



Position Paper

**FOSTERING NEW JOINT GROWTH OPPORTUNITIES BY TAKING ADVANTAGE
OF THE CHANGING ENERGY SCENARIO**

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Energy sector is undergoing major structural changes due to technological advancement and new patterns of sustainability, and the forthcoming entry into force of the Paris Agreement is expected to push these trends further. The evolving scenario opens up relevant opportunities for upgrading the energy infrastructure, rebalancing the energy mix at a national level and initiating profitable industrial partnerships.

South Africa will gradually lower the dominance of coal in the energy mix, increasing renewables and other less polluting fossil fuels, such as natural gas, and nuclear power. South Africa has already invested \$20 billion in renewables, and until 2020 the Government will further commit more than \$3 billion per year to stimulate private investments in renewables. Also, significant investments will be made to address current power shortages and to improve the reliability of the grid. New innovative technologies, such as smart grids and power storage solutions, are also likely to play a significant role.

Italy has undisputed competences and world-class industrial players in the natural gas power value-chain, renewables (projects management, financing, EPC and O&M), and smart grids and storage technologies. Italian major operators are already well established in South Africa: if cooperation is pushed even further, the two Countries could generate significant benefits also for mid-sized operators, developing innovative value chains in the energy sector.

The transition towards a low-carbon economy opens up opportunities in the energy sector of South Africa

1. On November 4th, 2016 the Paris Agreement – adopted by consensus on the UNFCCC¹ Conference held in December 2015 – will enter into force, bringing about **long lasting changes** in the energy sector at global level. To achieve the goal to limit, within the turn of the century global warming rise to below 2°C the Agreement hinges upon Intended Nationally Determined Contributions (INDCs), policy documents that each Country has to submit to the UNFCCC, indicating the climate strategy that it intends to follow from 2020 on.²
2. Italy and the EU are speeding up the ratification process of the Treaty, while South Africa is expected to follow suit in few years.³

3. Moving towards a **low-carbon and climate-resilient economy** as well as deploying innovative energy technologies opens up major opportunities for private and public stakeholders. In particular, the Agreement provides operators with the certainty that **“green” investments** will pay-off and significant resources will be committed for many years to come.

4. According to South Africa’s submitted INDCs and National Development Plan 2030, the Country’s CO₂ emissions will peak around 2025, plateau for five to ten years and then start to decline. Since South Africa has stated that its priority in the short-term is to address poverty and inequality, sustainability goals are expected to be achieved by cooperating tightly with the international business community, so as to lever existing resources and not to create pressure on public finances.

5. In the next few years, South Africa will commit **\$3 billion per year in renewables**, while in the long run, the Government estimates to invest \$349 billion to decarbonize electricity and \$513 billion in electric vehicles within 2050.⁴ This will create major opportunities for foreign players to cooperate with South Africa to change the energy mix, shifting away from coal towards more sustainable consumption patterns.

¹ United Nations Framework Convention on Climate Change. The 22nd session of the UNFCCC Conference of the Parties (COP22) will take place in Marrakesh in November 2016.

² Following the experience of the Kyoto Protocol, the Treaty relies on a bottom-up, voluntary approach to climate mitigation and adaptation, without any emissions quota or legally binding mechanisms put in place. Moreover, the Parties should commit no less than \$100 billion/year in climate mitigation and adaptation strategies, with specific funds dedicated to technology transfer to least developed Countries.

³ Italy and South Africa have signed the Agreement in April 2016, an action that does not create any legal obligation as neither of them have ratified it yet.

⁴ Source: South African Government, South Africa’s Intended Nationally Determined Contribution (INDC).

6. But it is not just South Africa that will turn green: Sub-Saharan Africa is expected to uphold robust economic growth rates in the coming years (GDP growth in the last 15 years averaged 5%)⁵, and growth in energy demand will have to be matched by an increasing share of renewables. South Africa is the **ideal hub through which to penetrate the whole Sub-Saharan energy market.**

South Africa has taken off on a path of sustainable growth

7. To date, coal still dominates South Africa's energy mix and supplies 93% of generated electricity,⁶ resulting in high levels of CO₂ emissions. Over the last decades, the Country – that has undisputed competences in coal-fired generation – managed to decouple economic growth from energy use, particularly after the appearance of the first rotational load shedding in 2008, when energy efficiency became a strategic priority in a Country that had always benefited from energy abundance. Nevertheless, lower electricity consumption and energy use is not reflected in CO₂ emission patterns which have, on the contrary, kept growing proportionally with GDP. This gives way for **substantial improvement in the carbon intensity** of South Africa.

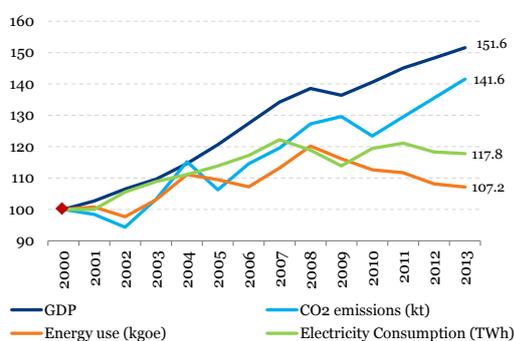


Figure 1. Trend in South Africa's GDP, CO₂ emissions, electricity consumption and energy use, index number (year 2000=100), 2000-2013 (Source: TEH-A elaboration on World Bank data, 2016)

8. In fact, the Government aims to shift away from coal by increasing renewables and natural gas, lowering coal-generated electricity to less than 50%.⁷ According to the National Development Plan 2030, South Africa will deploy further 40 GW of nameplate power capacity within 2030 (29 GW to match increasing demand and 10.9 GW to replace

⁵ World Bank data, 2016.

⁶ South Africa is a major coal producer and consumer and the 6th largest coal exporter in the world. ~80% of national coal production currently takes place in Mpumalanga.

⁷ According to the Integrated resource plan for electricity, 2010-2030 (2013 update).

ageing power fleet). **20 GW will have to come from renewables**,⁸ particularly wind and solar (having reached today a degree of maturity that allows them, under the right market conditions, to be competitive with fossil sources). Great opportunities for cooperation thus arise in project financing, execution and management of renewables plants, so as to lower renewables cost structure and maximize the allocation of limited resources.

9. Integrating renewables into the energy system may also help to meet growing energy demand and reduce the frequency of outages. South Africa displays a successful track-record, demonstrating that green energies can be deployed rapidly: since 2011 South Africa's Renewable Energy Independent Power Producer Procurement Program (REI4P) managed to procure 6,327 MW of capacity, for committed investments of more than \$20 billion.

10. Given the abovementioned strategic aim, South Africa's government sees **natural gas** as the perfect match to back-up the intermittency of renewables thanks to the operational flexibility of gas-fired power plants (possibility to be switched on and off in relatively short time compared to other fossil fuels) and to meet the need to lower CO₂ emissions (natural gas is the fossil fuel with the lowest carbon content, around 50% less CO₂ emitted compared to coal-fired plants).

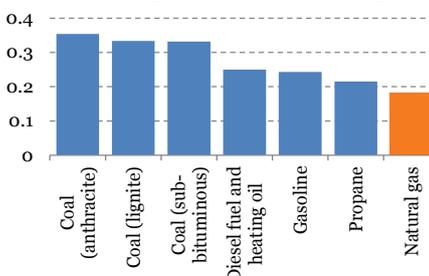


Figure 2. Kg of CO₂ emitted per kWh, by fuel (Source: TEH-A elaboration on IEA data, 2016)

11. To establish a sizeable natural gas power market, a **regional infrastructural network** is essential to convey to South Africa newly found natural gas reserves in neighboring Countries:

- The existing pipeline connects Pretoria to the Pande gas field in Mozambique, while there are plans to exploit the Rovuma basin⁹ further north through a 2,600 km

⁸ Source: South African Government, "National Development Plan 2030".

⁹ ENI operates, with a 50% stake, in the exploratory Area 4 in the offshore Rovuma basin, in Mozambique.

pipeline; the project should be completed within the mid-2020s by ENH, SacOil and China's CNPC, for a \$6 billion investment.

- Exploitation of the Namibian Kudu offshore natural gas field is also under discussion, but the project for building a pipeline connected to an onshore gas-fired plant has come to a temporary halt due to financial constraints.

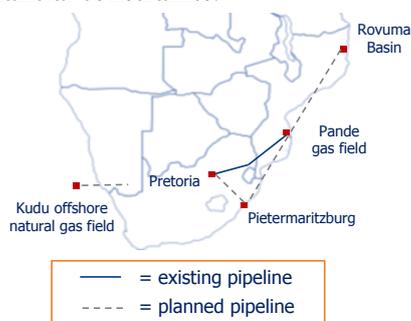


Figure 3. Planned natural gas pipelines in Sub-Saharan Africa, 2016.

12. Moreover, South Africa's Government considers favorably the construction of further LNG terminals alongside the existing ones. Since the natural gas distribution network encompasses mainly four Provinces (Mpumalanga, Free State, Gauteng and KwaZulu-Natal), an LNG-to-power program could be a suitable way to foster natural gas generated electricity around the Country.

13. South Africa has also significant shale gas reserves (11.02 Tcm, 62.5% of the U.S. proven reserves)¹⁰ and exploration activities are expected to begin by early 2017. However, shale gas development is highly controversial, given the already high pressure on water resources and potential pollution effects.¹¹

14. Given the abundant uranium resources, fostering the nuclear power sector would be a concrete option for South Africa. The Country owns 8% of the world total uranium reserves, generating from nuclear power about 5% of electricity through two reactors (1,830 MW of capacity) operated by Eskom.¹² Although expanding the nuclear power fleet is a key element of the NDP, this is not planned until 2023/2024.

Deploying technologies to increase grid efficiency and reliability

15. A further major strategic target for South Africa is to improve the **efficiency and**

¹⁰ Source: EIA data, 2016.

¹¹ Shale gas contribution in curbing CO₂ emission is debated, due to emissions of methane (with a GWP of 100 times that of CO₂).

¹² Source: World Nuclear Association, 2016.

reliability of the grid. To date, South Africa loses ~9% of electricity during transmission,¹³ and suffers frequent electricity supply disruptions, which negatively affect the economy (~0.5%–1% of GDP). Eskom, the national electricity public utility, struggles to match generated electricity with demand, forcing the company to frequently implement rolling blackouts.¹⁴

16. Efficiency enhancement and long-term investments on the transmission network are considered by the national Government as key factors for building up the large-scale power capacity needed to ensure a reliable supply to support future economic growth.

17. In addition, South Africa aims to use renewables to **spread electrification to remote areas** and this requires a significant structural upscale of the national grid. Renewables, power storage solutions, smart and micro grids have indeed made great strides in the last few years, experiencing tremendous technological advancement and cost-structure plunges. Particularly, power storage is expected to revolutionize the power market in coming years, allowing a more effective integration of renewables into the system.

18. These technologies are seen by South African policymakers as key drivers to cost-effectively reach the Country's target of connecting to grid 90% of the population by 2030 and, consequently, boost job creation and economic development (starting from the rural areas). Moreover, the combination of renewables plus micro grid and storage could be a significant tool for decreasing the carbon intensity of the mining industry,¹⁵ often located in remote areas, and other energy intensive sectors (such as automotive and steel production).

19. Lastly, **demand-side measures** are expected to create significant opportunities for business operators. As stated by the INDCs and the 2030 NDP, a key pillar of the South African energy strategy will be the introduction of a carbon tax. This will create significant economic benefits for energy

¹³ Source: World Bank data, 2016.

¹⁴ Intentional supply disruptions in localized sectors of the grid to avoid a general shutdown of the network. While in the past the Country displayed a significant overcapacity in power generation (up to 40%), a following period of underinvestment resulted in the inability to match growing energy demand and, subsequently, in the first cycle of blackouts in 2008.

¹⁵ The NDP explicitly aims at increasing the efficiency of the extractive industry by at least 15% by 2030.

efficient companies, also unleashing robust business opportunities for energy efficiency technologies.

South Africa and Italy can cooperate for the development of energy value chains

20. South Africa is looking for reliable and complementary partners to strengthen and further develop its energy sector. A close cooperation between Italian and South African companies offers mutually beneficial results, given the high synergies between the two Countries in terms of industrial needs, technical skills and know-how.

21. Having experienced one of the fastest growth rates of renewables in the early 2000s, Italy has already faced the challenges related to the integration in the energy system of high shares of power generation from renewables. Cooperation could thus be fruitful on **energy policy and governance** issues, exchanging best practices and regulatory solutions to overcome common problems at national and local levels.

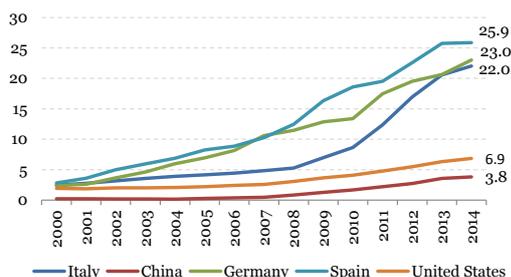


Figure 4. % of non-hydro renewables on total electricity generation in selected countries, 2000-2014 (Source: TEH-A elaboration on World Bank data, 2016)

22. Moreover, Italian companies' experience in **project financing, EPC** (Engineering, Procurement and Construction) – including transmission grid integration – **and O&M** (Operation and Maintenance) **activities for renewable plants** could be a key driver to lower the cost structure of renewables in South Africa. Several Italian players, such as Enel Group and TerniEnergia, participated in multiple rounds of the REI4P tender and currently operate in the South African market.¹⁶ The IPP Building Energy has

¹⁶ Enel Green Power owns and operates three PV parks, with ~1 GW of projects currently in execution. In 2016, TerniEnergia completed the construction of two PV plants in Paleisheuvel (Western Cape, 82.5 MWp) and Tom Burke (Limpopo, 66 MWp). Other Italian players are Enertronica (photovoltaic plants and energy solutions) and Sunchem Holding (biofuels from tobacco).

developed and managed more than 20 projects in the Country in different technologies (solar PV, biomass and hydro technologies).¹⁷

23. South African and Italian companies can partner together to **manage CCGT plants**, given that Italy is highly experienced in the natural gas power value chain, with advanced and highly-efficient CCGTs¹⁸ and generators.

Cooperation is already well set on track: Ansaldo Energia and Fata (Danieli Group) contributed to the construction of two electric power plants on a turnkey basis¹⁹.

24. The potential is high also to jointly develop new frontier technologies in order to boost energy efficiency in industry, residential and transportation sectors. Italy has developed advanced niches in **smart/micro grids and storage technologies**, the use of which would lessen the need for peaking power plants, thereby making significant short-term power generation increases possible to match current demand.

The Enel Group signed an agreement with Tesla aimed at developing – starting from South Africa – new businesses linked to residential storage through the integration of stationary energy storage systems and renewable plants.

25. Ultimately, given both Countries' strategic interest in the industry, they could partner-up to develop Clean Coal Technologies (CCTs), carrying out joint R&D and pilot projects – such as green coal or Carbon Capture and Storage (CCSs).

26. Major Italian and South African players are already cooperating fruitfully: if this partnership is pushed even further, the two Countries could generate significant benefits also for mid-sized operators, **developing innovative value chains the energy sector**.

¹⁷ Including the 81 MWp Kathu solar PV plant in Northern Cape, and the 18 MWp Mkuze biomass plant in KwaZulu-Natal, the first and largest in Africa.

¹⁸ The Italian CCGT (Combined Cycle Gas Turbines) fleet stands among the most advanced and high-performing in the world, with an average efficiency rate of 55%-60%.

¹⁹ Construction of the 342 MW Dedisa plant in Port Elizabeth and the 685 MW Avon plant, for a total worth of €420 million.

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