Financing the Akkuyu NPP in Turkey

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Growing economy

- Demography (76 million, expected to increase by 1.1%/year in the near future)
- Economy (growth rate of 5.1%/year in the last 12 years)

Need for energy

- Total Primary Energy supply 105 Mtoe (+38% from 2000)
- Relies heavily on energy imports (70% of total)
- Electricity demand is at 241 TWh in 2012 with an expected increase of 6.5-7.5%/year
- Electricity generation mix is based on gas (46%), hydro and coal (25% each)

Clear political vision and strategy in terms of energy

- Defined objectives in terms of electricity generation mix
- Unbundling and liberalisation of electricity sector and progressive opening of the electricity market
Energy targets for 2023

- Development of Renewable energy and nuclear
- Introduction of nuclear energy -> Target of 10% (2023) and 15% for 2030

Nuclear energy targets for 2023

- 8 Units to be operated and 4 units to be under construction
  - Akkuyu NPP (4800 MW)
  - Sinop NPP (about 4500 MW)
  - Third site (not officially declared)
Akkuyu NPP: General information

- BOO model
- Contractor: ROSATOM
- Agreement signed 12 May 2010
- Estimated cost: 20-25 Billion USD
- Reactor Type: VVER-1200
- Number of units: 4 (4800 MW total capacity)
- Construction period: 2015-2022
- Operation time: 60 years
Sinop NPP: General information

- PP partnership
  - 49% Turkish side: EUAS and, eventually, another company or IPO
  - 51% Consortium: Mitsubishi, Areva, GDF Suez and Itochu
- Inter-governmental agreement signed 3 May 2013
- Estimated cost: 22 Billion USD
- Reactor Type: ATME1
- Number of units: 4 (4480 MW total capacity)
Akkuyu Intergovernmental Agreement
Responsibilities – Turkish side

- Allocation of the NPP site
- Grid connection of the plant
- Facilitating the issuance of necessary licenses and permits
- Electricity power purchase according to the PPA
- No Sovereign Guarantees are provided
Akkuyu Intergovernmental Agreement
Responsibilities – Russian side

- Provide the capital
- Engineering design
- Obtaining all permits and licenses
- Construction, management and supervision
- Commissioning of the NPP
- Supply of equipment and material including nuclear fuel
- Operation and maintenance
- Waste management and decommissioning of the NPP
- Technology transfer and exchange of information
- Training of the Turkish staff of the NPP
• Russia is responsible for creating the Project Company and providing financing
  • The PC may sell up to 49% of the shares to the public (upon consent from Turkey)

• Structure of financing is preliminary envisaged as 20% equity – 80% debt
  • Equity financing (4 billion USD) is provided by Russian Federation
  • Rosenergoatom or other shareholder's bank credits
  • Funds of outside investors
    - Interest rate on credits are assumed to be 7-8%
    - Subsidy of credit rate from the Russian Government?
  • Export Credit for equipment/services provided by European suppliers
    - If OECD rules apply, this could represent up to 85% of the value (1.6 billion USD)

* (source MENR)
Financing Mechanism: Purchase Power Agreement

- Signed between TETAS and the Project Company
- Duration of the PPA: 15 years
- 70% of the electricity produced by Units 1 & 2 and 30% by Units 3 & 4
  - The Project Company will sell the remaining electricity to the market
  - One year before starting commercial operation, the PC has to indicate the amount of electricity to be produced in the first 15 years by each unit
  - The contractual arrangements and responsibilities in case of late/early commissioning will be reflected in the PPA price, but details are not public
- Electricity price at 123.5 USD/MWh (VAT excluded) in nominal term
  - Possibility to modify the price trajectory of electricity price (up to 153.3 USD/MWh) to ensure the payback of the project
- No Escalation costs
- Contribution to decommissioning and waste management funds (1.5 USD/MWh) during the length of the PPA
- Transfer of 20% of net profits of the PC to the Turkish Government after the expiry of the PPA
**Comments on risk allocation (I)**

- **Present Value of the electricity price defined in the PPA**
  - Defined in nominal terms and valid for a period 2020-2035
  - Depends on the assumed discount rate (2%-6%) and on assumed price trajectory
  - Average wholesale electricity price for 2010 was 93.8 USD/MWh
  - The PPA has the same value of the 2010 electricity wholesale price for 1.9% discount
  - The value of “price trajectory” is about 2%-5%
    
    | Value (in USD 2011 per MWh) of the purchase price agreement at different discount rates |
    |---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
    | 2.0%                            | 2.5%                            | 3.0%                            | 3.5%                            | 4.0%                            | 4.5%                            | 5.0%                            | 5.5%                            | 6.0%                            |
    |---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
    | Constant price trajectory       | 92.10                            | 85.76                            | 79.92                            | 74.53                            | 69.56                            | 64.98                            | 60.73                            | 56.81                            |
    | Maximal value                   | 93.74                            | 87.66                            | 82.04                            | 76.83                            | 72.00                            | 67.53                            | 63.37                            | 59.52                            | 55.93                            |

- **Construction risk**
  - The PPA is not adjusted to reflect potential cost overruns
  - Construction risk is borne exclusively by the project company (state-owned)

- **Construction delays**
  - Cost will be borne by the party responsible for the delay
  - The PC has the obligation to provide the agreed amount of electricity at the fixed price
**Electricity market risk**
- The PPA is applied to 50% of the electricity produced by the NPP for the first 15 years, while the remaining will be sold on the wholesale market
- The PC will be exposed to market and currency exchange rate risk
- TETAS will be exposed to market risk and exchange risk during the PPA
  - Demand for electricity is rapidly growing in Turkey
  - Wholesale prices are strongly correlated with coal and gas prices (expressed in USD)

**Design risk**
- The NPP is designed to withstand earthquakes of magnitude 9, but studies are on-going
- The PC will face the risk of safety-related design upgrades

**Waste management and decommissioning risk**
- The PC bears most of those risks
- Turkish State is responsible if funds for decommissioning are insufficient (up to 25%)

**Political risk**
Key Elements of the Akkuyu project

- Strong political support from Governments of Turkey and Russian Federation
  - Clear strategy and objectives in term of energy infrastructure
  - Nuclear is a strategic sector for Russian Federation
- Growing electricity demand in Turkey
- Guarantee of a stream of revenues via the PPA in USD
- Structure of the Turkish electricity market limits exchange rate and country risks
- Russian contractor fully takes the construction risk
  - Proven reactor design, several units constructed recently by Russian industry
  - Integrated supply chain from design and engineering to spent fuel management
- Financial support/guarantees from the Russian government
Thank you for your attention