

CAREC Energy Sector Update

Current projects, work-plan review, and long term strategy

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CAREC Senior Officials' Meeting
Tbilisi, Georgia
20-21 June 2017



2016-2020 Work Plan

Key Development Challenges

- Landlocked and far from developed markets
- Imbalance of energy resource endowments
- Aging infrastructure
- Limited institutional capacity

Strategic Priorities

- Increasing energy security and efficiency
- Promoting regional cooperation and integration

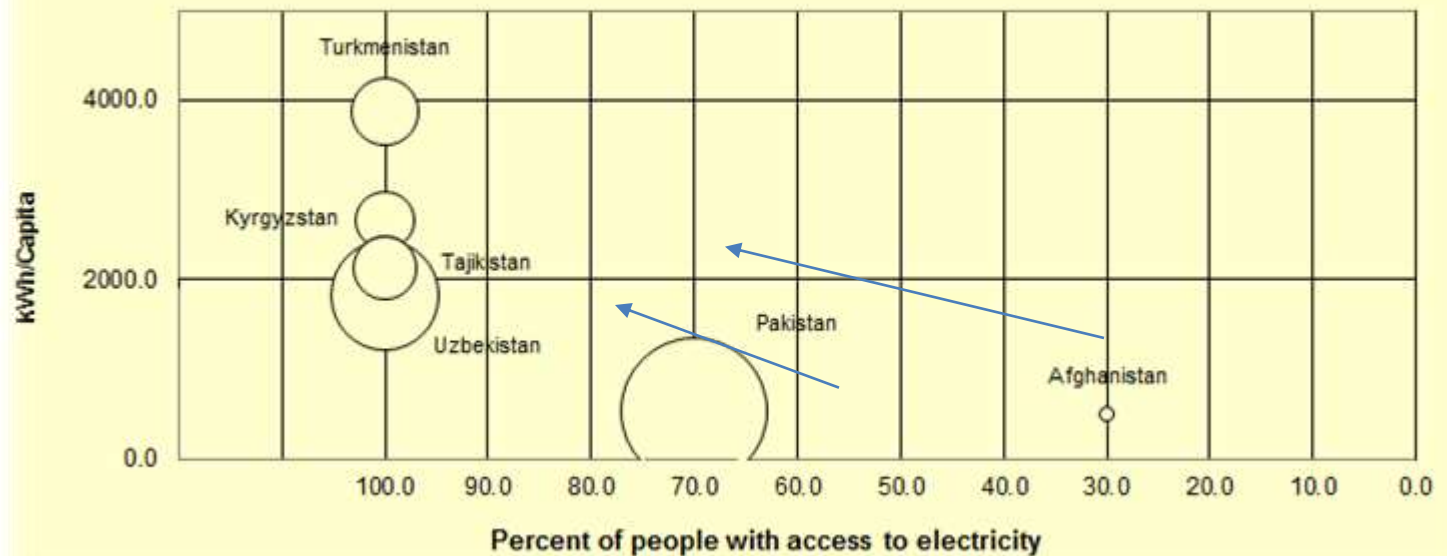
CASAREM: Central Asia-South Asia Regional Electricity Market



International Comparison

kWh/Capita

Australia	10,700
Germany	7,100
India	680
Japan	7,850
Philippines	650
Thailand	2,335
UK	5,500
USA	13,300



Trade Potential

- **Export**

- Year round thermal power - Uzbekistan, Turkmenistan, Kazakhstan
- Summer hydropower - Kyrgyz Republic and Tajikistan

- **Import**

- Year around shortage Pakistan, Afghanistan
- Winter shortage Kyrgyz Republic and Tajikistan

2016-2020 Work Plan

1

CASAREM

6

Prioritizing Clean Energy
Technology

2

Energy
Dispatch
and Trade

3

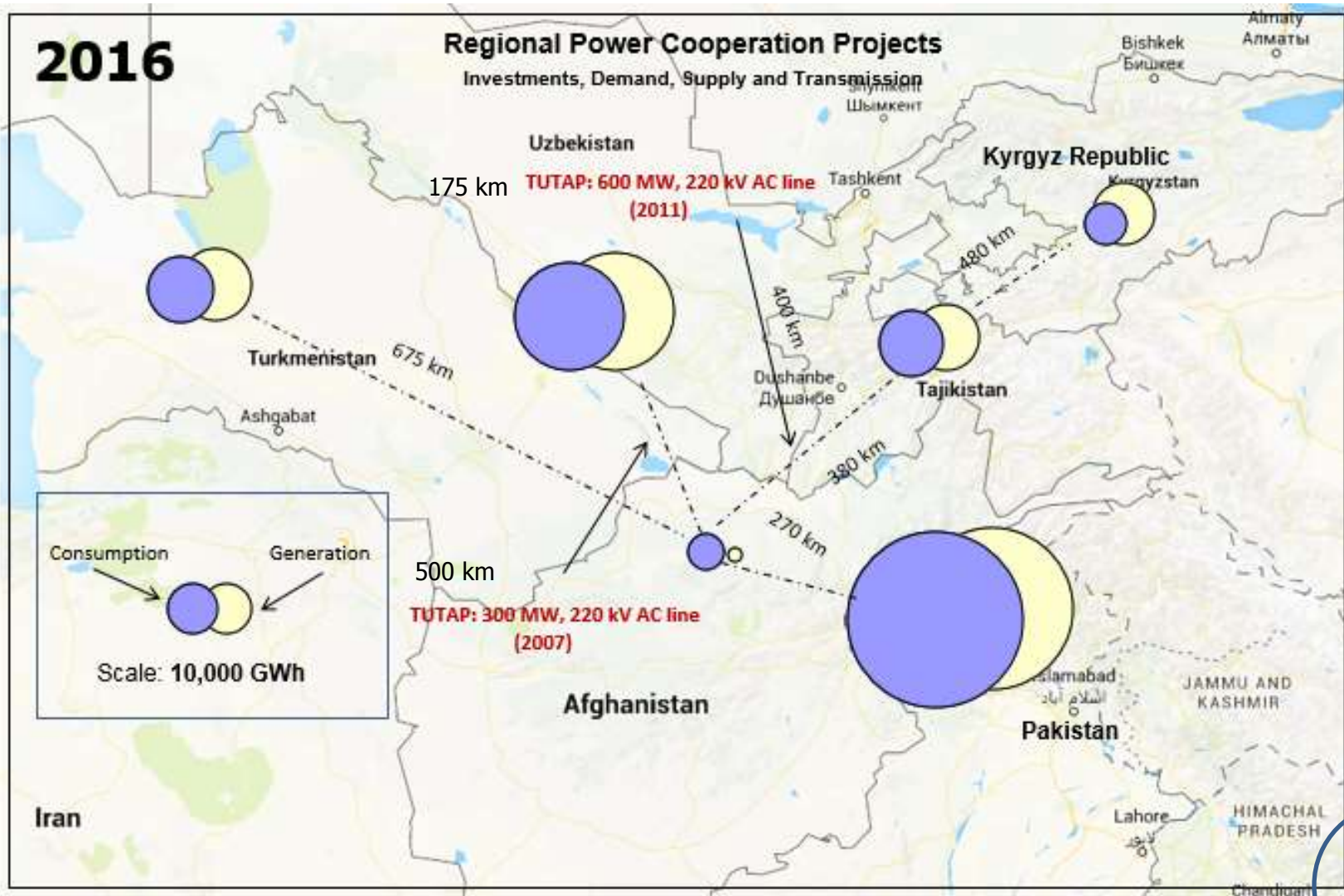
Energy-
Water
Linkages

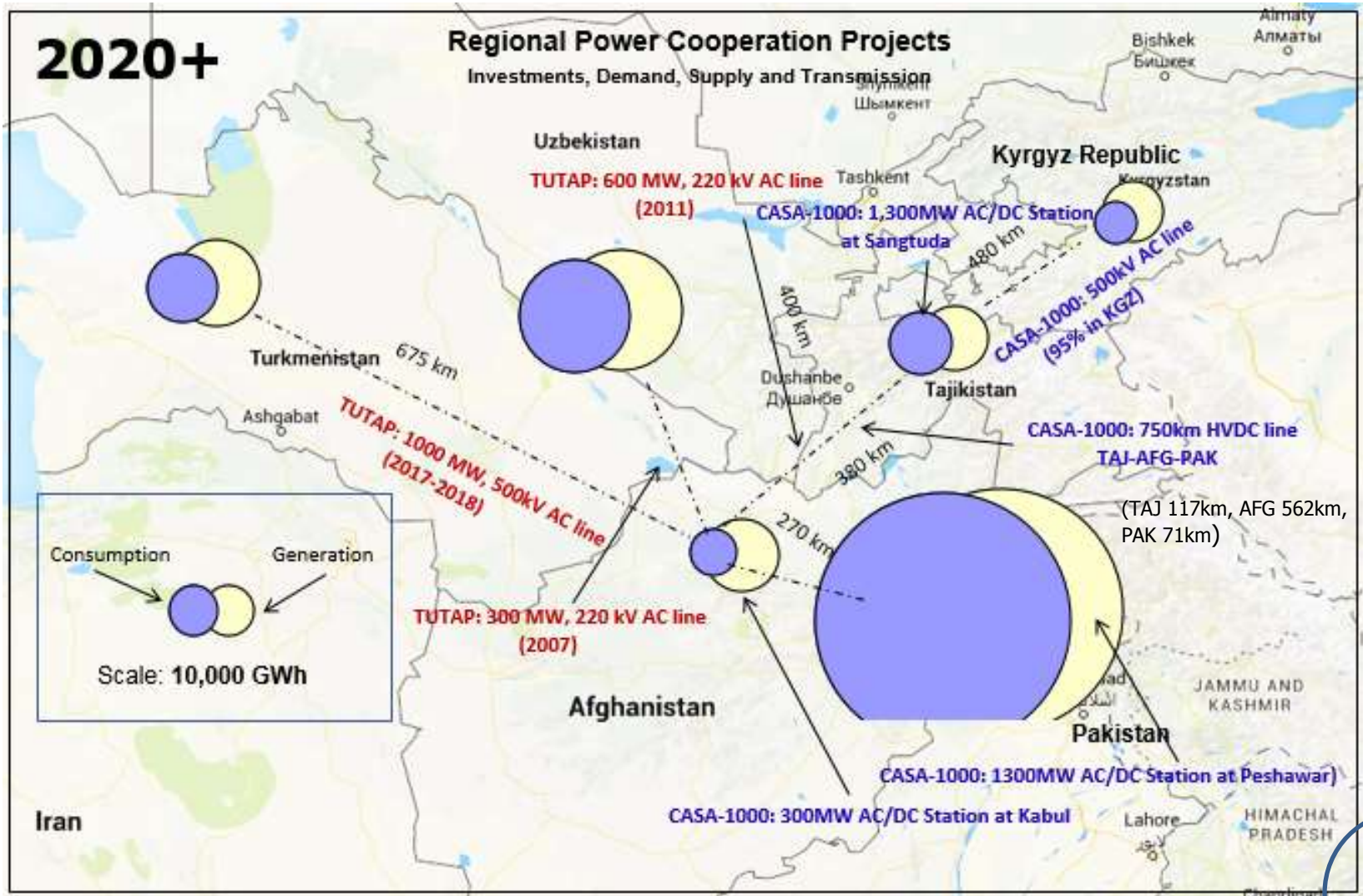
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Mobilizing
Finance

5

Capacity
Development





CASAREM-components

Turkmenistan-Uzbekistan-Tajikistan-Afghanistan-Pakistan (TUTAP)

Phases	Loan	Year	Connection	Status
I	2003	\$35	AFG-UZB	complete
II	2007	\$47	AFG-TAJ	complete
III	2012	\$140	AFG-TKM	complete by 2019
IV	2015	\$200	AFG	award July 2017
V	2016	\$240	AFG	award by Dec 2017

Work in progress:

(5th phase): 500 MW high voltage DC back to back convertor station at Pul-e-Khumri in northern Afghanistan



Next Steps:

- Develop open access (WB)
- Expand TUTAP scope in Turkmenistan (ADB)

CASAREM-components

Turkmenistan-Afghanistan-Pakistan (TAP)

Construction of 500-kV transmission infrastructure from Turkmenistan into Afghanistan and to Pakistan

Countries agreed to sign a joint ministerial statement for project preparatory work (19 May 2017)

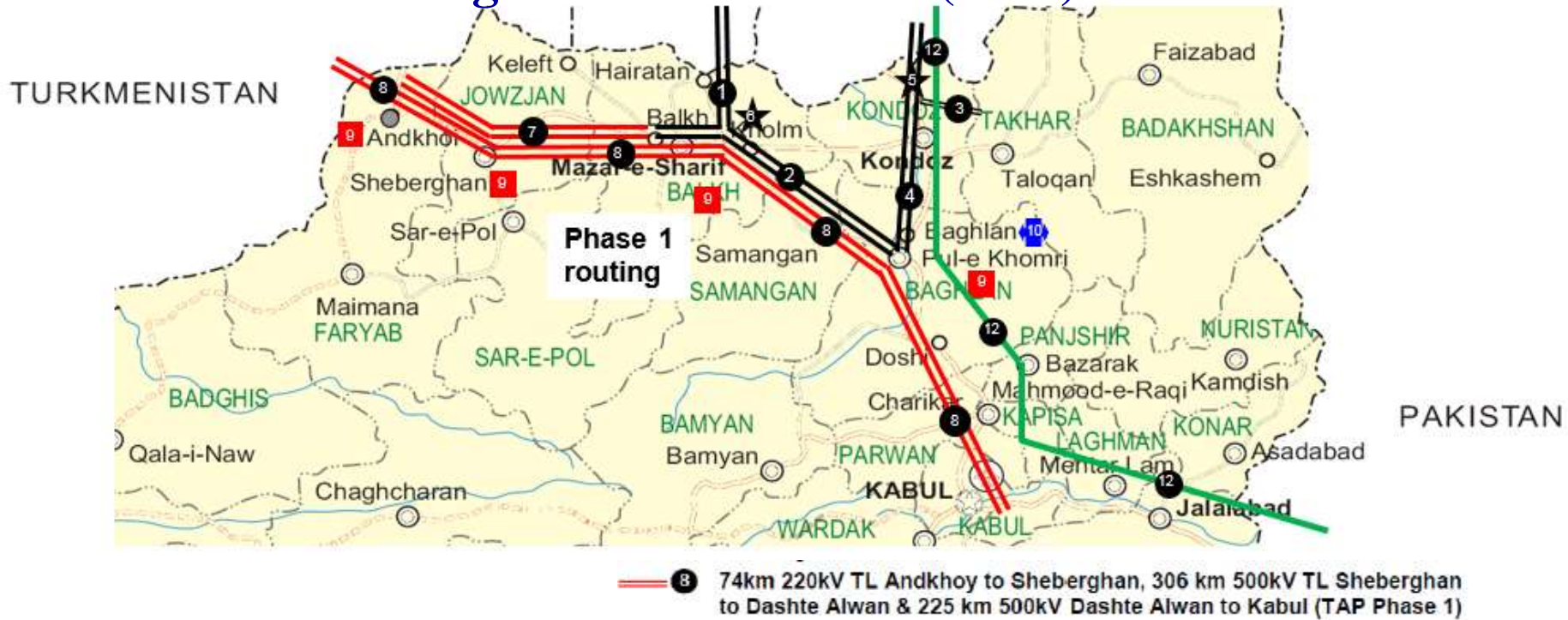


Next Steps:

- ✓ Respective Governments have requested for ADB to finance the two phases of TAP

CASAREM-components

Turkmenistan-Afghanistan-Pakistan (TAP)



1st Phase (commissioning 2020)

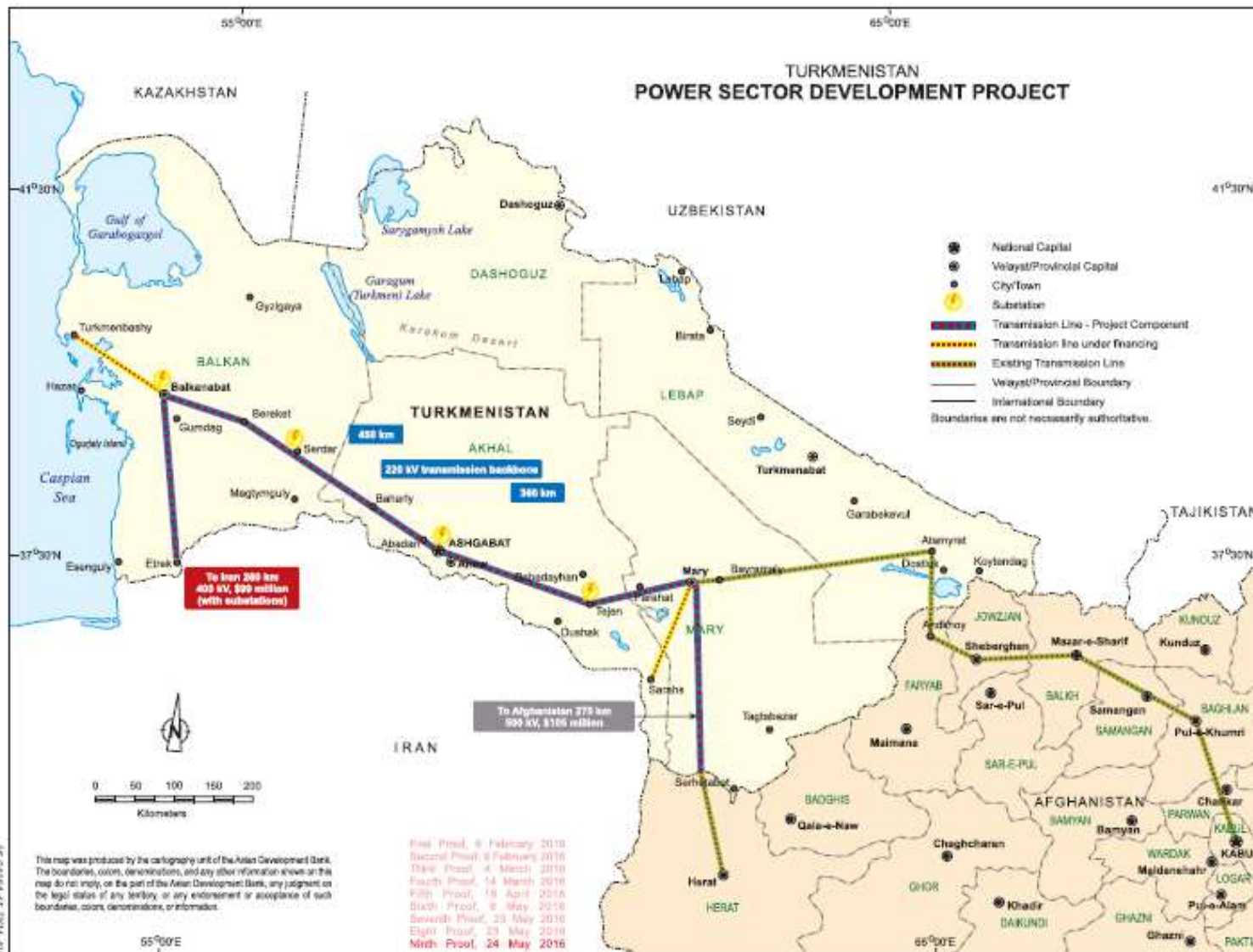
- Utilize existing (under implementation and planned) transmission network under TUTAP
- Use the idle CASA-1000 line during the winter months (October – April)
- Include additional ancillary infrastructure to complement TUTAP-CASA

CASAREM-components

Turkmenistan-Afghanistan-Pakistan (TAP)



- Transfer power from Turkmenistan from Serhetabad (TKM) / Torghundy (AFG) border into Herat, Kandahar and Spin Boldak in Afghanistan and export to Chaman and Quetta in Pakistan.



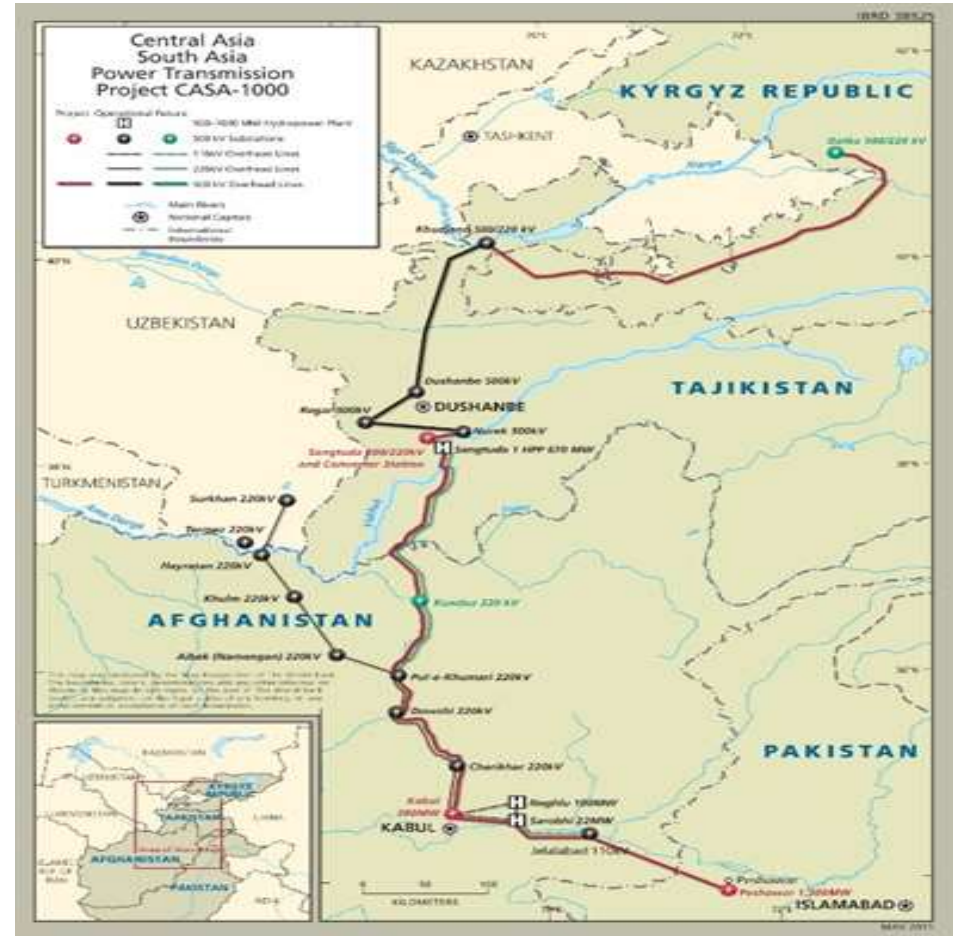
CASAREM-components

Central Asia-South Asia Regional Electricity Market (CASA-1000)

- Procurement is progressing
- Contract awards for various infrastructure components to be concluded in 2017

Next Steps:

- ✓ Five companies submitted proposals



CASAREM-components

Turkmenistan-Afghanistan-Pakistan-India (TAPI)

- TPCL and ADB has completed negotiations (Nov 2014)
- FASA negotiations conducted (Dec 2016)
- TPCL awarded the engineering design and supervision contract to ILF Beratende Ingenieure GmbH. (Jan 2017)



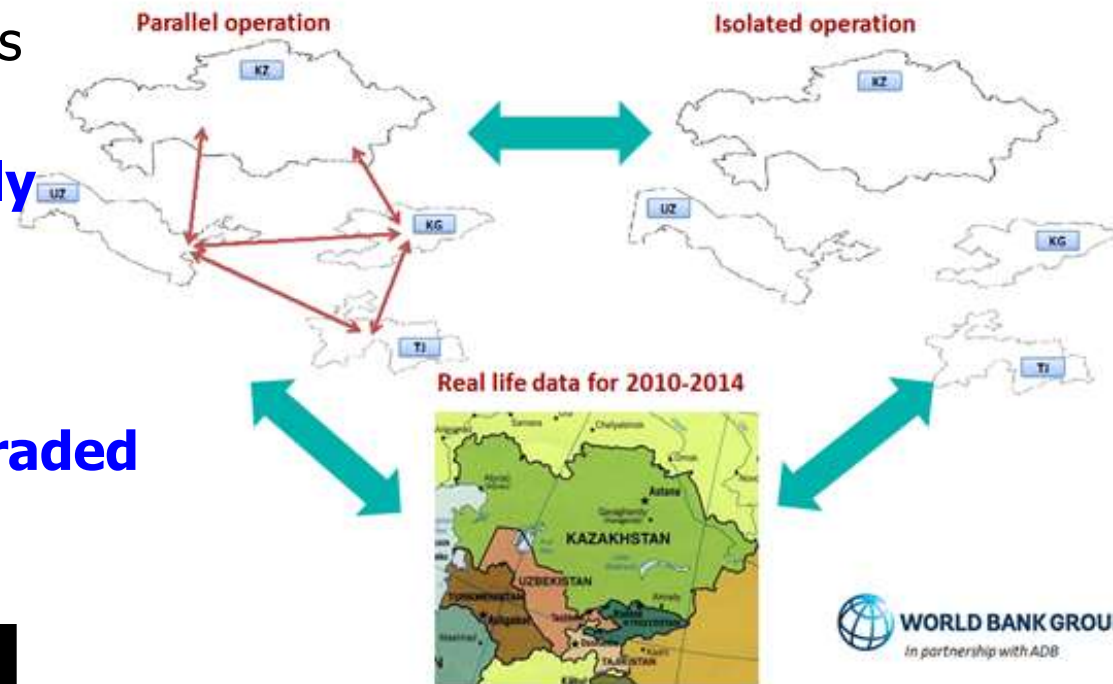
TPCL - TAPI Company Limited
FASA - Financial Advisory Services Agreement

Enhancing Regional Power Trade in Central Asia

Study Findings

- **\$6.4 billion** missed benefits (2010-2014)
- **Low trade is economically hurting** (Kyrgyz Republic, Kazakhstan, Tajikistan and Uzbekistan)
- **Only about 2,500 GWh traded** now; 25,000 GWh (1990s)

Modelling approach: 3 scenarios



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

Enhancing Regional Power Trade in Central Asia

- Governments interested to expand scope of the study and renewed interest in the regional market

Next Steps:

- Establish working group led by **Kazakhstan** and **Pakistan** with support from **Afghanistan** and **Kyrgyz Republic**
- Terms of Reference will be discussed at the next meeting (17 July, Astana)



Energy-Water Linkages

World Bank initiated:

- a study on energy sector vulnerability to climate change, energy-water modeling training
- a Central Asia energy-water knowledge data portal and network

Next Steps:

- identify investment needs into information systems to improve planning and management of water and energy linkages.
- prepare a third funding phase for the Central Asia Energy and Water Development Program

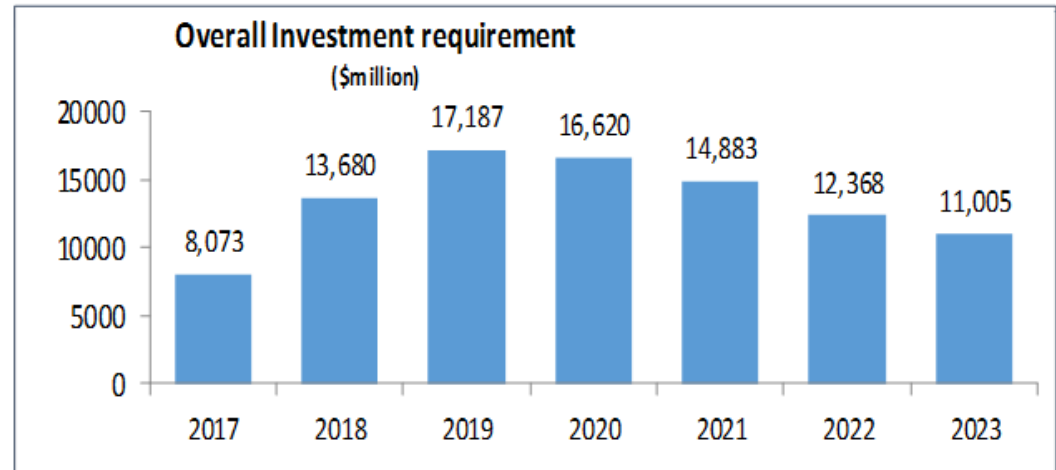


Mobilizing Finance

ADB Technical Assistance CAREC Power Sector Financing Roadmap



Investments: Priority Projects



• **\$100 billion** between 2017 and 2023

TA-8727 REG: Study for Power Sector Financing Road Map • Mobilizing Funds for Building Energy Assets

- assessed priority power infrastructure and findings presented in 1st CAREC Energy Investment Forum (**EIF**)

Mobilizing Finance



50 YEARS ADB CAREC MINISTRY OF ENERGY OF THE REPUBLIC OF KAZAKHSTAN EXPO 2017 ASTANA FUTURES ENERGY ADB Institute

CAREC ENERGY INVESTMENT FORUM 2017

FINANCING FUTURE ENERGY

18-19 July 2017, Astana, Kazakhstan

Registration Site: adb.eventsair.com/eif/eifmain
 Astana Expo: expo2017astana.com/en
 CAREC: carecprogram.org/events/EIF2017

450 participants from 30 countries:
 governments, investors, suppliers and project developers.

For questions, please email CAREC-ESCC Secretariat:
carec-energy@adb.org

The CAREC Program is a concerted partnership of 11 countries: Afghanistan, Azerbaijan, Peoples Republic of China, Georgia, Kazakhstan, Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan and Uzbekistan.

Next Steps:

- 2017 CAREC EIF will in Astana
- (Kazakhstan 18-19 July 2017)
- Theme: "Financing Future Energy"
- Expecting 450 delegates

Capacity Building and Knowledge Management (2016-2020)

Knowledge sharing: smart meters, project management, independent regulation, tariff policy, forecasting, planning and energy efficiency

Technology adoption: smart meters solar power, battery based storage, electric vehicles and energy efficiency

Regulatory issues: framework for independent regulation, tariff setting for time-of-use tariffs, pre-paid meters, IPP tariffs and benchmarking

Training: demand management, forecasting, solar power, battery storage, energy efficiency and management of large projects



Capacity Development and Knowledge Management



Capacity Development and Knowledge Management

Climate Institutions

- **Green Climate Fund:** new technology projects
- **Global Green Growth Initiative:** partnership of NDCs



Prioritizing Clean Energy technologies

Project Number: 49412-001
Regional Capacity Development Technical Assistance (R-CDTA)
August 2016

Access to Electricity with New Off-Grid Solar Technology in Central Asia

Financed by the Clean Energy Fund under the Clean Energy Financing Partnership Facility



Off-grid DC solar kits for as little as \$1,200?

Published on Friday, 14 October 2016

The answer is yes – off-grid is the future, and the only way to bring electricity to all by 2020.



Off-grid solar can be game-changer for electricity access in Central Asia

Published on Thursday, 22 September 2016

ADB recently approved new funding to demonstrate the technical and financial viability of this new technology combination in the CAREC region.

\$2 million grant
approved
in August 2016

Prioritizing Clean Energy Technologies

Project Number: 49413-001
Regional—Capacity Development Technical Assistance (R-CDTA)
February 2017

Leapfrogging of Clean Technology in Central Asia Regional Economic Cooperation Countries through Market Transformation

(Financed by the Clean Energy Fund under the Clean Energy
Financing Partnership Facility)



Leapfrog into technology to avoid getting
leapfrogged yourself

Published on Friday, 29 July 2016

Those that still question the need for technology
leapfrogging in development need to know if we continue
to use camel-era technology on the highway, we may get
hit by fast cars that have embraced innovation.

\$2 million grant
approved
in February 2017



\$7,600 in 1977

Less than **\$40** in 2016

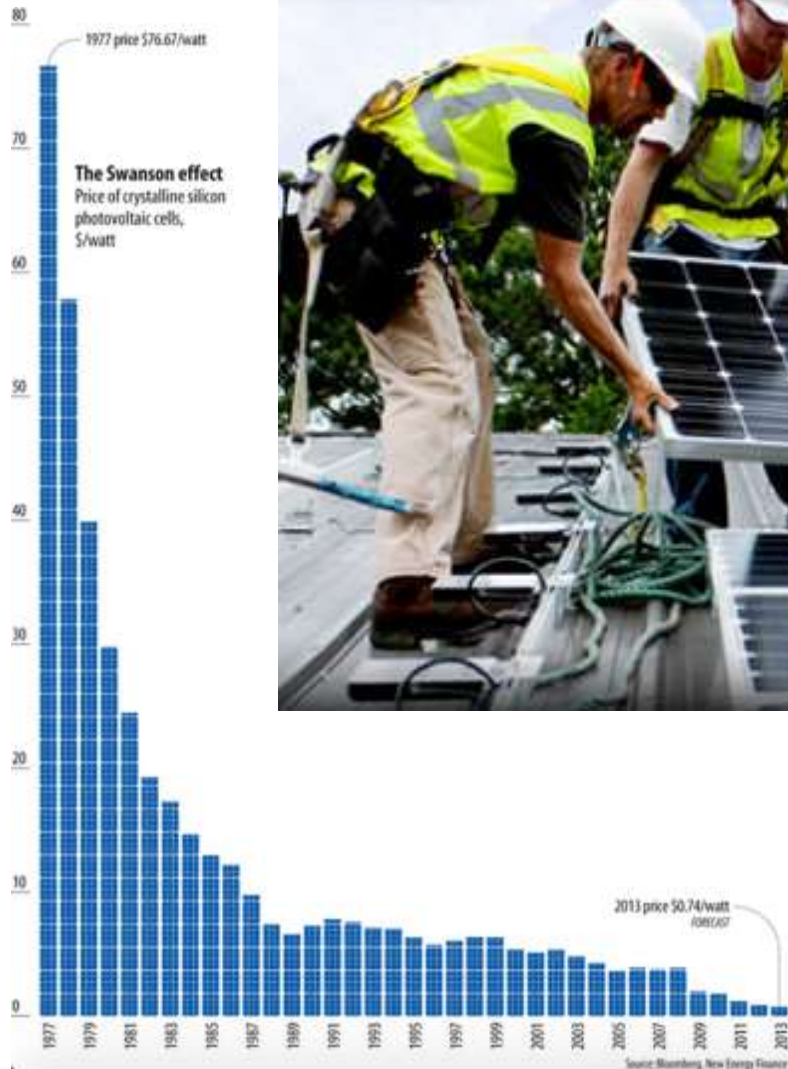
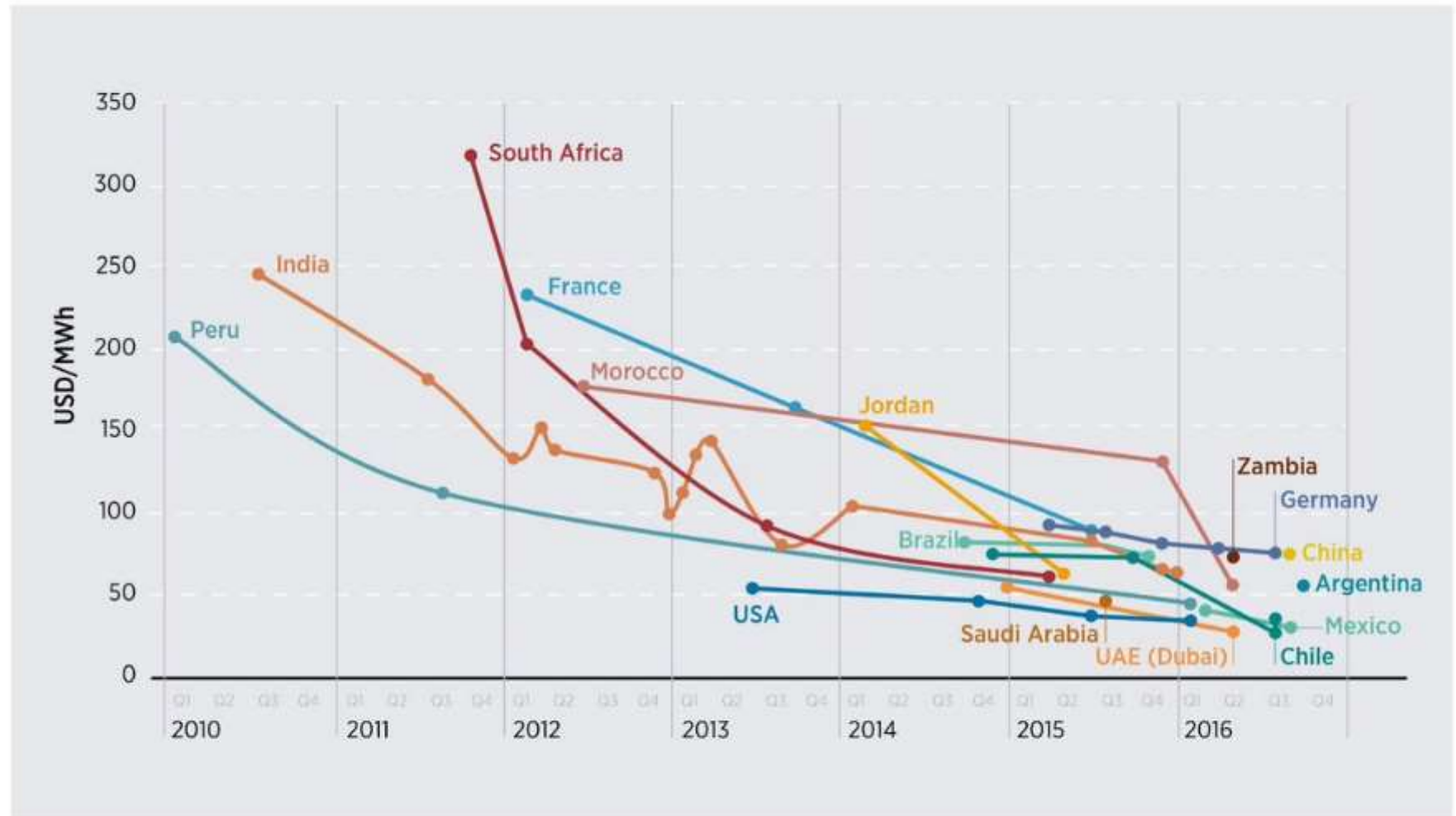


Figure 3 Evolution of average solar prices in auctions, January 2010-September 2016



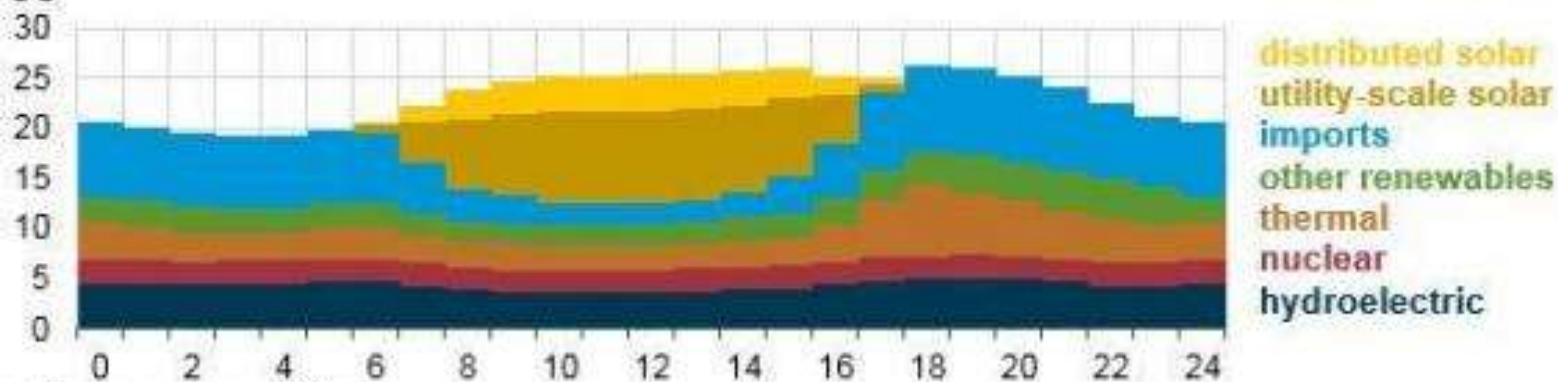
IRENA, 2017 (forthcoming).

California sun produces so much power that electricity prices turn negative

'In March, during the hours of 8am to 2pm, system average hourly prices were frequently at or below \$0 per megawatt-hour'

Ian Johnston Environment Correspondent | @montaukian | Tuesday 11 April 2017 10:30 BST | 69 comments

California Independent System Operator net generation, March 11, 2017
gigawatthours



June 15, 2017

This year's forecast from BNEF sees solar energy costs dropping a further 66% by 2040, and onshore wind by 47%, with renewables undercutting the majority of existing fossil power stations by 2030.

Stranded Assets

“dead equipment” and “revenue leakage,”

costing [Communications Service Providers](#) (CSPs) tens of millions of dollars every year.

- planning is critical
- Take or Pay contracts are contingent liabilities



For Guidance of the Senior Officials



Senior Officials' Meeting on Central Asia Regional Economic Cooperation

Endorse Mid-term review of 2016-2020 ESCC Work Plan to:

- Assess options for **energy efficiency**,
- Assess **risk of stranded assets** in new investments, and
- Invest in climate impact mitigation projects to meet **country's NDC commitments**