# Central Asia - South Asia Regional Energy Trade

Regional Energy Trade Workshop

Manila, 8 Sept 2014

**CAREC/ CASEREM Initiative**

Energy rich Central Asia and power poor South Asia:

**CASA 1000**

KGZ and TAJ Hydro surplus exported to PAK on dedicated line

**TUTAP**

Central Asia Thermal and hydro surplus exported to PAK via AFG grid

**Summary and Status**

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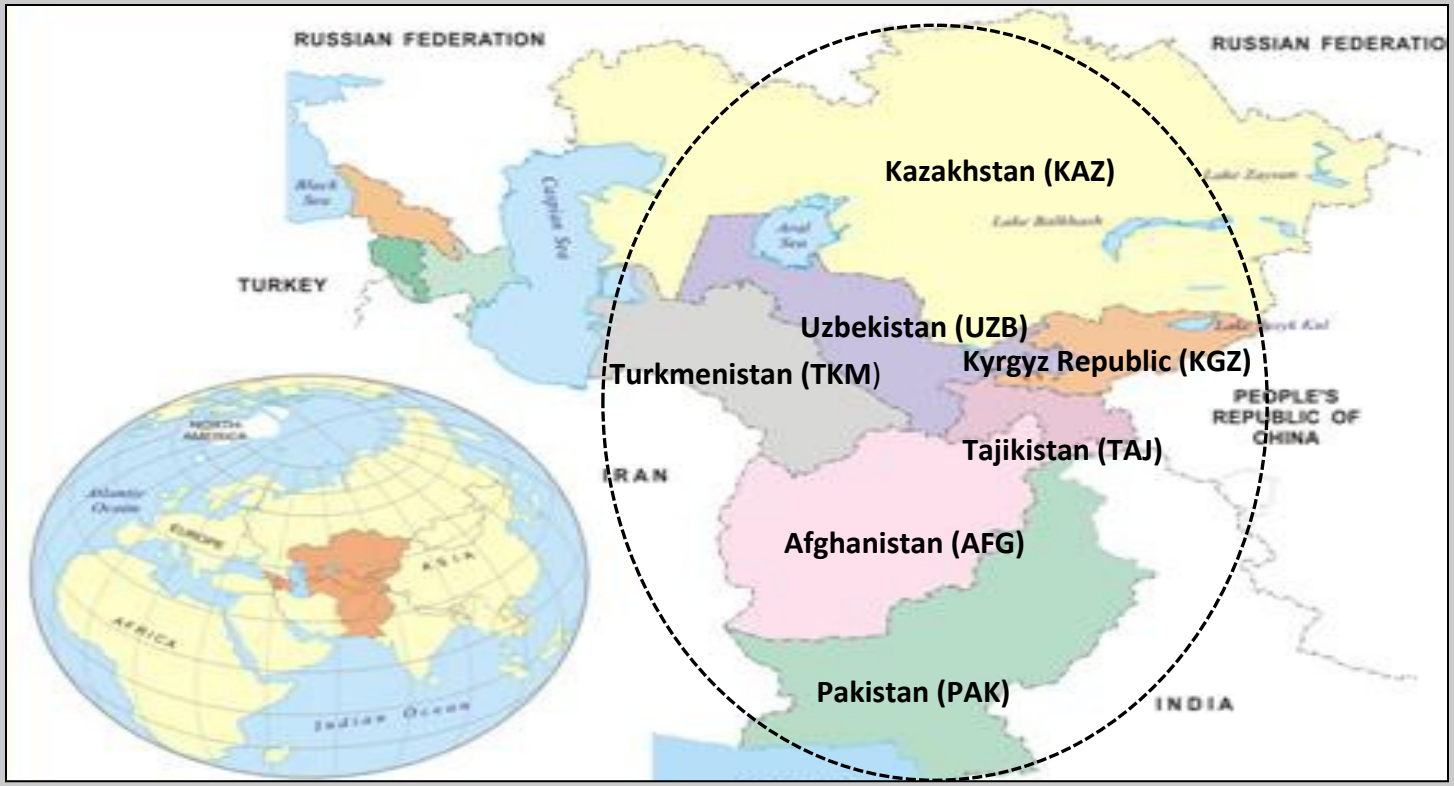
CAREC
Central Asia Regional Economic Cooperation

- A 10 country initiative supporting development through cooperation
- Priority areas are Transport, Trade Facilitation, Energy, and Trade Policy
- In Energy, CAREC supports research and investments to achieve benefits of energy trade
- 2013-15 CAREC Energy Work Plan includes support to develop CASEREM: Central Asia South Asia Regional Electricity Market

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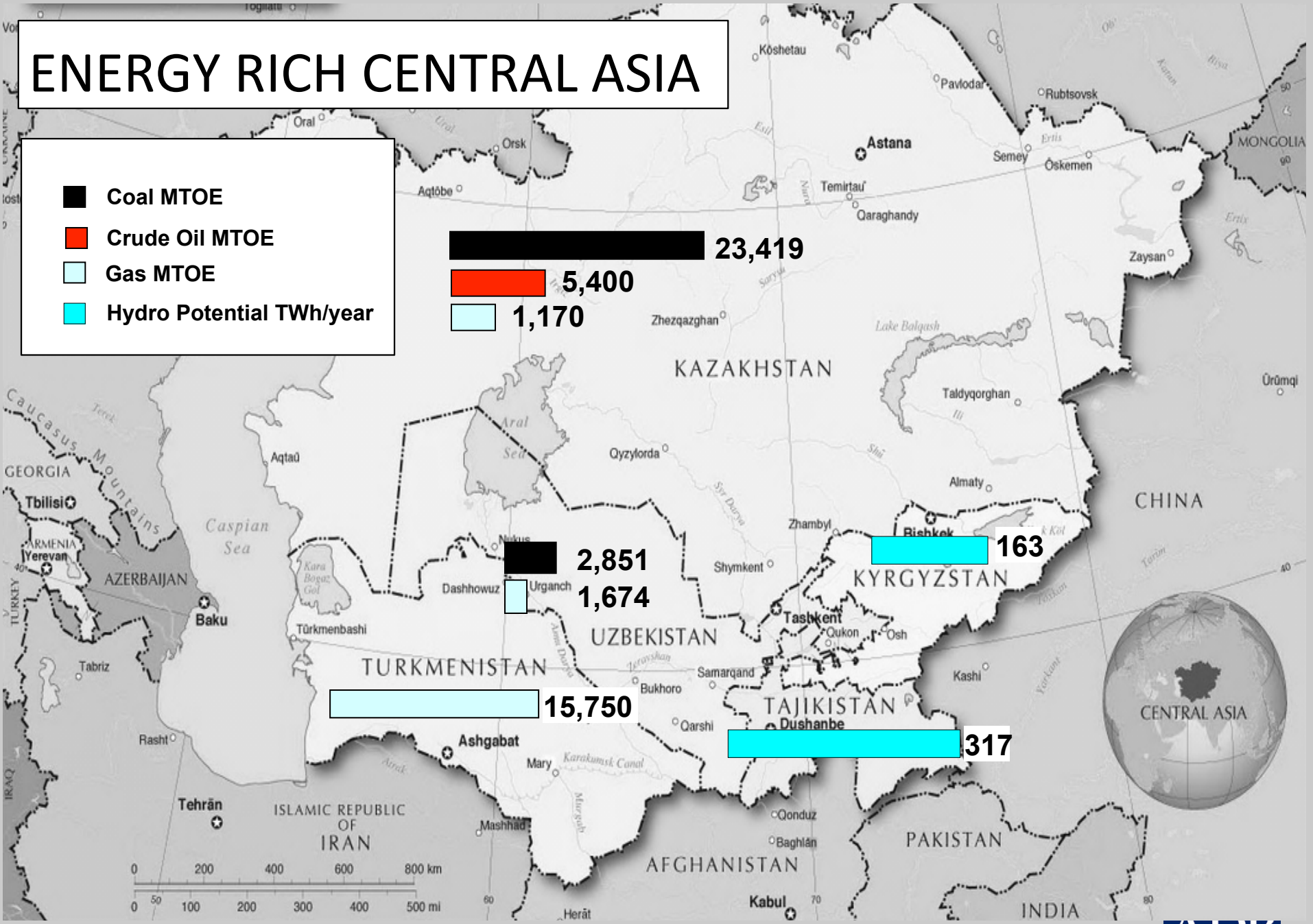
# ENERGY RICH CENTRAL ASIA




*Source: BP Statistical Review 2013*

# CENTRAL ASIA POWER GRID

| Electricity Trade between Central Asia Power System – KAZ-KGZ-TAJ-TKM-UZB | |
|---|---|
| 1998 | 25,413 GWh |
| 2000 | 7,803 GWh |
| 2005 | 6,319 GWh |
| 2008 | 3,712 GWh |

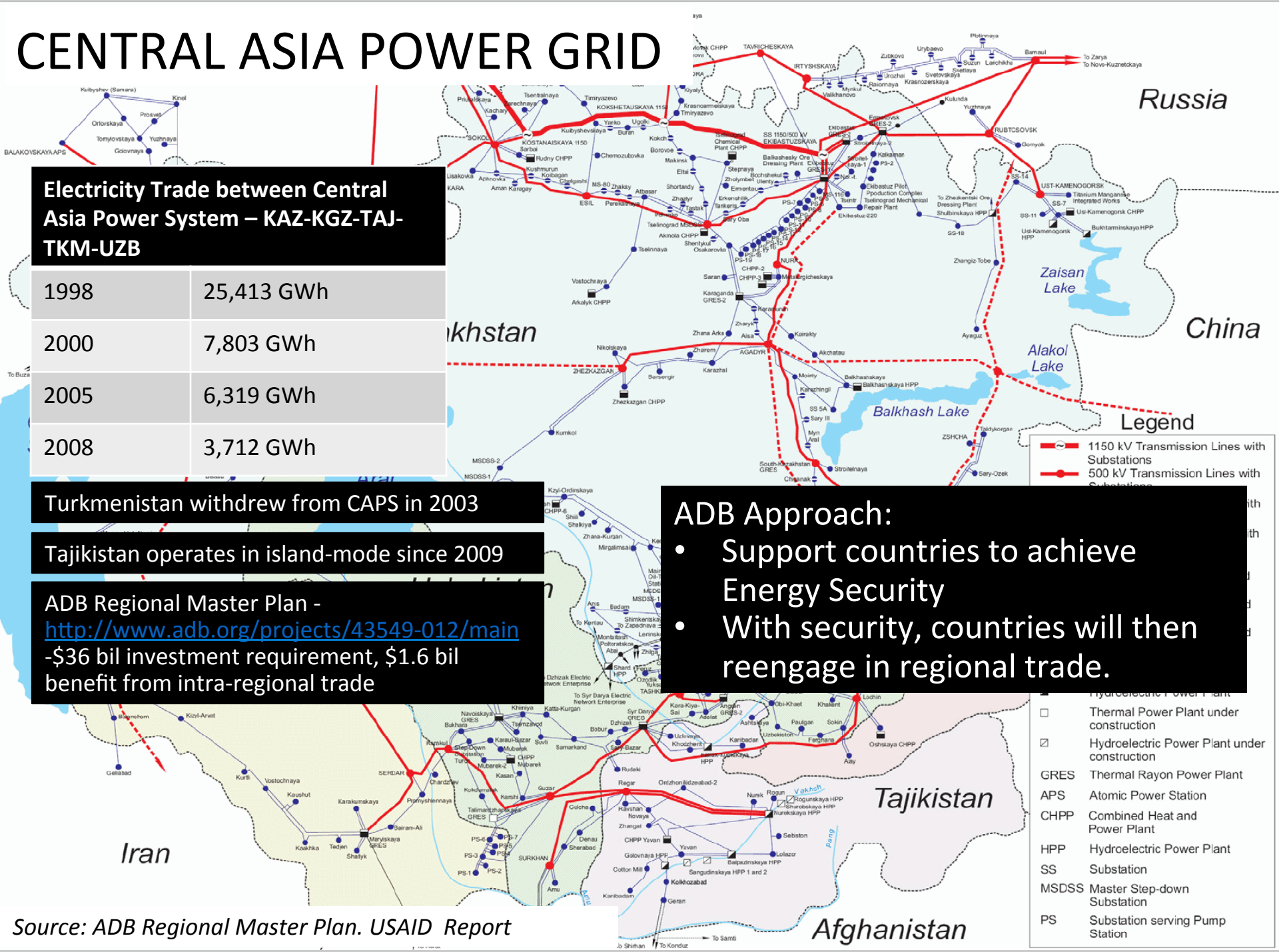
Turkmenistan withdrew from CAPS in 2003

Tajikistan operates in island-mode since 2009

ADB Regional Master Plan - http://www.adb.org/projects/43549-012/main
-$36 bil investment requirement, $1.6 bil benefit from intra-regional trade

ADB Approach:

- Support countries to achieve Energy Security
- With security, countries will then reengage in regional trade.




*Source: ADB Regional Master Plan. USAID Report*

# ENERGY CRISIS IN AFG AND PAK

*80m people with no access to electricity*
*+100m with intermittent supply*

**Afghanistan (AFG)**

- Population 30m
- Electrification rate 30%
- Power import 73%
- 500 kWh/Capita/Year
- Needs ongoing and increased power imports

**Pakistan (PAK)**

- Population 180m
- Electrification rate 67%
- No international power interconnections>> needs imports
- 540 kWh/capita/Year
- Shortage 5000 MW (10-20 hours load shedding/day)

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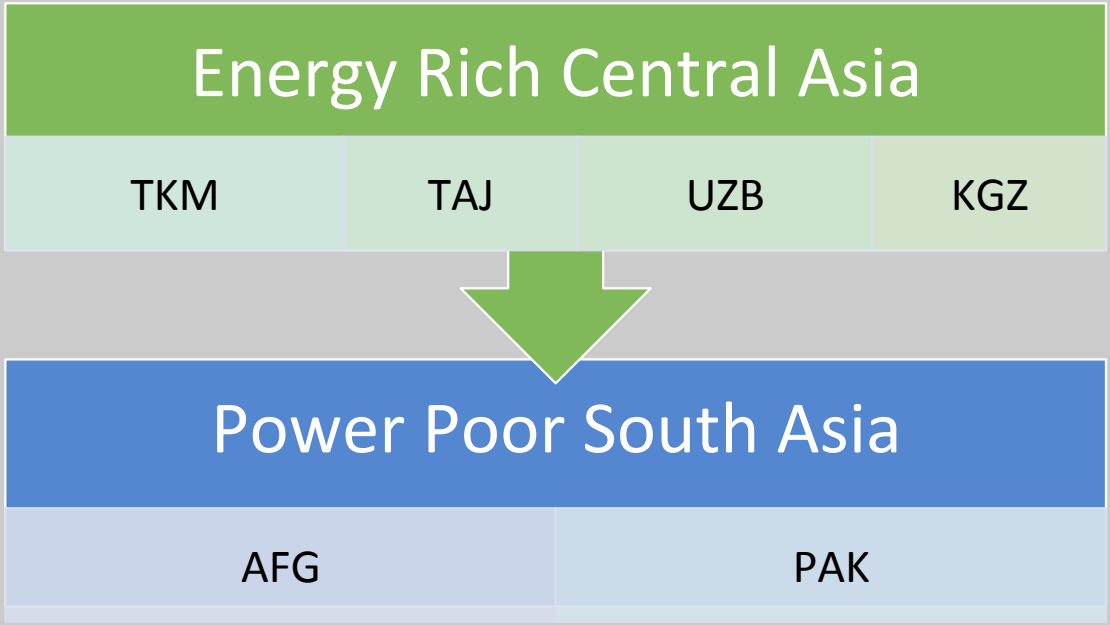
# CENTRAL ASIA-SOUTH ASIA CONNECTIVITY




Benefits

- ✓ Least cost option for meeting south Asia power needs
- ✓ Diversification and expansion of central Asia energy exports
- ✓ Trade driven economic growth

**Central Asia South Asia Regional Electricity Market "CASAREM"**

# CASAREM PROJECT: CASA 1000

*Export summer surplus hydro power from KGZ and TAJ to AFG and PAK over AC Transmission Line (KGZ to TAJ) and HVDC Transmission Line (TAJ to AFG to PAK)*

*CASA = Central Asia South Asia*


- Project cost ~$1B as:
  - KGZ $200m
  - TAJ $270m
  - AFG $300m
  - PAK $200m
- Funded by WB/IsDB/Others
- $512m approved by WB in March 2014
- IFC Transaction Advisor
- 4 countries will form a Commercial Joint Venture to appoint EPC contractor and O&M contractor for DC portion
- Commercial Agreements under negotiation
- Commercial Operation 2018

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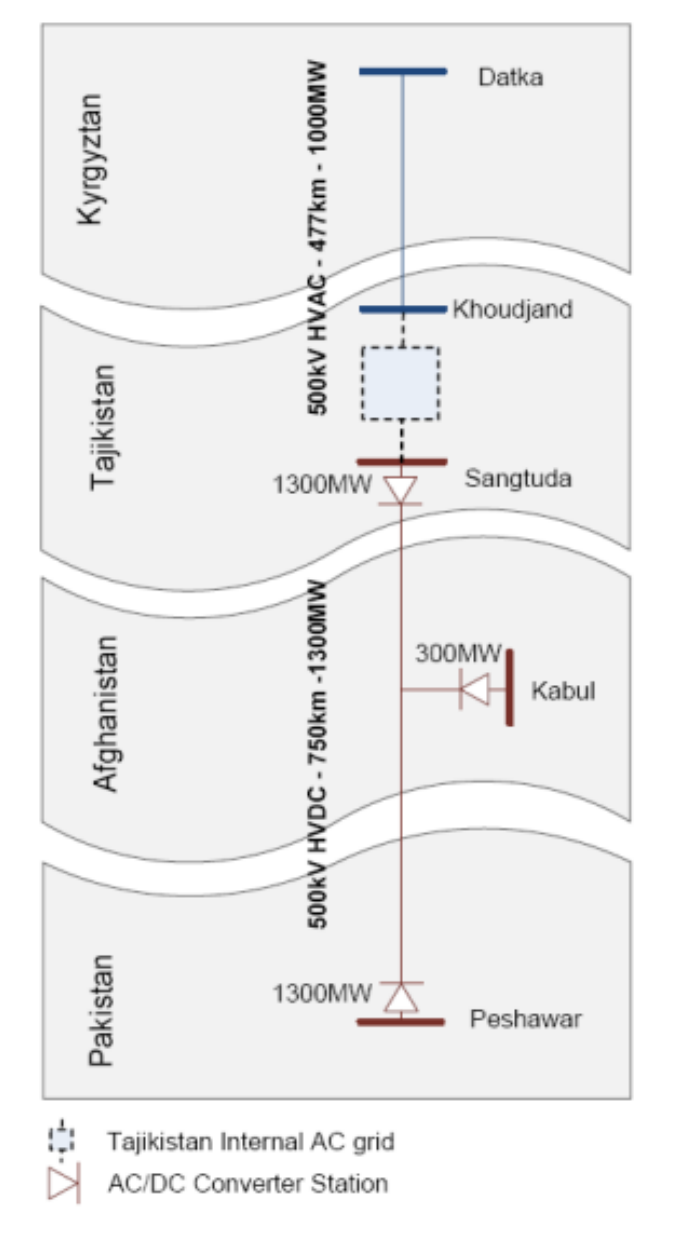
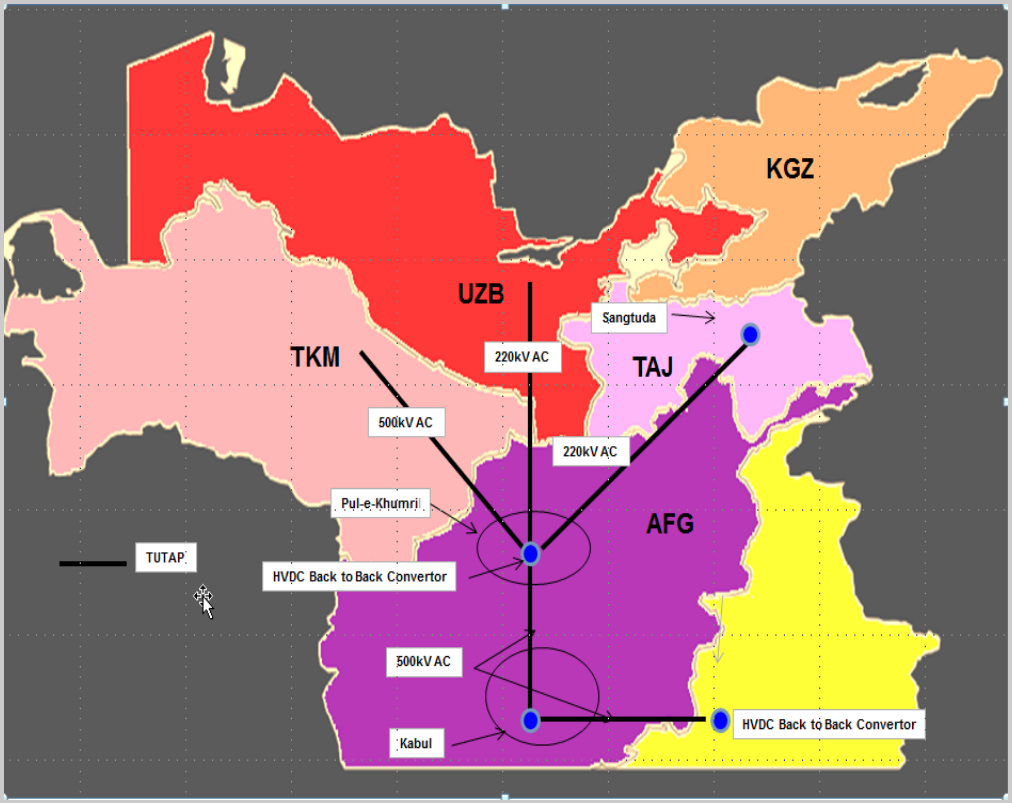
# CASA-1000 TECHNICAL FEATURES




- 500kV AC line KGZ to TAJ *(95% in KGZ)*
- TAJ grid to be reinforced
- 1,300MW AC/DC Station at Sangtuda.
- 750km HVDC line TAJ-AFG-PAK
  - *(TAJ 117km, AFG 562km, PAK 71km)*
- 300MW AC/DC Station at Kabul
  - *(import & export capability)*
- 1300MW AC/DC Station at Peshawar.
- 5 TWh/year to be exported

# CASAREM PROJECT: TUTAP

Connect Central Asian countries to planned Afghanistan grid who in turn can re-export to Pakistan

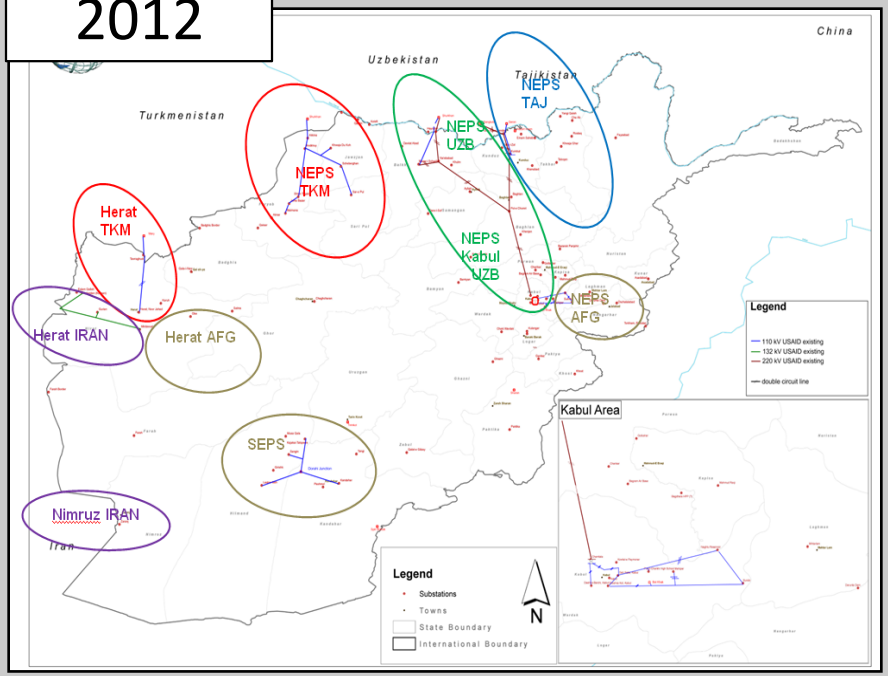



- ADB financed Afghanistan Power Sector Master Plan* identified the need for a unified Afghanistan grid with asynchronous connection to neighboring central Asian countries.
- TUTAP uses existing and planned assets in Afghanistan to connect Central Asia to Pakistan
- TUTAP is an acronym of countries to be directly connected to Afghanistan grid, being Turkmenistan, Uzbekistan, Tajikistan, Afghanistan and Pakistan

www.adb.org/projects/43497-012/documents

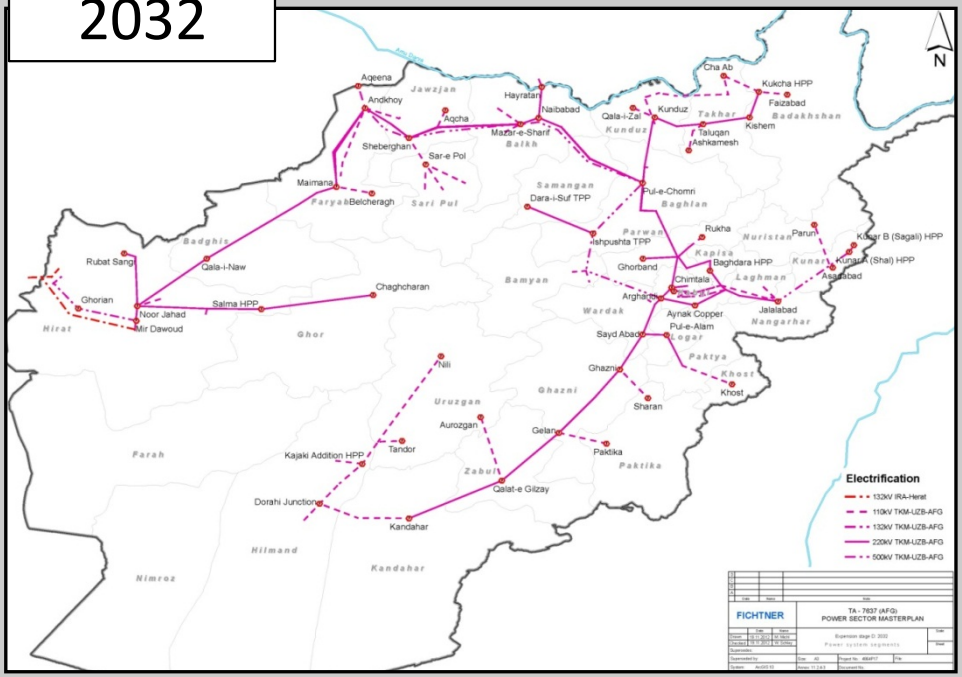
# AFGHANISTAN POWER SYSTEM, 2012-2032

## 2012




- 9 islands fed from different systems
- Peak load 850MW
- Annual consumption 3,800GWh
- 70% of the power from imports
  - 57% Uzbekistan
  - 22% Iran
  - 16% Turkmenistan
  - 4% Tajikistan

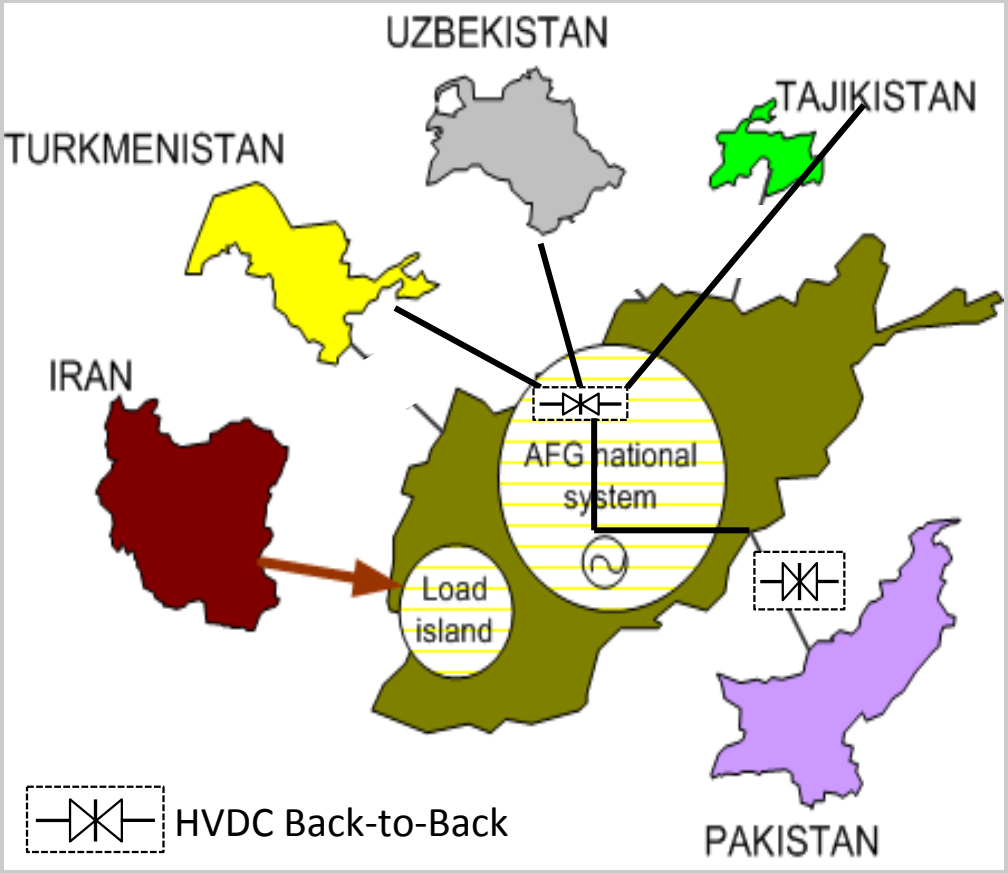
## 2032




- Integrated transmission network of AFG
- Share of domestic production increases to 67 %
- Electrification rate : 83%
- Peak load of about 3,500 MW
- Annual energy consumption of 18,400 GWh
- Power exchange options with neighboring systems

# PROPOSED ASYNCHRONOUS OPERATION

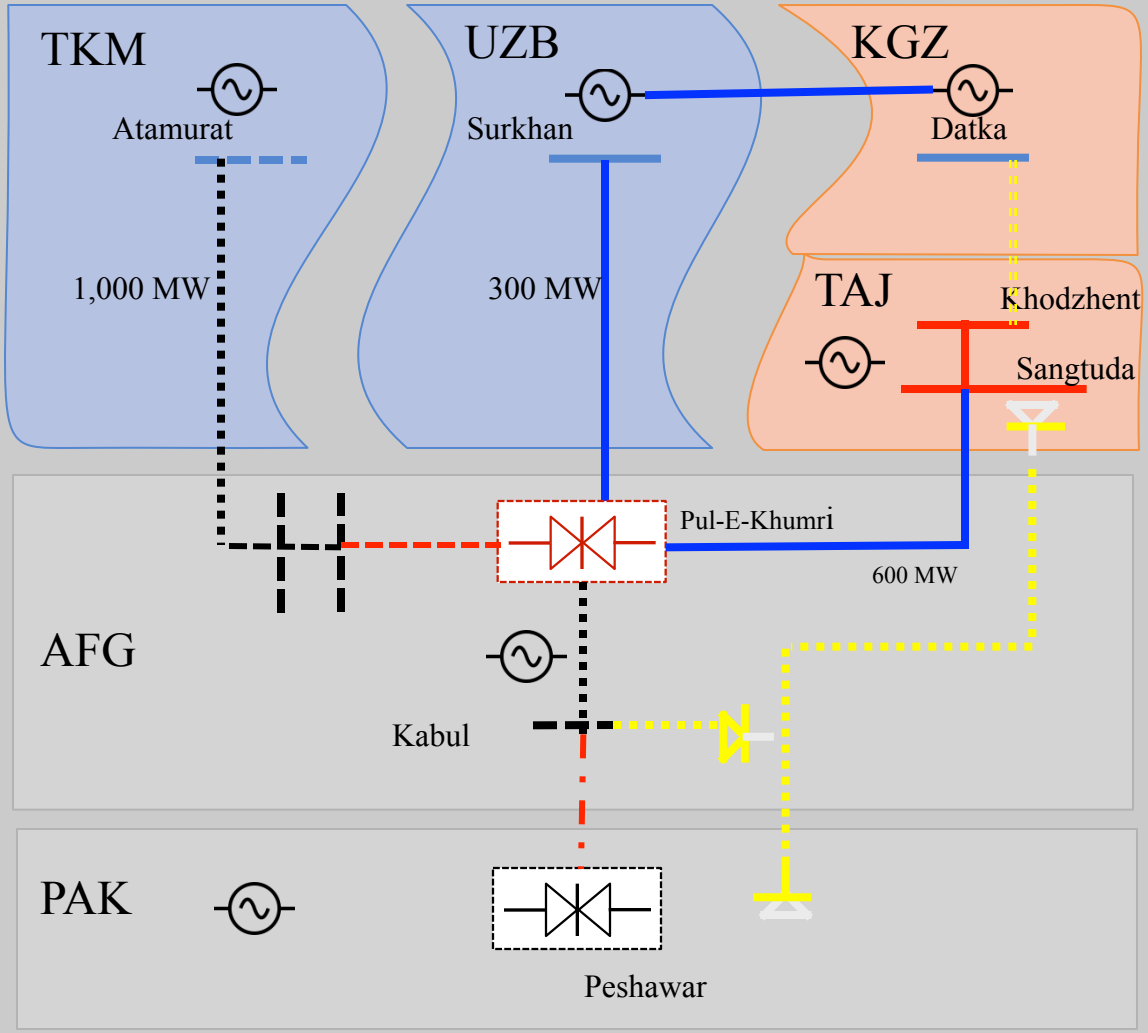
- UZB, TAJ and TKM systems are not operated in synchronism.
- Asynchronous interconnection will be via a common HVDC Back to Back hub at Pul-e-Khumri (PUK).
- Future connection to Pakistan again with HVDC BtoB.




## Benefits of HVDC back to back

- Modular technology- built in stages to meet evolving needs
- Facilitates integration of remote diverse resources
- Controllable -power injected where needed
- No stability distance limitation
- Proven technology
- Facilitates power wheeling to Pakistan

# TUTAP/CASA TECHNICAL FEATURES




Legend

| | |
|---|---|
| | Existing 220 kV |
| | Existing 500 kV |
| | Under implementation 500kV |
| | Proposed 500kV |
| | Proposed HVDC Back-to-Back |
| | CASA AC/DC Convertor |
| | CASA 500kV DC Line |
| | CASA 500kV AC line |

# SUMMARY AND STATUS

Central Asia Intra Regional Trade

- Assist countries in achieving energy security >>allowing regional trade
- ADB and donor partners are financing power generation and transmission to meet country and regional needs

Central Asia South Asia

- World bank is leading CASA-1000. $512m approved by WB in March 2014
- ADB is leading TUTAP. $500m of projects approved. Further project under development.

# THANK YOU

Jim Liston,
Principal Energy Specialist, ADB
Jliston@adb.org