

Overview of Modelling of the coal and power sectors in SATIMGE

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Southern Africa – Towards Inclusive Economic Development

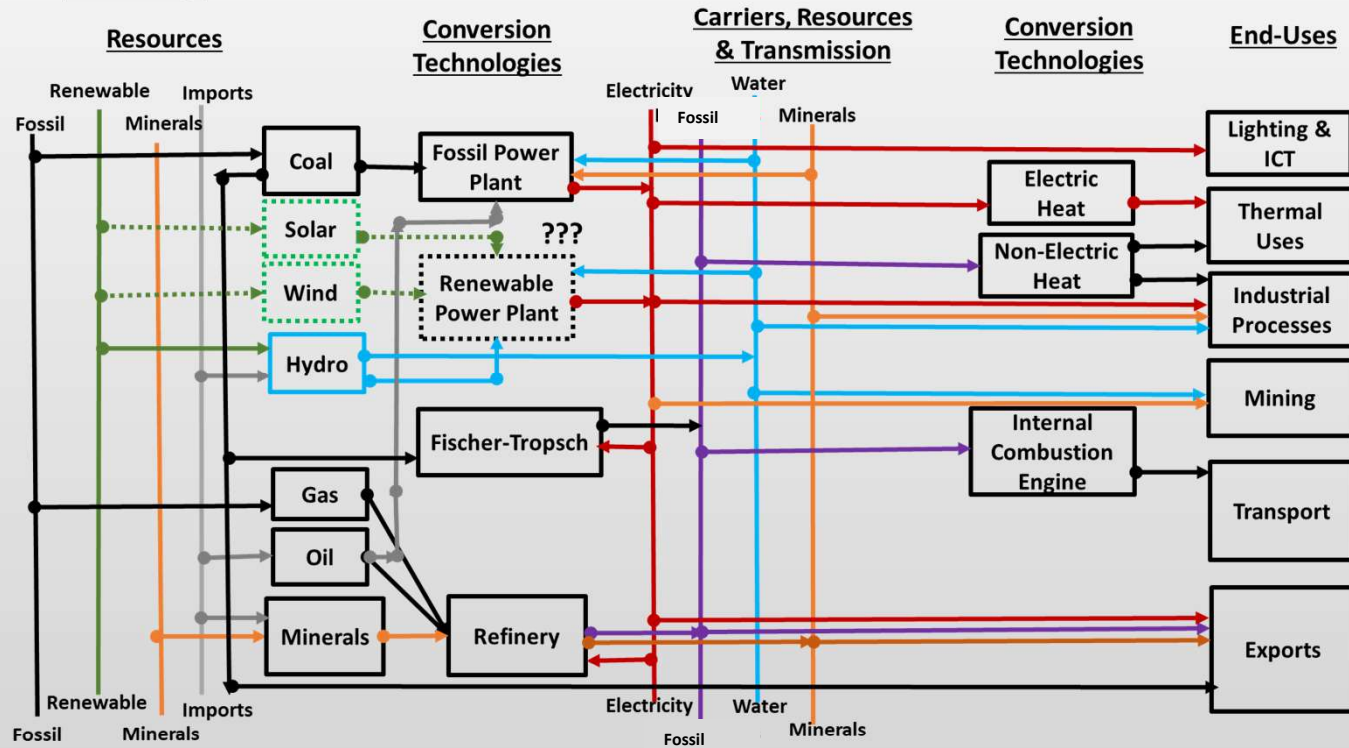


Overview of Presentation

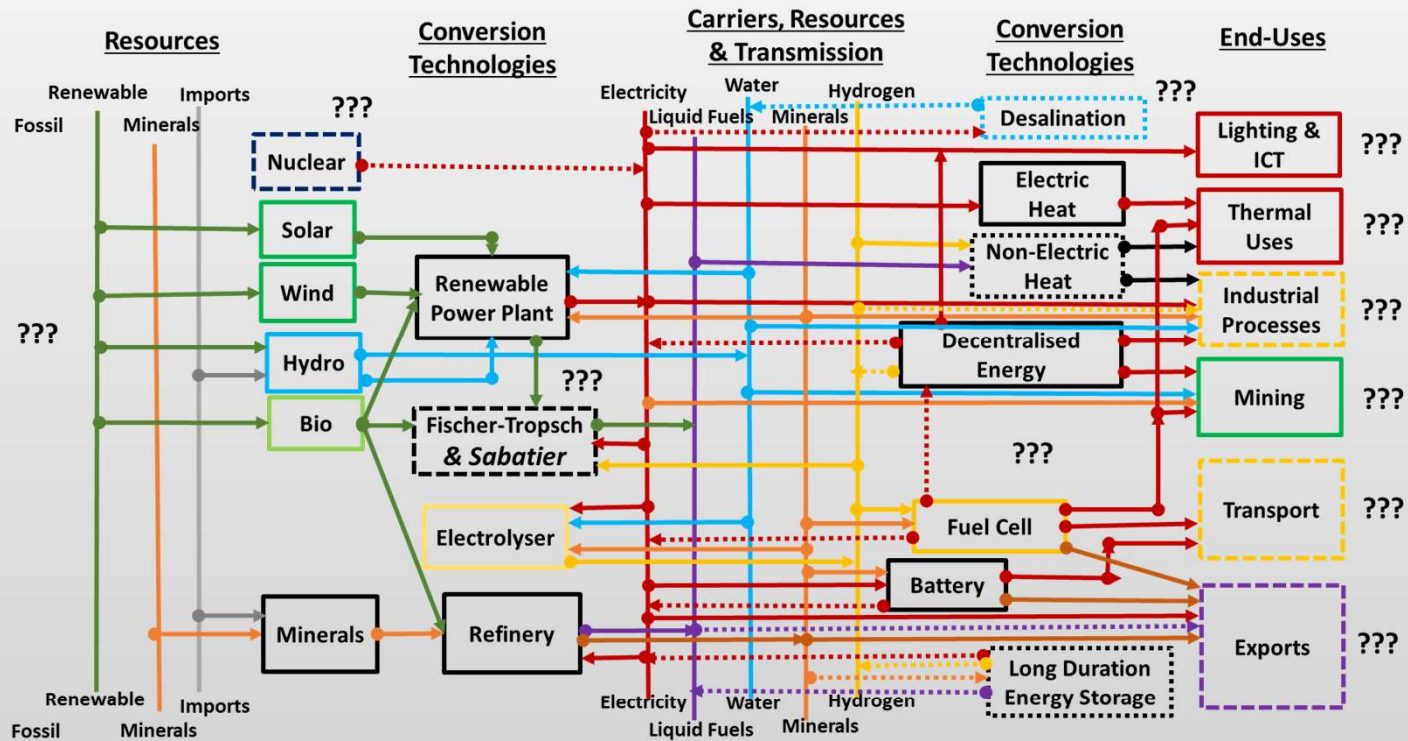
- ▶ SATIMGE: a framework for unpacking the transition
- ▶ Unpacking coal and power sector
- ▶ 2 contrasting scenarios
- ▶ Conclusions

Today in South Africa

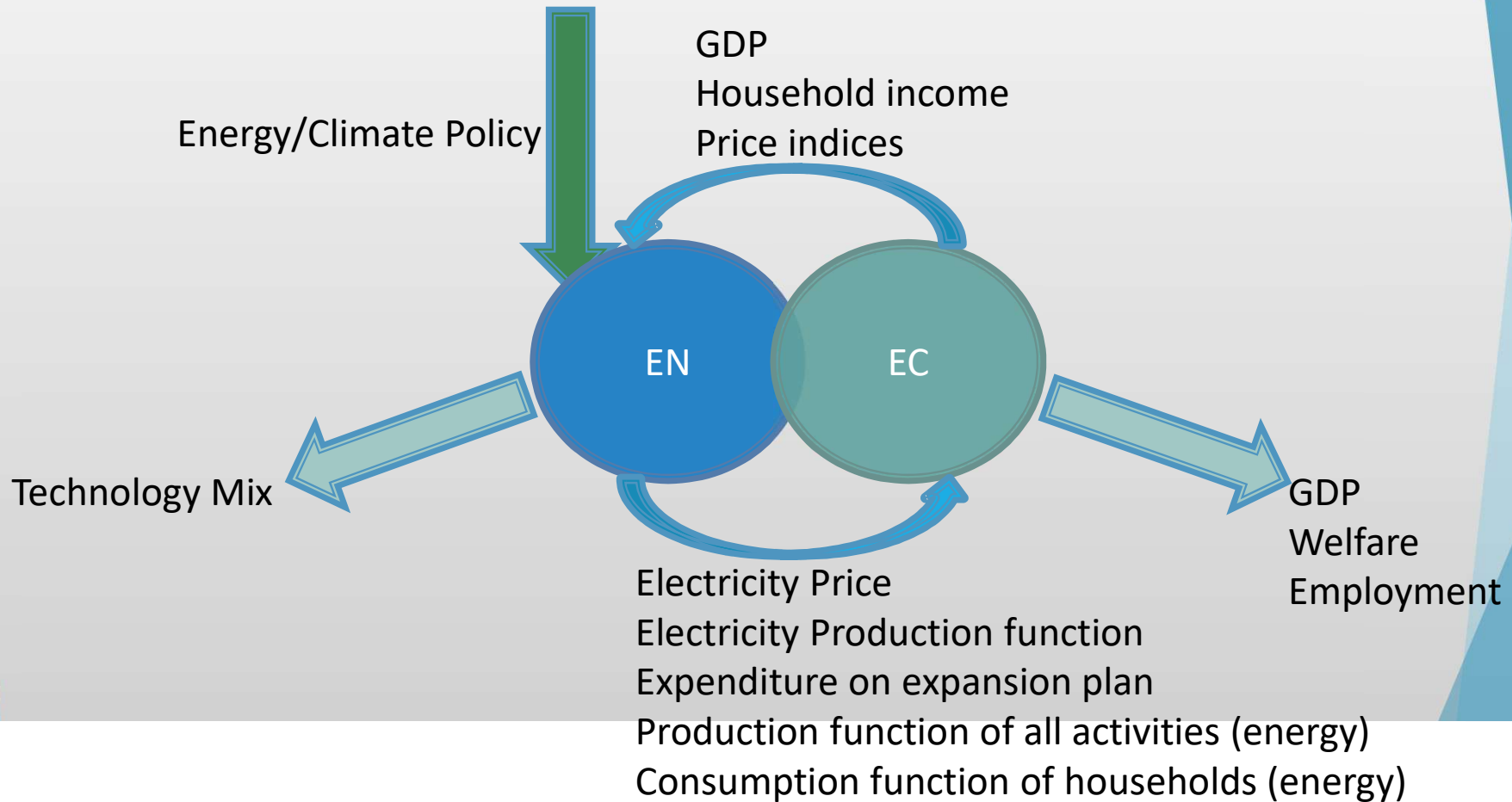
Status Quo Carbon Intensive



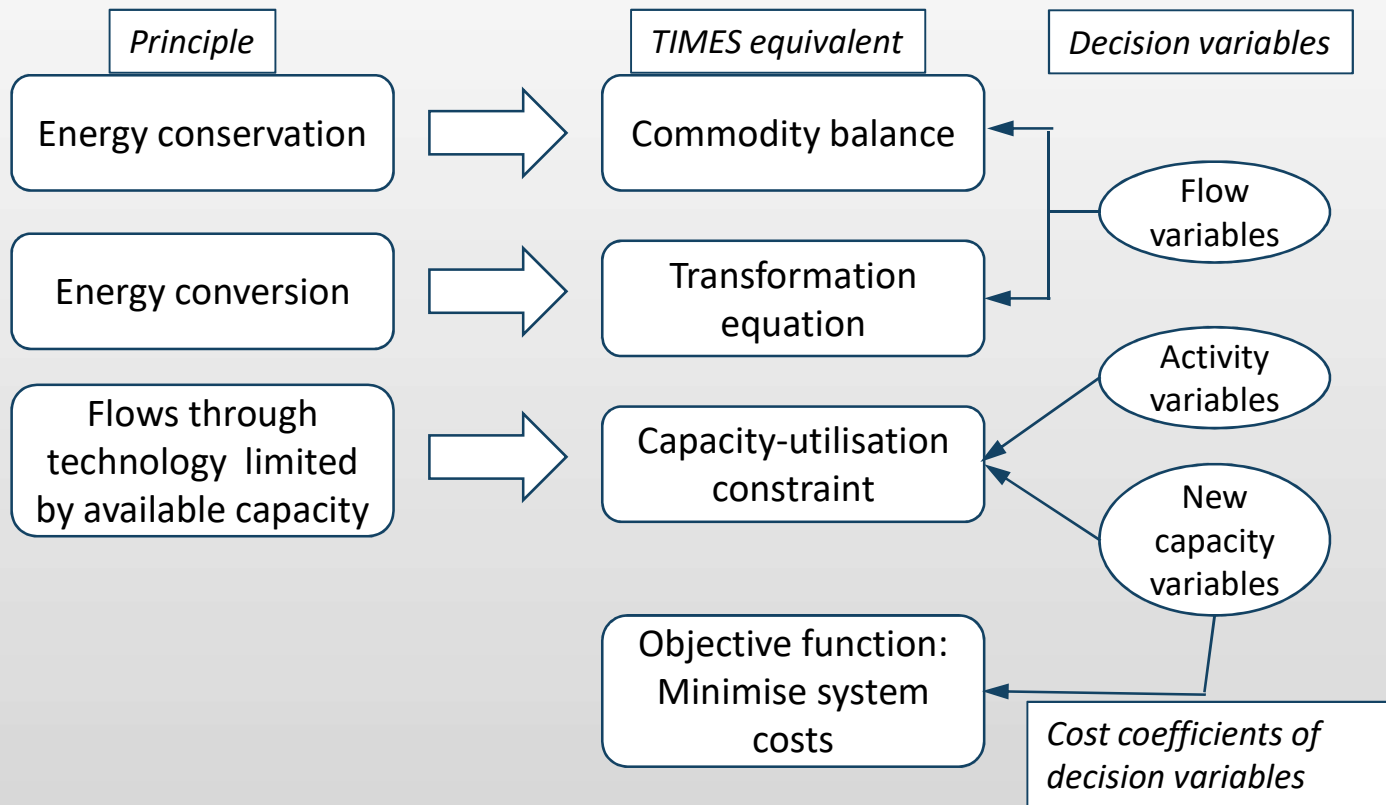
The Future in South Africa •.....→ Decarbonised & modernised



Linked Energy-Economic Modelling

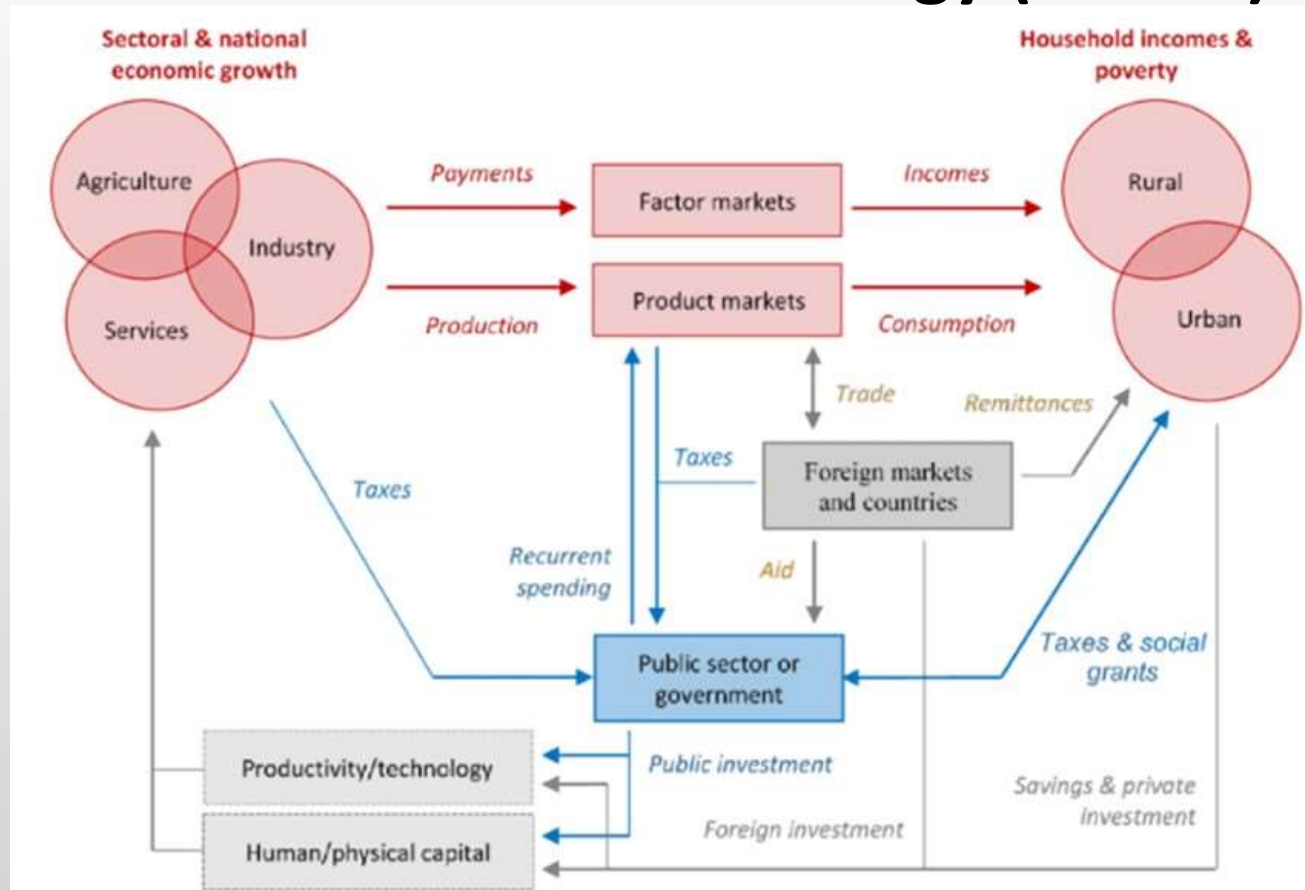


SATIM - Core equations/constraints



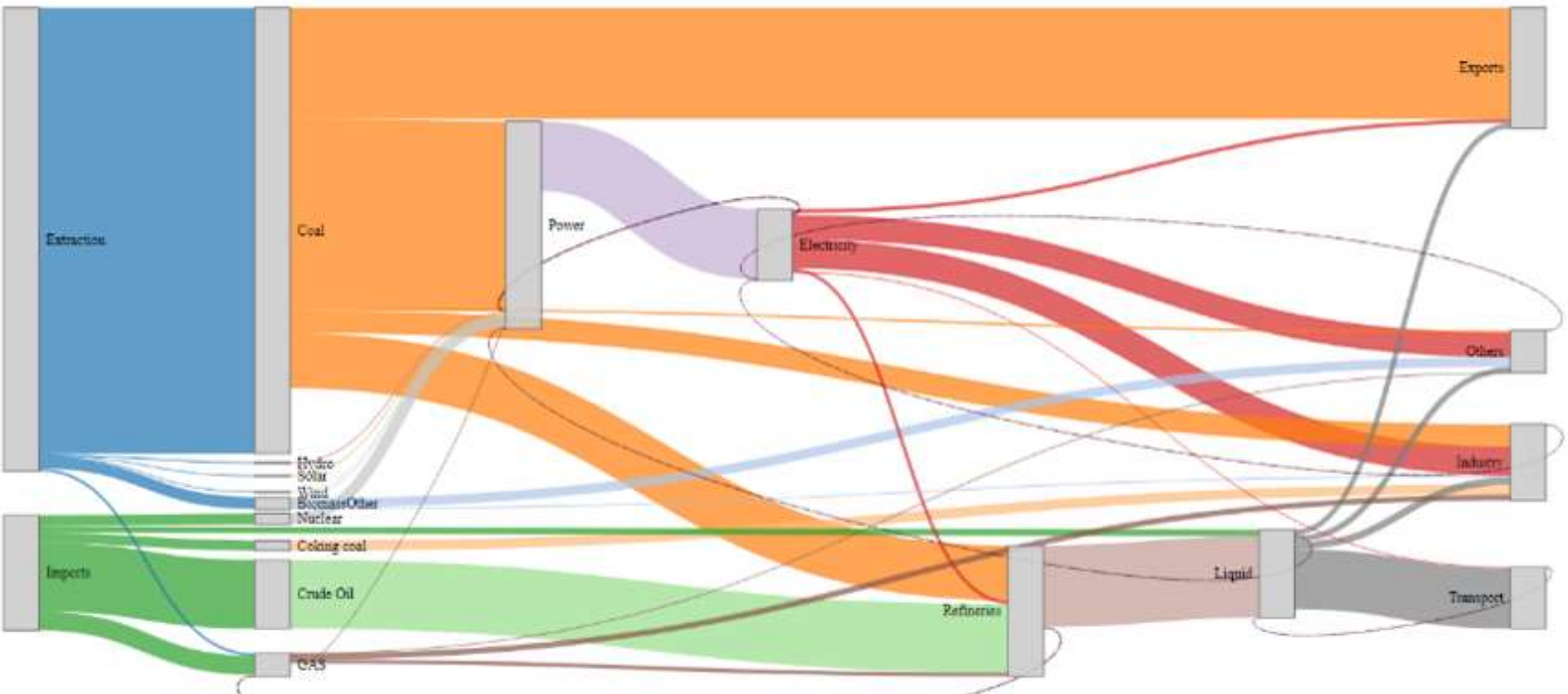
- ▶ Ensures technical feasibility of scenarios

General Equilibrium Model for South African CGE model with detailed Energy (eSAGE)

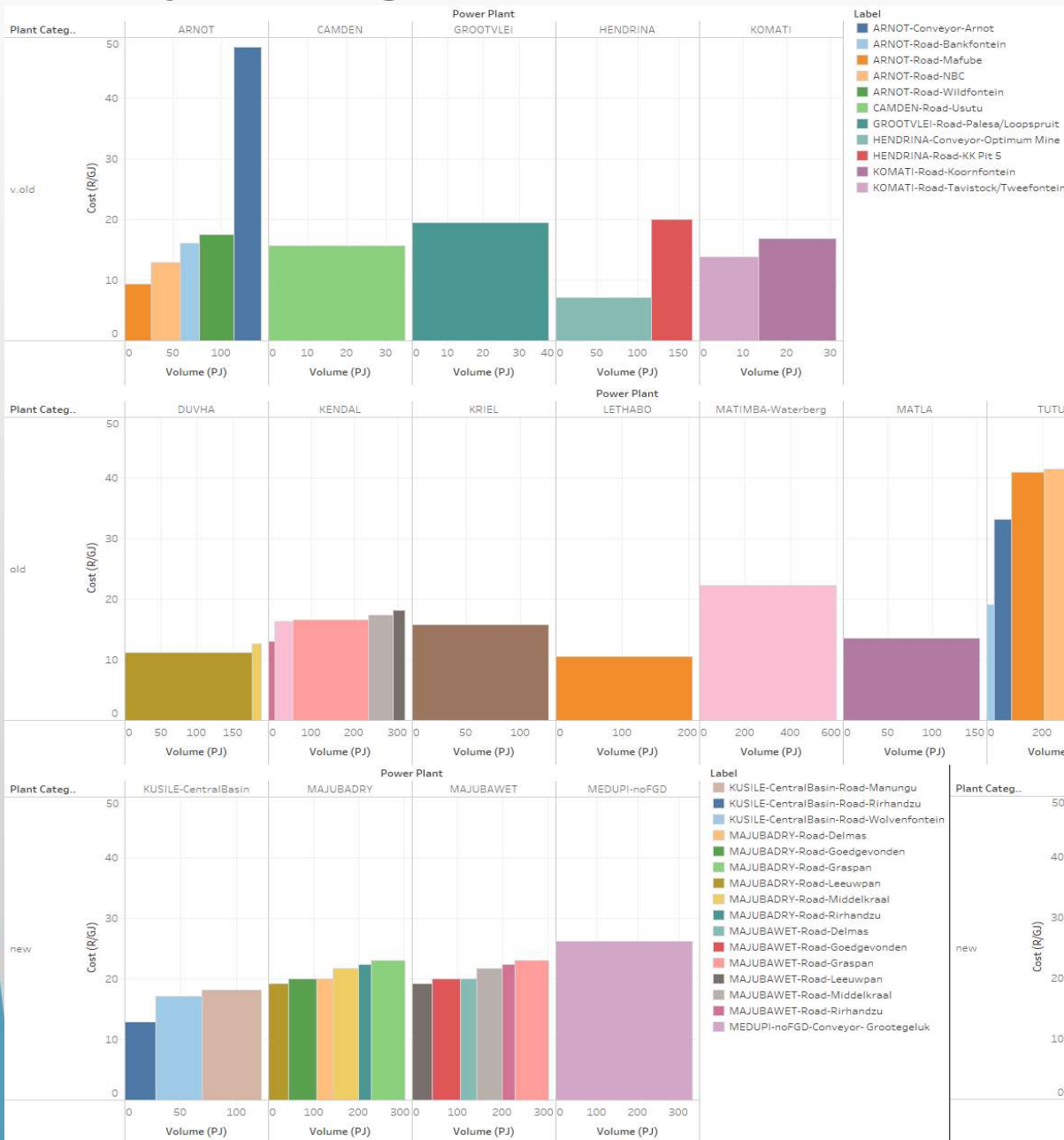


- ▶ Input/Output Table / Social Accounting Matrix at the core ensures sector linkages
- ▶ Ensures macro-economic constraints

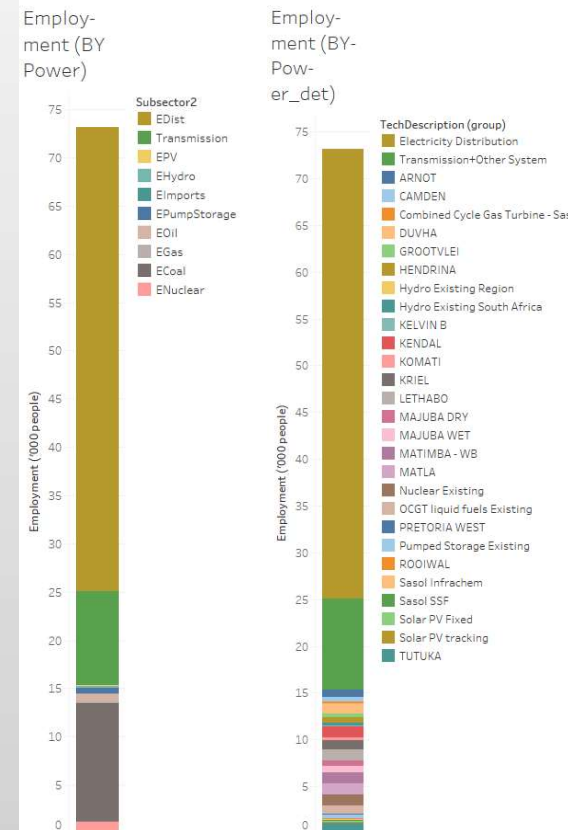
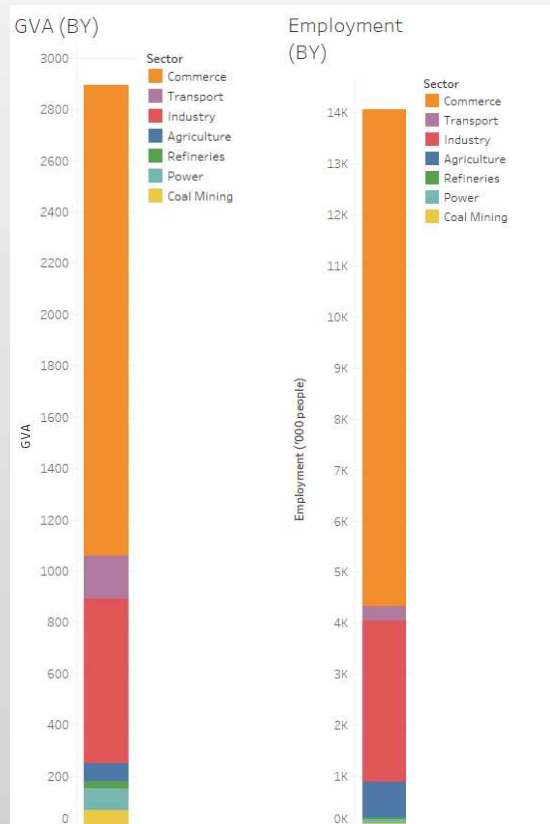
Unpacking Energy: Energy use in 2012



Unpacking Coal: Coal contracts (2)



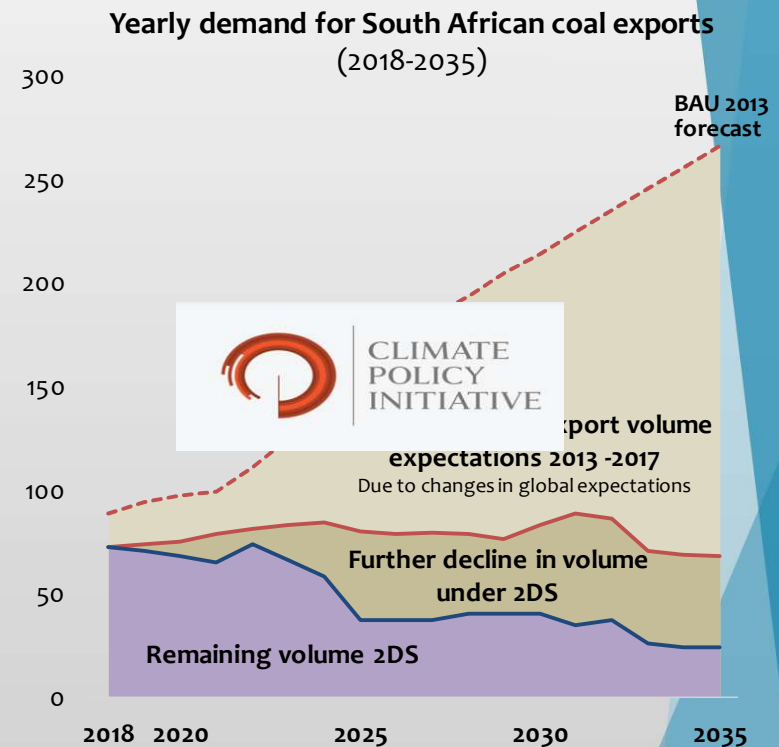
Unpacking the Economy: Value Added and Employment from Power and Coal in 2012



Looking forward: Two contrasting scenarios

▶ Similar to last 2 scenarios presented by Faaqiqa:

- ▶ No CO2 constraint
- ▶ Coal export demand as per CPI 2019 (2DS), i.e. flat exports, decreasing in 2025

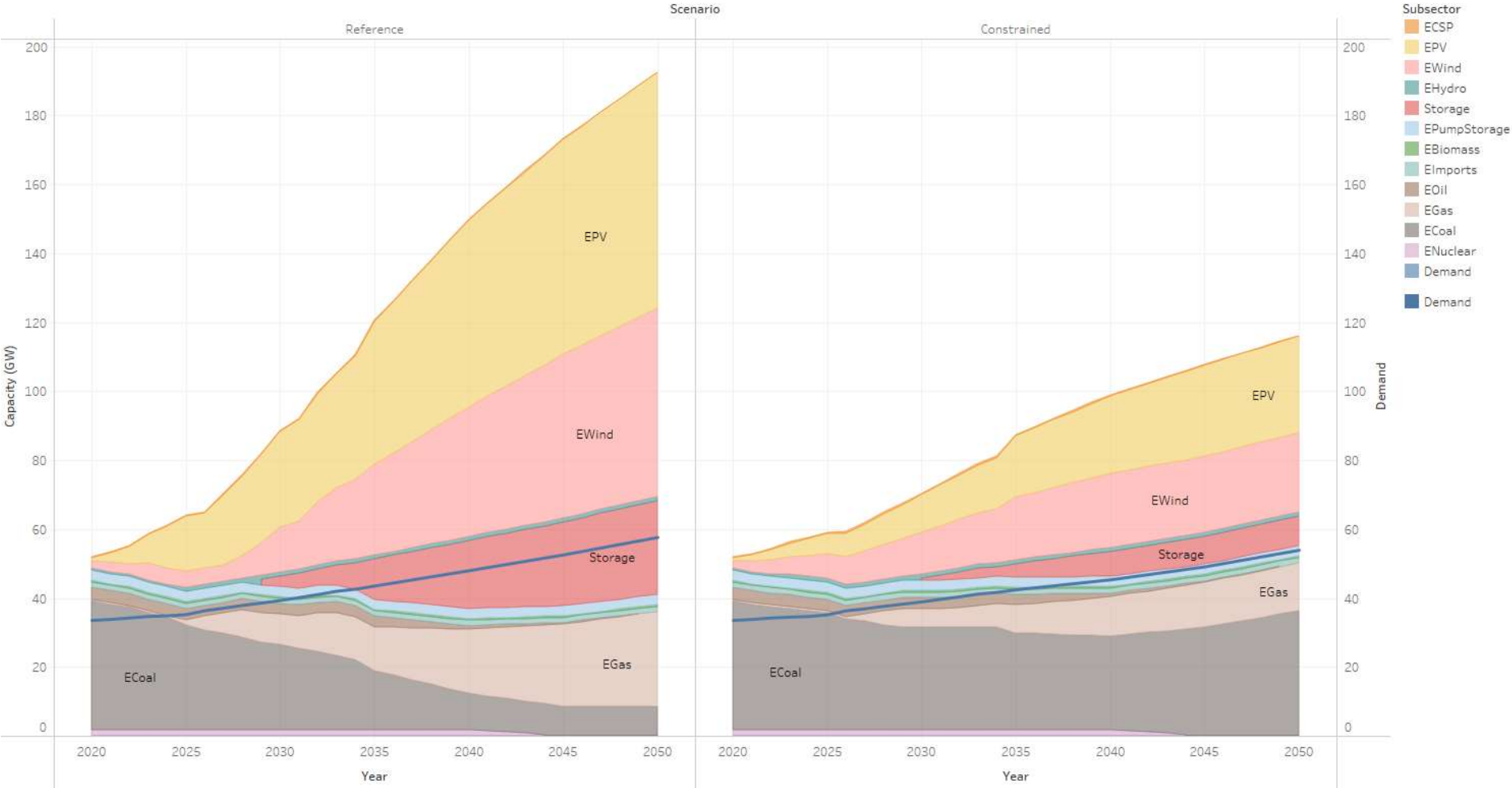


▶ **Reference Scenario:** Unconstrained

▶ **Constrained Scenario:** Wind and PV new build constrained to 1GW/year

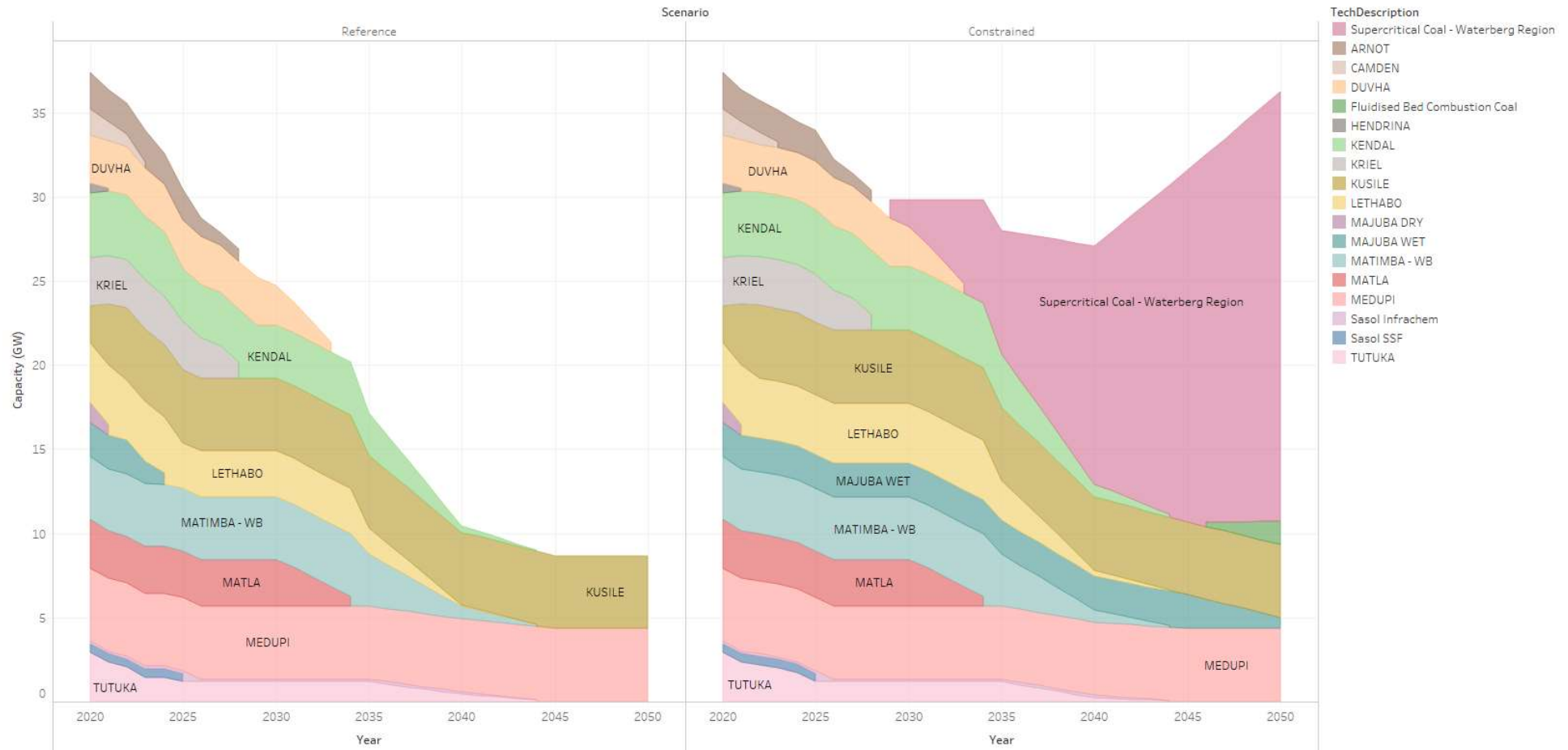
Looking Forward - Electricity Supply: Capacity

Capacity



Looking Forward - Electricity Supply: Coal Capacity

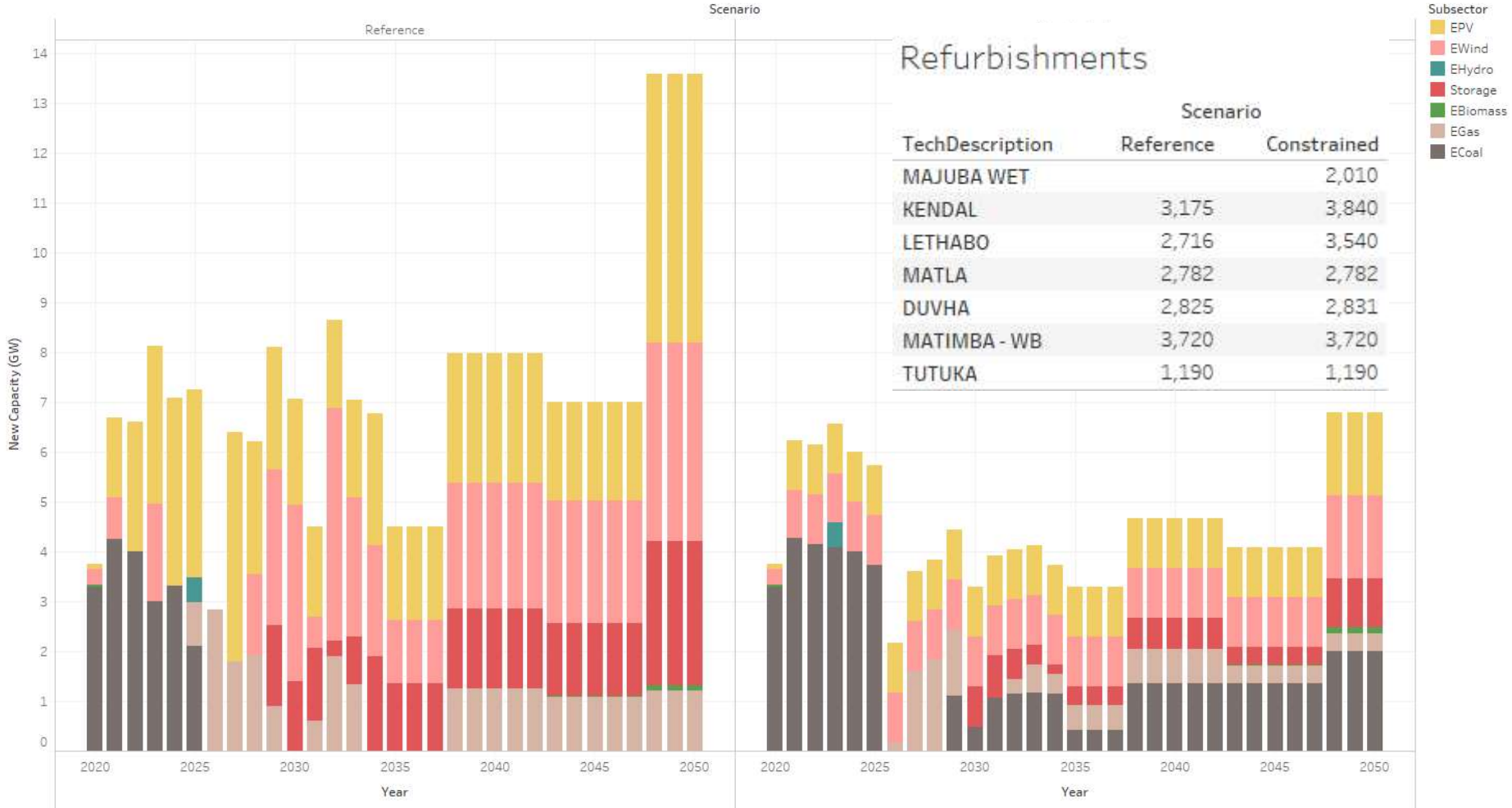
Capacity (coal)



▶ No new coal in Reference

Looking Forward - Electricity Supply: New Capacity

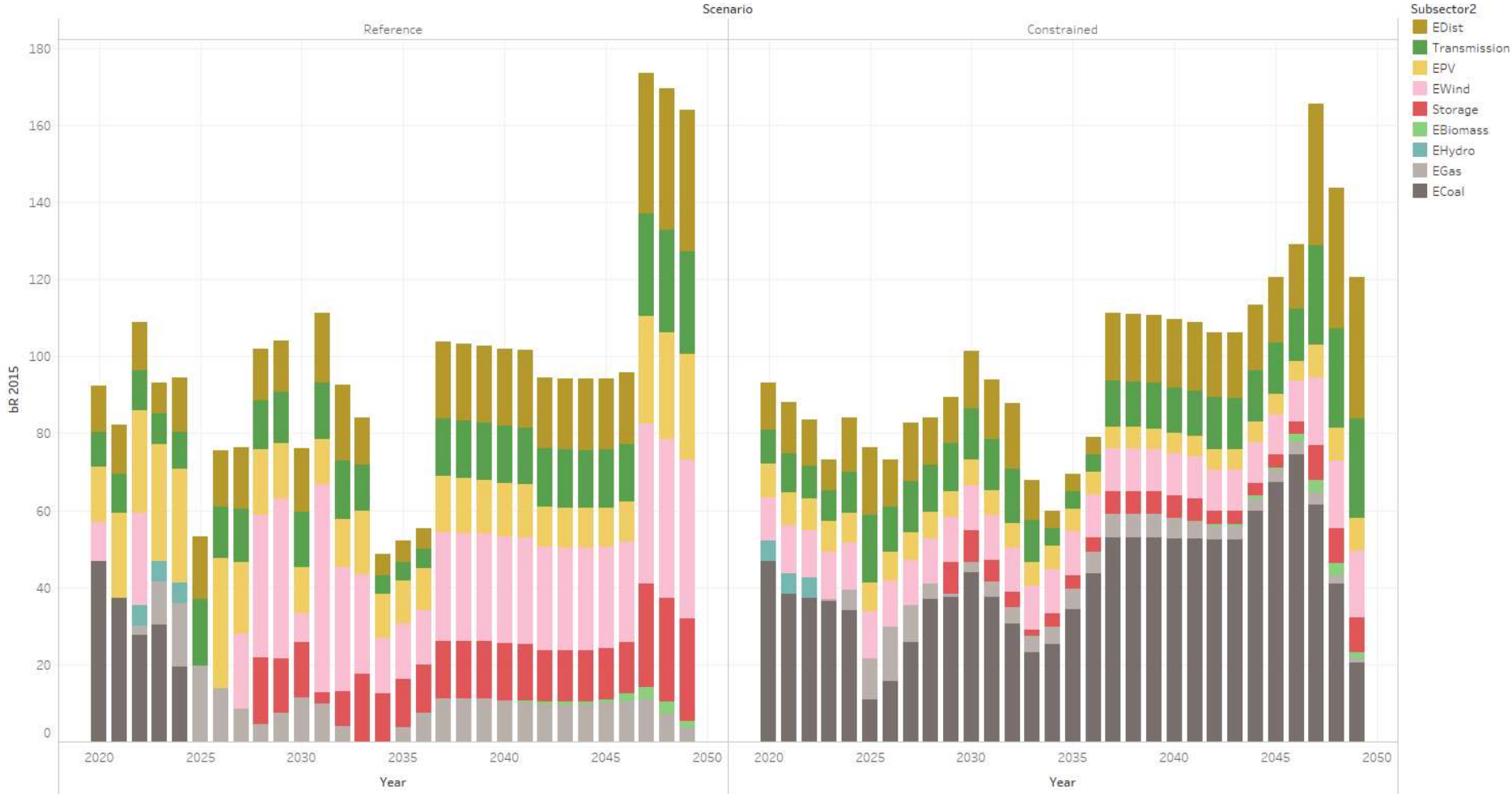
NewCapacity



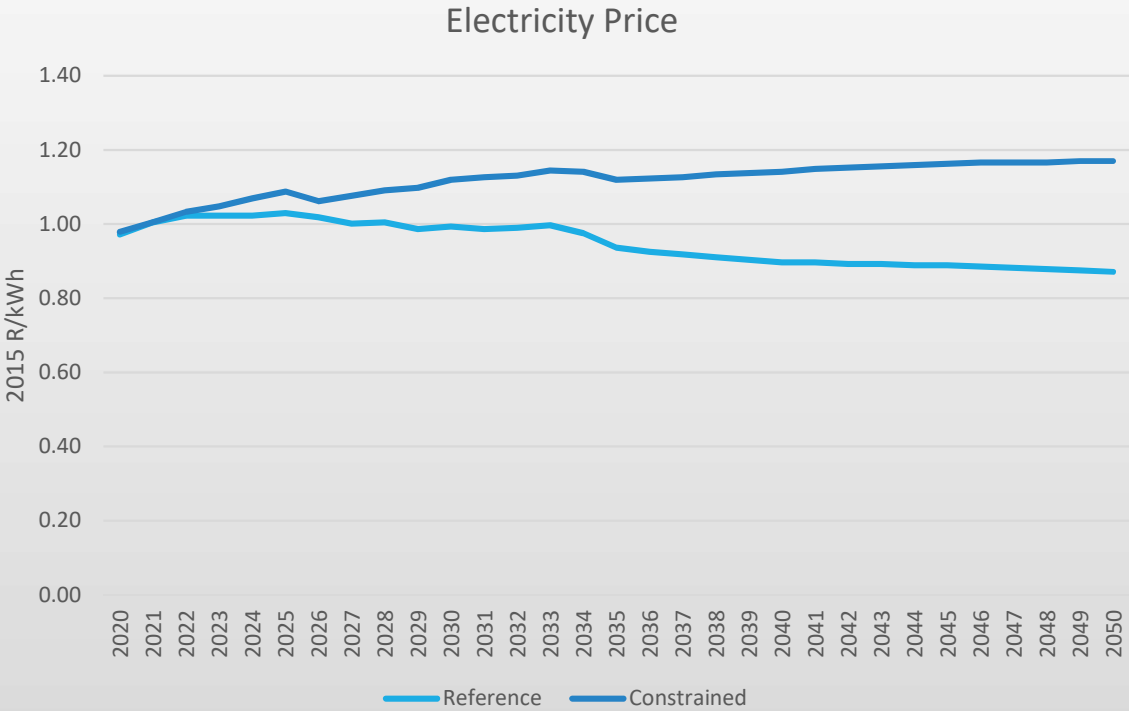
▶ 1GW constraint on PV and wind in constrained scenario

Looking Forward - Electricity Supply: Investment

Investment

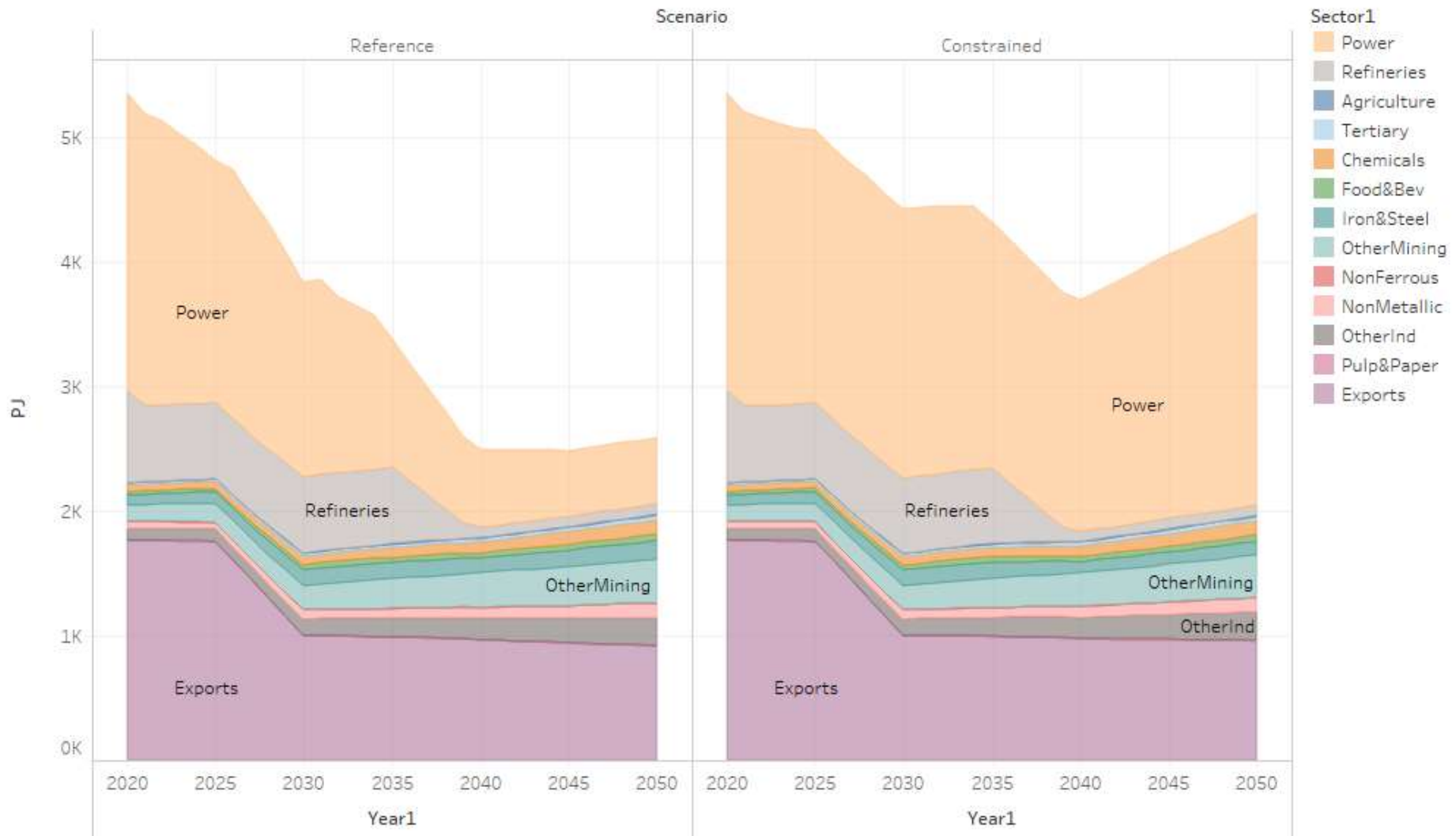


Electricity Price



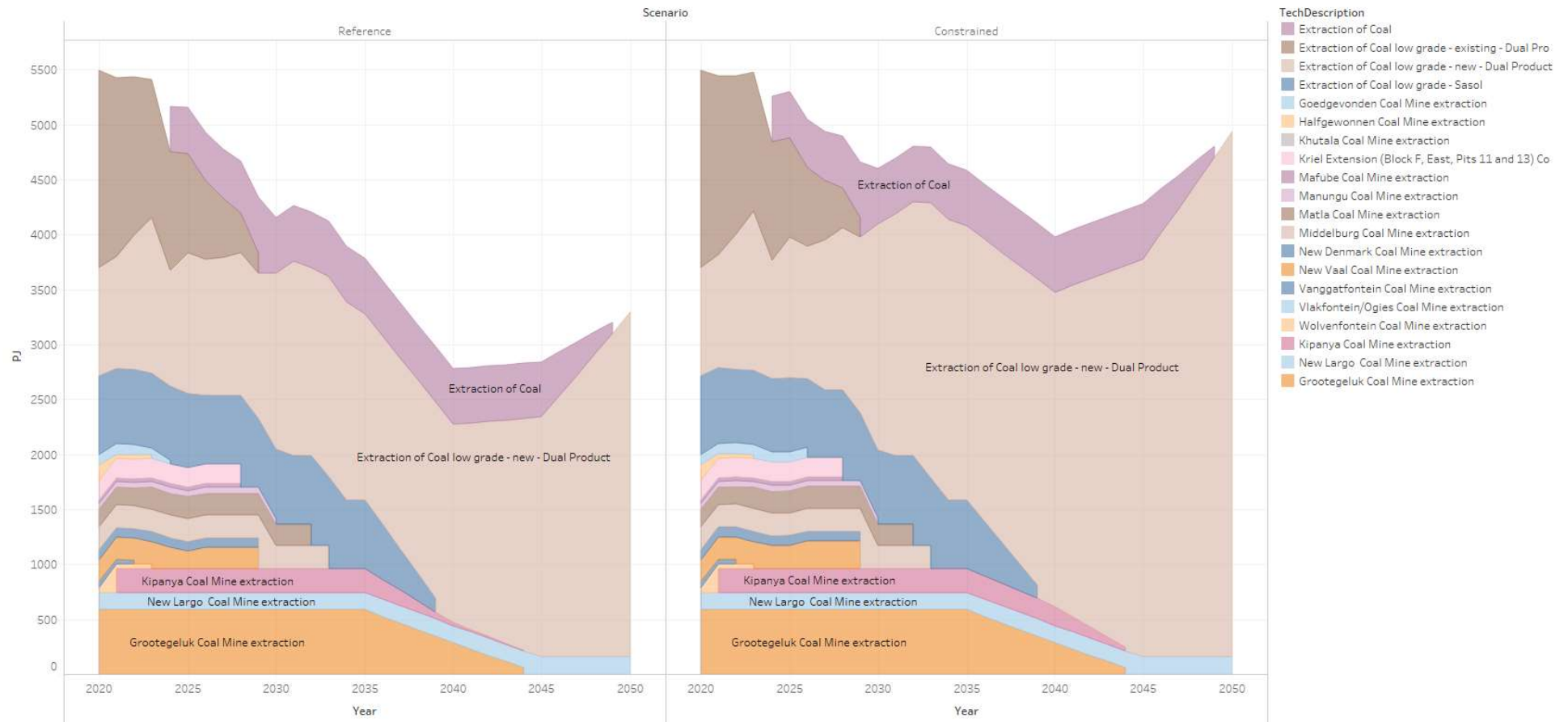
Looking Forward: Coal Demand

Coal (5)



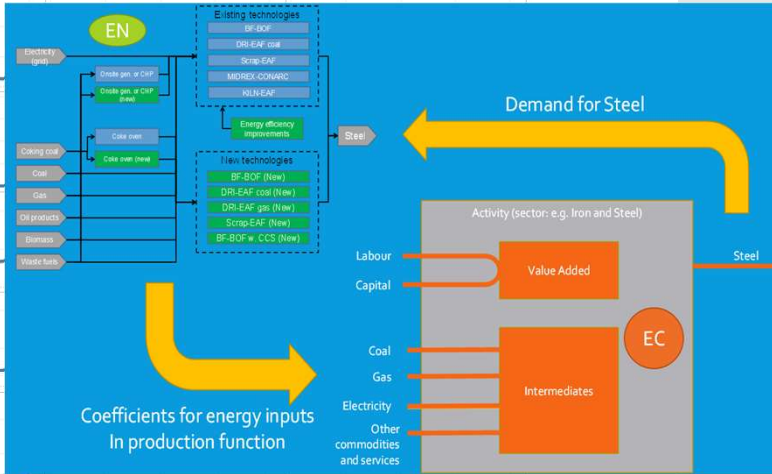
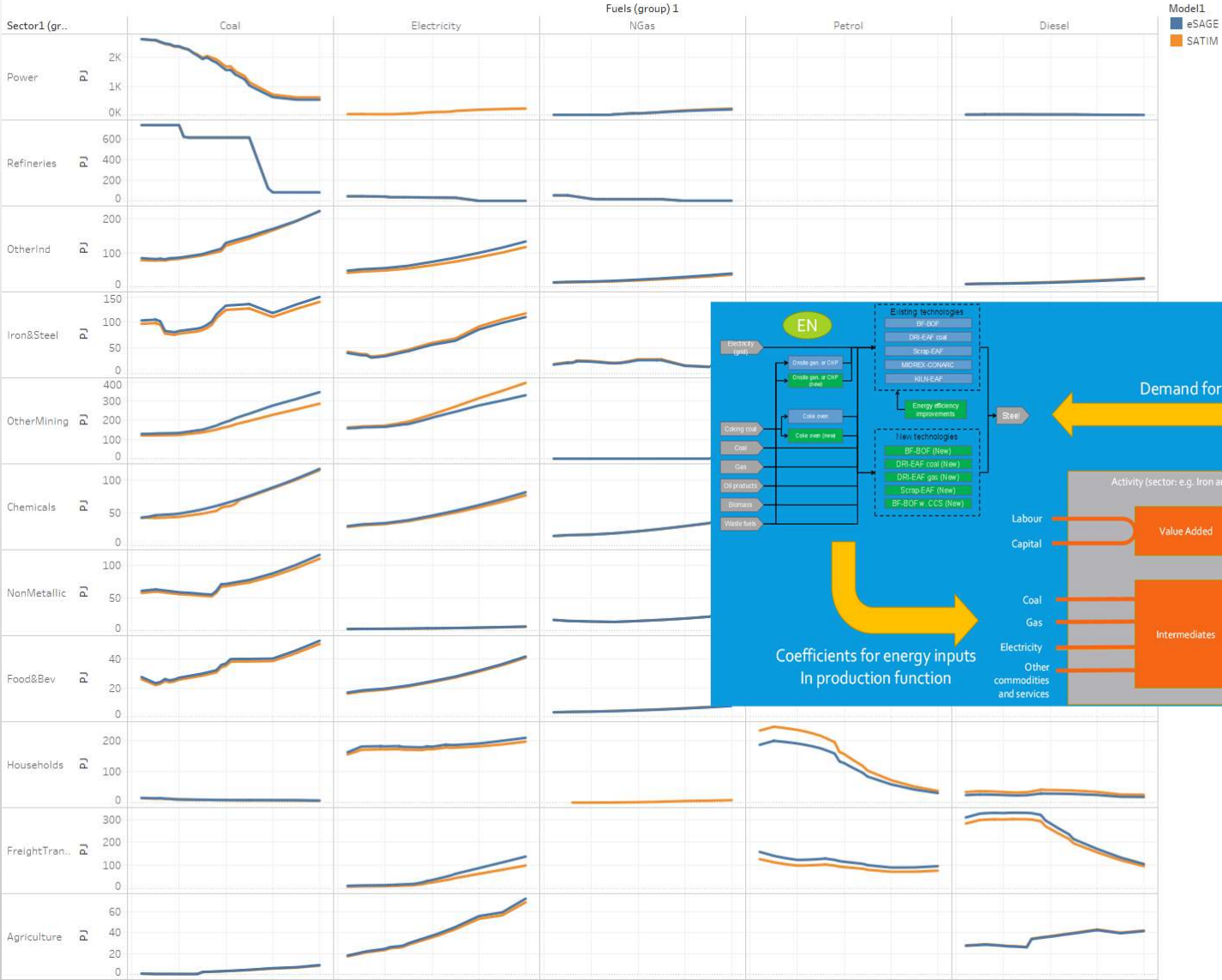
Coal Supply

CoalProd



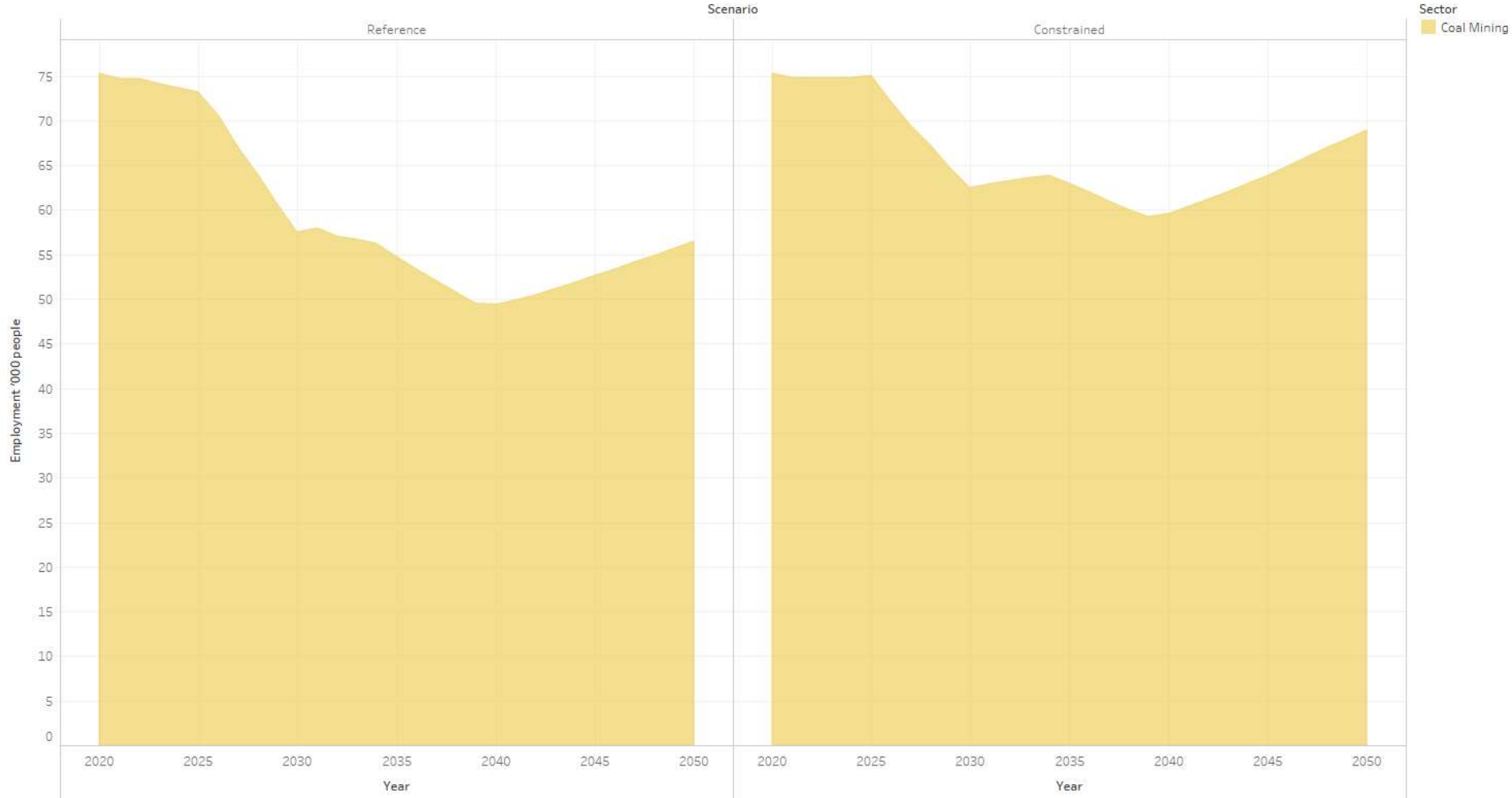
Linking CGE model to energy model necessary to capture technical change

TotalBySectorByFuel



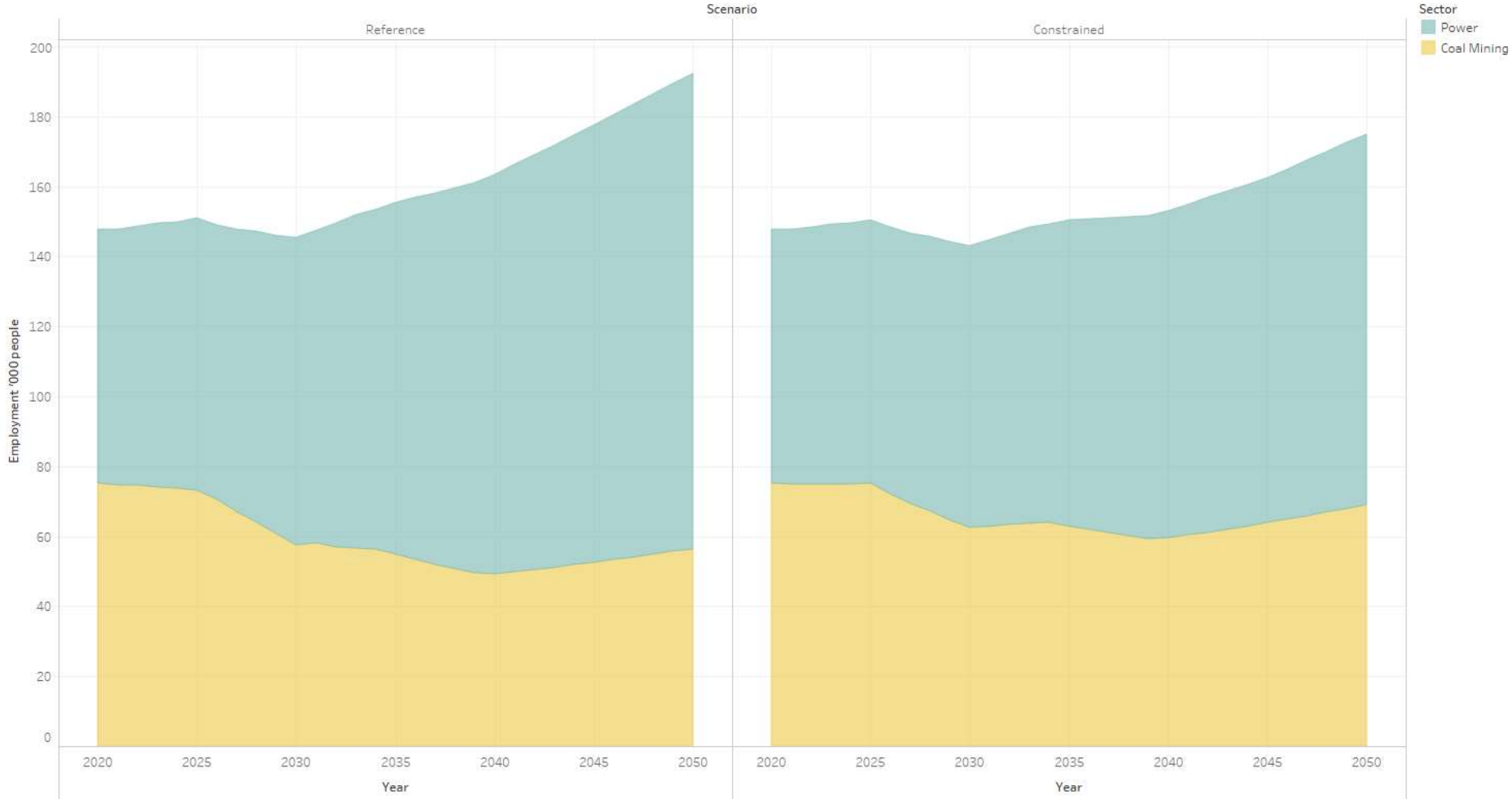
Looking forward: Employment in coal

Employment (Coal)



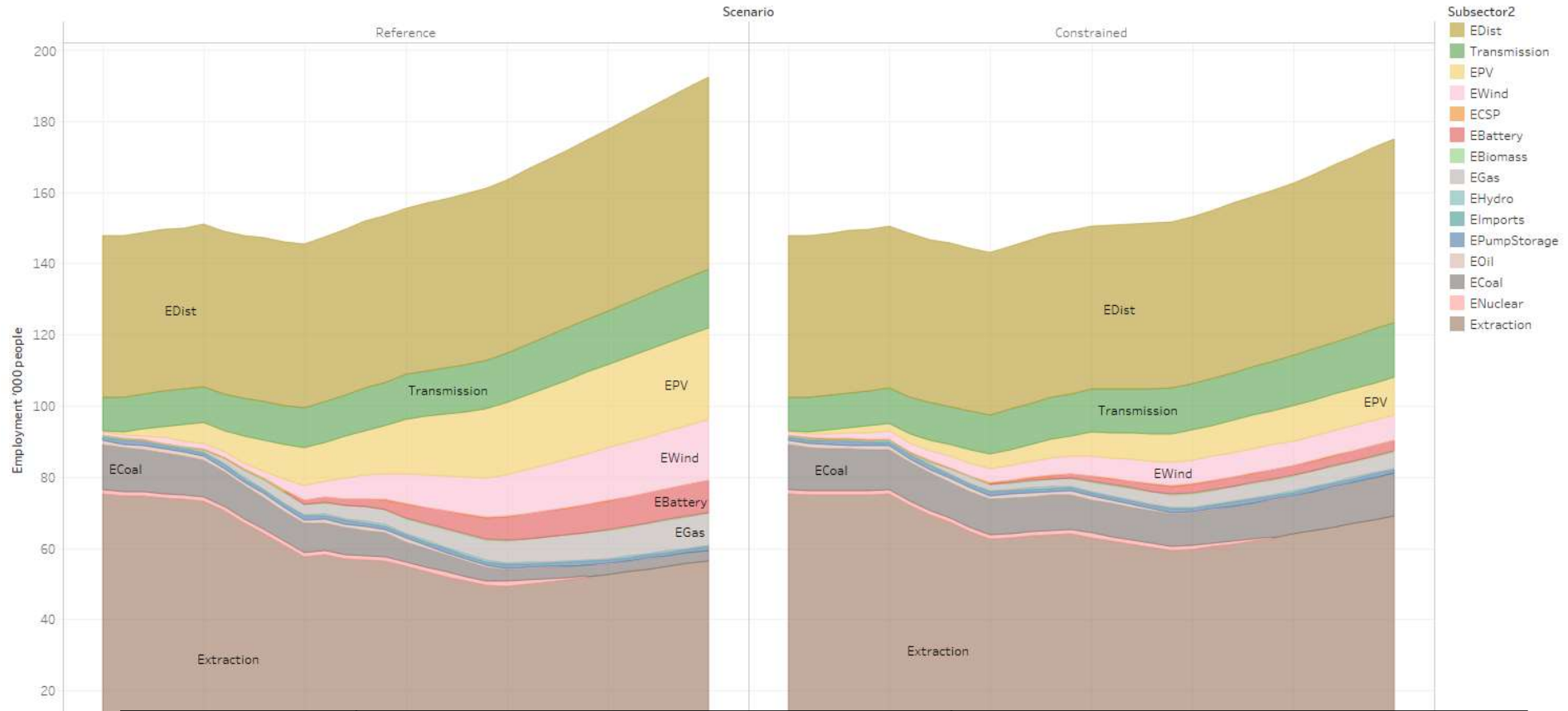
Looking forward: Employment in coal + power

Employment (Coal+Power)



Looking forward: Employment in coal + power

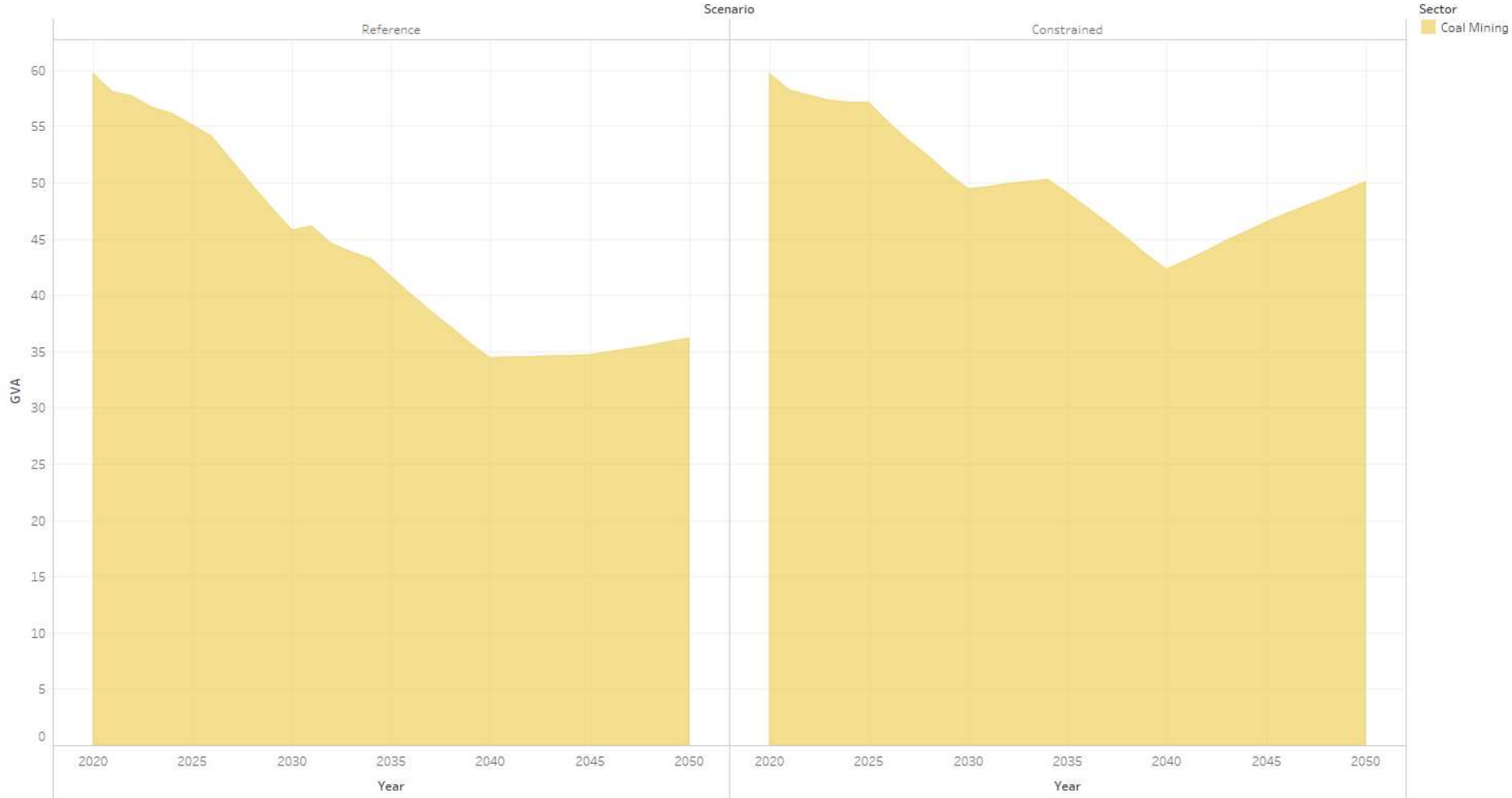
Employment (Coal+Power) (2)



	Jobs/TWh				Jobs/GW			
	PV	Wind	Coal	Nuclear	PV	Wind	Coal	Nuclear
2020								
REIPPP round 1,2	153	62			376	196		
REIPPP round 3	282	170			691	540		
McKinsey/IEP	107	120	28		262	606		
EIA_2017	107	69			263	346		
Eskom			35.7	92.1			206	645
Model	153	98	50.8	92.1	376	311	333	645

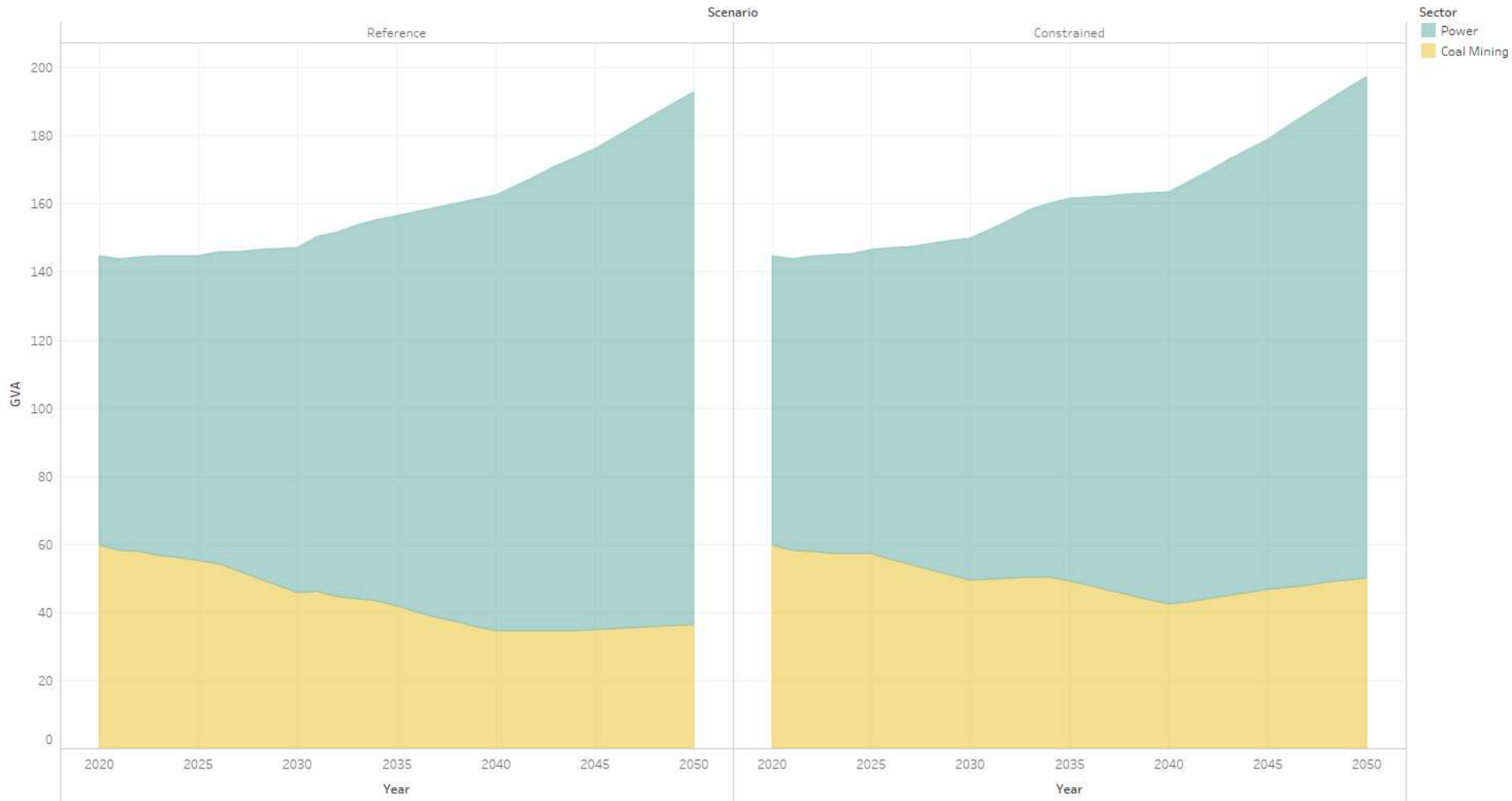
Looking forward: Value Added - coal

GVA (Coal)

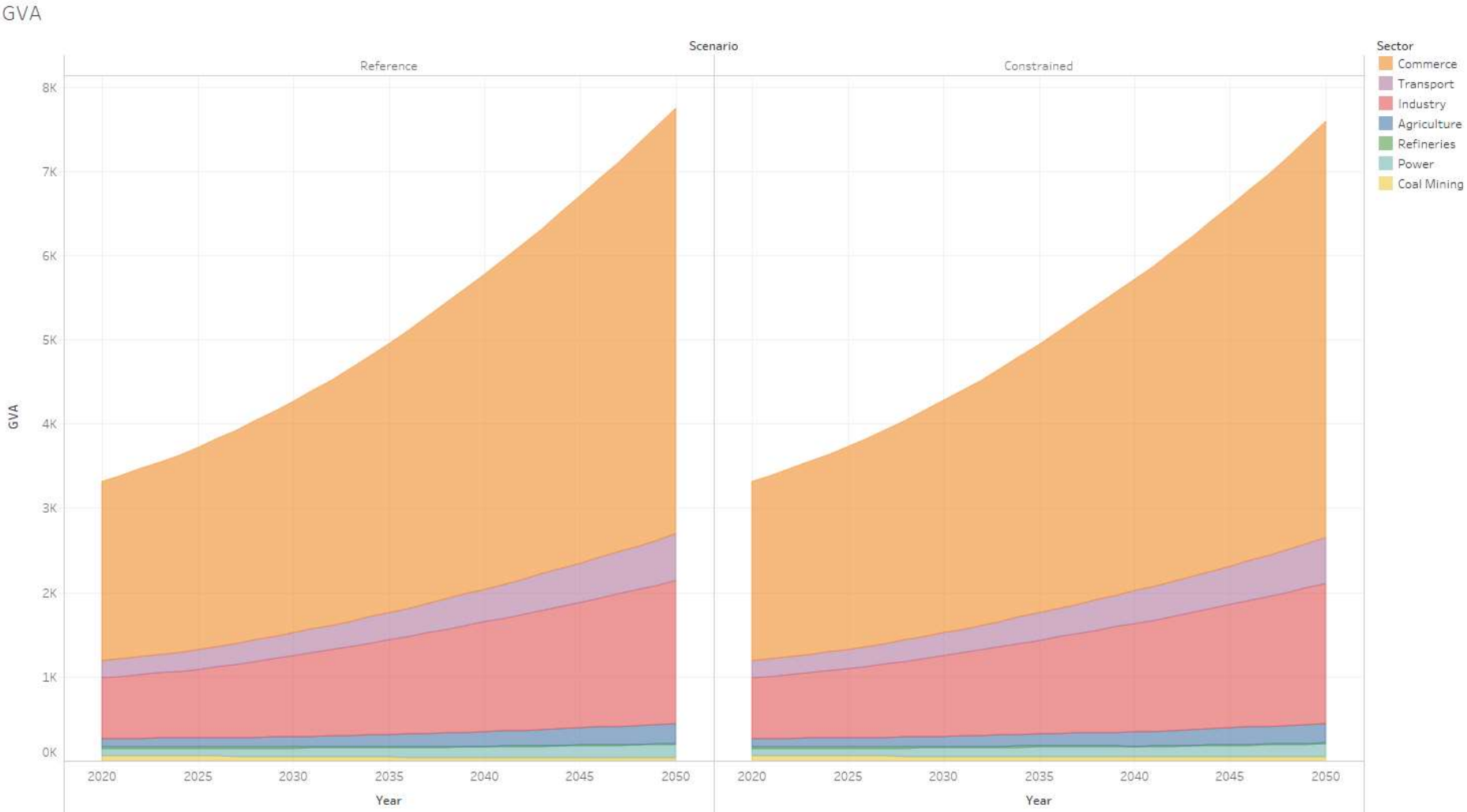


Looking forward: Value Added –

GVA (Power+Coal)

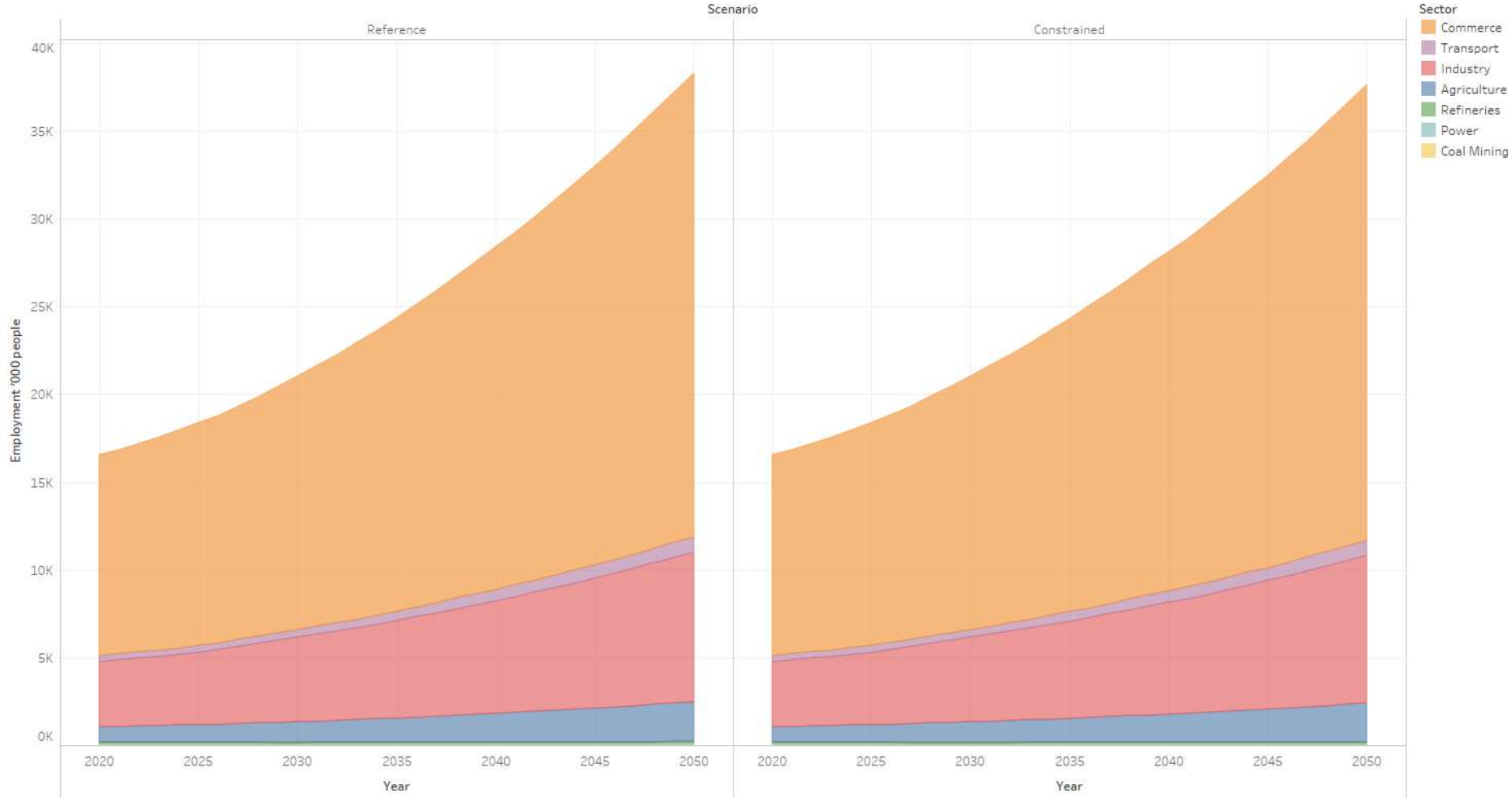


Looking forward: Total Value Added



Looking forward: Total Employment

Employment



Conclusion

- ▶ With rising costs, lower demand for exports, persisting with coal does not “save jobs” for South Africa at a macro level:
 - ▶ Jobs lost in coal and power more than made up elsewhere because of lower energy costs
- ▶ Framework presented that allows one to work at a detailed level – some details captured so far:
 - ▶ Employment intensity of power plants
 - ▶ Coal mines for power sector
- ▶ More work needed to more fully capture the cost of transition:
 - ▶ Model assumes free geographic and sectoral movement of labour
 - ▶ Look in more detail at coal outside of power
 - ▶ Need to look spatially at what activities would do labour uptake where coal mines and power plants are closing
 - ▶ Need to dig into cost of transitioning the labour

Thank you!

We are open for collaboration and contributions for future work...

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