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Skhira 2 combined cycle power plant

General project presentation

The project will be an IPP for a combined cycle power plant of 450 MW located in Skhira. The project is called Skhira 2 IPP and will be the second phase of a the Skhira 1 power plant (same capacity) procured as an EPC contract. The project aims at ensuring a 10% reserve capacity to secure the foreseen demand peaks by 2023.

The estimated cost of the project is **TND 1,100 million**

Since its inception, the Tunisian Electricity and Gas Company has been carrying out its economic and social role, which is to be the backbone of the industrial sector and to ensure the continuity of electricity supply of the country.

Electricity demand peaks during the summer because of the increased demand for air conditioning due to high weather temperatures. The last 10 years have witnessed a steady growth of 5% per year, equivalent to the installation of an additional 340 MWH (2-megawatt gas turbine) plant every two years. The peak of 2017 (4025 MW) was 18% higher than the peak of 2016.

Figure 1: Evolution of peak demand for electricity (2008-2017) in MW



Location:
Skhira

Company:
STEG

Mission:
IPP (Independent Power Producer)

Cost:
TND 1 100 million



Given the time needed to plan and procure thermal power plants (about 4 years before actual operation), and the urgent need to meet the peak demand for electricity on the short term (especially in 2019 and 2020), the Tunisian Government decided, beginning of 2018 to start procuring the first 450 MW of the combined cycle power plant as a traditional EPC (Engineering-Procurement-Construction) contract and to study the possibility to undertake the additional 450 MW as an (Independent Power Producer) contract (Skhira 2)

Project justification

The Skhira 2 combined cycle 450 MW project is part of the five-year (2016-2020) energy sector development plan, which was established in October 2015. Natural gas will remain the main fuel for electricity generation, so the Skhira combined cycle project constitutes the continuity of the choice of type "F" gas turbines, with an energy efficiency of 60% (combined cycle).

Recent projects in Tunisia have used the same technology, namely, the Ghannouch combined cycle plant (in 2011), the Sousse C and D plant (2018), the future combined cycle project of Rades C and finally the future power station of Mornaguia (2 Gas Turbines of 300 MW each with an open cycle).

The electricity demand forecast, as established in the Energy Sector Five-Year Development Plan 2016-2020 shows a peak power forecast for 2019 of 4,460 MW based on the following assumptions:

- An annual peak power of 4.6%
- The realization of energy efficiency actions for end uses (industrial, tertiary and residential)
- A proactive reduction of energy losses in electricity distribution and transmission networks.

Table: Breakdown of the maximum power available for the thermal park at 40° C

Thermal power plants	2017	2018	2019	2020
CC Sousse D (mono-shaft / Ansaldo)	370	370	370	370
CC Sousse C (mono-shaft / Ansaldo)	370	370	370	370
CC Sousse B (tri-shaft / Alstom)	320	320	320	320
STs Sousse A (Siemens)	<i>Decommissioned</i>			
CC Ghannouch (mono-shaft / Alstom)	370	370	370	370
CC Radès II (IPP) (tri-shaft / Alstom)	435	435	435	435
STs Radès A (Mitsubishi)	280	280	280	280
STs Radès B (Ansaldo)	280	280	280	280
GTs 120 MW (GE)	1 130	1 130	1 130	1 130
GTs 20-30 MW (Fiat + Alstom)	200	200	200	200
CC Radès C 450 MW (dual-shaft)	-	-	285	428
GTs Mornaguia 2x300 MW	-	570	570	570
GTs Bouchemma 2x120 MW (Special order)	200	200	200	200
Maximum power available at 40 ° C (MW)	3 955	4 525	4 810	4 953

Source: STEG, 2015 / CC: Combined Cycle; ST: Steam Turbine; GT: Gas Turbine

On the supply side available for the 2016-2020 period, and in addition to the scheduled decommissioning and the scheduled commissioning of production units (including the two Bouchemma Gas Turbines for 2016-2017), thermal power generation will be characterized by the degradation of the availability and reliability of small 20-30 MW Gas Turbines.

The renewable energy production, excluding self-producers, would provide an additional capacity of 830 MW in total during the five-year period 2016-2020: 375 MW in photovoltaic stations supposed to contribute to the day peaks of up to 50% of their capacity and 410 MW in wind power farms supposed to contribute to the economy in fuels (given their variability and intermittency).



Considering the consultation meetings with the Ministerial Task Force, which was created in 2013 during the discussions of the project for the future thermal power plant in Mornaguia, the power reserve capacity retained for the planning of the expansion of the park of electricity production and that equals to the largest level of power (i.e. 400 MW), was revised upward (i.e. 450 MW). This upward revision was made considering possible delays impacting the completion of the scheduled projects. Therefore the reserve capacity offered by the system is insufficient.

The results of the calculation of the STEG made using the WASP model (Wien Automatic System Planning package, developed by the International Atomic Energy Agency), confirm the need for additional production capacity operating of 450 MW for a combined cycle to ensure approx. 10% of reserve capacity.

Legal and institutional framework

The Société Tunisienne d'Electricité et du Gaz ("STEG") (www.steg.com.tn) was created by Decree No. 62-8 of April 3, 1962 and amended by Law No. 70-58 of December 2, 1970. STEG had a complete monopoly on all functions of the Tunisian power sector—generation, transmission and distribution—until 1996, when the market was opened to Independent Power Producers "(IPPs)". In 2009, Large Energy Consuming Industries "(IGCElec") were encouraged to produce power for their own needs.

The surplus they produce is to be fed into the national grid but their contribution has been all but minimal to date. Today, however, STEG is still the largest player in the power market, with a market share of 88%.

Most of the state actors in the energy sector are accountable to the Ministry. In addition to STEG, these include the Commission Supérieure de la Production Indépendante d'Electricité (Superior Commission of

Independent Electricity Production; CSPIE) and the Commission Interdépartementale de la Production Indépendante d'Electricité (Interdepartmental Commission of Independent Electricity Production; CIPIE), which were both set up in 1996 under the IPP law. The Ministry of Agriculture (Ministère de l'Agriculture, www.onagri.nat.tn) is responsible for the exploitation of hydropower. The CSPIE decides public tender processes and awards contracts to IPPs. It also passes rulings on tax incentives for investors. The inter-ministerial CIPIE carries out preliminary work for the CSPIE by selecting projects for tendering, contractual negotiations between the IPPs and the Energy Ministry, and securing public subsidies on a case-by-case basis.

Sectoral Laws

The electricity sector was the pioneer of PPPs in Tunisia through the Independent Power Producers / IPP model. Two factors have catalyzed the development of PPIs. The first was the adoption of Law 96-27 of 1996 which allowed the production of electricity by private companies for the first time. The second was a feasibility study to assess the potential for private participation in Tunisian electricity production via IPPs. This study, conducted in 1995, concluded that IPPs can indeed have a favorable impact. The study was conducted in a context in which the Tunisian Government was undergoing a structural adjustment plan aimed at reducing the budget deficit and in particular the percentage of external debt. In June 1995, the government invited international investors to propose a series of projects. Accordingly, the Tunisian Government has chosen to include IPPs in its portfolio of energy projects. IPP quickly emerged as the most sought after sector, with 84 potential investors interested. With Law 96-27 and the feasibility study, which serves as a general framework, two IPPs were concluded in the following years: (i) In 1997 with Carthage Power Company (Radès II)



and (ii) in 2003 with the El Bibane Electricity Company (SEEB).

TND 1 100 million

Functional scope of the project

The plant will be located south of the Skhira industrial complex in the Governorate of Sfax.

A land of 117 ha was made available to STEG by the Ministry of State Property and Land Affairs: 20-year concession contract renewable with STEG. This land will be used for both Skhira 1 (EPC) and Skhira 2 (present IPP) projects.

Completed technical studies (on going or yet to be carried out)

- Topographic survey.
- Geotechnical study.
- Study of the management of the supply and rejection of seawater.

Prospective implementation schedule agreements reached or to be reached

Based on the Radès IPP precedent (signed in 1997), the implementation schedule could be as follows:

- Project IPP Feasibility Study: 2018
- IPP Procurement: 2019-2020
- Construction phase: 2020-2023
- Operation phase: 2023-2043

Cost estimates

STEG estimates the total cost of the project at TND 1100 million calculated taking into account the following expenses:

- Cost of combined cycle power plant:
TND 950 million
- Cost of seawater cooling works:
TND 50 million
- Miscellaneous expenses:
TND 100 million

Total cost of the power plant project: