

The World Bank Group

2010 Environment Strategy

Analytical Background Papers

**Managing Pollution for Poverty Reduction and
Green Development**

November 2, 2010

Table of Contents

1	Context and Rationale	5
1.1	Context	5
1.2	Objectives	6
1.3	Framing the World Bank Group's Pollution Management Activities	6
2	Identifying the Pollution Management Portfolio	7
2.1	World Bank: Pollution Management and Environmental Health Theme	7
2.2	IFC Pollution Management Portfolio	11
3	Public Sector Client Demand to Address Past Pollution Flows	11
3.1	Legacy Pollution: Experience from ECA	11
3.2	Implications for Other Regions	16
4	Public and Private Sector Client Demand to Address Current and Future Pollution Flows	17
4.1	Public Sector Demand to Address Current and Future Pollution	17
4.1.1	Industrial Pollution	18
4.1.2	Global Concerns: Montreal Protocol and Climate Change	20
4.2	Private-Sector Client Demand for Current and Future Pollution Flows	21
4.2.1	Cleaner Production Lending Facility (CPLF) and Cleaner Production Advisory Program	21
4.2.2	Investment and Advisory Services in Energy Efficiency and Renewable Energy	26
4.2.3	Cleantech Investments	26
4.2.4	Carbon Finance and Carbon Delivery Guarantee	27
4.2.5	Support to Financial Institutions	28
4.2.6	Infrastructure	29
5	Client Demand for Urban and Rural Services that Mainstream Environmental Health Considerations	30
5.1.1	Water and Sanitation Services	31
5.1.2	Energy and Mining	32
5.1.3	Transportation	33
6	Policies and Tools for Pollution Management in WBG Operations	34
7	Drivers for the Pollution Management Portfolio	35
7.1	Drivers for the World Bank	35
7.1.1	Poverty, Environmental Health, and MDGs	36
7.1.2	Global Environment Issues	37
7.1.3	Economic Growth and Competitiveness	37
7.1.4	WBG Strategic Frameworks and Strategies	37
7.2	Drivers for IFC	38
7.2.1	Clear-cut, profit-driven improvements for the client	38
7.2.2	IFC's Internal Strategy	39
7.2.3	Opportunity for collaboration	39
7.3	Feedback from Stakeholder Consultations	39
7.4	Limiting Factors	40
8	Recommendations	40
9	References	42

List of Tables

Table 1: Activities Described in the Theme: Pollution Management and Environmental Health.....	8
Table 2: Sample selected for analysis of World Bank Pollution Management portfolio.....	8
Table 3: Regional Distribution of PMEHLending Portfolio (FY90-10)	10
Table 4: Distribution of PMEHL Approved Lending Operations for FY 1990 – 2009 by Sector Board.....	11
Table 5: Summary of legacy pollution projects in ECA region	13
Table 6: No. of Projects and Commitment by Region for Industrial Subset of Lending Portfolio	18
Table 7: No. of Projects and Commitment by Region for Industrial Subset of Lending Portfolio	19
Table 8: Distribution of CP portfolio by region for projects starting between FY07 - FY10	22
Table 9: Examples of Cleaner Production Actions	23
Table 10: Barriers to implementation of CP	25
Table 11: IFC investments in energy efficiency (US\$ million)	26
Table 12: Distribution of financial institutions portfolio for FY 08, 09, and 10.....	28
Table 13: Distribution of IFC infrastructure investments and advisory services for FY 08, 09, and 10	29
Table 14: Distribution of PMEHL Approved Lending Operations by Sector Group for FY 1990–2009.....	31

List of Figures

Figure 1: No. of Projects Approved by FY.....	9
Figure 2: Average Amount of Total Commitment per project by FY	9
Figure 3: Top-ten themes that are coded in addition to PMEHL for lending projects.	17
Figure 4: No. of approved lending operations by regions in 1990’s and 2000’s.....	19
Figure 6: Pollution Management Drivers and Limiting Factors	36

List of Boxes

Box 1: Clean Air and Safer Mobility in Dhaka.....	20
Box 2: Customizing Financing for Improving Environmental Compliance in SMEs.....	21
Box 3: Case Studies of IFC Cleaner Production Financing Programs.....	24
Box 4: Russia Sustainable Energy Finance program	29
Box 5: Case studies of infrastructure investments and advisory services	30

This report was prepared by Helena Naber; Julie Terrell and Craig Meisner (ECA - Legacy Pollution); Anjali Acharya (LCR - SME case study); Eri Tsutsui, Jack Fritz, Juliette Guantai, Laura Mariko Schmitz, and Nicola Cenacchi (World Bank portfolio analysis); Edmond Mjekiji, Francesca McCann, Jeanine Zegger, Jigar Shah, Lakhdeep Babra, and Mauricio Athie (IFC portfolio); and Fadi Doumani (drivers and limiting factors).

The team is grateful for the peer reviewers: Jane Nishida (Institutional Expert, World Bank), and Paolo Lombardo (Sr Environmental Spec, IFC), and for the review and suggestions that were received from: Alberto Ninio (Lead Counsel, LEGEN), Enis Baris (Sr. Public Health Specialist, MNSHD), Jon Strand (Senior Economist, DECEE), Kirk Hamilton (Lead Environmental Economist, DECEE), Marcelo Danolo (Procurement Specialist, OPCPR), Michael Toman (Research Manager, DECEE), and Pablo Benitez (Senior Economist, WBI).

The team is thankful to the peer reviewers and participants of concept note review meeting: Michele De Nevers (Manager, ENV, Chair), Bilal Rahill (Manager, CESI2), Harvey Himberg (OPCQC), Isabelle Paris (CESI2), Lakhdeep Babra (CESI2); Nina Chee (MIGEP), Paul Dolan (GEF), Wolfhart Pohl (ECSS3); and Akiko Nishimae, Alejandra Alvarez, Ari Huhtala, Clare Fleming, Fernando Loayza, Kulsum Ahmed, Rafael Hernandez and Yewande Awe (ENV).

The authors are also grateful to the guidance and contributions of Kulsum Ahmed (Lead Environmental Specialist, ENV).

1 Context and Rationale

1.1 Context

The World Bank Group (WBG) has been active in public and private sector pollution management for the past several decades. The Bank has mainstreamed environmental health concerns into its rural and urban services through projects that improved the management of solid and hazardous waste and wastewater, and controlled pollution related to a large variety of sectors including transport, industry, energy, and mining, with each decade having its flagship issues and projects.

A number of key WBG publications have reflected the mindset for addressing pollution management in the external environment and within the World Bank Group:

- In 1988, the World Bank published *Environmental Guidelines* to provide technical advice and guidance to staff and consultants involved in pollution related projects (World Bank, 1998).
- *Pollution Prevention and Abatement Handbook* (1998) reflected the changes that the area of pollution management witnessed in terms of technological changes and pollution management policies and practices, as well as the World Bank Group's pollution management portfolio. This handbook promoted the concept of sustainable development through its focus on pollution prevention aspects of pollution management. The Handbook consisted of three parts: part I contained a summary of key policy lessons in pollution management and its target audience were government decision makers; part II presented good-practice notes on implementation of policy objectives; while part III provided detailed industry specific guidelines for almost 40 industrial sectors and which reflected state-of-the-art thinking on reducing pollution in these sectors (World Bank, 1998). In 2007, part III of the Pollution Prevention and Abatement Handbook was updated in an effort led by IFC, and is now available online as *Environmental, Health, and Safety Guidelines* (World Bank, 2007).
- *Greening Industry* (Wheeler, 2000) focuses attention on a new model for managing industrial pollution that does not rely solely on command and control instruments and formal regulation, but combines these with informal regulation and market incentives to reduce pollution. The report describes the roles that governments, communities, and markets play in managing and reducing pollution.
- *World Bank Environment Strategy* (World Bank, 2001) identifies the promotion of environmental improvements as a fundamental element of development and poverty reduction, which it achieves through three interrelated objectives: improving people's quality of life, improving the prospects for and the quality of growth, and protecting the quality of the regional and global environmental commons, and pinpoints the prevention and reduction of environmental health risks as one of its focal areas.

The changing global context illustrated by the wave of global crises, the rising acknowledgement in different countries of the impacts of climate change and the necessity to address green house gas mitigation, the challenges in reaching the Millennium Development Goals pertaining to

environment and poverty, and the voices calling for new approaches through green new deal, green growth, and green development require that pollution management be addressed within a new context.

The Green New Deal was called for by UNEP as a response to the wave of financial, economic, and food crises of the first decade of the 21st century. Its objective was to revive the global economy and boost employment while accelerating the fight against climate change, environmental degradation, and poverty. The Green New Deal recommended that a significant portion of the estimated US\$ 3.1 trillion in economic stimulus packages be invested in five critical areas: energy efficiency; renewable energy; sustainable transport technologies; ecological infrastructure including freshwaters, forests, soils and coral reefs; and sustainable agriculture including organic production (UNEP / Green Economy Initiative, 2009). The OECD's call for green growth came out of the realization by many countries that a different kind of economic growth is needed—one that encourages recovery and renewed growth on more environmentally and socially sustainable grounds (OECD, 2010). The WBG Environment Strategy 2011–2020 aims to achieve green development; the focus is on the need to grow differently, with emphasis on broader and inclusive development. Such transformational change provides new challenges and new opportunities for dealing with existing pollution, new pollution, and pollution prevention.

1.2 Objectives

The preparation of the WBG Environment Strategy 2010–2020 provides an opportunity to take stock of the pollution management portfolio and to provide recommendations for the upcoming environment strategy period. The main objective of this analytical paper on pollution management is to propose how the WBG can be more effective in providing support on pollution management to clients in order to inform the preparation of the Environment Strategy 2010. This paper addresses one primary question: In a changing global context, what is the role of the WBG in pollution management? The paper will:

- Carry out desktop review and analysis of the WBG portfolio from fiscal year 1990 till the present with focus on activities since 2001 (the date of issue of the Environment Strategy 2001) with the aim of reviewing typologies of pollution management products and their trends over time. This will help to clarify entry points for pollution management in WBG activities.
- Identify the current and future drivers and internal and external limiting factors for client demand for the pollution management portfolio with the aim of better understanding the broader context of client demand for these projects.
- Assess good practice on pollution management within and across the WBG portfolio to highlight models for better practice and enhanced collaboration.

1.3 Framing the World Bank Group's Pollution Management Activities

The World Bank Group's pollution management activities are framed by its public and private sector clients and by the past, current, and future pollution flows that they respond to. In this context the report will discuss:

- Public sector demand to address past pollution flows; this demand is addressed by the World Bank through its legacy pollution portfolio and is illustrated by a case study from the ECA region.
- Public and private sector demand to address current and future pollution; this demand is addressed by the IFC which works with its private sector clients and the World Bank which responds to public sector clients.
- Demand for urban and rural services that mainstream environmental health considerations; this section examines the transport, energy and mining, and water and sanitation sectors within the World Bank and discusses the linkages with environment and pollution management as declared in these sectors' respective strategies.

The report will then present the main findings of the World Bank Group pollution management portfolio overview, including identification of WBG pollution management activities, and description of factors that affect the pollution management portfolio.

2 Identifying the Pollution Management Portfolio

2.1 World Bank: Pollution Management and Environmental Health Theme

In 2002, the World Bank released a theme and sector coding system that provides a basis for analysis and reporting on the content of World Bank activities. Theme and sector codes are assigned to lending operations, economic and sector work, technical assistance, research services, client training, and other activities that directly serve the Bank's external clients (OPCS, 2010). There are 11 groups of theme codes: economic management; public sector governance; rule of law; financial and private sector development; trade and integration; social protection and risk management; social development, gender, and inclusion; human development; urban development; rural development; and environment and natural resources management. World Bank operations can be assigned up to five theme codes.

Based on this system, activities that pertain to pollution management are assigned a percentage of theme code 84 (pollution management and environmental health, PMEHE)—one of the Natural Resources and Environmental Management group of themes. In addition to the PMEHE theme, other relevant themes under Natural Resources and Environmental Management include: (80) Biodiversity, (81) Climate change, (82) Environmental policies and institutions, (83) Land administration and management, (85) Water resources management, and (86) Other environment and natural resources management. Table 1 shows the list of activities that fall under the PMEHE theme as defined in the OPCS site.

Table 1: Activities Described in the Theme: Pollution Management and Environmental Health

Pollution Management and Environmental Health Activities	
Cleaner fuels	Cleaner production and eco-efficiency
Hazardous waste treatment, management, storage, and disposal	Improved environmental management in mining and energy operations
Industrial pollution control and prevention	Mitigation of non-point source pollution from agricultural runoffs
Oil spill contingency planning and remediation	Pollution abatement from shipping activities
Reduction and elimination of the production of persistent organic pollutants and ozone depleting substances	Reduction and elimination of the use of persistent organic pollutants and ozone depleting substances
Rehabilitation of contaminated production sites and surrounding areas	Sanitation and sewerage
Solid waste management	Surface and ground water quality management and monitoring
Vehicle emissions monitoring and maintenance	Wastewater management and treatment
Water pollution abatement	

Source: (OPCS, 2010)

The PMEH theme was used to identify pollution management and environmental health activities of the World Bank between fiscal years 1990–2010, in addition to the FY2010 pipeline, and analytical and advisory assistance (AAA) between fiscal years 2002–2010. The portfolio was identified as any activity that was assigned a percent for the pollution management and environmental health theme code. This yielded a sample of 737 approved lending operations (FY1990–2010), 231 analytical and advisory activities (AAA), and 88 pipelines as of FY10. Table 2 presents an overview of the total sample.

Table 2: Sample selected for analysis of World Bank Pollution Management portfolio

	Time Frame	No. of Projects
Approved lending operations	FY 1990 – FY 2010	737
Analytical and advisory activities	FY 2002 – FY 2010	231
Pipeline	FY 10 – onwards	88

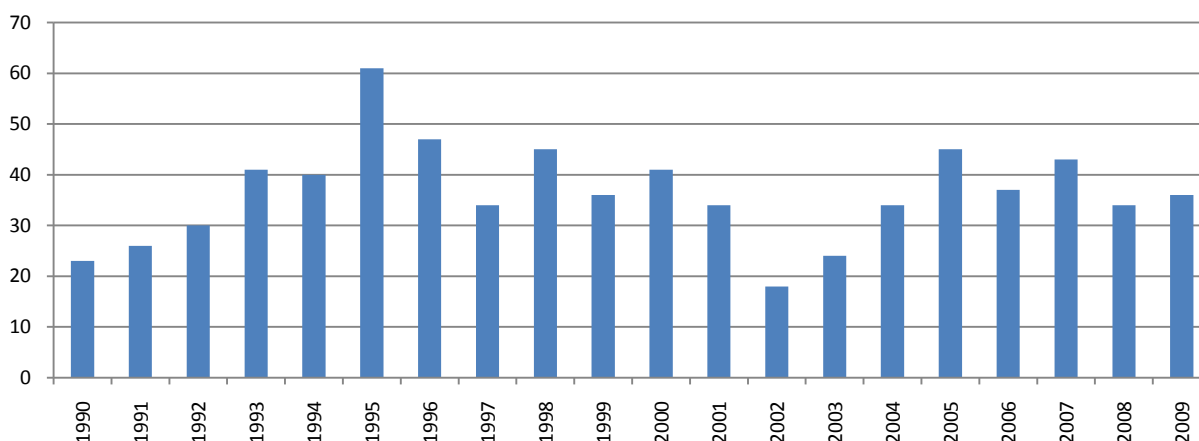
A number of caveats should be highlighted here:

- The theme coding system is useful in identifying the larger pollution management and environmental health portfolio, however it does not facilitate the detailed analysis of the portfolio, since the overall theme provides little information on the type of pollution management activities that the project undertook. Two methods were used to obtain more detail: the projects were analyzed by sector, and a sub-sample of approved lending operations (from FY 2002 – FY 2010) was reviewed and recoded according to pollution management activities as identified in the OPCS site (see Table 1).
- Detailed analysis showed that the percentage of the theme is not always an accurate indication of the degree to which a project actually contributes toward pollution management.

- FY10 projects were excluded from distributional analysis since data was obtained before FY10 was completed, though not from the detailed analysis of approved lending operations.

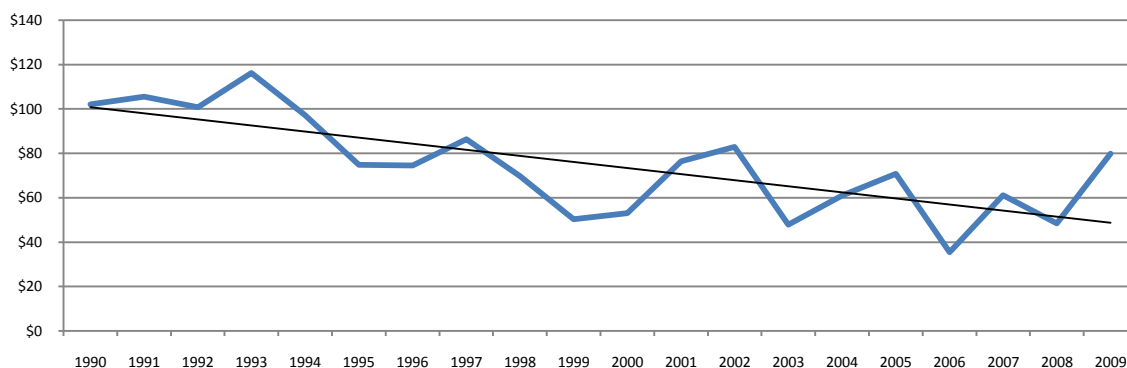
Number of Operations and Commitment Amounts: The number of approved lending operations per year fluctuated during the period under analysis with a maximum of 60 lending operations approved in 1995 and a minimum of 18 lending operations approved in 2002 (Fig. 1).

Figure 1: Number of Projects Approved by FY



Total commitments of the PMEHL lending operations portfolio were approximately \$54 billion. The average total commitment amount has decreased from \$85 million during the 1990s to \$61 million during the 2000's period (Fig. 2).

Figure 2: Average Amount of Total Commitment per project by FY



During the same timeframe, the average pollution management and environmental health commitment decreased from 22 million to 17. This decrease is consistent in all World Bank regions, except for MNA region, and is most evident in two sectors: energy and mining, and industry and trade where average commitment went down by more than 50%, and were total commitment also went down. All sectors except the water and sanitation saw slight decrease in average and total commitments though not to the extent of energy and mining and industry and trade sectors. The average and total pollution management and environmental health commitments in the water and sanitation sectors have increased however.

Instruments and Approaches: The larger share (93 percent of total commitments accounting for \$50 billion) of PMEHE operations was investment based, and 7 percent was policy based including development policy lending, sector adjustment loans and structural adjustment loans. The share of development policy lending has grown between the 1990s when it formed 4 percent of total commitments to the 2000s when it formed 11 percent of total commitments. DPL lending is most prominent in the LCR region, followed by MNA region. The PMEHE included nine DPLs: 6 were in LCR region (three in Colombia, and one each in Chile, Mexico, and Peru) and three DPLs in MNA region (all in Morocco). The largest share of PMEHE commitments were in the form of IBRD/IDA loans and credits (96 percent), followed by regular GEF grants (2 percent), and Montreal protocol (1 percent), with carbon offset, Bank guarantees, and special financing projects accounting for the remaining 1 percent.

Regional Distribution of PMEHE Portfolio: The ECA, EAP and LCR Regions accounted for 73 percent of approved pollution management and environmental health lending portfolio in terms of total commitment amount (Table 3). LCR accounted for 35 percent of carbon offset commitments, while EAP accounted for the largest share (35 percent) of IBRD/IDA commitments, and the largest share (55 percent) of Montreal protocol total commitments. MENA accounted for 67 percent of guarantees (this is mainly due to one project), 78 percent of special financing commitments, and 86 percent of recipient executed activities commitments. The largest share of PMEHE commitment is in China, which accounts for 24 percent of all total commitments within the PMEHE portfolio of approved lending operations. India, Brazil, Argentina and Indonesia account for another 25 percent of total commitments within the PMEHE portfolio during the analysis period of FY1990–2009.

Table 3: Regional Distribution of PMEHE Lending Portfolio (FY90-10)

Region	No. of Projects	No. of Projects (%)	Sum of Total Commitments (\$mill.)	Sum of Total Commitments (%)	Average of Total Commitments (\$mill.)	Sum of PMEHE Commitments (\$mill.)	Average of PMEHE Commit. (\$mill.)
AFR	111	15%	4,310	8%	39	1,004	9
EAP	168	23%	18,845	35%	112	5,090	30
ECA	181	25%	9,227	17%	51	2,457	14
LCR	133	18%	11,529	21%	87	2,910	22
MNA	82	11%	3,489	6%	43	1,001	12
SAR	62	8%	6,977	13%	114	1,836	30
Total	737	100%	54,378	100%	74	14,298	19

Responsible Sector Boards: PMEHE approved lending portfolio operations were mapped to 13 different sector boards. The EMT, WAT, TR, and ENV sector boards accounted for 83 percent of total commitments of the PMEHE theme lending operations. During the 2000's the share of commitments of ENV and WAT sector boards has almost doubled compared to the previous decade (from 10 percent to 20 percent for ENV, and from 18 percent to 33 percent), accompanied by a decrease in EMT sector board commitments (Table 4).

Project Performance: In terms of project performance, 389 operations within the PMEHE approved lending portfolio approved between FY1990 – 2009 were evaluated upon completion by IEG. Of

these, 77 percent were rated moderately satisfactory upon completion, which is slightly higher than the share of ENRM projects rated satisfactory (75.6 percent) and of all evaluated ENRM projects (IEG, 2008).

Table 4: Distribution of PMEHL Approved Lending Operations for FY 1990 – 2009 by Sector Board

Sector Board	PMEH Projects	PMEH Projects (%)	Total Commitments (\$million)	Total Commitments (%)
ENV	194	27%	7,353	14%
EMT	151	21%	14,568	27%
WAT	173	24%	12,916	24%
TR	79	11%	9,556	18%
UD	82	11%	5,519	10%
ARD	31	4%	2,105	4%
Others*	19	3%	1,706	2%
Total	729	100%	53,723	100%

* Others includes the following sector boards: WS, FPD, HE, ED, PS, SDV, and SP with each accounting for 1% or less of number of projects and of total commitments.

2.2 IFC Pollution Management Portfolio

IFC does not have a dedicated pollution management program, but it views pollution management as an integral component of other themes such as climate change and environmental and social risk management. In addition, IFC's programs in infrastructure investment and advisory, cleantech investments, cleaner production advisory services, and the cleaner production lending facility help to identify and implement projects that address pollution management issues by supporting resource-efficient investments that improve its clients' sustainable competitiveness. IFC's dual approach of targeting both dedicated pollution management projects and portfolio and pipeline mainstream investments has been a successful strategy in expanding the role of the private sector in cleaner production and therefore in pollution management. IFC continues to grow its green financing related initiatives and pollution management-related programs through investment and advisory services to adapt to and prepare for changes in the market and in private sector investment. IFC is committed to green financing and development by addressing pollution management and through its investments and advisory services.

3 Public Sector Client Demand to Address Past Pollution Flows

This section presents the World Bank's experience in addressing legacy pollution in the Europe and Central Asia Region (ECA), where many countries, in the post-socialist era, began to experience brownfields management challenges, and discusses possible implications for legacy pollution work in other regions.

3.1 Legacy Pollution: Experience from ECA

One of the main factors identified as a cause of the development of legacy pollution/brownfield sites in the ECA Region was the importance accorded to national industrial development which

came at a high cost to environmental quality and subsequently to health. The promotion of industrial development was often combined with weak environmental laws and regulations; standards that were below the accepted European norms; weak or non-existent enforcement; inappropriate management of land resources; underfunded environment management systems; a lack of containment standards and monitoring systems; and too few solid and hazardous waste disposal facilities. The cumulative impact of these factors over the years resulted in brownfield sites in many countries of the Region.

Countries started addressing their legacy pollution issues as they recognized that implementing a more integrated approach to brownfield resource management and hazards-risk mitigation would generate future economic growth, alleviate further environmental land degradation, improve health, achieve waste reduction, prevent water pollution, promote the efficient use of natural resources, and increase productivity (Table 5).

This realization grew with increasing health costs due to unacceptable water quality (e.g. in Poland, the Russian Federation, and Kazakhstan) and the desire of many ECA nations to join the European Union and the consequent need to adapt their environmental standards and regulations to those of the EU. Moreover, under privatization reforms, the newly established entities were not suited to handle pollution liabilities and cleaning efforts caused by past environmental degradation procedures (e.g. in Azerbaijan, Kazakhstan, and the Russian Federation), and the uncertain aspects of the financial market conditions created an obstacle to finalizing the sales of some investment objectives (e.g. in Bulgaria). These factors lead governments to dedicate efforts to address the environmental issues by establishing national and local programs, as well as creating joint projects with neighboring countries (e.g. Russian Federation, Azerbaijan, the Kyrgyz Republic, Kazakhstan, Latvia, Lithuania, Estonia, Romania, and Poland).

Based on priorities identified in national environmental action plans, governments in the Region established new laws and regulations in order to resolve inherited environmental problems and to prevent the occurrence of other environmental degradation such as the creation of new brownfields. Moreover, various regional environmental cooperation agreements were signed between neighboring countries that share transboundary issues (e.g. Latvia, Estonia, Lithuania) which committed governments to establish procedures for reducing land pollution caused by dumping waste in rivers and seas. As current or potential candidates for membership in the European Union (EU), countries also had to adopt and implement EU environmental regulations and standards. A good example of such a requirement is the implementation of river basin management plans which aim at achieving greater water quality and higher flow, putting into effect preventative and mitigation plans for land pollution caused by industries, establishing natural disaster management control, and conserving ecosystems. Also, explicit environmental laws and regulations were implemented and enforced in order to address specific issues with regard to privatized industrial entities, land ownership, responsibilities for clean-up, and preventing pollution.

Table 5: Summary of legacy pollution projects in ECA region

Country	Project Name	Objective	Implementation Activities	Outcome
Russian Federation	Environmental Management Project	Enhancing institutional Capacity	<ul style="list-style-type: none"> - Revising existing environmental laws, regulations, and standards - Enforcing environmental remediation reforms 	<ul style="list-style-type: none"> - Environmental hazards caused by past pollution and unsafe environmental management practices were reduced
Bulgaria	Environmental Remediation Pilot Project		<ul style="list-style-type: none"> - Modernizing Environmental management practices - Reforming Governmental environmental institutions on national and local levels 	
Latvia	Municipal Solid Waste Management		<ul style="list-style-type: none"> - Providing training for actions such as planning, budgeting, information management, and data use in policy making - Institutional arrangements were established for monitoring, assessment and evaluation of waste management 	
Lithuania	Klaipeda Environment Project	Strengthening environmental management in the areas of land degradation, coastal areas, and agriculture	<ul style="list-style-type: none"> - New laws and regulations were established, implemented and enforced in order to comply with the internationally accepted standards for cleaning-up land, rivers, and seas 	<ul style="list-style-type: none"> - Trans-boundary management barriers were removed
Europe and Central Asia	Baltic Sea Regional GEF Project - Phase I			<ul style="list-style-type: none"> - Coastal zone management was improved
Poland	Silesian Voivodship Fund for Environmental Protection			<ul style="list-style-type: none"> - Agricultural pollution was reduced
Croatia	Coastal Cities Pollution Control Project			<ul style="list-style-type: none"> - An ecosystem for land, coastal, and open sea environmental management was introduced
Azerbaijan	Urgent Environmental Investment Project	Strengthening natural environmental management especially in the area of waste/disposal	<ul style="list-style-type: none"> - Institutional arrangements were established for monitoring, assessment, and evaluation of waste/disposal system management 	<ul style="list-style-type: none"> - Significant improvements in strengthening the environmental management system capacity were accomplished - The current management system impedes further land degradation from natural resources
Kazakhstan	Ust-Kamenogorsk Environmental Remediation Project		<ul style="list-style-type: none"> - Clean-up technology, methodology, and monitoring procedures were enforced for heavily polluted oil fields - Hazardous waste management systems were installed - Disposal facilities were established 	
Romania	Mine Closure, Environment & Socio-Economic Regeneration Project	Strengthening natural disasters environmental management	<ul style="list-style-type: none"> - Various hazards risk reduction strategy training was conducted on national, regional, and municipal levels - Obtaining large scale investment technology for the purpose of improving water quality, wastewater systems, and hazardous waste disposals 	<ul style="list-style-type: none"> - Disaster Hazard Mitigation plan was designed and applied, which addressed immediate threats and risks, strengthened institutional environmental management as well as raised local community preparedness
Kyrgyz	Republic - Disaster Hazard Mitigation Project		<ul style="list-style-type: none"> - Upgrading municipal and industrial water treatment practices - New industrial technologies for waste disposals were installed. - Monitoring systems were administered to estimate the water and soil toxic levels as well as their impact on population health - In order to assure the most cost effective choices were selected and cost benefit analysis studies were conducted 	

Table prepared by Julie Terrell

Although, ECA nations made great achievements in addressing brownfields issues, challenges remain. For instance, the executed projects were implemented only in small areas for individual factories, oil fields, and in isolated coastal areas. The land value in these areas increased due to the established clean-up initiatives and preventive measures, the formation of institutional development, the appropriation of installed technology, and the enforcement of monitoring controls. Yet, vast polluted land remains to be cleaned-up. The small scale projects were deliberately selected, so that the outcomes would function as a guide to develop a methodology for managing future, larger, and more complex brownfield projects. The land value of the executed projects increased for investors who were involved in the prioritization activities. However, there is more land that needs to be cleaned up. Addressing these clean-up opportunities will reduce the threat to human health, revamp real estate/beach resort development, and expand agricultural production. Despite the great achievements thus far, most of the efforts have been modest in scale relative to the size of the problem. Such a trend is common in other regions as well (e.g. SAR and LAC). Nations will need to scale up the size and number of projects that address legacy pollution to make a significant impact on the problem.

Good Practices and lessons learned from the ECA Region Experience

Many lessons and benefits can be learned and applied from the ECA projects to similar projects in other Regions. A number of activities are essential for designing and executing brownfields projects successfully:

- Regional strategic nations need to provide assistance to emerging environmental issues in other nations.
- The identification of brownfields priorities needs to be predicated on a sound analytical basis such as those performed in Country Environment Analyses (CEA), Strategic environmental Assessments (SEA) and National Environmental Action Plans (NEAP). These priorities should be reflected in countries' National Strategic Planning.
- Data must be provided to assure governments that the incorporation of brownfields mitigation and pollution prevention projects will deliver sustainable economic development and increase social benefits.
- Sustainable development plans must be designed to comply with the countries' future budget and investment priorities.
- When prioritizing and implementing brownfields projects the following factors should be considered: budget availability, institutional capacity, health considerations, costs, economic development potential, and time vs. duration.
- Successful ECA projects should be used as a model for activities such as government interventions and innovative partnerships, strengthening environmental management, developing institutional capacity, and establishing pollution control.

ECA's experience and identified good practices may contribute toward successful implementation of future brownfields redevelopment/remediation projects in ECA and in other regions. These good practices include: importance of government commitment to the objectives of addressing legacy and brownfield sites' redevelopment; need to collect relevant data on polluted land areas; significance of carrying out prefeasibility analysis and risk assessment studies; engaging local communities; conducting feasibility analysis; and creating incentives for brownfields projects. Good practices that could be identified during the implementation include: establishment of a site supervision and post-development monitoring; and the establishment of a national and local risk insurance fund or a brownfields insurance fund for covering future liabilities.

In addition a few factors emerge that may be useful for other regions as they address legacy pollution issues:

- Institutional development and capacity building: In order to implement a successful brownfields remediation project, it is essential to determine and define the most suitable solutions. Such proposed solutions need to be evaluated based on current internationally acceptable environmental standards. Moreover, the proposed projects need to be characterized, classified, and prioritized to facilitate the formulation of the most effective strategy. It is essential to create and implement effective laws and regulations that support national environmental agendas and reinforce governmental authority. It is particularly important to establish national and local government agencies that will be directly involved in implementing the proposed strategies.
- Operational /mitigation measures: The first step in cleaning up the brownfields is determining the most appropriate available technology/methodology. Several designs should be considered based on a cost/benefit analysis. All the designs should follow internationally acceptable standards. Reviewing several clean-up scenarios will provide authorities with options for the most advanced and cost-efficient technologies and methodologies. Designs should be flexible and include components that can account for data gaps and risk factors. The proposing entities should provide a comprehensive demonstration of applicable clean-up technology and detailed characteristics of the contaminated site. The project development process should provide an opportunity to test technical approaches, establish clean-up remediation centers, provide a basis for cost estimations, and identify possible funding sources.
- Financial evaluation: Experience from the executed World Bank brownfields projects indicates that governments will commit to clean-up initiatives only if they are certain that it is necessary. For this reason, it will be worthwhile to provide rational reasons, evidence, and associated benefits for the clean-up project. It will be useful to emphasize the anticipated financial benefits in the form of land value appreciation and potential reductions in future health costs that implementation of the clean-up efforts could bring. For instance, successful clean-up could increase land values, producing higher property-tax revenues. Projects should also identify investment opportunities that will modernize and expand the economic sector where the clean-up initiative takes place.

- Future brownfields problems: Current environmental challenges such as strengthening environmental management, institutional development and capacity building, and reducing the impact of environmental degradation to human health, will continue to exist if further action is not taken. The longer the problem exists the higher the future incremental costs will be. In order to lessen the financial burden it will be necessary to initiate new or additional preventive land degradation projects in the near future.

The experience in the ECA Region indicates the importance of technical assistance and loans to clients for brownfields projects; the need for analytical work and quantitative data; and the importance of strengthening pollution management initiatives related to brownfields projects.

3.2 Implications for Other Regions

As countries in other Regions pursue economic growth and industrial expansion—with the aim to reduce poverty and achieve development—many are expected to face issues of environmental degradation and pollution from industry and development. Though the source of pollution may be different than in the ECA Region—where the main source of past pollution was state-owned or state-operated enterprises such as mining and solid waste—the new economies rely to a significant extent on SMEs, which are expected to contribute to economic growth but also to environmental degradation.

Countries in other Regions may not have the incentive of EU accession as countries in the ECA Region, however many will have other reasons to address pollution and environmental degradation from their economic growth and development activities. One important motivation is the rising cost of environmental degradation and associated health care. Studies from China show significant impacts of environmental degradation on GNP: estimates of environmental damage from pollution vary from 7.7 percent of GDP, when willingness to pay valuation methods are used, to 3.5 percent of GNP when a human capital approach is taken.

Public opinion and a strong green constituency—as in the case of India—could also be an incentive for countries to address pollution from industry and development. India, which has seen strong economic growth coupled with strong performance of its industrial sector, is witnessing visible deterioration in environmental quality in many industrial townships (World Bank, 2006); its citizens are increasingly resorting to the judiciary system to address their environmental concerns.

It is important that the Bank address incentives to prevent pollution from occurring, and that lessons learned from the ECA region are incorporated into projects that deal with legacy pollution. Clear prioritization should be made so that the legacy pollution portfolio addresses pollution in locations that disproportionately affect the poor and where action would result in ameliorated conditions, rather than in areas where there are no mechanisms to prevent the recurrence of pollution.

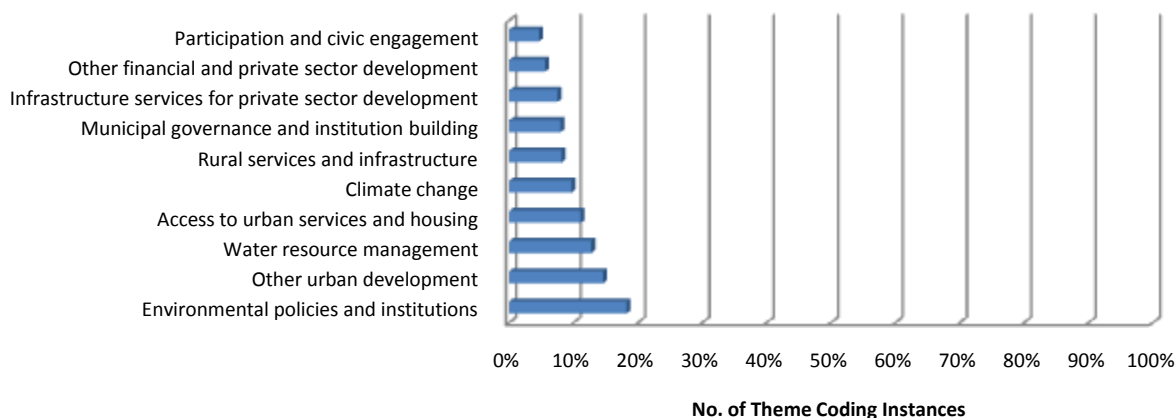
4 Public and Private Sector Client Demand to Address Current and Future Pollution Flows

4.1 Public Sector Demand to Address Current and Future Pollution

The World Bank responds to demand from countries to address their current and future pollution flows through infrastructure and pollution management investments that address pollution emanating from state-owned enterprises and operations; institutional strengthening, technical assistance and policy advice to create regulatory and economic incentives that would address current and future pollution from private sector actors; and through provision and dissemination of good practices and knowledge management on pollution prevention and management.

Technical assistance for pollution management includes developing and strengthening capacities of state agencies that are responsible for monitoring and enforcing environmental quality (for example, ministries of environment, municipalities, regional agencies) and for creating regulatory, economic and financial incentives for reducing pollution. Analysis of the lending portfolio indicates that the most common theme that was coded alongside PMEH is environmental policies and institutions (in almost 20 percent of cases), indicating the important role that environmental policies and institutions play in addressing pollution management issues. Fig. 3 presents the top-ten themes that are coded in addition to PMEH for lending projects.

Figure 3: Top-ten themes that are coded in addition to PMEH for lending projects.



Note: Numbers represent the number of times a theme was coded.

Several analytical and advisory activities of the World Bank address pollution management. Between FY 2002–2009, 231 activities were produced and include 142 economic and sector work outputs and 89 technical assistance outputs. Almost 30 percent of the analytical and advisory work pertains to environmental policies and institutions theme, followed by water resources management (20 percent), and climate change (18 percent). The largest share of the analytical and advisory work pertaining to pollution management and environmental health theme is produced by the environment sector board (72 percent of total), followed by the energy and

mining sector board (12 percent) and water sector board (8 percent). The SAR Region provides an innovative example by combining the technical and analytical aspects in economic and sector work, through the ongoing Energy Efficiency and Cleaner Technology in Brick Making in Bangladesh ESW. The aim of this ESW is to introduce energy - efficient, cleaner technologies and practices in the brick sector in Bangladesh. Through this ESW, demonstration pilots are combined with economic analysis to not only demonstrate the technical advantages of greener options, but also to clearly show their economic benefits.

Pollution management has sometimes been achieved in WB projects as a byproduct of the primary objective. For example a project that replaces outdated electrical transmission stations with modern, more efficient ones, also reduces the emissions associated with the required electric power. In the agricultural sector, many projects seek to improve drainage, thereby contributing toward reducing soil erosion and the runoff of agricultural chemicals.

The following sections present the World Bank’s experience in addressing pollution in the industrial sector and addressing pollution that is pushed by the global agenda through climate change and Montreal Protocol.

4.1.1 Industrial Pollution

Management of industrial pollution has been an important cornerstone in the World Bank’s pollution management and environmental health portfolio through operations that create the right incentives for pollution management, encourage cleaner production and energy efficiency, and address pollution from small and medium enterprises. Table 6 presents the numbers of projects by region and total commitment amounts.

Table 6: No. of Projects and Commitment by Region for Industrial Subset of Lending Portfolio

Region	No. of Projects	No. of Projects (%)	Total Commitment Amount (\$ million)	Total Commitment Amount (%)
AFR	10	9%	335	6%
EAP	31	28%	2,635	44%
ECA	37	33%	1,018	17%
LCR	16	14%	866	15%
MNA	9	8%	500	8%
SAR	8	7%	591	10%
Grand Total	111	100%	5,945	100%

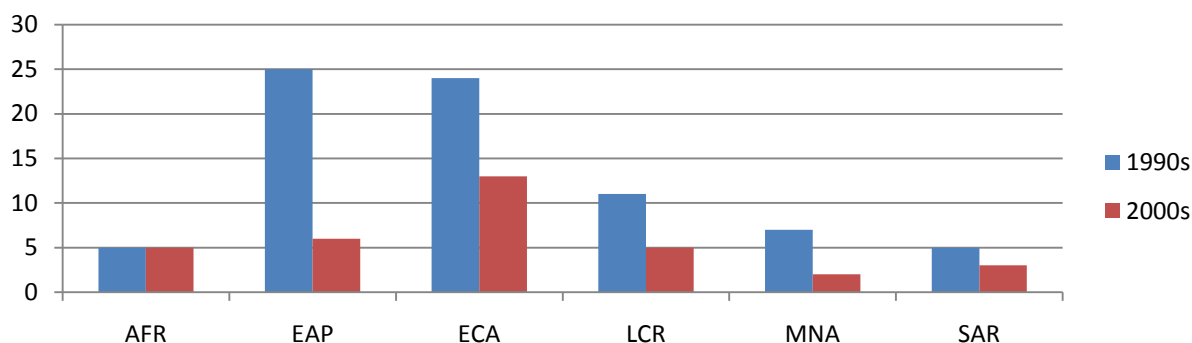
The share of GEF and Montreal protocol, in terms of number of projects, at almost 40 percent of all projects is higher within the industrial pollution subset, mostly due to the ozone depleting substances and persistent organic pollutants projects. However, IBRD/IDA has the largest share in terms of total commitment at 87 percent, since the average commitment amount of GEF and Montreal Protocol projects is 15 million compared to 86 million for IBRD/IDA (see Table 7).

Table 7: No. of Projects and Commitment by Region for Industrial Subset of Lending Portfolio

Product Line	No. of Projects	No. of Projects (%)	Total Commitment Amount (\$ million)	Average of Commitment Amount (\$ million)	Total Commitment Amount (%)
Carbon Offset	1	1%	8	8	0%
GEF	24	22%	272	11	5%
IBRD/IDA	60	54%	5,164	86	87%
Montreal Prot	23	21%	465	20	8%
Special Financing	1	1%	10	10	0%
Recipient Executed A	1	1%	26	26	0%
IDF	1	1%	0	0	0%
Grand Total	111	100%	5,945	54	100%

The WBG has been active in developing pollution management projects for industrial pollution management since the 1980s. The late 1990s was the apex of this trend, especially in countries with strong economic development during the period. However, the number of approvals has decreased in the 2000s for projects within the industrial subset in all regional departments of the Bank (see Fig. 4). This decrease is consistent for IBRD/IDA, GEF and Montreal Protocol approved lending operations. The total commitment has similarly decreased in all Regions, except in Africa Region which saw a slight increase in total commitment amount of approved operations between the 1990s and 2000s. Some of this reduction could be attributed to the wave of privatizations of state-owned enterprises during the 1990s.

Figure 4: No. of approved lending operations by regions in 1990's and 2000's



Industrial pollution is addressed through technical assistance for institution-strengthening, and through financial support in the form of credit lines and/or grants for investments in industrial enterprises (Brandon, 2008). Many issues have been addressed including ozone depleting substances, wastewater collection, power sector pollution, energy and water supply, as well as the strategic, institutional, and organizational aspects of pollution management such as the strengthening of the institutional capacity of the state Pollution Control Boards in India. More recent projects innovate in addressing pollution management. For example: EPAP II project in Egypt combines World Bank lending with grants from EIB and Finland and with JICA concession loans, while the Clean Air and Safer Mobility in Dhaka project is result of cooperation between

the environment and transport sectors and addresses air pollution transport and stationary sources of air pollution (see Box 1).

Box 1: Clean Air and Safer Mobility in Dhaka

The concentration of key air pollutants in Dhaka and other major cities in Bangladesh have been steadily increasing, with annual averages exceeding the World Health Organization thresholds. To address air pollution in Dhaka, the Government of Bangladesh with support from the World Bank launched, in October 2009, the '**Clean Air and Sustainable Environment (CASE)**—the first one to integrate environment and transport under one common objective of improving air quality. The project aims to improve air quality and safe mobility in urban cities through initiatives in the two major polluting sectors – the urban transport and brick making industries. The project is estimated to require US\$71.25 million, of which US\$62.20 million will be provided by IDA and US\$ 9.05 million by the Government of Bangladesh. The two major components of the CASE project are environment and transport. The **environment** component, implemented by the Department of Environment, aims at improving air quality management, strengthening the institutional and regulatory framework governing brick making industry and piloting the use of cleaner technology in the brick industry to improve energy efficiency and reduce air emissions. The **transport** component aims at reducing conflict between motorized and non-motorized transport, reducing congestion and providing safer and cleaner mobility for pedestrians and those using public transport. In addition, this component will help lay the foundation of a longer-term improvement in the urban transport sector (World Bank, 2009b).

Addressing pollution from small and medium enterprises (SMEs) has also been important. Projects for addressing pollution management from SMEs aim to address the lessons learned from previous projects in order to enhance the effectiveness of the implemented measures (see Box 2) in customizing financing for improving environmental compliance in SMEs.

4.1.2 Global Concerns: Montreal Protocol and Climate Change

Several global issues emerged in the analysis of the pollution management and environmental health portfolio. The most prominent ones were the phase out of ozone depleting substances (ODS) and persistent organic pollutants (POPS), as well as increase in projects that are driven by climate change considerations and which include cleaner fuels, energy efficiency, and renewable energy projects that also provide benefits to reducing pollution (e.g. cleaner fuel for public transport).

The Strategic Framework on Development and Climate Change was developed to guide and support the operational response of the WBG's core mission of supporting growth and overcoming poverty while recognizing the added costs and risks of climate change and an evolving global climate policy (World Bank, 2008a). The Strategic framework seeks to increase client countries' resilience to climate risks through adaptation and mitigation by developing effective delivery instruments, intermediation mechanisms, guarantee schemes, partnerships, knowledge, and capacity. The two major themes that are considered by the strategy are water resource management and energy efficiency. Both themes could also be considered as drivers of pollution management: ambient air pollution reduction and increase in water quantity and quality.

Box 2: Customizing Financing for Improving Environmental Compliance in SMEs

In several countries, SMEs play an important role in the national economy, contributing significantly to the country's GDP and to industrial employment. Ranging in scale from small informal businesses to well-established enterprises, these SMEs, however, face numerous financial, technical, and environmental challenges that constrain their competitiveness and growth potential. In the industrial sector, SMEs are typically more polluting and falling behind in the adoption of environmentally sound production. They generally use obsolete technologies and lack knowledge about newer cleaner technologies. Improper use of chemicals, inadequate treatment or disposal of waste, uncontrolled emissions, and production techniques that make intensive use of non-renewable resources further add to potential environmental impacts.

To address these environmental challenges and improve compliance with environmental regulations, SMEs need to invest in cleaner production technologies and processes. SMEs, however, often lack financial capacity and have poor access to commercial credit. There has been a range of financing mechanisms for SMEs that have been used by industrial pollution prevention projects within the Bank, depending on the country context, the financial markets and access to commercial credit etc. Some industrial pollution abatement projects (in Egypt, for example), have used financial intermediaries; others have extended credit lines (in Brazil and India for example) for pollution control; while yet others have used matching grants. Lessons learned from industrial pollution prevention projects have revealed that the financing mechanism for funding cleaner production investments in SMEs needs to be customized. A recent Bank-wide IEG review was very critical of projects using credit lines for supporting/promoting pollution abatement in the industrial sector. The Sustainable Industrial Development Project under preparation in Argentina is looking at an innovative mechanism to provide economic incentives for financing cleaner production investments in SMEs (plus some financing for general productivity investments).

The project envisions the provision of matching grants to SMEs (on a matching basis to ensure commitment and ownership) for investments to improve environmental compliance. Under this matching grant program, investment proposals from SMEs in selected polluting sectors will be reviewed and differential levels of co-financing provided by the project, depending on the proportion of environmental versus general productivity investments in the proposal. Through this design, the matching grant program encourages proposals that are more oriented toward environmental (cleaner production) investments. This financial mechanism will not substitute for commercial credit; as they are specifically focused on environmental investments for SMEs where bank financing is not generally available. Accompanying technical assistance includes activities that will help SMEs build credit histories, design business plans, and develop formal audited financial statements; thereby making them attractive to commercial banks as potential clients. In parallel, to raise awareness among commercial financial institutions in Argentina about the potential market in SME financing, the project plans to organize a seminar.

Catering to private sector demand, the IFC launched a SME Toolkit initiative, which contains a section on creating an environmental management system (EMS). The toolkit is available in fifteen languages, on several regional websites, and on CD Rom. The EMS section is a step-by-step guide designed to help enterprises implement EMSs and comply with IFC's environmental policies. The manual's primary goal is to help businesses use environmental reviews to identify cost-saving measures. It is also intended to be a resource for companies to ensure positive environmental impacts while benefiting their own organization.

Source: Prepared by Anjali Acharya

4.2 Private-Sector Client Demand for Current and Future Pollution Flows

4.2.1 Cleaner Production Lending Facility (CPLF) and Cleaner Production Advisory Program

Cleaner Production (CP) is the improvement of operational processes to make more efficient use of inputs such as raw materials, energy, and water along a company's value chain, resulting in cost savings and environmental and climate change mitigation benefits.

- **IFC’s Cleaner Production Lending Facility:** IFC’s Cleaner Production Lending Facility is a three-year, \$125 million loan facility to finance CP investments (energy efficiency, use of renewable energy, water savings and other resource efficiency) among portfolio clients in all real sector IFC departments. It follows a successful \$20 million pilot facility that was fully utilized. Like the pilot, the new facility provides a vehicle to support efficiently CP projects for existing clients through a streamlined process. These projects create examples that can be shared with other clients, including prospective new ones, in the same sector and help create awareness of the business case of many CP interventions. IFC also supports CP investments in its larger mainstream projects with new business clients.
- **The Global Cleaner Production Advisory Program:** IFC’s CP advisory services are available to new and established clients in all major regions. This advisory offering includes cleaner production assessments for clients who require technical support to identify opportunities. IFC’s advisory program also helps to create deal flow, not only for the CPLF but also for mainstream IFC business.

Table 8: Distribution of CP portfolio by region for projects starting between FY07 - FY10

Region	No.	Total Funds Managed by IFC (\$ thousand)	Average Funds Managed by IFC per Project (\$ thousand)
ECA	4	\$10,008	\$2,502
LAC	1	\$897	\$897
MNA	1	\$290	\$290
SA	5	\$1,583	\$317
SSA	1	\$45	\$45
World	2	\$11,210	\$5,605
Total	14	\$24,033	\$1,717

The IFC’s CP projects promote the adoption of cleaner technologies and techniques in infrastructure, manufacturing, agribusiness and service sectors through measures that include process yield and resource efficiency improvement, energy efficiency, renewable energy, recycling, and efficiencies in water use (see Table 9). Effective CP interventions include the reduction of resource consumption at the source, thereby reducing the need for costly end-of-pipe solutions, and improvements to operating efficiencies and costs. Many CP projects also reduce CO2 emissions, helping to mitigate climate change

Business opportunities for CP can best be judged against what is practicable in technical and economic terms for a given company or project and in the local context at any point in time. CP interventions often produce both cost savings and environmental benefits. Investments in energy efficiency and renewable energy also reduce GHG emissions, contributing to climate change mitigation. CP can result in benefits for all parties and stakeholders, as improvements protect the environment, the consumer, and the worker while improving efficiency, profitability and competitiveness.

Table 9: Examples of Cleaner Production Actions

CP Actions	Examples
Reduction in the quantity of material contained in a unit of product	Reduced weight glass containers save on material, transportation costs and waste (at end of useful life)
Reduction in the quantity of material consumed in producing a unit of product	Near net-shaped forgings reduce the amount of material required in a product while also reducing machining energy and waste
Reduction in the quantity of energy required to produce a unit of product.	Use of cold adhesives in place of those that require high temperature (and sometimes high pressure)
Reduction in the hazardous material required to produce a unit of product	Replacement of solvent vapor degreasers with aqueous cleaners
Reduction of waste generated in production of a unit of product	In optimal nesting of components from sheet metal, computerized placing and cutting reduces waste generated
Reduction in the emissions to atmosphere caused by the production of a unit	Replacement of solvent-based coating with water-based alternatives
Reduction in discharges to water resulting from the production of a unit	Capturing, treating and reusing water, reduces discharge and saves resource

Cleaner Production Lending Facility

IFC set up a pilot CP program in 2007 to encourage its portfolio clients to undertake CP investments in order to demonstrate the financial viability and environmental benefits of such projects. Through this \$20 million pilot lending facility, IFC provided CP loans ranging from \$250,000 to \$5 million per project for clients in good credit and environmental standing. These loans are processed swiftly with a streamlined process established by IFC's Board. CP Loan recipients also benefit from interactions with IFC's technical and environmental specialists who give input on CP opportunities. Separately funded advisory support was also available for clients who required more comprehensive audits or assessments. The pilot lending facility has been successfully utilized. In September 2009, IFC's Board approved delegated authority for a new \$125 million global Cleaner Production Lending Facility. See Box 3 for examples of projects funded under the pilot facility.

There are many opportunities for CP: continuous improvement programs such as 6-sigma and lean manufacturing, industry standards, product and process engineering groups, technical development and research, can all be sources of CP. It can also be used as a way to achieve compliance with environmental standards. Opportunities to implement cleaner production can occur at any point during production, at the design stage of a manufacturing plant, or as a retrofit of an existing process. In practice, the greatest gains to be had from cleaner production can be achieved at the earliest stages.

An effective CP campaign requires commitment from senior management. The first step is to benchmark current operations to identify performance gaps in energy, water, or resource usage. Setting up a baseline and making comparisons with key performance indicators helps in setting goals for improvements. Undertaking a CP assessment helps to identify and quantify opportunities to reduce, re-use, and recycle resources (reformulation of a product is not usually a

practical option). For each opportunity, cost and savings must be identified. Assessments may be performed by qualified in-house staff or with the involvement of expert consultants.

Box 3: Case Studies of IFC Cleaner Production Financing Programs

Jordan Energy and Water Usage Reduction: IFC is working with the leading tourism company in Jordan to reduce energy and water use. The \$2.5 million project targets installation of solar panels for water heating, water usage reduction measures, bulk Liquefied Petroleum Gas (LPG) conversions from oil, and energy efficiency improvements (air conditioning efficiency, lighting upgrades, and enhanced energy monitoring and controls). IFC provided a \$1.8 million CP loan for the project under the Cleaner Production Lending Pilot. The expected payback is about 2.5 years after implementation of 0.5 years. The project is expected to reduce energy and water costs by 11percent; reduce emissions by approximately 3,700 tons CO₂ p.a.; and reduce water usage by 46,000 m³ p.a.

China Utility-based Energy Efficiency (CHUEE): The CHUEE program is an example of CP intervention through market players. CHUEE is an energy efficiency financing program designed by IFC at the request of China's Ministry of Finance, to stimulate investment in energy efficiency and cleaner production projects. The goal is to reduce emissions of greenhouse gases by creating a sustainable financing mechanism for companies to invest in energy efficiency projects. IFC cooperates with Chinese commercial banks and offers them a facility whereby IFC shares part of the loss for all loans within the energy efficiency portfolio. The program also provides advisory services on marketing, engineering, project development, and equipment financing services to banks, project developers, and suppliers of CP products and services. The impact of the CHUEE program has been substantial.

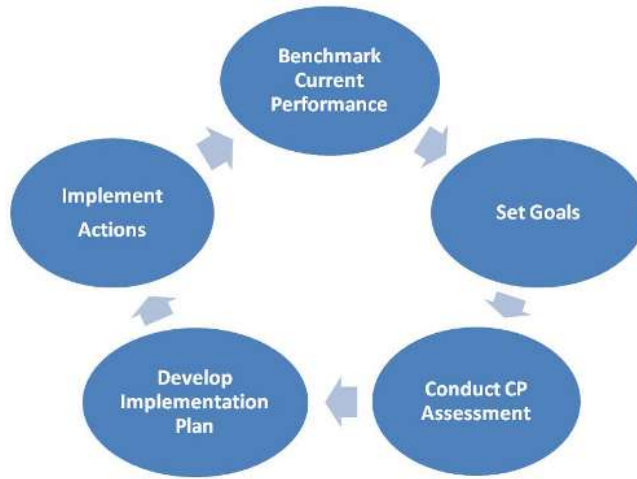
Following up on the recommendations from the assessment requires a good implementation plan and preparation of necessary applications or approval documents for internal or external funding if capital projects are involved. Once implemented, the projects should be monitored for performance. The CP process is an ongoing campaign with continuous benchmarking of performance and improvements.

Cleaner Production Advisory

The most compelling benefit of CP is that in reducing operating cost and improving productivity for a company, CP provides the business case for pollution prevention. It provides an economic justification for making physical and environmental improvements to a product or process, and it may well act as a trigger for innovation at the strategic level. In many cases it enhances market access and prevents market exclusion. Often it serves as a proactive approach to forthcoming legislation.

Despite the undoubted benefits of cleaner production there are many barriers to its implementation. While these barriers may vary in terms of perception from process to process and from jurisdiction to jurisdiction it is important that these barriers are identified so that mitigation strategies can be devised (Table 10).

Figure 5: The Cleaner Production Process



Source: Prepared by McCann F.

Table 10: Barriers to implementation of CP

Barrier Type	Barrier
Financial	<ul style="list-style-type: none"> • High cost of external capital • Lack of funding mechanisms • Perception that cleaner production investments are high risk • Cleaner production not understood, and hence not valued by external funders
Economic	<ul style="list-style-type: none"> • CP investments are not perceived to be attractive in comparison to production expansion opportunities • Immaturity or obsolescence of the company’s internal cost calculations • Immaturity or obsolescence of the company’s capital allocation procedures
Policy related	<ul style="list-style-type: none"> • Insufficient focus on clean production in environmental and technology strategies • Immaturity of environmental policy • Lack of environmental leadership • Perceived management risk in cleaner production
Organizational	<ul style="list-style-type: none"> • Immaturity or lack of integration of the environmental management function in mainstream affairs • Limited experience with employee involvement • Perceived complexity of the cleaner production process
Technical	<ul style="list-style-type: none"> • Limited availability of necessary equipment • Shortage of relevant technical information
Conceptual	<ul style="list-style-type: none"> • Indifference (“the individual can’t make any difference”) • Misunderstanding of cleaner production • General resistance to change

Benefits in the form of calculated costs savings streams, as opposed to highly visible new production assets, appear as nebulous and inherently more risky to many. As project opportunities tend to be relatively small scale and dispersed, transaction costs can prove daunting unless mechanisms are put in place to take advantage of similarities among projects and bundle them. Some form of financial intermediation is usually required, unless enterprises use their own funds. Typically, therefore, implementation of energy efficiency projects involves

interaction of both financing entities and technical experts with clients. Project delivery requires very efficient contracting to achieve this without driving up transactions costs—a challenge in any country, but especially where market institutions may be relatively weak, causing greater insecurities in contracting.

4.2.2 Investment and Advisory Services in Energy Efficiency and Renewable Energy

Energy efficiency and renewable energy (EE/RE) investments have been mainstreamed in the IFC portfolio with a solid commitment to increase EE/RE investments over the coming decade. In 2005, these investments totaled approximately 4 percent of total annual commitments, and by FY13, are expected to reach up to 20 percent (vs. 10 percent in FY09) of commitment volume.

Key energy efficiency investments include equipment, systems, and services (for example, replacing old boilers and changing incandescent light bulbs to CFLs) and process efficiency, industrial process change, facility replacement, electricity/gas generation, and distribution efficiency. Key areas of renewable energy investment include equipment, systems, and services that enable the use of energy from solar, wind, hydropower, biomass, geothermal, and tidal sources. Hybrid investments include cogeneration, EE/RE component manufacturers and financing through FIs and funds. See Table 11 for IFC investment in energy efficiency for the period 2005–2009.

Table 11: IFC investments in energy efficiency (US\$ million)

	2005	2006	2007	2008	2009
IFC net investment in renewable energy (includes all hydros)	65	84	294	433	720
IFC net investment in energy efficiency only	156	309	183	473	315
IFC net investment in clean energy	221	393	477	906	1,034

4.2.3 Cleantech Investments

In FY10 the IFC launched a Cleantech investment program anchored by its 10-year-old venture investment team in the Global Telecommunications and Information Technology Department. Four investments were closed in FY10, covering energy efficiency, solar, and biomass technologies and representing a total commitment of \$29.3 million. The average size of investments was \$7.3 million. One investment was in China (Shuoren), and three in India (Azure Power, Husk Power, and Applied Solar). The team seeks investments ranging from \$3 million to \$30 million in companies that have a stable technology or business model and that need expansion capital. The Cleantech venture investment team seeks to work in joint ventures with relevant industry teams across IFC and promotes third party co-investment as well as follow-on IFC debt financing to portfolio companies as they mature, leveraging IFC’s long-standing project and corporate finance products.

The team seeks technology, product, or service companies with market traction but that may not yet be profitable. IFC does not finance research and development, nor seek significant technology risk, but rather utilizes its strength in assessing and helping mitigate developing country market risks as firms target rapid growth. Locally grown intellectual property or

technology transfer potential and strong management teams are important factors for due diligence. In addition, companies must demonstrate an ability to deliver strong local economic impact and measurable environmental benefits.

The IFC prioritizes investments based on the following factors:

- *Management*: skills, experience, collective track record, industry knowledge
- *Stage*: companies with market traction (sales/order book) and substantially de-risked technology, forecasting positive operational cash flow in the next three years
- *Competitive advantage*: lower production costs/superior performance, barriers to entry including patents, know-how, brand, supply, and distribution
- *Market and growth potential*: large market with rapid penetration potential
- *Quantifiable environmental and social benefits*: key indicators include estimated GHG emission avoidance and improved access to amenities for the underserved, such as access to low-carbon, healthy energy, and water. To illustrate the kind of social impacts targeted, WaterHealth International, provides affordable, low-carbon drinking water access to over 2 million people in rural India, Ghana, and the Philippines. With respect to environmental impacts, the recent investment in Shuoren is expected to catalyze emission reductions of at least 11 million tons per annum CO₂e over 8 years.

Key Cleantech sectors for investment are renewable energy and energy efficiency; recycling and waste management; water (capture, transport, treatment, supply); clean transport; green buildings and materials; and industrial and agricultural eco-efficiency. The Cleantech team is also developing a \$60 million investment facility (the Cleantech Pilot) to blend donor funds and IFC balance-sheet investing in order to expand IFC's current program to riskier investments and to more difficult geographies, such as IDA countries and Sub-Saharan Africa.

4.2.4 Carbon Finance and Carbon Delivery Guarantee

IFC is structuring on-balance sheet financial products specifically for the carbon market that help unlock and optimize the value of carbon assets for developing country projects, while lowering the risk-adjusted cost of compliance for developed country buyers. Such products will further support climate-friendly projects in emerging markets, as well as enhance the competitiveness of IFC's traditional project and corporate finance products.

IFC is the only multilateral institution that is leveraging its 50+ years of project finance experience to develop innovative financial products for the carbon market including the flagship Carbon Delivery Guarantee (CDG). IFC's CDG is a structured financial product developed specifically for the carbon market. As of 2010, it is the only product that helps developing-country projects maximize the value of their future carbon credits by providing transparent access to traded emission markets. The CDG has an appreciable impact on the value of the credits, while providing projects with an AAA-rated counterparty. IFC acts as value-added intermediary – selling credits from projects into the secondary market at attractive prices, while eliminating the

risk to buyers in developed countries of not receiving the credits and lowering their risk-adjusted cost of complying with greenhouse gas (GHG) emission reduction requirements. These products leverage IFC's ability to take long-term risks in emerging markets and benefit both buyers and sellers of carbon credits. They support climate-friendly projects in emerging markets and enhance the competitiveness of IFC's traditional project and corporate finance products. Carbon is increasingly becoming a key value driver in IFC's operations and the private sector has become the primary conduit for trading and unlocking value.

IFC has managed two carbon finance Dutch-funded facilities with the arrangement that IFC will purchase carbon credits for the benefit of the Government of the Netherlands under the international emission reduction transfer rules of the Kyoto Protocol. As of 2010, the facilities have committed \$135 million in 12 transactions covering over forty projects in 7 countries and are closed to new projects.

4.2.5 Support to Financial Institutions

IFC has played an important role in providing support to emerging market financial institutions. IFC consistently mobilizes donor funding to provide advisory services for FI capacity building and training, including market analysis and product development and credit risk managers training. In addition, IFC creates financial structures tailored to the needs of diverse markets and providing funding including credit lines and senior loans, risk sharing products and guarantees, mezzanine financing, and subordinated debt and risk capital. IFC continues to establish partnerships with consultants, technology vendors, and energy service companies (ESCOs), to build a pipeline of new business. See Table 12 for information on financial institutions portfolio and Box 4 for an example from the Russia Sustainable Energy Finance Program.

Table 12: Distribution of financial institutions portfolio for FY 08, 09, and 10

Region	FY08		FY09		FY10	
	No.	\$ (in mill.)	No.	\$ (in mill.)	No.	\$ (in mill.)
AFR	26	887	57	1,010	48	1,000
East Asia	25	592	17	417	25	550
ECA	16	493	24	530	36	800
LAC	35	1,398	70	1,275	70	1,490
MENA	22	609	28	743	34	740
South Asia	11	136	17	219	8	175
Southeast Europe	17	439	25	330	40	870
World	3	51	5	184	-	-
Total	154	4,605	244	4,709	261	5,625
Average Project Size		29.9		19.3		21.6

Box 4: Russia Sustainable Energy Finance program

The Russia Sustainable Energy Finance Program was established as an advisory program to advance capacity building of local financial institutions and market players, to work the regulatory framework, and to promote education for end users—in this case small and medium enterprises (SME's). The program has resulted in financing of \$150 million with 5 partner banks who have launched dedicated sustainable energy finance products. Participating banks financed sustainable energy projects totaling over \$100 million, leading to financial savings of almost \$19 million per year savings for the beneficiary SMEs. This interim result represents over 2 million tons CO₂ reduction over the lifetime of these investments. The Program has worked on and supported the development of a favorable regulatory framework which resulted in the Russian State Duma passing the Law on Energy Saving and Improving Energy Efficiency in Nov 2009.

The program has also produced tools to simplify and standardize the scaling up of sustainable energy through local financial institutions such as the Energy Efficiency (EE) Calculator; the EE Calculator offers a standardized way to help local banks identify and track SE transactions and is increasingly used by other multilateral development banks in their lending programs to local financial institutions.

The Russia program realized a donor fund leverage of almost 30, where every dollar of donor funds has generated \$28 of IFC commitments and bank financing to projects. In addition, every dollar of donor funding has resulted in \$16.5 of additional end user SE investments, \$3.4 of costs removed from economy/year, and 0.3 tons of CO₂ saved. At the macro level, every \$1 invested through IFC's advisory programs (awareness and policy work), is estimated to have avoided \$22 of energy costs per year and saved 2.1 tons of CO₂.

4.2.6 Infrastructure

IFC's infrastructure investments and advisory services related to pollution management to date include wastewater treatment and solid waste projects. With an increasing focus on climate change, renewable energy and water, the IFC plans to expand its infrastructure investments and advisory services in the coming decade (see Box 5).

Table 13: Distribution of IFC infrastructure investments and advisory services for FY 08, 09, and 10

Region	FY08		FY09		FY10	
	No.	\$ (in mil.)	No.	\$ (in mil.)	No.	\$ (in mil.)
AFR	4	62	5	69	8	230
East Asia	7	426	6	264	7	265
ECA	1	80	1	64	3	155
LAC	9	291	13	525	12	470
MENA	8	407	4	138	8	270
South Asia	4	577	5	199	7	250
Southeast Europe	8	561	5	205	4	185
World	-	0	0	0	0	0
Total	39	2,404	38	1,464	49	1,825
Average Project		62		39		37

Box 5: Case studies of infrastructure investments and advisory services

Cairo, Egypt, Wastewater Treatment PPP: The IFC advised the government of Egypt on the structuring and execution of the 20-year PPP to design, finance, construct, operate, and maintain a new 250,000-cubic-meter-per-day wastewater-treatment plant in New Cairo. The project has a capital value of over \$150 million. Besides being the first public-private partnership (PPP) under Egypt's PPP program, the New Cairo Wastewater Treatment project is IFC's first infrastructure advisory project in the wastewater sector.

Serbia Solid Waste Management: IFC's Integrated Solid Waste Management Program in Serbia will support economically profitable, environmentally, and socially responsible recycling and waste management businesses in the Western Balkans—Albania, Macedonia, Bosnia, Serbia (including Kosovo), and Montenegro. The final objective of the Integrated Solid Waste Management Program (ISWMP) is to increase the volume of scrap collected and recycled or composted (solid and organic) in the region, which will result in performance improvements of the waste management industry and reduction of waste disposed at landfills. In physical terms, the goal of the ISWM Program is to decrease the annual tonnage of waste going to landfills by 20 percent from present levels by 2011. This is equivalent to an estimated decrease of 1.3 million tons of waste from current levels or by an estimated decrease of 6 million tons of waste for the five year period 2010–2015. In value terms the total savings achievable through ISWMP can be estimated at \$20 million in a one year period (2011) or \$130 million over the 5 year period (2011-2015) after completion of the project.

5 Client Demand for Urban and Rural Services that Mainstream Environmental Health Considerations

The World Bank faces considerable demand to mainstream environmental health considerations into urban and rural services through its infrastructure sectors: water and sanitation, transport, and energy and mining. This section presents an overview of the pollution management activities contributed by these sectors and discusses the links between their respective strategies, all of which mainstream environmental and pollution management considerations that stem from environmental health considerations as in the case of air quality.

The water, sanitation, and flood protection sectors account for about 38 percent of all approved lending operations, 38 percent of total commitment, and approximately 40 percent of PMEHE commitments. This is followed by the energy and mining sectors which account for approximately 27 percent of total commitments, and then by transportation sectors which account for 19 percent of total commitments within the PMEHE approved lending portfolio. These three sector groups account for 85 percent of total commitments between FY 1990–2009 within the PMEHE approved lending portfolio. The EAP Region accounts for the largest share of total commitments of energy and mining (38 percent), industry and trade (47 percent) and water, sanitation and flood protection (39 percent) sector groups, while the LCR Region accounts for the largest share of commitments (63 percent) of public administration, law, and justice sector groups. The largest share of regional commitments within the PMEHE portfolio was in the water, sanitation and flood protection sectors (AFR, EAP, LCR, and MNA) and in the energy and mining sectors in ECA and SAR Regions. During the 2000–2009 fiscal years, the share of regional commitments within the water, sanitation, and flood protection sector has increased to reach almost 90 percent of MNA, 73 percent of EAP, and 61 percent of ECA commitments. On the other hand, the SAR Region saw an increase in the share of transportation sectors which account for 51 percent of total regional commitments (see Table 14).

Table 14: Distribution of PMEH Approved Lending Operations by Sector Group for FY 1990–2009

Sector Code Group	No. of projects	No. of Projects (%)	Total Commitments (\$million)	Total Commitments (%)	Average Commitment (\$million)
Water, Sanitation, and Flood Protection	274	38%	\$20,598	38%	\$75
Energy and Mining	156	21%	\$14,589	27%	\$94
Transportation	87	12%	\$10,242	19%	\$118
Public Administration, Law, and Justice	82	11%	\$2,959	6%	\$36
Industry and Trade	59	8%	\$2,821	5%	\$48
Agriculture, Fishing, and Forestry	47	6%	\$1,532	3%	\$33
Multi-Sector^a	15	2%	\$729	1%	\$49
Others^b	9	1%	\$252	0%	\$28
Total	729	100%	\$53,723	100%	\$74

Note: Sector groups are based on OPCS Sector Codes definitions and projects are categorized by the sector with the largest percentage.

a. Multi-sector projects are those projects where more than one sector group is assigned a similar percentage.

b. Others includes health and other social services (7 operations), finance (1 operation), and education (1 operation).

5.1.1 Water and Sanitation Services

Sanitary services projects constitute approximately 38 percent of projects in the pollution management and environmental health portfolio and the same percentage of total commitment amount. Typical projects include urban water supply, wastewater collection, sewerage and drainage, wastewater treatment, and solid waste management.

The EAP, ECA, and LCR Regions account for 74 percent of the pollution portfolio's total commitments dedicated to sanitary services. The relative importance of sanitary services projects is highest however in MENA where sanitary services operations constitute approximately 65 percent of total pollution management commitment. The possibility for carbon finance and for capturing carbon from sanitary landfills have increased the number of projects over the last 10 years that combine sanitation with carbon finance. Approximately half the carbon offsets projects in the PMEH portfolio pertain to solid waste and one of these pertains to wastewater.

The Water Resources Sector Strategy (World Bank, 2004) adopted in 2003, aims to assist client countries to improve water resources management and development for sustainable growth and poverty reduction. It defines water resources management as comprising the institutional framework, management instruments, and the development, maintenance and operation of infrastructure thus effectively linking water resource management with water services in an integrated approach. The Strategy's key messages that are relevant to pollution management include:

- Water resources management and development are central to sustainable growth and poverty reduction.

- Developing countries must be active in both management and development of water resources infrastructure.

An evaluation conducted by IEG on the water sector (IEG, 2010) noted that the Bank and the borrowing countries have not yet sufficiently tackled some vital issues, such as broadening access to sanitation, fighting pollution, and restoring degraded aquatic environments. IEG called for the Bank to help clients and partners to ensure that these critical water issues are adequately addressed including dedicating greater attention to sanitation projects.

5.1.2 Energy and Mining

Typical projects in energy and mining that mainstream environmental health considerations include: thermal power and district heating; renewable energy development; air pollution control retrofits; fuel beneficiation/switching; large–medium hydropower; coal, gas, and oil development. Most of the investments in the energy and mining sector occurred during the 1990s and were propelled by work in the ECA and EAP Regions.

The WBG is developing an energy strategy which is expected to be completed in 2011. The Energy Strategy Approach Paper (World Bank, 2009a) notes that the future energy strategy will articulate a way forward to help developing countries achieve the twin objectives of improving access and reliability of energy supply, and facilitating the shift to a more environmentally sustainable energy development path. Some of the proposed areas of actions for the future energy strategy of the WBG that are relevant to environmental sustainability and pollution management include:

- Take account of environmental and social effects of energy supply and use by providing support for energy efficiency improvement (both supply and demand), energy conservation, energy investments with low lifecycle GHG emissions, environmental management systems, gas flaring reduction, minimizing local pollutant emissions and discharges, and environmentally responsible waste disposal (such as fly ash).
- Support countries in their efforts to shift to a low-GHG-intensity path.
- Promote technology for global and local environmental sustainability by continuing to work with GEF to help introduce relatively new technologies that require special incentives to be commercially competitive, or technologies that are proven elsewhere but new to the country, for demonstration effects.

The Extractive Industries and Sustainable Development report (Liebenthal, Michelitsch, & Tarazona, 2005) called for formulating and implementing integrated strategies at the sector and country levels for transforming resource endowments into sustainable development based on the presumption that successful extractive industries projects should not only provide adequate returns to investors but also provide revenues to governments, mitigate negative environmental and social effects, benefit local communities, and help ensure that extractive industries revenues are used effectively to support development priorities.

5.1.3 Transportation

LCR and EAP, followed by AFR, lead in terms of the number of transport operations and in terms of total commitment within the pollution management and environmental health portfolio. Projects include traffic management, improved roadways, and vehicular air pollution abatement.

The 2008 World Bank Group Transport Strategy (World Bank, 2008b) seeks to help partner countries to establish the governance, strategies, policies, and services that will deliver transport for development in a way that is economically, financially, environmentally, and socially sustainable. It is articulated around five strategic themes:

1. *Create the conditions for increased support for transport investment and governance.* During 2008–2012, the Bank Group will work with all development partners, including the private sector, to channel more resources toward investments in transport assets, infrastructure, and services.
2. *Deepen engagement in the roads and highways subsector.* The construction, management, and maintenance of roads and highways will continue to be the dominant subsector.
3. *Increase engagement in the urban transport subsector.* This engagement will reflect the escalating development challenge of public urban transport. In every region, the combined effects of population growth, urbanization, and motorization are compromising the efficiency and livability of cities.
4. *Diversify engagement in transport for trade.* Driven by increasing globalization and regional economic integration, diversification of engagement will be implemented by increasing support for public and private infrastructure investment to overcome transport bottlenecks in the trade in goods and services (railways, ports, inland waterways, and airports) and attention to the transport services that use them, including multimodal services. Pollution management could focus on the increased traffic from ports and airports as both modes are significant sources of pollution in urban areas.
5. *Transport and climate change: control emissions and mitigate impact.* Transport now produces an estimated 15 percent of GHG emissions with developing countries producing about a third of total emissions with a yearly average growth of 4 percent. The strong connection between economic growth and transport-generated greenhouse gases can be moderated over time by changes in travel behavior, logistics decisions, technology choices, and transport modes. These changes can also be influenced by planning, by fiscal and regulatory measures, and by public investments in infrastructure. Moreover, urban air pollution, 90 percent of it generated by motor vehicles, kills an estimated 800,000 people each year. Phasing out highly polluting vehicles, improving public transport, and monitoring air quality more intensively could help reduce the cardio-pulmonary burden of disease.

6 Policies and Tools for Pollution Management in WBG Operations

The World Bank's environmental and social safeguard policies aim to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staff in the identification, preparation, and implementation of programs and projects. All World Bank safeguard policies encourage parties to focus on pollution management through the promotion of better environmental quality. Two policies could be highlighted in this regard: i) Environmental Assessment OP 4.01, which is one of the 10 environmental, social, and legal Safeguard Policies of the World Bank, and is used to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations; ii) OP 4.09: Pest Management, which is applicable to situations when pesticides would be used (e.g. in agricultural and health sectors), and calls for avoidance of harmful pesticides (e.g. by using IPM), and in cases where avoidance of harmful pesticides is not possible to develop a pest management plan as a standalone document or as part of the environmental assessment.

The IEG evaluation of the World Bank Group's support to environmental sustainability (IEG, 2008) identified safeguards as important instruments to address environmental impacts in the Bank's operations. The evaluation estimated that between fiscal years 1990 and 2007, almost 6,800 projects were screened for their environmental impact. The evaluation noted increasing environmental-assessment effectiveness over time, however the report also records weaknesses such as upstream analysis of alternatives and consideration of indirect, induced, and cumulative impacts.

The IFC's Performance Standards (PS) (specifically PS3, Pollution Prevention and Abatement) have been critical for pollution management and mitigation for IFC clients. In order to address climate change and ensure environmental and social sustainability, the IFC has successfully boosted the standards related to environmental and socially sustainable investments, and promoted the concept of improved social and environment performance of companies through the effective use of management systems, effectively incorporating pollution management criteria in all its investments. Performance Standard 3 has the objectives of (i) avoiding or minimizing adverse impacts on human health and environment by avoiding or minimizing pollution from activities financed by IFC, and of (ii) promoting the reduction of emissions that contribute to climate change.

In that respect, PS3 establishes a reporting requirement on greenhouse gas (GHG) emissions in excess of 100,000 tons per annum CO₂ equivalent. PS3 also requires that alternatives be considered if emissions are above that threshold, and that energy efficiency measures be explored. The IFC Carbon Emissions Estimation Tool has been developed to assist industry departments with calculating project GHG emissions. More generally PS3 requires IFC clients to avoid the release of all pollutants or, when avoidance is not feasible, minimize or control the intensity or load of their release into the environment, and to adopt measures consistent with the principles of cleaner production. Considerations relevant to strategies contributing to the

improvement of ambient conditions when the project has the potential to constitute a significant source of emissions in an already degraded area have also been included.

The Environmental, Health, and Safety (EHS) Guidelines of the WBG are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). EHS guidelines are applicable to all World Bank projects for which a project concept note was approved after April 2007, and IFC uses the EHS Guidelines as a technical source of information during project appraisal activities. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group and are generally considered to be achievable in new facilities at reasonable costs by existing technology. For IFC-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. IFC Performance Standards require the client to refer to the EHS Guidelines when evaluating and selecting pollution prevention and control techniques for the project. When host country regulations differ from the levels and measures presented in the EHS Guidelines, IFC clients are required to achieve whichever is more stringent. The environmental assessment process may recommend alternative levels or measures, which, if acceptable to IFC based on a full and detailed justification demonstrating that the alternate choice is consistent with the Performance Standards requirements, become project- or site-specific requirements.

Internally, a pollution management thematic group was established—consisting of staff from the World Bank, IFC, and MIGA—which serves to enhance collaboration and knowledge sharing among pollution management practitioners within the WBG (Box 6).

Box 6: Pollution Management Thematic Group—Collaboration and Exchange of Ideas

The Pollution Management Thematic Group (PoMa) was established as a way to facilitate collaboration in developing the Smart Growth, Firm Competitiveness and Pollution Management ESW, which aims to update the policy guidance of the 1998 Pollution Prevention and Abatement Handbook (parts I and II). The thematic group consists of approximately 250 members in World Bank, IFC, and MIGA, and 12 BBLs were organized in fiscal years 2009–2010 that presented guidance notes on a variety of topics and obtained contributions from the PoMa thematic group members. The thematic group's role has expanded since its establishment to become a community of practice with skills on pollution management policy tools, contributing toward strengthening the WBG's capacity to provide quality advice and business advisory services on pollution management to both private and public sector clients. The next step for the group is to enhance its space in Scoop during FY11.

7 Drivers for the Pollution Management Portfolio

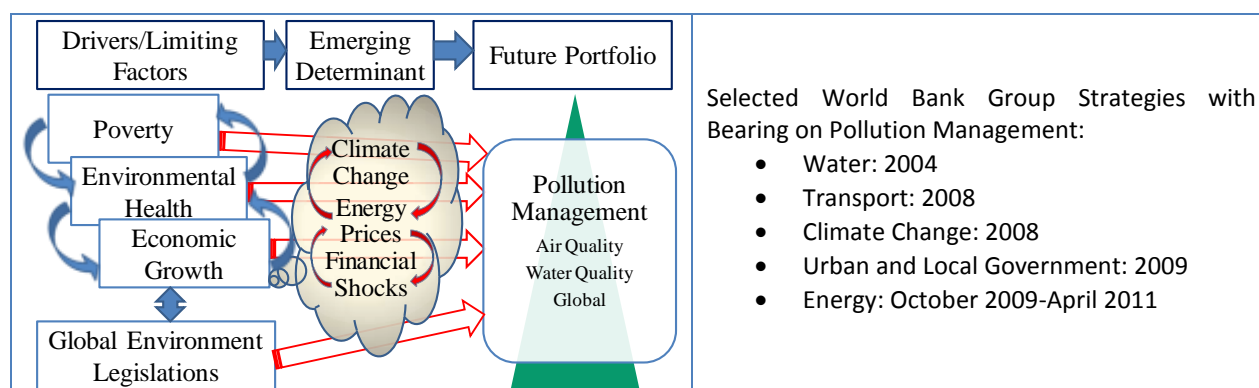
7.1 Drivers for the World Bank

There are a number of factors that could improve or impede air, water, and global pollution management. Over the next decades, high carbon intensity energy will still be needed to drive growth in both developed and developing countries. This economic growth will be associated with more pressures on the poor, health, and the environment.

Although the demand by the poor for environmental goods and services is high and urgent, achieving the MDGs has been delayed due to the 2008 financial crisis that affected economic growth worldwide, the price of international commodities, and ODA flows and their effectiveness. In terms of the burden of environmental health, the occurrence of modern diseases associated with air pollution, such as cardiovascular disease and cancers, will significantly overtake traditional disease, especially in urban areas.

At the local level, enacting and enforcing environmental—specifically pollution management—legislation in developing countries is associated with real commitment for change and good governance; ODA effectiveness is key to achieving this outcome. At the global level, the Montreal Protocol and the Stockholm Convention prove well calibrated to achieve their objectives, while climate change has emerged as a global threat with a significant transaction cost. Fig. 5 and Annex 1 provide an overview of drivers for World Bank pollution management work.

Figure 5: Pollution Management Drivers and Limiting Factors



Source: Doumani F.

7.1.1 Poverty, Environmental Health, and MDGs

One of the main drivers for the World Bank’s involvement in pollution management stems from its mission to reduce poverty and improve the quality of life for the poor. This could be achieved by responding to the demand for sanitation services for the currently 1.4 billion poor. In slums, the poor are faced with the double burden of traditional and modern disease from urban pollution as well as household and neighborhood pollution. Moreover, the MDGs clear set of targets to reduce poverty have been affected by the financial crisis of 2008. Except for safe water target that the world is on track to achieving, most other targets such as the effectiveness of sustainable environmental policies are not on target and have been disrupted by the financial crisis. Related to poverty and to the MDGs is the necessity to improve environmental health conditions especially for non-communicable diseases such as cardiopulmonary disease and cancers. These diseases may be attributable to air pollution and, to a lesser extent, water quality and food chain contamination (for example, from pesticides and industrial effluents containing heavy metals).

7.1.2 Global Environment Issues

Global environment issues and legislation (e.g. ozone depleting substances, persistent organic pollutants, and climate change) are also drivers for the pollution management portfolio. The Montreal Protocol proved effective at curbing ozone-depleting substances through a multilateral fund that used a direct approach at reducing the harmful substances. The Stockholm Convention called for international adherence to the precautionary principle and country self-monitoring for eventually eliminating POPs and provided funds for clean up and incineration. Climate change is without doubt an important trigger for countries to prioritize environmental issues, especially when some of the reforms or investments such as improving safeguards and enforcement for air and soil pollution or promoting mitigation measures to increase energy efficiencies, were long overdue. Climate change is also a driver for advancements in energy efficiency and renewable energy that could have positive impacts on pollution. On the other hand, global issues risk overshadowing pollution management at the local level if appropriate strategies and policies are not put in place.

7.1.3 Economic Growth and Competitiveness

Economic growth is another important driver for World Bank and IFC projects, especially as it relates to energy demand—and consequently to climate change. Energy demand is expected to grow and will require a more stringent pollution management regime to offset the pollution stemming from fossil fuels over the next decades. The carbon intensity of energy production, if not kept in check, will erode the competitiveness of those who comply with climate change mitigation efforts vis à vis non-compliers.

Due to the imperative of climate change and the scale of transformation of the energy structure necessary to meet this challenge, most OECD economies see investments in clean energy technologies as key to their long-term sustainable economic growth. Conversely, capturing this economic opportunity for non-OECD countries is the central challenge of the current energy and climate policy nexus. Clean energy investments could become a strategic asset and an opportunity that could help developing countries drive the quality of their economic growth. Moreover, clean energy is seen as a “win-win” solution to reduce GHG emissions while simultaneously stimulating a high-growth technology-based sector (e.g. vast fields of concentrated solar power plants in the Maghreb countries to supply as much as 15 percent of Europe's fast-rising electricity demand by 2050) with a broad range of employment opportunities. Hence, both developed and developing countries have a mutual imperative to transition to a clean energy economy. Such transition could be encouraged by consumers, who, with growing awareness, could play a role in driving demand for low carbon-intensity goods and services.

7.1.4 WBG Strategic Frameworks and Strategies

The World Bank 2008 Strategic Framework on Development and Climate Change was formulated to address the 2007 UNFCCC challenges. Concomitantly, and following up on the 2003 Infrastructure Action Plan (IAP), the World Bank Group (IFC, MIGA, IDA and IBRD) 2009–2011

Sustainable Infrastructure Action Plan (SIAP), in which the various infrastructure strategies fit, encapsulates the guiding principles of the WBG's infrastructure sector engagement as the triple bottom line: economic growth, equity, and environmental sustainability. SIAP seeks: (i) economic and financial viability in the infrastructure sector to better equip it to contribute to economic growth; (ii) social inclusion whereby infrastructure goods and services are provided to the poor, remote communities, women, and other historically disadvantaged groups; and (iii) local and global environmental sustainability; pollution management is emphasized in the last of these goals.

7.2 Drivers for IFC

Since the IFC works primarily with the private sector and financial intermediary institutions, the drivers for IFC's pollution management work relates primarily to the drivers that motivate the private sector.

7.2.1 Clear-cut, profit-driven improvements for the client

Key drivers for the IFCs pollution management related work are profit-driven improvements for the client. These include cost savings, improved business performance, market access, and reduced risk. For example, through the IFC's Cleaner Production Lending Facility, a company can increase energy savings by up to 15 percent per year. In many cases, projects have relatively high IRRs and short payback periods. In addition, the Cleaner Production Lending Facility and Advisory Program bolster demand for pollution management and the Cleantech investment vehicle invests in technologies on the supply side of pollution management.

Box 7: Example of Pollution Management Activities that Result in Clear-Cut, Profit Driven Improvements for the Client

A company operating two sugar refineries in Zimbabwe, with a yearly production of 140,000 tons of refined sugar and employing approximately 500 people, identified water conservation measures as part of an assessment to reduce the impact of high surcharges when the water consumption level exceeded the allocated amount, due to the rationing used to manage water shortages in a long drought. The most significant sources of water loss included: (i) approximately 42 m³ of fresh water used daily to wash the bagasse originating from the clarifier into the sewage system; (ii) an overflow of 264 m³ per day from an insufficient water storage capacity from the cooling towers, due to the increase in the capacity of the evaporation tanks; and (iii) use of 216 m³ of fresh water to wash the charhouse (an older method for decolorization using bone char). The following cleaner production solutions were implemented: (i) a water softener and additional piping were commissioned to recycle water as 'sweet water' in the melting pot at the start of process; (ii) the bagasse generated at the clarifiers was put through a press filter and used for agricultural purposes, instead of being discharged into the sewage system. The water has been recycled as "sweet water" in the melting pot; (iii) water meters were installed to improve water management at units with high water consumption. An option of re-directing the overflow from the cooling towers to the production process is under investigation. The measures were projected to reduce the water consumption by approximately 86,000 m³ annually and to reduce solid wastes to be disposed of by 120 tons per year. The factory invested US\$28,000 for the reduction of water consumption. With an expected saving of US\$24,000 per year on water charges, with a payback period of 14 months, not considering any possible surcharges for which the company may have been responsible.

Source: Paolo Lombardo

7.2.2 IFC's Internal Strategy

IFC's internal strategy, and one of its strategic pillars, is to promote environmental and social (E&S) sustainability by managing risks arising from investment and advisory operations, by finding opportunities to improve sustainability via investment and advisory services, and by providing global knowledge and standards. All IFC regional strategies highlight targets for energy efficiency and renewable energy investments. Regions with the highest greenhouse gas emissions have been key drivers for both investments and advisory work for the IFC.

7.2.3 Opportunity for collaboration

The opportunity for collaboration drives pollution management and responses to climate change. IFC has integrated climate change in its strategic priority on sustainability. In addition, the World Bank Group, including IFC, elaborated a Strategic Framework on Climate Change and climate change is a focus area for all regions in both investment and advisory activities.

7.3 Feedback from Stakeholder Consultations

The Environment Strategy consultations with stakeholders across the world identified the importance of addressing the different aspects of pollution management, the link between environment and poverty, and the importance of engaging all stakeholders for environmental sustainability.

Consultations in several regions identified inefficient waste management (problems in managing industrial waste, POPs, medical waste, hazardous and nuclear waste and secondary recycling) as a main challenge facing their countries. Wastewater, legacy pollution, transboundary pollution, and sustainable energy were also identified as important challenges in several consultations. Consultations emphasized the importance of the poverty alleviation agenda within the developing country context, and saw a healthy environment and effective management of natural resources as key to poverty reduction.

Consultations alluded to the need for the WBG to focus on facilitating private sector/industry sector clean up and engage them to utilize their Corporate Social Responsibility policy and budgets to strengthen the effectiveness of development initiatives. They also stressed the need to identify and support leapfrogging approaches that are appropriate to sustainable development in specific developing countries and that will facilitate the choices that leverage the country's unique strengths. Moreover, the WBG should use its ongoing initiatives with the FI sector to expand dissemination of good environmental practices. WBG should enhance the approach to improving quality of life, quality of growth and protecting the regional and global commons by integrating new elements such as the environmental sustainability of poverty reduction, livelihood security, growth models that include social equity, and the use of green and social accounting in place of GDP.

7.4 Limiting Factors

Several factors could limit the WBG's pollution management portfolio: the perceived low priority of pollution management compared to other development and economic growth priorities in client countries could dampen the implementation of new projects; the response to climate change, while promoting the pollution agenda related to energy use and adaptation, could be a limiting factor to action on pollution that is not associated with climate change—if resources are diverted to address climate change at their expense; and the allocation of resources to environmental health concerns (mostly pertaining to water and sanitation) could be surpassed by more global issues such as climate change and financial shocks.

8 Recommendations

This report proposes the following recommendations for the WBG Environmental Strategy 2010–2020:

1. *Continue to respond to public sector client demand for support to identify and clean-up priority legacy pollution.* Since the last strategy, demand in five Regions (LAC, SAS, EAP, MNA, and ECA) has been increasing steadily for this type of support. The WBG should continue to work with client countries to support them in their efforts to use risk assessment to identify legacy pollution and to support them in their clean-up efforts. Successful clean-up also means ensuring that current and future pollution at the same site is better managed to prevent re-contamination. Hence, it will be equally important to strengthen country systems for environmental management to better manage current and future pollution (see below).
2. *Respond to public and private sector client demand for support to better manage current and future pollution.* In this new Strategy implementation period, the WBG should place particular focus on working with a variety of public and private stakeholders to use a range of tools to pursue smart growth and enhanced firm competitiveness and promote sustainable development. This means moving forward on the following fronts:
 - Establish and implement a new Capacity Building Initiative to strengthen countries' environmental management systems (see chapter 5): The World Bank, working with other development partners, aims to support countries in their efforts to strengthen their own environmental governance frameworks, based on a demand-driven approach, using its full range of advisory and lending instruments. The *Pollution Prevention and Abatement Handbook* update (expected to be complete by Spring 2011), a product of the collective experience of WBG staff across our public and private sector practices provides information for policymakers on pollution management policy tools. This substantive information on policy instruments will be particularly important in the context of this new Capacity Building Initiative.
 - Scale up Cleaner Production investment and advisory services: IFC aims to boost investments in EE/RE, Cleantech, and Infrastructure and through the Cleaner Production

Lending Facility. On the advisory side, the IFC plans to expand in areas such as developing new models for water. Moreover the IFC intends to continue to be an innovator in thought leadership and financial innovations (examples include the IFC Green Bond offered to institutional investors and the carbon delivery model).

- Support financial market sustainability initiatives, through opportunities available to IFC, such as: establishing partnerships with consultants, technology vendors, and energy service companies (ESCOs) to build a pipeline of new business; mobilizing donor funding to provide advisory services for FI capacity building and training, including market analysis and product development and credit-risk managers training; and creating financial structures tailored to the needs of diverse markets by providing funding including credit lines and senior loans, risk sharing products and guarantees, mezzanine financing, and subordinated debt and risk capital.
 - Internally, in order to better respond to clients on this agenda, the WBG should continue to strengthen staff skills through the PoMa practice group (see Box 6) and to work with other partners, including across and within WB and IFC. Moreover, where there is demand, the Bank should conduct joint (IFC/WB) analytical work linked with public and private green development.
3. *Respond to client demand for urban and rural services that mainstream environmental health considerations through improved monitoring and reporting.* Since the last Strategy there has been an increase in environmental mainstreaming in several sectors, including water and sanitation, energy, and urban transport. Building on this momentum, during this Strategy period, the Bank should strengthen its ability to better monitor and report on environmental health objectives in its portfolio. This will require the following internal actions:
- Review and update the coding linked with the theme 'Pollution Management and Environmental Health' so that it is better able to monitor environmental health objectives from broader pollution management objectives and hence inform management decisions.
 - Work with sectors to identify core results indicators to be used at a project-level that capture both sectoral and environmental health objectives.

9 References

- Brandon, C. 2008. *Major Industrial-Pollution Projects Financed by the World Bank*. Unpublished .
- Emerson, J., Esty, D. C., Levy, M. A., Kim, C. H., Mara, V., de Sherbinin, A., et al. 2010. *2010 Environmental Performance Index*. New Haven: Yale Center for Environmental Law and Policy.
- IEG. 2008. *Environmental Sustainability: An Evaluation of World Bank Group Support*. Washington DC: World Bank.
- IEG. 2010. *An Evaluation of World Bank Support, 1997-2007: Water and Development*. Volume 1. Washington DC: World Bank.
- IFC. 2009. *IFC's Policy and Performance Standards on Social and Environmental Sustainability and Policy on Disclosure of Information: Report on the First Three Years of Application*. Washington DC: IFC.
- IFC. 2010. IFC Database. Accessed in 20 May, 2010.
- Liebenthal, A., Michelitsch, R., & Tarazona, E. 2005. *Extractive Industries and Sustainable Development - An Evaluation of World Bank Group Experience*. Washington DC: The World Bank.
- OECD. 2010. *Interim Report of the Green Growth Strategy: Implementing our commitment for a sustainable future*. Meeting of the OECD Council at Ministerial Level 27-28 May 2010. Retrieved August 11, 2010, from <http://www.oecd.org/dataoecd/42/46/45312720.pdf>
- OPCS. 2010. Retrieved from World Bank: www.worldbank.org
- UNEP (UNEP - Green Economy Initiative). 2009. *Global Green New Deal: An Update for the G20 Pittsburgh Summit*. Retrieved August 11, 2010, from <http://www.unep.org/greeneconomy/LinkClick.aspx?fileticket=ciH9RD7XHwc%3d&tabid=1394&language=en-US>
- Wheeler, D. 2000. *Greening Industry: New Roles for Communities, Markets, and Governments*. New York: Oxford University Press.
- World Bank. 1998. *Pollution Prevention and Abatement Handbook 1998 - Toward Cleaner Production*. Washington DC: World Bank.
- _____. 2001. *Making Sustainable Commitments: An Environment Strategy for the World Bank*. Washington D.C.: World Bank.
- _____. 2004. *Water Resources Sector Strategy: Strategic Directions for World Bank Engagement*. Washington DC: World Bank.
- _____. 2006. *India: Strengthening Institutions for Sustainable Growth - Country Environmental Analysis*. Washington DC: World Bank.
- _____. 2007. *Environmental, Health, and Safety Guidelines*. Retrieved 2010, from IFC: <http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines>.
- _____. 2008a. *Development and Climate Change: A Strategic Framework for the World Bank Group*. Washington DC: World Bank.
- _____. 2008b. *Safe, Clean, and Affordable...Transport for Development*. The World Bank Group's Transport Business Strategy for 2008-2012. Washington DC: World Bank.
- _____. 2009a. *Energy Strategy Approach Paper*. Washington DC: World Bank Group.
- _____. 2009b. "World Bank Information Note". Washington DC.
- _____. 2010. *The Management of Brownfields Redevelopment - A Guidance Note*. Washington D.C.: World Bank.

Annex 1: Drivers and Limiting Factors for Pollution Management

Entry Point	Driver	Determinant	Limiting Factor	Determinant	Pollution Management
Poverty					
Basic needs (water/sanitation, domestic fuel and vector prevention)	Intrinsic demand	Time: discount rate is very high for basic services the first 1 to 2 years and plummets after that	Prioritizing large area targets that discount clusters or pockets of poverty	Efficiency and economies of scale	Poverty reduction policies, stand alone projects with poverty focus and see MDGs
MDGs (189 parties) Goals 4, 6 and 7, which includes climate change	UN and other ODA binding commitments	Developed country growth and compliance	Could be supplanted by a more global issue (Climate change or financial shocks)	Scientific/quantitative vs. political/vested interests shaping the challenging issue acuteness	Mainly achieved through programs or components complying with MDG targets
Environmental Health					
WSH	Imperative basic needs	Better cost/benefit to improve priorities and allocative efficiencies by costing and discounting local benefits vs. global benefits (co-benefits) in terms of mitigation (complementary to local) and adaptation (selective and sequenced modular approach linked to better risk management and uncertainty reduction)	Could be supplanted by a more global issue (climate change, financial shocks, energy shocks, etc.) that would erode the preeminence of theme-driven developmental work	Scientific/quantitative vs. political/vested interests shaping the challenging issue acuteness	Make the “quantitative case” by distinctly deriving the PM co-benefits (by notably using the \$ PPP) at the local and global levels while ensuring green governance
IAP	Imperative basic needs				
OAP	Collective local needs				
Toxic chemicals	Collective local needs				
Agriculture & livestock issues	Collective local needs				
Vector-borne diseases through land use	Imperative basic needs				
Growth					
Demand-driven growth and Energy	Energy for electricity, transport and industries	Energy prices, financial shocks and Cancun accord reached and clean energy incentive schemes set up	Disruption of the global market chain for goods and services	Energy prices, financial shocks, social unrest, etc.	Growth will still need to be fueled by fossil fuels in the future and will require stringent PM regimes for all sectors irrespective of the ODA instrument used
Firm profits	Maximizing profits and lowering transaction costs	Governance, compliance, process and size, financial intermediation, energy prices and Cancun accord reached	Higher transaction costs and disruption of the global market chain for goods and services	Market and regulation, energy prices, financial shocks, social unrest, protectionism, etc.	
Competitiveness	Globalization				
Global Environment Legislations					
1987 Montreal Protocol (196 parties) on Ozone depleting gases	Binding agreement with specific targets	Funding and mechanism were adequate (envelope of US\$ 2 billion)	Disconnect between the effectiveness at reducing pollution and the time lag in achieving positive environmental outcomes	Erosion of funding	Target was almost totally achieved ahead of schedule
2001 Stockholm Convention (151 parties) on POPs (dirty dozen)	International adherence agreement	Up to the country to decide the reduction process	Could be supplanted by a more global issue (Climate change or financial shocks)		Mainly GEF involved through ODA funding
1992 UNFCCC (192 parties) and its 1997 Kyoto Protocol (189 parties) on GHG emissions	Binding agreement with Annex I (37 and EU) and II countries using carbon markets that allowed Annex I performers to gain financial, economic and political leverage and II to benefit from carbon funding; but carbon mark up gains are not reinvested in pollution abatement or energy efficiency	Flexibility in the calibration of the trade and cap system based on efficiency gains or economic stagnation	Important polluters were left out (USA, and carrier and maritime sectors) and the instrument was not forward looking and flexible enough to allow emerging polluters to be considered as Annex I countries	This flawed instrument led to a GHG increase of 47% between 1992 and 2008, which brought the preeminence of climate change as an imperative global survival issue but also as a spoiler to other developmental important issues (MDGs, etc.)	Carbon market could see some alteration and could stop being attractive to projects in development countries if the bear carbon market persists, which could weigh in favor of PM local benefits including through MDGs targets
1992 UNFCCC (192 parties) and its 2009 Copenhagen post Kyoto Protocol (1st attempt)	UN and country commitments with binding GHG emission reduction	Efficiency, effectiveness and equity in carbon reduction of 50% by 2050 (+ 2 ^o C) and carbon peaking by 2020	Kyoto Protocol could be replaced in 2012	Outcome of UNFCCC 2010 Cancun	
1992 UNFCCC (192 parties) and its tentative December 2010 Cancun post Kyoto Protocol (2nd attempt)	Country commitments (some already pledged) to a none binding GHG emission reduction <i>à la</i> Stockholm Convention	Efficiency, effectiveness and equity in carbon reduction to <i>possibly</i> achieve 450 parts per million in the atmosphere by 2050	Unfair deal to developing countries and especially BRIC bearing unfair reduction shares	Buying the indulgence of developing countries was not enough to reach a binding deal	Targets were removed and most parties “took note of” without endorsing the accord
			Unfair deal to developing countries and especially BRIC bearing unfair reduction shares	Informed choices in conjunction with level of transparency and governance lead to consensual or imposed deal	World Bank could manage developed country pledges (gradual increase from US\$ 20 to 100 billion pa), which could overtake PM activities

Source: Doumani F.