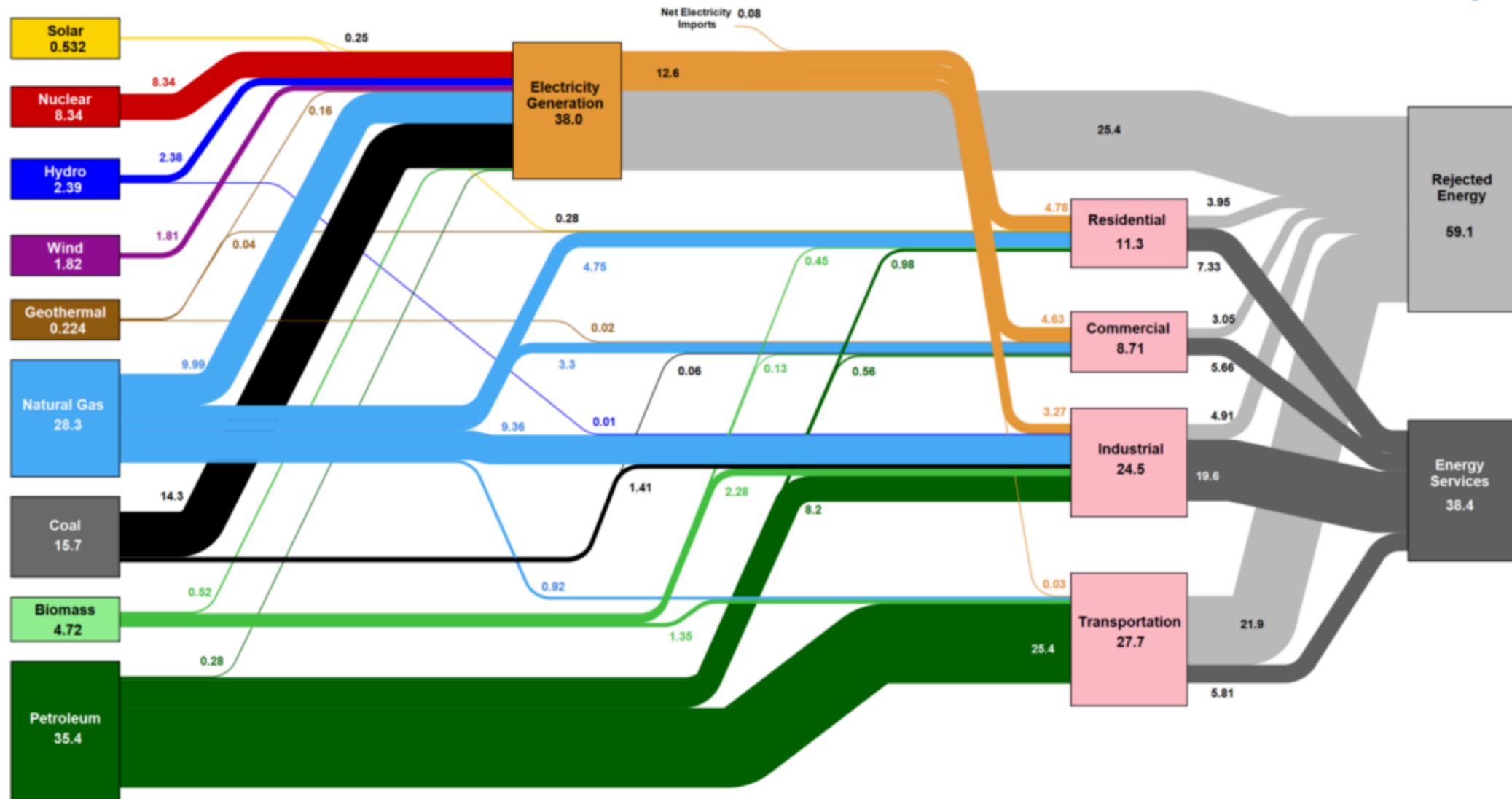




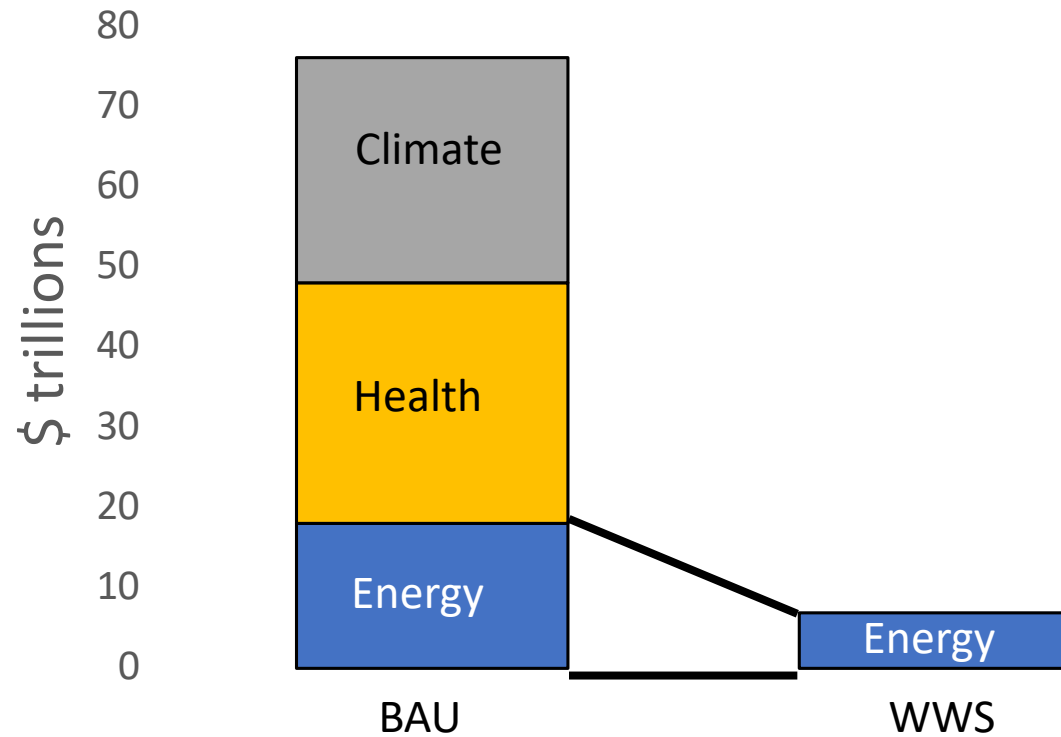
Accelerated replacement of the Eskom coal fleet

An opportunity to transform the ESI

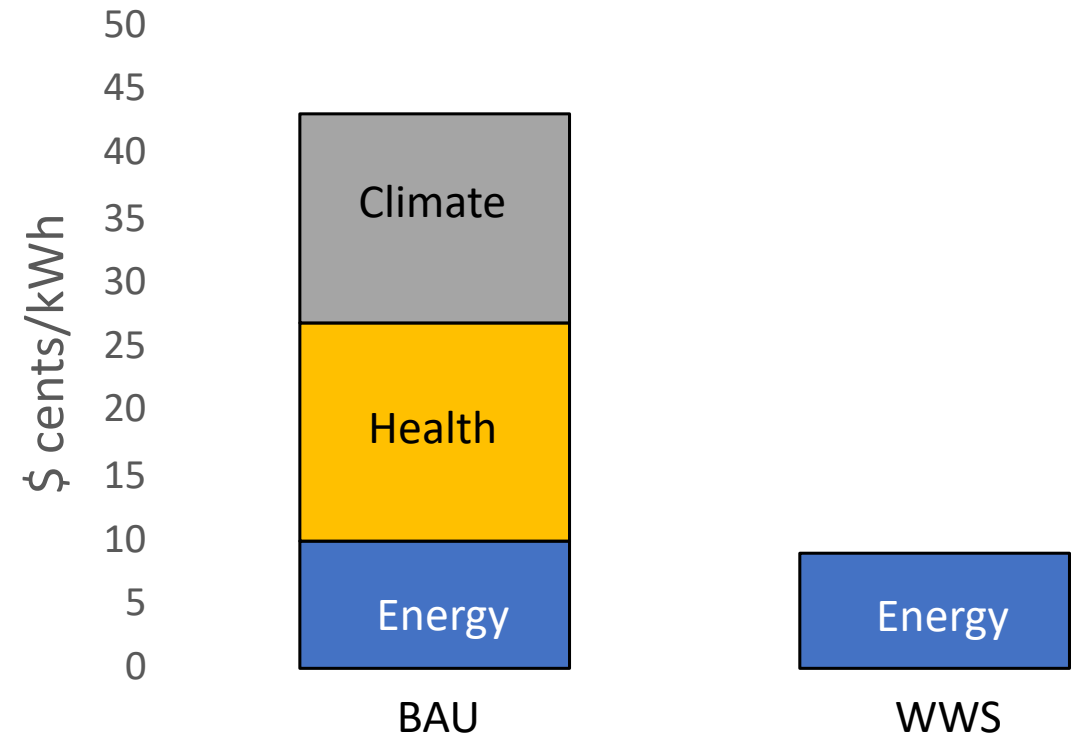
Estimated U.S. Energy Consumption in 2015: 97.5 Quads



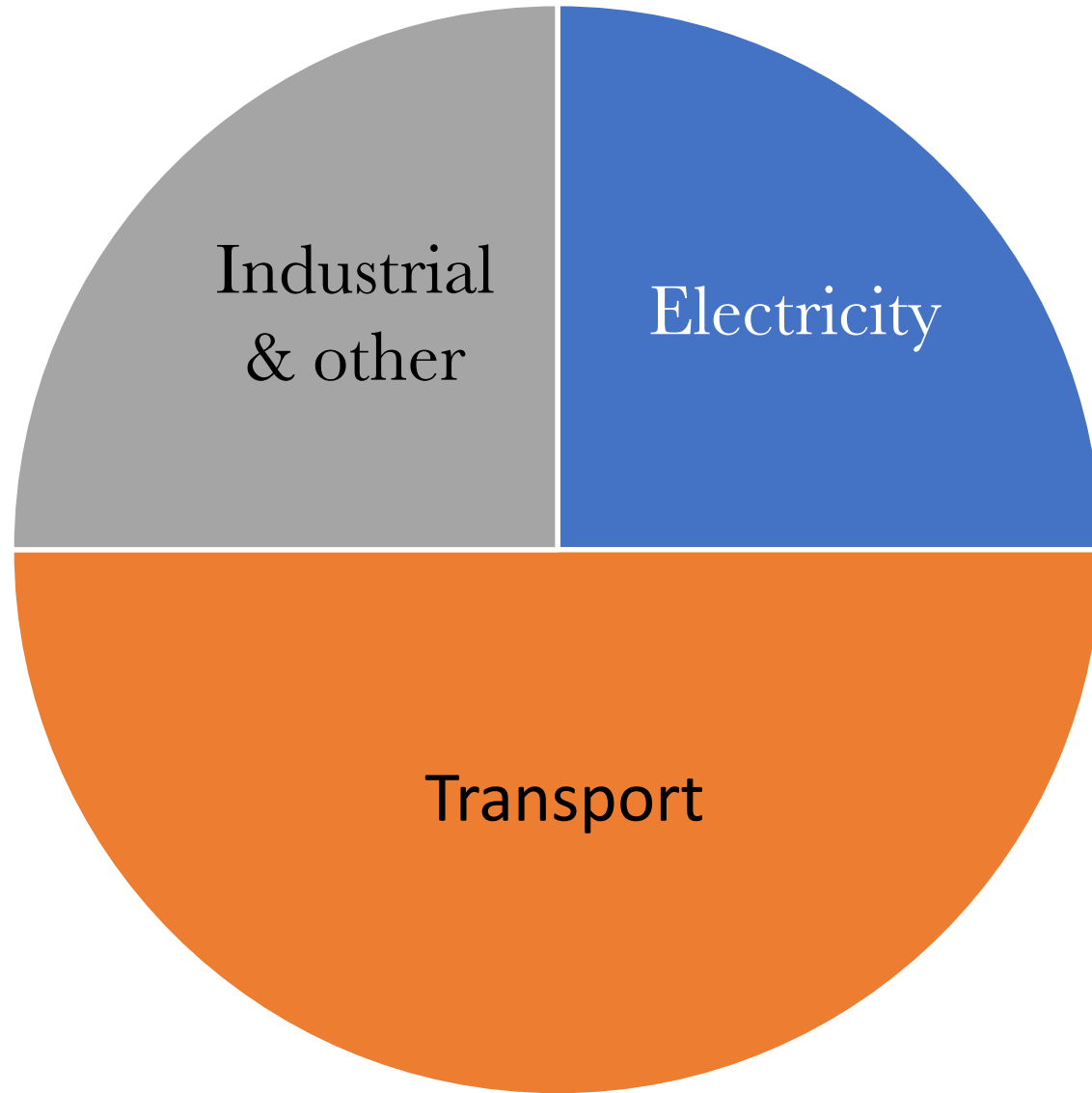
Estimated global energy spend 2050
Business as usual vs Wind/Water/Solar



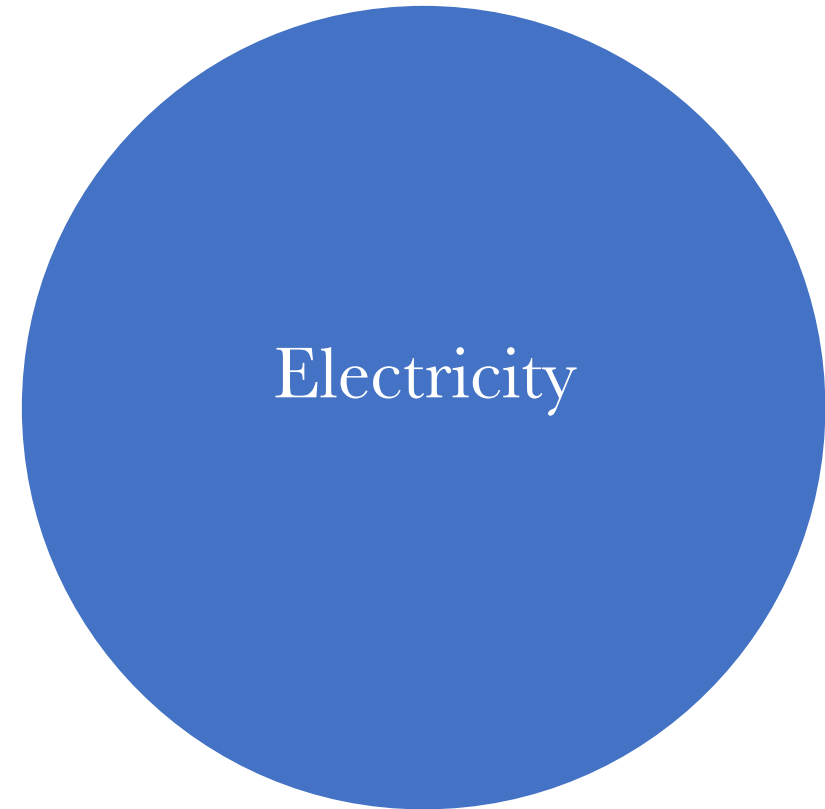
Estimated global energy cost \$c/kWh 2050
Business as usual vs Wind/Water/Solar



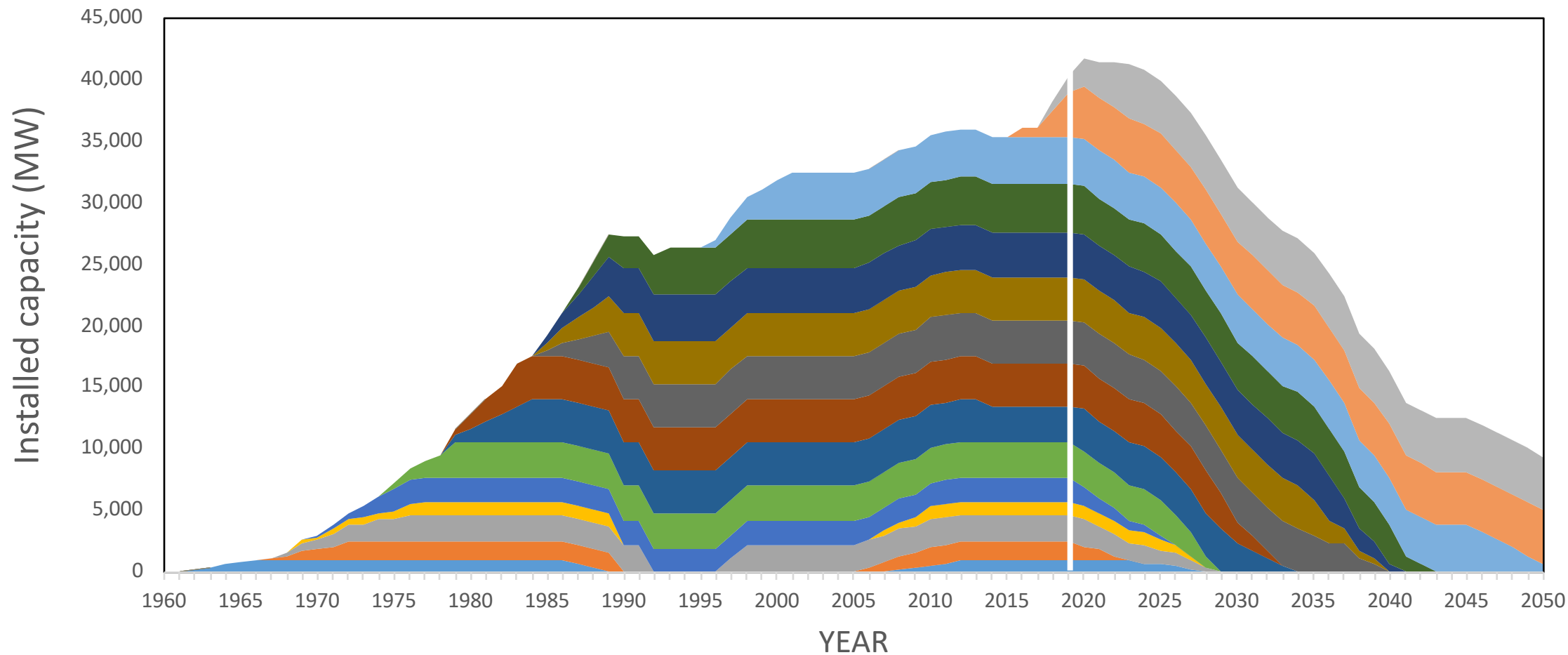
South African energy usage BAU



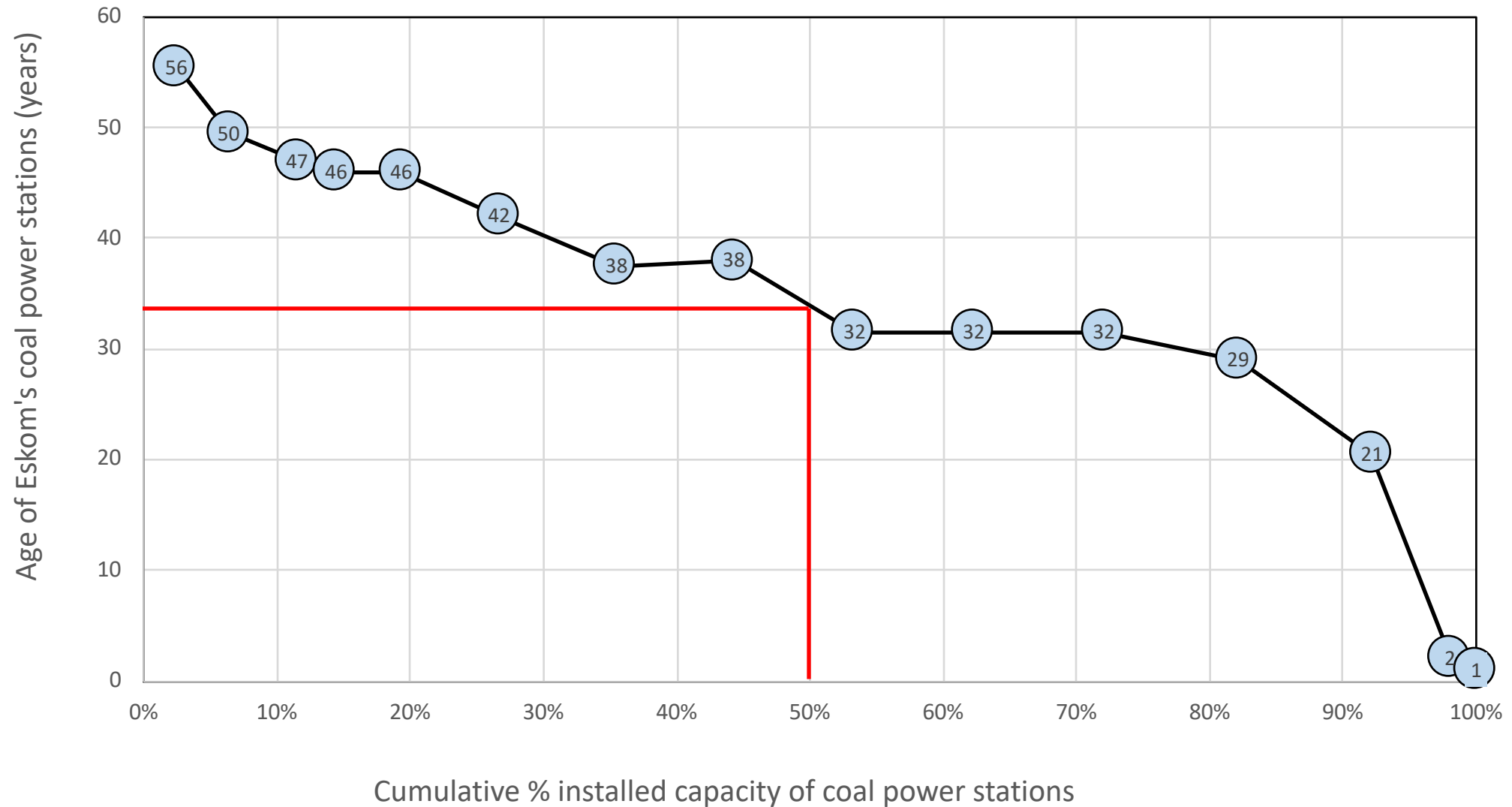
South African energy usage WWS



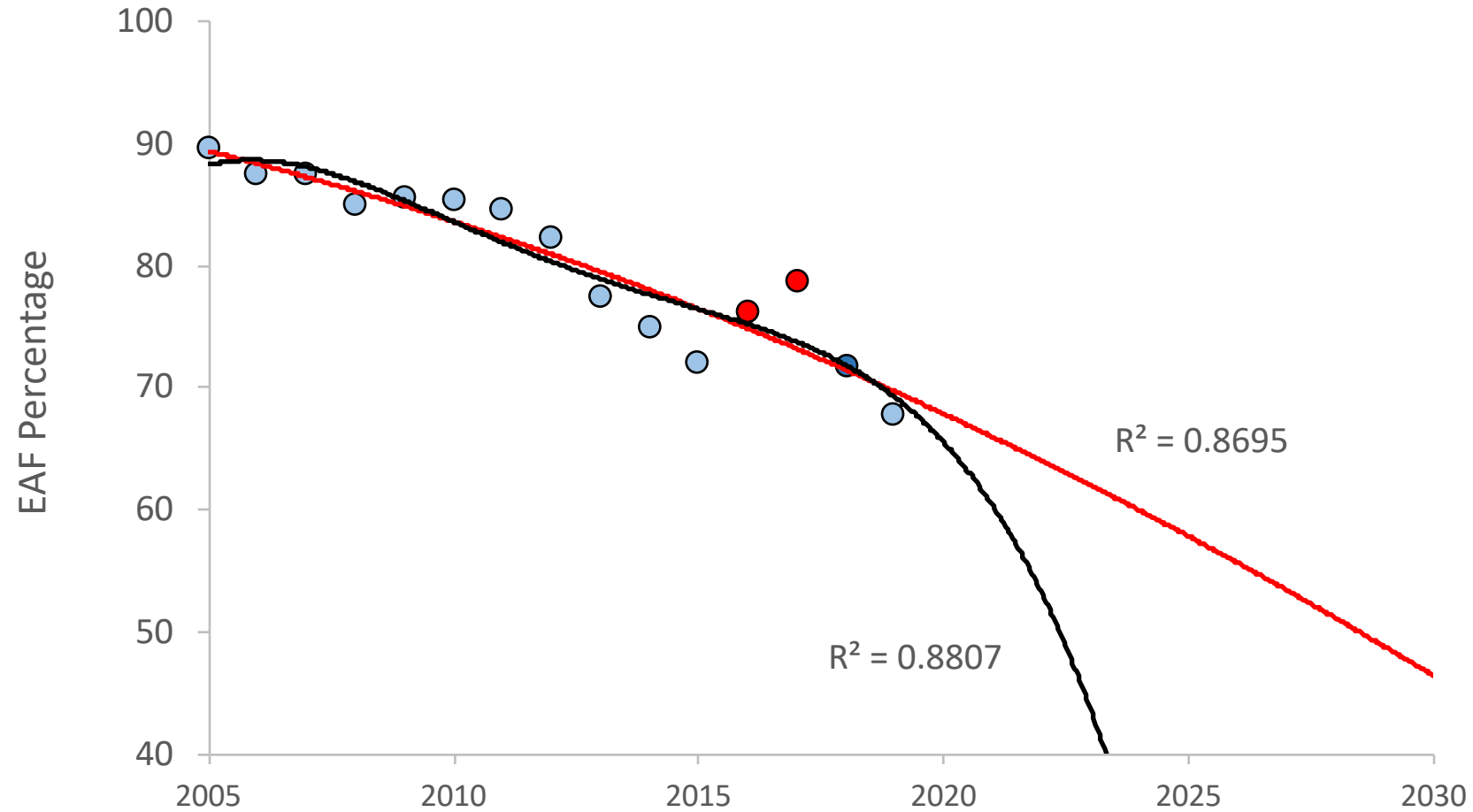
Eskom coal fleet: Build, mothballing and retirement schedule



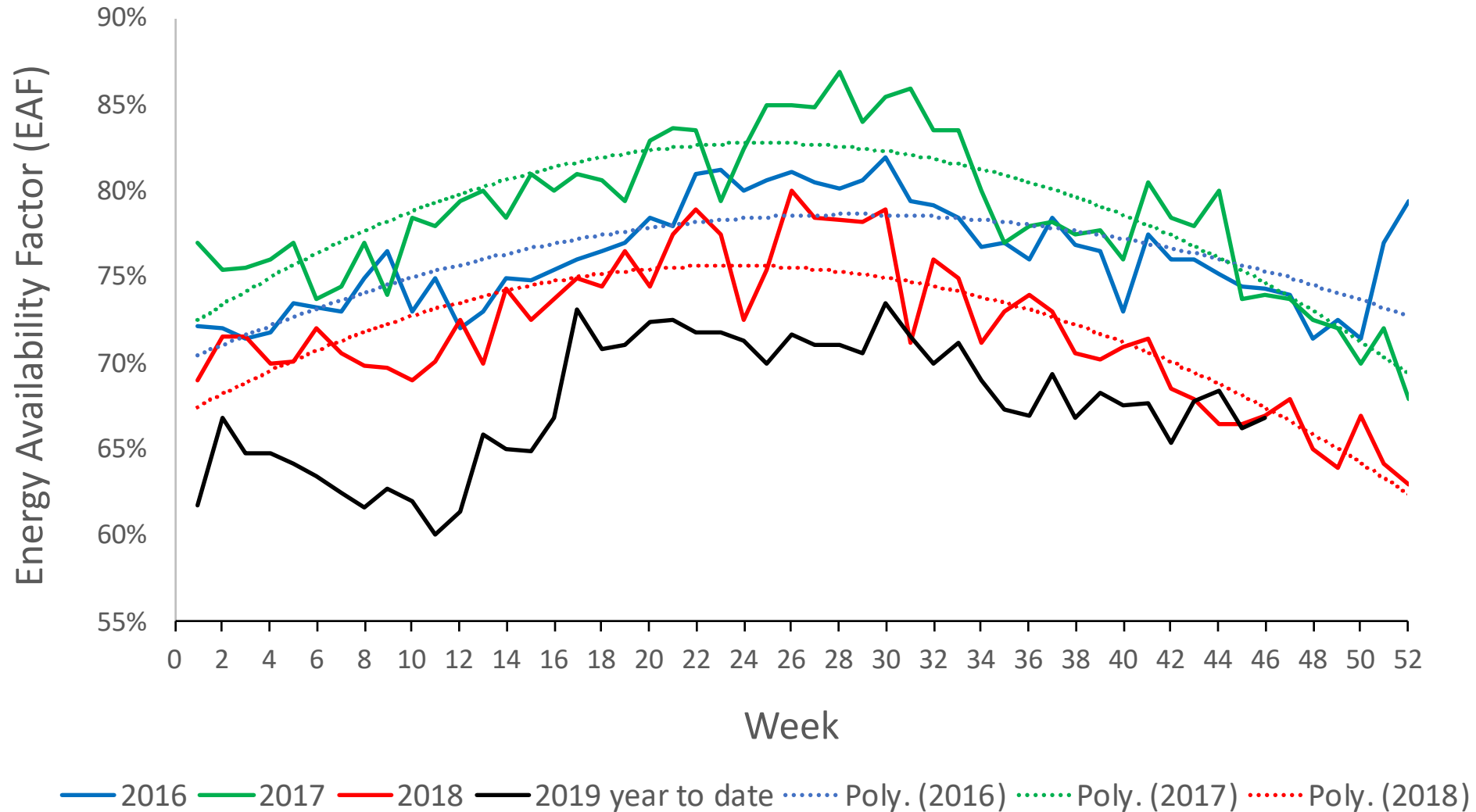
Age vs cumulative % installed capacity of the Eskom coal fleet



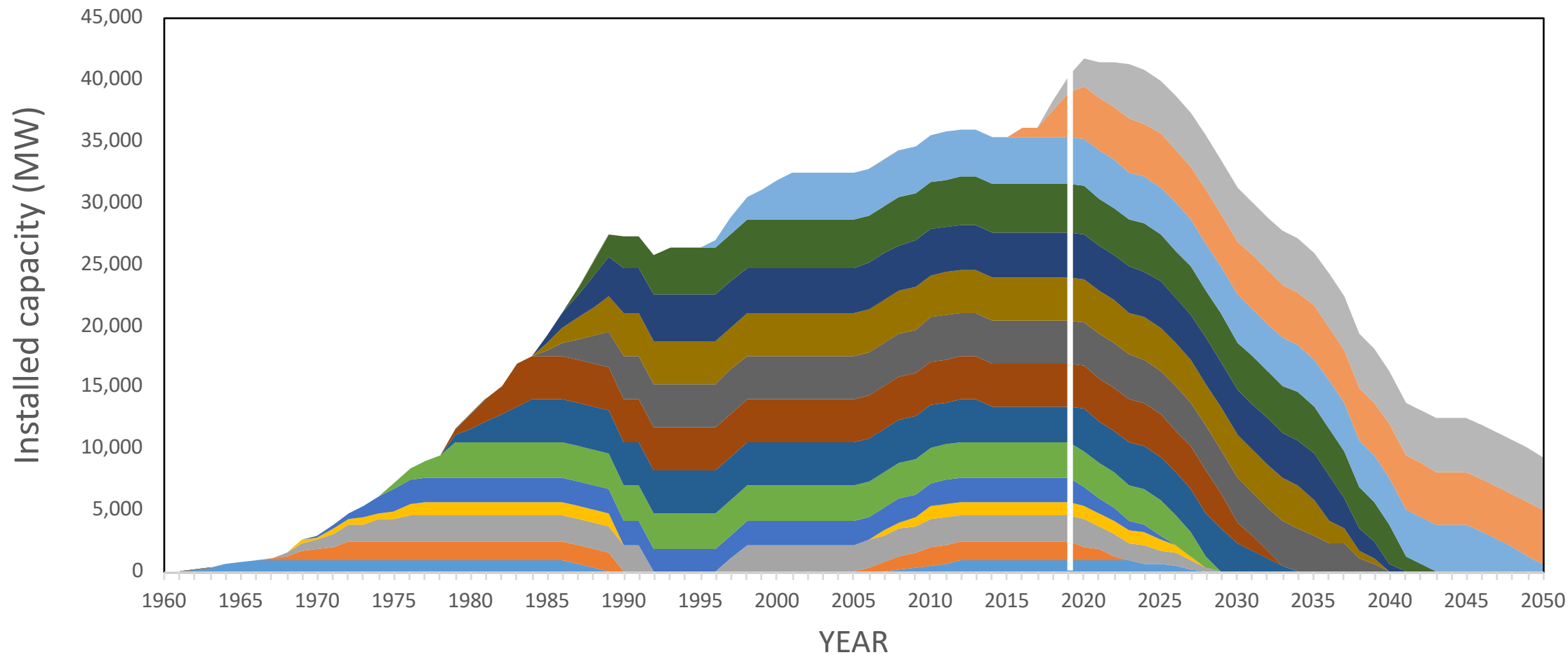
Eskom coal fleet energy availability factor (EAF)



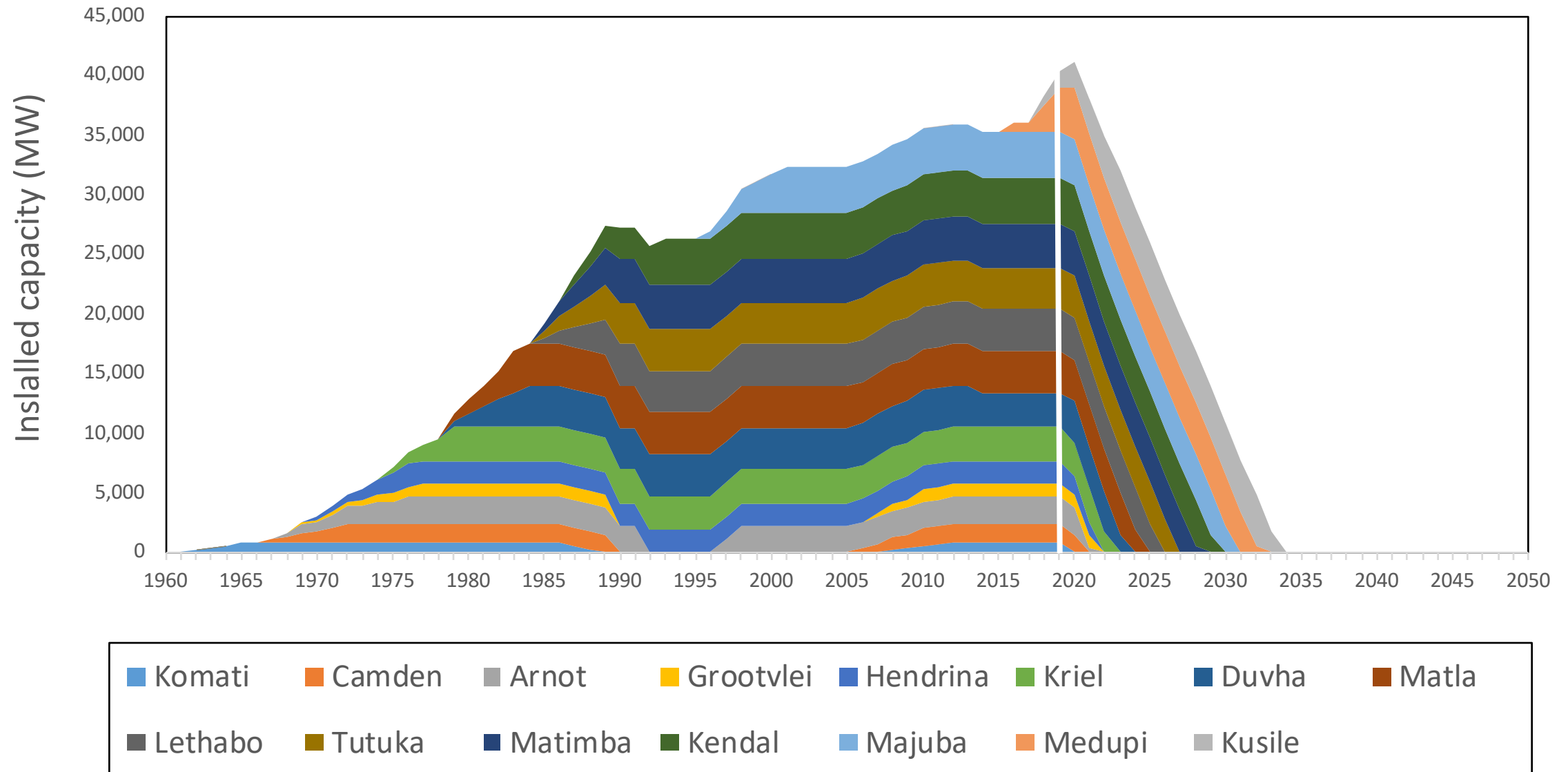
Eskom Weekly Energy Availability Factor (EAF) 2016 - 2019 year to date

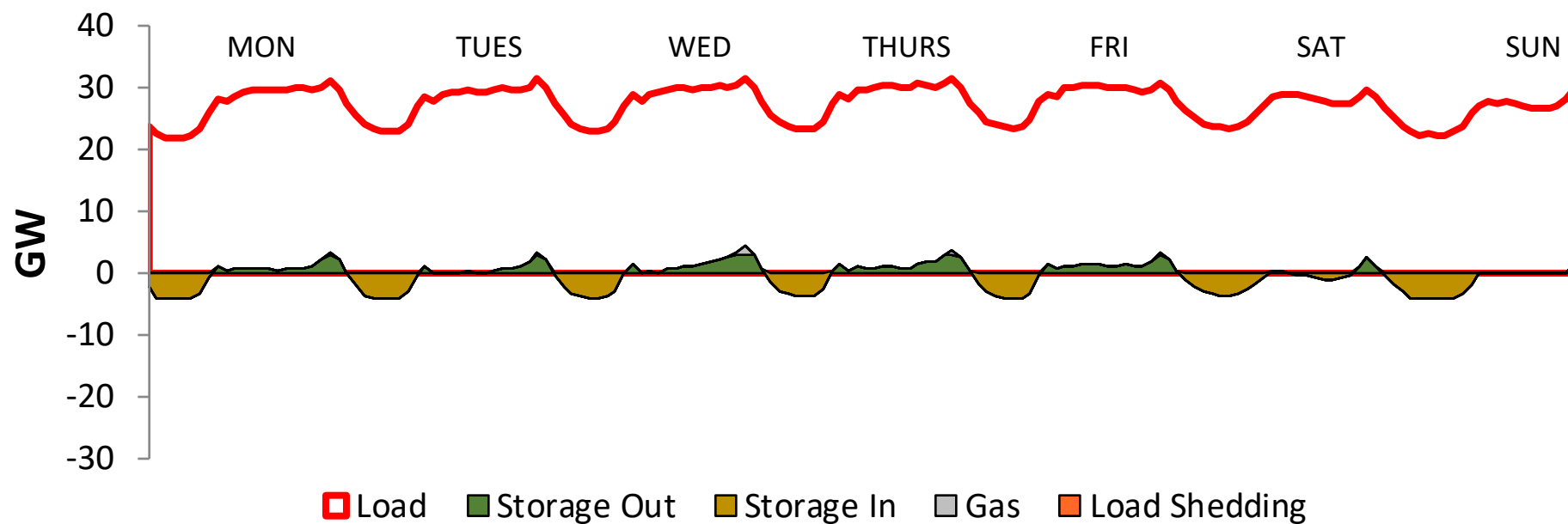
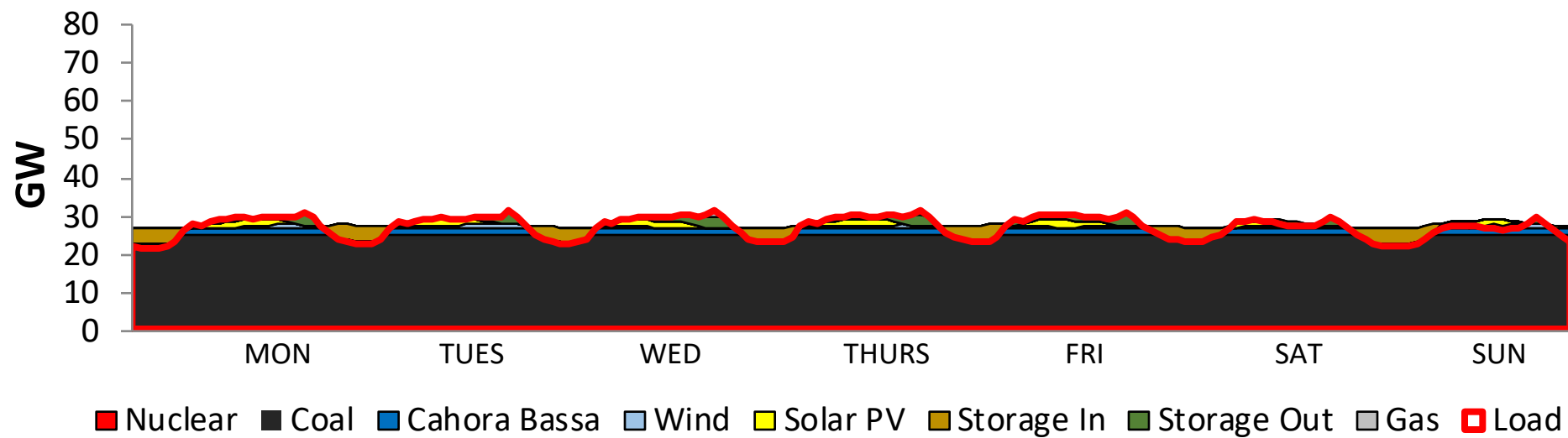


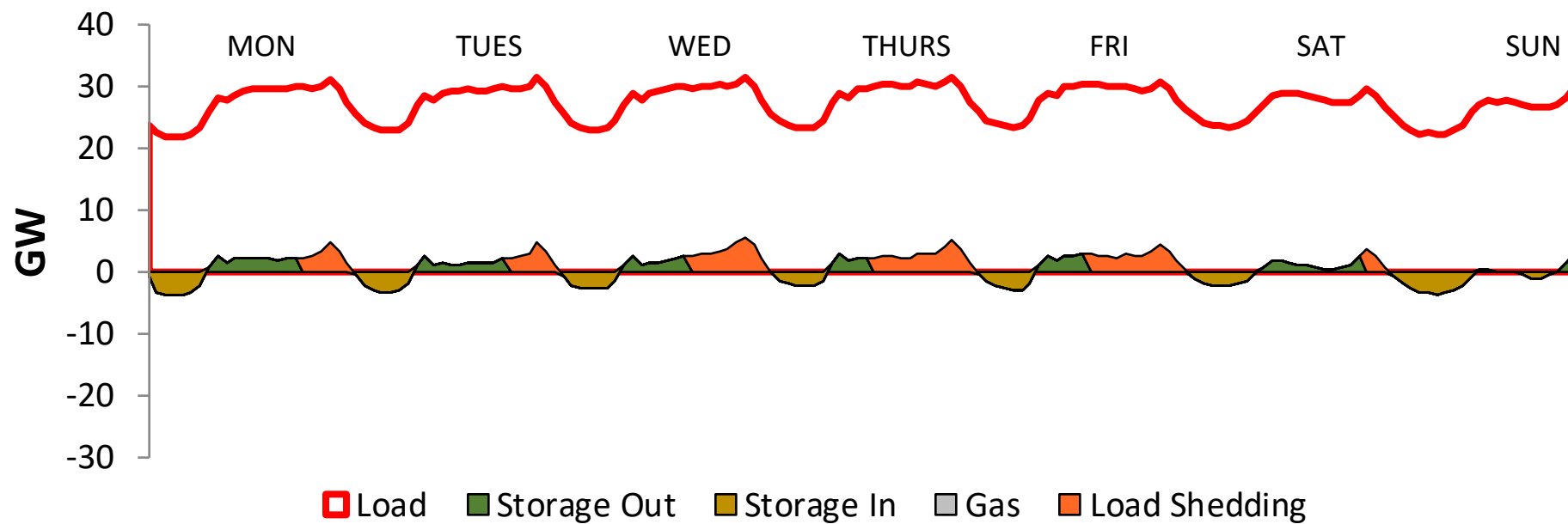
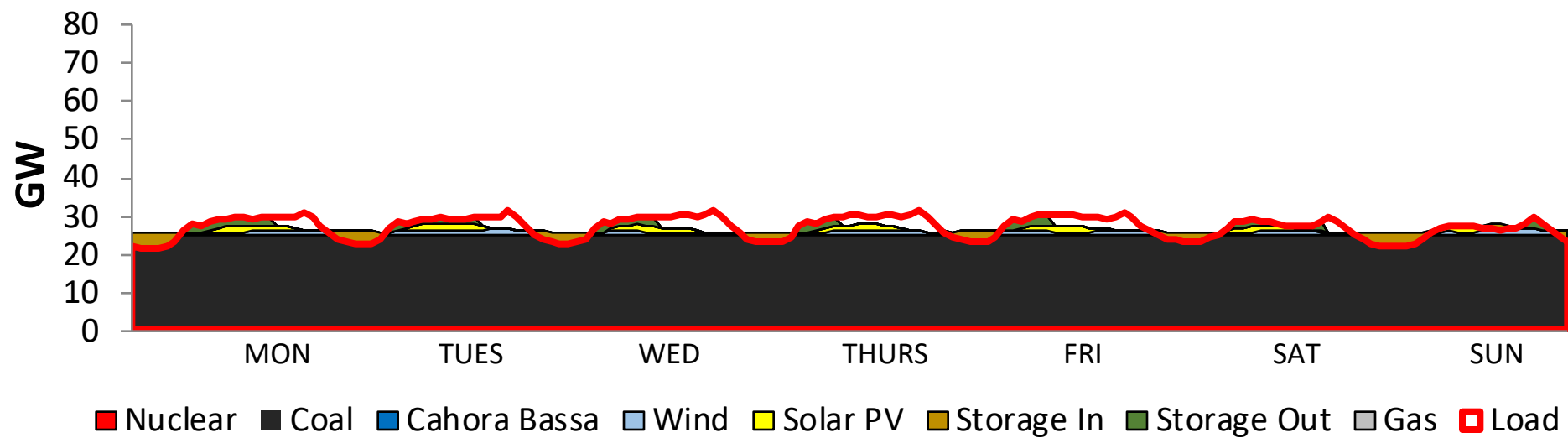
Eskom coal fleet: Build, mothballing and retirement schedule



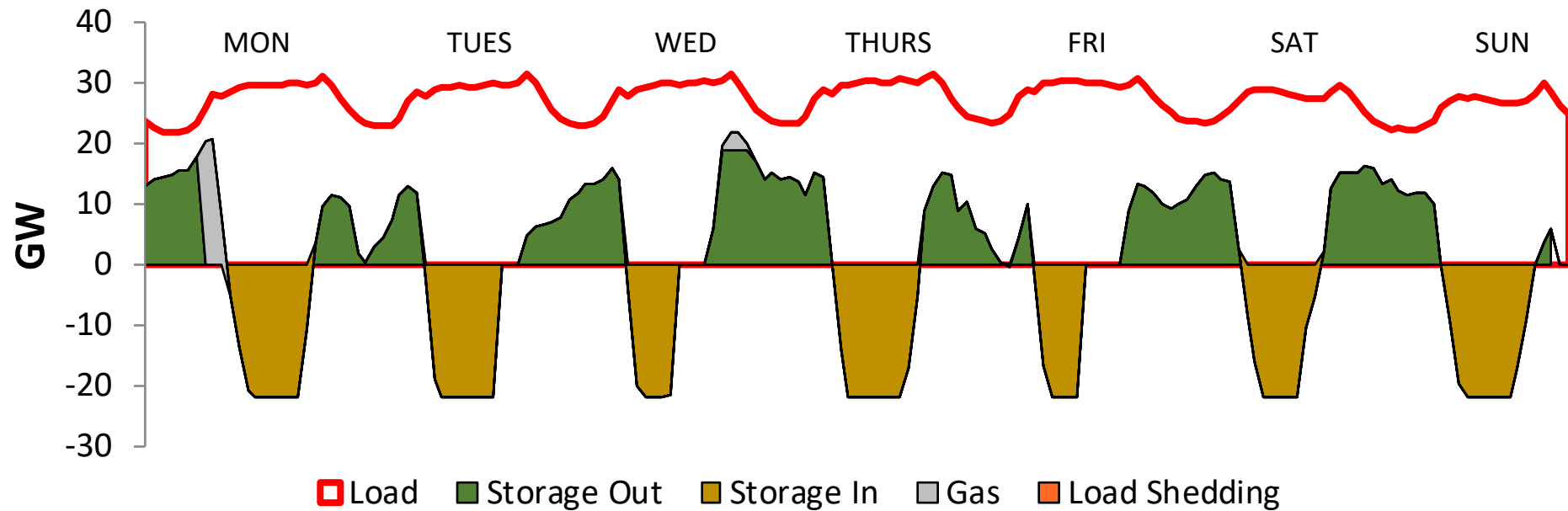
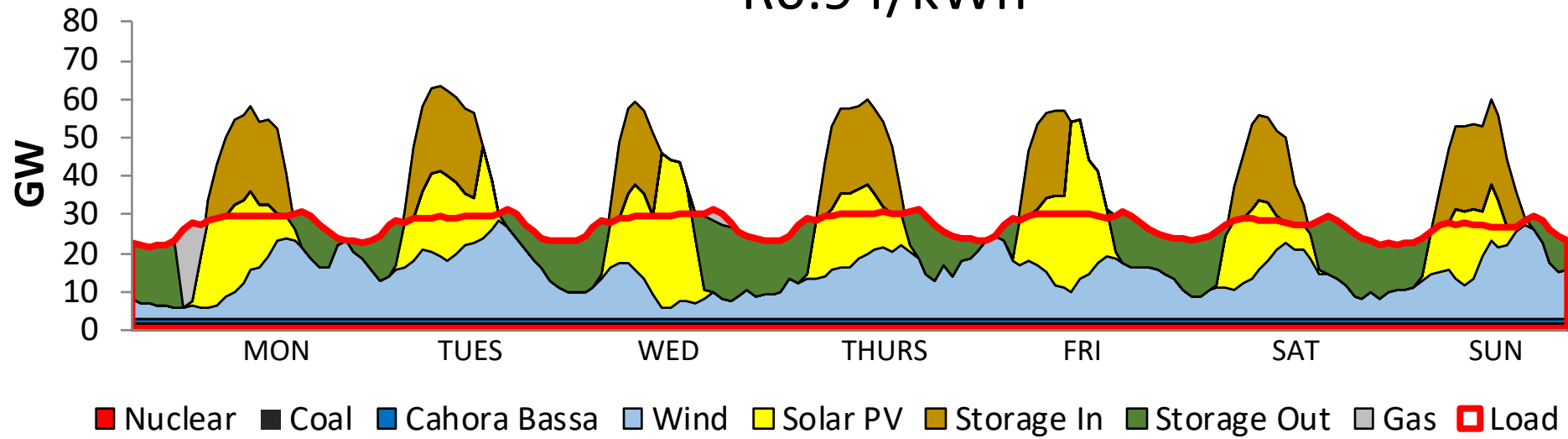
Eskom coal fleet accelerated retirement schedule



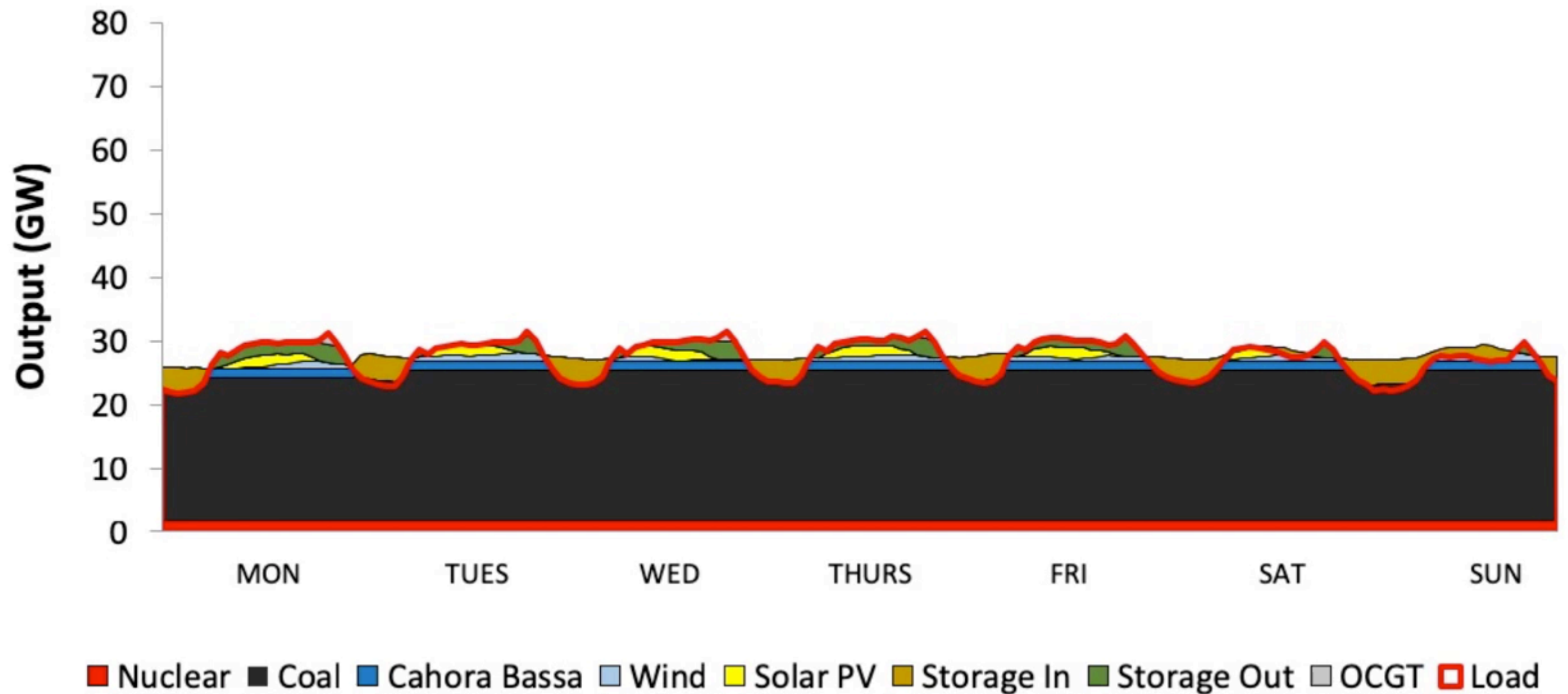




R0.94/kWh



2020



Summary of results: Capacity and output

Coal replacement	GW	Capacity Factor	Annual TWh
Coal	30	80%	210
Nuclear	28	90%	211
Gas	28	75.82%	199
Wind	34	40.31%	96
Solar PV	50	28.51%	114
Storage	18/72GWh	23.53%	44

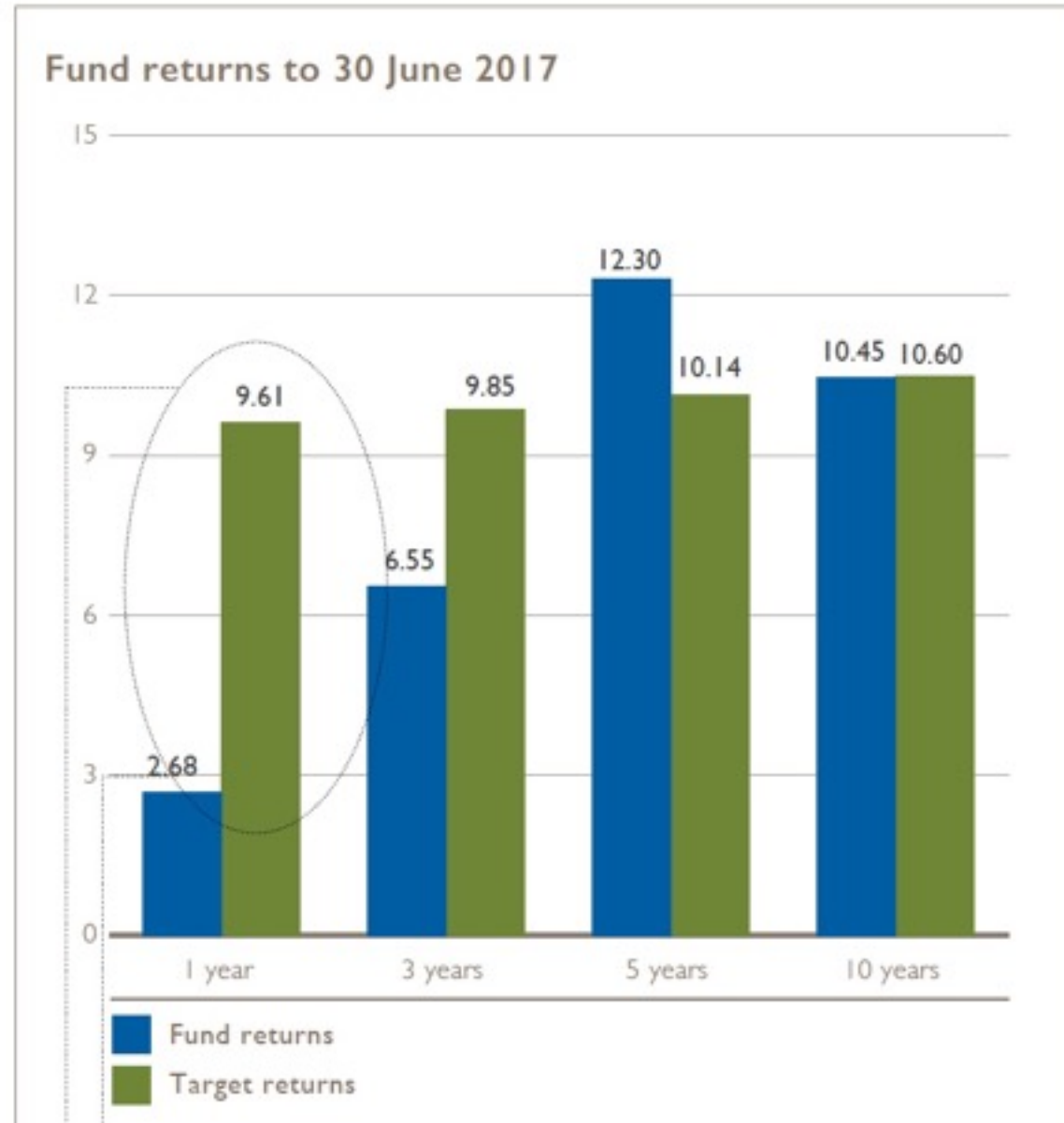
Summary of results: Costs and security of supply

Coal replacement	R/kWh	Hours of load shedding	Max stage of load shedding	Percentage Gas
Coal	R1.36/kWh	96	3	3.73%
Nuclear	R1.89/kWh	38	1	1.37%
Gas	R1.33/kWh	38	1	75.82%
Wind/Solar/Storage	R0.94/kWh	0	0	7.33%

Eskom's transmission grid network

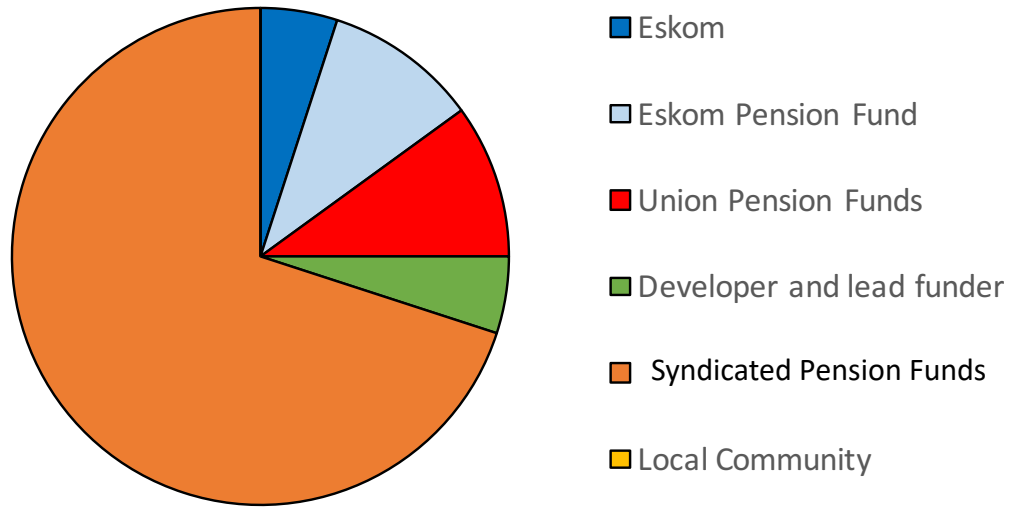


Eskom pension fund returns

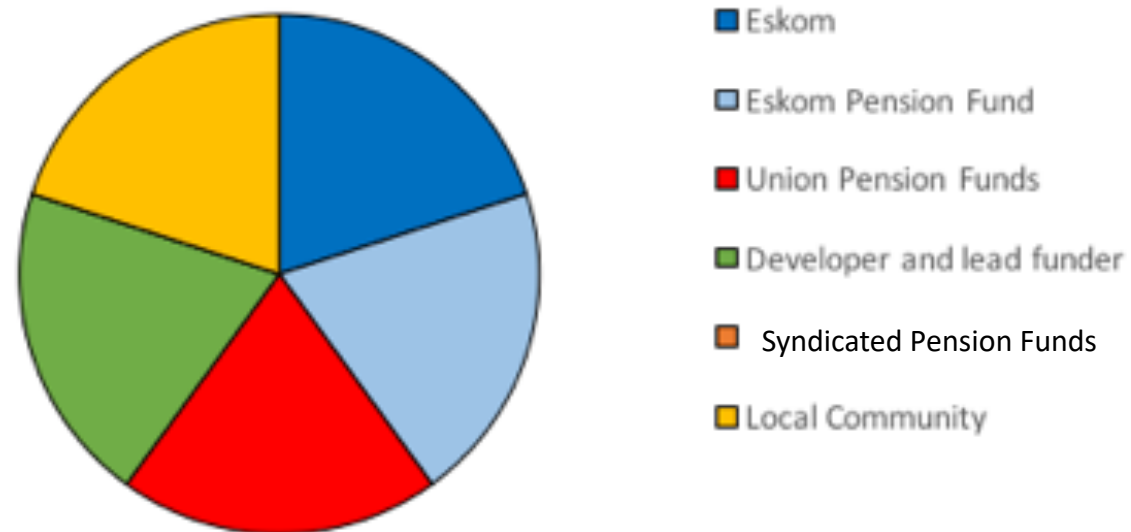


Recommended capital funding sources and equity ownership of a renewable replacement fleet

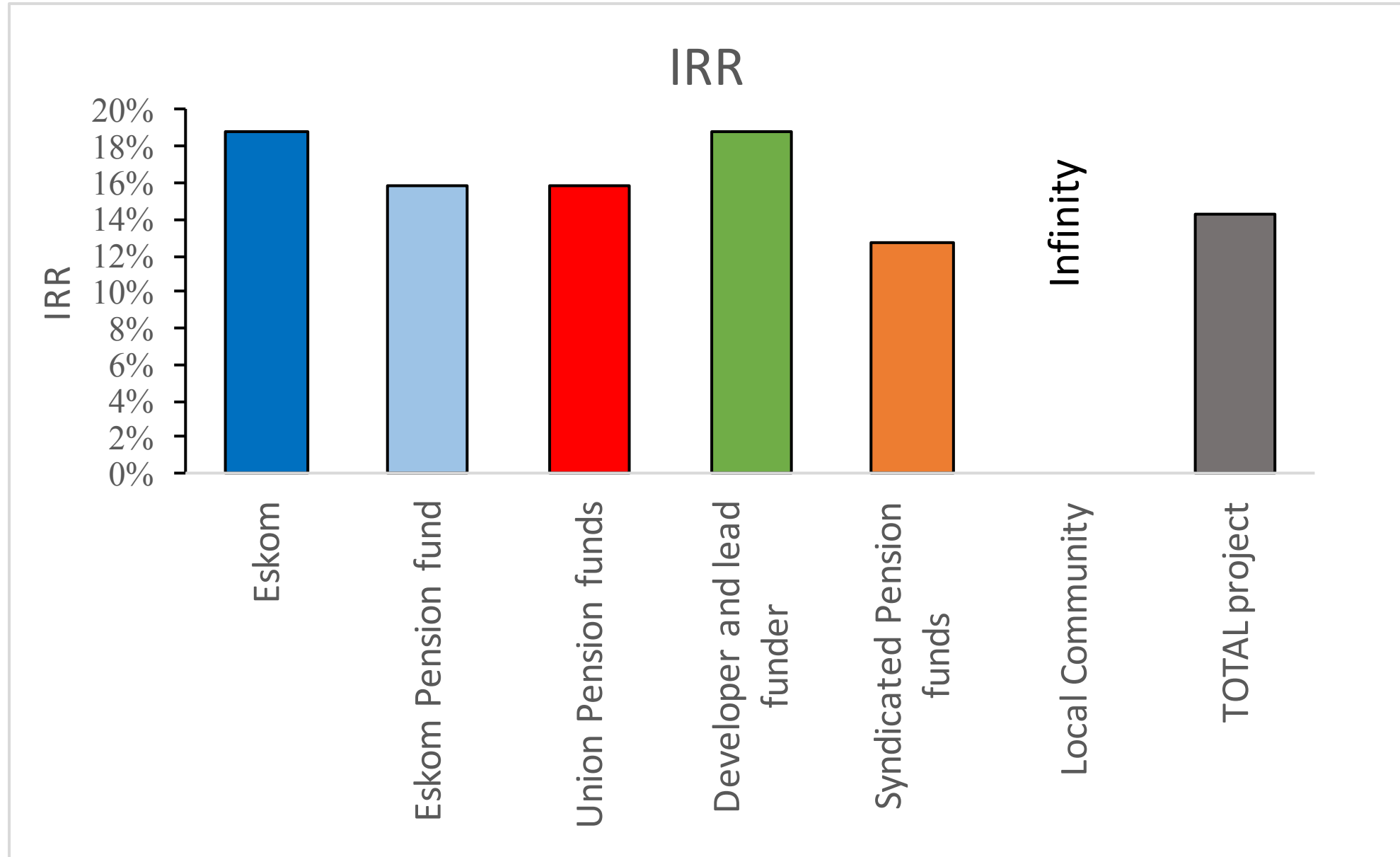
Capital %



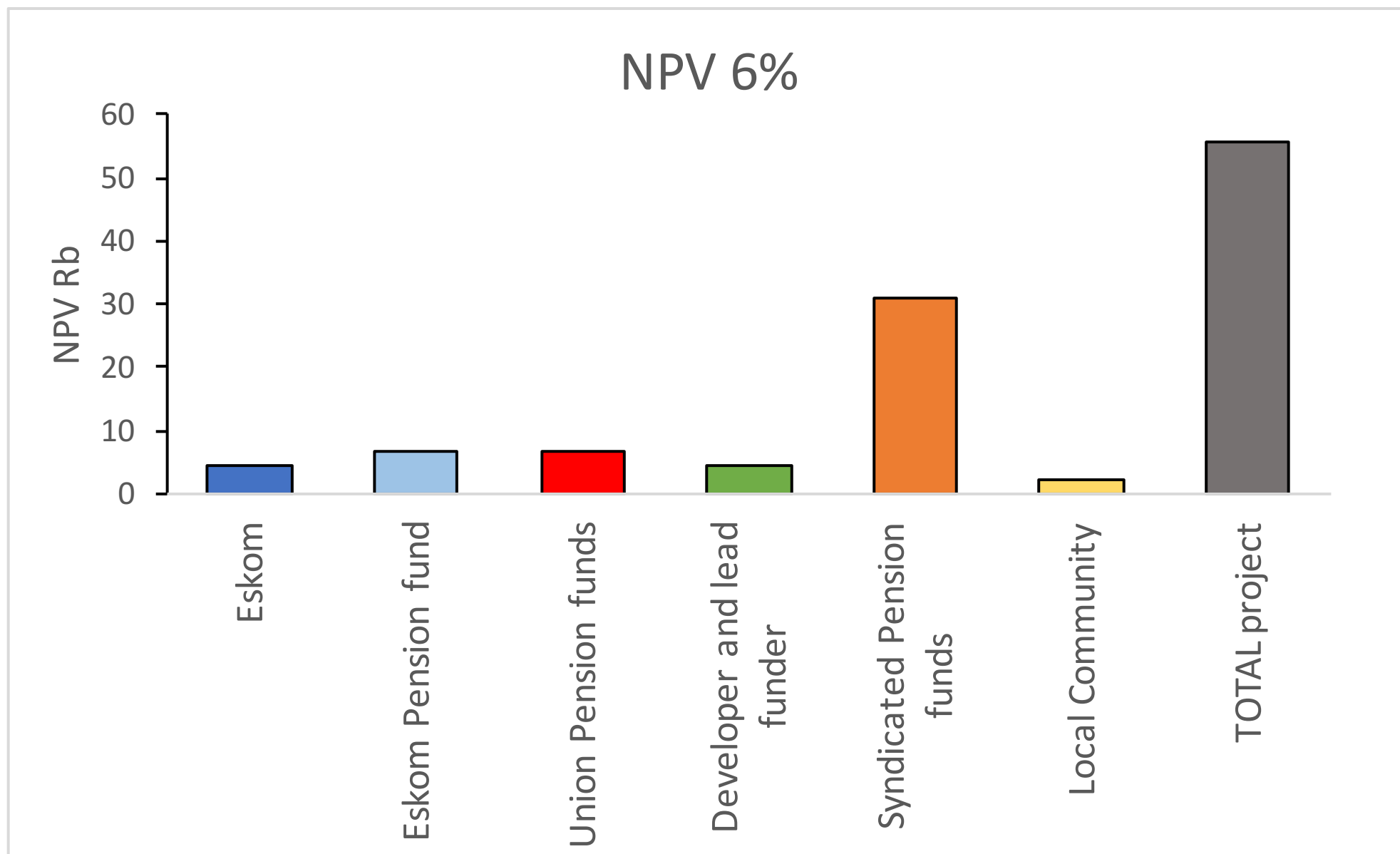
Equity %



Indicative returns for the different participants



Indicative returns for the different participants



Conclusions:

- We need to transition to 100% WWS as soon as possible;
- At least 80% by 2030;
- 100% by 2050;
- South Africa will require about four times its current electricity supply by 2050;
- Logical place to start is with an accelerated retirement of the coal fleet;
- We will require major upgrades to the existing transmission and distribution grids;
- We will require conversion from an analogue grid to a fully digital and smart grid; and
- We need large numbers of ICT savvy electrical engineers for the future

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