Counting Climate Mitigation Finance in Energy Sector

David C. Elzinga
Senior Energy Specialist, SDSC-ENE

Estimating Mitigation Finance

Mitigation Finance is:

- 100% of ADB investment in RE, EE, Fuel switching, carbon capture and storage, RE-dedicated T&D systems, smart grid, Flexible AC transmission system devices (VAR compensator, capacitor banks) and linked policies, regulations, capacity building, etc.
- Proportional to the loss reduction/energy savings benefits as percentage of total benefits for advanced metering infrastructure projects. Default value is 30%

Joint MDB Approach-Mitigation Finance Tracking

- Ineligible Activities:
  - ✓ Greenfield investments in fossil fuel-based facilities in all sectors except transport (exploration & processing facilities, fuel storage, transport/transmission and distribution facilities and use)
  - ✓ Brownfield investments to retrofit, rehabilitate or replace existing coal-based facilities without switching to cleaner fuel;
  - ✓ hydropower plants with high methane emissions from reservoir that exceed the GHG reduction from renewable energy; these are hydropower plants whose GHG emissions per kWh (90 gCO2eq/kWh) exceeds the grid emission factor in the project area;

Joint MDB Approach-Mitigation Finance Tracking

- Ineligible Activities:
  - ✓ geothermal power plants with high CO2 content in the geothermal fluid that cannot be re-injected;
  - ✓ biofuel projects that deplete carbon pools more than they reduce GHG emissions due to high emissions in production, processing and transportation.
  - ✓ Activities that reduce emission at the project site while causing increased emission somewhere else.

Can we explain the reasons behind the ineligibility of each of these activities?

Approaches in Estimating Mitigation Finance (MF)

- Method (A) – Preferred Approach: MF estimates by costing the mitigation components – to be used if mitigation components are clearly identifiable and cost data are available or can be determined
- Method (B)- Next Preferred Approach- MF estimates by using unit cost factor i.e. cost estimate per unit of output– this is similar to estimating the total cost of building using a known typical cost/sq. m. of area or the total cost of a power plant by using typical cost/MW.

Approaches in Estimating Mitigation Finance (MF)

- Method (C): Least Preferred Approach-MF estimates by using %MF factors or proxies – to be used when mitigation components are not identifiable, their costs are not available and/or when their costs are lumped together and cannot be disaggregated.

  % mitigation finance =%MF

  Mitigation finance = %MF x (ADB loan or ADB financing for aggregated cost of outputs)

Internal Cost Data Sources

- All project documents especially the Project Administration Manual (PAM)
- Two important cost estimates tables in the PAM:
  - Detailed cost estimates by financier – identifies which items are funded by ADB and by how much
  - Detailed cost estimates by outputs or components-identifies the cost of each mitigating and non-mitigating output.

Unit Cost Factor in Method B

- Preferably taken from very similar project (with similar technology, capacity/size, location- country or region)-capacity adjustment (using the Six-tenths rule) is needed if reference project has substantially different capacity; cost adjustment (using cost indices) is needed if reference project is beyond 5 years old.
- May be sourced from past ADB project documents or from reliable websites.
- Unit cost factor should not be changed frequently to avoid inconsistencies.

Determining %MF under Method C

- Factors or proxies will have to be identified and translated into numbers. These proxies should have the most direct link possible to show how GHG reduction can be achieved by the project or by the aggregated project outputs.

List of Eligible Mitigation Activities

Category	Sub-category	Eligible activities
1. Renewable energy	1.1. Electricity generation	Wind power
		Geothermal power (only if net emission reductions can be demonstrated)
		Solar power (concentrated solar power, photovoltaic power)
		Biomass or biogas power (only if they result in net reductions in emissions, taking into account production, processing and transportation)
		Ocean power (wave, tidal, ocean currents, salt gradient, and so on)
		Hydropower plants (only if net emission reductions can be demonstrated)
		Renewable energy power plant retrofits
	1.2. Heat production or other renewable energy application	Solar water heating and other thermal applications of solar power in all sectors
		Thermal applications of geothermal power in all sectors
		Wind-driven pumping systems or similar applications
		Thermal applications of sustainably produced bioenergy in all sectors
	1.3. Measures to facilitate integration of renewable energy into grids	New, expanded and improved transmission systems (lines, substations)
		Storage systems (battery, mechanical, pumped storage) that facilitate integration of renewables, or increase renewable energy production
		New information and communication technology, smart grid and mini grid

List of Eligible Mitigation Activities

2. Lower-carbon and efficient energy generation	2.1. Transmission and distribution systems	Retrofit of transmission lines or substations and/or distribution systems to reduce energy use and/or technical losses including improving grid stability or reliability (In the case of capacity expansion, only the portion of the investment that is reducing existing losses is included)
	2.2. Power plants	Thermal power plant retrofit to switch from a more GHG-intensive fuel to a different and less GHG-intensive fuel type[13]
		Conversion of existing fossil-fuel-based power plant to co-generation[14] technologies that generate electricity in addition to providing heating or cooling
		Energy efficiency improvement in existing thermal power plant

List of Eligible Mitigation Activities

Category	Sub-category	Eligible activities
3. Energy efficiency[15]	3.1. Energy efficiency in industry in existing facilities	Industrial energy efficiency improvements though the installation of more efficient equipment, changes in processes, reduction of heat losses and/or increased waste-heat recovery and/or resource efficiency[16]
		Installation of co-generation plants that generate electricity in addition to providing heating or cooling
		Replacement of an older facility (old facility retired) with a more efficient facility
	3.2. Energy efficiency improvements in existing commercial, public and residential buildings	Energy efficiency improvement in lighting, appliances and equipment, including energy-management systems.
		Substitution of existing heating or cooling systems for buildings by co-generation plants that generate electricity in addition to providing heating or cooling[17]
		Retrofit of existing buildings: architectural or building changes that enable reduction of energy consumption
	3.3. Energy efficiency improvements in the utility sector and public services	Energy efficiency improvement in utilities and public services through the installation of more efficient lighting or equipment
		Rehabilitation of district heating and cooling systems
		Reduction of heat loss in utilities and/or increased recovery of waste heat
		Improvement in utility-scale energy efficiency through efficient energy use and loss reduction, or resource efficiency[18] improvements
	3.4. Vehicle fleet energy efficiency and low-carbon fuels	Existing vehicle, rail or boat fleet retrofit or replacement (including the use of lower-carbon fuels, electric or hydrogen technologies), or new vehicle, rail or boat fleets with ultra-low carbon emissions, exceeding available standards.
	3.5. Energy efficiency in new commercial, public and residential buildings	Use of highly efficient architectural designs, energy-efficient appliances and equipment, and building techniques that reduce the energy consumption of buildings, exceeding available standards and complying with high energy efficiency certification or rating schemes
	3.6. Energy audits	Energy audits of energy end-users, including industries, buildings and transport systems

List of Eligible Mitigation Activities

Category	Sub-category	Eligible activities
5. Non-energy GHG reductions	5.1. Fugitive emissions	Reduction of gas flaring or methane fugitive emissions in the oil and gas industry
		Coal-mine methane capture
	5.2. Carbon capture and storage	Projects for carbon capture and storage technology that prevent the release of large quantities of CO_2 into the atmosphere from fossil fuel use in power generation, and process emissions in other industries
	5.3. Air conditioning and refrigeration	Retrofit of existing industrial, commercial and residential infrastructure to switch to cooling agent with lower potential for global warming
	5.4. Industrial processes	Reduction in GHG emissions resulting from industrial process improvements and cleaner production (for example, of cement or chemicals), excluding carbon capture and storage
6. Waste and wastewater	6.1. Wastewater	Treatment of wastewater, including wastewater collection networks, that reduces GHG emissions (only if substantial net GHG emission reductions can be demonstrated)
	6.2. Solid waste management	Waste management projects that capture or combust methane emissions
		Waste-to-energy projects
		Waste collection, recycling and management projects that recover or reuse materials and waste as inputs into new products or as a resource (only if net emission reductions can be demonstrated)

List of Eligible Mitigation Activities

Category	Sub-category	Eligible activities
9. Cross-cutting issues	9.1. Support for national, regional or local policy, through technical assistance or policy lending	National, sectoral or territorial policies/planning/action plans/planning/ institutions dedicated to mitigation such as NDCs, NAMAs and plans for scaling up renewable energy
		Energy sector policies and regulations leading to climate change mitigation or the mainstreaming of climate action, such as energy efficiency standards or certification schemes; energy efficiency procurement schemes; renewable energy policies, power market reforms to enable renewable energy
		Systems for monitoring the emission of greenhouse gases
		Efficient pricing of fuels and electricity (such as subsidy rationalisation, efficient end-user tariffs, and efficient regulations on electricity generation, transmission or distribution, and on carbon pricing)
		Education, training, capacity-building and awareness-raising on climate change mitigation or sustainable energy or sustainable transport; mitigation research
		Other policy and regulatory activities, including those in non-energy sectors, leading to climate change mitigation or mainstreaming of climate action, such as fiscal incentives for low-carbon vehicles, sustainable afforestation standards
	9.2. Carbon finance	Carbon markets and finance (purchase, sale, trading, financing and other technical assistance); includes all activities related to compliance-grade carbon assets and mechanisms
	9.3. Supply chain	Measures in existing supply chains dedicated to improvements in energy efficiency or resource efficiency[24] upstream or downstream, leading to an overall reduction in GHG emissions
10. Miscellaneous	10.1. Other activities with net greenhouse-gas reduction	Any other activity if agreed by MDBs may be counted as climate mitigation finance when the results of *ex-ante* GHG accounting (undertaken according to commonly agreed methodologies) show emission reductions that are higher than a commonly agreed threshold, and the project consistent with a pathway towards development characterised by low GHG emissions.

Types of T&D Projects and Calculation Method

- New T&D
- Extension of existing T&D to off-grid areas
- Retrofitting/strengthening of existing T&D without extension
- Cross-border transmission system

% climate finance = %EE (+%RE)

Climate finance = %climate finance x ADB loan

Estimating Mitigation Finance-T&D Retrofitting, Augmenting, Strengthening

- Method (A): MF estimates by costing the mitigation components – to be used if mitigation components are clearly identifiable and cost data are available or can be determined
- Method (C):MF estimates by using %RE & % EE factors or proxies – to be used when mitigation components are not clearly identifiable and/or when costs are lumped together and cannot be disaggregated.

  % climate finance =%RE + %EE

  Climate finance = %climate finance x ADB loan (or ADB funded cost of mitigation components)

Current Approaches

- Method (A): CF estimates by costing the mitigation components
  - Investment in RE-dedicated T&D /smart grid/flexible AC transmission system (FACTS) devices such as static VAR compensator (SVC), capacitor banks, etc.: climate finance is 100%.
  - Investment in advanced metering infrastructure (AMI): climate finance is 30% (default value); the range is from 13% to 57% based on an European study.
  - Investment in T & D investments that result in expansion and loss reduction
    - loss reduction benefits/total benefits
- Method (C):CF estimates by using % EE factors or proxies
  - Default percentage of climate finance is 40% for loss reduction
  - Share of RE on the T&D

%Cost breakdown-T&D systems to support Method (A)

Based on AEP's latest estimates, the following is an approximate cost breakdown for a typical 765 kV transmission line built with lattice towers:

Siting:	3%	
Right-of-Way (ROW):	10%	
Engineering & Management:	5%	
Materials:	41%	(of which 60% is structures, 30% conductors, 10% other)
Construction:	41%	

These percentages can vary for different projects and different project decisions. Most significant variations exist in the costs of ROW and materials.

For a typical 765 kV transmission station, the cost breakdown is:

Materials:	70%	(of which 50% is transformers, 20% circuit breakers, 30% other)
Labor:	30%	

Source:https://web.ecs.baylor.edu/faculty/grady/_13_EE392J_2_Spring11_AEP_Transmission_Facts.pdf

ADB

Proposed Approaches

- Loss reduction: CF estimates by ensuring a quantitative loss reduction in either transmission or distribution or both for 40% allocation.
  - Distribution – 8%
  - Transmission – 4%
  - T&D – 12%

- RE: When %RE for the specific T&D is not certain, the share of RE in the overall system is used as a proxy for how much climate finance is attributed to the T&D investment.
  - current percentage of RE in the electricity mix of a DMC

% climate finance =%RE + %EE

Climate finance = %climate finance x ADB loan

Cross-border Transmission

EF_R = grid emission factor of receiving country

EF_T = grid emission factor of transmitting country

If EF_T is greater than EF_R then there is no emission reduction as receiving grid will be dirtier and CF =0

EF_T is less than EF_R then there is emission reduction and MF is estimated by Method A, B or C

Estimating Mitigation Finance-PBL&RBL

Mitigation Finance is:

- Proportional to the number of mitigating policy outputs for policy-based loans(PBL)-if there are no cost estimates for each policy output. There may be policy outputs that are not mitigating. For example, if only 2 of 10 policy outputs in a PBL are mitigating outputs, then mitigation investment is 20% (=2/10) of ADB loan. If there are cost estimates per policy output, the total cost of all ADB-funded mitigating policy outputs will be the mitigation finance.
- Equal to the total ADB investment in all mitigating disbursement-linked indicators (DLIs) in a result-based lending (RBL). There may be disbursement-linked indicators that are not mitigating.

Monitoring & Reporting Climate Finance

Appendix 5: Monitoring and Reporting of Climate Finance within the Project Preparation and Approval Process – Tasks and Responsibilities

A. Matrix of Tasks and Responsibilities

Preparation Stage		Task		Responsible
1.	Pre-Concept Stage	1.1	Identify project scope	Project Team
		1.2	Conduct climate risk screening	Project Team, SDCD for guidance
2.	Concept Paper	2.1	Draft project scope	Project Team
		2.2	Prepare preliminary estimate of climate finance for identified mitigation and/or adaptation activities and indicate this in Project at a Glance	
		2.3	Input climate finance details in e-Ops, including in the climate finance section of project classification data entry sheet	
		2.4	Sector-/Thematic-focused Peer Review* (interdepartmental review for private sector projects) conducts quality assurance of preliminary climate finance estimate. Climate Change and Disaster Risk Management Division (SDCD) participates in peer reviews* of projects with complex climate finance estimation.	Sector Group/Thematic Group/ and SDCD
3.	Project Preparation	3.1	For projects identified as having medium to high climate risk, determine adaptation activities for integration in project design	Project Team
		3.2	Prepare detailed project cost estimates, with separate estimates for climate mitigation/adaptation activities	
4.	RRP	4.1	Provide climate finance estimate in Project at a Glance and financing plan section of main text	Project Team
		4.2	Provide climate finance estimate in the financing plan section of the Project/Program/Facility Administration Manual, including breakdown of each eligible activity	
		4.3	Update climate finance details in e-Ops (see item 2.3)	
		4.4	Sector-/Thematic-focused Peer Review* provides quality assurance of RRP climate finance estimate. SDCD participates in peer* reviews of projects with complexities in climate finance estimation.	Sector Group/Thematic Group, and SDCD
5.	Approval	5.1	Incorporate approved climate finance in department-level climate finance tracking and reporting; collect and monitor data regularly	Operations Department
		5.2	Incorporate approved climate finance in sector-level climate finance tracking and reporting; collect data and monitor against sector-specific targets regularly	Sector Group/Thematic Group
		5.3	Incorporate approved climate finance in corporate level climate finance tracking and reporting; collect and monitor data regularly	SPD (DeFR), SDCD (joint MDB reporting, internal reports)
6.	Others	6.1	Future project pipeline monitoring at department, sector, and corporate levels	Operations Department, Sector Group/Thematic Group, and SDCD/SPD, respectively

*Interdepartmental review for private sector projects

Case Study 1-FSM: RE Development Project

Case Study #1: Loan 3004/5- FSM: Yap Renewable Energy Development Project

This is an example of a project loan

Yap Island Proper in Federal States of Micronesia is currently 100% dependent on imported diesel for power generation. Existing diesel power generators are also oversized and inefficient. This project seeks to reduce Yap's dependency on imported diesel by expanding renewable generation and improving supply-side efficiency of power delivery.

Step 1: Identify the mitigation component

The outputs of the projects and their identification as mitigation or non-mitigation are shown in the table below.

Project: Loan 3004/5 FSM-Yap Renewable Energy Development Project				
Outputs	Description	Will output reduce/promote reduction of ghg emission?	Does the output fit the typology?	Mitigation/Not mitigation
Wind power	1.4 MW capacity	yes	yes	mitigation
Solar power	300 kW, grid connected	yes	yes	mitigation
Diesel power	New, efficient, 1.8 MW	yes	No	Non-mitigation (because the output runs on fossil fuel-diesel oil)
Efficient project management services	Establish project management unit to provide technical design, management, construction supervision services, capacity building	yes	yes	Partly Mitigation (part of these services is also for the diesel power output-a non-mitigation component)

Case Study 1-FSM: RE Development Project

C. Detailed Cost Estimates by Financier[1]

	Item	ADB (OCR) Amount	ADB (OCR) % of Cost Category	ADB (ADF) Amount	ADB (ADF) % of Cost Category	Government Duties and Taxes	Government Total	Government % of Cost Category	Total Cost
A.	**Investment Costs**								
	Equipment[3]								
	Solar Installations	1.07	100.0%	0.00	0.0%	0.00	0.00	0.0%	1.07
	Diesel Generator	0.38	16.0%	1.97	81.0%	0.00	0.08	0.08	3.0%	2.43
	Wind Farm[2]	1.76	42.0%	2.06	48.0%	0.24	0.17	0.41	10.0%	4.23
	Works								
	Solar Installations[2]	0.00	0.0%	0.00	0.0%	0.06	0.00	0.06	100.0%	0.06
	Wind Farm[2]	0.00	0.0%	0.00	0.0%	0.48	0.02	0.50	100.0%	0.50
	Land Acquisition								
	Wind Farm[2]	0.00	0.0%	0.00	0.0%	0.50	0.00	0.50	100.0%	0.50
	Consultants								
	Tendering & Supervision[2]	0.63	70.0%	0.00	0.0%	0.23	0.04	0.27	30.0%	0.90
	Subtotal (A)	**3.84**	40.0%	**4.03**	41.0%	**1.51**	**0.31**	**1.82**	19.0%	**9.69**
C.	**Contingencies**	**0.84**	59.0%	**0.32**	22.0%	**0.24**	**0.04**	**0.28**	19.0%	**1.44**
	Physical[2]	0.73	60.0%	0.26	21.0%	0.19	0.04	0.23	19.0%	1.22
	Price[2]	0.11	50.0%	0.06	27.0%	0.05	0.00	0.05	23.0%	0.22
D.	**Financing Charges During Implementation[2]**	**0.00**	0.0%	**0.01**	33.0%	**0.01**	**0.01**	**0.02**	64.0%	**0.03**
	Total Project Cost (A+B+C+D)	**4.68**		**4.36**			**2.12**		**11.16**
	% Total Project Cost		**41.9%**		**39.1%**			**19.0%**	**100%**

ADB

Case Study 1-FSM: RE Development Project

D. Detailed Cost Estimates by Outputs/Components

($ million)

Item	Total Cost	Solar		Wind		Diesel	
		Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category
A. Investment Costs[a]							
1 Equipment	7.73	1.07	13.8%	4.23	54.7%	2.43	31.4%
2 Works	0.56	0.06	10.7%	0.50	89.3%	-	-
3 Land Acquisition	0.50	-	-	0.50	100.0%	-	-
4 Consultants (Tendering & Supervision)	0.90	0.12	13.3%	0.60	66.7%	0.18	20.0%
Subtotal (A)	**9.69**	**1.25**	12.9%	**5.83**	60.2%	**2.61**	26.9%
B. Contingencies							
1 Physical[b]	1.22	0.12	9.7%	0.84	69.4%	0.26	21.0%
2 Price[c]	0.22	0.01	5.3%	0.19	84.2%	0.02	10.5%
Subtotal (B)	**1.44**	**0.13**	9.1%	**1.03**	71.3%	**0.28**	19.6%
C. Financing Charges During Implementation[d]							
1 Interest During Implementation	0.00	0.00	0.0%	0.00	0.0%	0.00	0.0%
2 Commitment Charges	0.03	0.01	33.3%	0.02	66.6%	-	-
Subtotal (C)	**0.03**	**0.01**	33.3%	**0.02**	66.6%	**0.00**	0.0%
Total Project Cost (A+B+C)	**11.16**	**1.39**	12.5%	**6.88**	61.6%	**2.89**	25.9%

Case Study 1-FSM: RE Development Project

Solution-Case Study 1										
Climate Mitigation Finance Calculations ($million)										
			ADB (OCR)	ADB (ADF)	Data sources	Solar	Wind	Diesel	Total Cost	Data Sources
A. Equipment						1.07	4.23	2.43	7.73	Table D, PAM
Solar			1.07	0	Table C, PAM					
Prorated OCR cost						1.07	0	0		
Prorated ADF cost						0	0	0		
Wind			1.76	2.06	Table C, PAM					
Prorated OCR cost						0	1.76	0.00		
Prorated ADF cost						0.00	2.06	0.00		
Consultants-tendering&supervision			0.63	0	Table C, PAM	0.12	0.60	0.18	0.90	Table D, PAM
Prorated OCR cost						0.08	0.42	0.13		
Prorated ADF cost						0.00	0.00	0.00		
C. Total Contingencies			0.84	0.32	Table C, PAM	0.13	1.03	0.28	1.44	Table D, PAM
Prorated OCR cost						0.08	0.60	0.16		
Prorated ADF cost						0.03	0.23	0.06		
D. Financial charges			0	0.01	Table C, PAM	0.01	0.02	0	0.03	Table D, PAM
Prorated OCR cost						0.00	0.00	0.00		
Prorated ADF cost						0.003	0.007	0.00		

		Solar	Wind	Total
ADB OCR		1.23	2.78	4.01
ADB ADF		0.032	2.30	2.328
Total climate finance		1.26	5.08	6.34

Case Study 2 – PRC: Beijing-Tianjin-Hebei Air Quality Improvement-Hebei Policy Reform Program

Loan 3356: PRC-Beijing-Tianjin-Hebei Air Quality Improvement-Hebei Policy Reform Program					
Policy Outputs	**Will output promote reduction of GHG emission?**	**Does the output fit the typology?**	**Mitigation/Not Mitigation**	**Cost per policy output ($million)**	**Mitigation cost per policy output ($millions)**
Output 1 : Pollution from key sectors fundamentally reduced					
Natural gas network expansion plan (green-field fossil fuel project)	no	no	Non mitigation	381.6	0
Enabling regulation to encourage capture of synthetic natural gas and allow its inject in the natural gas distribution system (fossil fuel related)	no	no	Non mitigation	156.6	0
Action plan for accelerated decommissioning of decentralized heat only boilers and replace them with centralized CHP plant (Energy Efficiency – retrofitting)	yes	yes	mitigation	367	367
All 11 municipalities adopted policy on quantitative targets for raw coal reduction and promotion of centralized and non-coal fired heating service.	yes	yes	mitigation	26.5	26.5
Provincial policy on evaluating performance of investment and institutional framework of promoting urban public transport in all 11 municipal governments (efficiency improvement through modal shift)	yes	yes	mitigation	8.4	8.4
Policy on promotion of crop stalks utilization and prohibition of agricultural biomass burning in rural area drafted (directly reducing GHG emissions)	yes	yes	mitigation	28.4	28.4
Provincial crop stalk utilization plan with higher energy recovery target of 15% of the collected amount drafted by Hebei agricultural department (directly related reducing GHG emissions)	yes	yes	mitigation	1.1	1.1
Supporting policy on cleaner energy in rural area with appropriate financial and market-based incentives (directly related reducing GHG emissions)	yes	yes	mitigation	4	4
Output 1 Subtotal				**973.6**	**435.40**

Case Study 2 – PRC: Beijing-Tianjin-Hebei Air Quality Improvement-Hebei Policy Reform Program

Output 2: Environmental policy and institutional framework for implementation strengthened					
Amendment of the Hebei Air Pollution Prevention and Control Regulations improved and drafted with clear and binding provisions.	no	no	Non mitigation	68.9	0
Provincial VOCs emission standard for key industries drafted by Hebei environment protection department and issued by Hebei provincial government. Hebei 9.6environment protection department engaged an institute to assess air pollution control strategies for heavy diesel trucks	no	no	Non mitigation	0.10	0
Hebei environment protection department allocated budget for upgrading the ambient air quality monitoring capacity (including for emergency air quality forecasting) in its 2016 annual work plan	no	no	Non mitigation	9.60	0
Hebei environment protection department increased the number of monitoring equipment to verify compliance with air emission standards of key polluting sources	no	no	Non mitigation	21	0
Provincial policy on ecological and environmental accountability measures drafted by Hebei environment protection department and issued by Hebei provincial government	no	no	Non mitigation	30.30	0
Hebei environment protection department approved and allocated budget for training plans on (i) air quality monitoring, modeling, and forecasting, and (ii) regulatory enforcement in counties and townships	no	no	Non mitigation	0.10	0
Output 2 Subtotal				**130**	**0**

Case Study 2 – PRC: Beijing-Tianjin-Hebei Air Quality Improvement-Hebei Policy Reform Program

Output 3: Employment promotion for inclusive industrial transformation enhanced					
Provincial government opinion on improvement in employment and entrepreneurship drafted by Human resources and social security bureau and issued by Hebei provincial government	no	no	Non mitigation	6.20	0
Output 3 Subtotal				**6.20**	**0**
Total (Outputs 1+2+3)				**1109.80 =Y**	**435.4 =X**
ADB Loan	**$300 million**				
ADB mitigation Finance	**= (X/Y)* ADB Loan = (435.4/1109.8)*300 =$117.70 million**				

Practice Problem1-Mitigation Finance

Project Investment Plan

Item		Amount ($ million)[a]
A.	**Base cost**[b]	
	1. Power transmission capacity expansion	314.8
	2. Power distribution network improvement	39.5
	3. Mini-grid based renewable energy development in off-grid areas	24.4
	4. Project management and capacity building	9.2
	Subtotal (A)	**387.9**
B.	**Contingencies**[c]	**25.1**
C.	**Financing Charges During Implementation**[d]	**27.0**
	Total (A+B+C)	**440.0**

a. Includes taxes and duties of $7.75 million to be financed by the government through cash contribution, and $0.58 million for mini hydro subprojects under output 3 to be financed by the ADB SCF.
b. In March 2014 prices.
c. Physical contingencies computed at 3% of base cost. Price contingencies computed using ADB's forecasts of international and domestic inflation includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
d. Interest during construction (IDC). IDC for ADB loan has been calculated at a rate of 1.0% per annum during the grace period of 8 years and 1.5% per annum thereafter of 24 years.
Source: Asian Development Bank, Nepal Electricity Authority, and Alternative Energy Promotion Centre

Financing Plan

	Amount ($ million)					Share of
Source	**Subtotal**	**Output 1**	**Output 2**	**Output 3**	**Output 4**	**Total (%)**
ADF Loan*	180.00	135.00	40.00	5.00	0.00	40.91
ADB SCF Grant*	11.20			10.00	1.20	2.55
Norwegian Grant	60.00	52.00			8.00	13.64
EIB Loan	120.00	120.00				27.27
Government	60.33	52.54	4.54	3.25		13.71
Communities	8.47			8.47		1.92
Total	**440.00**	**359.54**	**44.54**	**26.72**	**9.20**	**100.00**

* The interests cost (present value) of $5 mil ADF loan allocated for AEPC (Output 3) is $0.58 mil which is equal to the amount of taxes and duties of procurements under Output 3. The ADB SCF will finance the taxes and duties of procurements under Output 3 which should have been funded by GON, so that GON will receive such amount of taxes and duties from ADB SCF and use those to compensate interests cost (present value) of ADF loan ($5 MIL) relent to APEC.

Practice Problem1-Questions

1) Are the information given enough to estimate mitigation finance for the whole project?
2) If yes, explain why, then proceed to #4;
3) If no, what are the missing information and how do you intend to get them? Make assumptions if needed then proceed to #4; explain/discuss the basis of assumptions made.
4) Calculate mitigation finance

Solution to Practice Problem1

- Output #1- Non-Mitigation
- Output #2 – incomplete info to determine eligibility. For conservative estimate, consider this output non-mitigation
- Output#3-RE – Mitigation component
- Output #4 – Partly mitigation (only the SCF funding)
- ADB funding for output#3 (OCR) = $5 m (this goes to the project-at-a glance document
- ADB-managed funding (SCF-100%) = $11.2 m
- Total mitigation finance = $5 m + $11.2 m = $16.2 m

Practice Problem 2-Mitigation Finance

How much is the mitigation finance for this project?

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Improved reliability and efficient power supply in Armenia	Per capita consumption of power increased to 3,000 kWh by 2023 (2013 baseline: 2,000 kWh) Annual electricity supply increased to 15,000 GWh by 2023 (2013 baseline: 6,300 GWh) Power system losses reduced to 8% by 2023 (2013 baseline: 12.7%)	EPSO and HVEN annual reports National statistics on per capita power consumption and annual electricity supply published by the Ministry of Energy and Natural Resources EPSO and HVEN project completion reports	**Assumption** Government policy will continue to support energy infrastructure modernization. **Risk** Limited financial support may delay the expansion of power generation and distribution assets.
Outcome Increased operating efficiency of the domestic transmission network	Full compliance with grid code and stability requirements on power system operation set by the regulator by 2020 (2013 baseline: partly complied with) Number of unplanned outages in the 220 kV substations reduced to 5 times per year (2013 baseline, 8 times)	EPSO and HVEN annual reports EPSO and HVEN project completion reports	**Assumption** Timely implementation of transmission rehabilitation projects financed by other financiers
Outputs 1. Expansion of SCADA system and EMS fully implemented 2. Rehabilitation of two 220 kV substations in Agarak 2 and Shinuhayr 3. Institutional development, capacity building, and project management successfully completed	SCADA system and EMS cover 100% of transmission network by 2017 (2013 baseline: partially installed) Substation capacity increased by 250 MVA by 2020 (2013 baseline: 380 MVA) Project implemented on time and within budget PIU staff from EPSO and HVEN trained on ADB procurement and safeguard practices At least 10 operations staff from EPSO and at least 30 from HVEN acquired knowledge and skills regarding SCADA, EMS, and substation operation and maintenance	EPSO and HVEN annual reports EPSO and HVEN records of commissioning EPSO and HVEN annual reports EPSO and HVEN records of commissioning EPSO and HVEN project completion reports	**Assumption** Access to competent contractors and high-quality equipment and material

Practice Problem 2

III. DUE DILIGENCE

A. Technical

23. Expansion and rehabilitation of the SCADA system, the EMS, and substation facilities through the installation of modern digital control and protection systems will significantly improve system reliability and security. Rehabilitation of substation facilities not only helps HVEN deliver power reliably and safely to customers but also reduces transmission losses and lowers operating costs. ADB conducted technical due diligence on the investment proposal and is satisfied with the quality of the cost estimates, operating cost structures, appropriateness of the technology, and the execution plan. The readiness level is high and the technical solutions are assessed to be more cost-effective than the alternatives. Use of the SCADA system and EMS is an international standard practice for power system operators based on proven technology and is considered appropriate in this case. EPSO and HVEN operation and maintenance staff are familiar with the proposed design concepts. EPSO and HVEN have sufficient technical capacity and experienced staff to undertake project implementation.

Practice Problem 2

C. Detailed Cost Estimates by Financier

($ million)

	ADB ADF Amount	% of Cost Category	Government Amount	% of Cost Category	Total Cost
A. Investment Costs					
1 SCADA	**12.7**	**100%**	**0.0**	**0%**	**12.7**
1.1 Turnkey Contract	11.5	100%	0.0	0%	11.5
a Civil Works	0.0	-	0.0	-	0.0
b Rehabilitation of electrical equipment	11.5	100%	0.0	0%	11.5
1.2 Environment and Social Mitigation	0.0	-	0.0	-	0.0
1.3 Supervision Consultancy	1.2	100%	0.0	0%	1.2
2 Substations	**21.8**	**100%**	**0.0**	**0%**	**21.8**
2.1 Substations - Turnkey Contract	19.4	100%	0.0	0%	19.0
a Civil Works	3.3	100%	0.0	0%	3.3
b Rehabilitation of electrical equipment	15.7	100%	0.0	0%	15.7
c Environment and Social Mitigation	0.4	100%	0.0	0%	0.4
2.2 Supervision Consultancy	2.4	100%	0.0	0%	2.4
3 Taxes and Duties	**0.0**	0%	**7.0**	100%	**7.0**
Subtotal (A)	**34.5**	**83%**	**7.0**	**17%**	**41.5**
B. Recurrent Costs					
1 Project Management	0.0	0%	0.6	100%	0.6
Subtotal (B)	**0.0**	0%	**0.6**	100%	**0.6**
Total Base Cost	**34.5**	**82%**	**7.6**	**18%**	**42.1**
C. Contingencies					
1 Physical	0.2	5%	3.7	95%	3.9
2 Price	0.1	6%	1.7	94%	1.8
Subtotal (C)	**0.3**	**5%**	**5.4**	**95%**	**5.7**
D. Financing Charges During Implementation					
1 Interest During Implementation	2.2	100%	0.0	0%	2.2
Subtotal (D)	**2.2**	**100%**	**0.0**	**0%**	2.2
Total Project Cost (A+B+C+D)	**37.0**	**74%**	**13.0**	**26%**	**50.0**

Practice Problem 2

D. A. Detailed Cost Estimates by Outputs/Components

($ million)

	Total Cost	SCADA/ EMS Expansion Component 1 Amount	% of Cost Category	Substations Rehabilitation Component 2 Amount	% of Cost Category	Project Management and Capacity Buiding Component 3 Amount	% of Cost Category
A. Investment Costs							
1 SCADA	**12.7**	**11.5**	**71%**	**0.0**	**0%**	**1.2**	**20%**
1.1 Turnkey Contract	11.5	11.5	71%	0.0	0%	0.0	0%
a Civil Works	0.0	0.0	0%	0.0	0%	0.0	0%
b Rehabilitation of electrical equipment	11.5	11.5	71%	0.0	0%	0.0	0%
c Environment and Social Mitigation	0.0	0.0	0%	0.0	0%	0.0	0%
1.2 Supervision Consultancy	1.2	0.0	0%	0.0	0%	1.2	20%
2 Substations	**21.8**	**0.0**	**0%**	**19.4**	**70%**	**2.4**	**40%**
2.1 Substations - Turnkey Contract	19.4	0.0	0%	19.4	69%	0.0	0%
a Civil Works	3.3	0.0	0%	3.3	12%	0.0	0%
b Rehabilitation of electrical equipment	15.7	0.0	0%	15.7	57%	0.0	0%
c Environment and Social Mitigation	0.4	0.0	0%	0.4	1%	0.0	0%
2.2 Supervision Consultancy	2.4	0.0	0%	0.0	0%	2.4	40%
3 Taxes and Duties	**7.0**	**2.2**	**14%**	**3.9**	**14%**	**0.9**	**14%**
Subtotal (A)	**41.5**	**13.7**	**84%**	**23.3**	**84%**	**4.5**	**74%**
B. Recurrent Costs							
Project Management	0.6	0.0	0%	0.0	0%	0.6	10%
Subtotal (B)	**0.6**	**0.0**	**0%**	**0.0**	**0%**	**0.6**	**10%**
Total Base Cost	**42.1**	**13.7**	**84%**	**23.3**	**84%**	**5.1**	**84%**
C. Contingencies							
1 Physical	3.9	1.3	8%	2.2	8%	0.5	8%
2 Price	1.8	0.6	4%	1.0	4%	0.2	4%
Subtotal (C)	**5.7**	**1.8**	**11%**	**3.1**	**11%**	**0.7**	**11%**
D. Financing Charges During Implementation							
Interest During Implementation	2.2	0.7	4%	1.2	4%	0.3	4%
Subtotal (D)	**2.2**	**0.7**	**4%**	**1.2**	**4%**	**0.3**	**4%**
Total Project Cost (A+B+C+D)	**50.0**	**16.3**	**100%**	**27.7**	**100%**	**6.0**	**100%**

EMS = energy management system, SCADA = supervisory control and data acquisition.

Solution to Practice Problem 2

Solution-Practice Problem 2						
Climate Mitigation Finance Calculations ($million)						
	Total Cost	Data sources	SCADA/EMS	Substations rehab	Project Mgt/Capacity building	Data Sources
1. SCADA/EMS	12.7		11.5	0	1.2	Table A, PAM
Prorated ADB cost	12.7	Table C, PAM	11.50	0.00	1.20	
2. Substations Rehabilitation	21.8		0.00	19.40	2.40	Table A, PAM
Prorated ADB cost	21.8	Table C, PAM	0.00	19.40	2.40	
3. Total Contingencies	5.6		1.80	3.10	0.70	Table A, PAM
Prorated ADB cost	0.3	Table C, PAM	0.096	0.166	0.038	
4. Financial charges	2.2		0.7	1.2	0.3	Table A, PAM
Prorated ADB cost	2.2	Table C, PAM	0.700	1.200	0.300	
TOTAL PRORATED ADB COST	37		12.296	20.766	3.938	

Baseline substation capacity	380	MVA (DMF)
Capacity Increased due to project	250	MVA(DMF)
Capacity after rehabilitation	630	MVA(DMF)

Mitigating components:	ADB COST	Climate finance %	Climate Finance	380/630 =60.32%
Substations rehabilitation	20.766	60.32%	12.52557	60.32% of investment goes to EE; 39.68% to expansion*
Project Management/Capacity building	2.494	100%	2.49375	(0.038+.300)/(1.2+2.4)+2.4 =2.494
TOTAL CLIMATE FINANCE			15.01932	

*EE savings counts only for the baseline capacity (380MVA); baseline is inefficient substation at 380 MVA

Beyond 380 MVA, there is no energy savings anymore as baseline now is efficient substation.

Per MDB approach, investment in expansion does not qualify as mitigation investment

ADB

Thank you

delzinga@adb.org