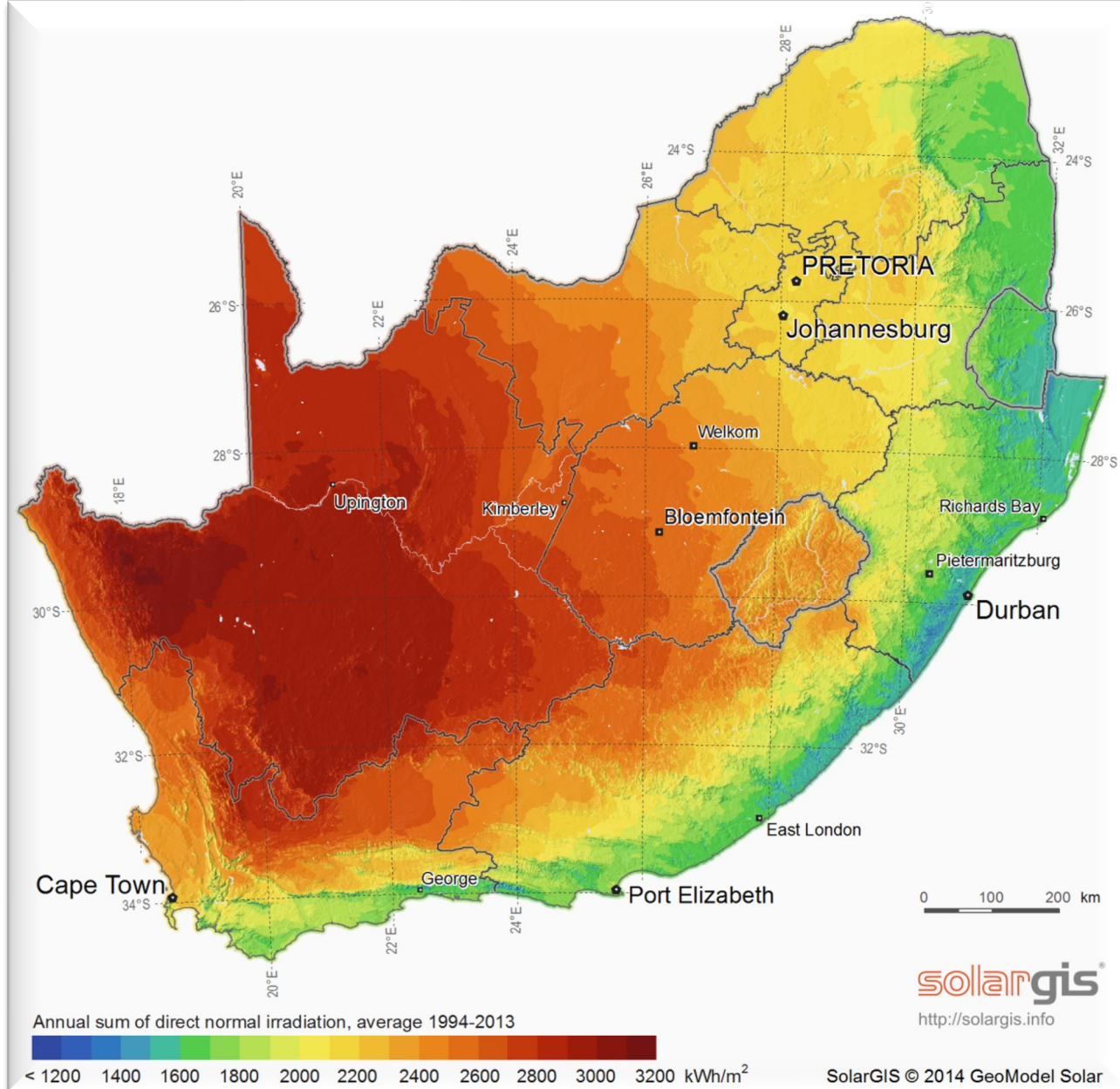


Wind

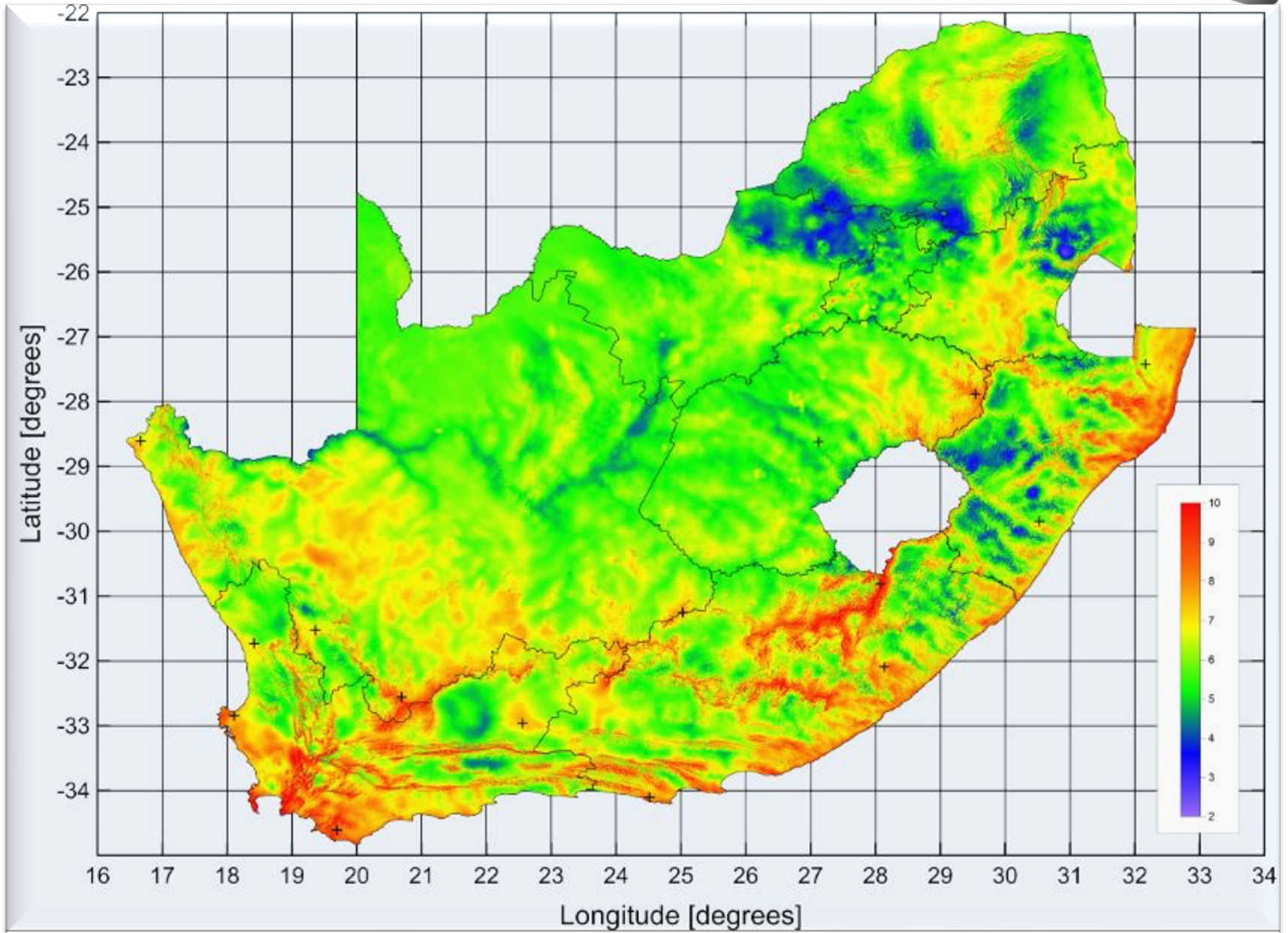


Biomass

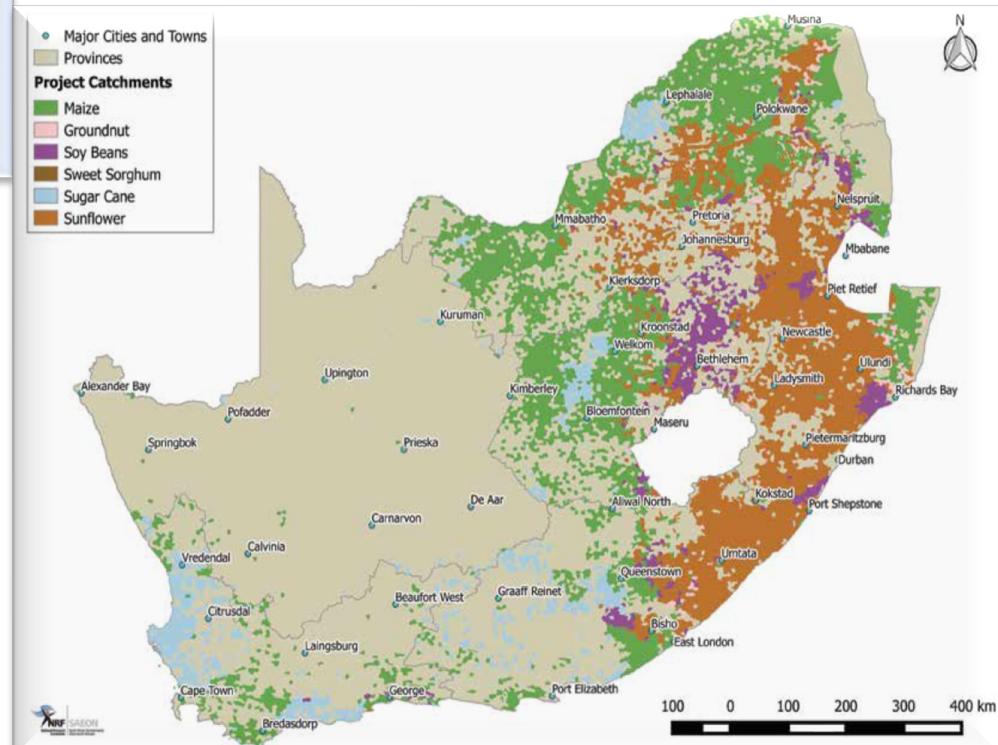
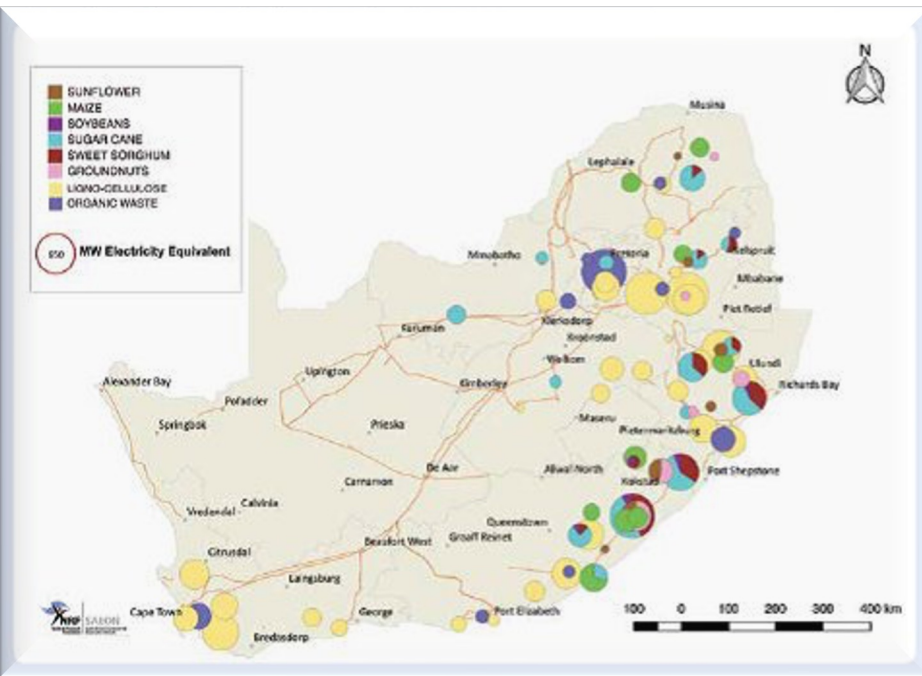
Sunshine concentration



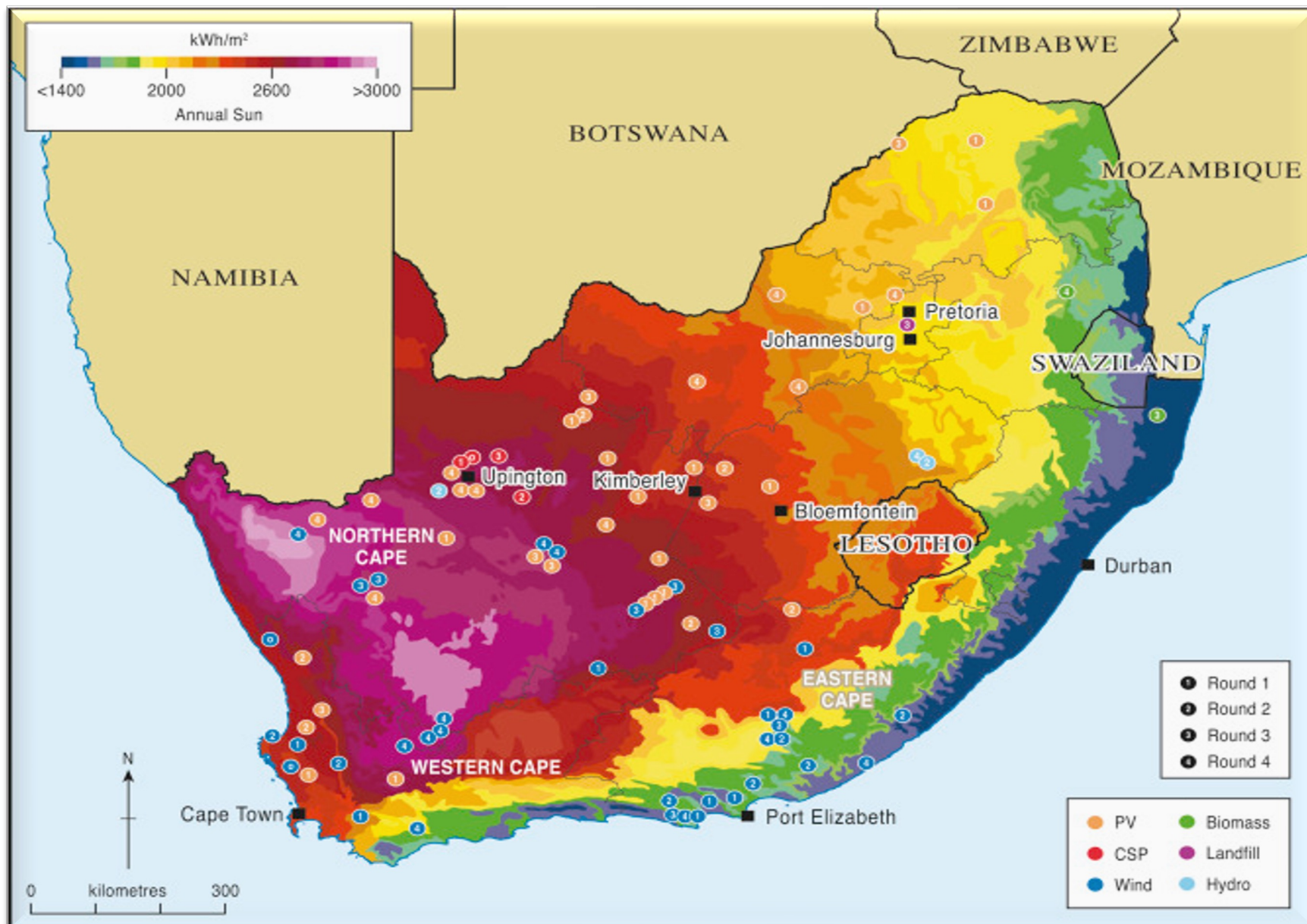
Wind concentration



Biomass/waste concentration



SA RE Plants 2018





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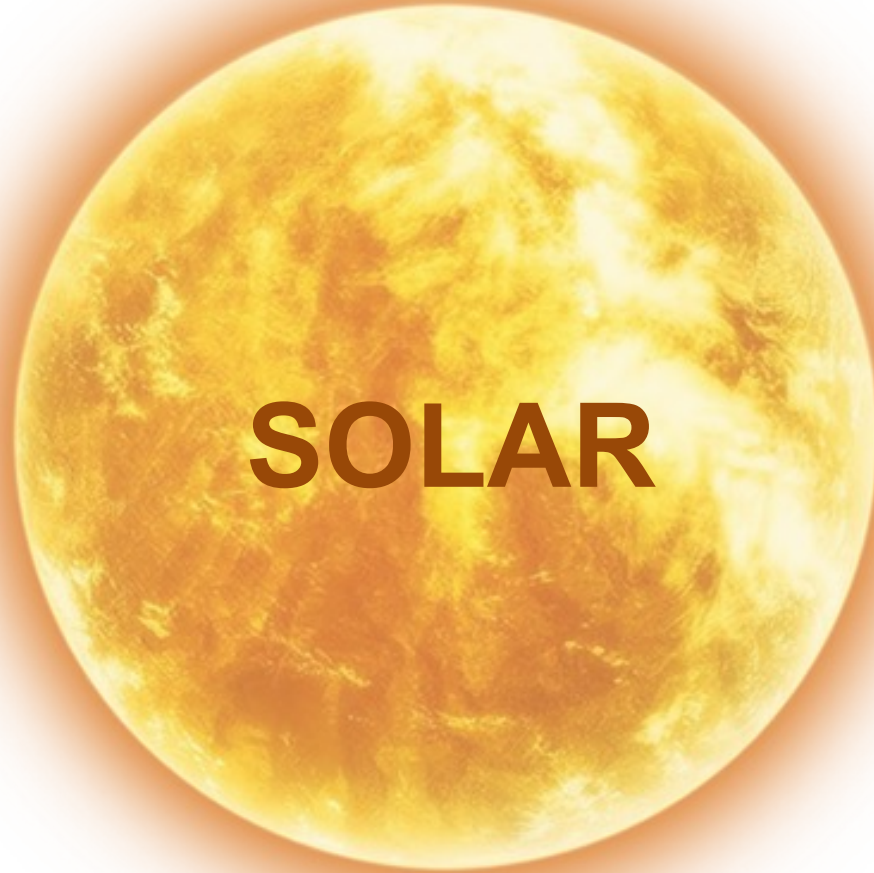
Technology

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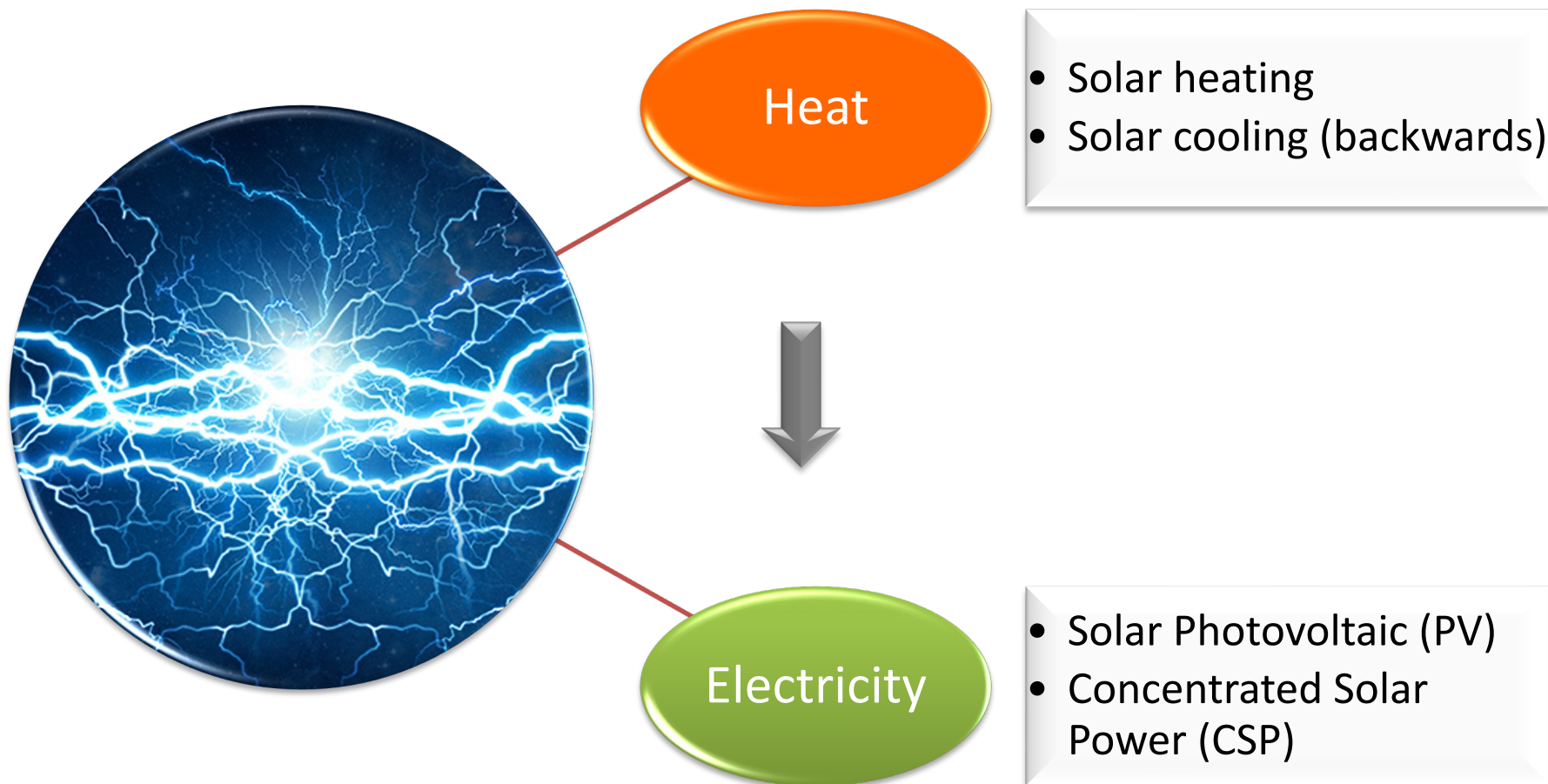
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Double Barrelled Solar technology for SA





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Solar Water heating for Your House



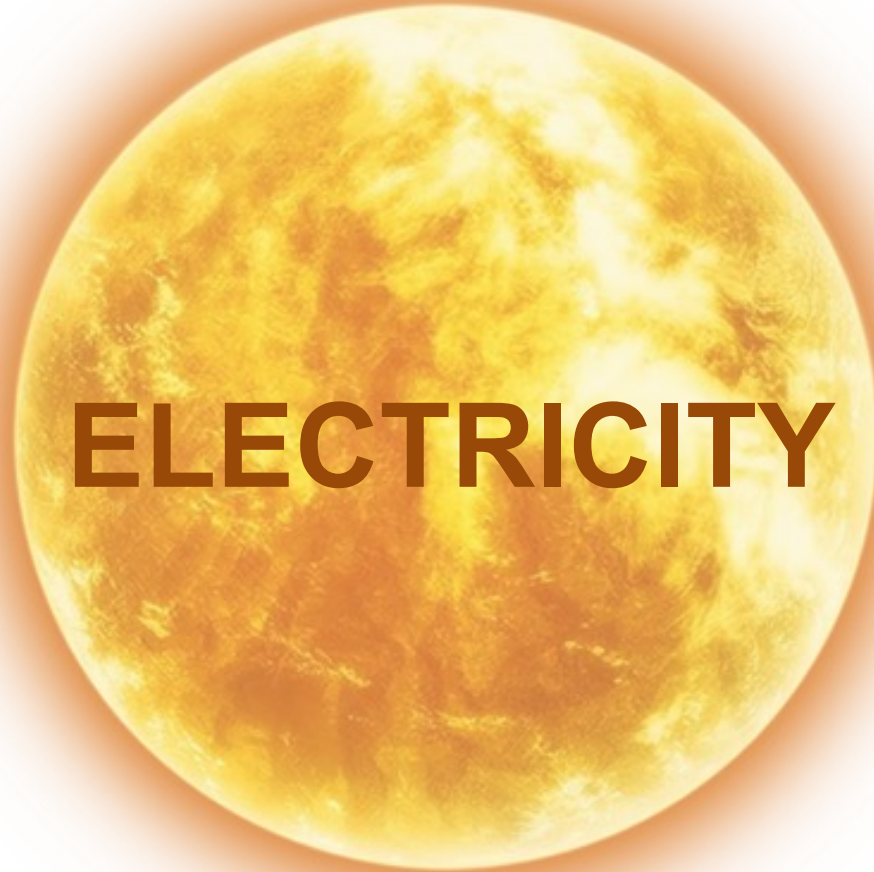


Wits Junction Residences



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ELECTRICITY

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Solar Photovoltaic (PV)



Concentrated solar





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Energy Efficiency

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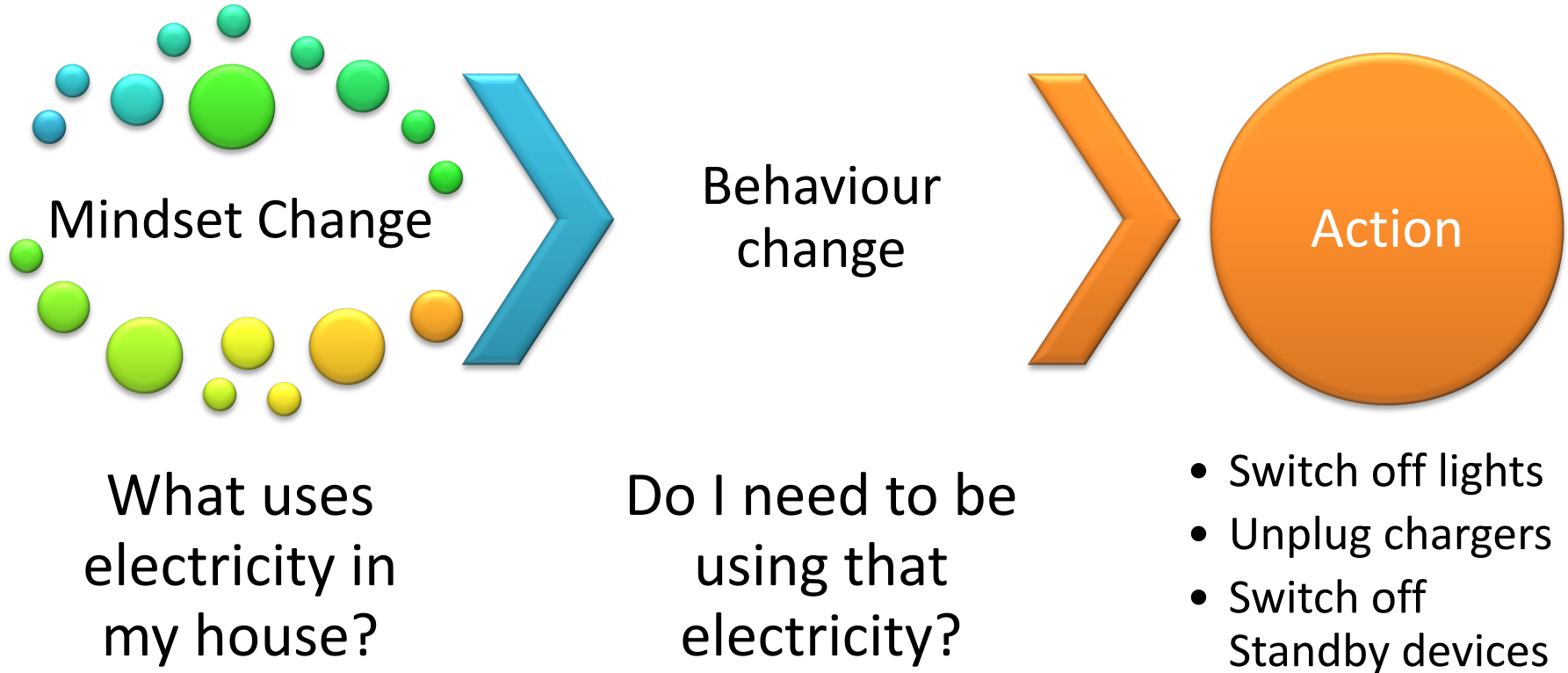
Efficient Energy Use OR Energy Efficiency

- To reduce the amount of energy required to provide a product and/or service

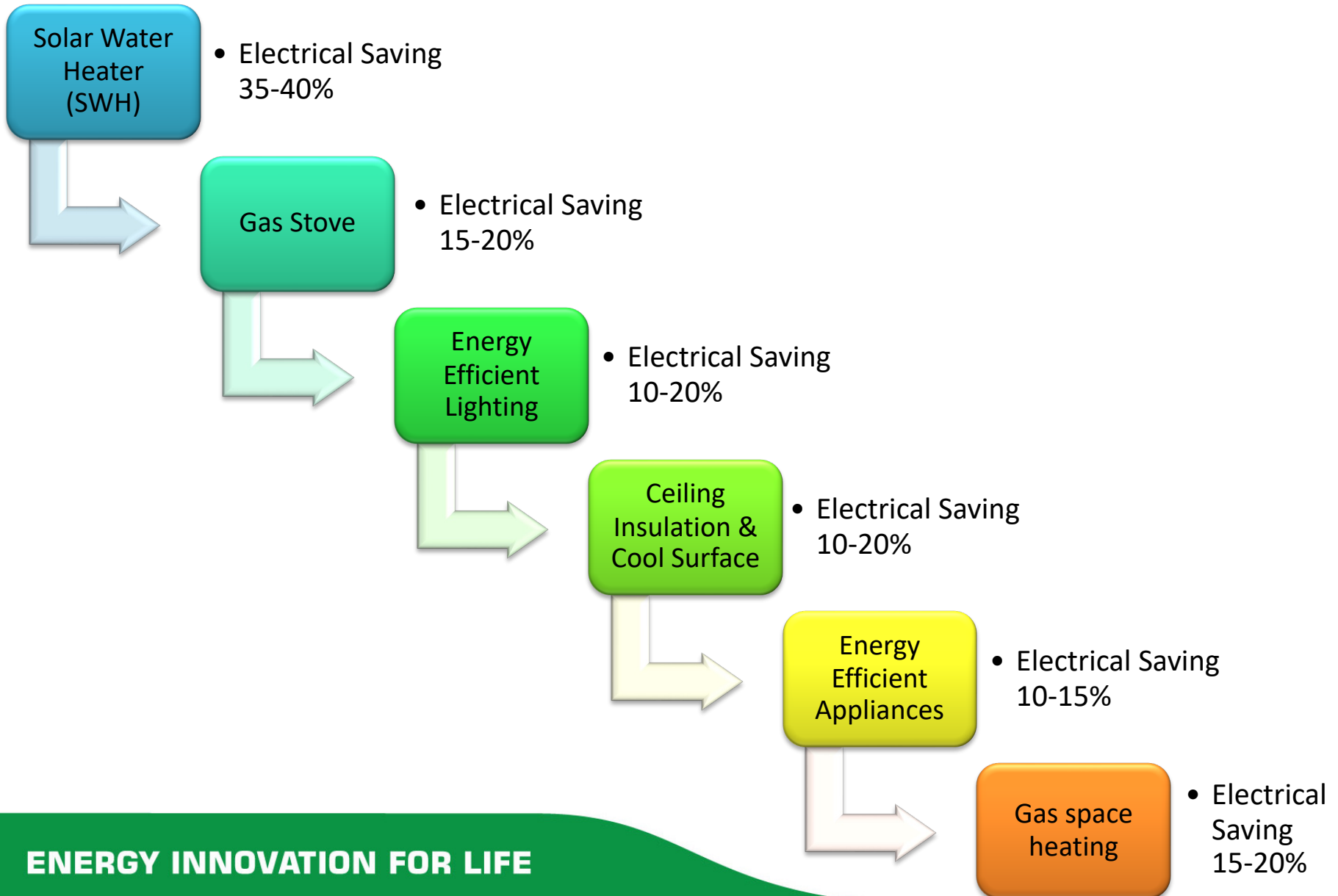
An energy efficient building maintains

- Moderate temperatures
- Low humidity and increased air quality
- Uses less energy
- Costs less to operate
- Produces fewer greenhouse gasses

What can I do first?



Before Doing Any Major Electrical Interventions...





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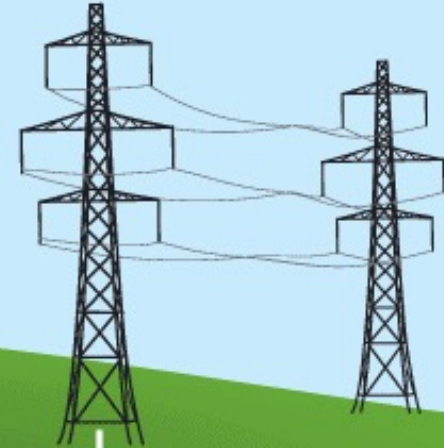
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Photovoltaic and Batteries for Energy Security

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How does the PV-battery back up work?



Battery



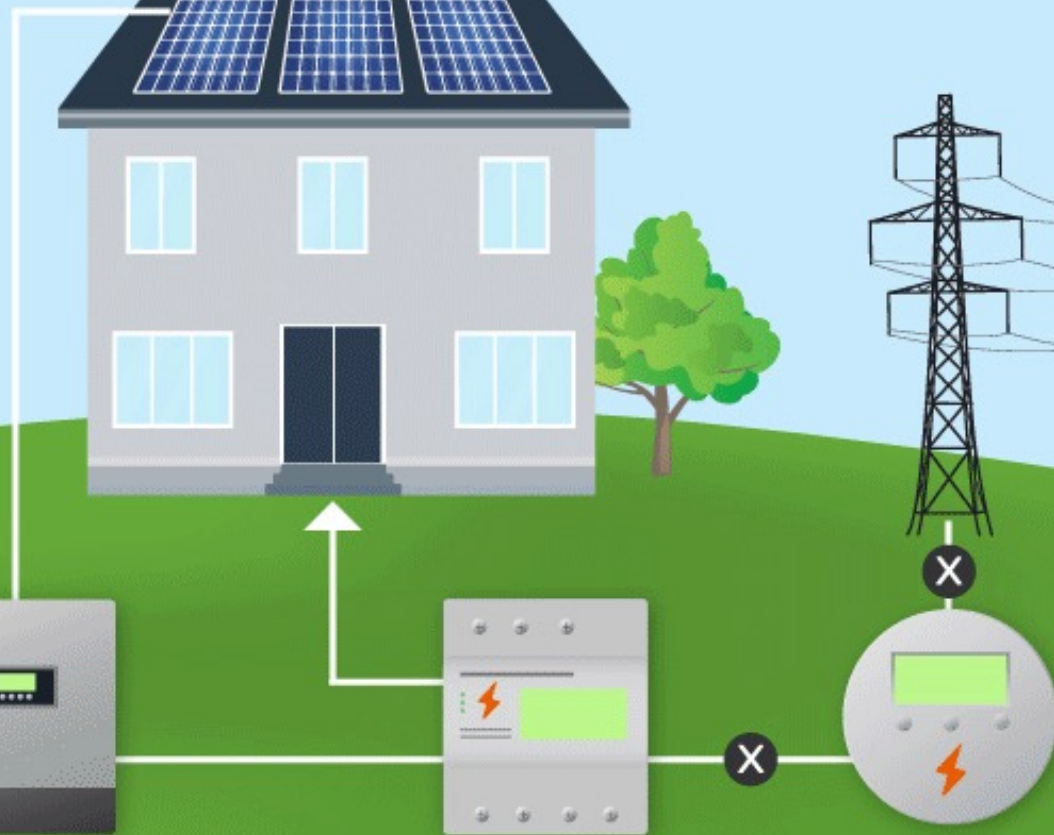
Inverter



Electric Panel



Electric Meter





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**THANK
YOU**

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