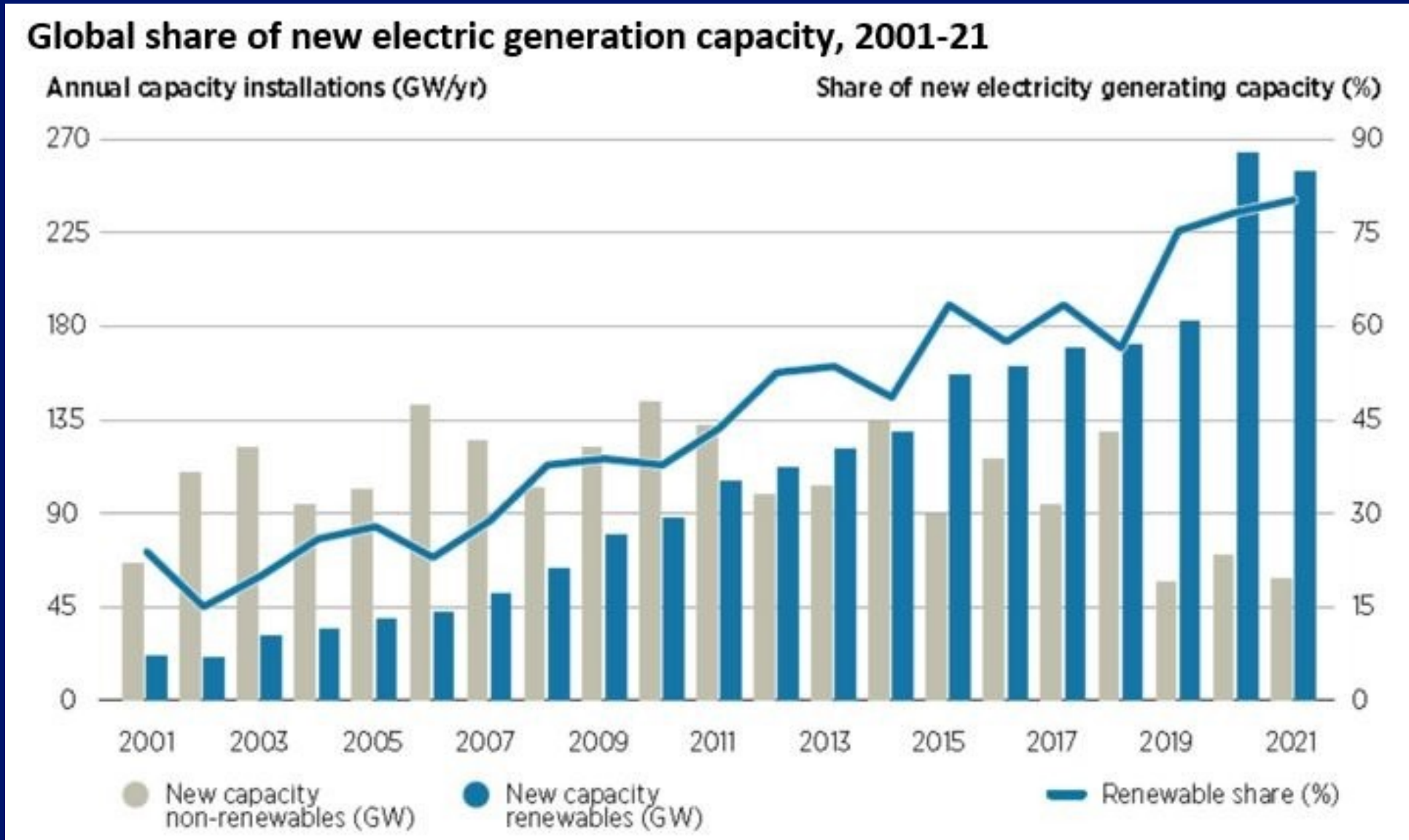
MAKING CLIMATE CAPITAL WORK: ESTIMATING THE COST PATHWAY TO 2050

PROF MARK SWILLING
CO-DIRECTOR: CENTRE FOR SUSTAINABILITY TRANSITIONS
CHAIR OF THE BOARD: DEVELOPMENT BANK OF SOUTHERN AFRICA

CST Centre for Sustainability Transitions

BLENDED FINANCE TASKFORCE

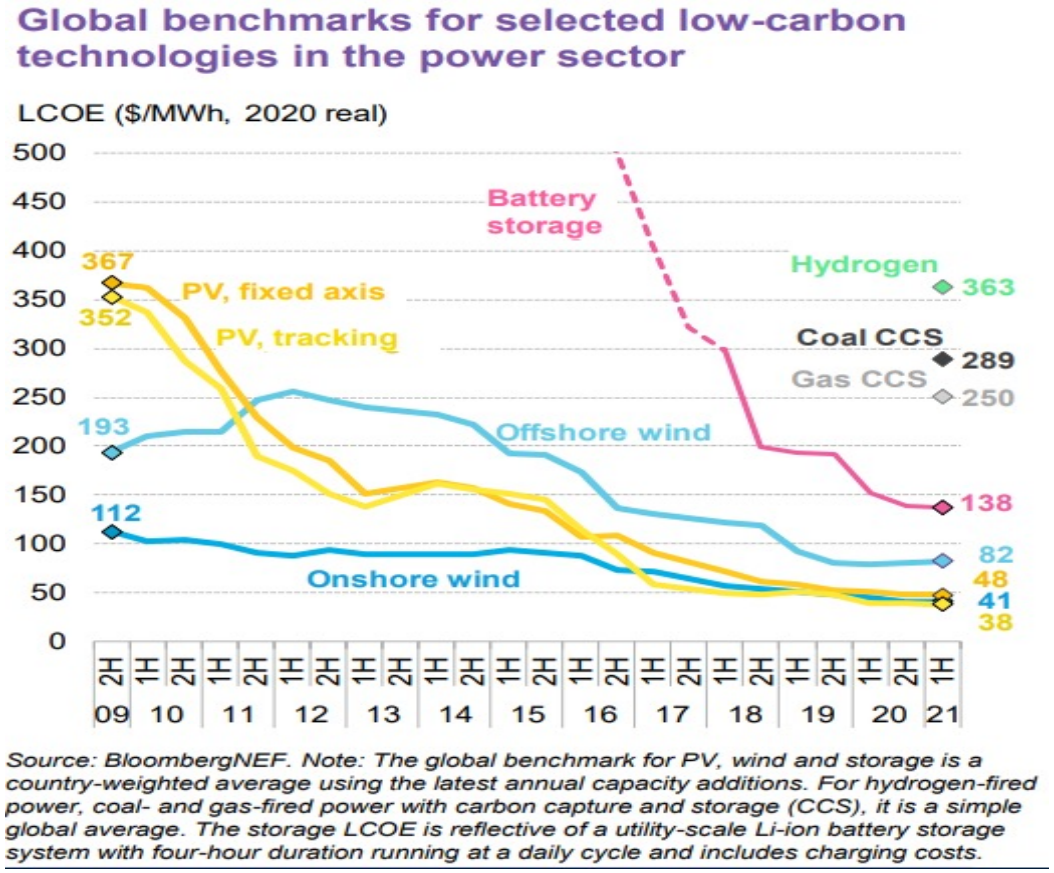
GLOBAL MEGA-TREND – CAN SA AFFORD TO MISS THE BOAT?



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

PLUNGING RENEWABLE COSTS - ALLOWING SA TO RAPIDLY CHANGE THE ENERGY MIX

Cost of renewable energy has plummeted



Source: BloombergNEF. Note: The global benchmark for PV, wind and storage is a country-weighted average using the latest annual capacity additions. For hydrogen-fired power, coal- and gas-fired power with carbon capture and storage (CCS), it is a simple global average. The storage LCOE is reflective of a utility-scale Li-ion battery storage system with four-hour duration running at a daily cycle and includes charging costs.

Renewables are already the least cost option for SA

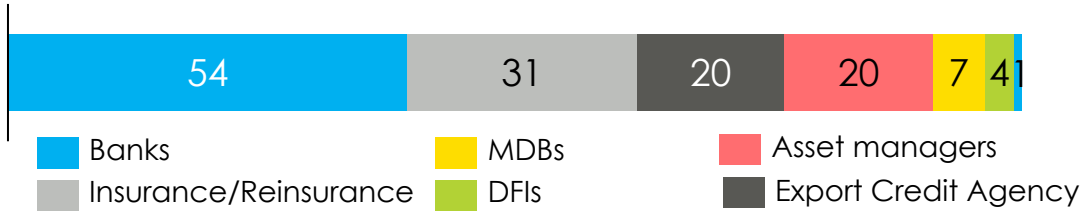
- **Falling renewable pricing.** 2009 and 2019: solar costs fell 89% - Onshore wind costs fell 70% in the same period.
- **Flat to rising thermal & nuclear costs.** Coal costs have been flat while nuclear costs have risen by 26%.
- **Renewables are the least cost option for SA. L**east cost option for South Africa is to build new renewables rather than to fund the refurbishment of old coal fired power stations.
- **Batteries are the key.** Battery costs have fallen substantially – prices need to halve again to allow renewables + batteries to provide base-load. Likely to occur in the next 2-4 years.

- **Drivers are now economic, not environmental – SA's energy challenge should not be framed purely ito climate targets**

Source: Bloomberg New Energy Outlook 2021

GLOBAL PRIVATE & PUBLIC CAPITAL WILL NOT FINANCE NEW COAL PROJECTS & HIGH EMITTERS

Global FIs and companies exiting fossil fuels



- **140 global banks, insurers and investors globally have announced divestment from coal mining and/or coal-fired power plants**
- **Hurdle for SA banks to fund new coal projects is "very, very high"**
- **General Electric announced that it will no longer build or supply equipment to coal-fired power plants**
- **International Energy Agency (IEA) has called for a halt in new fossil fuel investments**
- **China declared it won't fund coal outside China**

Investors are placing restrictions on fossil fuel investments

"Net Zero Asset Managers Initiative"

International asset managers committed to supporting the goal of net zero GHG emissions by 2050 or sooner

$130 trillion: assets under management
450 signatories. 45 countries

BLACKROCK®

the largest asset manager in the world, is divesting active investments in companies that generate more than 25% of their revenues from thermal coal

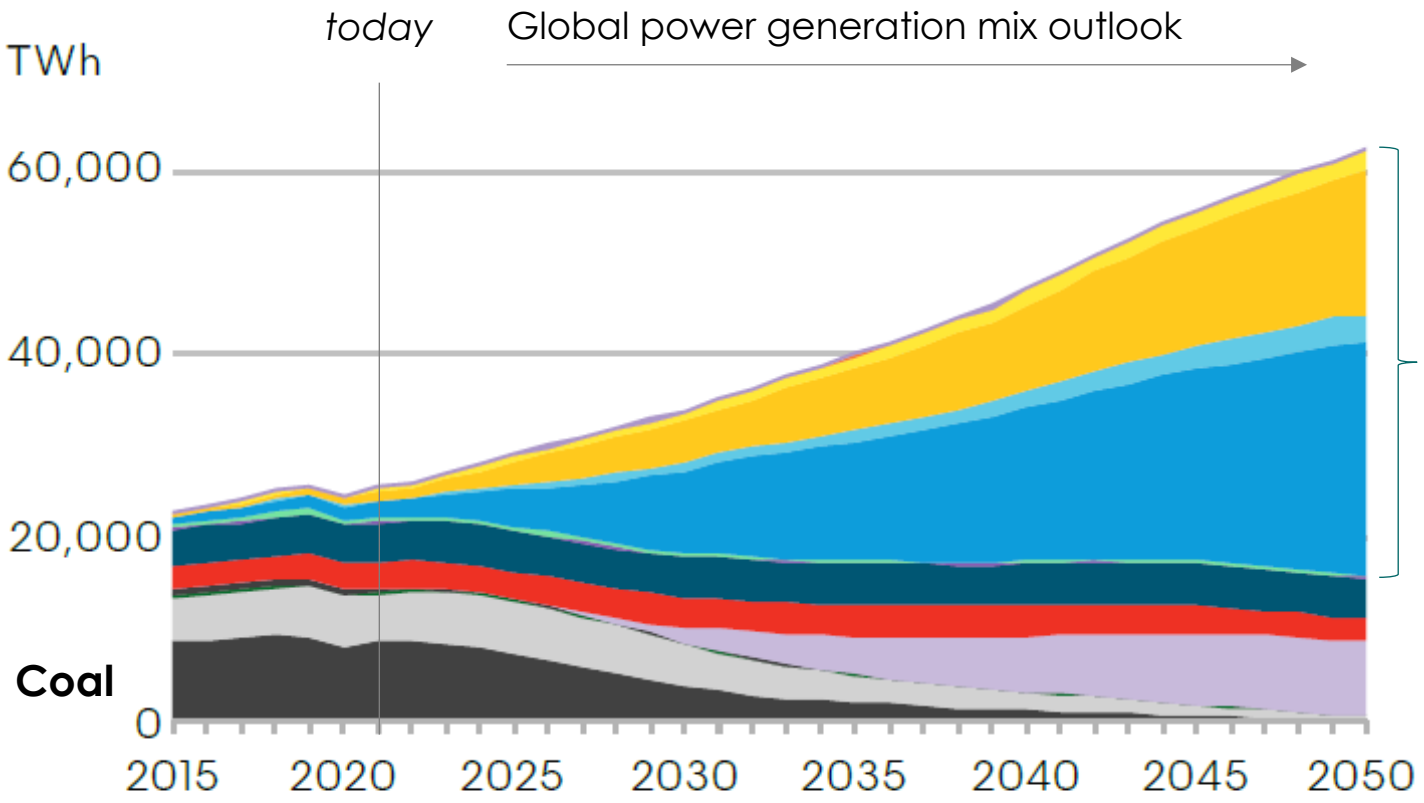
Norway and Ireland's sovereign wealth funds have divested from oil, gas and coal and plan to boost renewable energy investment

- **Global & local banks will struggle to finance new coal projects**
- **Global asset managers are increasingly shifting investment from high emission projects without transition plans**

Source: BNEF, IEEFA Asset managers leaving coal, IEEFA Finance leaving coal "Energy smart technologies" includes smart grids, demand response, and energy storage.

GLOBALLY, SOLAR & WIND GROWING EXPONENTIALLY AS COAL & GAS DECLINE

Global power generation mix: historical & forecast from BNEF 'Economic Transitions Scenario' 2021 (least-cost model)



Forecast for 2050, made by BNEF in..

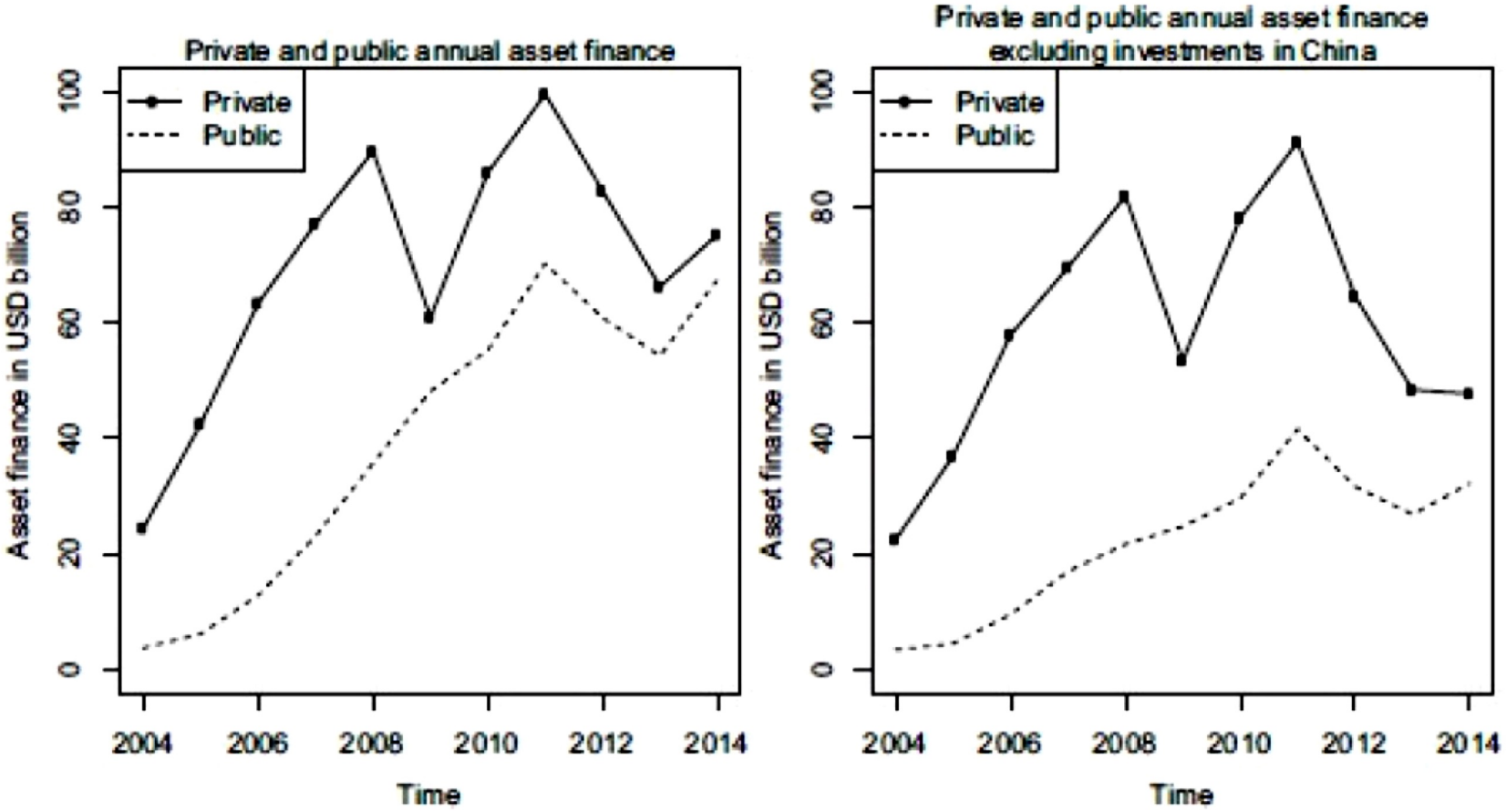
	2020		2019
Solar PV	56%	⇧ revised up	48%
Wind	69%	⇧ revised up	62%
Coal	24%	⇩ revised down	31%

Coal numbers revised down annually. Renewables revised up

- **$15 trillion invested in new power generation capacity**, now over $500 bn per year – double FF & nuclear combined

Source: Bloomberg New Energy Outlook 2021

PUBLIC & PRIVATE SECTOR FUNDING OF RENEWABLES, 2004-2014

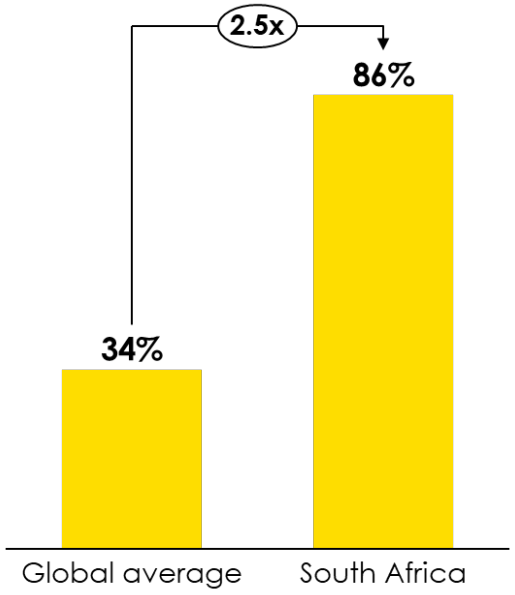


Excluding China

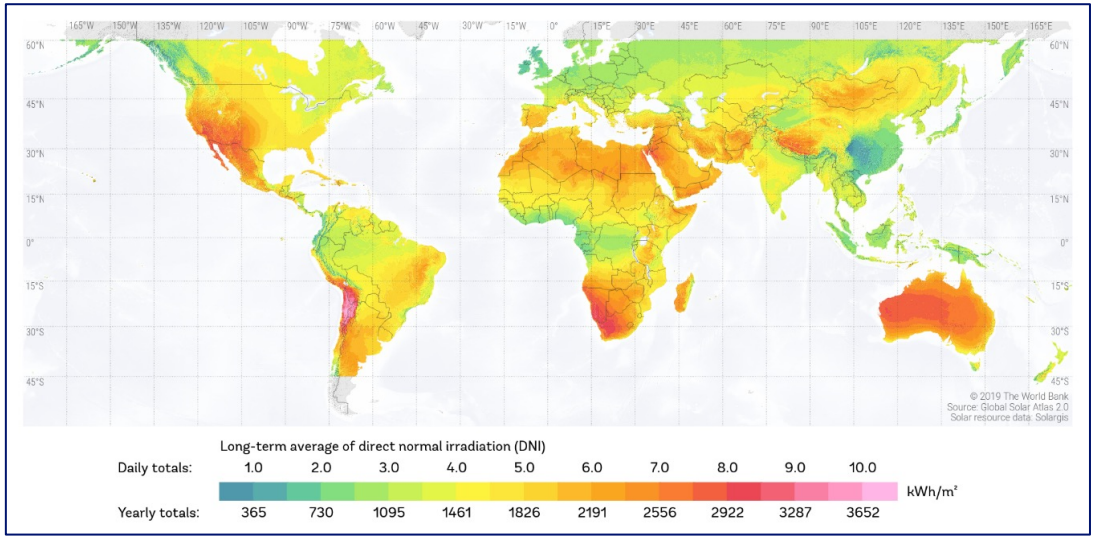
Public sector investments in high risk technologies reduces risk over time, enabling private sector investments in technologies as their risk profiles come down

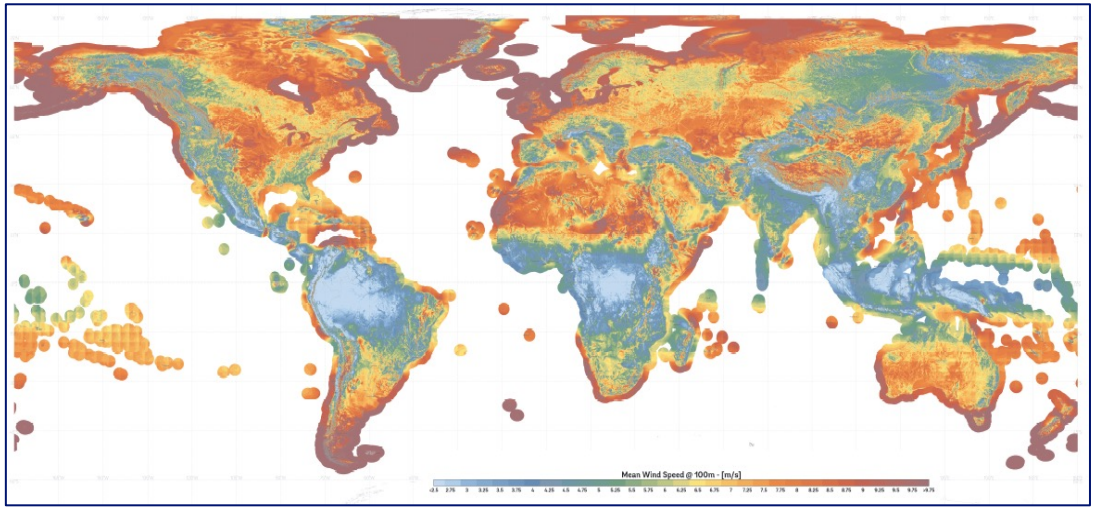
Source: Mazzucato and Semieniuk, 2018:15

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



South Africa some of the best solar & wind resources globally





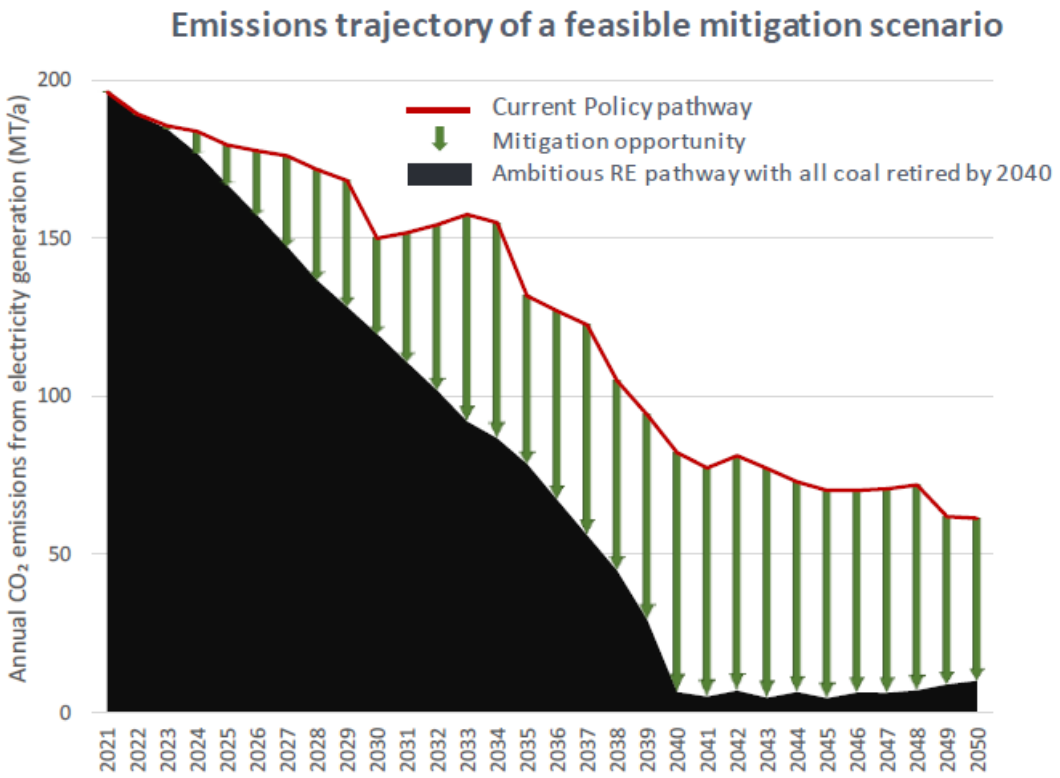
Sources: World Bank Group, ESMAP, Solargis, DTU Wind Energy, Vortex

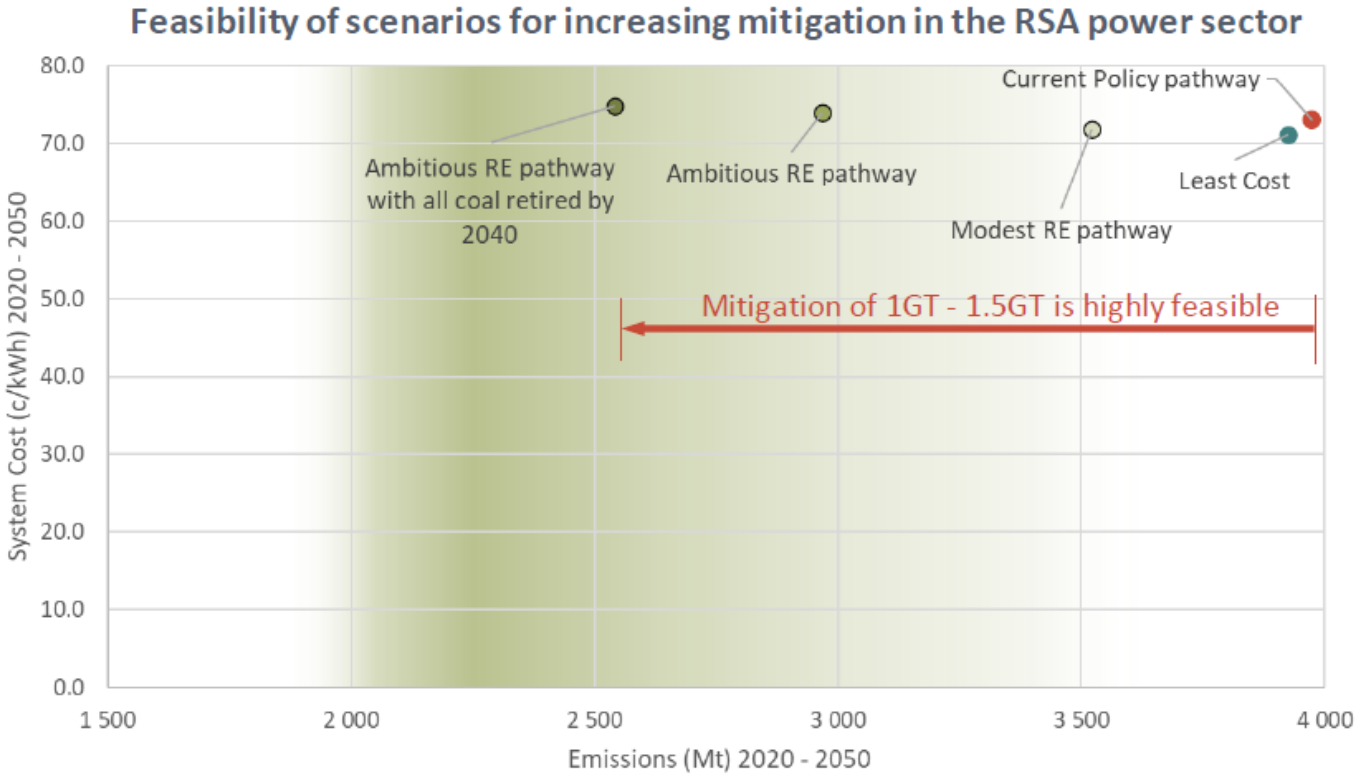
CST Centre for Sustainability Transitions

BLENDED FINANCE TASKFORCE

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

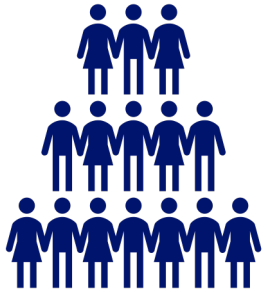
Source: Meridian Economics 'A Vital Ambition'

CST Centre for Sustainability Transitions
BLENDED FINANCE TASKFORCE

RELATIVE TO NDC COMMITMENTS:

- NDC target emissions range: 350 to 420 Mt of CO2 pa
- Lower range is equivalent to 1.5 Gt saving of carbon emissions, i.e. the ambitious scenario
- Total RSA emissions in 2020: 540 Mt (incl. forestry, land use, transport, etc) – power sector = 200 Mt
- If all other sectors remain constant, power sector will have to lead
- More expensive to decarbonize other sectors: but if they electrify as much as possible, and the power sector decarbonizes, then they benefit financially and environmentally from the cheaper decarbonized power provided by the reformed power sector system
- The ambitious 'coal off' scenario = 1.4 Gt saving by 2040, which achieves the lower end of the NDC target range

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**

CST Centre for Sustainability Transitions

BLENDED FINANCE TASKFORCE

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

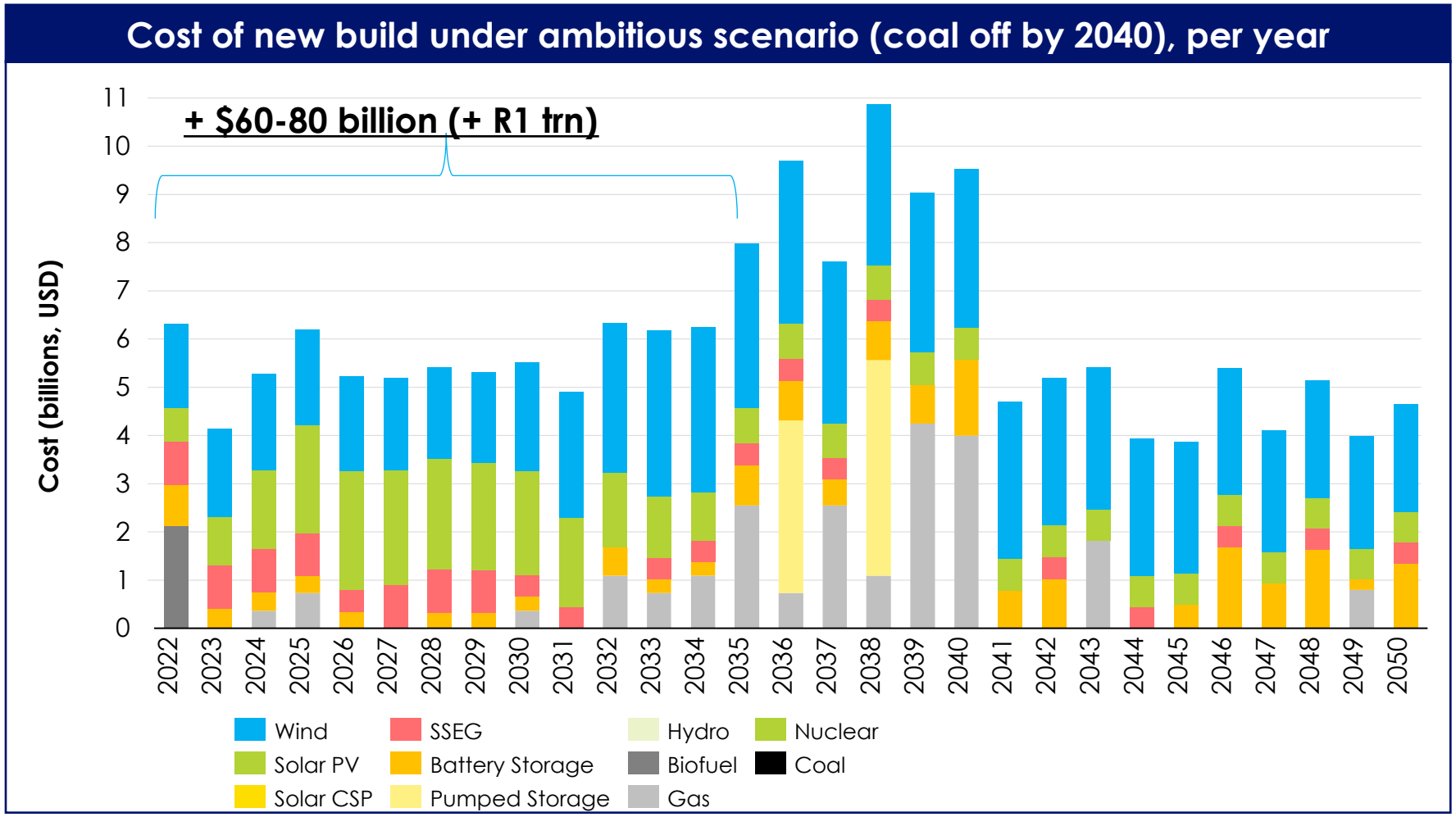
Increasing concessionality

[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.

CST Centre for Sustainability Transitions
BLENDED FINANCE TASKFORCE

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



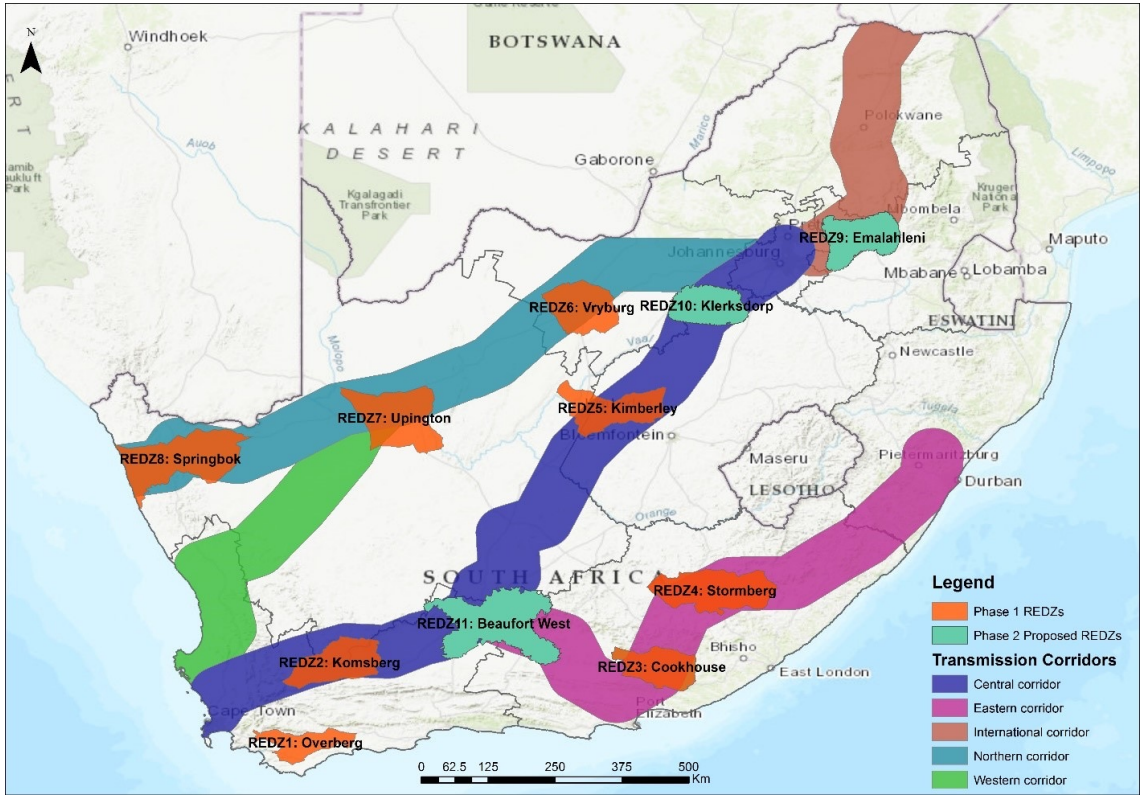
Source: Meridian Economics 'A Vital Ambition' & own calculations

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.

[1] Indicative timeframes for project planning through to commissioning. [2] Department of Energy, Forestry and Fisheries confirms environmental authorisations are required for renewables projects in REDZs, but permitting timeframe reduced to 150 days from 300 days.

CST Centre for Sustainability Transitions

BLENDED FINANCE TASKFORCE

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 (more like $51 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, manufacture of kit)	• **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** / ***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

ROUGH ESTIMATE OF FUNDING POTENTIAL TO 2035

▪ Funding for Bid Windows 5, 6 and 7 (Sovereign guaranteed?) – 17.8 GW @ R1.6 bn/100MW:	R284 bn
▪ SA DFIs & PIC (DBSA = R100 bn, IDC = R120 bn, PIC = R2 trillion – assume 20% for DFIs/10% for PIC):	R280 bn*
▪ Private sector (unguaranteed, non-REIPPPP, 9.2 GW as per OV numbers):	R147 bn
▪ International donors:	R100 bn
▪ MDBs (could be more if ZAR denominated)	R 50 bn
▪ Just transition funding (grant and state funding)	R 60 bn
▪ **Total**	**R921 bn**

Notes:

- **R1trn needed for generation only through to 2035**
- **External funding as a % of the total: 16% (ideally, should be kept below 20%)**
- **DFI/PIC funding should be focused on the grid (transmission and distribution)**
- **Note: exact numbers need to be jointly generated by key partners**

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

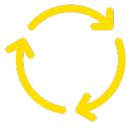
		Risk									
		Macro		Credit/commercial			Technical		Finance	Infra specific	
		Political/ country risk	Currency risk	Credit risk	Liquidity risk	Demand risk	Construction risk	Operation risk	Access to capital	Lack of pipeline	Off-take risk
Instruments	1. Guarantees			■	■		■	■	■		
	2. Insurance	■			■		■	■	■		
	3. Hedging		■			■					
	4. Junior/subordinated cap			■	■		■	■	■	■	
	5. Securitisation			■	■						
	6. Contractual mechanisms					■					■
	7. Results-based incentives							■			
	8. Grants								■	■	

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

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

CST Centre for Sustainability Transitions

BLENDED FINANCE TASKFORCE