Adaptation Finance

Energy

What counts as adaptation Finance?

Climate adaptation finance is the cost of activities undertaken to lower the current and expected risks to/vulnerabilities of the project posed by climate change.

A Recap of the Key Elements …

YES to all three questions:

1. Is the project ***at demonstrated risk*** from the impact(s) of climate change? (establishing the climate vulnerability context of the project);
2. Is there an ***explicit statement of intent*** to address climate vulnerability through project design and/or activities?
3. Is there a ***clear and direct link*** between the climate vulnerability context and specific project activities? (Are they logical responses to the climate risks identified?)

Indicative Impacts of Climate Change on Electricity Generation, Transmission, and End Use

Technology	Δ Air Temp	Δ Water Temp	Δ Water Availability	Δ Wind Speed	Δ Sea Level	Floods	Heat Waves	Storms
Coal	1	2	1-3	-	-	3	1	-
Oil	1	2	1-3	-	-	3	1	1
Natural gas	1	2	1-3	-	-	3	1	1
Nuclear	1	2	1-3	-	2*	3	1	-
Hydropower	-	-	1-3	-	-	3	-	1
Wind	-	-	-	1-3	3*	1	-	1-3
Photovoltaic	1	-	-	1	-	1	1	1
CSP/solar tracking	-	-	2	2	-	1	1	2
Biomass/biofuel	1	2	2	-	3*	3	1	-
Geothermal	-	1	-	-	-	1	-	-
Ocean	-	1	-	-	1	N/A	-	3
T&D grids	3	-	-	1	3*	1-2	1	2-3
End use	2	-	-	-	-	-	3	-

Δ = change in, CSP = concentrating solar power

*Higher severity in coastal or low-lying areas

Notes: 3 = severe impact, 2 = medium impact, 1 = limited impact; – = no significant impact, N/A = not applicable

Source: Modified and expanded from European Commission. 2010. *Investment needs for future adaptation measures in EU nuclear power plants and other electricity generation technologies due to effects of climate change*. Final report. European Commission Directorate-General for Energy Report EUR 24769.

Potentially Eligible Adaptation Activities in the Energy Sector

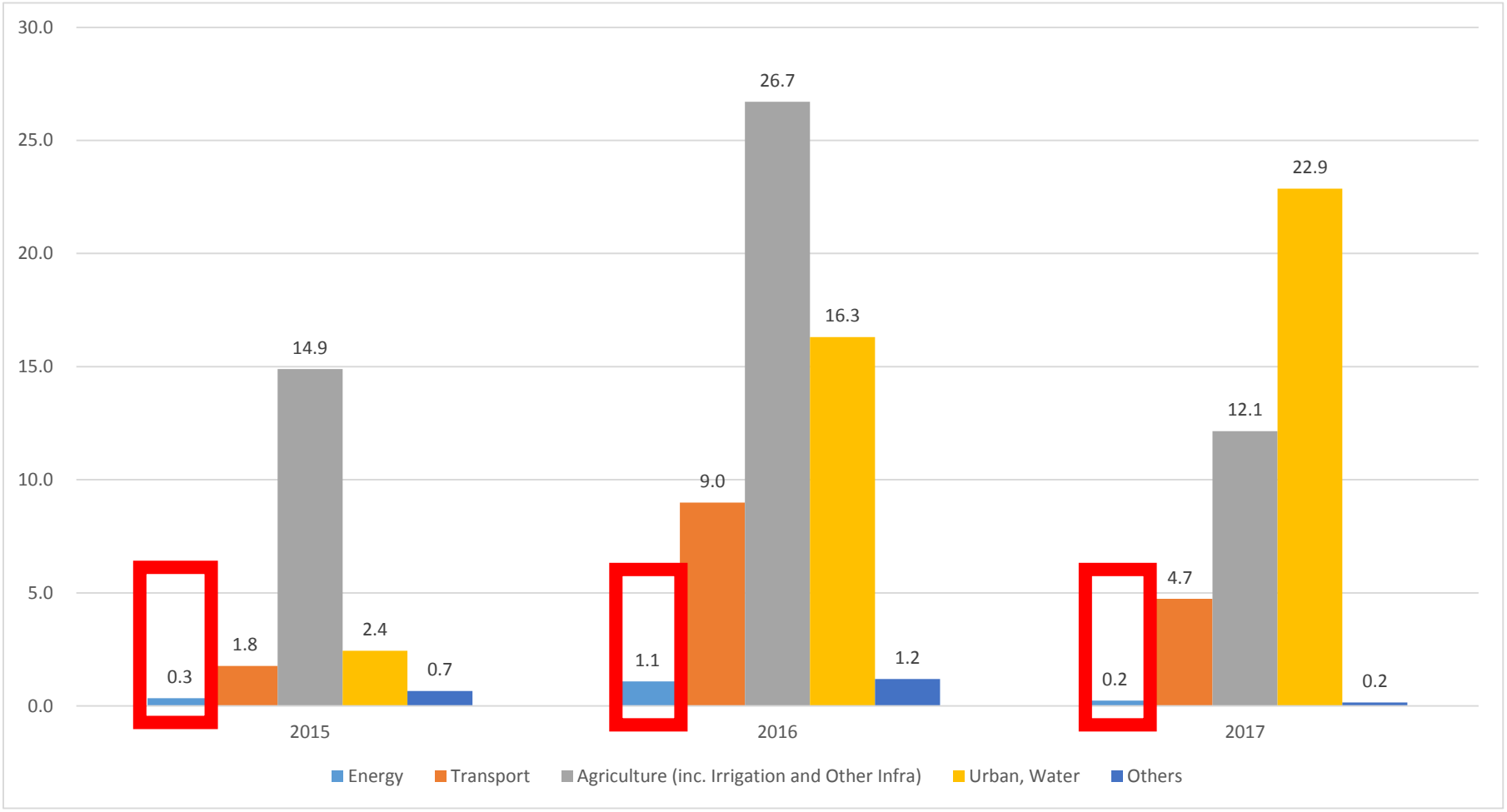
Tables 1-15 in Appendix 5 of the energy sector Guidance Note

Table 5 Key Climate Change Impacts and Adaptation—Hydropower

Climate Variable	Physical Components	Key Impacts	Adaptation Options
• Precipitation • Temperature • Extreme events	• Dam and other structures (intake, penstock) • Power station (turbines and generators)	• Indicated below for specific climate changes	• Develop improved hydrological forecasting techniques and adaptive management operating rules • Develop basin-wide management strategies that take into account the full range of downstream environmental and human water uses • Restore and better manage upstream land including afforestation to reduce floods, erosion, silting, and mudslides • Analysis to estimate likely range of projected climate variations over hydro lifetime • Identify cost-effective designs (new plants) and modifications (existing plants) to deal with specific risks identified for the site

ADB Adaptation Finance: *Recent reports*

Adaptation Finance as a % to Total ADB Approved Investments **by Sector** 2015-2017



Note: This includes approved investments provided by ADB Funds only; *Others* include Education, Finance, Health, Industry and Trade, ICT, Mutisector and Public Sector Management

Sources: ADB Climate Finance Database, SPD Sectoral Breakdown of Investments

Case Study 1

A Hypothetic Project

Possible approaches to estimate the cost of the sea wall:

- Internet search for the cost of similar facility in the same area or region
- Order-of-magnitude, top-of-the-head estimates from projects officers or technical experts within the bank who have done similar projects
- Cost inquiries from contractors doing similar projects in the project area.

Case Study 1

A Hypothetic Project

Possible approaches to estimate the cost of the sea wall:

- Internet search for the cost of similar facility in the same area or region
- Order-of-magnitude, top-of-the-head estimates from projects officers or technical experts within the bank who have done similar projects
- Cost inquiries from contractors doing similar projects in the project area.

Case Study 1

A Hypothetic Project

- The third option is considered the most reliable and probably more accurate. The average all-in cost from contractors is about $5,000 per meter of sea wall installed. The cost to build the sea wall is 3,000 meters x $5,000/meter or $15,000,000.

- ADB's climate adaptation finance will be $15,000,000 x 60% or $9,000,000

Case Study 2

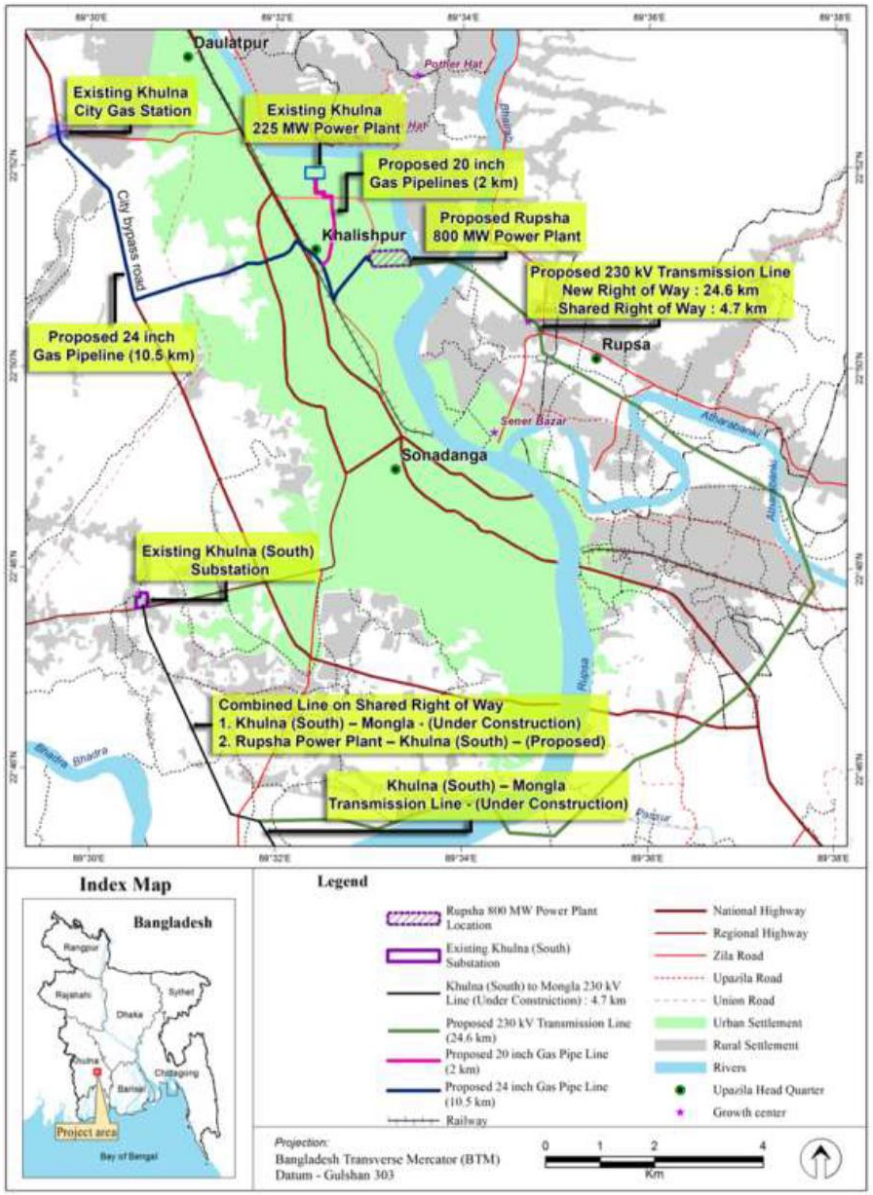
(BAN) Rupsha 800-Megawatt Combined Cycle Power Plant Project

Project components:

- A new Rupsha 800 megawatt (MW) combined cycle **power plant** (CCPP)
- **Gas distribution pipelines**: (i) a 10-kilometer (km), 24-inch gas pipeline to connect the Khulna city gas station to the Rupsha power plant; and (ii) an additional 2 km, 20-inch gas pipeline from the Rupsha power plant to North-West Power Generation Company Limited's existing 225 MW power plant at Khulna, which is currently operating on high-speed diesel (HSD). The project will replace the HSD at the Khulna power plant and provide a stable gas supply for its operation**.**
- **Power transmission interconnection**, consisting of a 230-kilovolt switchyard and 29 km of 230-kilovolt high-capacity double-circuit transmission lines, to transfer generated electricity from the Rupsha power plant to the existing Khulna south grid substation;
- **Capacity strengthening** of the North-West Power Generation Company Limited

Case Study 2

(BAN) Rupsha 800-Megawatt Combined Cycle Power Plant Project



Case Study 2

(BAN) Rupsha 800-Megawatt Combined Cycle Power Plant Project

Context of project vulnerability (CCPP, transmission lines, and gas distribution pipes)

- Higher average temperatures and more frequent and severe extreme temperatures are expected to reduce the plant efficiency and the generating capacity;
- Reduced availability of surface water resources and changing seasonal flow patterns of the river as the primary source of cooling water may increase the risk of thermoelectric power plant de-ratings; and
- Accelerating sea level rise, increasing frequency and intensity of storms and cyclonic events increases the vulnerability of flooding, storm surge and saline intrusion.

Case Study 2

(BAN) Rupsha 800-Megawatt Combined Cycle Power Plant Project

Explicit Statement of Intent

A set of adaptation measures were integrated into the project design to address the risks associated with projected climate change, based on a detailed climate change risk and adaptation assessments.

Climate Threat		Impact on the power plant		Result of impact
Increasing in air temperatures	→	Gas turbine cycle performance	→	Reduce the efficiency
Increasing in river water temperature	→	Steam turbine cycle and coolant water cycle performance	→	rate and reduce the generation capacity

Case Study 2

(BAN) Rupsha 800-Megawatt Combined Cycle Power Plant Project

Clear and Direct Links between Adaptation Activities and Climate Vulnerability

Items	Linked adaptation measures	Adaptation finance ($ million)	ADB's adaptation finance ($ million)	Remarks
Closed-loop cooling tower	Water use efficiency and reuse	4.34	2.64	Cost difference between one-through system and cooling tower for the CCPP
Demineralized water treatment system (reverse osmosis)	Alternative water resources	21.75	13.27	Entire cost for desalination of intake water
River bank protection and levelling	Waterproofing and elevation of critical infrastructure	1.45	0.88	Cost of additional 2.2 m in levelling height
Auxiliaries system	Emergency protection system	13.59	8.29	Based on unit cost for the emergency system of $64.58 per square meter