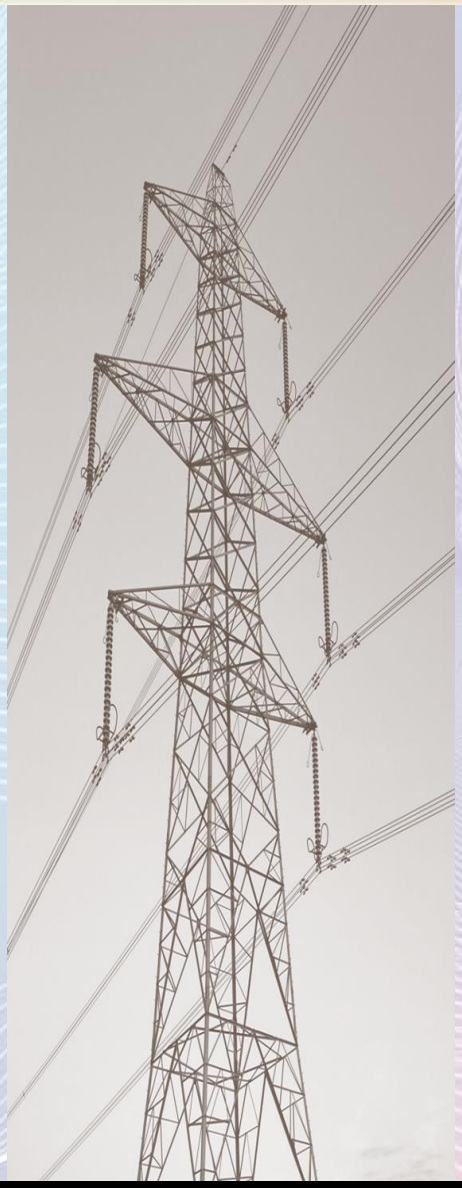


Afghanistan Energy Sector

Afghanistan Energy Sector

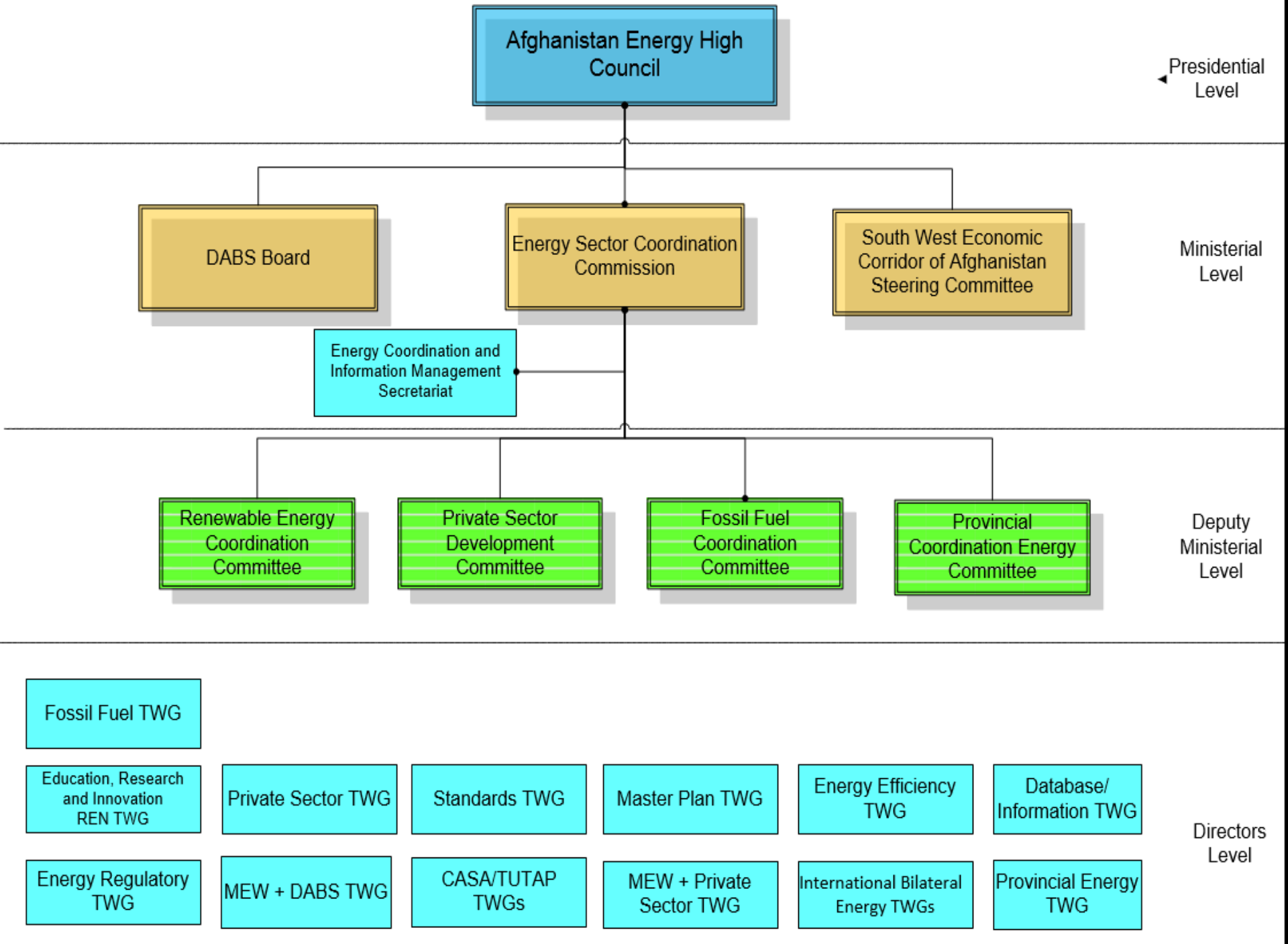
Out line of Presentation

- Overview of Energy Sector Policy
- Energy Sector Structure
- Energy Status in Afghanistan
- Afghanistan Electricity Demand Forecast
- Afghanistan Energy Potential
- Projects in Pipeline
- Renewable Energy in Afghanistan
- Challenges and Way forward

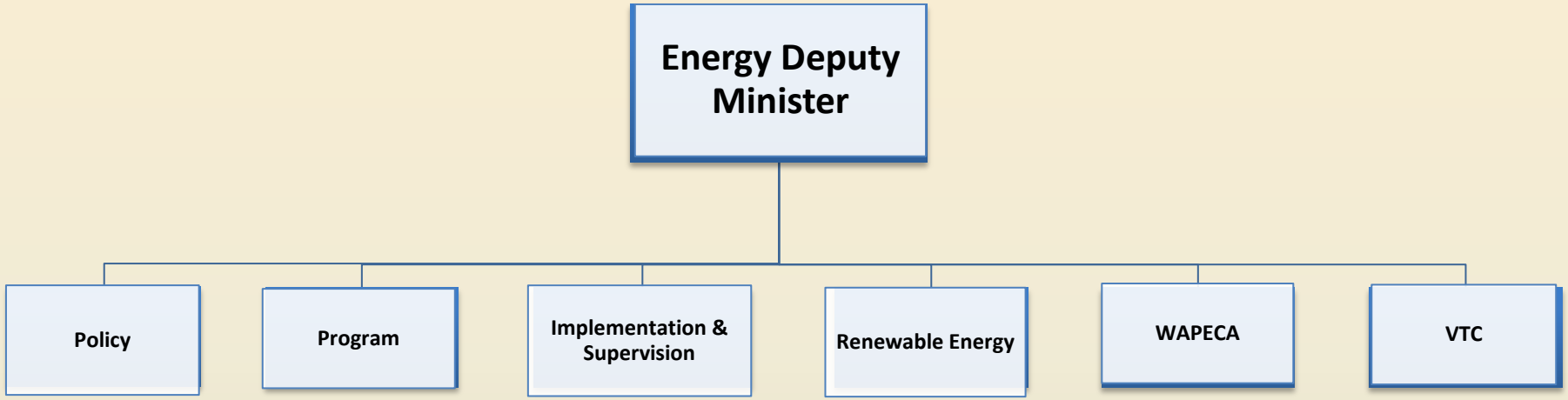
Energy Sector Policy

Afghanistan's Energy Sector Strategic goal is to provide sustainable power supply, at affordable prices, and in an environmentally sound manner, for economic growth, and to improve living standards

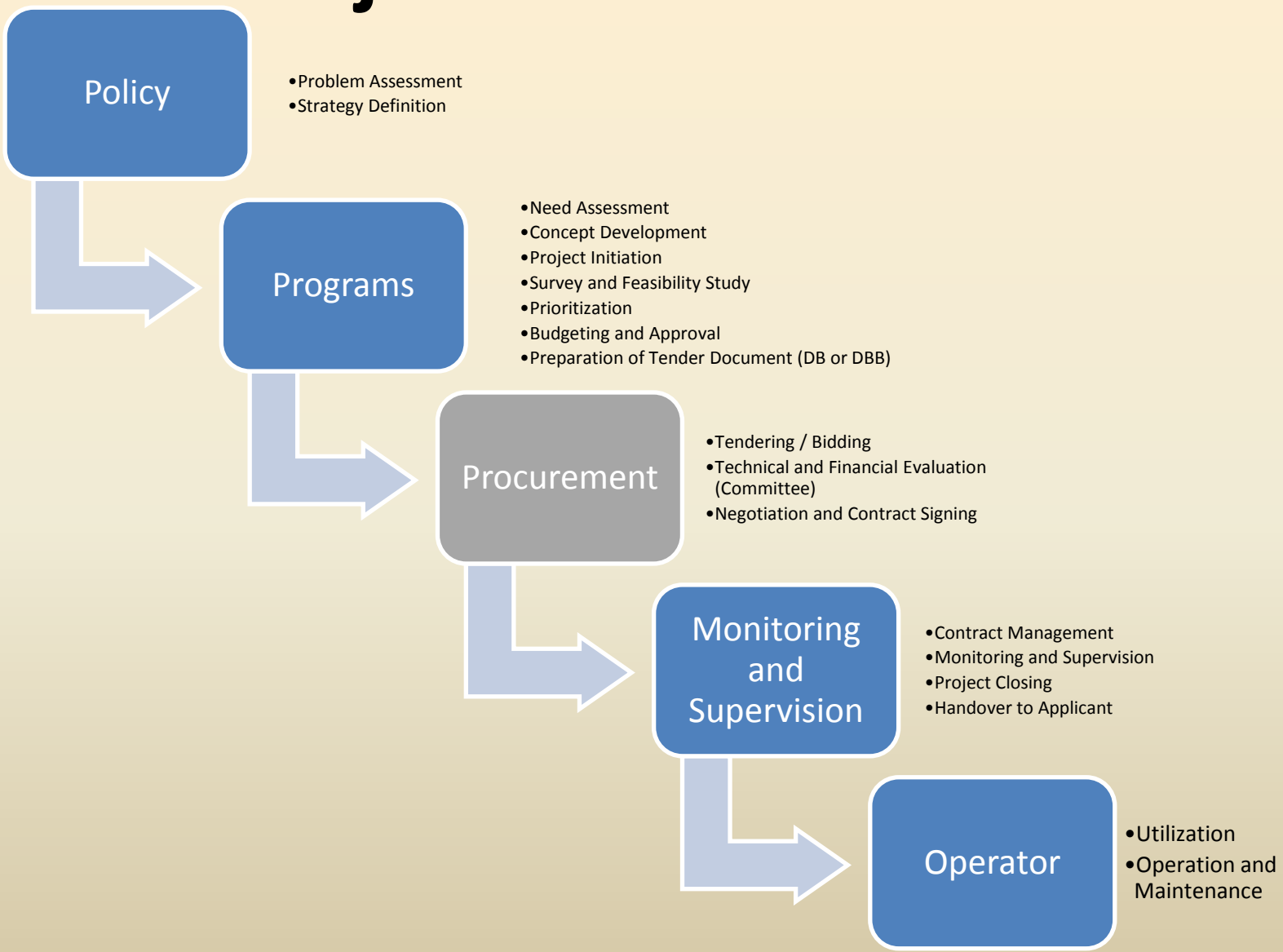
- Direct policies and regulations
- Make maximum use of domestic resources
- Initiate sector regulation
- Promote private sector participation and investment in the electricity sector
- Encourage the expansion of access to underserved and rural communities
- Stimulate the rational use of Renewable sources of energy


Afghanistan Energy High Council
Presidential Level
DABS Board
Energy Sector Coordination Commission
South West Economic Corridor of Afghanistan Steering Committee
Ministerial Level
Energy Coordination and Information Management Secretariat
Renewable Energy Coordination Committee
Private Sector Development Committee
Fossil Fuel Coordination Committee
Provincial Coordination Energy Committee
Deputy Ministerial Level
Fossil Fuel TWG
Education, Research and Innovation REN TWG
Private Sector TWG
Standards TWG
Master Plan TWG
Energy Efficiency TWG
Database/ Information TWG
Energy Regulatory TWG
MEW + DABS TWG
CASA/TUTAP TWGs
MEW + Private Sector TWG
International Bilateral Energy TWGs
Provincial Energy TWG
Directors Level

Current Structure



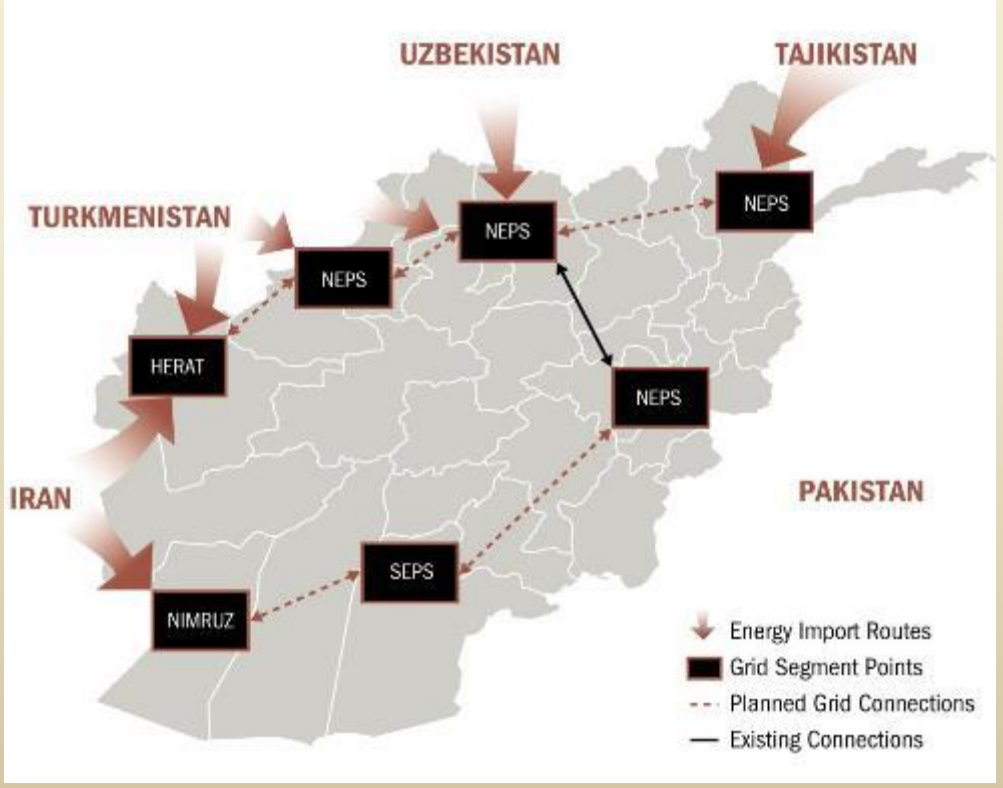
Project Work Flow



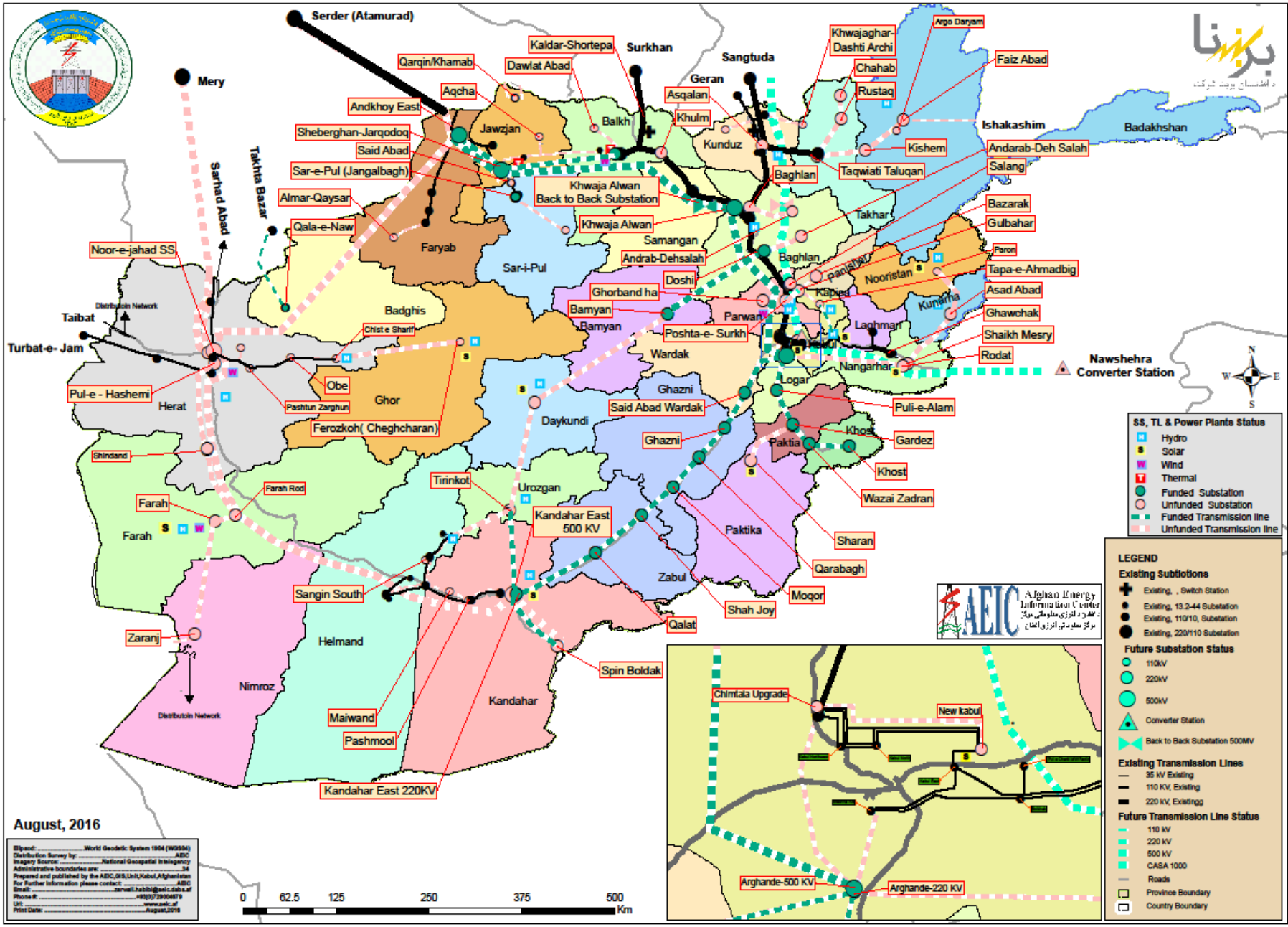
Industry structure and institutional arrangements

- Currently, the power sector is governed by Ministry of Energy and Water (MEW) and operated by Da Afghanistan Breshna Sherkat (DABS), which controls & operates all the activities of power sector throughout the country.
- The Afghanistan power system is categorized into four different networks namely, North East Power System, South East Power System, Herat Zone System and Turkmenistan system which facilitates both internal and cross border interconnections with neighboring countries like Uzbekistan, Tajikistan, Iran and Turkmenistan.

- ✓ North East Power System; **(NEPS)** consisting of a grid linking 17 load centers (Kabul, Mazar-i-Shariff, Jalalabad, etc) with Uzbekistan and Tajikistan (HVTL 220kv, 110kv, 35kv)
- ✓ South East Power System **(SEPS)** consisting of Khandar, etc linking Kajaki (HVTL 110kv)
- ✓ Herat system linking the Herat Zone with Islamic Republic of Iran and Republic of Turkmenistan (HVTL 132kv, 110kv)
- ✓ Turkmenistan system linking Herat, Faryab, JawzJan, Sar-e-Pul and Andkhoy district. (HVTL 110kv)



Afghanistan National Grid Plan

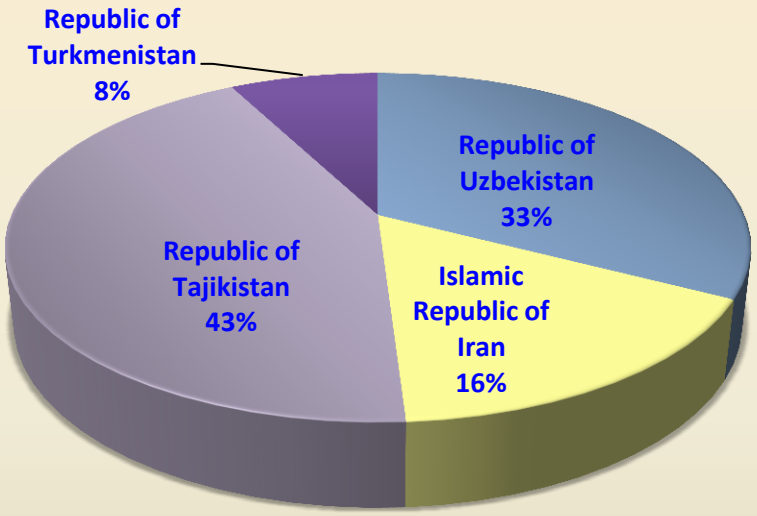


Energy access is a key focus of national development programs

- National Priority Programs (NPP)
  - National Energy Supply Program (NESP) on Infrastructure Cluster
  - National Water and Natural Resources Development Program : where Energy for Rural Development in Afghanistan is one component : ARD Cluster.
- Power Sector Master Plan prepared
  - 20 year grid expansion planning
- Gas sector plan is under formulation stage
  - Options to efficiently utilize country's significant natural gas resources for electricity, transport, and heating/cooking
- Development of coordination bodies
  - Renewable Energy Coordination Committee
  - Inter-ministerial Commission for Energy

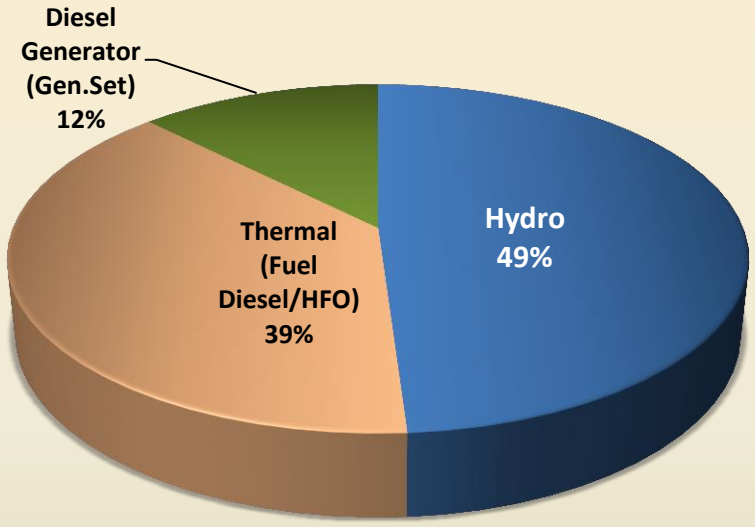
Afghanistan on Grid Generation / Transmission Profile

Transmission Lines Installed Capacity, Max in MW



Republic of Uzbekistan	326
Islamic Republic of Iran	164
Republic of Tajikistan	433
Republic of Turkmenistan	77
Total	**1,000**

Afghanistan Core Generation, Installed Capacity in MW



Hydro	254
Thermal (Fuel Diesel/HFO)	200
Diesel Generator (Gen.Set)	65
Total	**519**

Afghanistan Electricity Demand Forecast Within 20 Years

- A demand forecast for 20 year horizon has been prepared based on commonly applied methodology. Inputs are key socio-economic variables, such as GDP growth, as well as standardization of the average tariff level for all category of consumers, as critical deciding factors. Starting with the forecasts for the various provinces, the anticipated total demand forecast for Afghanistan has been estimated. (Afghanistan Power Sector Master Plan)

- For the whole of Afghanistan, gross demand, i.e. dispatched electrical energy, will increase in the base case scenario by 5.7% or 8.7% per annum on average from its current level to 18,400 GWh in 2032. Total peak demand in 2032 is expected to stand at around 3500 MW. In addition, high and low scenarios were developed which show a total gross demand of about 22,500 GWh and a peak of 4300 MW in 2032 in the high scenario and around 13,700 GWh gross demand and 2600 MW peak in the low scenario. (Afghanistan Power Sector Master Plan)

Afghanistan Energy Potential

No	Type	Potential
1	Hydro Power	• 23,000MW of Energy • 125 sites been identified for MHP, with potential of over 600MW of electricity
2	Wind Energy	• 158,500 MW installed capacity i.e. 5MW/km^2 • 31,600km^2 windy land area i.e. 5% of Afg. total land area
3	Solar Energy	• 300 Sunny day in one year, i.e. 3,000 Hours of Sun • 6.5 kWh/m^2 per day solar radiation average
4	Bio-Mass	• More than 85% of Afghanistan's energy needs are met by traditional biomass, mainly wood and dung
5	Geo-Thermal Energy	• Prospects of low to medium temperature geothermal resources are widespread all over Afghanistan. • Power plants to be built in Afghanistan could range from 5 to 20MW each
6	Gas and Coal	• 3000 MW*– 4000 MW* • Prefeasibility Studies, Sites Identification of coal power plants • 8 out of 12 gas wells been surveyed

Investment Required to Meet demand Supply Gap

- To achieve the goal for providing power supply towards whole Afghanistan, a large investment plan is required for all the sub-areas like, Generation expansion, Transmission Network development and strengthen Distribution System. This will need a total investment of $10,096m, out of which, $7,330m for Generation sector development and network integration, $1,727m for major Transmission Projects and $1,040m for Transmission Network development within the provinces up to the year 2032. (Afghanistan Power Sector Master Plan)

- The total investment for stage A is estimated at $1,214m. Stage B will require $1,464m while stage C and stage D will require about $1,409m and $6,010m. The high investment in Stage D is related to the hydropower plants. (Afghanistan Power Sector Master Plan)

Overview on Investment type	Subtotal by project	Stage A	Stage B	Stage C	Stage D
Generation development	$ 7,329.50	$ 327.60	$ 348.50	$ 981.50	$ 5,671.90
Major transmission projects	$ 1,725.90	$ 595.00	$ 676.00	$ 212.90	$ 242.00
Transmission development within the provinces	$ 1,041.00	$ 291.10	$ 439.80	$ 215.10	$ 95.00
Total in Million USD	$ 10,096.40	$ 1,213.70	$ 1,464.30	$ 1,409.50	$ 6,008.90

Energy Projects in pipeline Status

- CASA 1000: 1000 MW from the Northern neighbors to Pakistan through Afghanistan - 300 MW will be used in the country
- Aynak copper mine: Chinese company (MCC) will exploit the coal mine in North Hindukush and build coal power plant - projected capacity is 400 MW
- Mazaar Gas Plant: 50 MW gas power plant supported by IFC/WB
- TAPI : Turkmenistan, Afghanistan, Pakistan and India Gas pipe line
- TUTAP : Turkmenistan, Uzbekistan, Tajikistan, Afghanistan and Pakistan – Interconnection
- TAP 500: Turkmenistan, Afghanistan and Pakistan 500 KV TL project

Legislation

General Works done and in Progress

Regulatory + Policy + Strategy

- Electricity Services Law
- Renewable Energy Policy
- Rural Renewable Energy Policy -draft
- REN Strategy
- Energy Efficiency Standards for Buildings
- Wind & Solar Atlas and Investment Plan
- RED ToR and Five Year Action Plan
- REN Industry Study – Under process to be developed
- INDC

Coordination

- Inter Ministerial Commissioning of Energy
- Renewable Energy Coordination of Energy
- REN Potential Maps
- REN Online Database
- REN Magazine
- REN Union of Private Companies
- Energy Working Groups – 5 Provinces
- Technical REN Working Groups

Demonstration

- 50 MW REN projects – off grid
- Provincial Electrical Concepts
- REN Workshop and Exhibition or Road shows
- Regional REN workshops and seminars
- REN Park – To be constructed
- Solar and MHP Guidelines
- 100 MW REN Package for private investors

Electricity Regulator

- Historically electricity tariffs were fixed by Government.
- Constrained by political and administrative compulsions, over the years resulted in acute distortion of tariffs on a large scale.
- Thus arose the need for removing this responsibilities from Government and vesting them in independent electricity regulatory body.
- Independent regulatory mechanism for the Power sector is somewhat new to our country but it has been working successfully in many developed countries.
- In Afghanistan, the institution of electricity regulators has been introduced under USAID/GIZ assistance. Thereafter, this became an important item in the reform agenda for the Power sector and was ultimately included in the Afghanistan Electricity Law, 2015.

Renewable Energy Development Roadmap

Regulatory Framework

- ♦ Electricity Act
- ♦ REN Policy
- ♦ REN Strategy
- ♦ Tariff Act
- INDC

Institutional Framework

- ♣ Constituted Regulatory Body
- ♣ Constituted REN directorate in Ministry and Utility
- ♣ Established independent FI to finance REN projects

Capacity Development

- ♠ Establish REN Institute
- ♠ Arranging training at home and abrade
- ♠ Arranging seminar, symposium and workshop

Project Development

- ♥Implementing REN Projects
- ♥ Identify REN Potentials
- ♥Implementing REN project
- ♥O&M – Sustainability of the projects

Renewable Energy Development

A renewable energy industry with private sector participation will require

Assessments
- RE Resource
- Market
- Feasibility

Technology
- Research
- Development
- Demonstration
- Standards

Commercials
- Access to capital
- Business model innovation
- Evidence of cost-recovery

People
- Awareness
- Training
- Certifications

Underpinned By

- Political Will
- Regulatory Environment
- Investment
- Coordination (Govt / Devpt Partners / Private Sector)

Renewable Energy Proposed 100 MW Projects

No	Project Name	Province	Type of Energy	Capacity (kW)	Power Plant Est. Cost (Million USD)	No. of People Supplied
1	Kandahar Solar - DG Hybrid Project	Kandahar	Solar	30000	90	
2	Kabul Solar - Hydro Hybrid Project	Kabul	Solar	10000	25	
3	Roof Top Solar Project	Kabul	Solar	5000	15	
4	Kabul Waste to Energy Project	Kabul	Biomass	6000	23	
5	Kabul Waste Water Treatment Project	Kabul	Biomass	1000	2	
6	Bini Hisar Biogas Digester Project	Kabul	Biomass	500	1	
7	Pul Charkhi Biogas Project	Kabul	Biomass	500	0.5	
8	Ghor Solar Project + Backup + Distribution Network	Ghor	Solar	5000	25	
9	Helmand Solar Project	Helmand	Solar	3000	20	
10	Herat Wind project	Herat	Wind	14000	36	
11	Spogmee MHP Project	Badakhshan	MHP	2500	10	
12	Kuran Wa Munjan MHGP Project	Badakhshan	MHP	1500	9	
13	Yangi Qala MHP Project	Takhar	MHP	1000	6.5	
14	Farkhar MHP Project	Takhar	MHP	500	2.5	
15	Namak Ab MHP Project	Takhar	MHP	500	2.5	
16	Mazar Waste to Energy Project	Balkh	Biomass	6000	16	
17	Zari MHP Project	Balkh	MHP	500	2	
18	Sholgara MHP Project	Balkh	MHP	500	1.5	
19	Kishindeh MHP Project	Balkh	MHP	500	2	
20	Urozgan Solar Project	Urozgan	Solar	1500	4.5	
21	Noristan Solar Project + Distribution Network	Noristan	Solar+MHP	1000	4	
22	Daikundi Solar Project	Daikundi	Solar	1000	3	
23	Badghis Solar Project	Badghis	Solar	1000	3	
24	Zabul Solar Project	Zabul	Solar	1000	3	
25	Paktia Solar Project	Paktia	Solar	1000	3	
26	Logar Solar Project	Logar	Solar	1000	3	
27	Khost Solar Project	Khost	Solar	1000	3	
28	Ghazni Solar Project	Ghazni	Solar	1000	3	
29	Paktika Solr Project + Distribution Network	Paktika	Solar	1000	4	
30	Farah Solar Project	Farah	Solar	1000	3	
	Total			100000	326	1000000

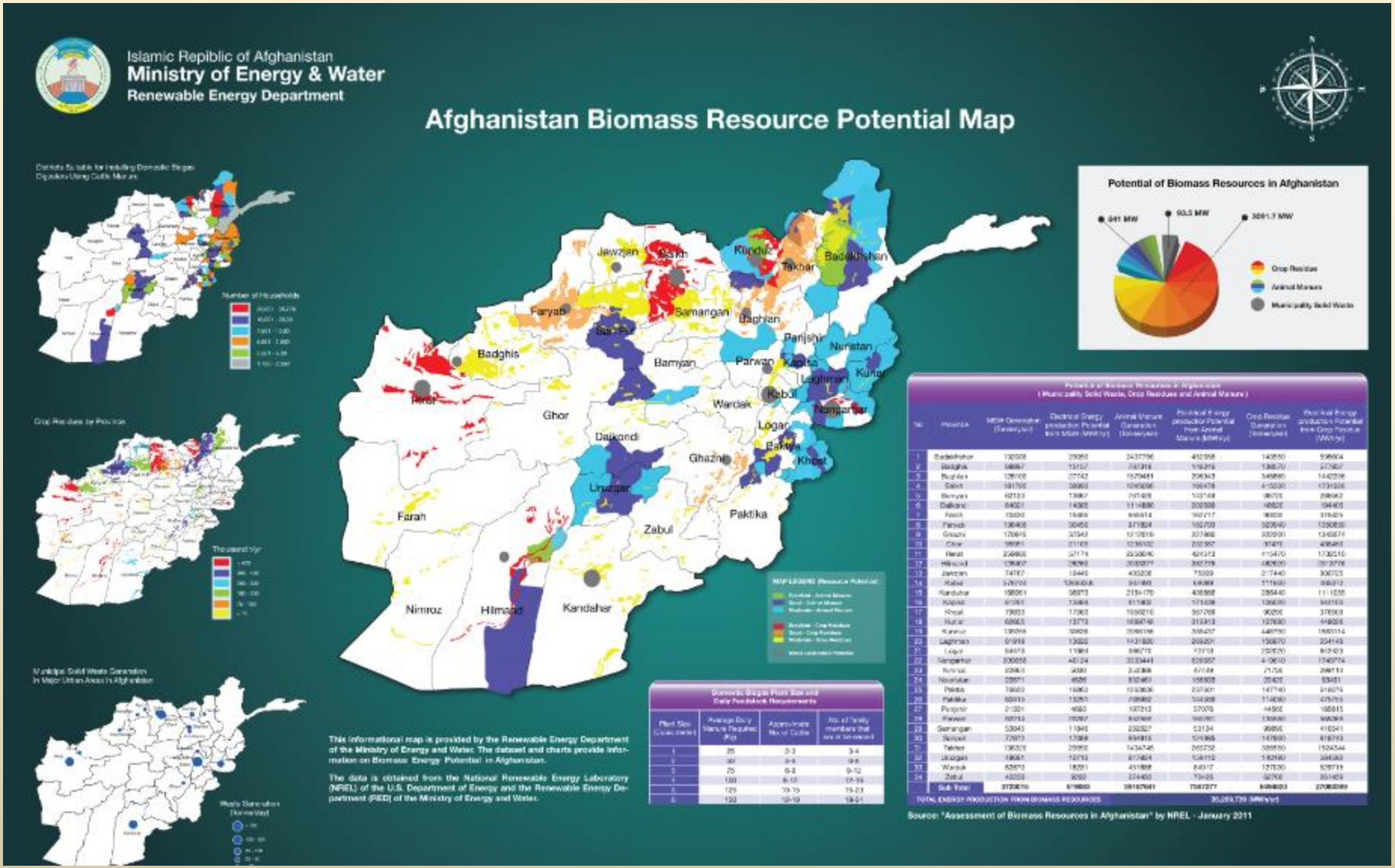
وزارت انرژی و آب

Ministry of Energy and Water

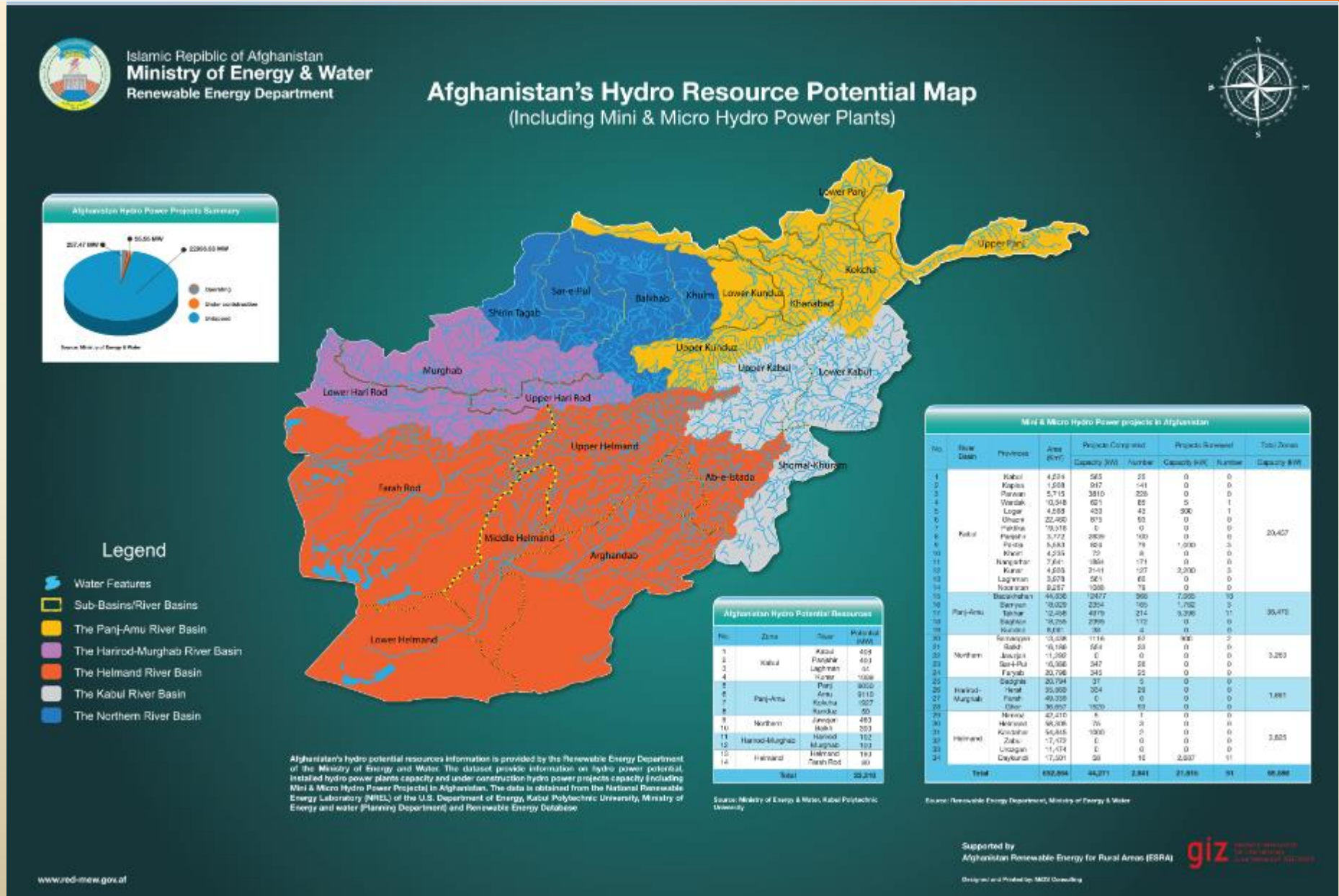
What we Offer for Investors

- Long Term Land Lease – Energy Farms
- 25% Subsidy
- Tax Incentives
- Security Assistance
- Long term PPA
- Right to Buy
- Attractive Tariff

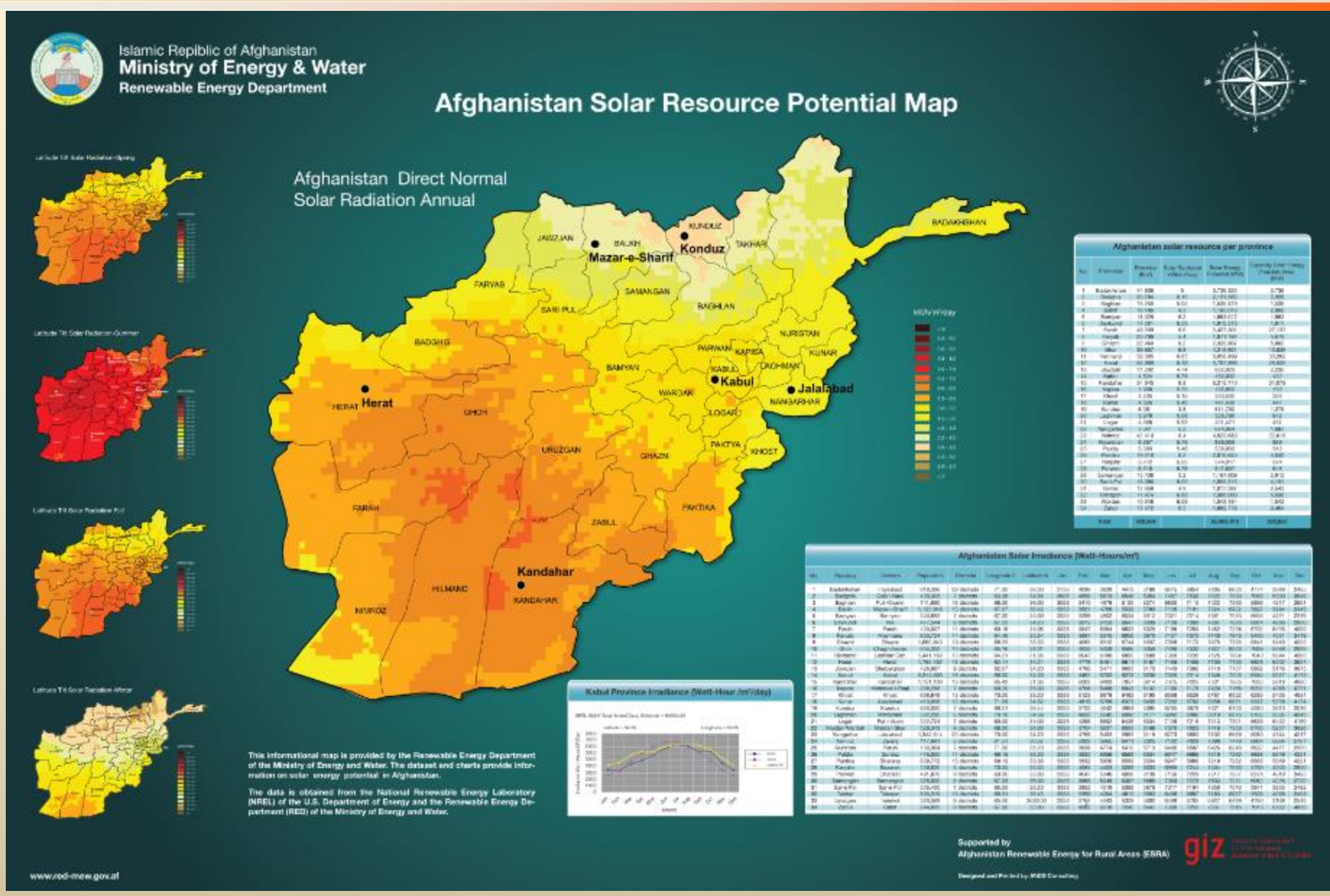
Renewable Energy Maps



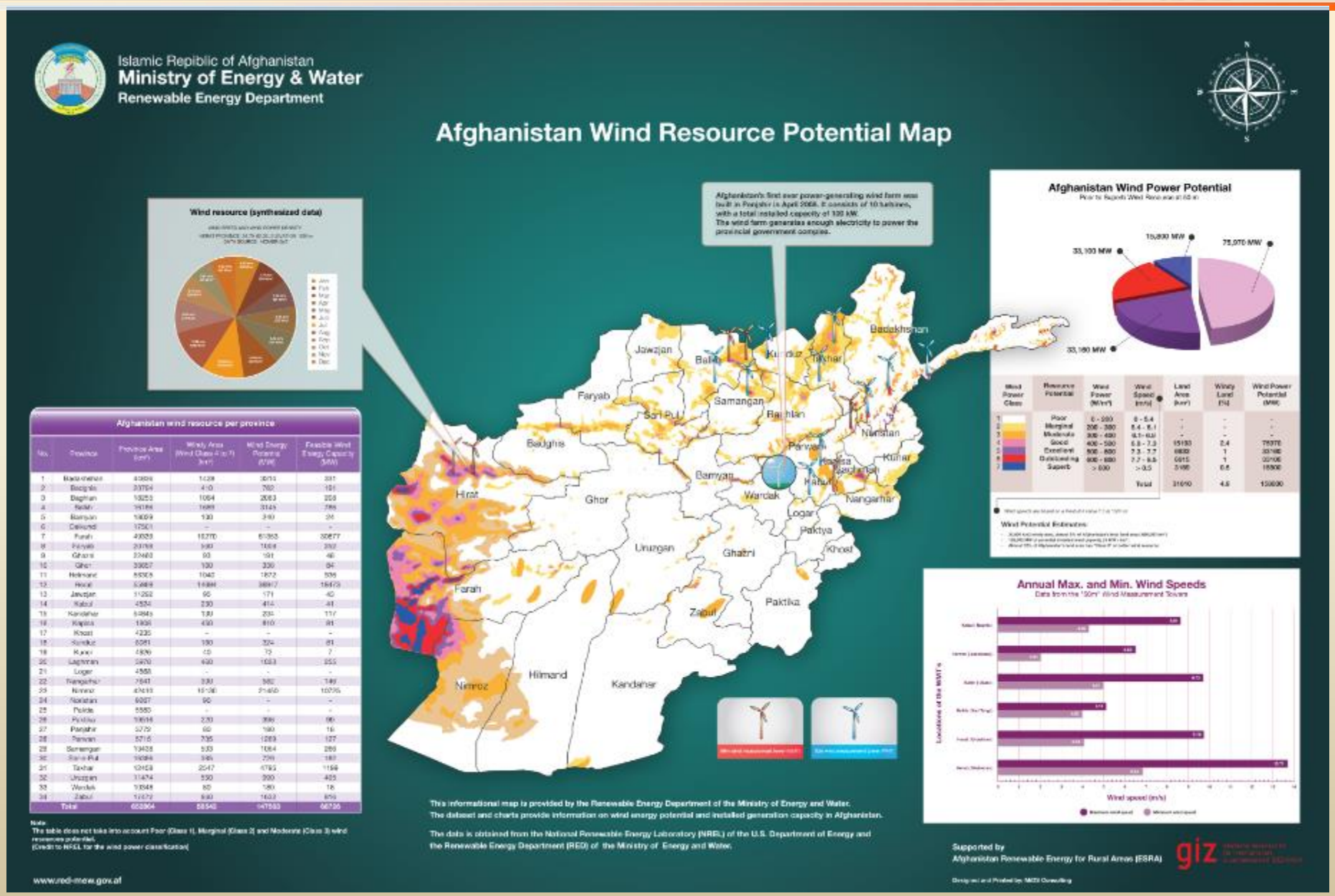
Renewable Energy Maps



Renewable Energy Maps



Renewable Energy Maps



Development of RE Sector

No	What	How
1	Resource Assessments	• Site-specifc resource assessments • Evaluation of grid-connectivity options • Grid-tied / mini-grid / stand-alone balance assessment • Market (+tariff) assessments
2	Technology Development and Demonstration	• Pilot/demonstration programs (stand-alone / mini-grid / grid-tied) • Standards development • International technology transfer • REN Parks
3	Commercials	• Business model innovation + demonstration • Demonstrate cost-recovery by private sector • Financial risk mitigation for PPPs • Mechanisms to access capital
4	People	• Awareness programs • Developing Curricula / certifications • Advertisements

What Needs to be Done

No	What	How
5	Political Will	• Awareness of RE benefits • Coordination with government at different levels • Demonstration of benefit to constituents • Demonstration of economic benefit
6	Regulatory Environment	• Develop legal basis for private sector • Transparent guidelines • Technical standards • Oversight/monitoring (especially O&M)
7	Coordination	• ICE / RECC • IRENA • ECO • SAARC


Thank You
تشکر