



South African National Energy Association

Member of
**WORLD
ENERGY
COUNCIL**



Thinking
Energy

PRETORIA FIDDLES WHILE COAL BURNS

Latest Results of the World Energy Trilemma Index 2017

SUMMARY

In the 2017 rankings of the World Energy Council's Trilemma Index, South Africa achieved a ranking of 82 out of 125 which is a 2 place improvement from the 2016 ranking of 84. However we question whether this is this good enough?

For further analysis we consider South Africa's position in three groupings – a SADC grouping, a BRICS grouping and an Economic Group III grouping (GDP per capita between US\$ 6 000 and US\$ 14 300) and it can be seen that South Africa's performance is as bad as 82/125 may suggest. However, given our high score on institutional capacity, we should be doing much better.

INTRODUCTION

The concept of the Trilemma was developed by the World Energy Council in order to determine whether countries are providing reliable access to modern energy to as many of their citizens as possible at an affordable price and in an environmentally sustainable manner.

In order to quantify or measure the level at which a country is achieving a balance between the three parameters of energy security (or reliable supply), energy equity (or access and affordability) and environmental sustainability the Trilemma Index was developed.

The Trilemma index is graphically depicted in a triangle with security, equity and sustainability at the vertices as shown in the diagram below.

ENERGY SECURITY

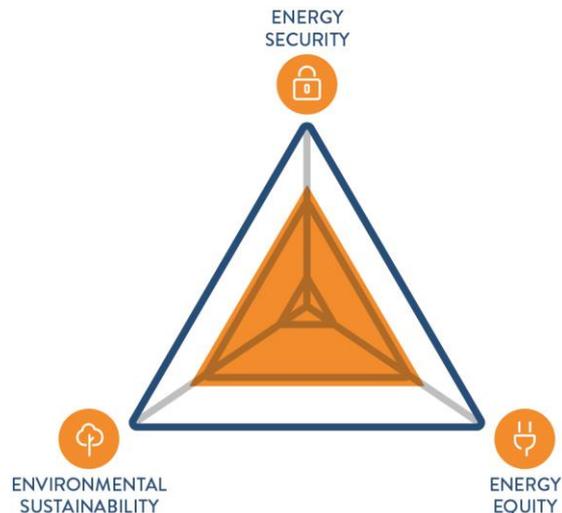
Effective management of primary energy supply from domestic and external sources, reliability of energy infrastructure, and ability of energy providers to meet current and future demand.

ENERGY EQUITY

Accessibility and affordability of energy supply across the population.

ENVIRONMENTAL SUSTAINABILITY

Encompasses achievement of supply- and demand-side energy efficiencies and development of energy supply from renewable and other low-carbon sources.



Furthermore, the contextual indicators consider the broader circumstances of energy performance, including a country's ability to provide coherent, predictable and stable policy and regulatory frameworks, initiate R&D and innovation, and attract investment

In general there has been an overall improvement among the countries included in the Index - access to electricity and clean cooking have both increased by 7% to 87% and 75%, respectively since 2000. Meanwhile, lower carbon forms of energy are being used to support energy access and economic growth, with renewables making up 19.3% of final global energy consumption worldwide in 2015. A more diversified and low-carbon energy mix will help to improve energy security and environmental sustainability but its positive effects may be stifled by rising final energy consumption, which is predicted to increase by up to 46% by 2060.

These changes in Trilemma performance are happening while the global energy sector is being transformed by three reinforcing trends - decarbonisation, digitalisation and decentralisation.

SOUTH AFRICAN RESULT

TRILEMMA INDEX RANKINGS AND BALANCE SCORE

| RANK | | 2015 | 2016 | 2017 | Trend | Score | |
|-------|--|---------------------------------------|------|------|-------|-------|---|
| 82 | | Overall rank and balance score | | | | | |
| | | 81 | 84 | 82 | ▶ | BCD | |
| SCORE | | Energy performance | | | | | |
| | | Energy security | 68 | 66 | 47 | ▶ | B |
| | | Energy equity | 80 | 82 | 87 | ▶ | C |
| | | Environmental sustainability | 105 | 105 | 109 | ▶ | D |
| | | Contextual performance | 49 | 47 | 46 | ▶ | |

From the figure above, the movement of the energy security score from 66 in 2016 to 47 in 2017 is the main reason for the improved overall ranking in 2017. This is a result of the electricity supply position moving from not being able to meet the demand on a continuous basis to now being in excess due to declining demand and additional generation capacity coming on stream from the multiple renewable energy projects, new coal and pumped storage units as well as the improved performance of the National Utility's power plant fleet.

The energy equity score has deteriorated slightly even though the access to modern energy (electricity in particular) continues to improve on an absolute number basis. This result shows that other countries are doing better at improving their levels of access.

Environmental sustainability is the weakest area of performance for South Africa in the Trilemma context. This is a consequence of more than 80% of the power generated in South Africa being from coal-fired power stations. Until the generation mix becomes less carbon intensive, this element of the Index will continue to be a weakness and will impact negatively on the Trilemma ranking.

WHAT DOES THIS RESULT MEAN?

At first glance a ranking of 82 in 125 may not look particularly good. However in order to make this assessment more meaningful, consider the South African performance in the context of three peer groupings i.e.

- A SADC grouping
- A BRICS grouping and
- Economic Group III grouping (GDP per capita between US\$6 000 and US\$ 14 300)

The data for these grouping is summarised in Table 1.

SADC Grouping

In terms of Overall ranking South Africa is second to Mauritius and it can be seen that it is the Sustainability score that makes a significant difference between the Overall rankings of the two countries. This poor showing in the Sustainability ranking for South Africa arises since most of our power is generated using coal as fuel. This will not change much in the short time

BRICS Grouping

Overall ranking in this grouping puts South Africa 3rd to Russia and Brazil. In this grouping it is the Equity ranking that pulls us down again. South Africa's performance is essentially "middle of the road" which is nothing to be excited about, especially considering the backlog that China and India are overcoming.

Economic Group III grouping

In this grouping from an Overall ranking perspective South Africa is somewhat middle of the road notwithstanding our good placing on the Security ranking. Unfortunately our Equity and Sustainability rankings pull us down in this group as well.

CONCLUSION – IS THERE ANY HOPE FOR SOUTH AFRICA'S ENERGY FUTURE?

The common theme arising from looking at South Africa's ranking in each of the 3 groupings considered is that our Security ranking is good especially now that the load-shedding challenge is no longer with us. However, the areas for further work are in the Equity ranking and the Sustainability ranking.

Since 1994 a huge effort has been put into providing access to electricity, especially for rural communities. At present more than 80% of the South African population have access to electricity. However, it is clear that when compared with countries in the BRICS and Group III groupings there is still much work to be done.

The Sustainability ranking will be very difficult to address since, endowed with abundant coal deposits and negligible natural gas, it is natural that the power generation industry was developed using coal as its fuel. Coal mining is also an important job provider and integral to the economy of the country. Consequently it is not something that can simply be “switched off” without major economic and social consequences. However, many of the coal fired power stations will need to be retired in the next 10 to 15 years and this gives time to proactively plan to make power generation in South Africa less carbon intensive, but this planning needs to start now!

What is really disappointing about South Africa’s performance is revealed when we look at the contextual index. In all three “peer” groupings South Africa is the top-scorer. This indicates that we have the institutional capacity to provide coherent policy and regulation, drive R&D and innovation and attract investment. With this capability, middle of the road performance is surely not good enough.

If there is to be any hope for South Africa’s energy future we have to make full use of our inherent institutional capacity to deliver, to all our citizens, energy services that are reliable, affordable and environmentally responsible

What do you think?

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THE FULL TRILEMMA and TRILEMMA INDEX REPORTS ARE AVAILABLE FROM THE SANEA WEBSITE

TABLE 1: RESULTS FROM THE 2017 WORLD ENERGY COUNCIL TRILEMMA INDEX REPORT

| | <u>OVERALL RANKING</u> | | | | <u>SECURITY RANKING</u> | | <u>EQUITY RANKING</u> | | <u>SUSTAINABILITY RANKING</u> | | <u>CONTEXT RANKING</u> | |
|---------------------------|------------------------|------|-------|---------|-------------------------|-----------|-----------------------|----------|-------------------------------|----------------|------------------------|---------|
| | Country | Rank | Score | Trend | Country | Security | Country | Equity | Country | Sustainability | Country | Context |
| SADC | Mauritius | 47 | CBB | Flat | South Africa | 47 | Mauritius | 65 | Mauritius | 36 | South Africa | 46 |
| | South Africa | 82 | BCD | Flat | Swaziland | 54 | South Africa | 87 | Namibia | 53 | Botswana | 49 |
| | Swaziland | 90 | DBD | Flat | Zimbabwe | 60 | Botswana | 93 | Swaziland | 58 | Namibia | 60 |
| | Namibia | 97 | DDB | Flat | Mauritius | 80 | Namibia | 100 | Botswana | 94 | Tanzania | 94 |
| | Botswana | 98 | DCC | Flat | Botswana | 103 | Swaziland | 102 | Zimbabwe | 105 | Swaziland | 97 |
| | Zimbabwe | 120 | BDD | Flat | Namibia | 105 | Tanzania | 119 | South Africa | 109 | Zimbabwe | 119 |
| | Tanzania | 123 | DDD | Flat | Tanzania | 107 | Zimbabwe | 120 | Tanzania | 112 | Mauritius | |
| BRICS | Russia | 44 | ABD | Flat | Russia | 13 | Russia | 38 | Brazil | 47 | South Africa | 46 |
| | Brazil | 54 | BBB | Flat | Brazil | 46 | Brazil | 74 | India | 92 | China | 47 |
| | South Africa | 82 | BCD | Flat | South Africa | 47 | China | 76 | South Africa | 109 | Russia | 56 |
| | China | 86 | BBD | Flat | China | 58 | South Africa | 87 | Russia | 113 | Brazil | 74 |
| | India | 92 | CCC | Flat | India | 66 | India | 96 | China | 117 | India | 86 |
| Economic Group III | Columbia | 45 | BCA | Flat | Peru | 38 | Turkey | 52 | Columbia | 16 | South Africa | 46 |
| | Turkey | 50 | CBB | Flat | Columbia | 43 | Armenia | 53 | Sri Lanka | 24 | Turkey | 52 |
| | Armenia | 52 | CBB | Flat | South Africa | 47 | Ecuador | 54 | Egypt | 34 | Armenia | 59 |
| | Peru | 55 | BCB | Flat | Swaziland | 54 | Trinidad | 55 | Peru | 39 | Namibia | 60 |
| | Ecuador | 64 | BBC | Flat | Indonesia | 59 | Jordan | 56 | Paraguay | 52 | Columbia | 66 |
| | Egypt | 69 | CBB | Flat | Ecuador | 61 | Egypt | 60 | Namibia | 53 | Peru | 67 |
| | Indonesia | 75 | BCB | Flat | India | 66 | Morocco | 66 | Turkey | 55 | Jordan | 69 |
| | Morocco | 77 | DBC | Flat | Sri Lanka | 69 | Lebanon | 75 | Swaziland | 58 | Morocco | 70 |
| | South Africa | 82 | BCD | Flat | Bolivia | 71 | Peru | 80 | Armenia | 63 | Trinidad | 75 |
| | Sri Lanka | 83 | CCA | Flat | Armenia | 72 | Indonesia | 82 | Indonesia | 68 | Mongolia | 77 |
| | Paraguay | 84 | CCB | Flat | Turkey | 82 | Columbia | 84 | Lebanon | 71 | Indonesia | 83 |
| | Jordan | 87 | DBC | Flat | Trinidad | 92 | Paraguay | 85 | Morocco | 74 | India | 86 |
| | Trinidad | 88 | CBD | Flat | Egypt | 93 | South Africa | 87 | Ecuador | 77 | Sri Lanka | 93 |
| | Swaziland | 90 | DBD | Flat | Paraguay | 95 | Bolivia | 90 | Jordan | 78 | Lebanon | 95 |
| | India | 92 | CCC | Flat | Mongolia | 102 | Mongolia | 92 | India | 92 | Paraguay | 96 |
| | Lebanon | 95 | DBC | Flat | Namibia | 105 | India | 96 | South Africa | 109 | Swaziland | 97 |
| Namibia | 97 | DDB | Flat | Morocco | 109 | Sri Lanka | 99 | Bolivia | 110 | Egypt | 103 | |
| Bolivia | 101 | CCD | Flat | Jordan | 121 | Namibia | 100 | Mongolia | 124 | Bolivia | 106 | |
| Mongolia | 106 | DCD | Flat | Lebanon | 122 | Swaziland | 102 | Trinidad | 122 | Ecuador | 108 | |