MAKING CLIMATE CAPITAL WORK: ESTIMATING THE COST PATHWAY TO 2050

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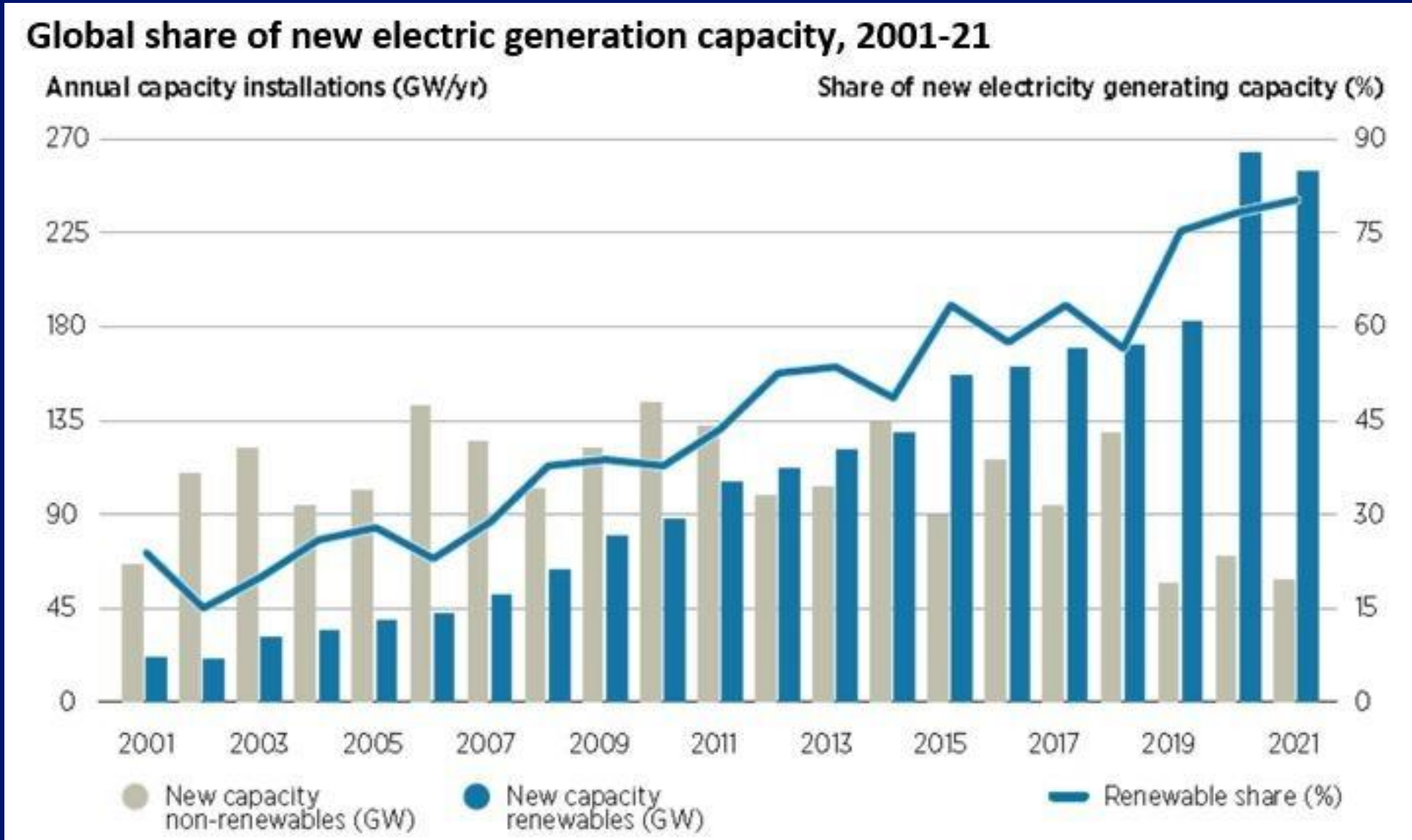
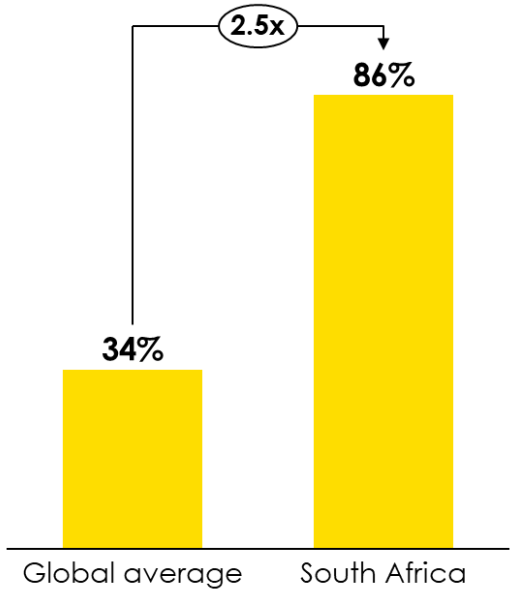
BLENDED FINANCE TASKFORCE

THE GLOBAL MEGA-TREND – CAN SA AFFORD TO MISS THE BOAT?

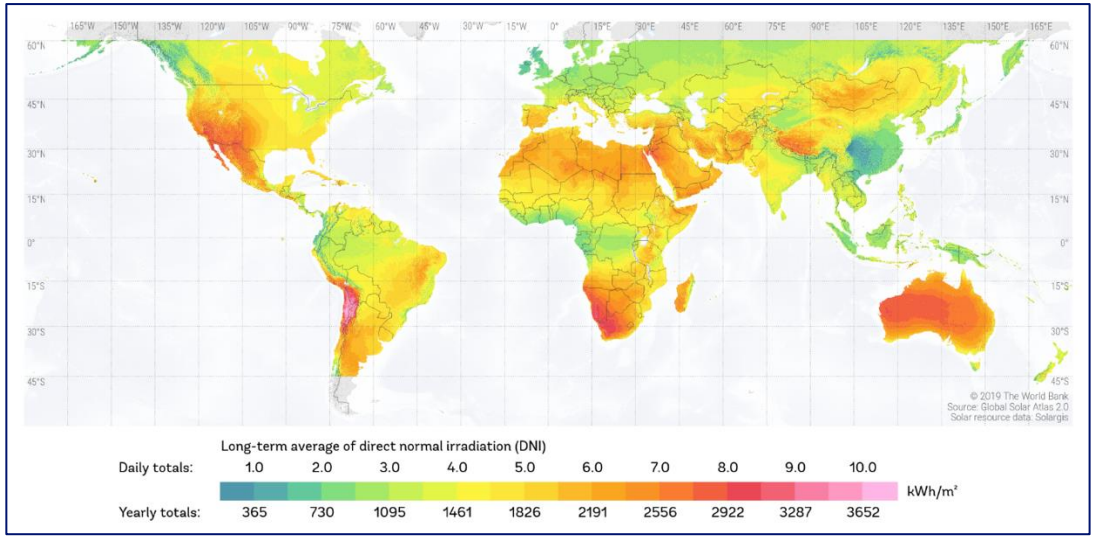


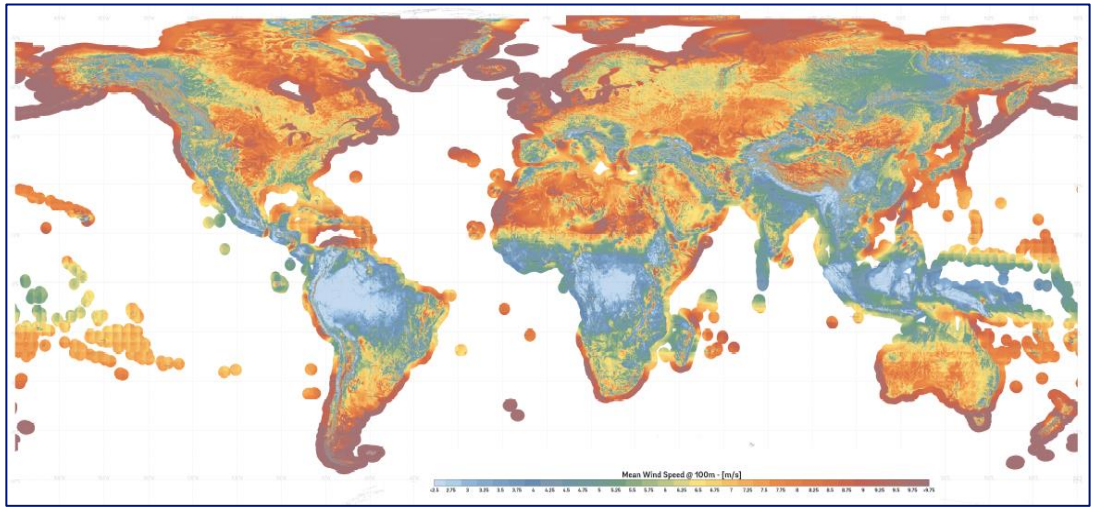
Source: World Energy Transitions Outlook 2022, Mar 2022, IRENA

SOUTH AFRICA CURRENTLY GENERATES 86% OF ITS ELECTRICITY FROM DOMESTIC COAL-FIRED POWER



South Africa some of the best solar & wind resources globally





Sources: World Bank Group, ESMAP, Solargis, DTU Wind Energy, Vortex

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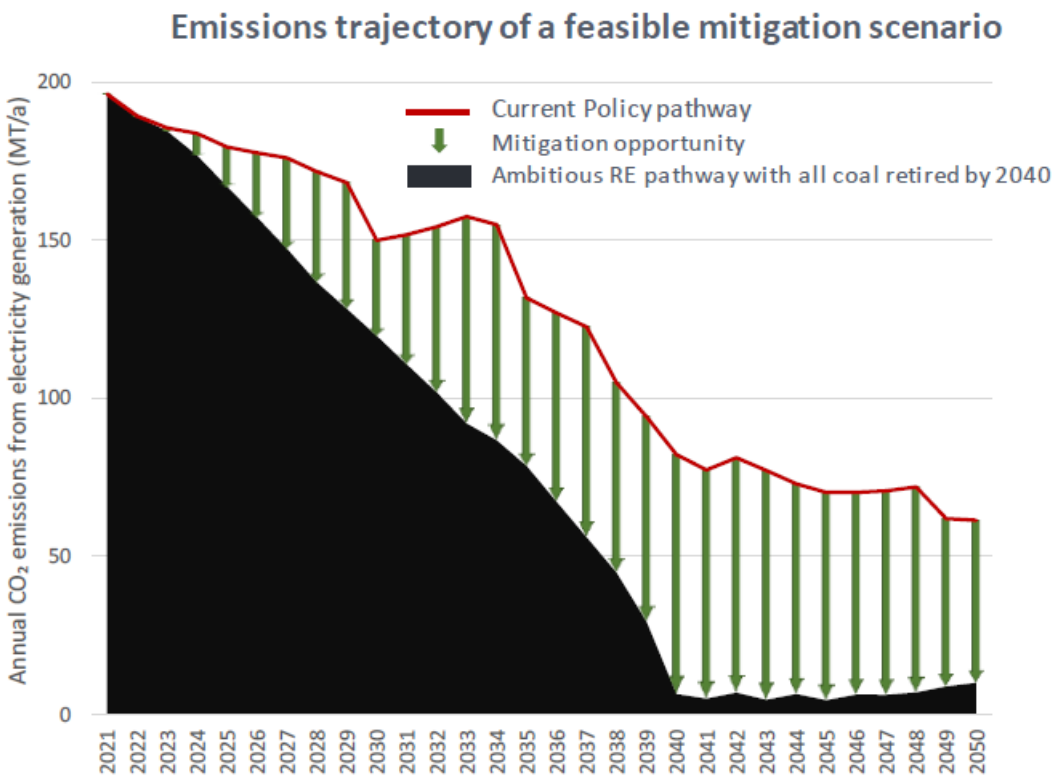
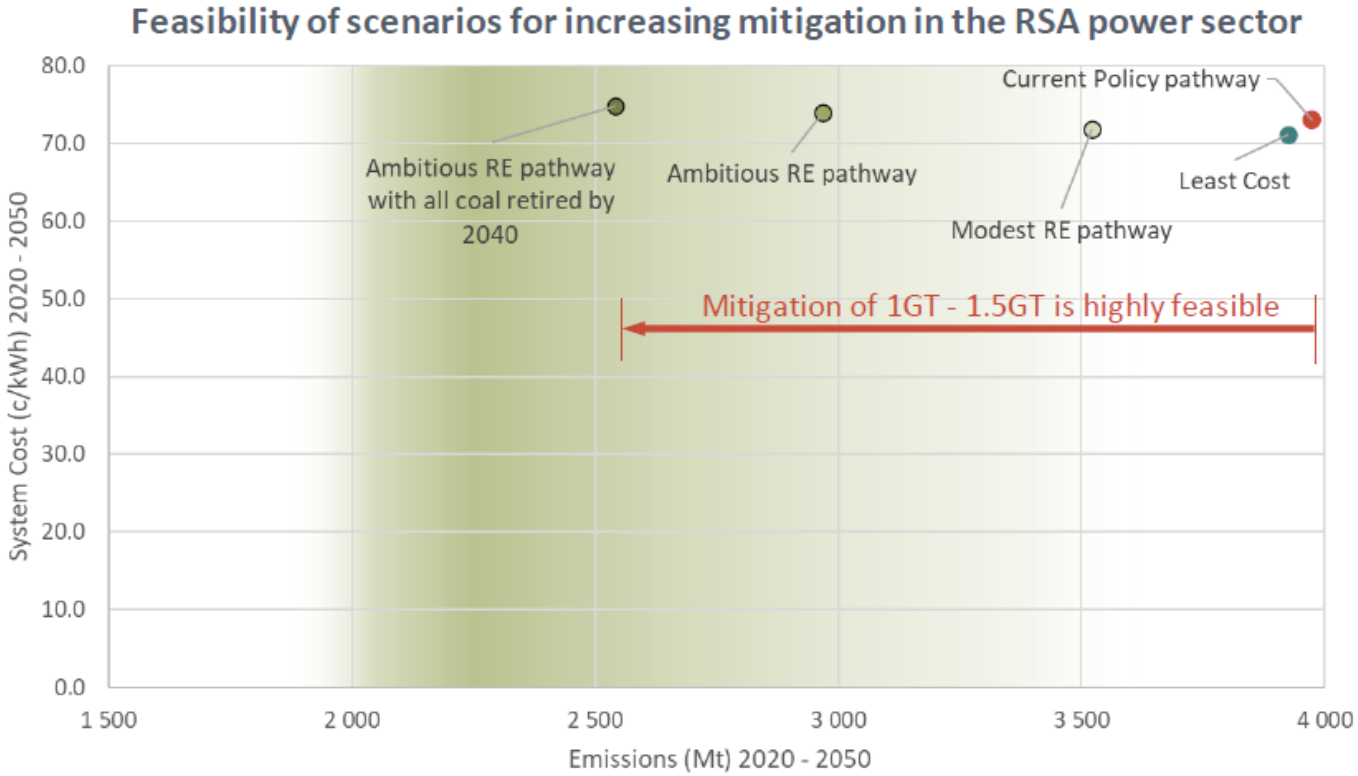
SOUTH AFRICA CAN AVOID 1.4GT OF CARBON EMISSIONS BY DECOMMISSIONING COAL EARLY AND RAPIDLY SCALING RENEWABLES

SA can mitigate 1.4Gt of carbon with an accelerated decommissioning schedule





- **SA's power sector can avoid 1.4Gt of CO_2** emissions against a BAU reference case of 3.9Gt CO_2 emissions from 2020-2050
- **New renewables is the least cost option for SA to satisfy demand -** cheaper than refurbishing old coal power stations. The recently published National Infrastructure Plan commits SA to the least-cost pathway, which is expected to be reflected in an updated IRP
- **Accelerating the closure of all coal power stations to 2040** would come at additional cost but can be achieved with international support

Source: Meridian Economics 'A Vital Ambition'

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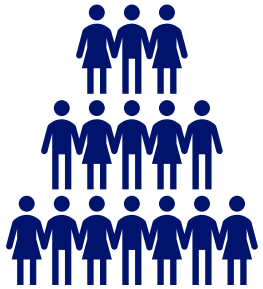
BUT THERE CAN BE NO TRANSITION UNLESS IT IS JUST



125,000 workers are directly employed in the coal value chain

Every worker supports between **3 and 10 dependents**

Under any plausible scenario, **the livelihoods of thousands of people are at risk.**

We must **extend our definition of a just transition** beyond workers, to address the challenges faced by communities in coal-dependent areas, including:

Health

Education

Youth Unemployment

Environmental Rehabilitation

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IT WILL TAKE AT LEAST $250BN SPENT OVER THE NEXT THREE DECADES TO TRANSITION TO A LOW-CARBON, MORE EQUITABLE ENERGY SYSTEM

The Just Energy Transition requires a combination of investments into infrastructure and costs to transition away from coal. Together, these amount to over $250bn over the next three decades[1]

SA Just Energy Transition

Over $250bn R3.7 trillion

(NIP2050 estimate: R4.4 tn for energy & transport. NWRS-3 estimate for water: R300 bn over 10 years)

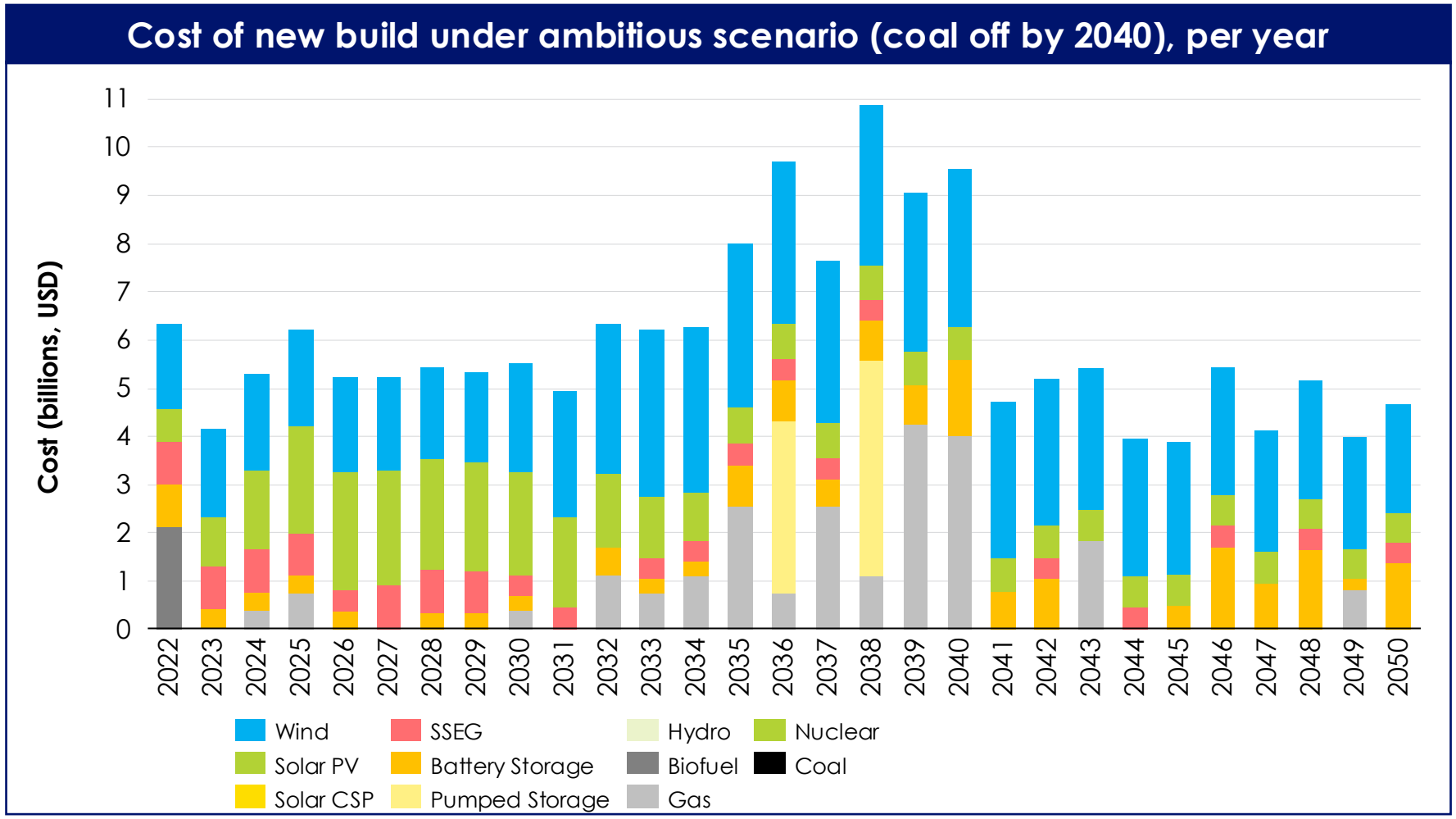
	System component	Total investment/cost 2022-50	Capital type needed
Investments	1 **Renewable energy** build-out	**$125 bn (160 GW)**	Private capital, municipal , cooperative
Investments	2 3 **Flexibility (electricity storage & gas – until alternatives possible)**	**$50 bn (Battery: 33GW Gas: 30 GW)**	Development finance (Blended, DFIs, MDBs, Climate funds)
Investments	4 **Transmission & distribution (rehab & extension)**	**$40 bn (up to $51 bn)**	
Investments	5 **Green industrialisation**	**TBC** (e.g. Green H2, electric mobility, component manufacturing, services)	DFIs, private capital
Costs	6 **Early retirement** of coal plants	**$24 bn**	Public capital (Gov. budget & Donor agencies)
Costs	7 **Climate justice outcomes** (workers & communities)	**Up to $10bn**	Philanthropic

Increasing concessionality

[1] The majority of catalytic capital will need to be frontloaded and so deployed in the first decade of the transition. Under an ambitious coal off by 2040 scenario, the majority of the renewable energy infrastructure will need to be in place before then.

BUILD OUT OF RE ENERGY GENERATION IS LARGEST PORTION OF SYSTEM TRANSFORMATION COST – MAINLY PRIVATE SECTOR INVESTMENTS

~$175bn
funding required over the next three decades



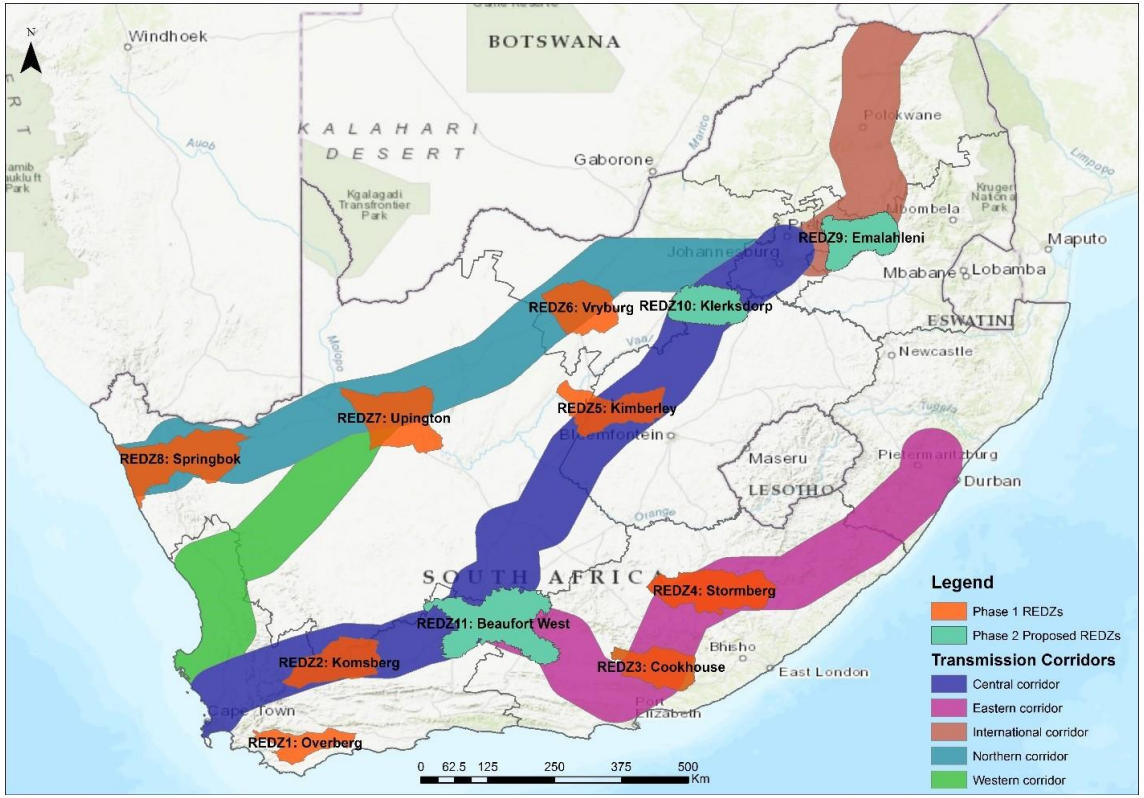
Source: Meridian Economics 'A Vital Ambition' & own calculations

EXPANDING TRANSMISSION AND STORAGE INFRASTRUCTURE IS THE FOUNDATION FOR A SUCCESSFUL ENERGY SYSTEM TRANSFORMATION

Tx & Storage basic, but key considerations

- Grid connectivity is a fundamental pre-condition for investment in large-scale renewables projects
  - Physical proximity to grid
  - Grid & converter capacity
- Project development timeframes on order of 5-10 years for transmission projects vs 3-5 years for RE projects[1]
  - Tx projects need to precede renewables projects
- Transmission projects reduce 'connection risk' for renewables IPP's
- Storage projects reduce 'balancing risk' for renewables IPP's
- Development, ownership, operation of storage projects could sit with Eskom and/or private sector
- Priority 'Renewable Energy Development Zones' identified by DEFF with expedited environmental authorisation processes and adjacent to priority Tx corridors[2]
- **Build rate is the primary constraint: needs to accelerate from ~400 Kms pa to ~1500 – 2000 Kms pa!!**

South Africa's REDZs & Transmission Corridors



Source: CSIR (https://www.csir.co.za/renewable-energy-development-zones)

8 existing Renewable Energy Development Zones (REDZs) + 3 additional zones (now approved) overlayed onto transmission corridors where investment is planned.

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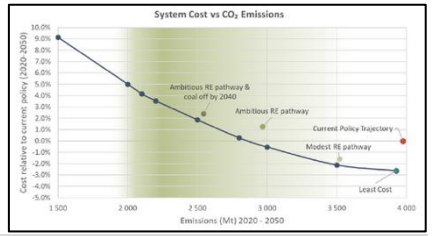
THE RECENT $8.5BN COMMITMENT CAN HELP UNLOCK SOME OF THE JET CAPITAL NEEDED

	System component	Total cost/investment 2022-2050 (US$bn)	Entity to lead investment, and risk/return profile	Potential use of $8.5bn and its impact
	1 **Renewable energy** build-out	**$125 bn**	• **IPPs** financed by private capital • **Commercial** risk/return, earned via long-term contract with system operator (ITSMO/Eskom)	• **None** – these should be financed by private capital through IPPs • **Limited exception** where Eskom repowering old coal sites as RE, though still contentious
Flexibility	2 **Battery & pumped hydro storage**	**$30 bn**	• **IPPs** OR **Eskom Transmission** • Commercial return OR regulated return	• Possible – if Eskom constructing • Adds critical flexibility to help **de-risk RE build out;** can also **help reduce load shedding**
Flexibility	3 **Gas plants**	**$20 bn**	• **IPPs** financed by private capital • **Commercial** risk/return, earned via **capacity contracts** with system operator (ITSMO/Eskom)	• **None** – these should be financed by private capital through IPPs • Even if Eskom, **fossil will not attract $8.5bn**
	4 **Transmission** & distribution	Total = $40 bn • Transmission = **c.$25 bn** • Distribution = c.$15 bn (up to R25 bn)	• Owned & delivered by **Eskom Transmission** • **Regulated return** with cost recovered through electricity tariffs; **limited risk**	• **Priority for concessional loans** with a focus on Tx extensions[2] to REDZ[3] to **de-risk RE build out** • **Value derived from concessional loan** should roughly align and offset costs in #6
	5 **Green industrialisation**	**TBC** (e.g. Green H2, electric mobility)	• **Projects led by private sector,** with DFI support incl. concessional debt, first-loss equity, TA	• **Yes –** donor govs. to support **seeding of green industries**, according to SA prioritisation
	6 **Early retirement** of coal plants	Pathway (Gt[1] 2020-50) / Add'l system cost **3.9Gt (least cost)** / ***baseline*** 3.5 Gt / +$5 bn 3.0 Gt / +$18 bn **2.5 Gt** / **+$24 bn**	• Cost will be borne by **Eskom Generation** as these plants forego marginal profits • **No return:** values required to make Eskom Generation financially whole v. 4Gt path • **Risk** relates to delivery of emissions outcomes	• ***Possible*** deployment of grant funding, however that should be prioritised to #6 • **Indirectly** the value gained from concessional loans (e.g., #4) should align
	7 **Climate justice outcomes**	**Up to $10 bn**	• **Grant** capital/**micro-loans -** local organisations & philanthropies (e.g. DBSA D-labs)	• **Yes –** priority for **grant funding** within $8.5bn to support workers in coal value chain

[1] Gigatonnes cumulative emissions from South Africa's power sector 2020-2050. Note: current emissions c.200Mt per annum; [2] Transmission extension projects will open up areas for renewable generation projects. Transmission replacements / reinforcement work should be financed outside the $8.5bn by Eskom as a matter of course of maintaining the network; [3] REDZ = Renewable Energy Development Zones; Transmission lines built to areas of high renewable resource can de-risk connection risk, and enable many GWs of renewable energy development; **Sources:** Meridian, Eskom, Jobs studies

TOTAL SYSTEM TRANSFORMATION INVESTMENTS & COSTS: KEY FIGURES AND FOCUS ON 2020S

	System component	Total cost/investment 2022-2050 (US$bn)	Investment in 2020s	Key reference figures and sources
	1 **Renewable energy** build-out	**$125 bn**	• **$40 bn**	• **+ 160 GW** capacity 2020-50 • **+ 55 GW** in 2020s
Flexibility	2 **Battery storage**	**$18 bn**	• **$3-4 bn**	• **+ 33 GW** capacity 2020-50 • **+ 5 GW** in 2020s • **Meridian 'A Vital Ambition'**
Flexibility	3 **Gas plants**	**$20 bn**	• **$2 bn**	• **+ 30 GW** capacity 2020-50 • **+ 2 GW** in 2020s
	4 **Transmission** & distribution	Total = $40 bn • Transmission = **c.$25 bn** • Distribution = c.$15 bn • up to $25)	Total = $25 bn • Transmission = **c.$13 bn** • Distribution = c.$12 bn	• **Triangulated** across multiple sources, including Eskom Tx Development Plan (2021-30): **$8bn** for 5,600 km of lines • However, above is aligned to supporting **30GW of RE build** (IRP), not the **55GW** build in an accelerated RE build scenario • **Mix** of both Tx extensions (to support RE connections) and Tx refurbishments & reinforcements
	5 Green industrialisation	TBC	• TBC	• N/A
	6 **Early retirement** of coal plants	Pathway (Gt[1] 2020-50) / Add'l system cost **3.9Gt (least cost)** / ***baseline*** 3.5 Gt / +$5 bn 3.0 Gt / +$18 bn **2.5 Gt** / **+$24 bn**	• **Limited** – costs are primarily borne via early closures beyond 2030	• **Meridian Vital Ambition** study • Least cost scenario baseline according to NIP 2050 • **2030:** Mt from power sector down to **120Mt** in 2.5Gt pathway 
	7 **Climate justice outcomes**	**Up to $10 bn**	• **Funding towards climate justice outcomes should be frontloaded**, given the long-term nature of the activities required	• **125,000** workers employed in coal value chain (TIPS). Coal off by 2040 under 2.5Gt scenario meaning all workers must be relocated, retrained, and/or compensated • Skills funding between **R22k-141k per worker**, depending on current skill level. Compensation cost **~R180k per worker** vs. green industry job (CST, TIPS) • Significant investment required in local area rehabilitation

DONORS SHOULD ABIDE BY A SET OF PRINCIPLES TO ENSURE FIT-FOR-PURPOSE CLIMATE FINANCE COMMITMENTS

Embed transparency and accountability into donor pledges, specifying the source and type of funds and establishing disclosure & reporting mechanisms

Establish donor coordination and standardisation mechanisms, streamlining decision-making and reporting to reduce transaction costs

Make greater use of catalytic instructments to ensure pledges are fit-for-purpose to solve the challenges at hand, tackling key risks and funding gaps

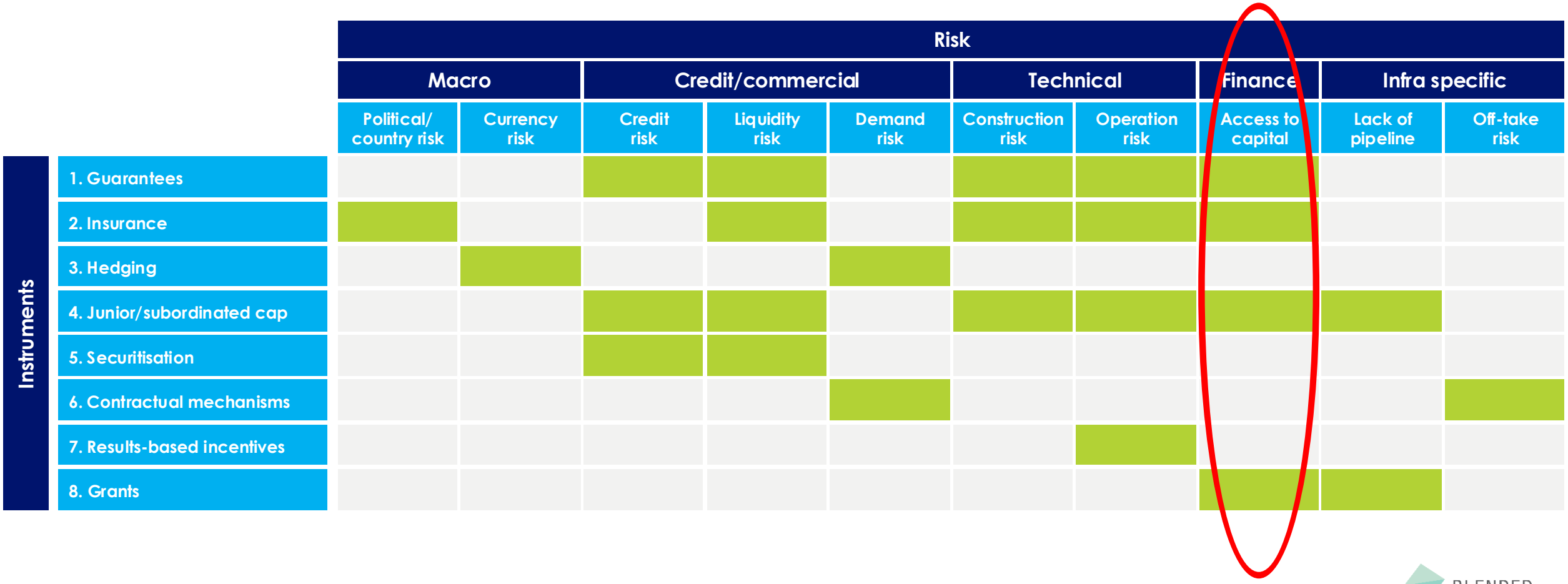
Ensure donor funding is complementary and coordinated, linking it to existing funding programmes and other sources of capital

Use demand to guide funding allocation in a manner that responds to domestic market and political structures

Shift decision-making power to achieve long-term impact through transitions that are country-led and country-owned

DONOR GOVERNMENTS SHOULD MAKE GREATER USE OF CATALYTIC INSTRUMENTS AND INNOVATIVE FINANCIAL STRUCTURES

From what we know so far, a majority of the $8.5bn commitment will be mostly sovereign debt – with limited concessionality – and a negligible allocation to grant funding



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A CONSTELLATION OF ACTORS ARE ALREADY WORKING TO ACCELERATE THE TRANSITION IN SOUTH AFRICA, CONTINUED COOPERATION IS NEEDED

Government

- Ensure a **robust enabling environment,** including stability, strong institutions, governance, and buy-in at the highest level
- South Africa has already signalled **strong commitment to the agenda** with the establishment of the Presidential Climate Commission and, recently, the Presidential Climate Finance Task Team

Domestic finance

- **Build strong project pipeline** of Paris-aligned investments
- **Strengthen data collection** efforts to provide track record for international investors
- **Identify opportunities for de-risking** with concessional capital to leverage Blended Finance toolkit
- **Ensure depth of financial markets**, with access to instruments such as currency swaps, interest rate swaps, and green bonds

Civil society

- **Shape the narrative** around what a just transition should look like and engage with policymakers
- **Continue strong advocacy** for positive climate outcomes and the protection of communities
- **Hold institutions to account** to ensure they are serving the interests of the many, not the few

International finance

- **Increase alignment** between different capital providers, such as development finance institutions, the private sector, and philanthropy
- **Fine-tune risk assessments,** ensuring that perceptions are not self-fulfilling and identifying risk mitigation opportunities

Industry & Business

- **Enact & accelerate the green industrialisation agenda**, incubating and adopting innovative technologies
- **Support the creation of decent jobs,** with a focus on workers within the coal value chain
- **Promote the roll-out of clean energy infrastructure** as key offtakers

ANNEX:
SYSTEM TRANSFORMATION SUPPORTING MATERIAL

SUPPORTING DATA: RENEWABLE ENERGY GENERATION (1/2)

Table 1. Assumptions for new power generation and storage capacities aligned with the coal off by 2040 scenario

New capacity built (MW)	2022-2030	2031-2040	2041-2050	Total
Wind	17,950	36,650	32,600	87,200
Solar PV	28,500	20,000	15,000	63,500
Solar CSP	0	0	0	0
SSEG	8,000	3,500	2,500	14,000
Battery Storage	4,500	12,000	17,000	33,500
Pumped Storage	0	4,500	0	4,500
Hydro	0	0	0	0
Biofuel	1,500	0	0	1,500
Gas	2,000	24,500	3,500	30,000
Total	**62,450**	**101,150**	**70,600**	**234,200**

Table 2. Assumptions for overnight capital expenditure costs aligned with the coal off by 2040 scenario

Average Overnight CapEx ('000 ZAR/MW)[1]	2022-2030	2031-2040	2041-2050
Wind	14,731	13,503	12,563
Solar PV	9,104	7,523	6,482
Solar CSP	n/a	n/a	n/a
SSEG	13,541	13,541	13,541
Battery Storage	11,129	8,314	7,234
Pumped Storage	n/a	27,148	n/a
Hydro	n/a	n/a	n/a
Biofuel	21,415	n/a	n/a
Gas	11,017	11,171	11,325
Total	n/a	n/a	n/a

SUPPORTING DATA: RENEWABLE ENERGY GENERATION (2/2)

Table 3. Total capex required for new power generation and storage buildout (Jan 2022 ZAR)

Cost of new build (million ZAR)	2022-2030	2031-2040	2041-2050	Total
Wind	264,417	494,868	409,559	1,168,844
Solar PV	259,464	150,467	97,228	507,160
Solar CSP	n/a	n/a	n/a	0
SSEG	108,328	47,394	33,853	189,574
Battery Storage	50,079	99,766	122,983	272,829
Pumped Storage	n/a	122,166	n/a	122,166
Hydro	n/a	n/a	n/a	0
Biofuel	32,122	n/a	n/a	32,122
Gas	22,033	273,685	39,638	335,356
Total	**736,444**	**1,188,346**	**703,261**	**2,628,050**

Table 4. Total capex required for new power generation and storage buildout (Jan 2022 USD)

Cost of new build (million USD)	2022-2030	2031-2040	2041-2050	Total
Wind	17,442	32,643	27,016	77,101
Solar PV	17,115	9,925	6,413	33,454
Solar CSP	0	0	0	0
SSEG	7,146	3,126	2,233	12,505
Battery Storage	3,303	6,581	8,112	17,997
Pumped Storage	0	8,058	0	8,058
Hydro	0	0	0	0
Biofuel	2,119	0	0	2,119
Gas	1,453	18,053	2,615	22,121
Total	**48,578**	**78,387**	**46,389**	**173,354**

SUPPORTING DATA: TRANSMISSION AND DISTRIBUTION

Table 5. Total capex required for transmission and distribution infrastructure (approx. Jan 2022 ZAR)

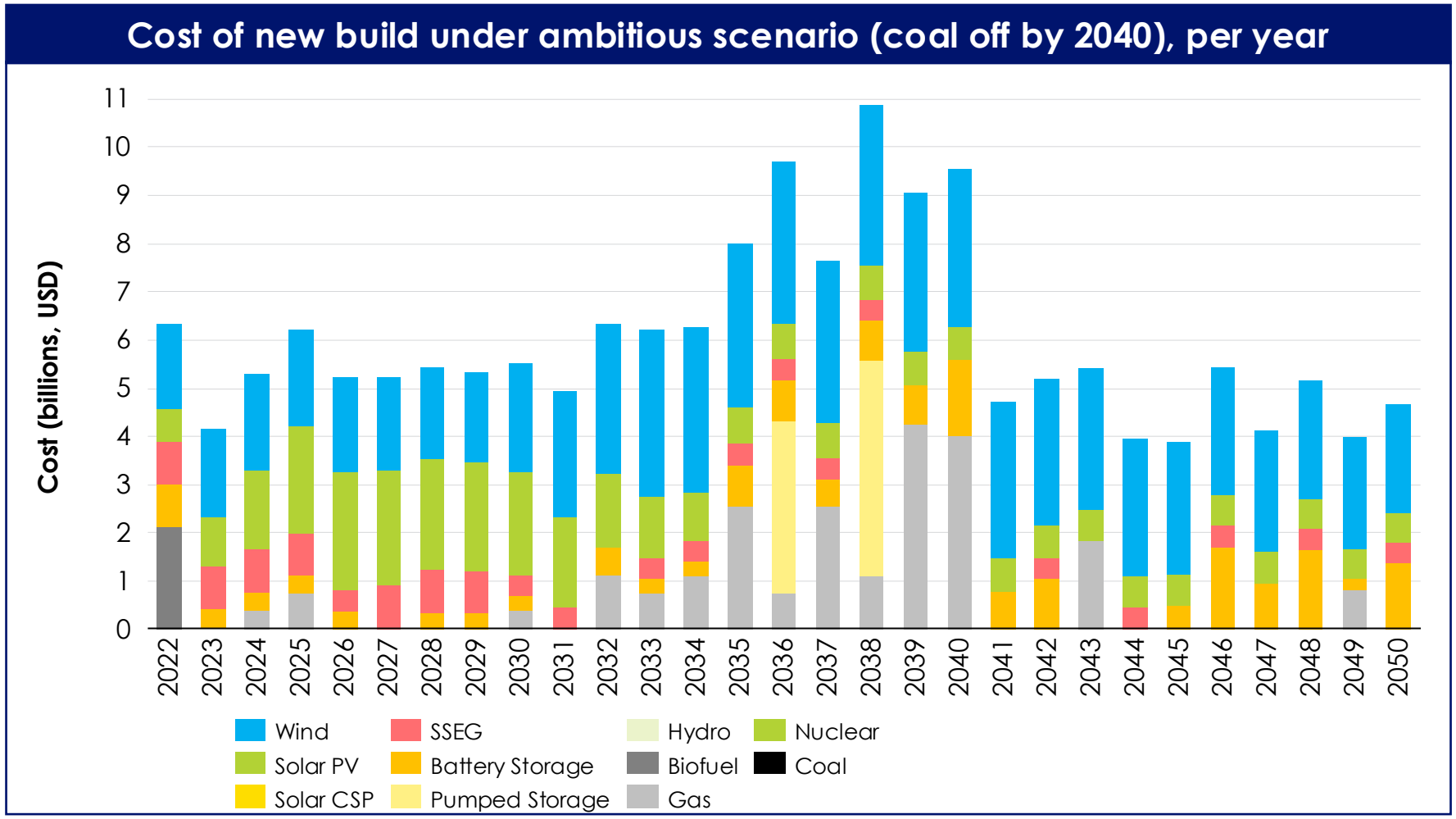
Period	RE Build (GW)	Tx Costs (bn ZAR)	Dx Costs (bn ZAR)	Total Investment (bn ZAR)
2022-2031	54	200	100	300
2032-2040	50	185	93	278
Total	**105**	**385**	**193**	**578**

Table 6. Total capex required for transmission and distribution infrastructure (approx. Jan 2022 USD)

Period	RE Build (GW)	Tx Costs (bn USD)	Dx Costs (bn USD)	Total Investment (bn USD)
2022-2031	54	13.0	6.5	20
2032-2040	50	12.1	6.0	18
Total	**105**	**25**	**13**	**38**

THE BUILD OUT OF CLEAN ENERGY IS LARGEST PORTION OF SYSTEM TRANSFORMATION COST, BUT SHOULD MOSTLY BE UNDERTAKEN BY THE PRIVATE SECTOR

~$175bn
funding required over the next three decades



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EXPANDING TRANSMISSION AND STORAGE INFRASTRUCTURE IS THE FOUNDATION FOR A SUCCESSFUL ENERGY SYSTEM TRANSFORMATION

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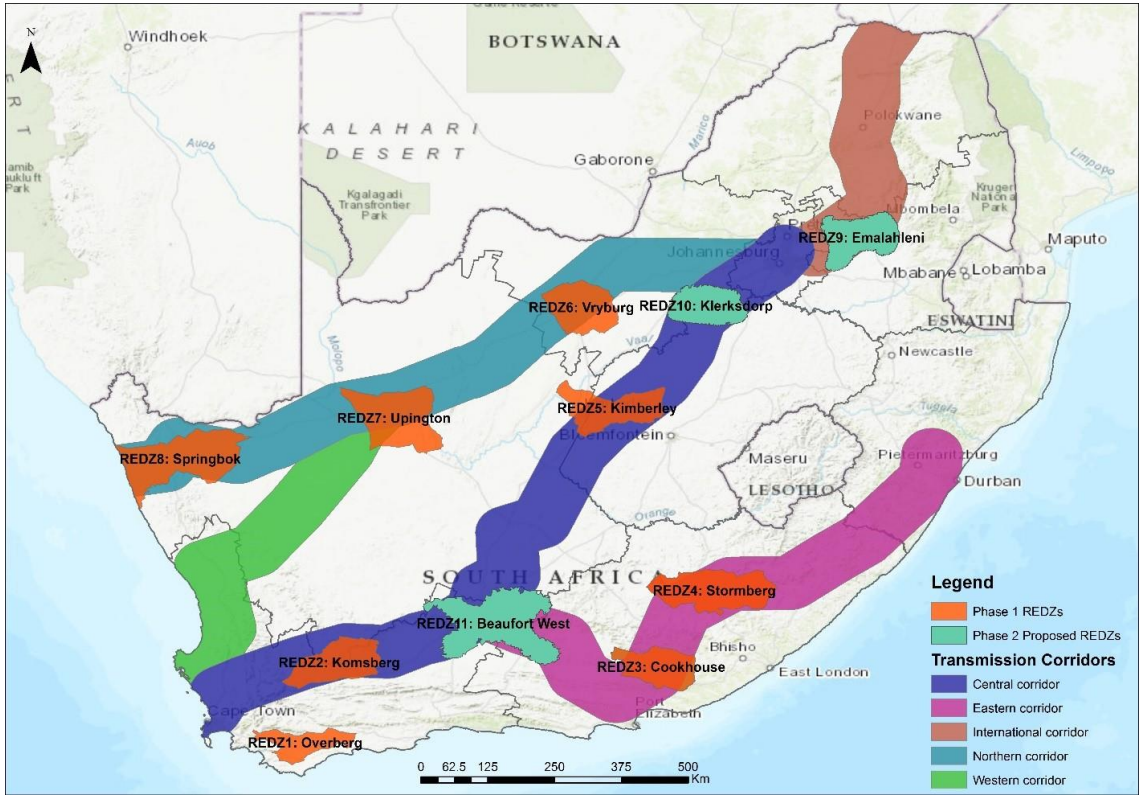
South Africa's REDZs & Transmission Corridors



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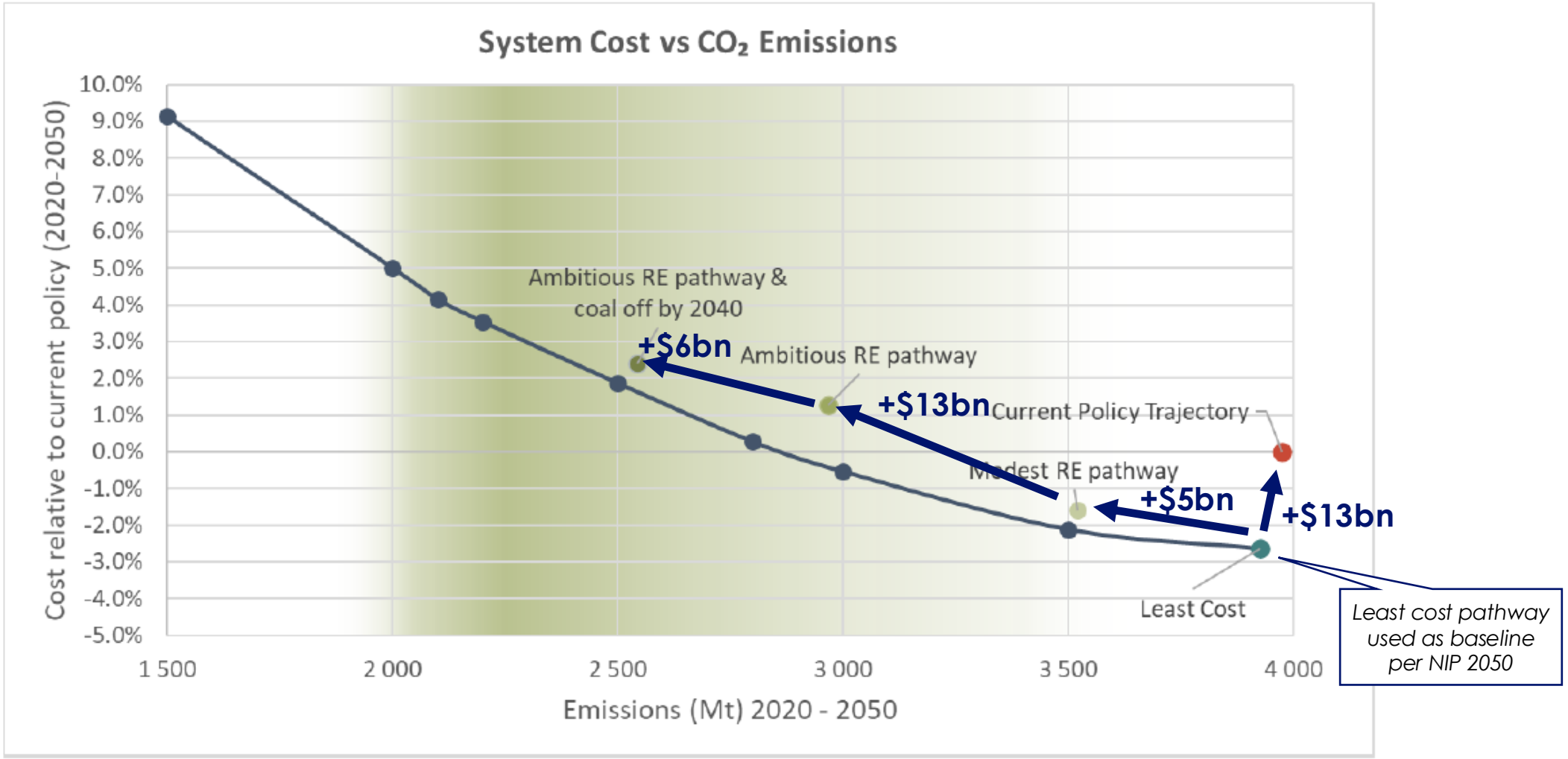
SYSTEM COST IMPLICATIONS OF LOWER EMISSIONS PATHWAYS



Source: Meridian Economics, 'A Vital Ambition'

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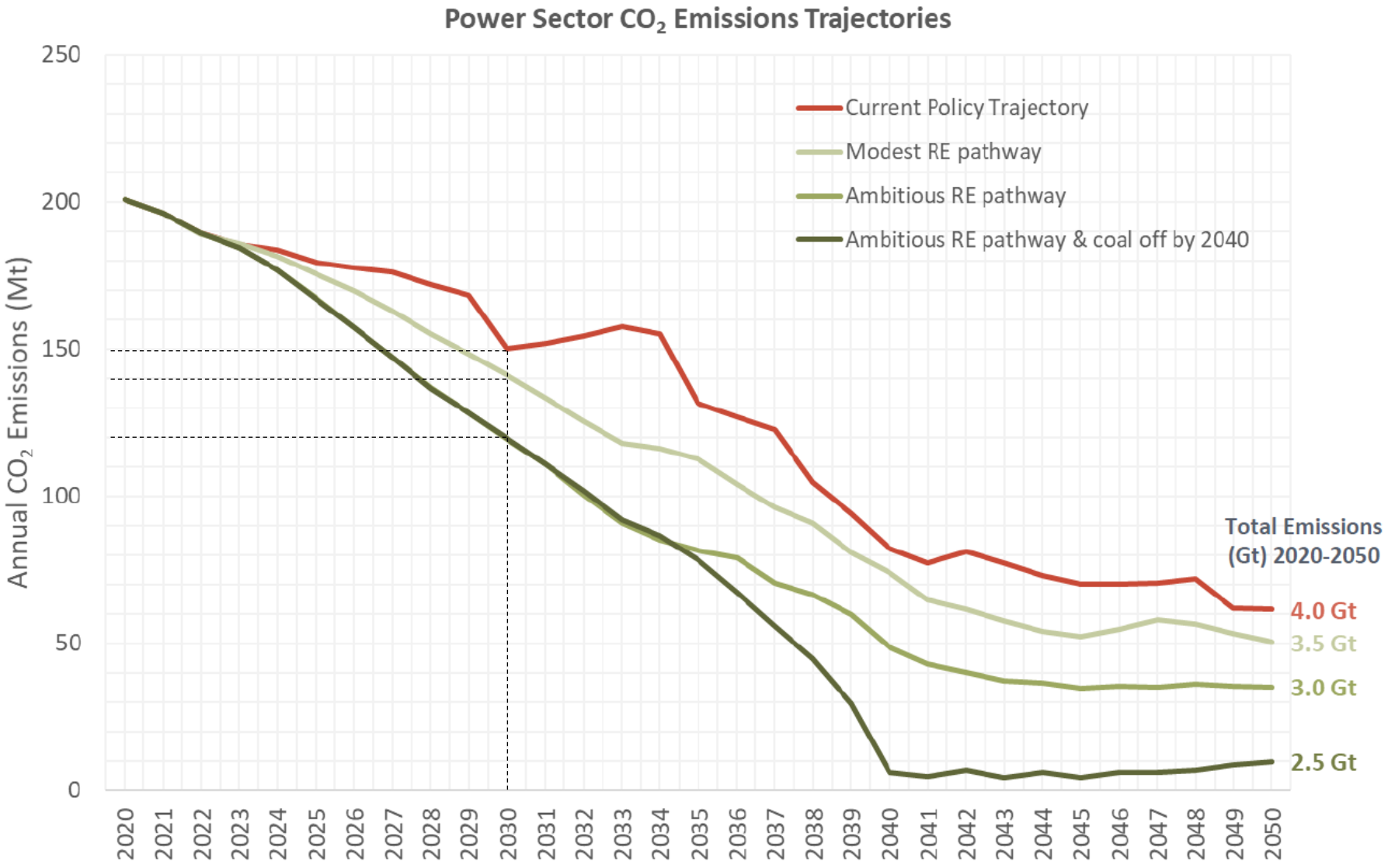
ANNUAL POWER SECTOR EMISSIONS UNDER DIFFERENT PATHWAYS



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