Investing in Climate Resilience in Emerging Economies: EBRD's Action on Climate Change

Marta Modelewska
Principal Manager, Climate Change Adaptation

Brussels, 27-28 September 2016

European Bank
for Reconstruction and Development

European Bank
for Reconstruction and Development

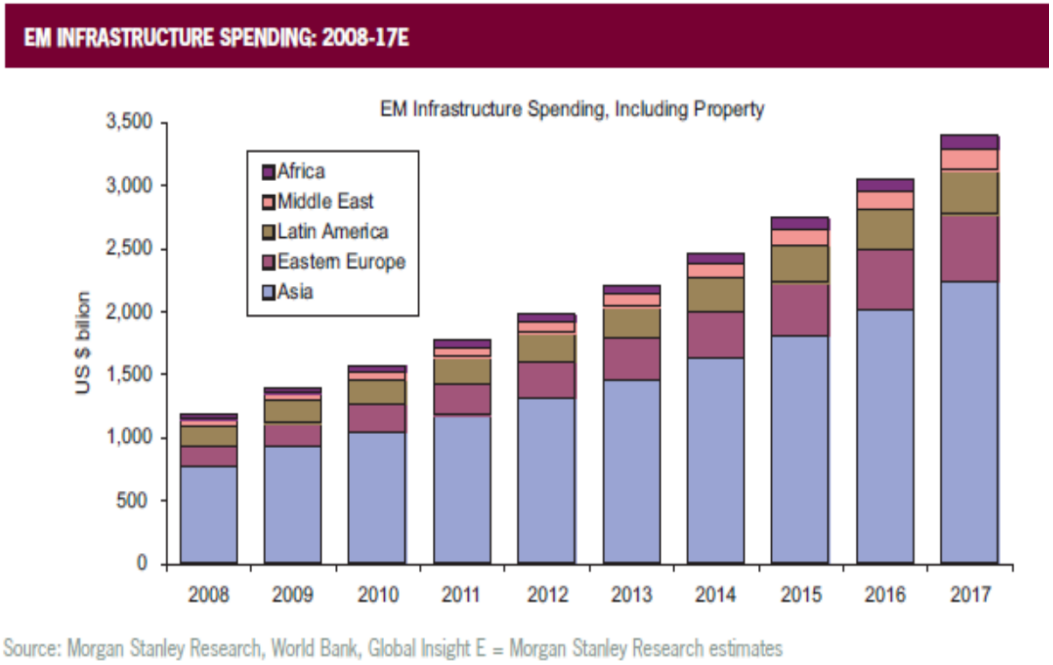
EBRD GREEN ECONOMY TRANSITION

TOOLS FOR MAINSTREAMING GREEN FINANCE

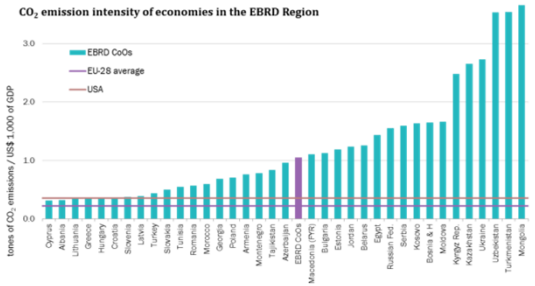
PROJECT HIGHLIGHTS

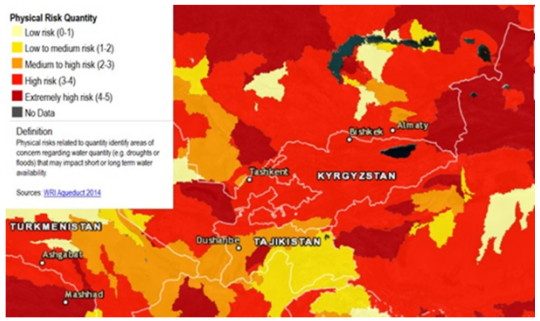
Climate Change in emerging economies: The financing challenge

European Bank
for Reconstruction and Development



Source: Morgan Stanley Research, World Bank, Global Insight E = Morgan Stanley Research estimates



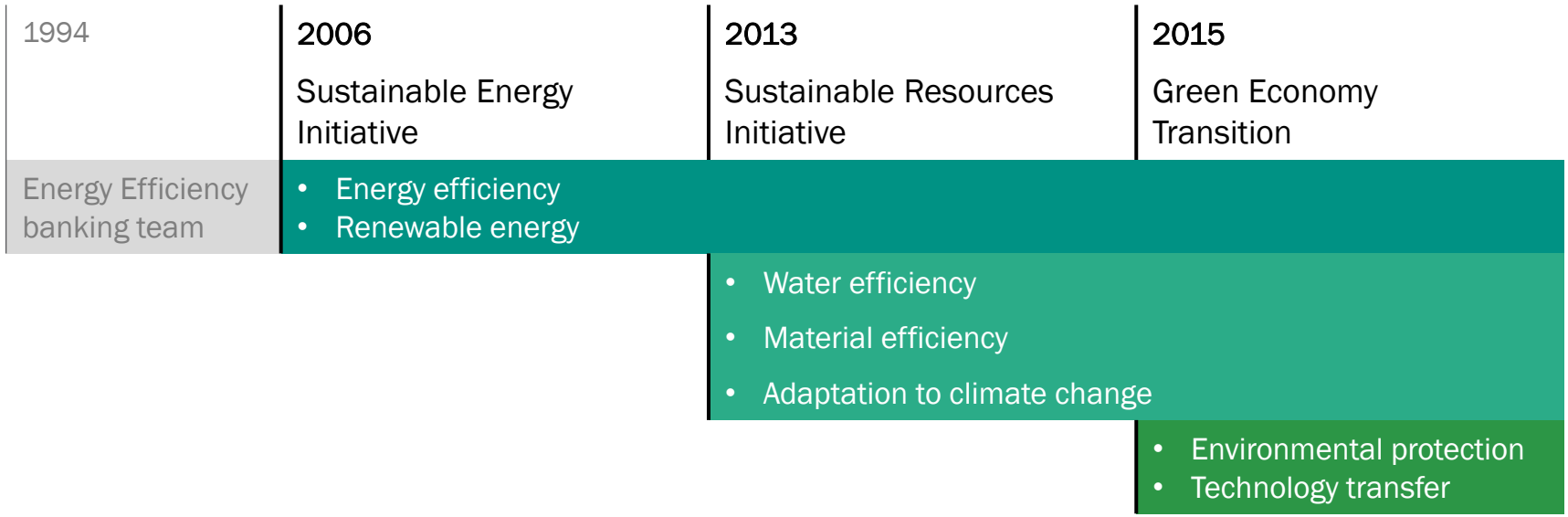


- The International Energy Agency estimated **US$ 8-13 trillion** are needed for energy efficiency investments in transport, industry and buildings between 2014-2035.
- The IPCC 5th Assessment Report estimated **US$ 6.4 trillion** are needed in 2010-2029 for energy efficiency investments across sectors for a pathway consistent with a +2*C increase.
- MDBs delivered **US$ 103 billion** of climate finance in 2011-2014.

Mainstreaming green financing: EBRD strategies

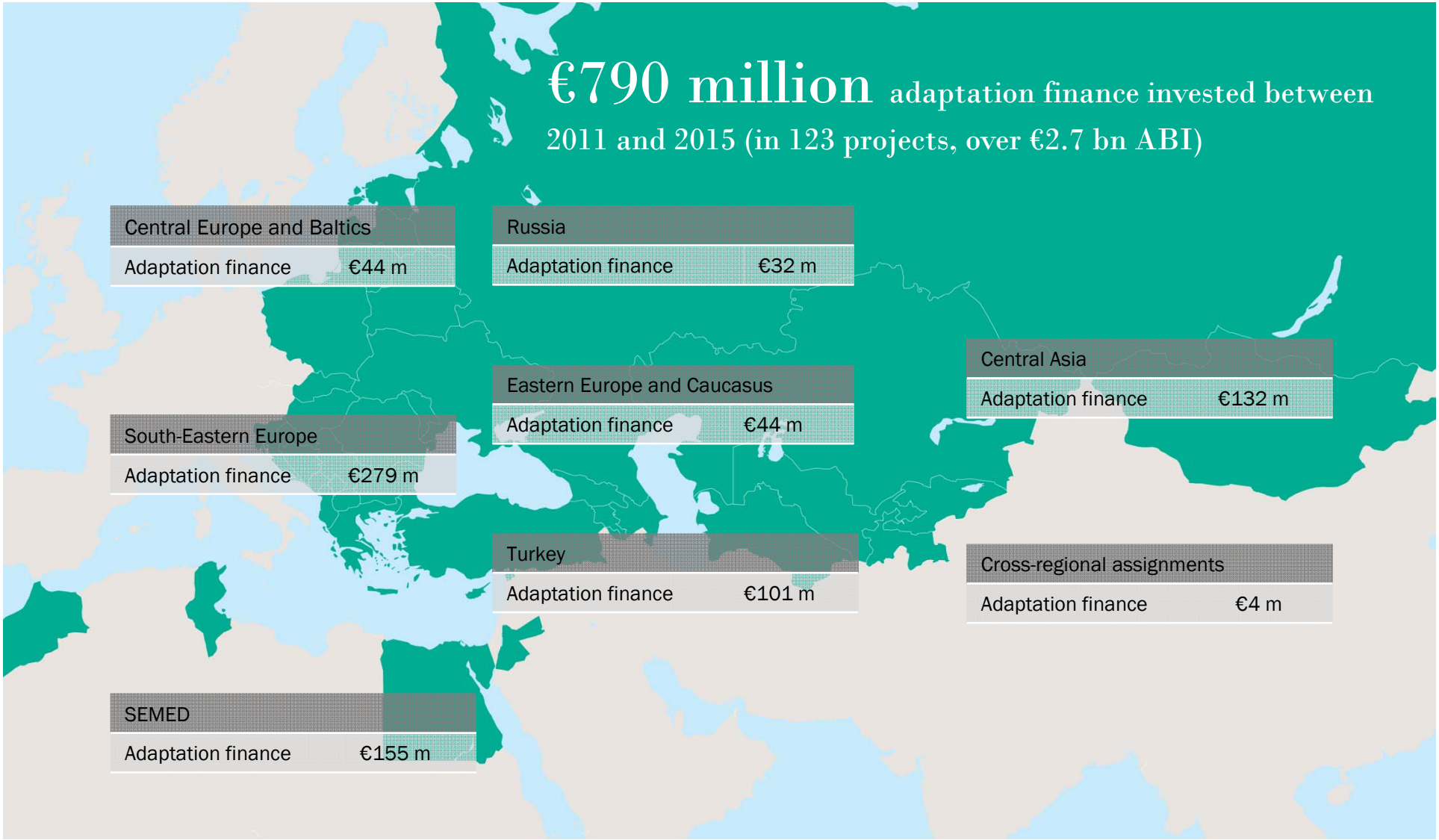
European Bank
for Reconstruction and Development

- Since 2006 the EBRD has adopted cross-sectorial strategies **to mainstream** across the Bank's operations, and **to increase** the share of Bank business represented by measures which enhance the **efficient use of energy and resources (water, materials)** and **contribute to the mitigation of, and adaptation to, climate change.**
- The latest strategy, the Green Economy Transition (GET) aims to further scale up the Bank's green business, and to include new areas of activity, such as environmental protection and technology transfer.



EBRD Climate Adaptation Portfolio: Adaptation finance by geography

European Bank
for Reconstruction and Development

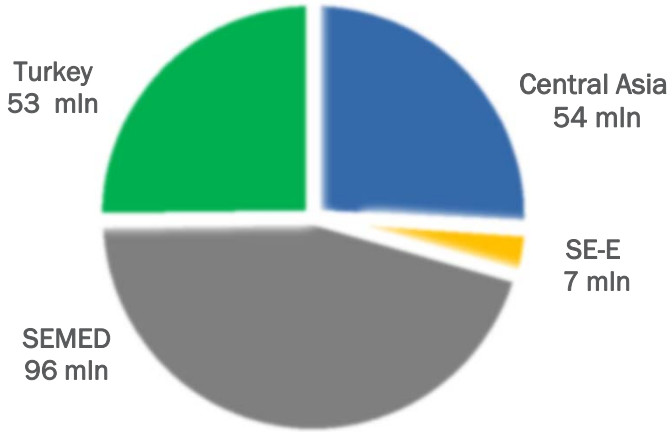


EBRD Climate Adaptation Portfolio

European Bank
for Reconstruction and Development

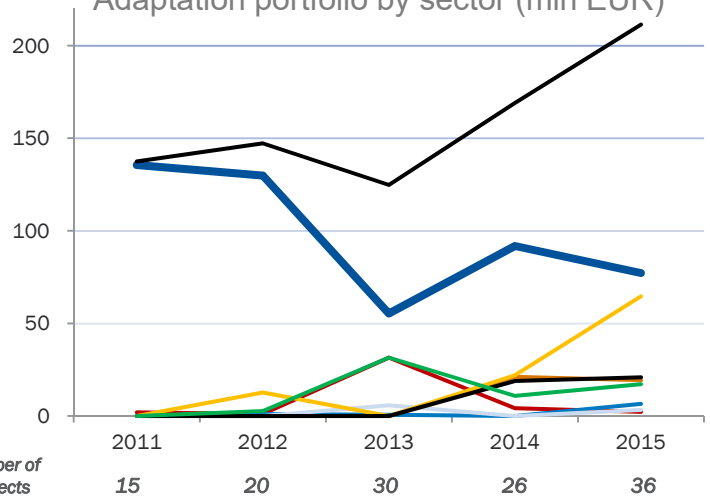
- Central Asia
- Central Europe and Baltic States
- Eastern Europe and the Caucasus
- Russia
- South-eastern Europe
- Southern and Eastern Mediterranean
- Turkey
- Regional
- Total

Adaptation portfolio by region (mln EUR)



- Municipal infrastructure
- Manufacturing
- Property & Tourism
- Natural Resources
- Power & Energy
- Financial Institutions
- Transport
- Agribusiness
- Total

Adaptation portfolio by sector (mln EUR)

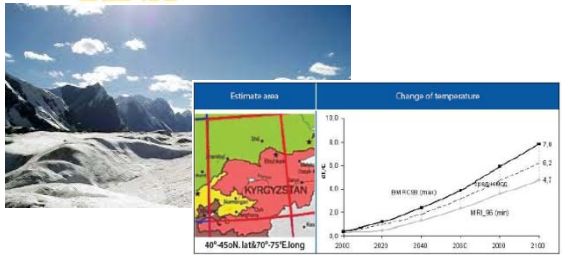


GREEN CLIMATE FUND

GCF as potential source of funding for projects in the region

The Fund promises to be a source for many of the EBRD's CoO (not all, e.g. Turkey)

PPCR PILOT PROGRAM FOR CLIMATE RESILIENCE



Kyrgyz Republic becomes eligible for PPCR funding

EBRD involved in scoping mission, several CoOs (SEMED) become eligible for private sector funding

European Bank
for Reconstruction and Development

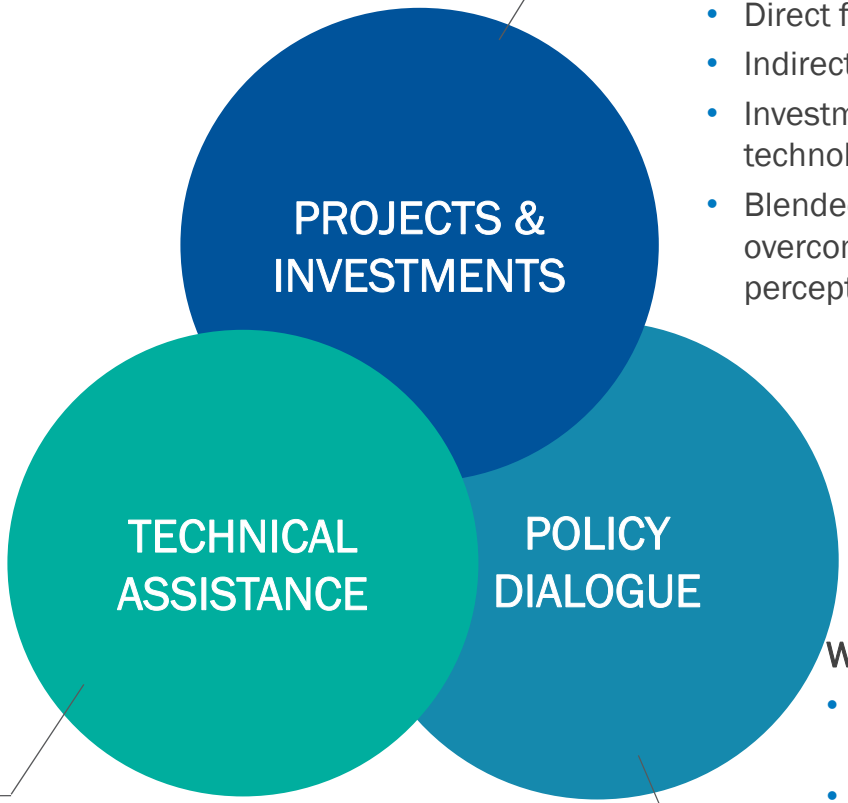
EBRD GREEN ECONOMY TRANSITION

TOOLS FOR MAINSTREAMING GREEN FINANCE

PROJECT HIGHLIGHTS

Mainstreaming green financing: EBRD business model

European Bank
for Reconstruction and Development



Tailored financing instruments

- Direct financing
- Indirect-financing via local banks (SEFFs)
- Investment grant support for climate technology transfer
- Blended concessional finance so as to overcome affordability and risk perceptions

Targeted activities:

- Energy and resource audits to identify green investments
- Integrated technical, financial and marketing teams to support client banks in developing sustainable energy lending
- Assessments of risks related to climate vulnerabilities
- Transition gaps and market scoping studies

Working with governments

- To address sustainability and environmental market failures
- To strengthen the institutional and regulatory context and create optimum conditions for green investments to take place

Mainstreaming green financing: Business development tools

European Bank
for Reconstruction and Development

CLIMATE VULNERABILITY ASSESSMENTS

Supporting businesses and utilities which are most exposed to future climate change impacts to identify risks and integrate adaptation measures in investment programmes.

RESOURCE EFFICIENCY AUDITS

Offering audits to the Bank's clients who have resource efficiency potential, to identify and prioritise resource efficiency investments based on the financial return from input cost savings.

BLENDING OF CLIMATE FUNDS

Sourcing and structuring dedicated resources from international providers of climate finance for blended financing operations for terms appropriately matching the risk and duration profiles of green projects.

SUSTAINABLE ENERGY FINANCING FACILITIES

Extending credit lines to partner banks for on-lending to local projects, together with dedicated technical assistance teams who help identify and assess green investment opportunities, train up banks' staff and develop marketing activities.

TECHNOLOGY TRANSFER SUPPORT

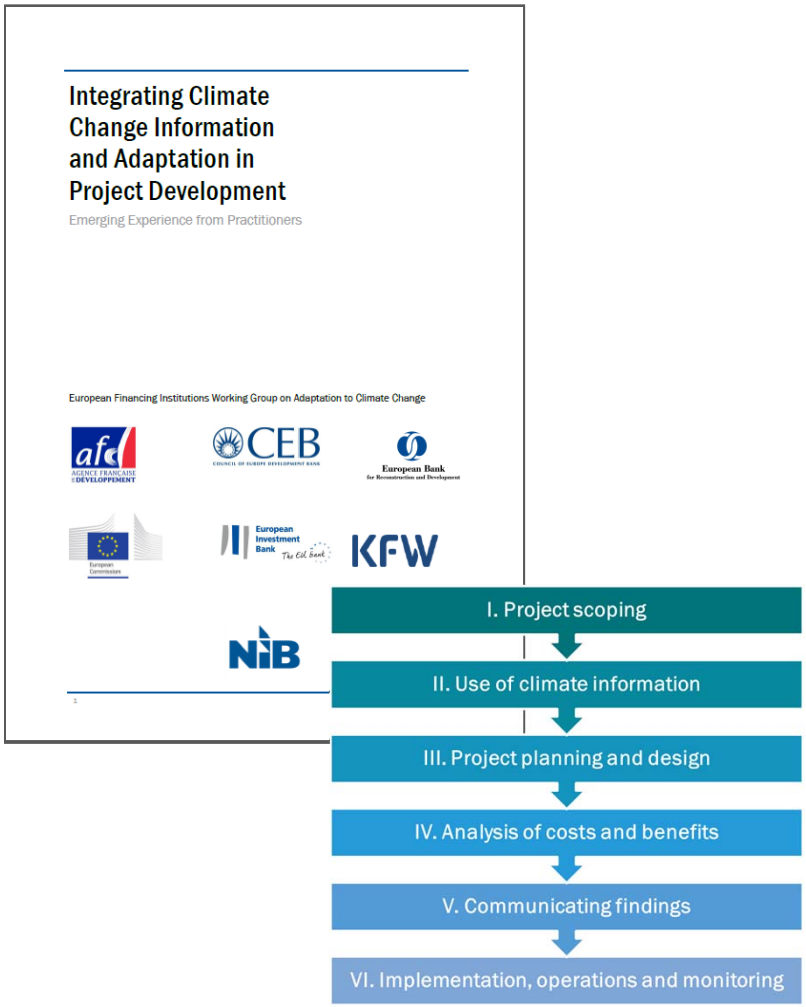
Identifying clients with potential to invest in higher resource efficiency technologies in early transition markets and supporting them with partial investment grants that help overcome first-mover risks and affordability barriers.

POLICY DIALOGUE

Working with governments and authorities to environmental market failures, strengthen the institutional and regulatory context and create optimum conditions for green investments to take place.

EUFIWACC Guidance on integrating climate resilience into project development and implementation

European Bank
for Reconstruction and Development



European Financing Institutions

- Agence Française de Développement
- Council of Europe Development Bank
- European Bank for Reconstruction & Development
- European Commission – Directorate-General for Climate Action
- European Investment Bank
- KfW Development Bank
- Nordic Investment Bank

Expert agencies

- Climate Service Center Germany (GERICS)
- Joint Assistance to Support Projects in European Regions (JASPERS)

Consultancies

Acclimatise, Agrer, Atkins, Baastel, CES Consulting Engineers Salzgitter GmbH, Climpact-Metnext, CrissCross Consulting, D'Appolonia, Eco Ltd., ENVIRON, Factor CO2, GOPA mbH, Green Partners, Guiran Consulting, Kommunalkredit Public Consulting, Luxconsult S.A., Mott MacDonald, Perspectives, Pöyry, Royal Haskoning DHV, Safege, SIA srl, Sofreco, Suez Environnement Consulting, Sweco, TA Consult Partners Ltd., WSP Parsons Brinkerhoff

European Bank
for Reconstruction and Development

EBRD GREEN ECONOMY TRANSITION

TOOLS FOR MAINSTREAMING GREEN FINANCE

PROJECT HIGHLIGHTS

Case study: improving Tajikistan's hydropower sector

European Bank
for Reconstruction and Development

CLIENT AND PROJECT

Support to the Tajik state-owned power utility for financing the rehabilitation of two units at the Qairokkum hydro power plant. The output of the plant supplies electricity to 500,000 people.

This will increase capacity of the plant from 126MW to 142MW and strengthen the plant's resilience against the projected impacts of climate change.

TECHNICAL ASSISTANCE

Resources of US$ 4.7 million from the EBRD Special Shareholder Fund, the Government of Austria and the UK, support the technical evaluation of the project and capacity building to integrate climate resilience considerations in plant operations.

ADAPTATION COMPONENT

- Rehabilitation of hydro power plant to make its operation more climate-resilient
- Design of the upgrade to include climate resilience considerations by modelling future hydrology under a range of climate change scenarios
- Turbine upgrade and spillway capacities adjusted to optimise power generation and safety across the range of projected hydrological conditions.

FINANCIAL STRUCTURE

EBRD loan	US$50 million
PPCR* funds, of which	US$21 million
Loan	US$10 million
Grant	US$11 million

*The Climate Investment Funds (CIF) Pilot Programme for Climate Resilience (PPCR)

CLIMATE INVESTMENT FUNDS

UKaid from the Department for International Development

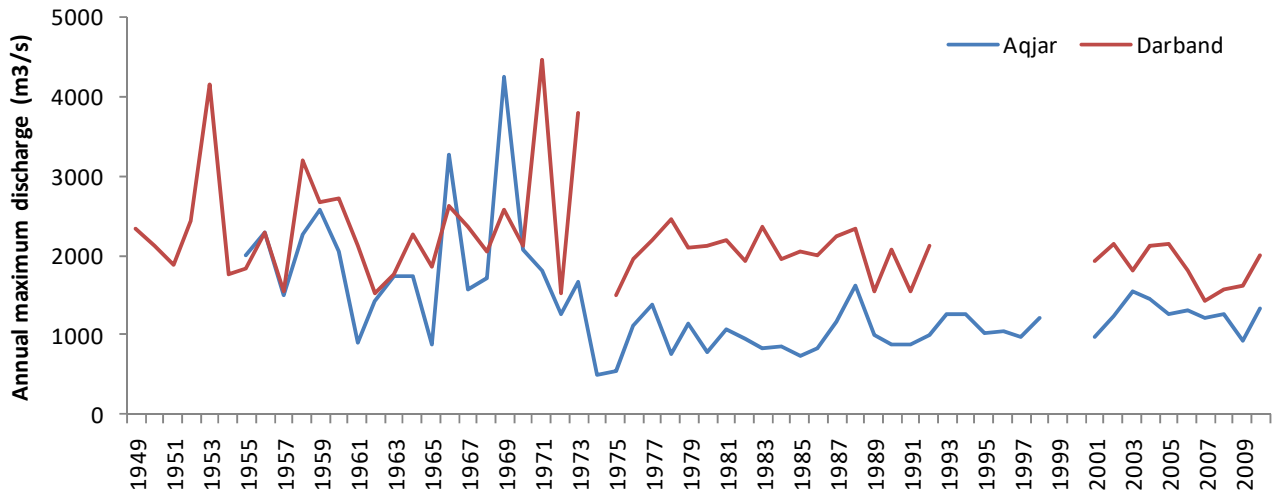
BMF FEDERAL MINISTRY OF FINANCE OF THE REPUBLIC OF AUSTRIA

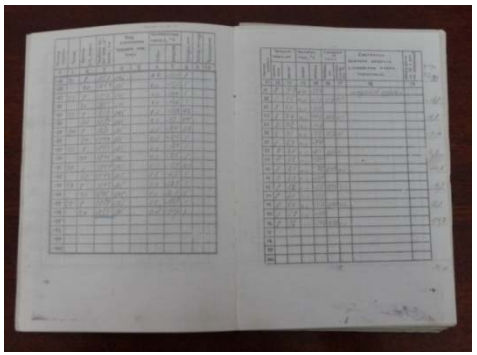
Investment preparatory phase: climate change and hydrological modelling (2010 – 2012)

European Bank
for Reconstruction and Development

Step 1: Data assembly and trend analysis

- Meteorological data from Tajik Hydromet and Kyrgyz Hydromet
- Records on natural disasters (floods, landslides) from the Tajik National Committee for Emergencies
- Data and model outputs from IPCC sources
- **Sector Study:** Funded by USD 300K grant from PPCR

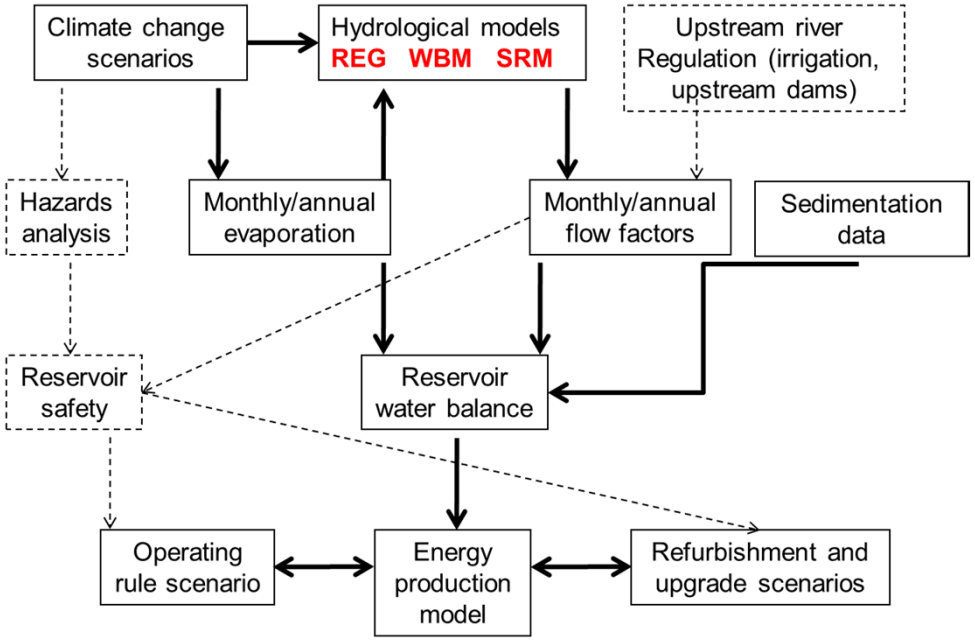




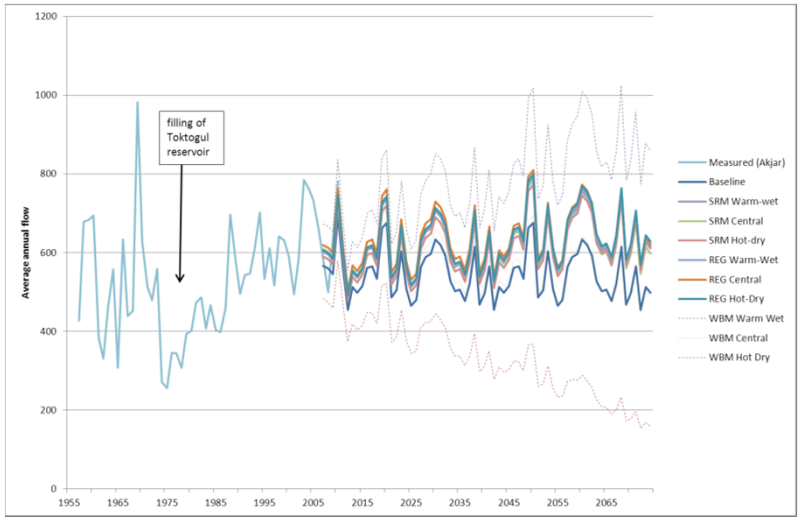
Investment preparatory phase: climate change and hydrological modelling (2010 – 2012)

European Bank
for Reconstruction and Development

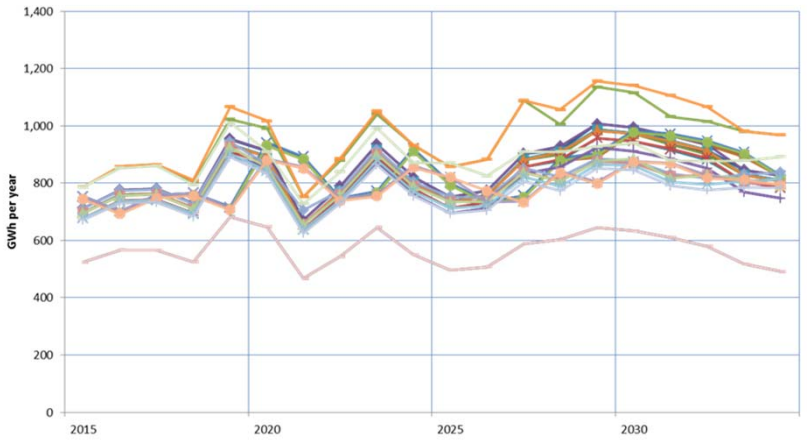
Step 2: Modelling Qairokkum's capacity to generate electricity under different climate change scenarios



Measured/simulated inflows 1957 to 2074



Modelled energy generation 2015 - 2050



Implementation phase: investment design & implementation (2013 - 2016)

European Bank
for Reconstruction and Development

Step 3: Technical options for the rehabilitation of Qairokkum hydropower plant

Net present value (€ million)

Hydro Scenario		Alternative 6 N - 170 MW	7 N - 210 MW	4 N 2 O - 150 MW
Regression Model REG	central	177	143	177
	hot-dry	171	137	171
	warm-wet	171	137	171
Snowmelt Runoff Model SRM	central	170	136	169
	hot-dry	163	129	165
	warm-wet	168	134	168
Watershed Bal. Model WBM	central	157	122	161
	hot-dry	83	48	93
	warm-wet	212	183	199

A min-max analysis

Hydro Scenario		Alternative 6 N - 170 MW	7 N - 210 MW	4 N 2 O - 150 MW
Regression Model REG	central	0.0	-33.7	-0.3
	hot-dry	0.0	-34.1	-0.2
	warm-wet	-0.4	-34.5	0.0
Snowmelt Runoff Model SRM	central	0.0	-34.1	-0.6
	hot-dry	-2.2	-36.5	0.0
	warm-wet	-0.5	-34.7	0.0
Watershed Bal. Model WBM	central	-4.0	-38.6	0.0
	hot-dry	-10.9	-45.5	0.0
	warm-wet	0.0	-29.1	-12.5
Minimum Regret		-10.9	-45.5	-12.5

Scenario 1	Scenario 2	Scenario 3
Scenario 1 envisaged a replacement of all turbines. Whilst the new turbines would have the same flow rate – 177m3 per second – their efficiency would be much higher. The plant's generation capacity after the rehabilitation would be 174MW.	Scenario 2 envisaged a replacement of all turbines and the installation of an additional turbine with a generation capacity of 40MW. This would increase the generation capacity of the rehabilitated power plant to 214MW.	Scenario 3 envisaged a replacement of four turbines in the same way as proposed in scenario 1. The remaining two turbines would run as long as they could be maintained in operational condition. Thereafter, electricity generation would continue with four turbines - a scenario thought suitable for climate scenarios under which the water flow into Qairokkum's reservoir would decrease over time.

Case study: ports in Morocco

European Bank
for Reconstruction and Development

	Low-end CC scenario		High-end CC scenario	
Years	Berth Down Time	Damage	Berth Down Time	Damage
1-5	€281,250	€225,000	€422,000	€340,000
6-10	€565,000	€450,000	€845,000	€675,000
11-15	€985,000	€590,000	€1,475,000	€885,000
16-20	€1,450,000	€845,000	€2,320,000	€1,270,000
21-52	€2,000,000	€1,265,000	€3,000,000	€1,900,000

Adaptation Measure	Cost
Increase in height of quay edge	€2.0 million
Relocation of mooring infrastructure	€1.7 million
Relocation of fenders	€1.4 million
Berth down time during construction	€1.0 million
Total capital cost	**€6.1 million**

Scenario	Internal Rate of Return
Low end climate change prediction	2.14%
High end climate change prediction	5.07%

PIANC
The World Association
for Waterborne Transport Infrastructure

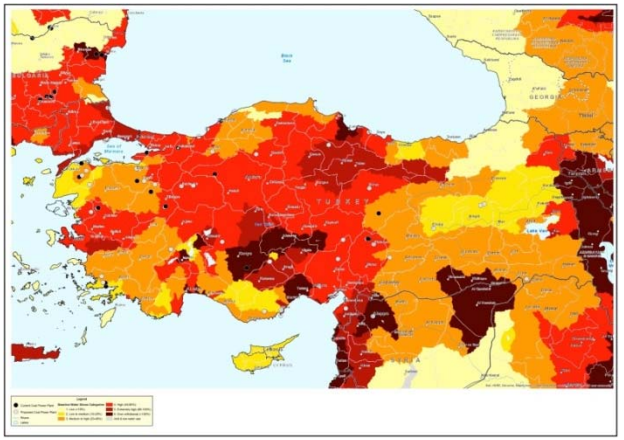
PIANC Working Group 178 on Climate Change Adaptation for Ports and Navigation Infrastructure

Moroccan port authorities will be supported to benefit from emerging PIANC guidance

Case study: industrial water use in Turkey

European Bank
for Reconstruction and Development

- New Water Law in Turkey (2016) will introduce **cost reflective** water tariffs
- EBRD **shadow water price methodology** helps understand full costs associated with water use
- In this example, applying the shadow price would increase annual water use costs by **EUR 1.5 million**
- Significant implications for capital investment appraisal of **water reuse & recycling technologies**



Location	Turkey, Marmara
Type	Industrial
Project	Water & energy efficiency investments for a tissue paper mill
Main source	Energy and Water Efficiency Audit
Tariff (2013) EUR/m^3	0.69 (not including wastewater; no charge for 20% of water pumped from wells)
Shadow price EUR/m^3	**2.60**

European Bank
for Reconstruction and Development

Thank you for your attention

MARTA MODELEWSKA

Principal, Climate Change Adaptation

Energy Efficiency and Climate Change Team

ModelewM@ebrd.com

EBRD, One Exchange Square
London, EC2A 2JN
United Kingdom
www.ebrd.com