TIPS Webinar on Just Transition and sectoral solutions

24 March 2021

Presented by: Stanley Semelane

CSIR
Touching lives through innovation

Our mandate

CSIR MANDATE

"The objects of the CSIR are, through **directed** and **particularly multi-disciplinary research** and **technological innovation**, to foster, in the national interest and in fields which in its opinion should receive preference, **industrial** and **scientific development**, either by itself or in **co-operation with principals** from the **private** or **public sectors**, and thereby to contribute to the **improvement of the quality of life** of the people of the Republic, and to perform any other functions that may be assigned to the CSIR
by or under this Act."

(Scientific Research Council Act 46 of 1988, amended by Act 71 of 1990)

CSIR
Touching lives through innovation

Content

- Drivers for energy transition
- Why just energy transition is critically important?
- Localisation opportunities of renewable energy technologies
- Solar module production economic feasibility assessment using a MSP method – Case study example
- Key just energy transition enablers

Three drivers require a global energy transition: Natural resources are finite, CO_2 emissions need to be capped and energy poverty has to be resolved

Needs to be considered in our local context and the National Development Plan

Resources are finite

Coal

(140 to 300 yrs)

Gas

(60-100 yrs)

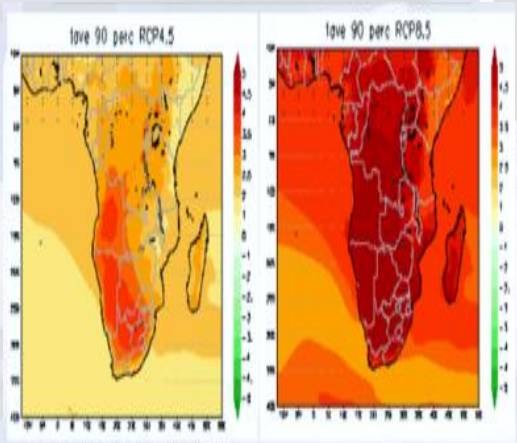
Oil

(40 – 60 yrs)

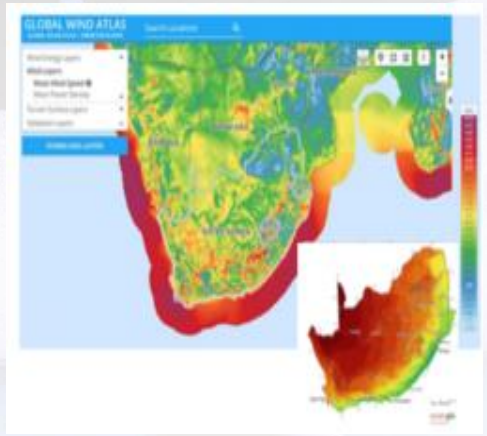
Reserves

Resources

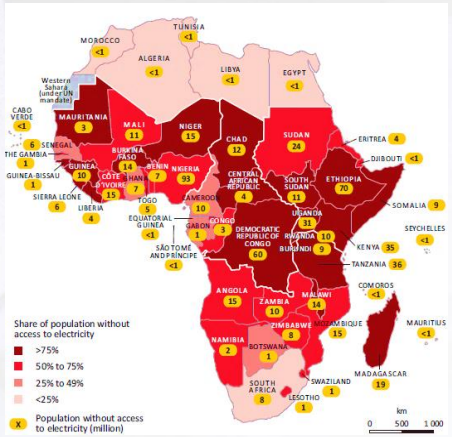
CO_2 emissions reduction



Wind and solar resource



Energy poverty



300 yrs

Today

Price pressure

Regulatory/policy pressure

NDP Vision 2030

- Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change
- Social Equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households
- Reliable and efficient energy service at competitive rates, while supporting economic growth through job creation

CSIR
Touching lives through innovation

Sources: WEC; BCG; CSIR analysis, National Development Plan

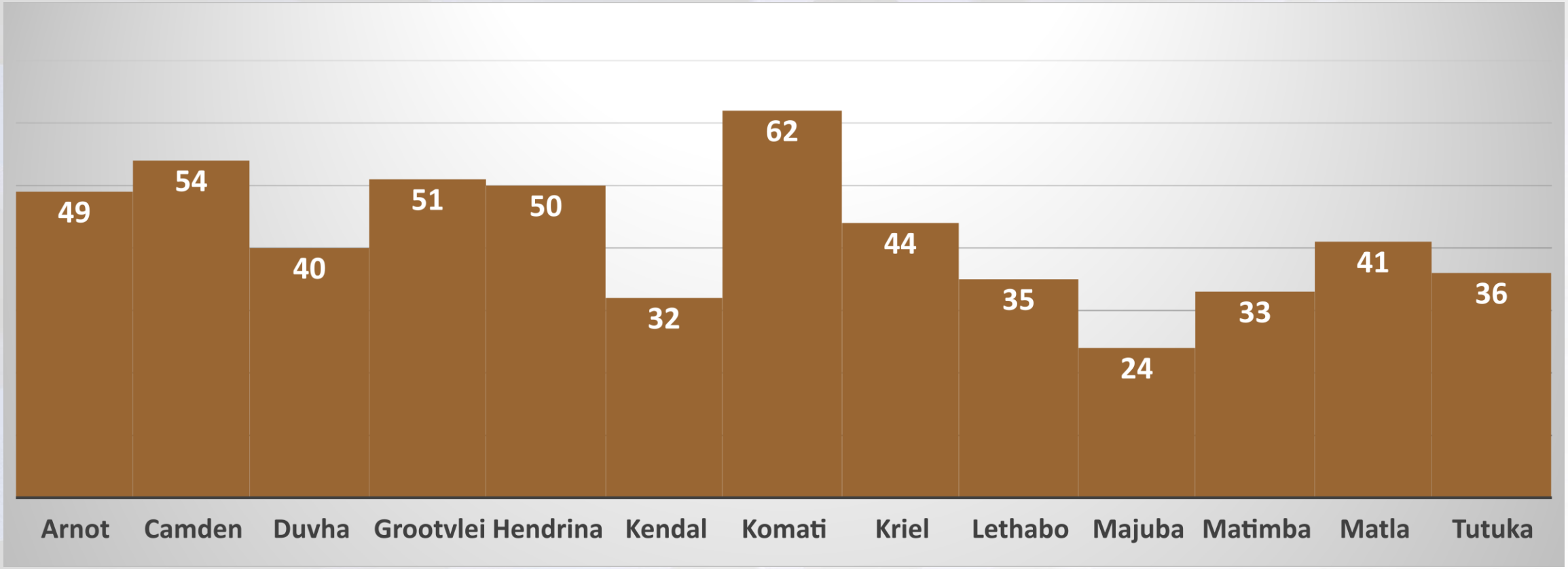
A just energy transition is critically important

Key considerations for South Africa

- The coal sector is the largest mining contributor to gross domestic product (GDP) and the third-largest employer when compared with other domestic mining activities (Mining Review Africa, 2018).
- The country's coal sector has about 93 000 direct employees with earnings of approximately R22 billion (Minerals Council South Africa, 2020)
- 170 000 indirect jobs are created by the coal sector (Mining Review Africa, 2018).
- According to (Mining Review Africa, 2018), the South African coal sector created approximately R129 billion in sales in 2017 (28% of the country’s total mineral sales).
- South African has an unemployment rate of 30.8% (Trading Economics, 2020), therefore, it is important to understand the role that the employee transfer/ relocation can play in creating jobs.

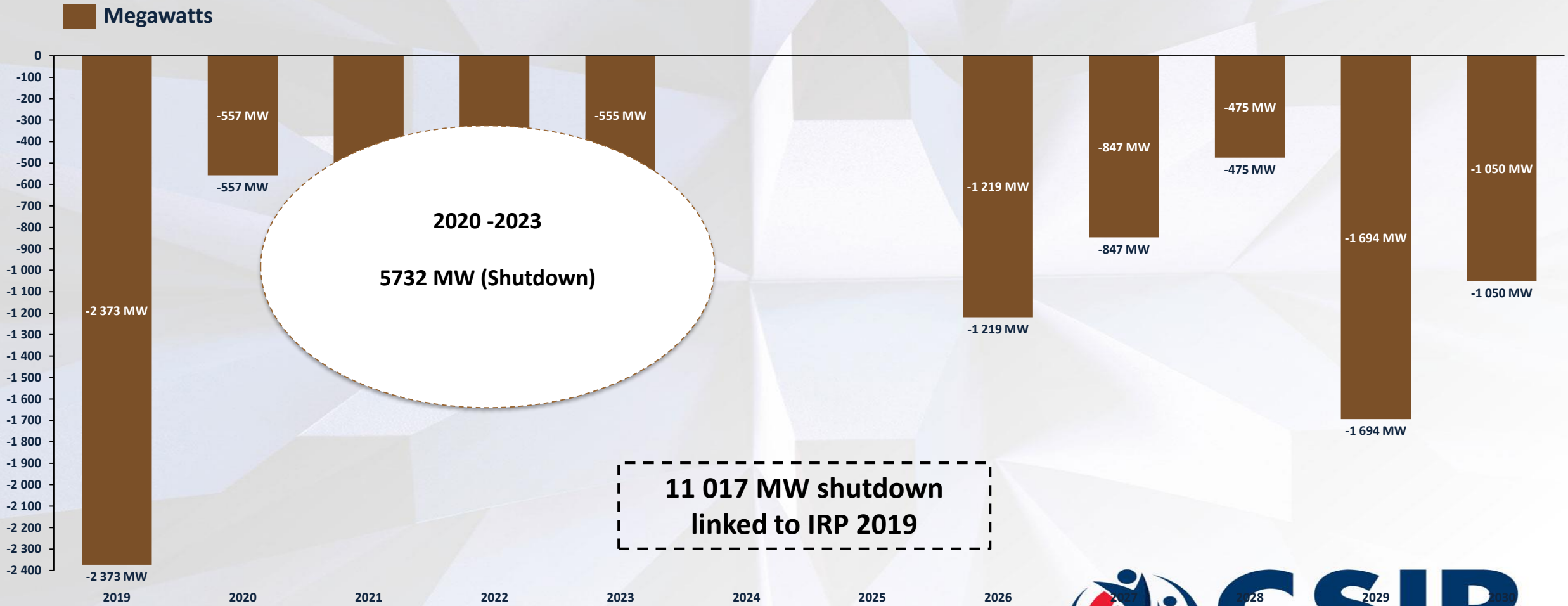
5

Lifespan of our coal power stations (42.38 years on average)



CSIR
Touching lives through innovation

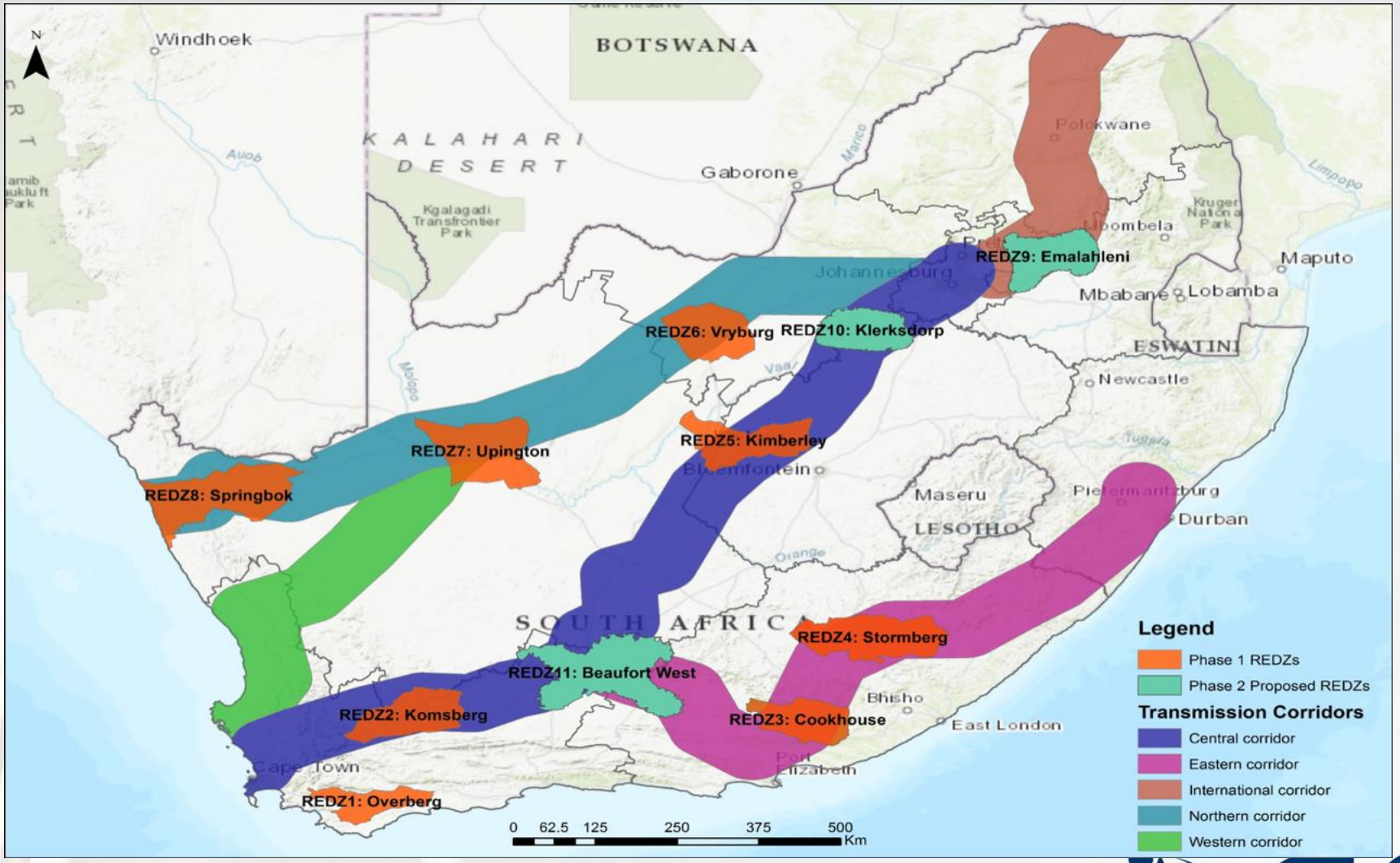
Substantial coal-fired capacity is planned to be decommissioned in the IRP2019



Sources: IRP 2019 CSIR analysis,

CSIR
Touching lives through innovation

Renewable Energy Development Zones (REDZ)

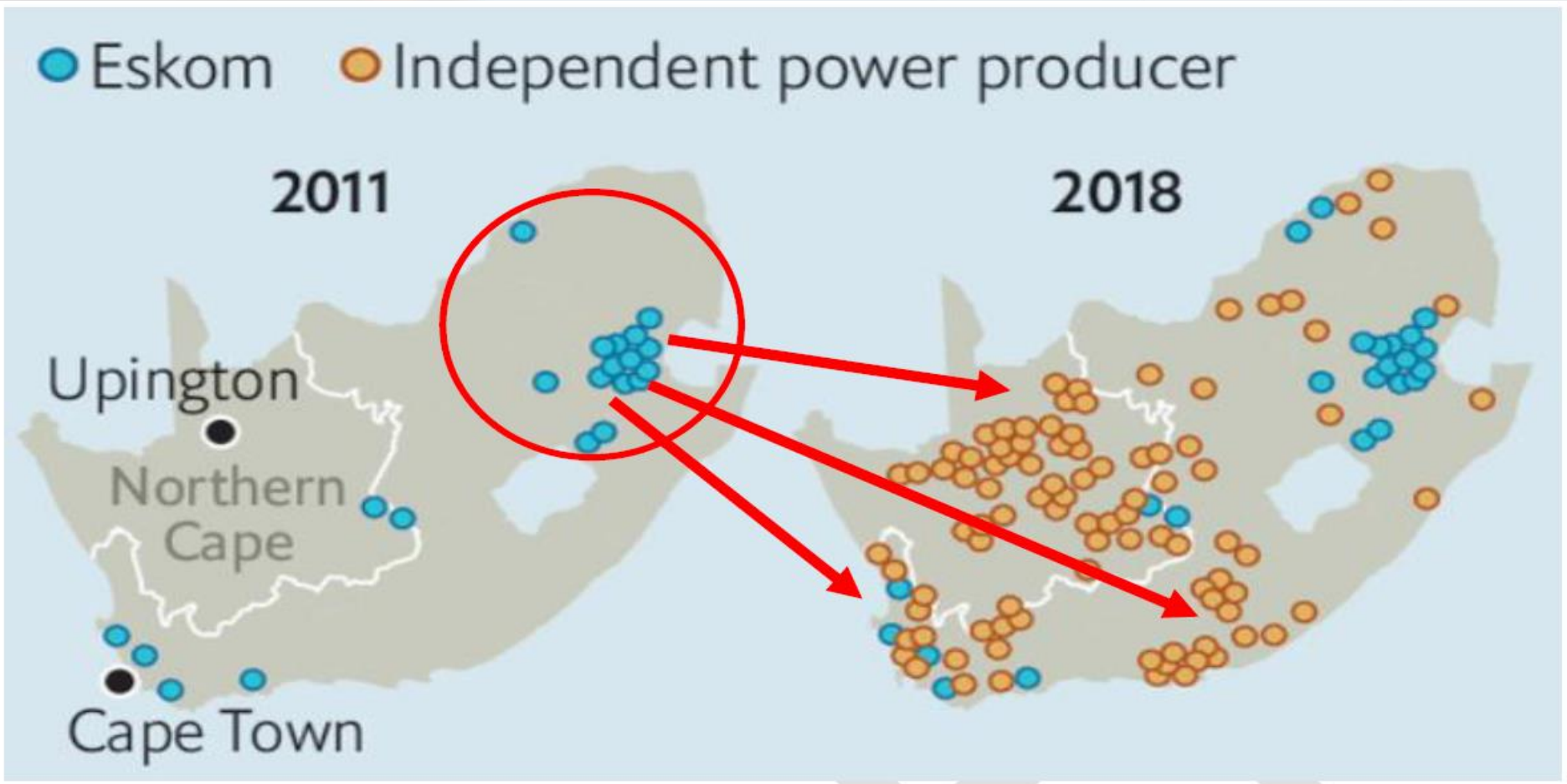


Source: CSIR, 2018

CSIR
Touching lives through innovation

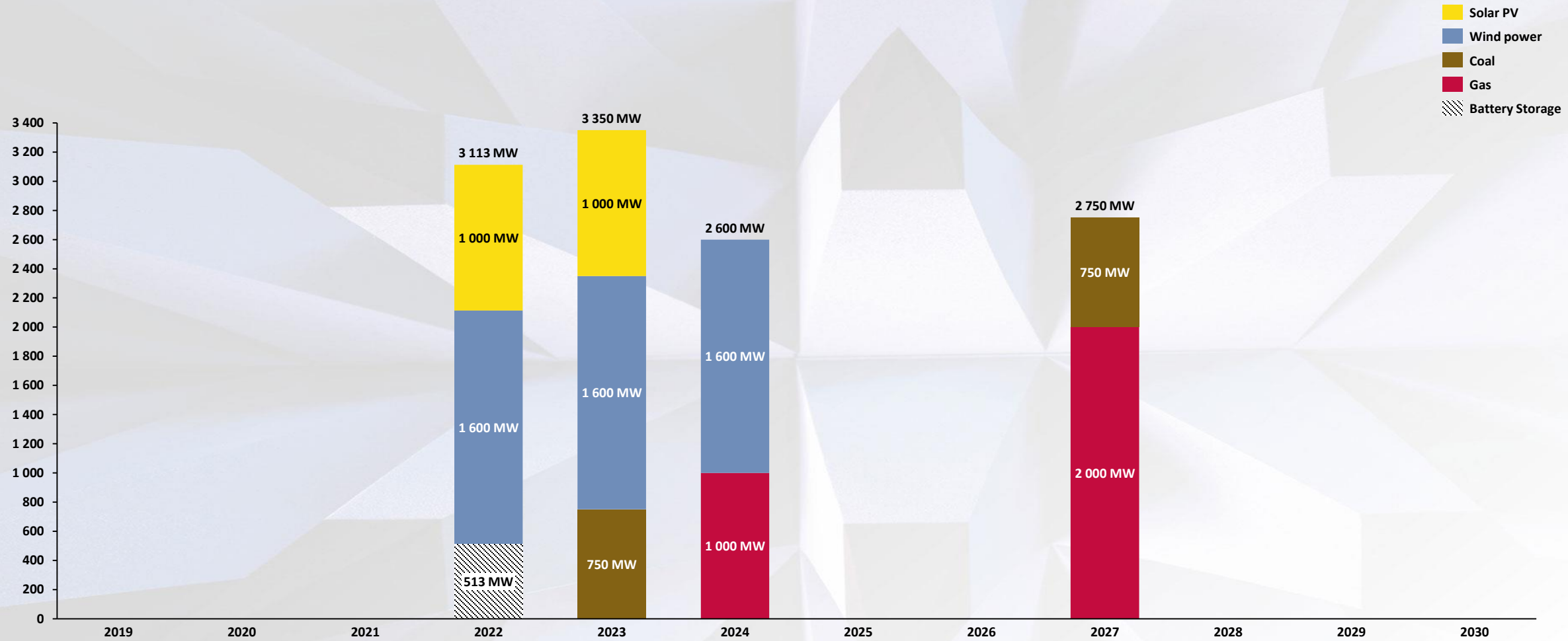
Assess practical/realistic opportunities for workforce relocation

To support construction and operation of new pant



Sources: The Economist, 2019

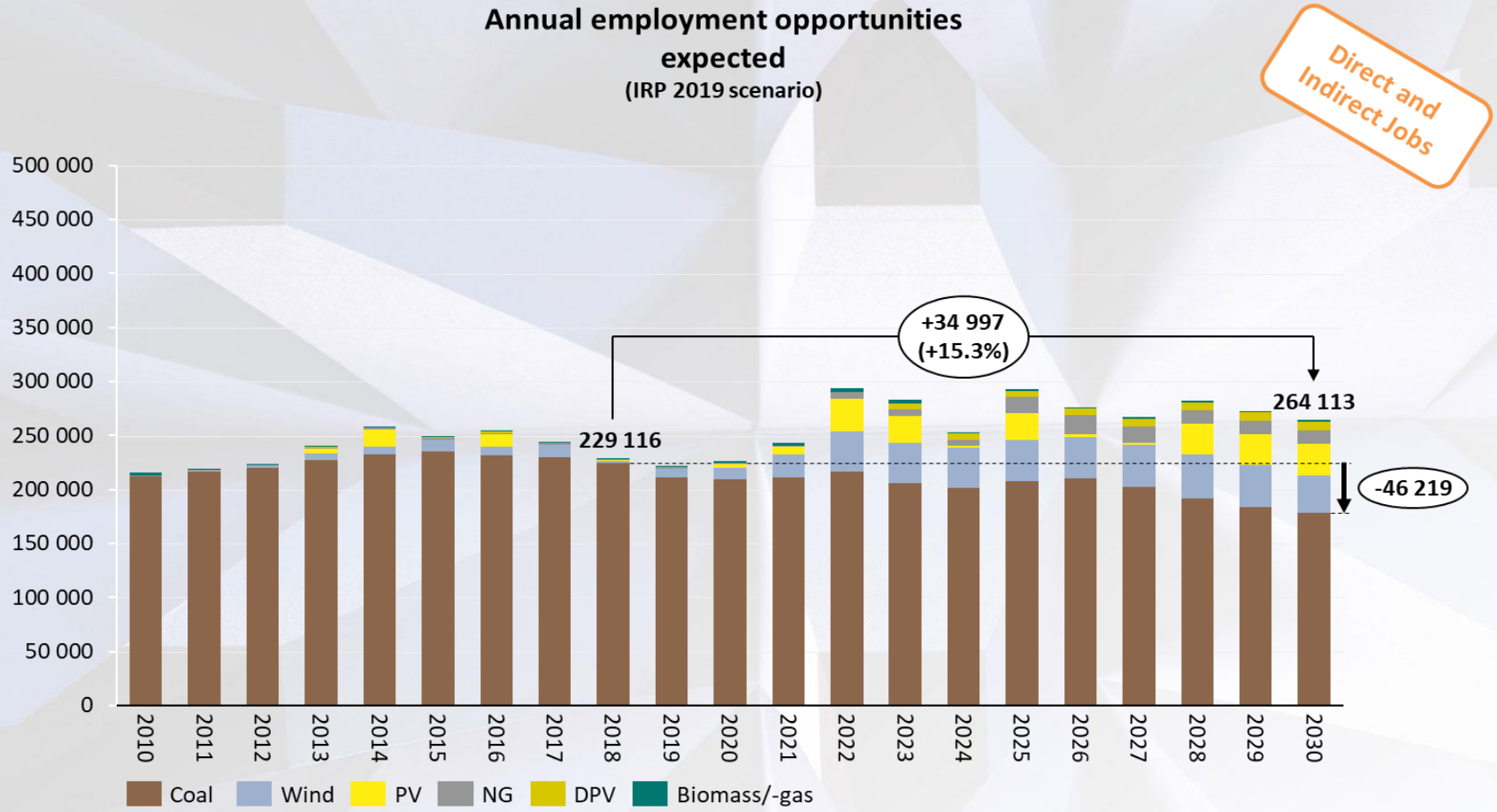
IRP Procurement implementation plan



Sources: IRP 2019 CSIR analysis,

CSIR
Touching lives through innovation

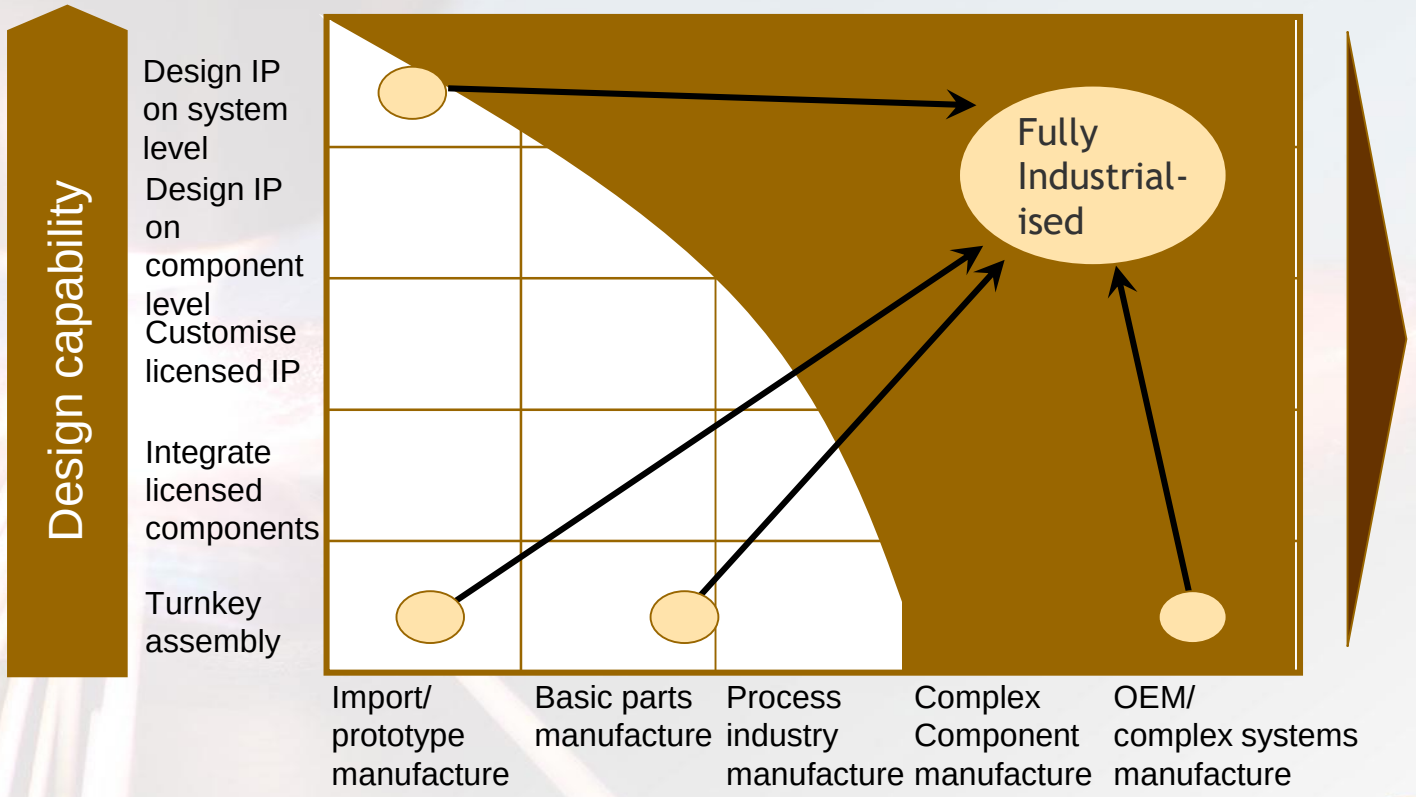
Despite the challenges, an appropriately planned just transition will increase net jobs in South Africa



Sources: IRP 2019 CSIR analysis,

Proposed solution: The localisation of renewable energy technologies is an important part of a just transition

Industrialisation involves building a country's capabilities and capacity to design, manufacture and service products of increasing complexity and value.

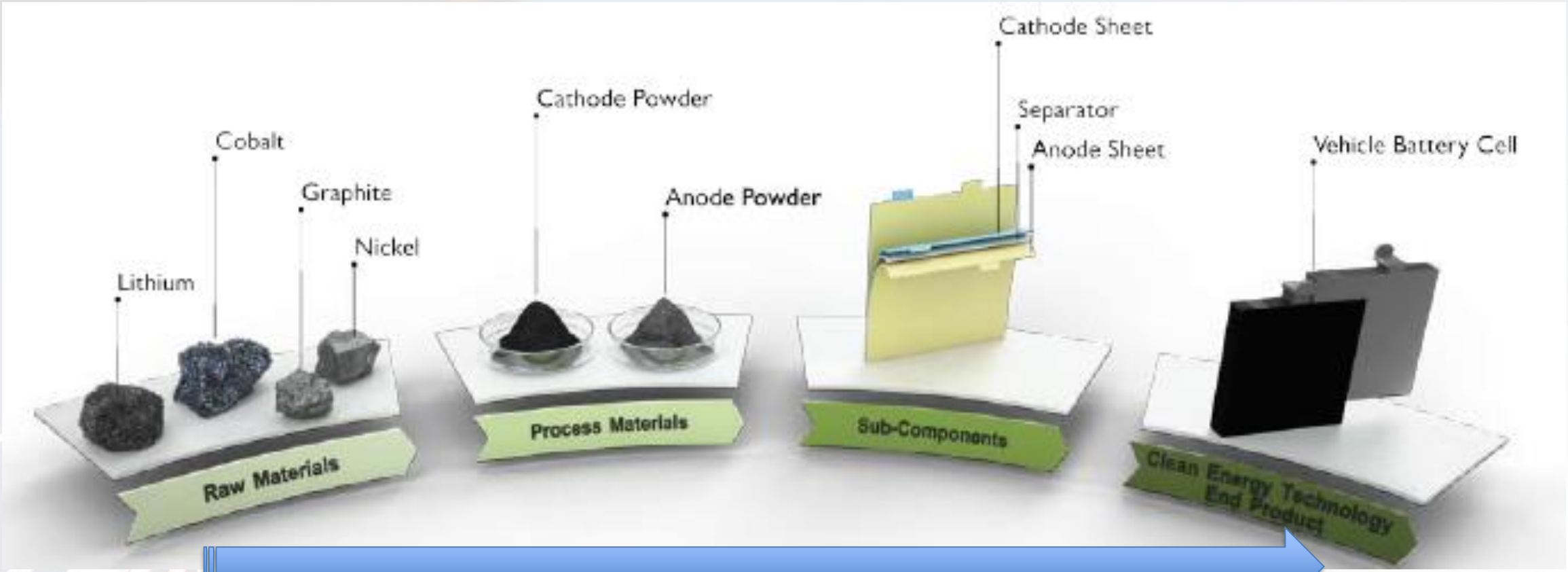


Industrialisation tends to be a step by step process – Countries get stuck in the middle of the matrix.

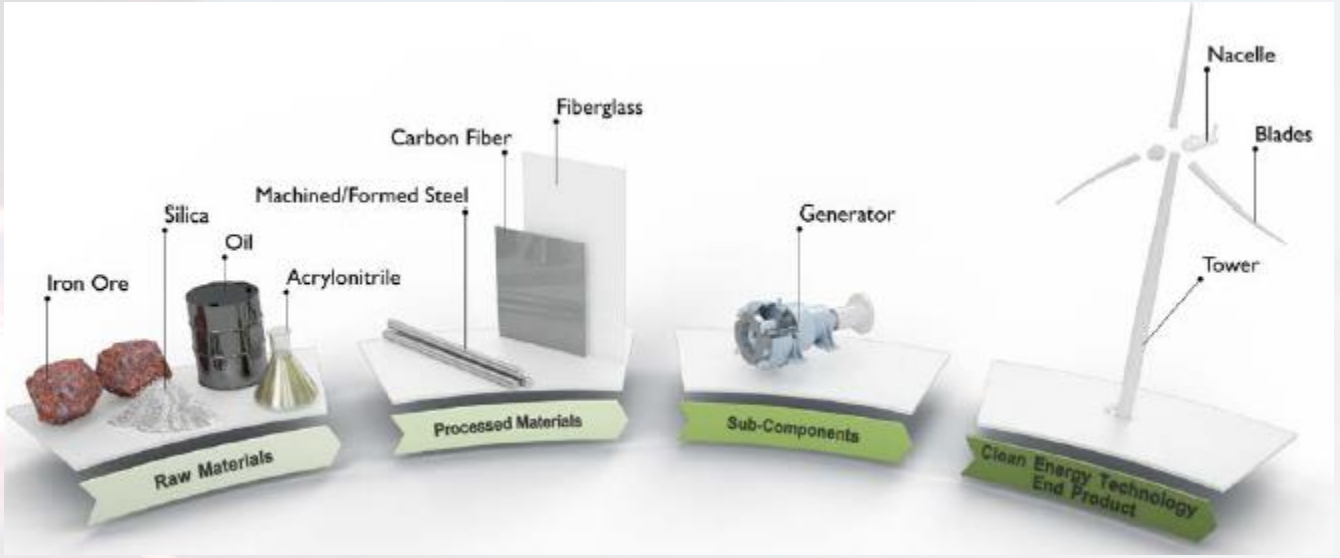
Sources: NREL, 2018, United Nations, 2017

CSIR
Touching lives through innovation

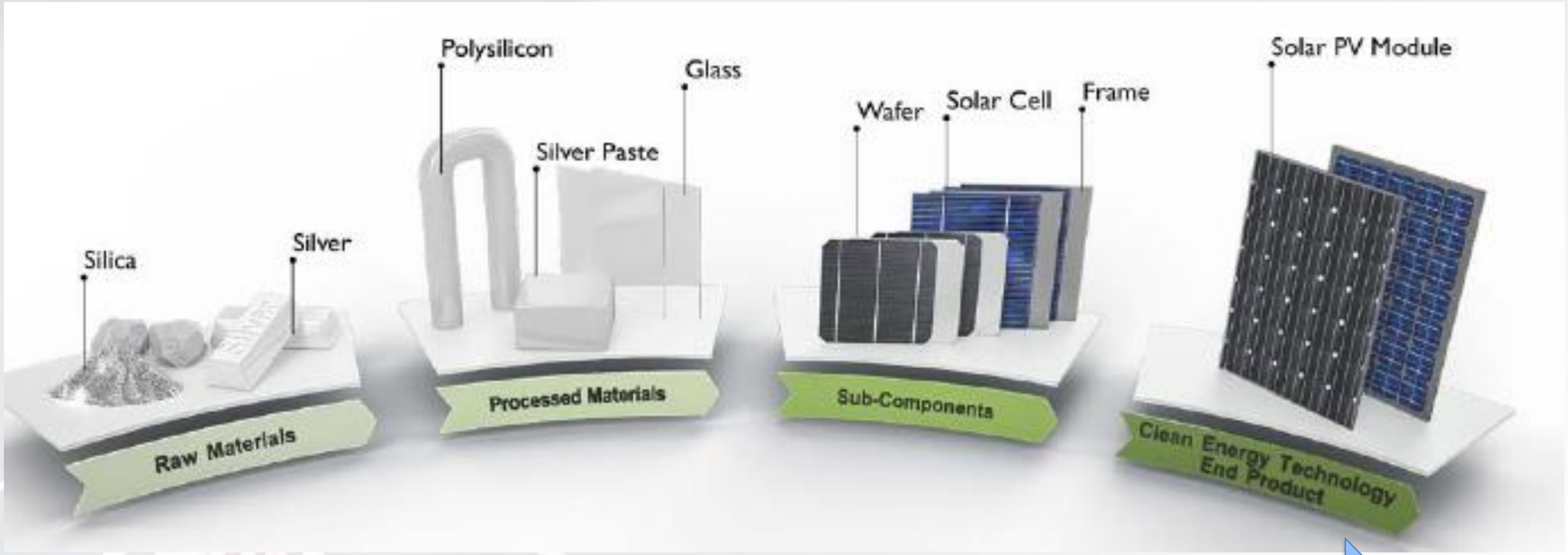
Localisation opportunities – Battery Storage



Localisation opportunities – Wind power



Localisation opportunities – Solar PV



CSIR
Touching lives through innovation

1 GW Solar module production economic feasibility assessment using a MSP method

Solar PV Module Weekly Spot Price

Item	High	Low	Average	AvgChg	AvgChg %
Poly Solar Module	0.300	0.190	0.207	↓ -0.001	↓ -0.48%
Poly Module in China	0.240	0.190	0.204	↓ -0.003	↓ -1.45%
Poly High Eff / PERC Module	0.340	0.215	0.243	↓ -0.001	↓ -0.41%
Mono High Eff / PERC Module	0.390	0.235	0.260	↓ -0.001	↓ -0.38%
Mono High Eff / PERC Module in China	0.260	0.235	0.239	↓ -0.002	↓ -0.83%
ThinFilm Solar Module	0.330	0.230	0.245	– 0	– 0%
US Multi Solar Module	Visit here for more detail module price information				
Mono Silicon Solar Module	Visit here for more detail module price information				
India Poly Module	Visit here for more detail module price information				
Unit: USD / Watt	more			*Last Update:* 2019-08-07	

IRR Results – Case Study

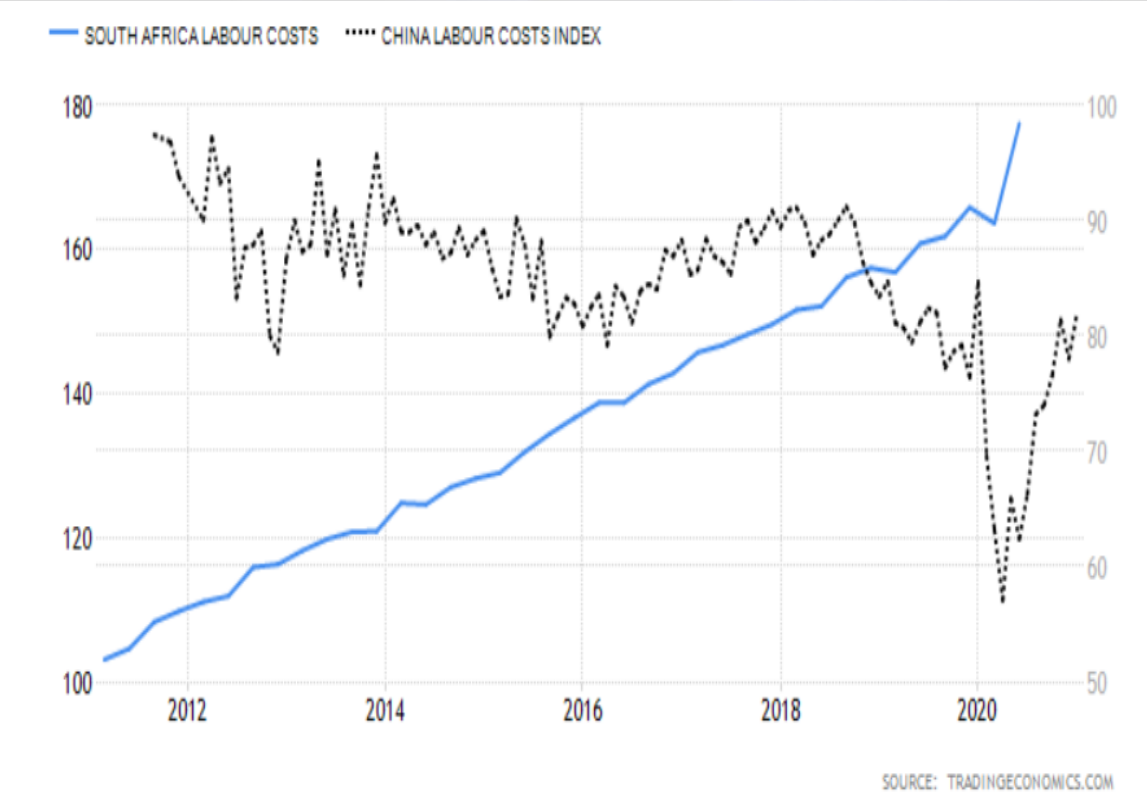
of parameter	IRR Results	Price increase exps.	Annual Expenses	Solar Panels Sales
No change for Variable	1.75%	1.75%	1.75%	1.75%
-15%	1.32%	1.75%	0.64%	1.13%
-10%	1.43%	1.75%	0.76%	1.30%
-5%	1.57%	1.75%	0.98%	1.53%
0%	1.75%	1.75%	1.75%	1.75%
5%	2.02%	1.75%	1.75%	2.00%
10%	2.47%	1.75%	1.75%	2.26%
15%	3.51%	1.75%	1.75%	2.53%

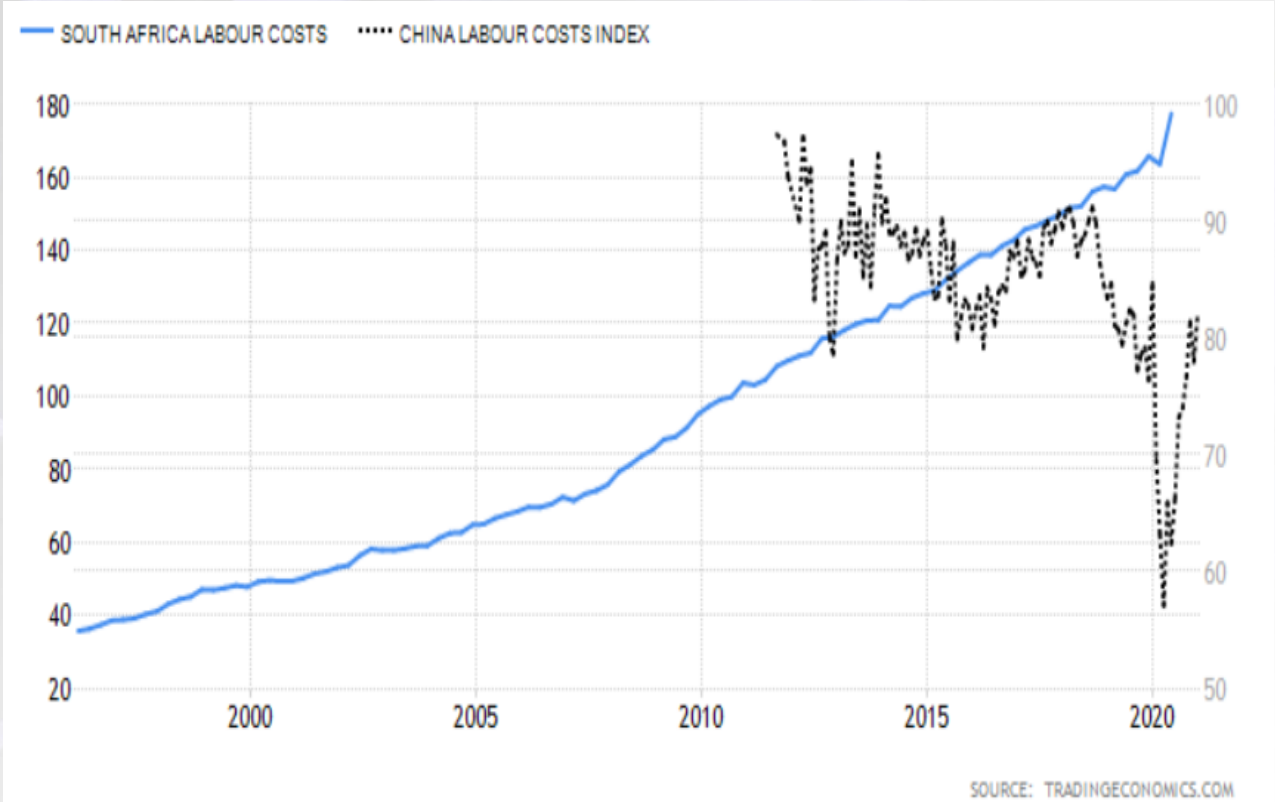
Scenarios	Selling price per watt	NPV	IRR	Subsidy requirement	DPBT not considered
Baseline	$0.14/W	$ -252 152	1.75%	$ 640 542 886	Non recoverable
Scenario 1	$0.21/W	$ -9 148 183	N/A	$ 281 663 290	Non- recoverable
Scenario 2	$0.24/W	$ -13 192 432	N/A	$ 188 054 774	Non-recoverable
Scenario 3	$0.39/W	$-32 200 403	N/A	$ 8 603 576	Non-recoverable

CSIR
Touching lives through innovation

Sources: Semelane et al., 2021

Labour cost index between South Africa and China

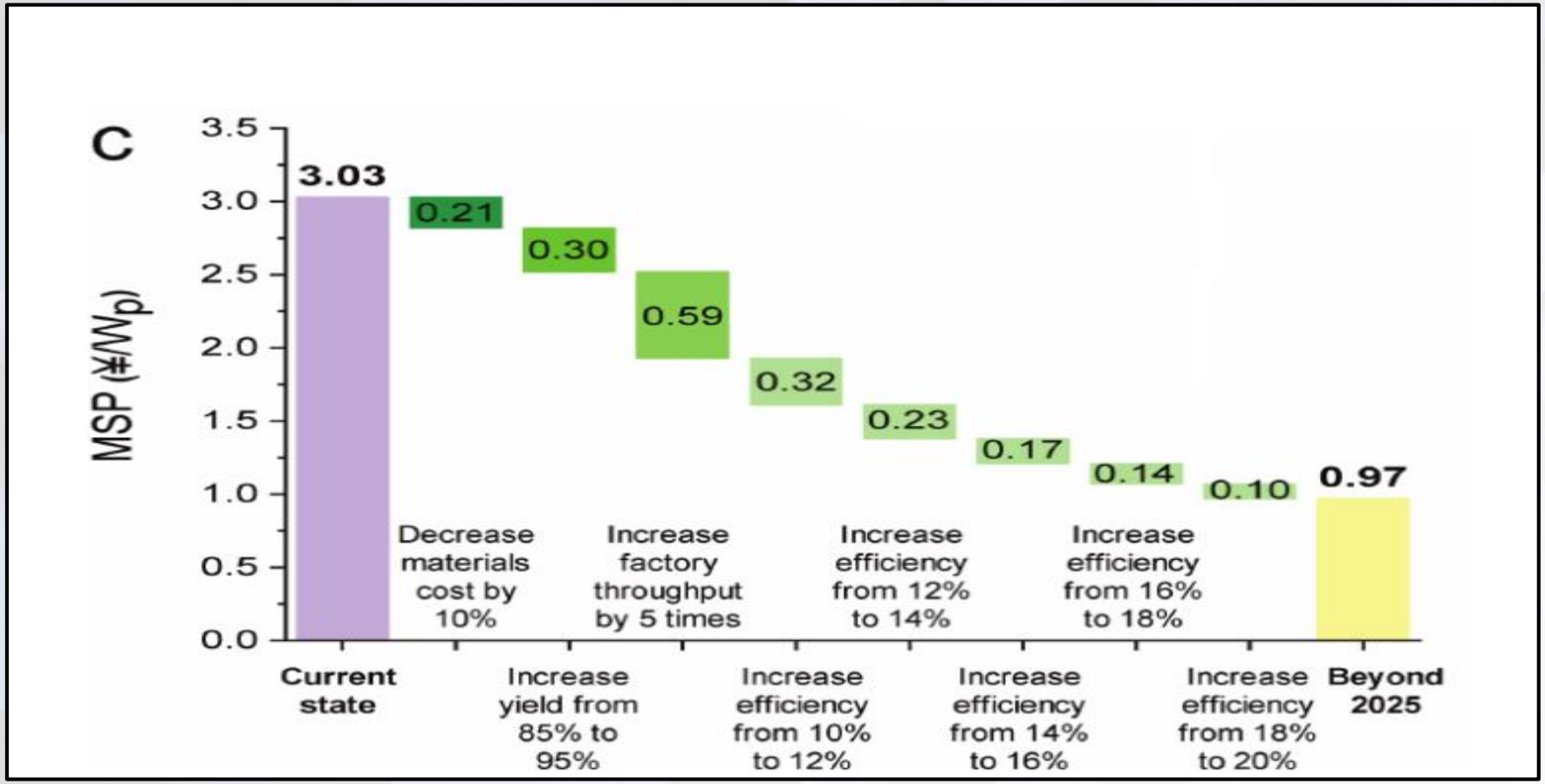




Sources: Semelane et al., 2021

CSIR
Touching lives through innovation

Minimum sustainable price – Solar PV



Sources: Semelane et al., 2021

Key enablers

What needs to be done to achieve a just energy transition?

- Mapping the just energy transition planning framework for South Africa's power sector including the repurposing of South African decommissioning coal power stations
- Establish partnerships and social dialogue between government, local municipalities, enterprises and labour unions to guarantee a just energy transition
- Social protection plans that will secure salaries, pension rights, healthcare benefits, cash transfers for early retirement packages for coal sector employees
- Investment in infrastructure, skills and reskilling for the affected workforce as well as the formation of alternative industries that will mitigate the impacts of coal phase-out
- Investment in business case development for economic diversification pathways (broader just transition framework)
- Localise renewable energy technologies and implement procumbent models that drive and support local ownership and manufacturing
- Understand the trade-offs of the energy transition as well as the implication of coal consumption and production change on the GDP
- Market creation that considers that Sub-Saharan Africa region
- Deploy evidence-based decision support using techno-economic techniques and credible data with organisations with no vested interested in the outcome

A just transition will have substantive positive impact

Deliberate choices will enable South Africa to transition and support the NDP

Impact	Social	Economic	Enviro
Net **increase in jobs**	✓	✓	
Reduced emissions and water consumption	✓		✓
Creation of new industries (Gas, Renewables, Electric Vehicles, Batteries)		✓	
Lowest cost energy – longer term strategic advantage	✓	✓	
Green hydrogen and clean synthetic fuels		✓	✓
Increased energy security		✓	
Support universal access to energy	✓		
Flexibility to respond to changing economic growth and energy demand		✓	

CSIR
Touching lives through innovation

Source: Just energy transition CSIR analysis,

The End

Stanley Semelane

SSemelane@csir.co.za

065 856 3373

Touching live through innovation