



SIGAR

Special Inspector General for Afghanistan Reconstruction

AFGHANISTAN'S ENERGY GRID: PLANNED AND EXISTING INFRASTRUCTURE, AS OF SEPTEMBER 2018

Quarterly Report to the United States Congress, October 30, 2018

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KEY TERMINOLOGY

Transmission Lines Lines that transmit high-voltage electricity for distribution to customers.

Substations Substations "step up" or "step down" voltages in order to adjust to different stages of electrical transmission from transmission lines to distribution lines that carry energy to businesses and homes.

Kilovolt Voltage A unit of electromotive force equal to 1,000 volts. Pressure that pushes electrical charges through a circuit. High-voltage transmission lines generally transmit energy over long distances. Lower voltage is safer for customers to use.

LEGEND

USG Funded

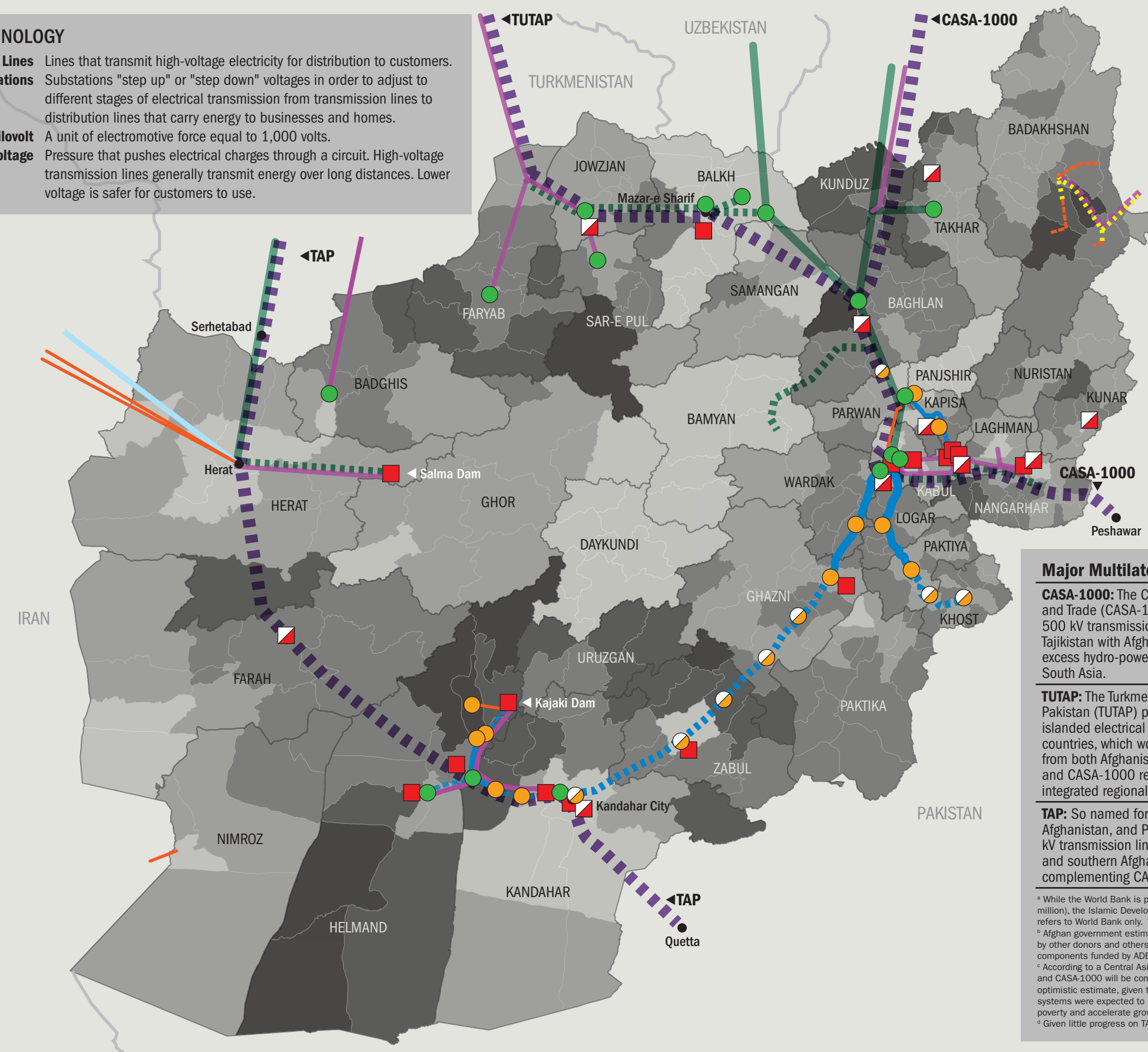
- Existing: 110 kV (Blue solid line)
- Existing: 220 kV (Blue dashed line)
- Planned: 110 kV (Blue dotted line)
- Planned: 220 kV (Blue dash-dot line)
- Existing Substation (Constructed or Upgraded) (Orange circle)
- Planned Substation (White circle with orange border)

RS-Defined District Stability Level

- GIROA Control (Lightest gray)
- GIROA Influence (Light gray)
- Contested (Medium gray)
- INS Activity (Dark gray)
- High INS Activity (Darkest gray)

Existing/Other Donor Funded

- Existing: 20 kV (Orange solid line)
- Existing: 110 kV (Purple solid line)
- Existing: 132 kV (Light blue solid line)
- Existing: 220kV (Green solid line)
- Planned: 20 kV (Orange dashed line)
- Planned: 35 kV (Yellow dashed line)
- Planned: 110 kV (Purple dashed line)
- Planned: 220 kV (Green dashed line)
- Planned: 500 kV (Dark purple dashed line)
- Existing Substation (Green circle)
- Existing Power Plant (Red square)
- Planned Power Plant (White square with red border)



Major Multilateral Power-Sector Projects

CASA-1000: The Central Asia South Asia Electricity Transmission and Trade (CASA-1000) Project involves the construction of a 500 kV transmission line connecting the Kyrgyz Republic and Tajikistan with Afghanistan and Pakistan. The project aims to export excess hydro-power from energy-rich Central Asia to energy-poor South Asia.	Funding Source:	World Bank and Others ^a
	Total Cost (All Countries):	\$1.17 billion
	Cost of Projects in Afghanistan:	\$356.5 million
	Expected Completion Date:	12/31/2020
TUTAP: The Turkmenistan, Uzbekistan, Tajikistan, Afghanistan and Pakistan (TUTAP) project aims to connect Afghanistan's currently islanded electrical grids and provide linkages to neighboring countries, which would facilitate the export of excess electricity from both Afghanistan and Central Asia to Pakistan. Both TUTAP and CASA-1000 represent the first phase of the creation of an integrated regional energy market in East, Central, and South Asia.	Funding Source:	Asian Development Bank
	Total Cost (All Countries):	\$662 million ^b
	Cost of Projects in Afghanistan:	\$662 million ^b
	Expected Completion Date:	2025-2030 ^c
TAP: So named for its three participating countries—Turkmenistan, Afghanistan, and Pakistan—TAP aims to construct a 500 kV transmission line to export Turkmen energy to western and southern Afghanistan and on to Quetta, Pakistan, thus complementing CASA-1000.	Funding Source:	Asian Development Bank
	Total Cost (All Countries):	Not yet financed
	Cost of Projects in Afghanistan:	Not yet financed
	Expected Completion Date:	2021 ^d

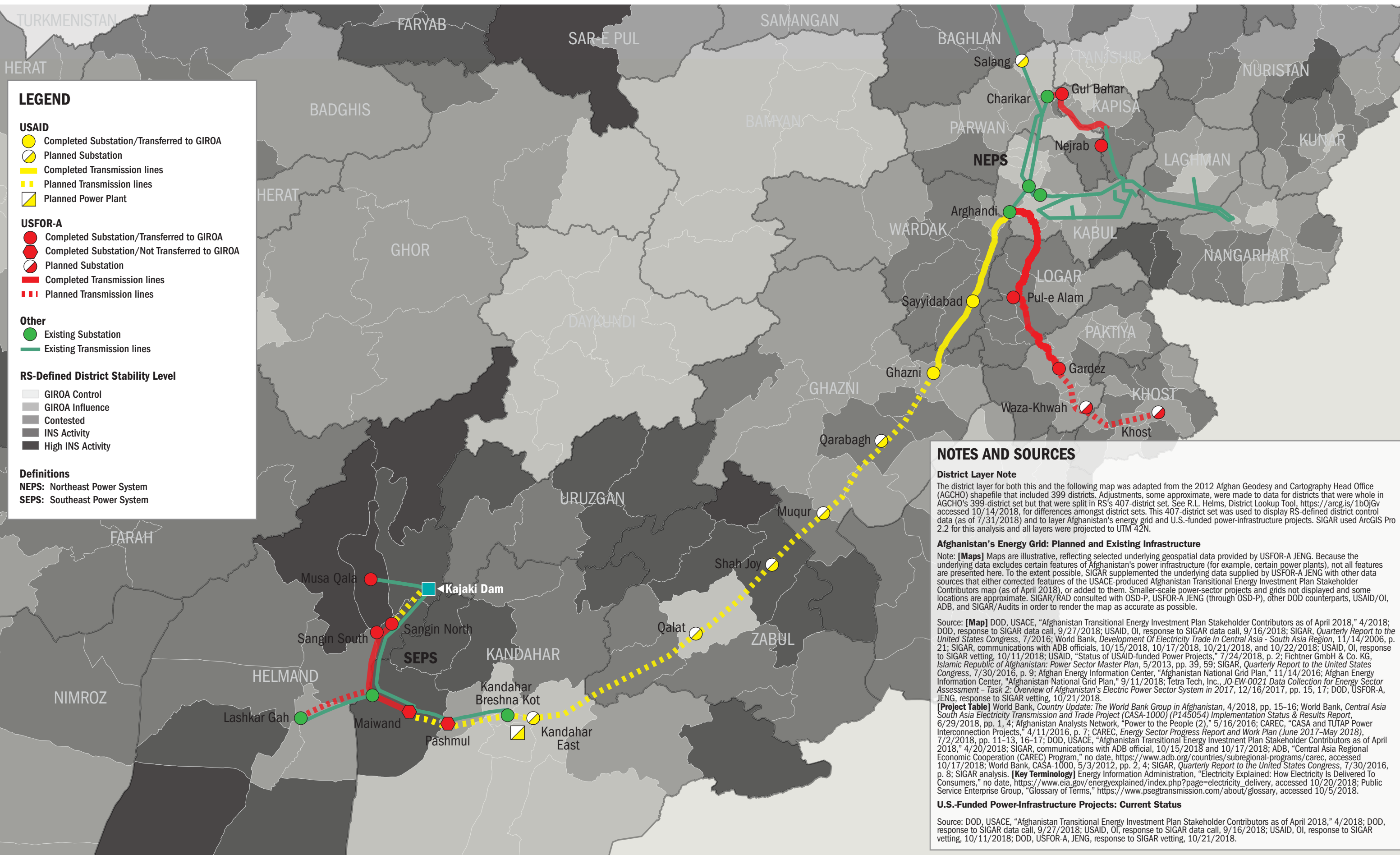
^a While the World Bank is providing more than half the financing for CASA-1000 (\$526.5 million), other major donors include the European Investment Bank (\$180 million), the Islamic Development Bank (\$155 million), and the European Bank for Reconstruction and Development (\$110 million). Cost of projects in Afghanistan refers to World Bank only.

^b Afghan government estimate subject to change. While listed as an ADB project in the table above, TUTAP comprises several segments, some of which are funded by other donors and others that could be funded by pending bilateral agreements, according to ADB. Project costs presented represent an estimate of TUTAP components funded by ADB, which noted that there are differences between allocated and contracted amounts for each segment of the overall project.

^c According to a Central Asia Regional Economic Cooperation (CAREC) Program Energy Sector Progress Report and Work Plan published in June 2018, TUTAP and CASA-1000 will be complete by 2025. However, there is no firm timeline for completion of TUTAP. According to ADB, a completion year of 2025 represented an optimistic estimate, given the slow implementation rate of large capital projects in Afghanistan. In 2016, the Afghanistan Analysts Network said that TUTAP systems were expected to be fully operational by 2030. Supported by six multilateral institutions, CAREC is a partnership of 11 countries that aims to reduce poverty and accelerate growth in Central Asia through economic development.

^d Given little progress on TAP in 2018, this completion date may be optimistic, according to ADB.

U.S.-Funded Power-Infrastructure Projects: Current Status, as of September 2018



LEGEND

USAID

- Completed Substation/Transferred to GIROA
- Planned Substation
- Completed Transmission lines
- Planned Transmission lines
- Planned Power Plant

USFOR-A

- Completed Substation/Transferred to GIROA
- Completed Substation/Not Transferred to GIROA
- Planned Substation
- Completed Transmission lines
- Planned Transmission lines

Other

- Existing Substation
- Existing Transmission lines

RS-Defined District Stability Level

- GIROA Control
- GIROA Influence
- Contested
- INS Activity
- High INS Activity

Definitions

NEPS: Northeast Power System
SEPS: Southeast Power System

NOTES AND SOURCES

District Layer Note

The district layer for both this and the following map was adapted from the 2012 Afghan Geodesy and Cartography Head Office (AGCHO) shapefile that included 399 districts. Adjustments, some approximate, were made to data for districts that were whole in AGCHO's 399-district set but that were split in RS's 407-district set. See R.L. Helms, District Lookup Tool, <https://arcgis.com/arcgis/1b0jGv> accessed 10/14/2018, for differences amongst district sets. This 407-district set was used to display RS-defined district control data (as of 7/31/2018) and to layer Afghanistan's energy grid and U.S.-funded power-infrastructure projects. SIGAR used ArcGIS Pro 2.2 for this analysis and all layers were projected to UTM 42N.

Afghanistan's Energy Grid: Planned and Existing Infrastructure

Note: [Maps] Maps are illustrative, reflecting selected underlying geospatial data provided by USFOR-A JENG. Because the underlying data excludes certain features of Afghanistan's power infrastructure (for example, certain power plants), not all features are presented here. To the extent possible, SIGAR supplemented the underlying data supplied by USFOR-A JENG with other data sources that either corrected features of the USACE-produced Afghanistan Transitional Energy Investment Plan Stakeholder Contributors map (as of April 2018), or added to them. Smaller-scale power-sector projects and grids not displayed and some locations are approximate. SIGAR/RAD consulted with OSD-P, USFOR-A JENG (through OSD-P), other DOD counterparts, USAID/OI, ADB, and SIGAR/Audits in order to render the map as accurate as possible.

Source: [Map] DOD, USACE, "Afghanistan Transitional Energy Investment Plan Stakeholder Contributors as of April 2018," 4/2018; DOD, response to SIGAR data call, 9/27/2018; USAID, OI, response to SIGAR data call, 9/16/2018; SIGAR, Quarterly Report to the United States Congress, 7/2016; World Bank, Development Of Electricity Trade In Central Asia - South Asia Region, 11/14/2006, p. 21; SIGAR, communications with ADB officials, 10/15/2018, 10/17/2018, 10/21/2018, and 10/22/2018; USAID, OI, response to SIGAR vetting, 10/11/2018; USAID, "Status of USAID-funded Power Projects," 7/24/2018, p. 2; Fichtner GmbH & Co. KG, Islamic Republic of Afghanistan: Power Sector Master Plan, 5/2013, pp. 39, 59; SIGAR, Quarterly Report to the United States Congress, 7/30/2016, p. 9; Afghan Energy Information Center, "Afghanistan National Grid Plan," 11/14/2016; Afghan Energy Information Center, "Afghanistan National Grid Plan," 9/11/2018; Tetra Tech, Inc., JO-EW-0021 Data Collection for Energy Sector Assessment - Task 2: Overview of Afghanistan's Electric Power Sector System in 2017, 12/16/2017, pp. 15, 17; DOD, USFOR-A, JENG, response to SIGAR vetting, 10/21/2018.

[Project Table] World Bank, Country Update: The World Bank Group in Afghanistan, 4/2018, pp. 15-16; World Bank, Central Asia South Asia Electricity Transmission and Trade Project (CASA-1000) (P145054) Implementation Status & Results Report, 6/29/2018, pp. 1, 4; Afghanistan Analysts Network, "Power to the People (2)," 5/16/2016; CAREC, "CASA and TUTAP Power Interconnection Projects," 4/11/2016, p. 7; CAREC, Energy Sector Progress Report and Work Plan (June 2017-May 2018), 7/2/2018, pp. 11-13, 16-17; DOD, USACE, "Afghanistan Transitional Energy Investment Plan Stakeholder Contributors as of April 2018," 4/20/2018; SIGAR, communications with ADB official, 10/15/2018 and 10/17/2018; ADB, "Central Asia Regional Economic Cooperation (CAREC) Program," no date, <https://www.adb.org/countries/subregional-programs/carec>, accessed 10/17/2018; World Bank, CASA-1000, 5/3/2012, pp. 2, 4; SIGAR, Quarterly Report to the United States Congress, 7/30/2016, p. 8; SIGAR analysis. [Key Terminology] Energy Information Administration, "Electricity Explained: How Electricity Is Delivered To Consumers," no date, https://www.eia.gov/energyexplained/index.php?page=electricity_delivery, accessed 10/20/2018; Public Service Enterprise Group, "Glossary of Terms," <https://www.psegtransmission.com/about/glossary>, accessed 10/5/2018.

U.S.-Funded Power-Infrastructure Projects: Current Status

Source: DOD, USACE, "Afghanistan Transitional Energy Investment Plan Stakeholder Contributors as of April 2018," 4/2018; DOD, response to SIGAR data call, 9/27/2018; USAID, OI, response to SIGAR data call, 9/16/2018; USAID, OI, response to SIGAR vetting, 10/11/2018; DOD, USFOR-A, JENG, response to SIGAR vetting, 10/21/2018.