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Unlocking Libya's Energy Future: The Strategic Role of Nuclear Power in a Fossil-Dominated Electricity Mix

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Outline

1

Libya's Current Energy Landscape

2

Emissions Profile & Structural Challenges

3

The Case for Diversification & Nuclear Power

4

Key Advantages & Technology Options

5

Economic Benefits & Addressing Concerns

6

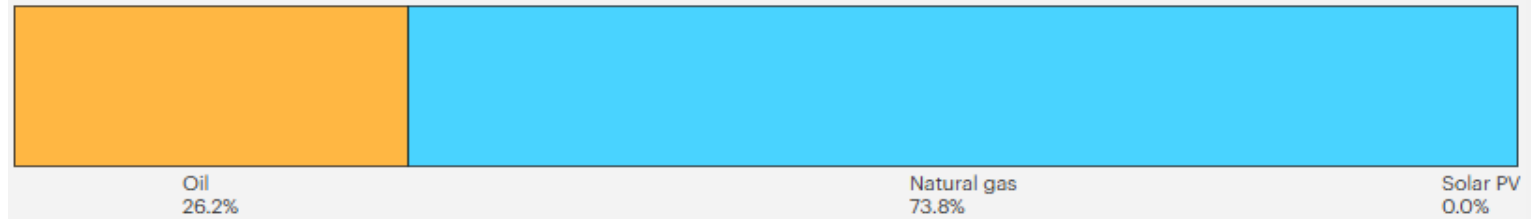
The Way Forward & Conclusion

Libya's Current Energy Landscape

- **Total Electricity Generation: 100% Fossil Fuels.**

- Natural Gas: **73.8%.**
- Oil: **26.2%.**

Electricity generation, Libya, 2023



- **Heavy Reliance on Exports:** 73% of energy production is exported.
- **Top Regional Consumer:** Highest electricity consumption per capita in the region (Africa).

➤ *Sources: IEA, World Energy Balances 2023*

Emissions Profile & Structural Challenges

- **Emissions:** 48.1 Mt CO₂. Electricity/Heat sector is the largest source (44.2%).
- **Key Challenges:**
 - Aging infrastructure leading to frequent blackouts.
 - Massive energy losses (~309,000 TJ).
 - Limited grid flexibility.
 - **Result:** Economic disruption and lost export revenue.

Why Libya Needs Diversification

- **100% Fossil Dependence = National Risk.**
- **Rising Demand:** Growing population and industrialization.
- **Energy Security:** Need for stable, low-carbon base-load power.
- **Economic Imperative:** Preserve oil & gas for high-value export.

The Case for Nuclear Power

- **Proven, low-carbon base-load technology.**
- Compatible with national grid and industrial demand.
- **A long-term investment** in national energy security.

➤ *Source: DOE “Pathways to Commercial Liftoff: Advanced Nuclear”.*

Key Advantages of Nuclear

- **Reliability:** >90% capacity factor.
- **Low Emissions:** Among the lowest lifecycle CO₂.
- **Compact Footprint:** Minimal land use.
- **Stable Economics:** Insulated from fuel price swings.
- **Multi-use:** Power, heat, desalination, hydrogen.

Technology Options

- **Generation III+ Large Reactors:**
 - Ideal for coastal industrial hubs and major grid base-load.
- **Small Modular Reactors (SMRs):**
 - Modular, scalable, lower initial investment.
 - Suitable for smaller grids or dedicated uses (e.g., desalination).

Economic Benefits & Addressing Concerns

- **Economic Benefits:**
 - Increase export revenue by reducing domestic fuel burn.
 - Stimulate high-skill jobs, R&D, and local industry.
- **Addressing Concerns:**
 - **Safety:** Modern designs have passive safety systems.
 - **Waste:** Managed under IAEA guidelines; volumes are small.
 - **Public Acceptance:** Built through transparency and education.

The Way Forward

1. **Integrate** nuclear into national energy strategy.
2. **Develop** human resources and a robust regulatory body.
3. **Partner** with IAEA and experienced technology vendors.
4. **Evaluate** potential sites and financing models (e.g., public-private partnerships).

Conclusion

- Libya's fossil-based system is economically and environmentally unsustainable.
- Nuclear energy provides a **clean, secure foundation** for future growth.
- It is a strategic investment in **national resilience, economic stability, and climate responsibility.**



THANK YOU