

SOUTH AFRICA

GRID-CONNECTED RENEWABLE ENERGY

Jan VAN DEN AKKER
2020

ABBREVIATIONS AND ACRONYMS

BBBEE	Broad Based Black Economic Empowerment
BW	Bidding Window
CSIR	Council for Scientific and Industrial Research
CSP	Concentrated Solar Power
DBSA	Development Bank of South Africa
DEA	Department of Environmental Affairs
DEDEAT	Department of Economic Development Environmental Affairs and Tourism
DEFF	Department of Environment Forestry and Fisheries
DHET	Department of Higher Education and Training
DoE	Department of Energy
DMRE	Department of Mineral Resources and Energy
DST	Department of Science and Technology
DTI	Department of Trade and Industry
EME	Exempted Micro Enterprise
ED	Economic Development
EnD	Enterprise Development
ERA	Electricity Regulation Act
FIT	Feed-in Tariff
GWh	Gigawatt hour
IRP	Integrated Resource Plan
IPP	Independent Power Producer
LCOE	Levelised Cost of Energy
MW	Megawatt
MWh	Megawatt hour
NERSA	National Energy Regulator of South Africa
NQF	The South African National Qualifications Framework
NT	National Treasury
NSF	National Skills Fund
NWA	Numerical Wind Atlas
OWA	Observational Wind Atlas
PPA	Power Purchase Agreement
PV	Photovoltaic
QCTO	Quality Council for Trades and Occupations
QSE	Qualifying Small Enterprise
R&D	Research and Development
RE	Renewable Energy
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SABS	South African Bureau of Standards
SANEDI	South African National Energy Development Institute
SANS	South African National Standard
SAQA	South Africa Qualifications Authority
SARETEC	South African Renewable Energy Technology Centre
SMME	Small Medium and Micro Enterprise
TREC	Tradable Renewable Energy Certificate
TVET	Technical and Vocational Education and Training
USD	United States of America Dollar
ZAR	South African Rand

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS	2
TABLE OF CONTENTS	3
LIST OF BOXES	4
1. ELECTRICITY AND RENEWABLES SECTOR	5
2. RENEWABLE ENERGY POLICY AND PLANS	6
2.1 POLICY AND PLANS	6
2.2 RENEWABLE ENERGY INDEPENDENT POWER PRODUCER PROCUREMENT PROGRAMME (REIPPPP)	7
2.3 RENEWABLE ENERGY DEPLOYMENT	8
2.4 POST-2020 DEVELOPMENTS AND CONCLUSIONS	11

LIST OF BOXES

Box 1	SOUTH AFRICA, POWER GENERATION CAPACITY	5
Box 2	SOUTH AFRICA RENEWABLE ENERGY POLICY CONTEXT	6
Box 3	GLOBAL ONSHORE WIND POWER TRENDS	8
Box 4	GENERATION CAPACITY AWARDED UNDER REIPPPP	9
Box 5	BENEFITS OF WIND POWER DEVELOPMENT UNDER REIPPPP Bid WINDOWS (BW).....	10
Box 6	SUMMARY OF THE PROJECT OBJECTIVE, OUTCOMES, AND OUTPUTS	ERROR! BOOKMARK NOT DEFINED.
Box 7	LIST OF PROJECT PARTNERS AND MAIN STAKEHOLDERS	ERROR! BOOKMARK NOT DEFINED.
Box 8	EVALUATION RATINGS OF PROJECT DESIGN AND FORMULATION.....	ERROR! BOOKMARK NOT DEFINED.
Box 9	LOCATION OF WASA WIND MASTS	ERROR! BOOKMARK NOT DEFINED.
Box 10	WASA HIGH RESOLUTION WIND RESOURCE MAP	ERROR! BOOKMARK NOT DEFINED.
Box 11	RENEWABLE ENERGY DEVELOPMENT ZONES (REDZ).....	ERROR! BOOKMARK NOT DEFINED.
Box 12	WASA 3 WORK PLAN.....	ERROR! BOOKMARK NOT DEFINED.
Box 13	SCHOOLS SMALL-SCALE WIND PUMPING WORK PLAN	ERROR! BOOKMARK NOT DEFINED.
Box 14	EVALUATION RATINGS OF PROGRESS TOWARDS RESULTS.....	ERROR! BOOKMARK NOT DEFINED.
Box 15	OVERVIEW OF PLANNED AND REALISED GEF BUDGET AND CO-FINANCING.....	ERROR! BOOKMARK NOT DEFINED.
Box 16	EVALUATION RATINGS OF PROJECT IMPLEMENTATION AND EXECUTION.....	ERROR! BOOKMARK NOT DEFINED.
Box 17	PROPOSED CHANGES IN THE PROJECT RESULTS FRAMEWORK WITH UPDATED INDICATORS	ERROR! BOOKMARK NOT DEFINED.

1. ELECTRICITY AND RENEWABLES SECTOR

Current electricity production in South Africa relies heavily on coal inputs with about 94% of South Africa’s electricity generation coming from coal and, therefore, has a very high greenhouse gas (GHG) emission factor. Around 77% of South Africa's energy needs are directly derived from coal and 92% of coal consumed on the African continent is mined in South Africa. South Africa has 18 coal-fired power stations with an installed capacity of 40,836 MW, conventional hydroelectric power stations and hydro pumped storage schemes at 3,571 MW and gas turbine power stations with an installed capacity of 3,326 MW. Renewable energy contribution to the energy mix is about 3,309 MW mainly from wind energy, small hydro, solar photovoltaics and concentrated solar power, while nuclear energy contributes 1,850 MW. Total installed capacity was 53,025 MW in 2017, to which 1,500 MW of imported hydro can be added¹.

Peak demand in 2011-12 was 37,065 MW (power produced was 49,889 MW). The energy generated in 2012 was 298,752 GWh². Most of this electricity was consumed domestically, but around 13,038 GWh was exported to Swaziland, Botswana, Mozambique, Lesotho, Namibia, Zambia, Zimbabwe and other Southern African Development Community countries participating in the Southern African Power Pool. South Africa supplements its electricity supply by importing around 9,000 GWh per year from the Cahora Bassa hydroelectric generation station in Mozambique via the 1,920 MW Cahora Bassa high-voltage direct current transmission system of which 1500 MW is sold to South Africa. Electricity distributed in South Africa amounted to 229,342 gigawatt-hours (GWh) electricity in 2016³.

Box 1 South Africa, power generation capacity

	Generation capacity (MW, 2017)			
	ESKOM	IPP	Municipal	Total
Coal	40,142	214	480	40,836
Gas	2,426	1,023		3,449
Hydro (large)	3,391		180	3,571
Hydro (small)	2	17		19
Nuclear	1,860			1,860
Wind	113	1,499		1,612
Concentrated solar (CSP)		300		300
Solar PV		1,367		1,367
Biomass/landfill gas		11		11
Total	47,934	4,431	660	53,025

Compiled from: ESKOM, *Factsheet Generation Plant Mix* (2017); Wikipedia, *List of power stations in South Africa* (2017/18); Energy Information Agency, US Department of Energy (2018)

The utility Eskom was converted in 2002 into a public company, although it is de facto a parastatal under the Department of Public Enterprises. Eskom currently owns most of the electricity production. Eskom still has the majority of generation rights and produces approximately 90% of the electricity. Of the capacity of 53,025 MW in 2017, about 660 MW was generated by municipalities and 4,431 MW by independent power producers (IPPs). Eskom maintains the national grid (operating the integrated national high-voltage transmission system) and a large part of the distribution infrastructure.

In January 2008, SA experienced widespread rolling electricity blackouts due issues with generation capacity at Eskom. To remedy the inadequacy of supply, load shedding was carried out and lasted until early May 2009. In 2013 South Africa again approached a period of limited capacity during a winter period of higher

demands. Power problems escalated in late 2014 when the coal storage silo collapsed at one of the largest coal power plants. After experiencing chronic power shortages for several years, no major blackouts occurred. Since 2016, South Africa has had a power capacity surplus as a result of weaker electricity demand and of new capacity commissioned by both public and private sectors, mainly from independent power producers (or IPPs) which added about 4.5 GW⁴. However, in 2019 the issue of power shortage returned with load shedding of about 4 GW⁵.

¹ See Box 1. The imported hydro comes from the Mozambique Cahora Bassa dam;

² NERSA, *Energy Supply Statistics for South Africa 2012*

³ STATS SA, *Electricity generated and available for distribution (Preliminary)*, June 2018

⁴ Eskom plans to bring online over 12,000 MW of new electricity installed capacity (US Energy Information Administration, 2015), of which 8770 MW coal-fired, 2097 wind power, 400 concentrated solar, 1094 solar PV plants, 33 MW landfill gas/biomass (Wikipedia, List of power stations in South Africa (2017/18)).

⁵ Source: UNDP/GEF Project Document “Leapfrogging South Africa’s markets to high-efficiency LED lighting and high efficiency distribution transformers”

2. RENEWABLE ENERGY POLICY AND PLANS

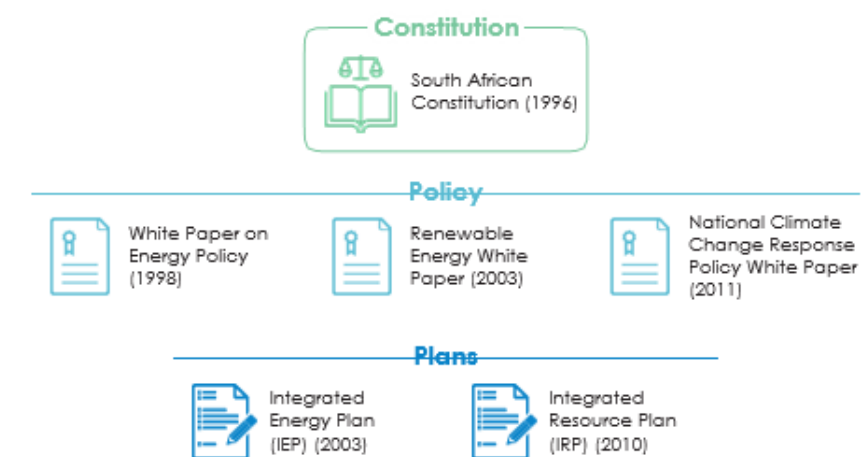
2.1 Policy and plans

Since 1996, with the introduction of the Constitution, South Africa has been creating the building blocks for economically and ecologically sustainable development and a sustainable energy future.

A number of official documents have laid the policy foundation for the promotion of renewable energy technologies such as solar, hydro, biomass and wind.

- The 1998 White Paper on Energy Policy of South Africa⁶ calls for diversification of the energy mix and addresses the importance of energy access
- The White Paper on Renewable Energy of 2003 mentions a non-mandatory renewable energy target for the first time, indicating that 10 GW should come from renewable energy by 2013.
- The Integrated Resource Plan 2010-2030 (2011). IRP aims to double electricity generation capacity through a diversified energy mix by 2030, mainly coal, gas, nuclear and renewables. IRP includes a strong reliance on renewables: 42% of all added capacity by 2030 should be by renewable generation, the equivalent of 17,800 MW (of which 8,400 MW to be achieved by wind energy). The IRP is to be updated every two years. The first Update (2013) revised down the target for renewable energy from 17 800 MW to 10 000 MW in line with the bleaker economic outlook. After another Update in 2016, the latest Update was drafted in 2018 and gazetted in October 2019, and extends the analysis period to 2050 and would bring installed RE capacity by 2030 to about 25,000 MW⁷, of which 11,442 MW is of wind power.
- Compared to the IRP that focuses on electricity generation, the Integrated Energy Plan (IEP, 2016) outlines the energy sector as a whole and aims to guide the development of energy policies, to provide the future landscape of energy infrastructure investments and policy development. The IEP addresses energy demand balanced with energy supply, transformation, economic and environmental considerations regarding available resources.
- The National Climate Change Response Policy White Paper (2011) includes Renewable Energy as one of its ‘flagship programmes’, based on the plans specified in the IRP 2010-2030. The Nationally Determined Contribution (NDC) states an ambition for a de-carbonised energy sector and “a complete transformation of the future energy mix”, incorporating clean and high-efficiency generation technology.
- The National Development Plan Vision 2030 (2012) calls for an increase in electricity generation reserve margin from 1% (2014) to 19%, requiring the development of 10 GW of additional electricity capacity by 2019 against the 2010 baseline of 44 GW, with 5 GW of the 10 GW to be sourced from renewable energy.

Box 2 South Africa renewable energy policy context



Source: *State of Renewable Energy in South Africa* (DoE, 2017)

⁶ The White Paper defines as specific objectives: a) Increase access to affordable energy services; b) Improve energy governance; c) Secure supply through diversity; d) Stimulate economic development, and e) Manage energy-related environmental and health Impacts.

⁷ Estimated based on Table 7, *IRP 2018, draft-for-comments*: 7,608 MW hydro and pumped storage, 7,958 PV, 600 MW CSP, 11,442 MW wind and 499 MW other RE and cogeneration

In May 2011, the Department of Energy (DoE) gazetted the Electricity Regulations on New Generation Capacity (New Generation Regulations) under the Electricity Regulation Act (ERA). The ERA and Regulations enable the Minister of Energy (in consultation with NERSA) to determine what new capacity is required. Ministerial determinations give effect to components of the planning framework of the IRP. New determinations amount to 29,110 MW, of which 14,725 MW of renewable energy (including 6,360 MW of wind).⁸

A significant share of the new electricity capacity will be developed and produced by Independent Power Producers (IPPs). The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. In November 2010 the Department of Energy (DoE)⁹ together with the National Treasury entered into an agreement with the Development Bank of Southern Africa (DBSA) to provide the necessary support to implement the IPPPP and establish the IPPPP Office (see www.ipp-renewables.co.za/)

2.2 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

Historically, feed-in tariffs (FITs) have been the most widely used international government policy instrument for procuring renewable energy (RE) capacity. After investigating the RE-FIT option, the South African government favoured a competitive tender approach to reach the RE goals set in the IRP 2010. For this purpose, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) was established by DBSA, DoE and the National Treasury. The REIPPPP's main objective is to secure private sector investment for the development of new electricity generation, which is expected to be from renewable energy sources with about 7,000 MW operational by 2020. The REIPPPP has provided a clearer framework upon which Eskom could enter into power purchase agreements with producers.

From August 2011 to 2015 four procurement rounds known as Bidding Windows (BWs, in which 6,422 MW of electricity was procured from 112 RE Independent Power Producers (IPPs). By March 2019, 3,976 MW of electricity generation capacity from 64 IPP projects has been connected to the national grid¹⁰ (of which 1,980 MW of onshore wind), contributing to South Africa's climate change objective with reduction of 36.2 million tons of carbon dioxide and generating 35,669 GWh of energy and generated about 40,134 jobs (of which 33,019 were in construction and 7,115 in operations).

The REIPPPP has attracted significant investment in the development of the RE IPPs into the country. The total investment (total project costs, including interest during construction), of projects under construction and projects under (financial) negotiation, is ZAR 209.7 billion (this includes total debt and equity of ZAR 209.2 billion, as well as early revenue and VAT facility of ZAR 0.5 billion). The REIPPPP has attracted ZAR 41.8 billion in foreign investment and financing in the four BWs and small-scale windows. Investment costs have been ZAR 22/MW on average for wind (ZAR 31/MW for solar, and ZAR 89/MW for CSP).

In the determination, the Minister allocated an initial 100 MW of the 3725 MW to the procurement of small projects which has since been expanded to 400 MW. The projects with a generation capacity of not less than 1 MW and not more than 5 MW using a number of RE technologies (wind, solar PV, biogas, landfill gas) are considered as qualifying technologies for selection under this Small Projects IPP Procurement Programme. Currently, about 99 MW is generated by 20 small IPPs under the small-scale RE window.

⁸ *IPPPP, An Overview*, DoE-DBSA-NT (2019).

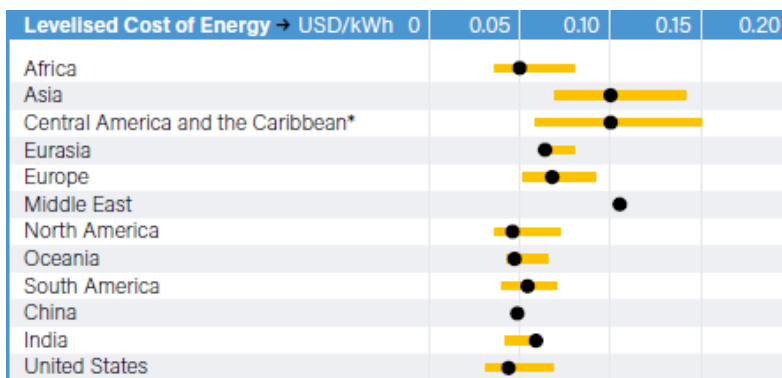
⁹ Now part of Department of Mineral Resources and Energy (DMRE)

¹⁰ *South Africa's Utility-Scale Wind & RE Industry Key Data* (SAWEA, March 2019) and <https://www.ipp-renewables.co.za/> *IPPPP, An Overview*, DoE-DBSA-NT (2019).

Box 3 Global onshore wind power and renewable energy trends

The global weighted-average levelized cost of energy (LCOE) of onshore wind projects commissioned in 2018, at USD 0.056/kWh, was 13% lower than in 2017 and 35% lower than in 2010, when it was USD 0.085/kWh. This trend is driven by the continued reductions in total installed costs (from an average of USD 1,913/kW in 2010 to USD 1,497/kW in 2018), as well as by improvements in the average capacity factor (from 27% in 2010 to 34% in 2018). This mirrors the trend in utility-scale photovoltaic energy (PV), which saw an even more dramatic trend in lowering the LCOE from USD 0.37/kWh in 2010 to USD 0.09/kWh in 2018 (with investment cost dropping from USD 4,621/kW on average in 2010 to USD 1,210 per kW in 2018). The LCOE may further drop (to USD 0.048/kWh for solar PV and USD 0.045/kWh for onshore wind). Similarly, the cost of concentrated solar power (CSP) has dropped from USD 0.341 in 2010 to USD 0.185/kWh in 2018 and maybe to USD 0.073/kWh in 2021 (IRENA, 2018). Costs of electricity from onshore wind are now at the lower end of the fossil fuel cost range. Globally, new solar PV and onshore wind will increasingly be cheaper than the marginal operating cost of existing coal-fired power plants.

Global installed capacity of onshore wind power was about 568 GW in 2018 (from 120 GW in 2008). Over the past 6 years, an average of about 49 GW has been added each year (47 GW was added, for example, in 2017). Offshore wind had 23 GW installed capacity in 2018



At least 103 countries have commercial wind power capacity and 33 countries have more than 1 GW in operation. China leads the pack with 206.8 GW, followed by USA (96.6 GW), Germany (53.2 GW), India (35.1 GW), France (15.3 GW), Brazil (14.7 GW), UK (13.0 GW) and Canada (12.8 GW). In 2018, installed onshore wind in Africa and Middle East was 5.72 GW, of which 2,1 GW in South Africa. (REN21, 2019) and GWEC (2019)

The renewable energy market as a whole expanded from 800 GW (85 GW, excluding hydro; out of total generation capacity of 3,800 GW in 2004) to about 2,738 GW (1,246 excluding hydro) or 33% of total installed power generation capacity (REN21, 2019; REN21, 2014). Internationally, the strong RE market growth is stimulated not only by the increasingly lower costs, but also by the emergence of regulatory regime that intends to promote clean energy. Regulatory policies, including feed-in policies and renewable portfolio standards, have been instrumental in guaranteeing market access for renewable power suppliers, in setting power prices for grid-connected renewable systems and in establishing mechanisms for achieving new lower prices for technology delivery.

2.3 Renewable energy deployment

Given the trends of global lower prices (see **Box 3**) national regulations and programmes and long-term domestic visibility of a multi-decade transition towards diversification, the country has already seen significant market growth in RE since 2010. The biggest contribution has been from utility-scale RE, driven by programmes such as REIPPPP. In conjunction with REIPPPP, Eskom has an active research programme focusing on the development of wind energy, pumped storage, and CSP projects.

Operational capacity of renewable power increased from about 100 MW in 2000 (excl. the 2,048 MW large hydro and pumped storage) out of a total installed capacity of 50,657 MW¹¹ to 4,036 MW in 2017 (of which 2,096 MW wind,

¹¹ NERSA Energy Supply Statistics for South Africa (2000)

excluding the 3,553 large hydro and pumped storage; out of total installed capacity of 52,811 MW in 2017¹²). According to the CSIR (2015) study, the introduction of renewable energy into the national grid resulted in a reduction of an equivalent of 4.4 million tonnes of CO₂.

As of March 2019, there are 22 operational wind power IPP's that have up to date an installed capacity of 2078 MW connected to the national grid (contributing 52% of the power supply by renewables) with more than 900 wind turbines spread out over three provinces (most in Eastern Cape, and in Western and Northern Cape). Wind energy produced net savings of ZAR 1.8 billion in the first half of 2015 and was also cash-positive for Eskom by ZAR 300 million¹³

Impacts of REIPPPP

The multi-phase bidding process has been characterized by progressive reductions in the prices offered by RE independent power producers (IPPs), as well as increases in local content and levels of employment in the RE sector. This has been encouraged by evaluation criteria for the REIPPPP that demand that 70% should be related to price and the remaining 30% to economic, job creation, local content, ownership management, and preferential procurement consideration.

Box 5 highlights benefits of the development of onshore wind projects under REIPPPP. First, what is clearly visible from the wind energy bidding rounds is that kWh prices fell with each bidding window, averaging ZAR 0.71 per kWh in the last and fourth bidding round, a decline of 100% compared with the first bidding round with ZAR 1.42 per kWh. Likewise, solar PV bid prices decreased from ZAR 3.29 /kWh to ZAR 0.82/kWh in Round 4. For onshore wind, average tariffs went down with 50% from ZAR 1.67/kWh to ZAR 0.84 per kWh¹⁴. For small wind projects, the average tariff has been ZAR 1.27/kWh.

Box 4 Generation capacity awarded under REIPPPP

	BW1		BW2		BW3		BW3.5		BW 4		ALL	
	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects
Onshore Wind	649	8	559	7	787	7			1 362	12	3 357	34
Solar PV	627	18	417	9	435	6			813	12	2 292	45
Solar CSP	150	2	50	1	200	2	200	2			600	7
Landfill Gas					18	1					18	1
Biomass					17	1			25	1	42	2
Small Hydro			14	2					5	1	19	3
	1425	28	1040	19	1457	17	200	2	2 205	26	6 327	92

Since November 2011 more than 6 327 MW from 102 renewable energy projects have been awarded, of which wind projects contribute more than half of total capacity (3,557 MW). The figures do not include the Small RE programme (about 95 MW).

Source: PowerPoint, *Enabling Renewable Energy in South Africa: Assessing the REIPPPP*, WWF, August 2014

The employment for South African citizens in the construction and operation of RE IPPs has continued to grow from about 2,500 in 2013/14 (DoE, 2017) with more than 33,000 job years by 2019 (*IPPPP, An Overview*, March 2019), just above the target of 32,000 jobs. However, there have been some complaints, especially by organised labour, regarding jobs associated with conventional sources of energy like coal, and associated value chains, being threatened by the expanding renewable energy sources¹⁵.

¹² en.wikipedia.org/wiki/List_of_power_stations_in_South_Africa

¹³ *Financial costs and benefits of renewable energy in South Africa in 2014*, CSIR (2015)

¹⁴ *IPPPP, An Overview*, DoE-DBSA-NT (2019).

¹⁵ Mukonza & Nhamo (2018), *Wind energy in South Africa: A review of policies, institutions and programmes*

Significantly more people from local communities were employed during construction than was initially planned. The expectation for local community participation was 13,000 job-years. To date, 18,250 job-years have been realised (i.e. 140% more than initially planned). Regarding the employment share in construction, *IPPPP, An Overview* (March 2019) mentions black citizens (79%), local communities (49%), women (8%) and youths (41%). These shares all have exceeded the original targets set.

Minimum ownership by local communities in an IPP of 5% is required as a procurement condition, with the actual achievement being about 9%. For projects that have reached financial closure, South Africans on average own 52% equity in all IPPs. Black South Africans own, on average, 33% of project equity, while local communities hold 9% equity in the IPPs¹⁶. An average of 21% shareholding by black people in engineering, procurement and construction (EPC) contractors has been attained in projects that have reached financial close under the REIPPPP (this is 1% higher than the 20% target).

A possible local content level of 68% has been aimed at in the latest BW rounds. Local content commitments by IPPs amount to R67.6 billion, i.e. 45% of total project value (R151.1 billion for all bid windows). Thus, achievements have been lower, around 45-48% for wind, but higher for solar (about 55-65%). In the case of solar PV, imports even started to be offset by significant exports as South Africa is becoming a significant player in the assembly of PV panels.

The share of procurement that is sourced from Broad-Based Black Economic Empowered (BBBEE) suppliers, Qualifying Small Enterprises (QSE), Exempted Micro Enterprises (EME) and women-owned vendors are tracked against commitments and targeted percentages. The actual share of procurement spent by IPPs from BBBEE suppliers for construction and operations combined is currently reported as 86% (more than 60% target; ZAR 48.5 billion).

IPPs are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward SED initiatives, i.e. education and skills development, social welfare, health, enterprise development. For the current portfolio, the average commitment level is 2.2% (which is well above the target level of 1%). Enterprise development contributions committed for BW1 to BW4 and the small RE programme amount to ZAR 7.2 billion.

After a protracted period of supply constraints and occasional load shedding, the national utility’s operations stabilised during 2015 and reached a state of surplus capacity during 2016/17. This is ascribed to slowing electricity demand, the addition of new build capacity and a significant improvement in the utility’s operational performance. Consequently, Eskom indicated that the addition of further large-scale RE capacity might lead to significant overcapacity on the system and declined to sign PPAs. Delays with REIPPPP after BW3 have had severe adverse effects on newly established local industries. The DoE (2017) report on the status of RE, mentions that of the original 12 new manufacturing businesses reported at the end of 2015, six had closed or suspended operations.

However, due to the troubled financial situation of utility Eskom, the buyer of the allocated power, developers of the projects in question had to renegotiate the PPAs and accept lower prices. After a hiatus of three years, all of the 27 outstanding PPAs awarded in rounds 3.5 and 4 of the REIPPP programme were signed (representing a generation capacity of 2.3 GW) in April 2018.

Box 5 Benefits of wind power development under REIPPPP Bid Windows (BW)

	BW1	BW2	BW3	BW4
MW allocation	649	559	787	1,362
Local content (million ZAR)	2727	4,817	6,283	5,146
Local content (%)	27%	48%	47%	45%
Job creation (construction)	1,810	1,787	2,612	2,831
Job creation (operation)	2,461	2,238	8,506	8,161

Source: DoE, *State of Renewable Energy in South Africa* (2016).
IPPPP, Overview, March 2019

¹⁶ Mukonza & Mhamo (2018); Future Growth (2019): article *REIPPP comes of age* (May 2019). IPPPP, An Overview, DoE-DBSA-NT (2019)

2.4 Post-2020 developments and conclusions

From August 2011 to 2015 seven procurement rounds known as Bidding Windows (BWs, in which 6,422 MW of electricity was procured from 112 RE Independent Power Producers (IPPs). In 2015, an impasse between the REI4P and South Africa's state-owned monopoly power utility, Eskom, resulted in a three-year delay in the signing of power purchase agreements for projects awarded in BW4, as well as a hiatus in the procurement program. By June 2021, 91 of the 92 projects reached financial closure.

Renewable energy capacity was 9,638 MW (out of a total of 57,436 MW in 2020). The RE4P is in line with the new IRP 2019 which proposes the energy mix to be expanded to 82,893 MW (36,230 MW) will be generated by renewable energy. Preparation for future bid windows is underway. During 2021/22, the IPPPP plans to roll out five bid windows (11,813 MW). To alleviate the medium-term electricity supply constraints and reduce the extensive utilization of diesel-based peaking electrical generators, the 2 GW "technology-neutral" Risk Mitigation IPP Procurement Program for dispatchable capacity was launched in late 2020, which was awarded to projects that combined solar PV, wind, storage and gas-fired generation.

By June 2021, 5,250 MW of electricity generation capacity from 81 IPP projects connected to the national grid, contributing to South Africa's climate change objective with the cumulative reduction of 63.9 million tons of carbon dioxide and generating 62,949 GWh of energy (since the first project became operational in 2013). The annual expected generation is 12,690 GWh.

The multi-phase bidding process has been characterized by progressive reductions in the prices offered by RE independent power producers (IPPs). Prices fell with each bidding window, averaging ZAR 0.71 per kWh in the last and fourth bidding round, a decline of 100% compared with the first bidding round with ZAR 1.42 per kWh. Likewise, solar PV bid prices decreased from ZAR 3.29 /kWh to ZAR 0.82/kWh in Round 4. For onshore wind, average tariffs went down with 50% from ZAR 1.67/kWh to ZAR 0.84 per kWh.

The REIPPPP has attracted significant investment into the country. The total investment (total project costs, including interest during construction), of projects under construction and projects under (financial) negotiation, is ZAR 209.7 billion (this includes total debt and equity of ZAR 209.2 billion, as well as early revenue and VAT facility of ZAR 0.5 billion). The REIPPPP has attracted ZAR 41.8 billion in foreign investment and financing in the five BWs and small-scale windows. Investment costs have been ZAR 22/MW on average for wind (ZAR 31/MW for solar, and ZAR 89/MW for CSP)

The employment for South African citizens in the construction and operation of RE IPPs has continued to grow from about 2,500 in 2013/14 (DoE, 2017) to 68,517 job years by mid-2021, which is almost 90% higher than the originally planned target of 32,000 jobs. This has been encouraged by evaluation criteria for the REIPPPP that demand that 70% should be related to price and the remaining 30% to economic, job creation, local content, ownership management, and preferential procurement consideration.

Local content minimum thresholds and targets were set higher for each subsequent bid window. Currently, about ZAR 61 billion is spent on local content in line with what was planned. Minimum ownership by local communities in an IPP of 5% is required as a procurement condition, with the actual achievement being about 9%. For projects that have reached financial closure, South Africans on average own 52% equity in all IPPs. Black South Africans own, on average, 34% of project equity, while local communities hold 9% equity in the IPPs. Black South Africans hold 34% of the shares across the complete supply chain. Local communities hold 8% equity in the IPPs.