Uzbekistan’s energy sector
Opportunities for international cooperation

October, 2018
Agenda

1. Oil and gas sector
2. Power sector
3. Appendix
Uzbekistan is the largest market in Central Asia; stable and fast growing

Key information

- **Capital**: Tashkent (2.3M – official data)
- **Urbanization**: ~50%
- **Official currency**: "Sum" – UZS (UZS/USD = 8’200)
- **Languages**: Uzbek (official), Russian (commonly used)
- **Political system**: Presidential multi-party democratic republic

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Uzbekistan is rich in mineral resources and the country is actively investing in further value chain segments.

Mineral resource diversity excludes the dependence on a single resource type.

### Reserves
- **Natural gas & oil**: 24th
- **Gold**: 10th
- **Copper**: 10th
- **Uranium**: 16th
- **Coal**: 29th

### Production
- **Natural gas & oil**: 13th
- **Gold**: 9th
- **Copper**: 20th
- **Uranium**: 7th
- **Coal**: 34th

Diversification of the energy supply portfolio:

- **Hydropower**
  - Investments of USD 2.65 billion in 2017–2025 to develop 18 new projects and upgrade 14 existing plants.

- **Solar**
  - ~51 billion tons of oil equivalent

- **Wind**
  - ~360 million tons of oil equivalent for wind energy

Source:
- Natural gas & Coal: BP Statistical Review of World Energy, June 2017
- Uranium: Uranium 2016: Resources, Production and Demand, a Joint Report by the Nuclear Energy Agency and International Atomic Energy Agency
- Uzbekistan State Committee on Geology and Mineral Resources
Uzbekistan have significant successful experience of joint ventures with regional and international O&G companies.

**History of selected examples of JVs & PSAs**

- **2004**
  - **Selection of Lukoil** for world class Kandym group of field
    - Current production 9Bcm
    - >$6B of investment

- **2008**
  - **Development of Karakul investment block by CNPC**
    - Production started in 2017
    - Targeted plateau 1 Bcm of gas

- **2013**
  - **Creation of Uzkorgas-chemical together with Korean consortium**
    - Joint production and processing facilities
    - $4B of investment

- **2017**
  - **Development of M25 field with Gazprom**
    - Two-phased expansion with up to 4Bcm plateau production
    - $5.8B of investment

- **2018**
  - **BP and SOCAR entering Ustyurt region**
    - Exploration phase within perspective region
Uzbekistan's reserves are developed both by state-owned Uzbekneftegaz as well as by international JVs/PSAs.
Uzbekistan's gas transportation system provides access to China & Russia markets for local and international producers.

Central Asia – Center: to Kazakhstan
From Turkmenistan to Russia
Full capacity: 35 Bcm
UZ share: 6 Bcm

Central Asia – China: to Kazakhstan
From Turkmenistan to China
Full capacity: 55 Bcm
UZ share: 10 Bcm

Uzbekistan South Pipeline
Full capacity: 3.2 Bcm
UZ usage: 2.5 Bcm

Production:
- Gas
- Gas & condensate
- Oil

Storage & transport:
- Storage facilities
- Gas pipelines
- Turkmenistan — China gas pipelines

Refining & chemicals:
- Gas chemical
- Gas processing
- Refinery
Vision and priorities for further development of Uzbekistan oil & gas industry (across the value chain)

O&G reserves exploration -
- Invite international O&G players to conduct exploration works in new perspective territories & blocks to discover new gas reserves
- Use modern seismic processing tools to discover new formations (e.g. under salt layers) in traditional territories & blocks

Oil & gas production -
- Invite international OFS players to bring modern EOR technologies (e.g. horizontal drilling & fracking, artificial lift) to maintain current production levels
- Together with international O&G players jointly develop oil & gas fields

Gas processing & oil refining -
- Complete construction of the gas-to-liquid (GTL) plant to produce ecologically clean diesel and jetfuel
- Build new capacities to produce monomers (ethylene, propylene) with further production of locally consumed plastics, synthetic rubbers, chemical fibers
- Upgrade country's outdated oil refineries to produce ecologically clean fuel, base oils and additives with Euro 5 quality
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Current situation: ~14 gigawatts capacity and ~60K GWh generation with gas as the main source

Total installed capacity for power generation is ~14 gigawatts

Generation is ~60K GWh with 2/3 coming from gas

Power capacity, GW (Jan 1, 2018)

- 10 TPPs: 12.1 GW
- 37 HPPs: 1.9 GW
- Other (block stations): 0.1 GW
- Total: 14.1 GW

Power generation, K GWh (2017)

- Gas: 40.3 GWh (66%)
- Coal: 11.7 GWh (19%)
- Hydro: 8.1 GWh (13%)
- Other: 0.7 GWh (1%)
- Total: 60.7 GWh

Source: UZ electro energy concept 2030
Current situation: ~23K km of electric lines to distribute power with core consumers in industrial and residential sectors

<table>
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<th>Power transmission system includes</th>
<th>86% of total power consumed by industry, residential and agro consumers</th>
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<tbody>
<tr>
<td>~23K km of lines</td>
<td></td>
</tr>
<tr>
<td>1850 km  500-kilovolt (kV) lines</td>
<td>Industry 41%</td>
</tr>
<tr>
<td>6200 km  220-kilovolt (kV) lines</td>
<td>Residential consumers 24%</td>
</tr>
<tr>
<td>15300 km 100-kilovolt (kV) lines</td>
<td>Agricultural consumers 21%</td>
</tr>
<tr>
<td></td>
<td>Commercial entities 12%</td>
</tr>
<tr>
<td></td>
<td>Transport 3%</td>
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% of total power consumption (2017)

Source: UZ electro energy concept 2030
Current problems cover low efficiency and poor condition of assets, high level of losses and low tariffs

- **Low efficiency of TPPs.** All TPPs run on steam turbine technology with a weight average efficiency of 33%, compared to 55% for advanced combined-cycle gas turbine technology.
- **Poor assets condition.** Most power generation assets are 40–50 years old, in poor condition, and require replacement and/or rehabilitation.
- **Power assets are not strategically situated.** About 70% of power generation occurs in the north while over 90% of gas production occurs in the south.

- **Poor assets condition.**Assets have not been properly maintained and upgraded, affecting the delivery of reliable power supply to domestic customers, especially in the south regions.
- **High level of losses.** Transmission system losses are officially reported at 18% and distribution losses at 14%. Revenue collection rate is not more than 80% which may be understated because of Uzbekenergo’s inability to collect information on the amount of electricity supplied and inability to monitor the revenue collection.

- **Low tariffs.** Uzbekistan’s electricity tariff has been low in absolute terms because of the low domestic cost of natural gas relative to international prices ($66 per 1,000 m³, which is substantially lower than its export price). This has discouraged demand-side energy efficiency improvements.

Source: ABD, EBRD
Vision of development covers capacity and operational efficiency increase, regulatory environment improvement

- **TPP capacity increase.** Several TPPs with additional capacity of 2.5 GW are currently under construction.
- **HPP capacity increase.** Uzbekistan embarked on the ambitious program of rehabilitation of old and construction of new HPPs with estimated 27.4M MW/h annual hydropower generation capacity. The plans are to develop 18 new HPPs and modernize 14 existing HPPs till 2025.
- **Renewable energy.** Targeting up to 21% renewable energy by 2031, Uzbekistan also plans to install at least 4 GW of solar capacity.
- **Nuclear generation.** In 2018, the government has announced plans to develop a nuclear power generation starting with two units 1200 MW each.
- **New PPs to optimize network.** To reduce gas and power transmission losses, CCGT power plants will be constructed in Talimarjan and Navoi in the south, close to gas fields.
- **Operational efficiency improvement.** To improve the efficiency of dispatch operation and energy management, a modern and automated supervisory control and data acquisition system will be developed.
- **A set of regulatory measures,** including1: Long-term master plan development, Investment program 2030, Institutional and structural reforms, Promoting PPP and regulatory environment preparation, New tariff methodology, Corporate governance improvement, Renewable energy development.

1. Detailed description is on the next slide
Source: ABD, EBRD
**Vision of development: 7 core regulatory initiatives developed with international organizations**

<table>
<thead>
<tr>
<th>№</th>
<th>Regulatory Initiative</th>
<th>Short description / goals</th>
<th>Leader</th>
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</table>
| 1. | Develop long-term master plan in the power sector | • Address peak demand growth while improving operational efficiency of power system in Uzbekistan  
• Prioritize the least cost investments and financing needs in power generation, transmission and distribution subsectors for the next 20 years. | ADB |
| 2. | Consolidated investment program up to 2030 | • Increase investment attractiveness of Uzbekenergo for IPP and PPP arrangements  
• Enhance Uzbekenergo’s financial positions as a credible off-taker (more below). | EBRD |
| 3. | Prepare a proposal on institutional and structural reforms | • Review the policy, legal and regulatory, institutional, and governance framework in the power sector  
• Benchmark international practices for power sector institutional reform  
• Help define key objectives and intermediate objectives for power sector institutional reform and formulate a power sector institutional reform strategy and roadmap | WBG |
| 4. | Prepare legal and regulatory base for promoting PPP in the energy sector | • Improve the legal and regulatory framework for PPP through the development of a modern policy, legal and institutional framework for PPP projects  
• Develop a capacity building workshop on PPP for renewable energy development/competitive procurement of renewable projects | EBRD |
| 5. | Financial recovery of power sector | • Implement sustainable debt management for Uzbekenergo, which will prioritize future investments and tariff levels  
• Develop the new tariff setting methodology to ensure gradual full cost recovery as well as a strategy to implement it in a time bound manner while at the same time identifying and mitigating adverse social impacts | ADB |
| 6. | Develop proposals to improve corporate governance system of UE | • Incorporate governance as part of its review of options and preparation of a roadmap and an implementation package for attracting investment  
• Adopt and fully implement Corporate Governance Rules based on 2015 OECD Corporate Governance Guidelines for SOEs | EBRD |
| 7. | Develop renewable energy | • Support the Government to prepare solar PV projects, and attract and select private sector investors through a competitive and transparent process  
• Support preparation of renewable energy by laws and regulations that need to be developed  
• Provide capacity development support through workshops and study tours. | WBG |
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The URDF\(^1\) founded to provide financial support for major industrial projects in Uzbekistan (incl. O&G)

Established in 2006 by a Decree of the President of the Republic of Uzbekistan with the major objectives to...

- Accumulate export revenues
- Finance and co-finance strategic industrial investment projects

Areas of Financing

- Oil & Gas
- Chemical & Petrochemical
- Energy & Power
- Metals & Mining
- Transport & Infrastructure

Equity has grown from USD 1 billion in 2006 to USD 20 billion in 2018

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1 The Uzbekistan Reconstruction and Development Fund is a co-investor in the Uzbekistan O&G industry
The URDF’s portfolio includes >100 projects with the total value exceeding $35 billion; primary focus on O&G

Over 120 projects with total project cost of $36.4B

- **40 projects completed**
  - Oil & Gas: 37%
  - Aircraft, transportation, infrastructure: 27%
  - Power: 19%
  - Mining: 10%
  - Chemicals: 7%

- **23 projects under implementation**
  - Oil & Gas: 37%
  - Aircraft, transportation, infrastructure: 27%
  - Power: 19%
  - Mining: 10%
  - Chemicals: 7%

- **40 projects being prepared**
  - Oil & Gas: 33%
  - Aircraft, transportation, infrastructure: 9%
  - Power: 28%
  - Mining: 22%
  - Chemicals: 8%