AFRICAN SOURCE MARKETS

COAL MARKET PRICE OUTLOOK

2020-2040

PRIVATE & CONFIDENTIAL

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October 2020

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Resource Finance
Commodity Markets
Restoration / Just Transition
Research

RB1 PRICE HISTORY

USD/mt FOB RBCT… 4% Annual Growth

RB1 – SAVED BY THE RAND

ZAR/mt FOB RBCT… 6% Annual Growth

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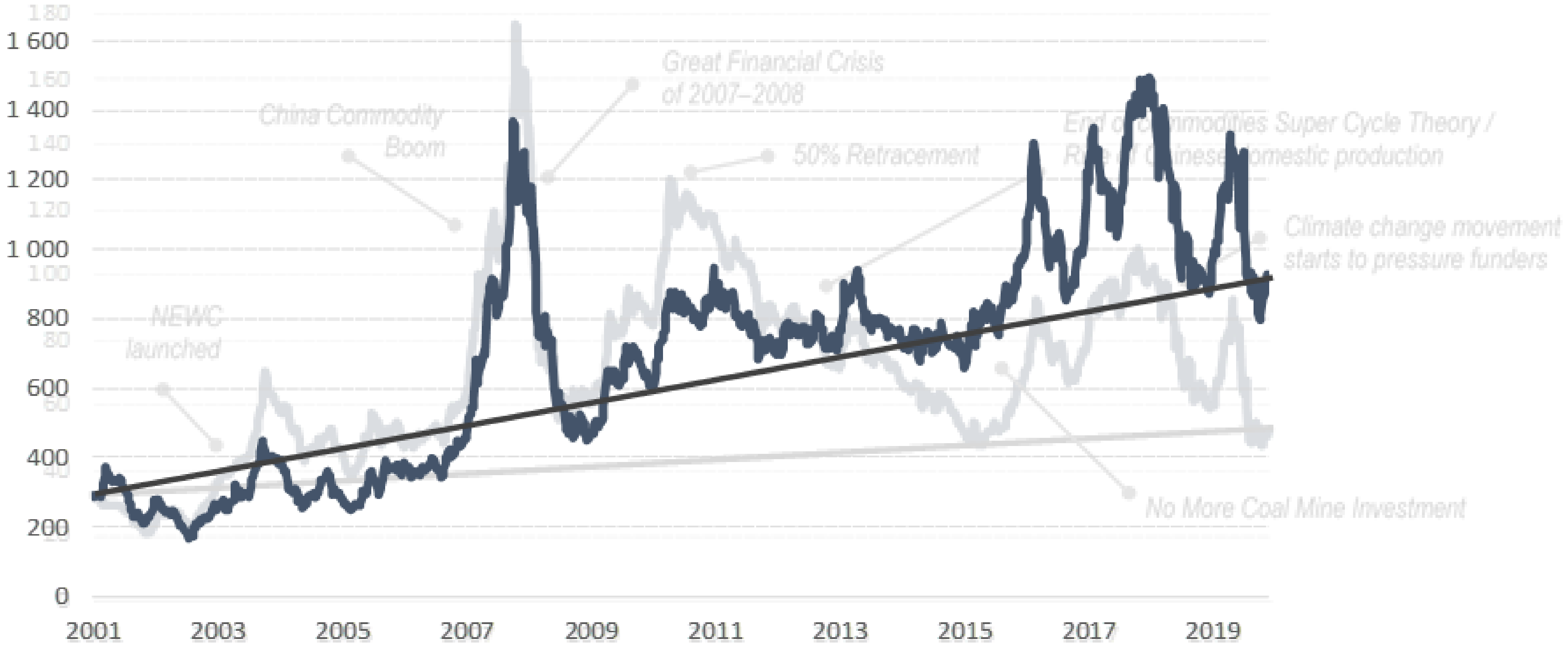

COAL MARKET DRIVERS

Usual Suspects

AFRICAN SOURCE MARKETS

- Supply / Demand Fundamentals
- Production Cost Curve Position
- Swing Supply *e.g. USA*
- Freight Prices
- Price Shocks *e.g. Derailments, Strikes*
- Competing Fuels *e.g. Gas Switching*
- Carbon Market
- Weather & Seasonality *e.g. Heating / Cooling / Monsoons / Hydro power*
- Technical Analysis / Trend

COAL MARKET DRIVERS

Usual Suspects… Plus Some Others

- Supply / Demand Fundamentals
- Production Cost Curve Position
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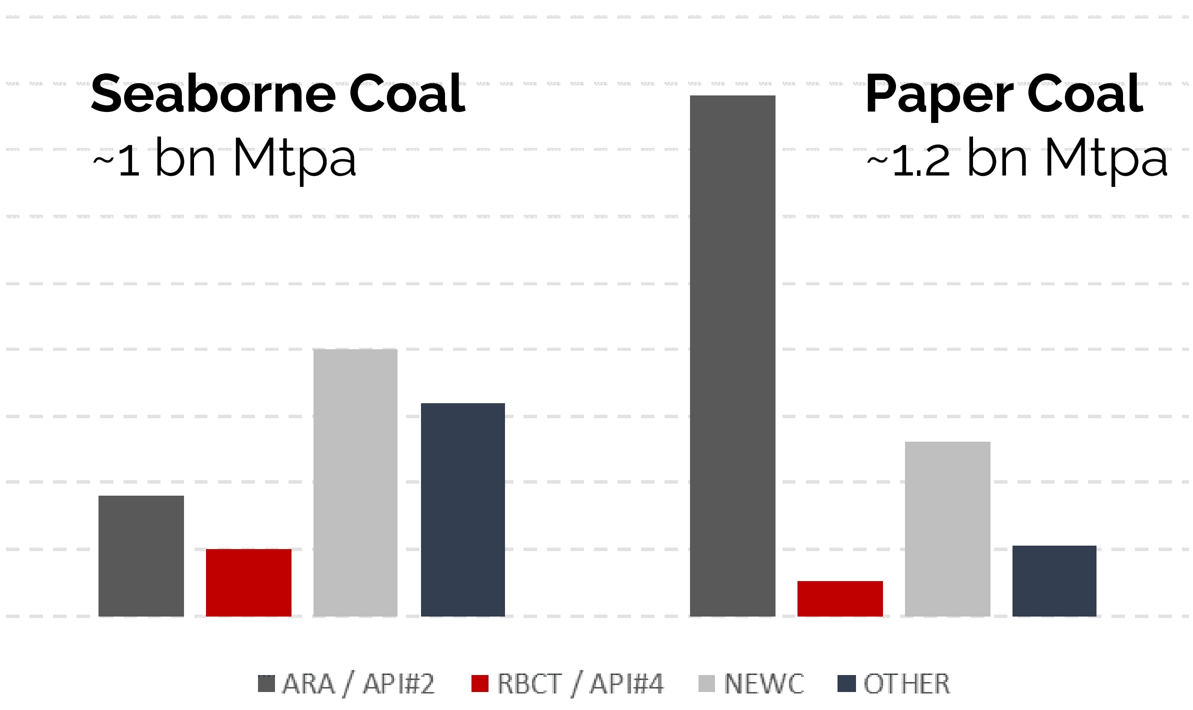
- Technical Analysis / Trend

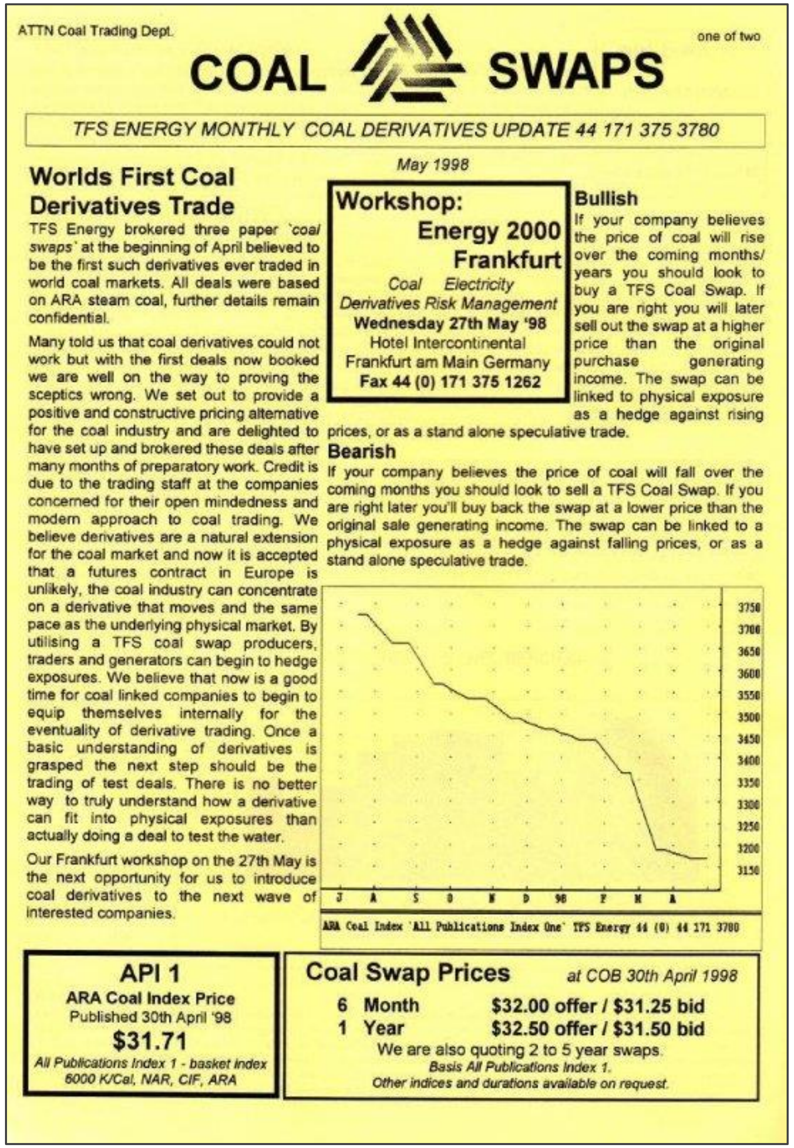
- Financial / Paper Trading
  - *Clean Dark Spread*
  - *Hedging Forward Production*
  - *Spread Trading (RB1:RB3 / RB:NEWC / API2:API4)*
  - *Time Spreads (rolling forward curve)*
- Option Trading / Delta Hedging
- Speculative Trades
- Long / Short Squeezes (distressed cargoes)

FINANCIAL COAL

Paper Traders

- Volatility down from ~ 40% (April) to 15% (September)
- Bulk of contracts traded ~ Calendars, then Quarters, then Spot





ATTN Coal Trading Dept.

one of two

COAL SWAPS

TFS ENERGY MONTHLY COAL DERIVATIVES UPDATE 44 171 375 3780

May 1998

Worlds First Coal Derivatives Trade

TFS Energy brokered three paper *'coal swaps'* at the beginning of April believed to be the first such derivatives ever traded in world coal markets. All deals were based on ARA steam coal, further details remain confidential.

Many told us that coal derivatives could not work but with the first deals now booked we are well on the way to proving the sceptics wrong. We set out to provide a positive and constructive pricing alternative for the coal industry and are delighted to have set up and brokered these deals after many months of preparatory work. Credit is due to the trading staff at the companies concerned for their open mindedness and modern approach to coal trading. We believe derivatives are a natural extension for the coal market and now it is accepted that a futures contract in Europe is unlikely, the coal industry can concentrate on a derivative that moves and the same pace as the underlying physical market. By utilising a TFS coal swap producers, traders and generators can begin to hedge exposures. We believe that now is a good time for coal linked companies to begin to equip themselves internally for the eventuality of derivative trading. Once a basic understanding of derivatives is grasped the next step should be the trading of test deals. There is no better way to truly understand how a derivative can fit into physical exposures than actually doing a deal to test the water.

Our Frankfurt workshop on the 27th May is the next opportunity for us to introduce coal derivatives to the next wave of interested companies.

Workshop:
Energy 2000 Frankfurt
Coal Electricity
Derivatives Risk Management
Wednesday 27th May '98
Hotel Intercontinental
Frankfurt am Main Germany
Fax 44 (0) 171 375 1262

Bullish

If your company believes the price of coal will rise over the coming months/ years you should look to buy a TFS Coal Swap. If you are right you will later sell out the swap at a higher price than the original purchase generating income. The swap can be linked to physical exposure as a hedge against rising prices, or as a stand alone speculative trade.

Bearish

If your company believes the price of coal will fall over the coming months you should look to sell a TFS Coal Swap. If you are right later you'll buy back the swap at a lower price than the original sale generating income. The swap can be linked to a physical exposure as a hedge against falling prices, or as a stand alone speculative trade.

3750 3700 3650 3600 3550 3500 3450 3400 3350 3300 3250 3200 3150

J A S O N D 98 F M A

ARA Coal Index 'All Publications Index One' TFS Energy 44 (0) 44 171 3780

API 1
ARA Coal Index Price
Published 30th April '98
$31.71
All Publications Index 1 - basket index
6000 K/Cal, NAR, CIF, ARA

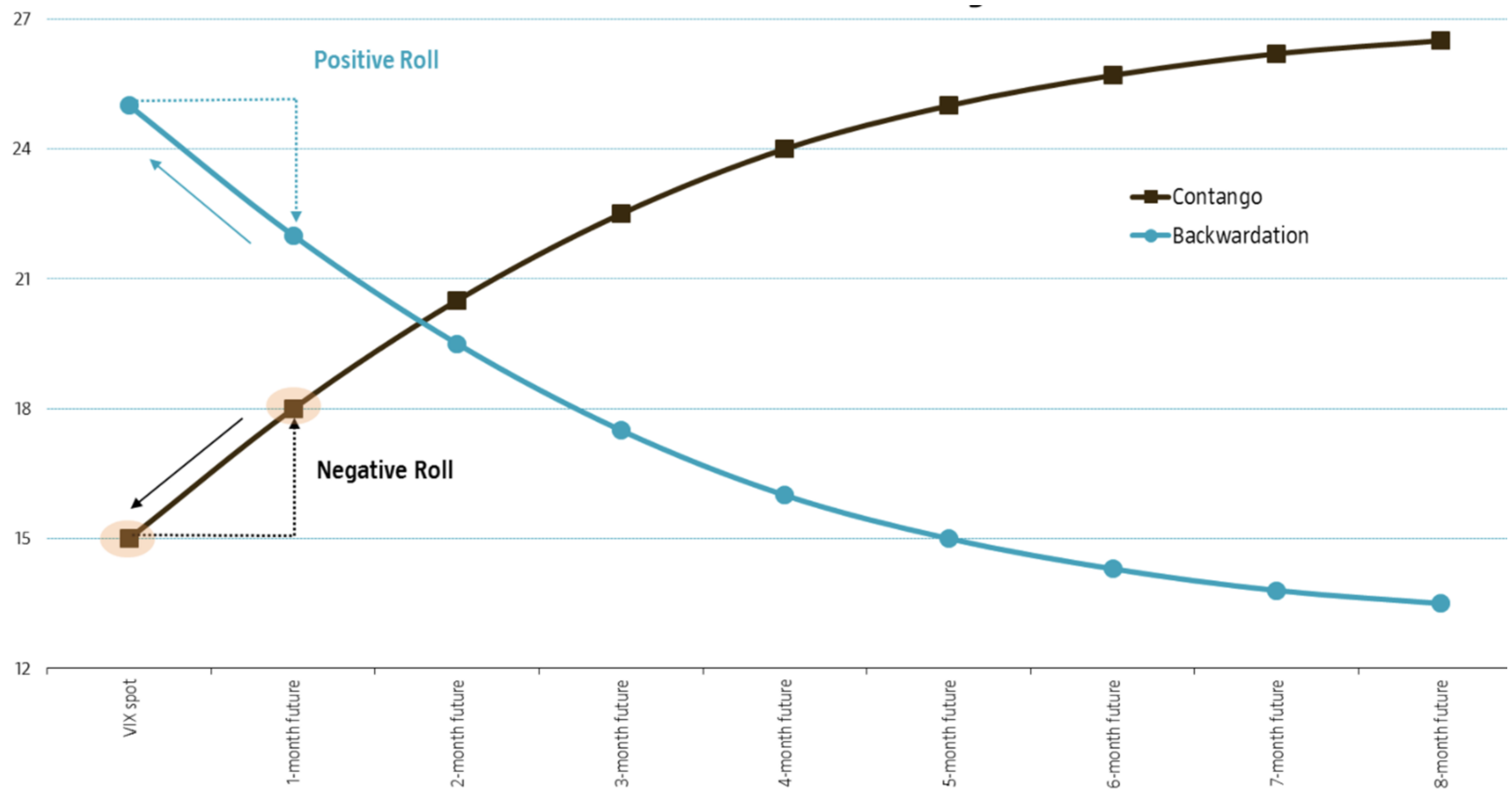
Coal Swap Prices *at COB 30th April 1998*

6	Month	$32.00 offer / $31.25 bid
1	Year	$32.50 offer / $31.50 bid

We are also quoting 2 to 5 year swaps.
Basis All Publications Index 1.
Other indices and durations available on request.

FORWARD CURVE

Definitely not a crystal ball



FORWARD CURVE

Definitely not a crystal ball

Weekly *Coal Index Report*

Issue 20-42 | Friday 16 October 2020

Spot Market *Prices*

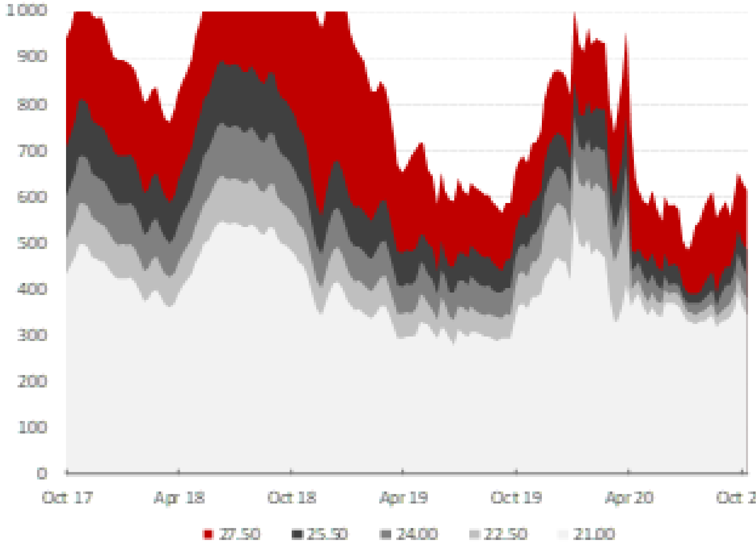
	FOB RCBT (USD/mt)*		FCA Witbank (ZAR/mt)**				
	6,000	5,500	27.50	25.50	24.00	22.50	21.00
25-Sep-20	54.35	47.35	610	490	440	395	360
02-Oct-20	58.85	51.35	655	530	480	430	395
09-Oct-20	57.75	50.00	630	500	450	395	360
16-Oct-20	58.25	48.50	615	485	430	380	345
		A-grade Peas	865 - 965				
		B-grade Peas	735 - 835				

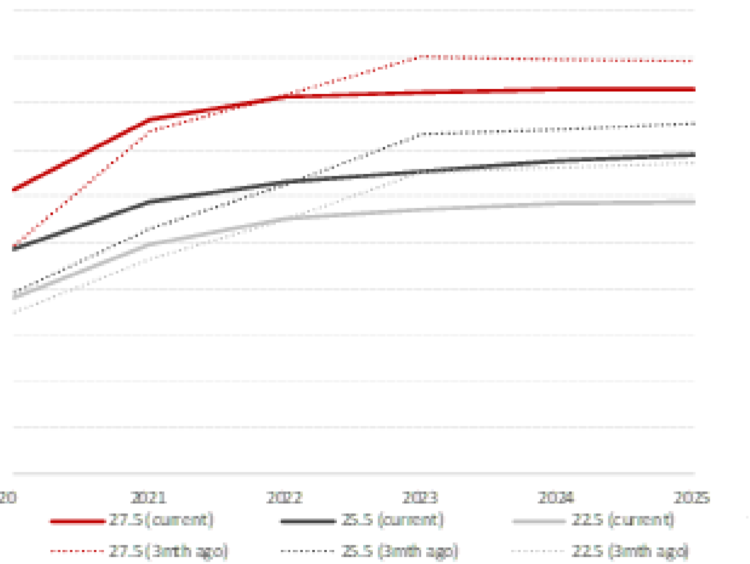
** CV typ (kcal/kg NAR)   ** CV typ (MJ/kg GAD)*

Market *Commentary*

The Chinese ban on Australian imports has wrought confusion amongst traders, with many finding innovative ways to get their cargoes sold. Diplomatic relations between the countries soured ever since Australia's ban on Huawei and blaming China for Covid-19. However, as coal supplies tighten ahead of Winter, China has apparently issued its north-eastern Jilin province with import quotas for 5Mmt. One imagines there may be more of these "*exceptions*" to come, although as domestic mines in Inner Mongolia and Shanxi, China's top two coal regions, raise production, the tightness in the northeast is expected to ease. Vietnam is expected to significantly increase coal imports as domestic coal production becomes deeper and more expensive, and as local gas reserves deplete from 2022 onwards. We expect to see extended closures of up to 3 weeks at both Australian and SA mines for December, allowing for prices to recover, whilst also enabling extended maintenance on processing and logistics facilities. Meanwhile, Ivan Glasenberg, the man who has defined the coal market, may have a point… Whilst other mining majors pursue buyers, who would probably extend coal mining, Glencore is instead running down its coal operations, without replacing them. Which approach is better for long term CO_2 emissions? Climate activists will probably end up pressuring everyone.

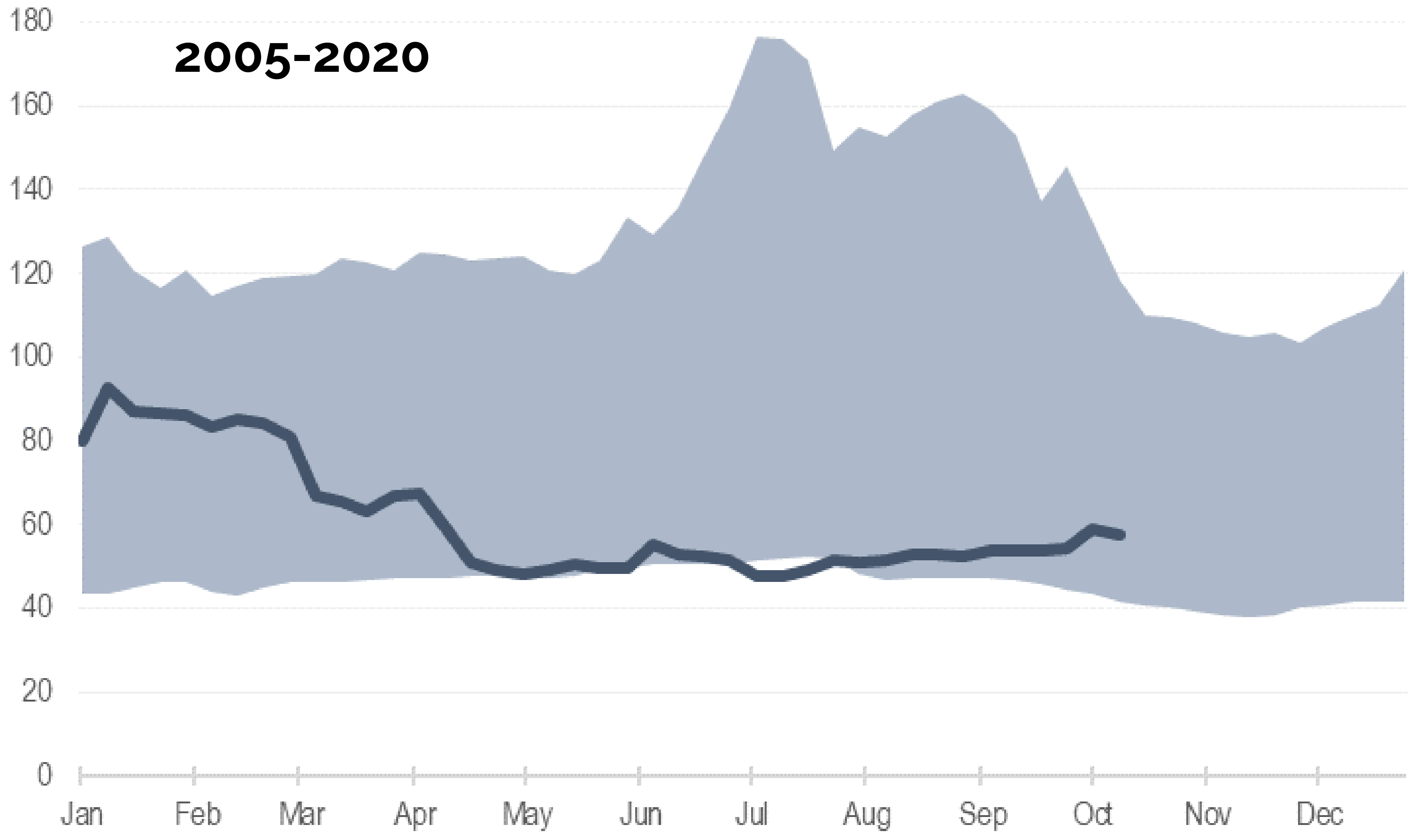
Historical Pricing *& Forward Curve*





SEASONALITY

Does it still exist?



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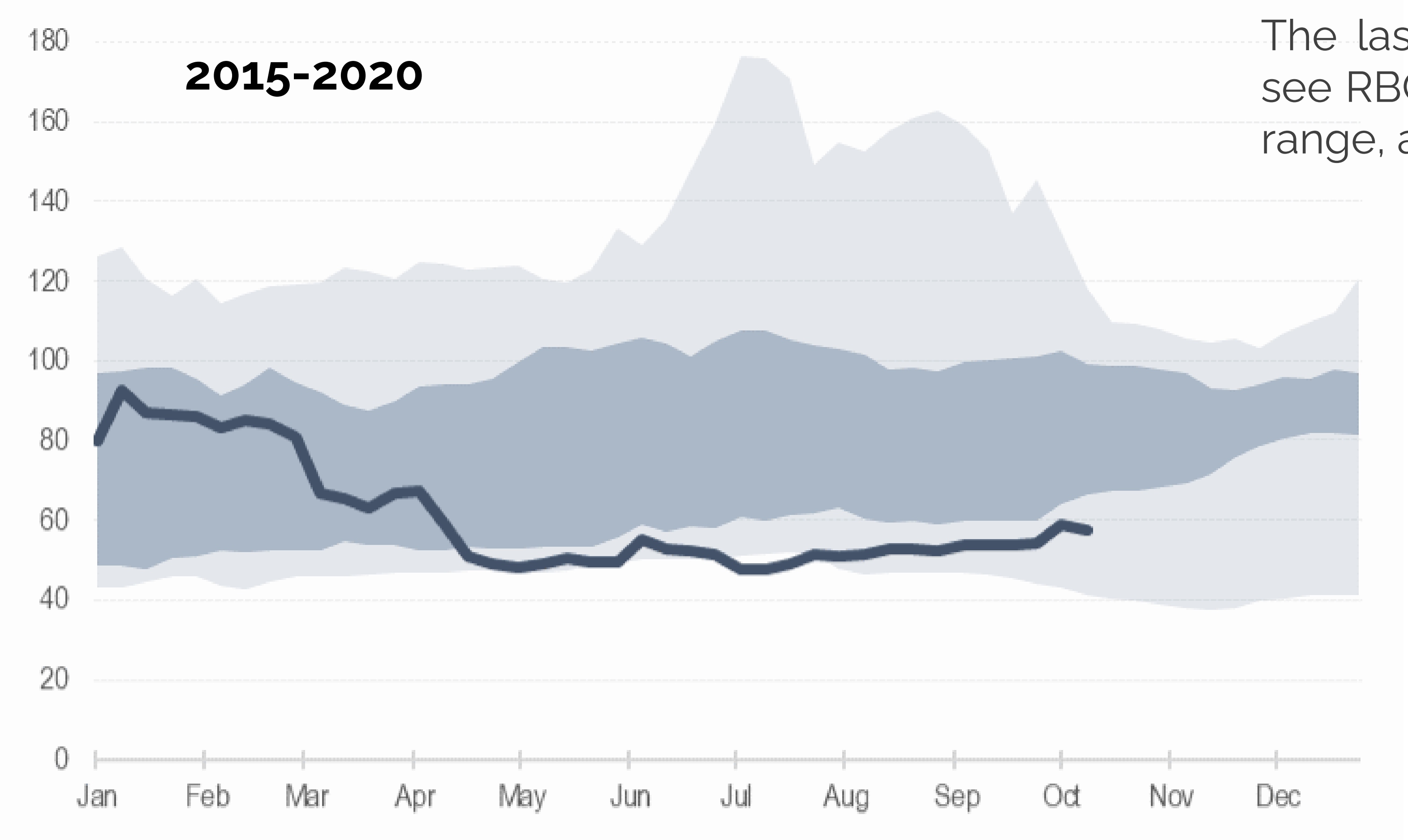

The last few years have tended to see RBCT coal trading in a narrower range, and often rallying into Q4.

WHAT NOW?

2020 – Annus Horribilis?
Or Wake Up Call?

It's not only Greta that is angry…

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WHAT NOW?

2020 – Annus Horribilis? Or Wake Up Call?

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- *Mixed **Covid-19** recovery underway… economic uncertainty rising*
- ***Climate & shareholder activism** continues to curtail coal finance*
- *California blackouts… **viability of 100% renewable powered** grid?*
- *Joe Biden (anti-coal).. current favourite to win **US presidential election***
- ***China…** inward-looking (self-sufficient) or driving global growth again?*
- ***Domestic Indian & Chinese coal production** increasing?*
- ***SE Asia** (and China) continue to build coal-fired power stations*
- *SA coal ownership and logistics will **fragment further***
- ***Spot price depressed,** Q4 rally appears unlikely*
- ***HELE technology** / other uses for coal – increasingly more vital*

2021-2025

COVID-19 RECOVERY - **BULLISH**

AFRICAN SOURCE MARKETS

- 3rd & 4th waves… business mostly returned to a "**new normal**"
- **Tourism & property** likely to remain hardest hit - neither critical for coal
- Covid-19 highlighted **food & water security** as greater concerns than energy security
- Commodity traders tend to be more conservative than "*Robin Hood*" stock traders, although "*lockdown liberation*" should **feed bullish sentiment**
- Possible **return to more conservative** "*old-school*" business as usual approaches vs. increasing focus on climate due to Covid-19

2021-2025

CLIMATE ACTIVISM – **BULLISH (DESTROYS PRODUCTION)**

- **Shareholder activism drives larger producers to exit coal sector**
- By 2025 most large mining houses will have exited coal. Glencore?
- **Ivan Glasenberg has a good point.*** Which is better? A responsible Glencore running down its coal assets, restoring Nature at the same time, or cutting and running to private investors who will increase production?
- However, smaller, private owners might not have balance sheet for exploration and large scale mine development. Thus, quick & easy mini-pits will likely cause untold environmental damage but eventually lead to sterilising of larger underground reserves for good.

* FT Commodities Mining Summit, October 2020

2021-2025

RISE OF RENEWABLES – **BEARISH (DESTROYS DEMAND)**

AFRICAN SOURCE MARKETS

- 2020 California load-shedding caused by high power demand, inadequate transmission grid, **overreliance on intermittent renewable energy**, and natural gas challenges due to hot weather.
- Europe likely to continue with **coal plant closures**, but America and rest of world may pause.
- However, **renewables catching on fast** elsewhere… India stating that non-fossil fuel sources (nuclear, hydro and renewables) to account for 60% of generation capacity by 2030.
- **Tipping point likely by 2025…** new renewable energy should be cheaper (capex + opex) everywhere than existing coal-fired capacity. The definition of a "*stranded asset*".

2021-2025

US PRESIDENT – **NEUTRAL**

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- **All talk, no action….** *"Politicians and diapers should be changed frequently, and usually for the same reason."*
- Biden wants to **spend $2-trn decarbonising the country's economy**. At the same time, despite Trump's rhetoric, more coal plants closed, and more coal jobs were lost, under Trump's watch than under Obama. *The economy speaks louder than Trump's tweets*.
- Crucial issue is the **likely relationship with China going forward**. Biden will mend bridges whereas Trump will double-down on economic cold war, forcing China to focus more on domestic supply and consumption.
- Either way, **fear and uncertainty** around elections could create bearish, volatile markets.

2021-2025

CHINA – **THE BIGGEST BULL (OR) BEAR**

AFRICAN SOURCE MARKETS

- An isolated, **inward-looking China** = decreased domestic power demand, higher domestic coal supply = bearish for global market
- An engaged and **integrated global China** = high domestic power demand, looser trade restraints and less reliance on domestic coal supply = bullish
- Interesting situation **re: Australian coal ban**. Likely to be exceptions and quite short-lived. If prolonged, SA coal prices to benefit.
- By 2025 we expect to see the **e-RMB emerge** as China's preferred cryptocurrency for trading in all its commodities.
- Although price becomes irrelevant when a Chinese supermajor owns :
  - *SA coal mines – who else can the majors sell to?*
  - *Dry bulk fleet i.e. immune to freight prices*
  - *Chinese coal-fired power stations*

2021-2025

INDIAN & CHINESE DOMESTIC COAL - **BEARISH**

- India is **SA's most vital export coal market**. Indian sponge iron sector is especially important, although they are exploring cheaper alternatives from Australia, Mozambique, Russia etc.
- World's two largest coal producers want to increase domestic coal production further. Thankfully for SA, Indian customers are **mostly West coast based** = freight advantage for South Africa vs. Australia etc.
- Also, most Indian coal reserves situated to East of country, meaning costly logistics to get coal to West coast power stations.
- China needs higher quality Australian & SA coals (5,500 NAR, high ash vs. low quality domestic reserves), thus SA becoming strategically important.

2021-2025

SE ASIAN DEMAND - **BULLISH**

- Traditional Asian buyers… **Taiwan, South Korea & Japan** - robust demand going forward. However, several coal plant closures also planned.
- More promising - rising coal demand from **Thailand, Malaysia, Philippines, Vietnam**, and **domestic coal for Indonesia** (similar to ESKOM).
- Vast majority of **circa 300 GW** in new generation capacity in Southeast Asia by 2040 = coal-fired. May change as climate finance alters rapidly.
- ASEAN countries that may not be impacted as much include **Cambodia, Laos, and Myanmar,** also all expanding their coal burn.

2021-2025

FRAGMENTING OF SA PRODUCTION - **BULLISH**

AFRICAN SOURCE MARKETS

- 2030 SA coal landscape will look **completely different to past 20 years**.
- **Little budget for large scale exploration, mine expansions** or restoration = abandoned mines with plenty reserves left in the ground. Draglines, longwalls & CM sections eschewed in favour of high grading & mini-pits.
- Expect **SA coal production to decline quite rapidly from 2025** onwards. Indeed, production needs to decline by at least 22 Mtpa as ESKOM will likely be retiring up to 10 GW of coal-fired generation capacity by 2030.
- Future of SA domestic coal pricing hangs on balance between demand destruction and production shutdowns, with plenty of rail and port logistics likely to be available. **Spot market is best solution to deal with this.**

2021-2025

HELE / "CLEAN COAL" - **BULLISH**

AFRICAN SOURCE MARKETS

- **HELE -** High Efficiency, Low Emissions (38 – 48%)
  - *not going to happen in SA, can't compete with natgas ~ 42% - 60% efficiency*
- **CCS –** Carbon Capture & Storage… highly overpromised & under-delivered
- **UCG –** Holds significant potential for powergen & hydrogen economy
- **BIOCHAR –** Significant potential for mine restoration –> activated carbon
- **BROWN HYDROGEN -** Significant potential – partner with platinum miners
  - Allotropes of carbon (graphite, graphene, diamond etc.) all likely to be important in hydrogen economy – why not coal?

2025-2040

PEERING INTO THE FUTURE FOG

2025 - 2040

PEERING INTO THE FUTURE FOG

AFRICAN SOURCE MARKETS

- *Significant portion of global vehicle fleet = electric battery (renewables + storage) & hydrogen (green + blue + possibly brown?) SA maybe 10%.*
- ***Crude & refined fuels*** *price at historic lows – effect on coal?*
- ***Climate feedback loops being felt***
  - *Hotter, drier winters & hotter, wilder and wetter summers - flooding*
- ***Most valuable commodities = water & topsoil (60 harvests left)***
  - *Survival rule of 3 = 3 min (air), 3 hrs (environment), 3 days (water), 3 weeks (food)*
  - *Coal mines can produce both – more profitable than coal?*
- ***Global coal ban?*** *Or race to bottom between Demand Destruction & Production Shutdowns?*
- ***Massive increase in (clean) freight prices?*** *Effect on SA coal markets?*
- ***BRICS nations vs. ROW on climate?*** *SA Coal supplies to India / China?*

2025 - 2040

LAST MEN STANDING

AFRICAN SOURCE MARKETS

- **New Colonialism**
  - will "*empowered*" SA miners simply become contract miners for invisible new Chinese owners, or Swiss Trading Houses? She who controls the logistics and the end customer controls the margins.
- To secure (green) finance, will **ESKOM be forced to shut down coal** sooner?
  - Can renewables / nuclear / gas take up the mantle in the meantime?
- Will SA coal production start shutting down before ESKOM does? If so, ESKOM may face a significant "**coal supply cliff**" circa 2030.

"Tomorrow belongs to the people who prepare for it today."
- Malcolm X

2025-2040

CLIMATE CHANGE

AFRICAN SOURCE MARKETS

- Coal miners and utilities **ignore this at their peril**
- Forget greenwashing – create **profitable circular economies around existing coal assets & power stations**
- Can be **part of solution**, not the problem
  - **Forests** – draw down CO_2, increase rainfall, restore soils
  - Coal slimes / fines -> pyrolysis – **biochar -> activated carbon (20x more valuable)**
  - Acid mine drainage + Eskom fly ash (etc.) -> balance pH – **water purification**
  - **Phyto remediation** - clean up mine & process sites – valuable minerals e.g. nickel
  - **Myco remediation** – restore soil food web in dead, stockpiled topsoil – create agri value chains (food and clothing)
  - **Pumped storage power** – drop water down old mine shafts + solar power to pump up

2025-2040
JUST TRANSITION

- Coal miners and utilities **ignore this at their peril**
- All previous solutions can help create jobs / restore communities

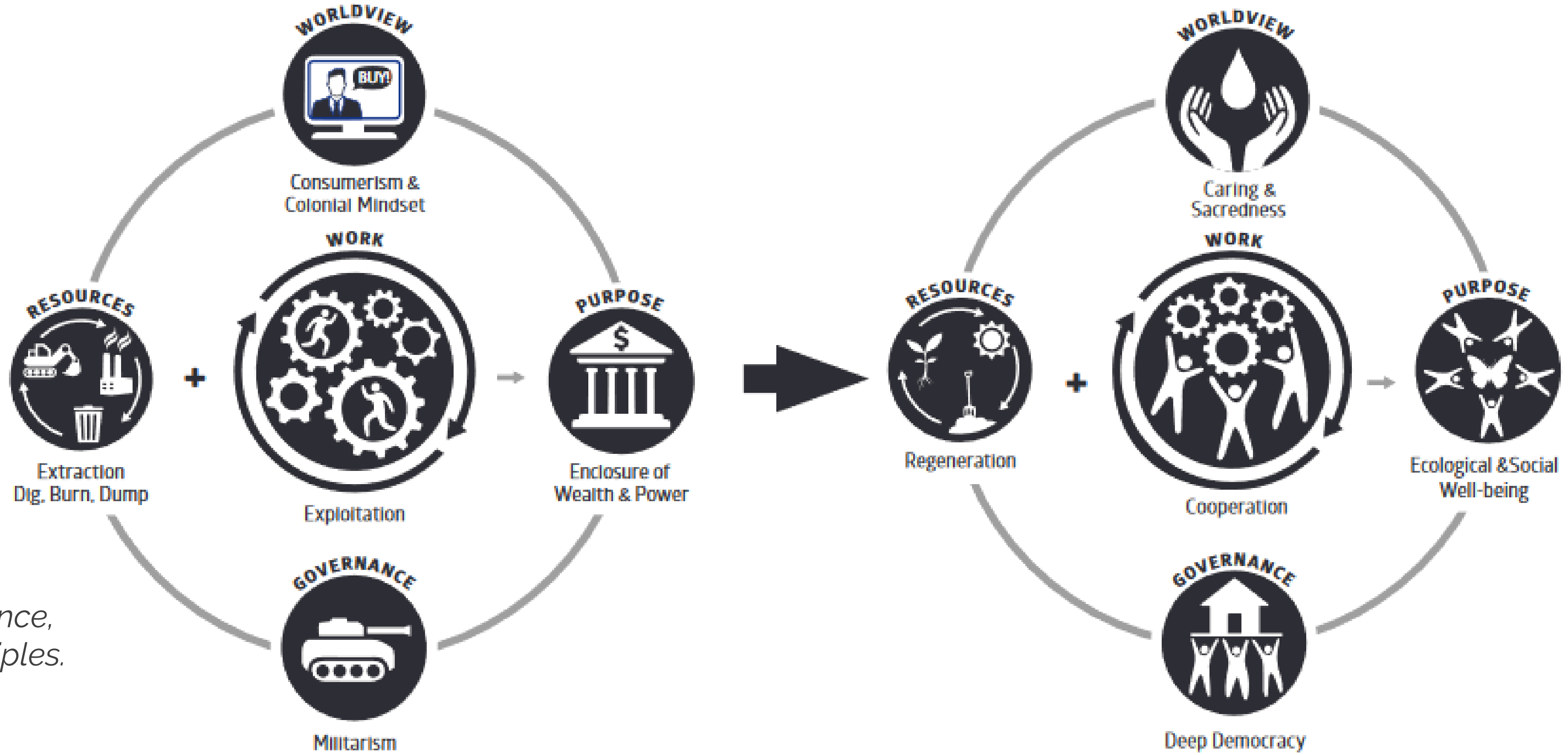
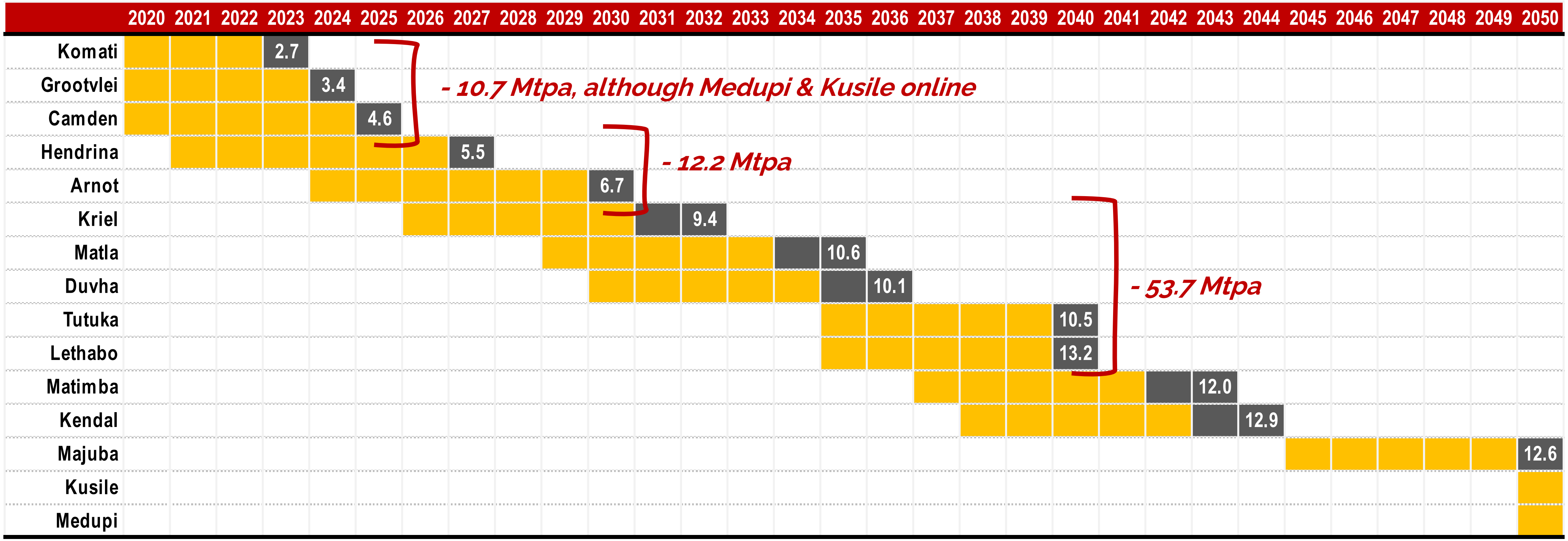


Image courtesy of Climate Justice Alliance, Just Transition Principles.

2025-2040

SA SUPPLY / DEMAND

AFRICAN SOURCE MARKETS



2025-2040

SA SUPPLY / DEMAND

AFRICAN SOURCE MARKETS

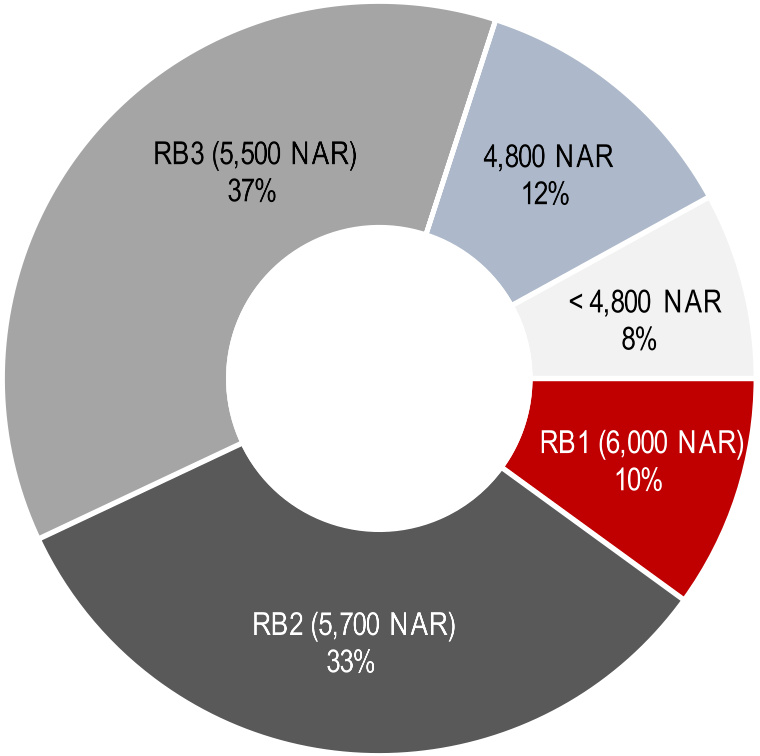
SA COAL SUPPLY / DEMAND ASSUMPTIONS	2005	2010	2015	2020	2025	2030	2035	2040
Exports	69.0	63.5	75.4	**73.0**	77.0	75.0	73.0	70.0
Domestic Power	120.0	122.7	119.2	**112.0**	115.3	103.1	83.2	49.4
Chem / SynFuel	37.0	40.0	39.0	**37.0**	36.0	36.0	35.0	35.0
Industrial & Met	22.0	20.0	14.5	**14.0**	13.0	13.0	12.0	12.0
TOTAL DEMAND	**248.0**	**246.2**	**248.1**	**236.0**	**241.3**	**227.1**	**203.2**	**166.4**
Available Production				**240.0**	236.0	241.3	227.1	203.2
Prod Increase / Decrease to Keep Balance				**-4.0**	**5.3**	**-14.2**	**-23.9**	**-36.8**
NET SUPPLY / DEMAND BALANCE				**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

It's quite possible production decreases by more than this by 2030. If so, ESKOM faces a potential "**coal supply cliff**" with resulting upwards pressure on price.

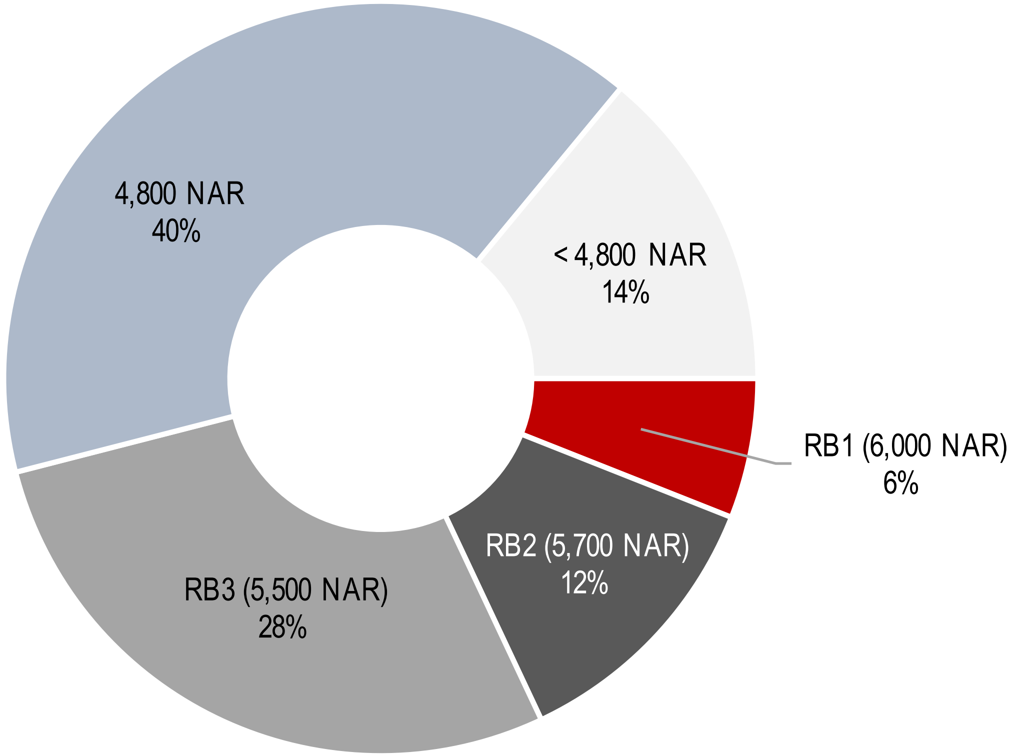
If supply does not shut down, both domestic and export prices should remain weak, assuming spot market dynamics were allowed to play out. A market would definitely **help in matching best available supply to increasingly uncertain demand** going forward.

2025-2040

SA COAL QUALITIES (estimated)



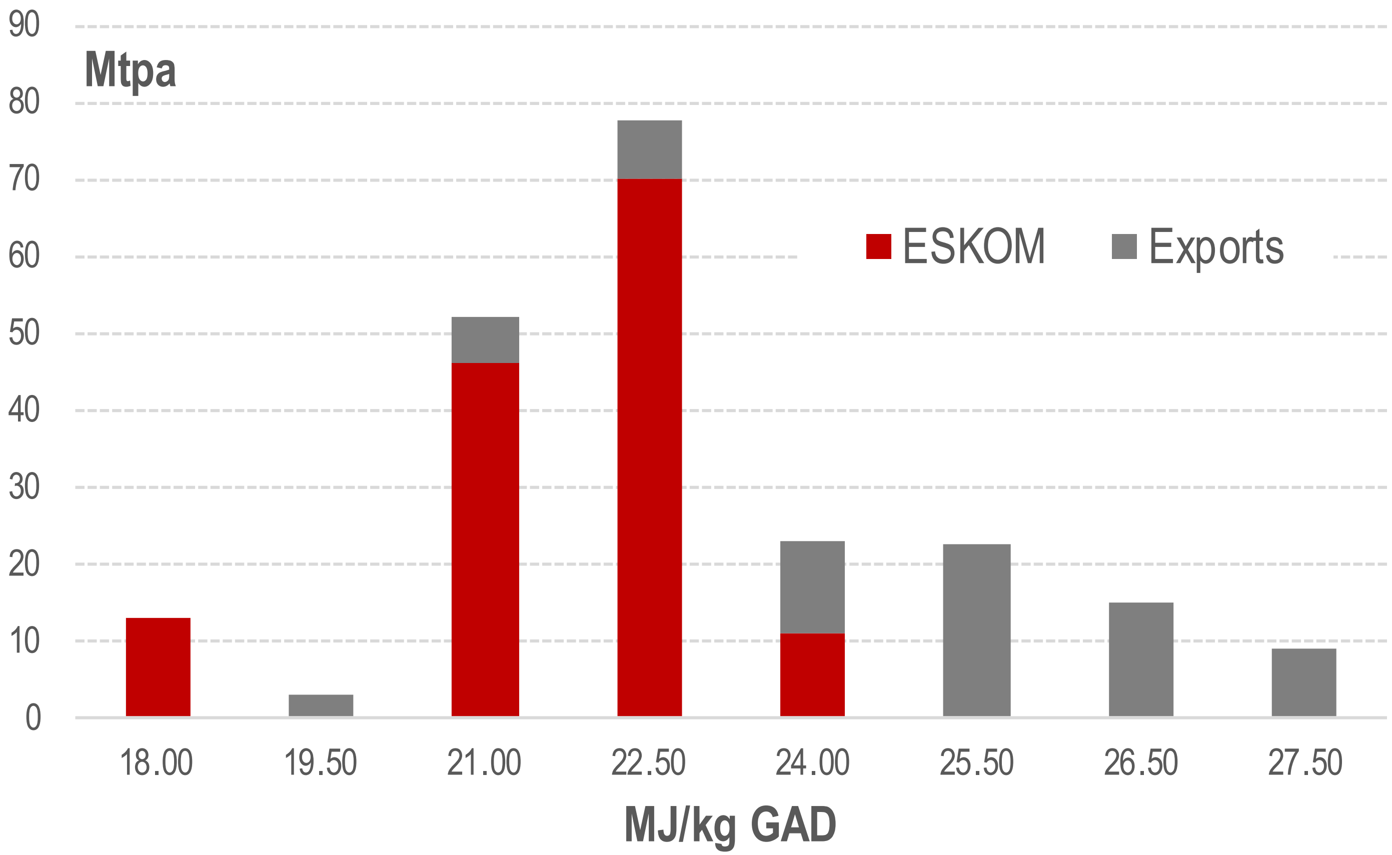
2020 RBCT Exports
RB3 dominant



2025 RBCT Exports
4,800 (22.50 MJ/kg) dominant?

2025-2040

SA COAL QUALITIES (estimated)



2020 SA Coal Production Split

Both Exports & Eskom wanting 22.50 MJ/kg by 2025

2025-2040

SA COAL PRICE PATHWAYS

AFRICAN SOURCE MARKETS

2020	2025	2030	2035	2040
				297.0
			208.5	228.5
		149.4	160.4	175.8
	106.5	114.9	123.4	135.2
	81.9	88.4	94.9	104.0
58.0	63.0	68.0	73.0	80.0
	44.1	47.6	51.1	56.0
	30.9	33.3	35.8	39.2
		23.3	25.0	27.4
			17.5	19.2
				13.4

RB1 Potential Price Pathway
USD/mt FOB RBCT

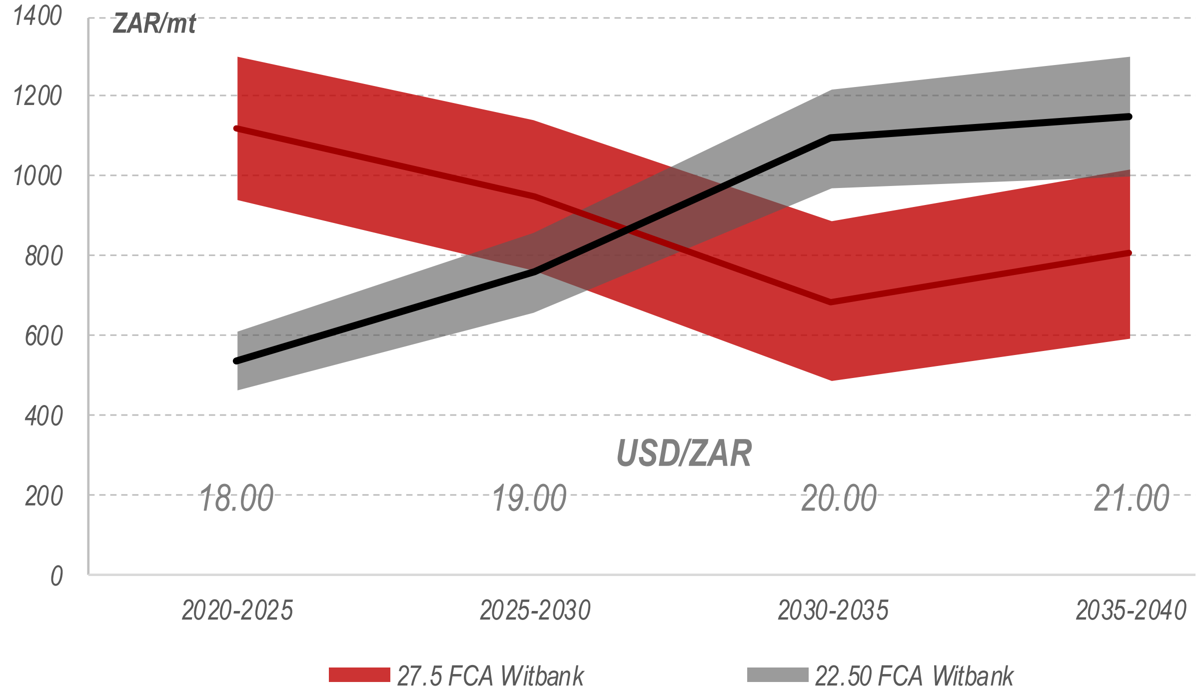
2020	2025	2030	2035	2040
				1 816.9
			1 263.9	1 579.9
		879.3	1 099.1	1 373.8
	611.7	764.6	955.7	1 194.6
	531.9	664.8	831.1	1 038.8
370.0	462.5	578.1	722.7	903.3
	393.1	491.4	614.3	767.8
	334.2	417.7	522.1	652.6
		355.0	443.8	554.8
			377.2	471.5
				400.8

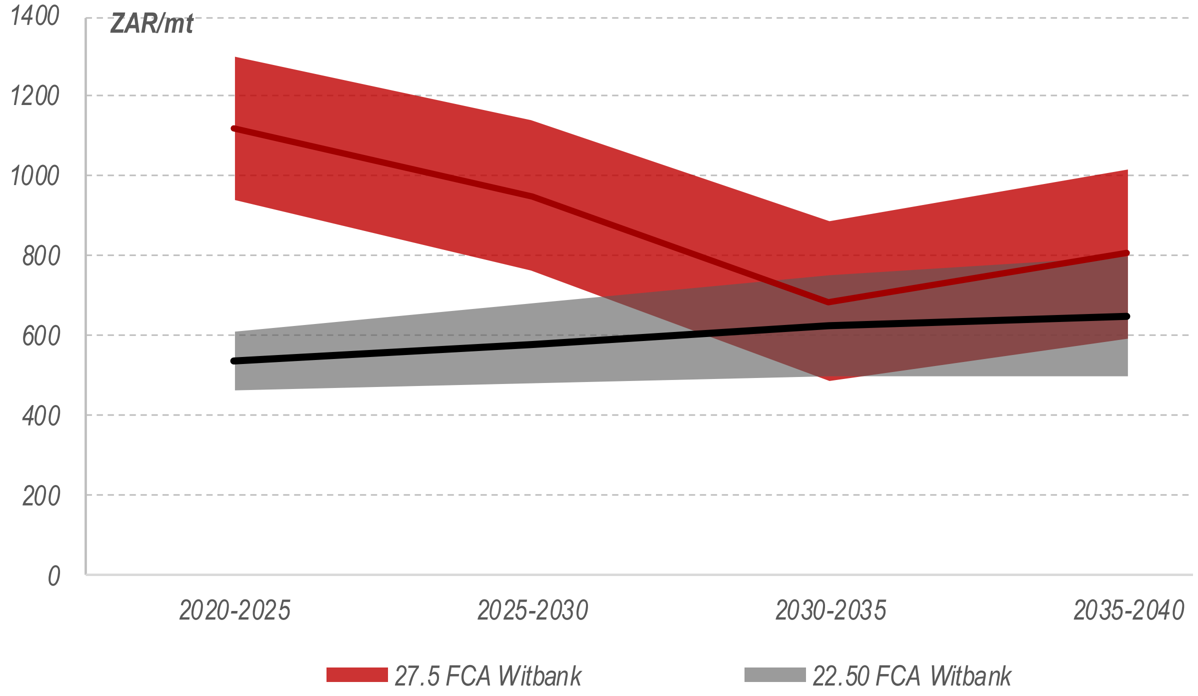
22.5 MJ/kg Potential Price Pathway
ZAR/mt FCA Witbank

2025-2040

SA COAL PRICE PATHWAYS

AFRICAN SOURCE MARKETS





ESKOM Faces Coal Supply Cliff
ZAR/mt FCA Witbank

No Coal Supply Cliff
ZAR/mt FCA Witbank

THANK YOU

Resource Finance
Commodity Markets
Restoration / Just Transition
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South African Coal Price Outlook 2020 - 2040
$500

Energies: Coal   October 2020

We investigate potential future coal price pathways, for both SA export and domestic markets and explore the potential "coal supply cliff" that might emerge circa 2030. Required reading for anyone involved in the coal markets. **Free to members or US$500 for non-members.**

Subscribe

Southern African Energy GIS Database
$100

General: Mapping   August 2020

Our GIS database is available as a Google Earth .kmz file with ten layers:

- All African Coal Fields (group by country)
- Coal Consumers (group by industry type)
- Coal Producers (group by company, division)
- Fuel Depots (group by company)
- Farm Boundaries (currently only for Mpumalanga coalfields)
- Pipelines (group by company)
- Ports (group by country)
- Power Stations (biomass, coal, gas, hydro, nuclear, solar & wind)