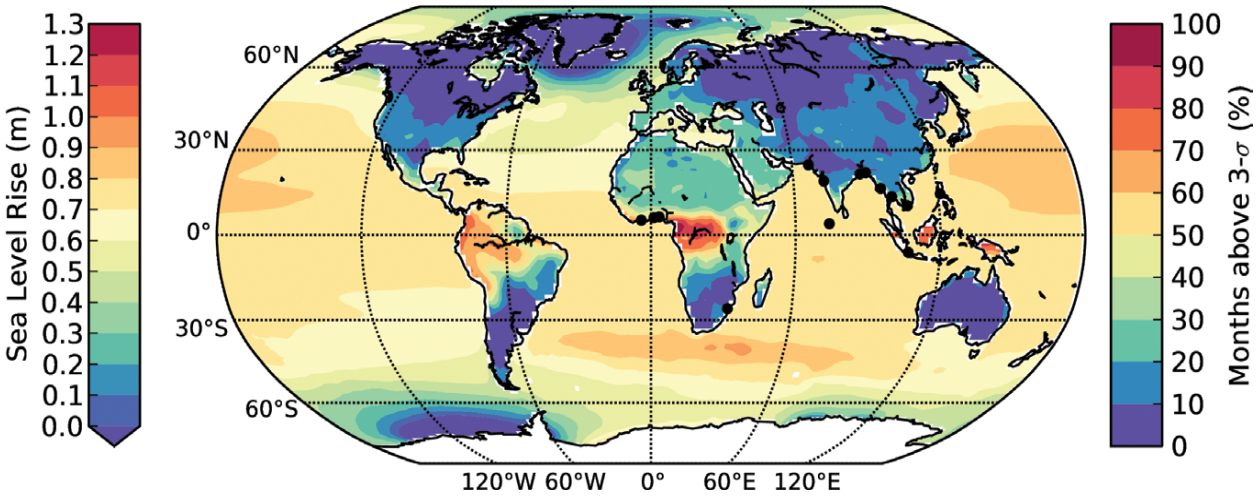
Climate Driven Investments: Growth and the Costs of Climate Change

Erika Jorgensen, World Bank

Talinn, 23 October 2013

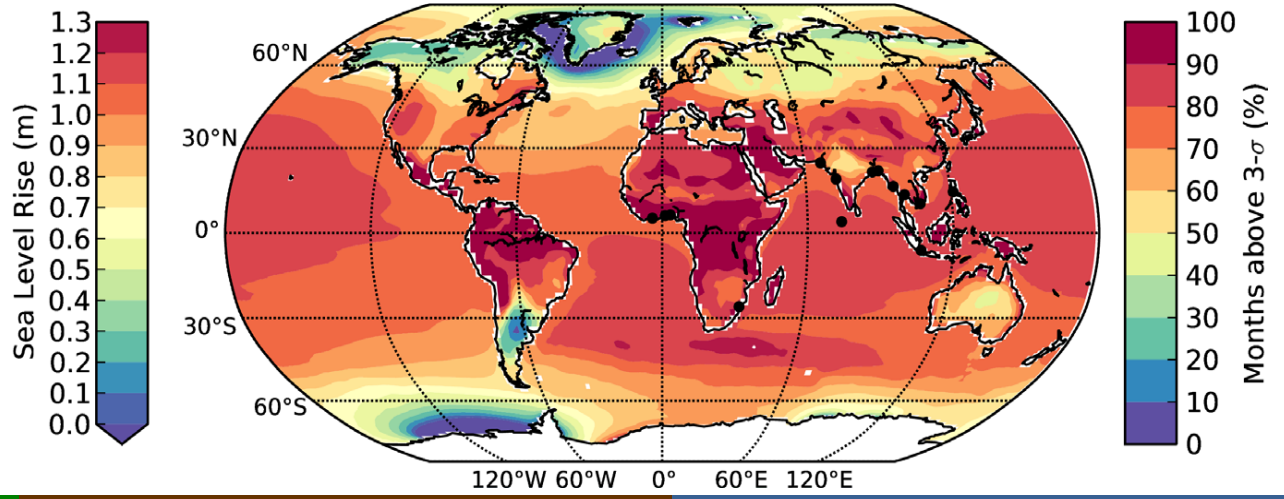
Section I. The challenge of our generation

2C WORLD



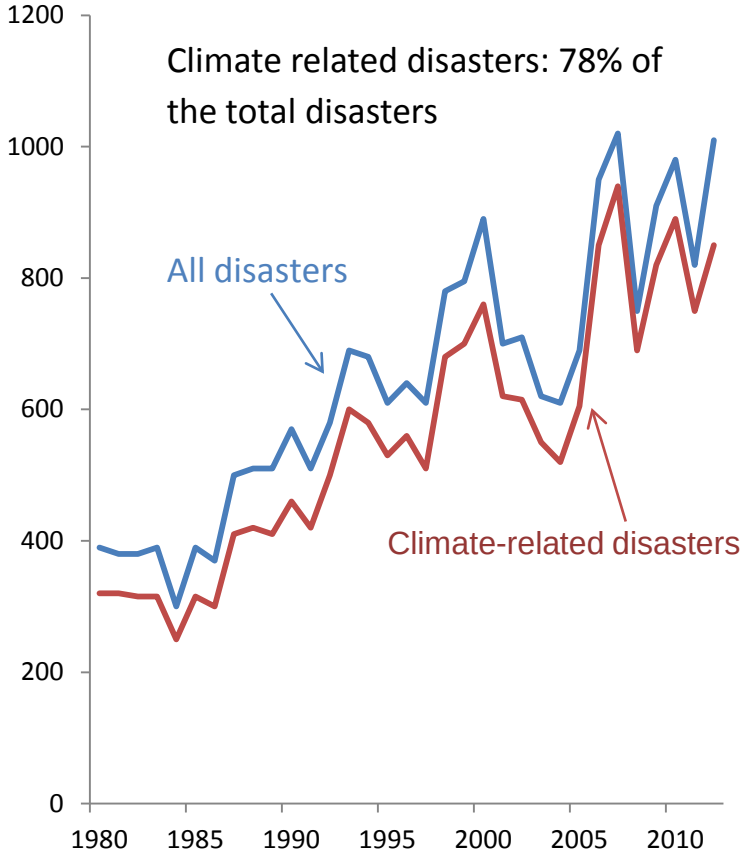
A 4C warming would lead to much larger impacts on the poor than a 2C one

4C WORLD

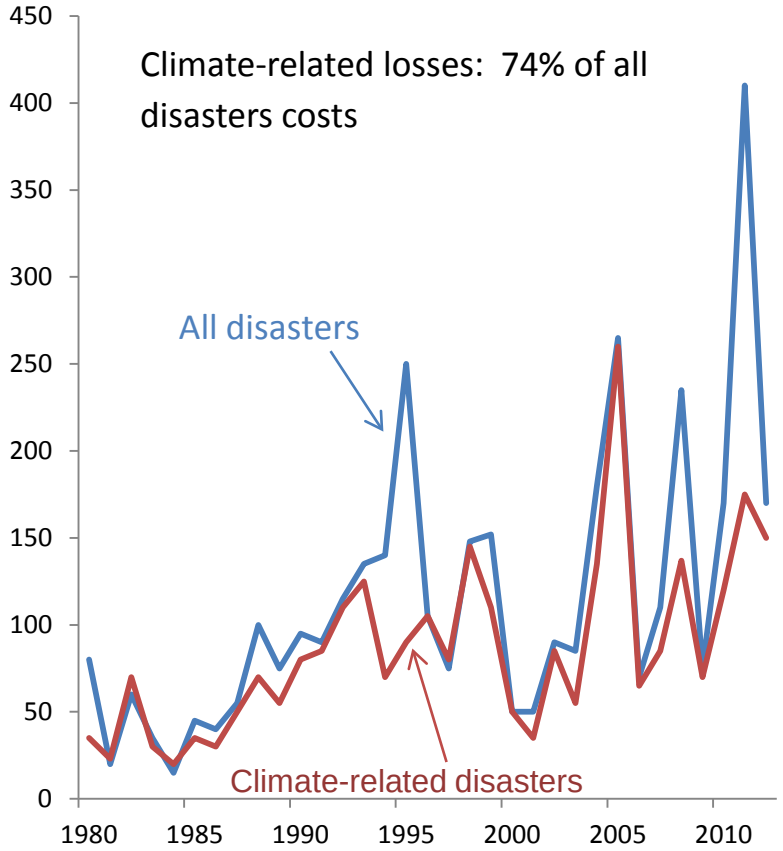


Section I. The costs of extreme weather are stunning and growing

Number of disasters worldwide (1980 – 2012)

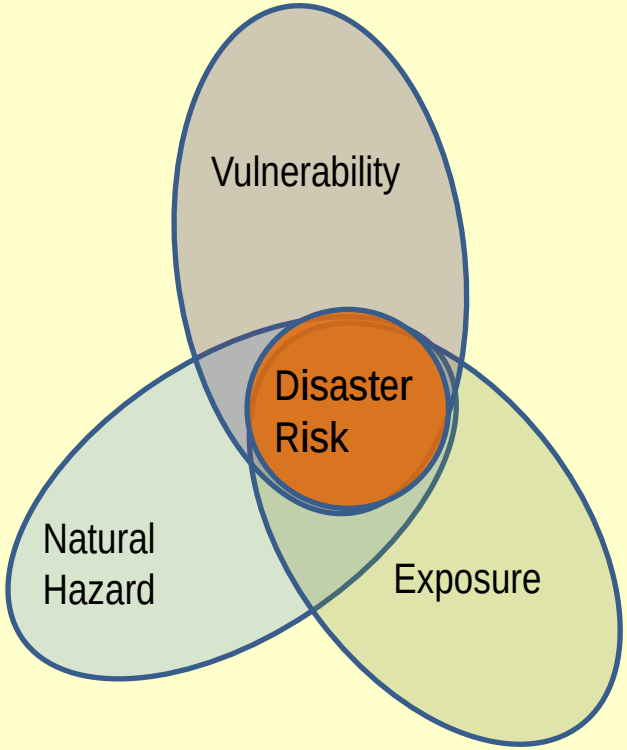


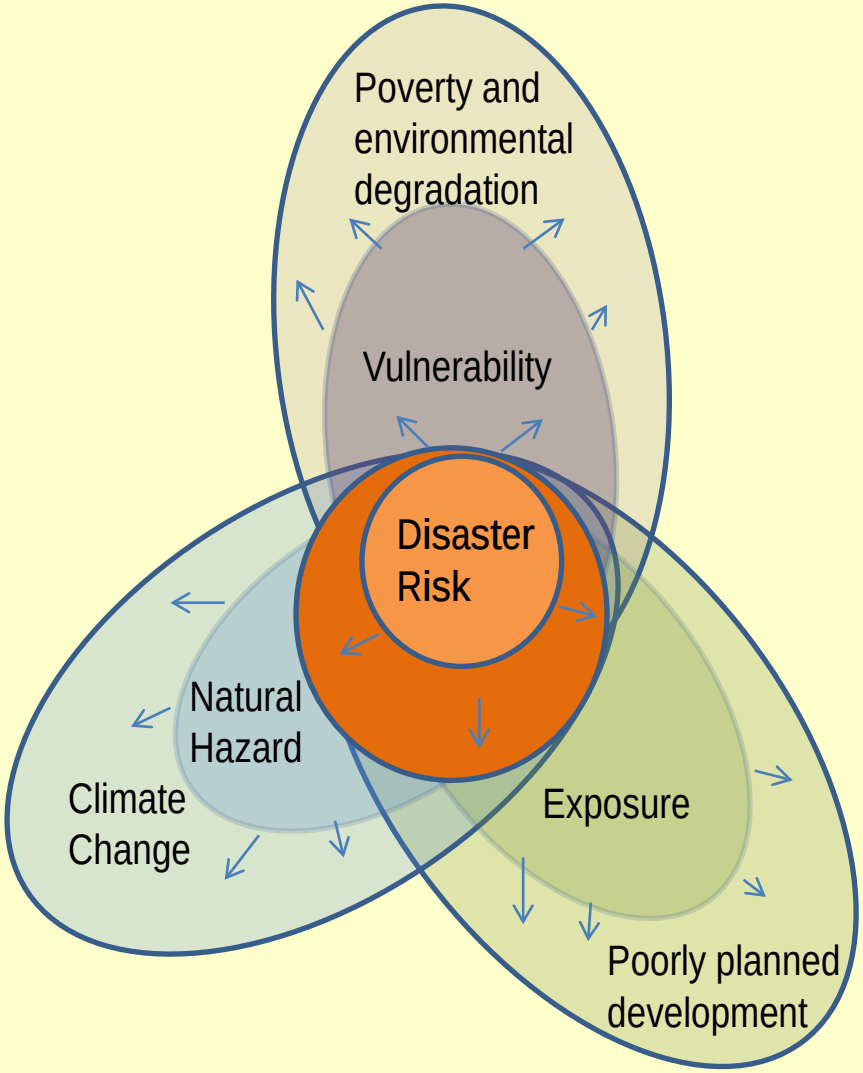
Disaster-related losses (US$ billion, 2012 values)



Source: World Bank estimates based on data from Munich Re © 2013 – as of January 2013

Section I. Disaster impacts rise with climate change, poor planning and poverty

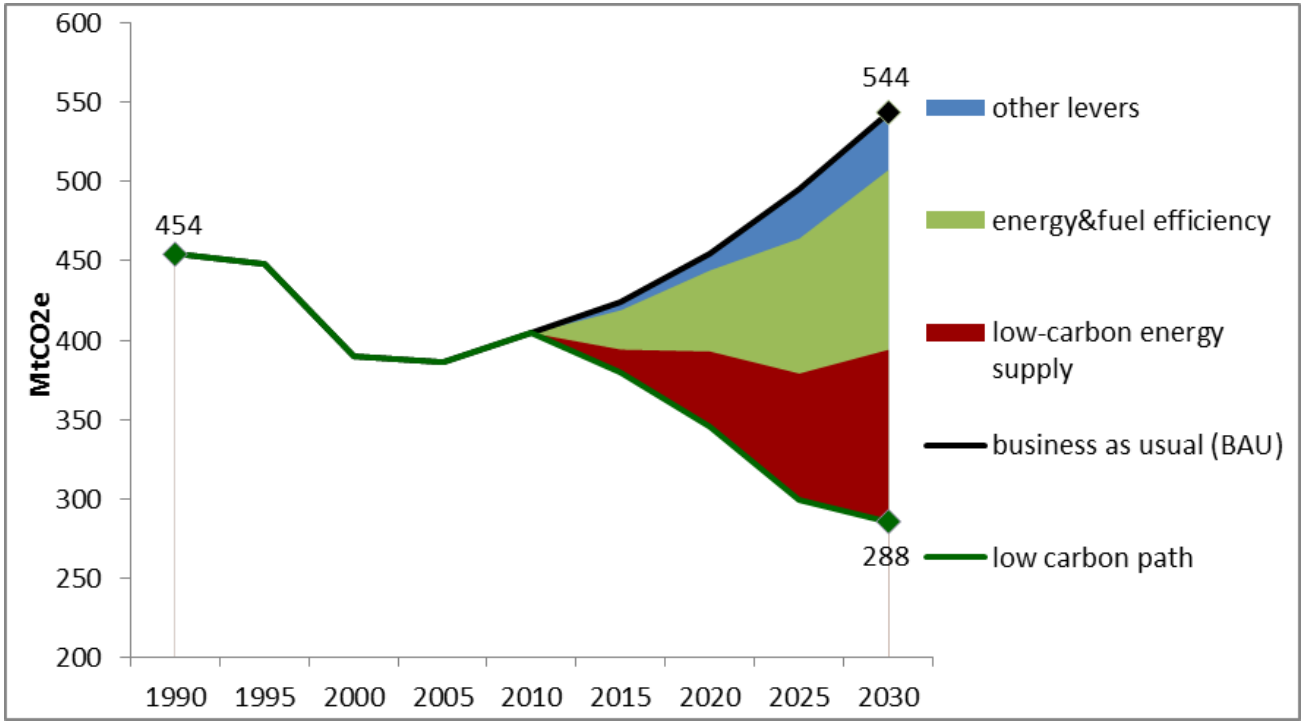




Source: Adapted from IPCC 2012

Section II. Country Assessments
Poland: Transitioning to a low emissions economy

An affordable low carbon growth path for Poland - Applying a suite of models to assess abatement potential and economic impact

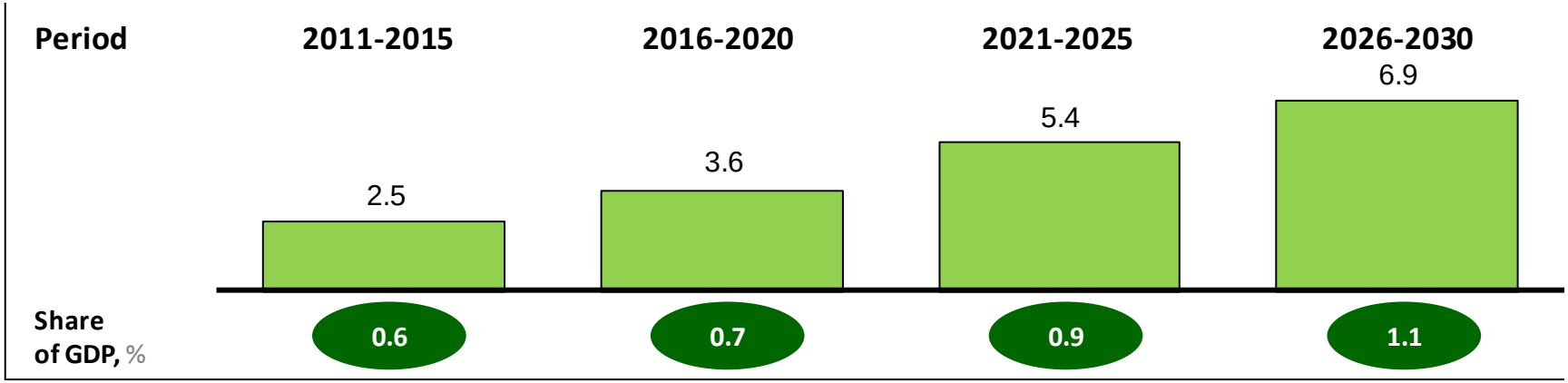


- GHG emissions can be reduced by 30% by 2030 through an optimal mix of low-carbon options using existing technologies
- Switching to low-carbon energy and energy efficiency measures provide the bulk of abatement.

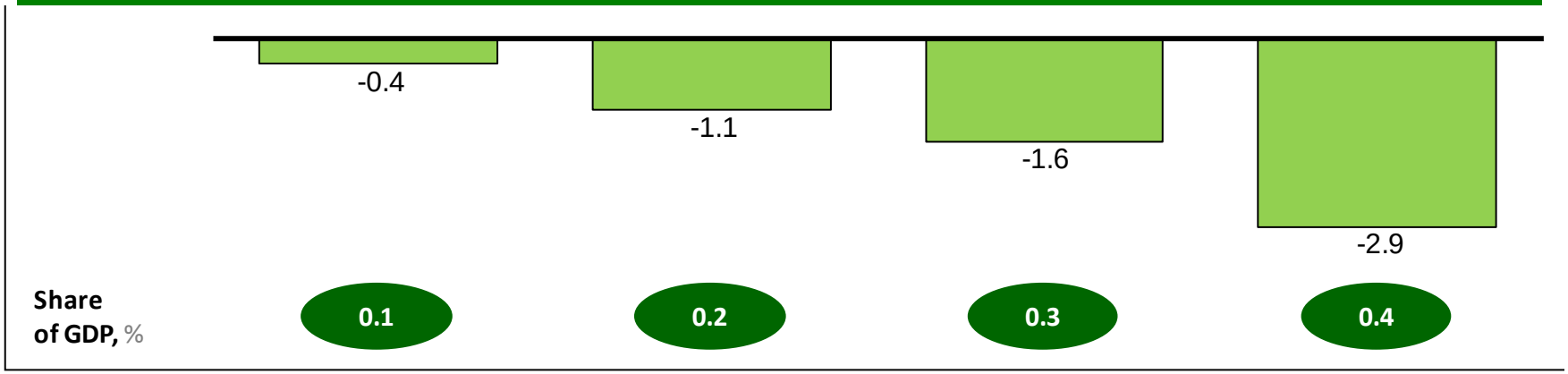
Section II. Country Assessments
Poland: Transitioning to a low emissions economy

Needed investment for mitigation - Capital expenses and operational cost savings

Required additional investment (annual average in each 5-year period, EUR billion)



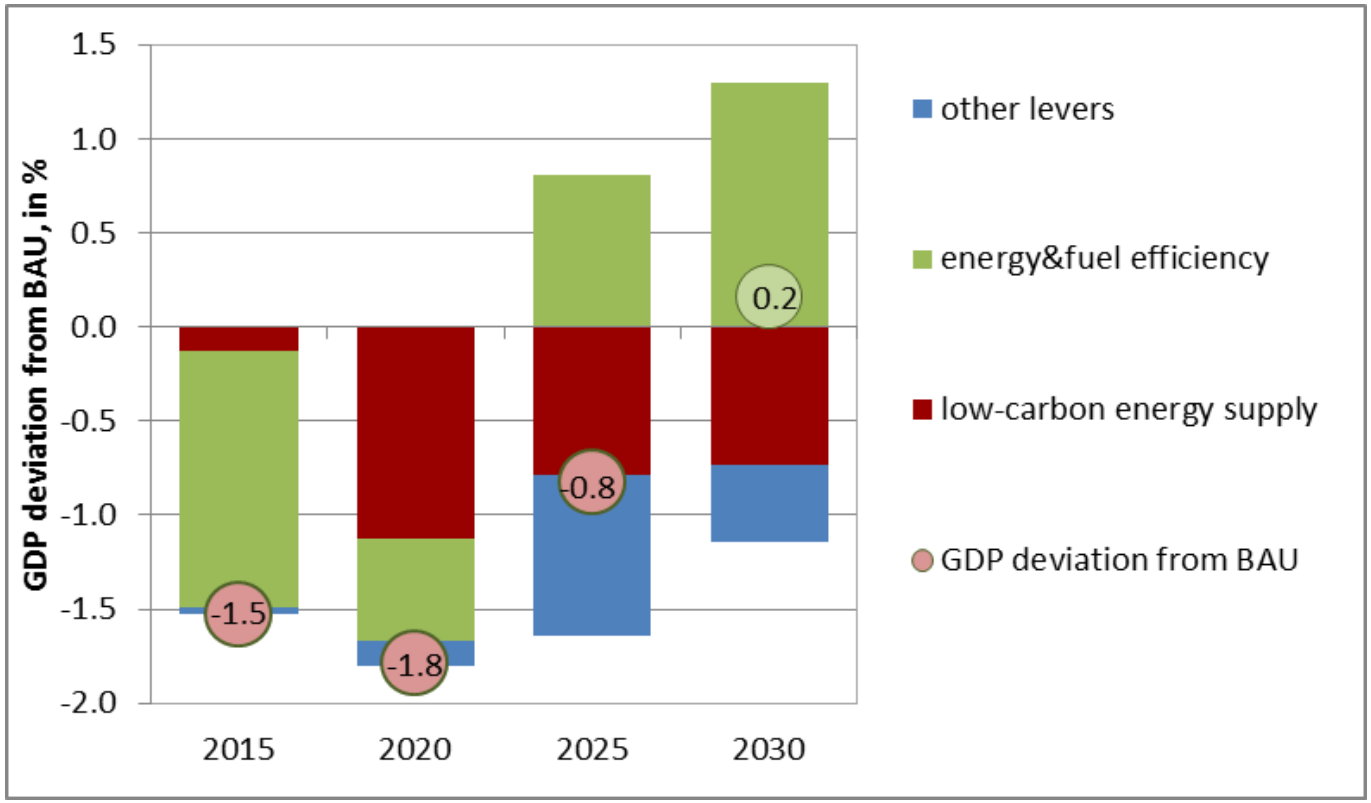
Operational cost savings (annual average in each 5-year period, EUR billion)



Section II. Country Assessments
Poland: Transitioning to a low emissions economy

Impact on growth - Linking bottom-up technology analysis with top-down growth analysis

- Growth and jobs affected, but only moderately--the move to low carbon is affordable
- Costs in early years of almost 2% of GDP
- Impact on growth and jobs turns positive by 2030
- Energy efficiency boosts growth within a decade of implementation

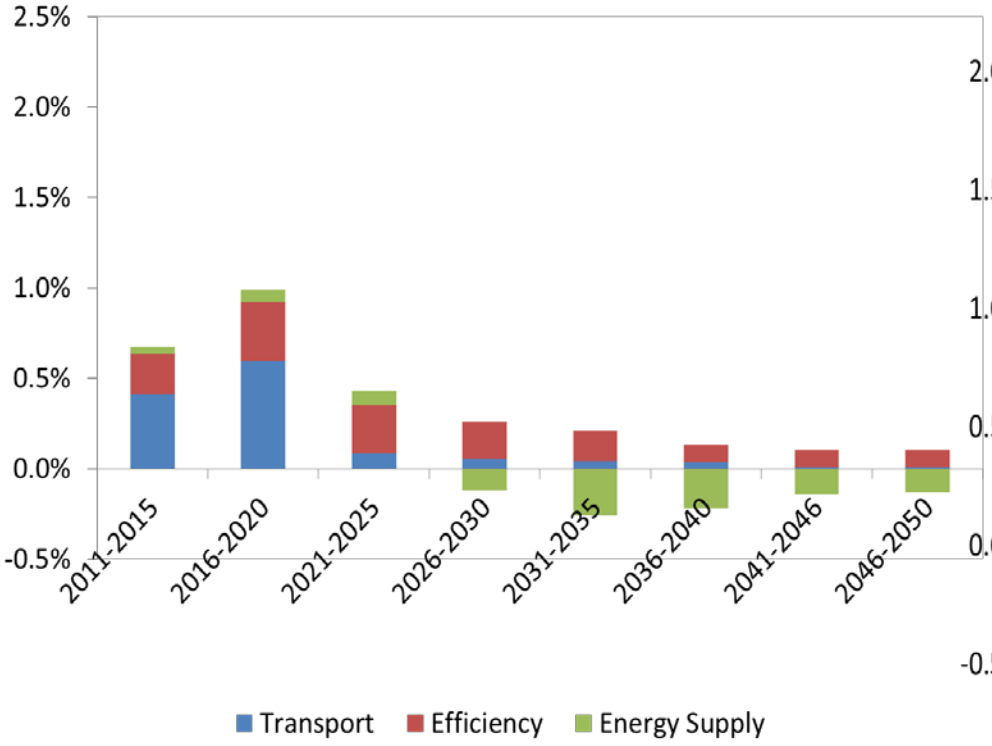


Section II. Country Assessments
FYR Macedonia: A Low Carbon and Resilient Growth Path

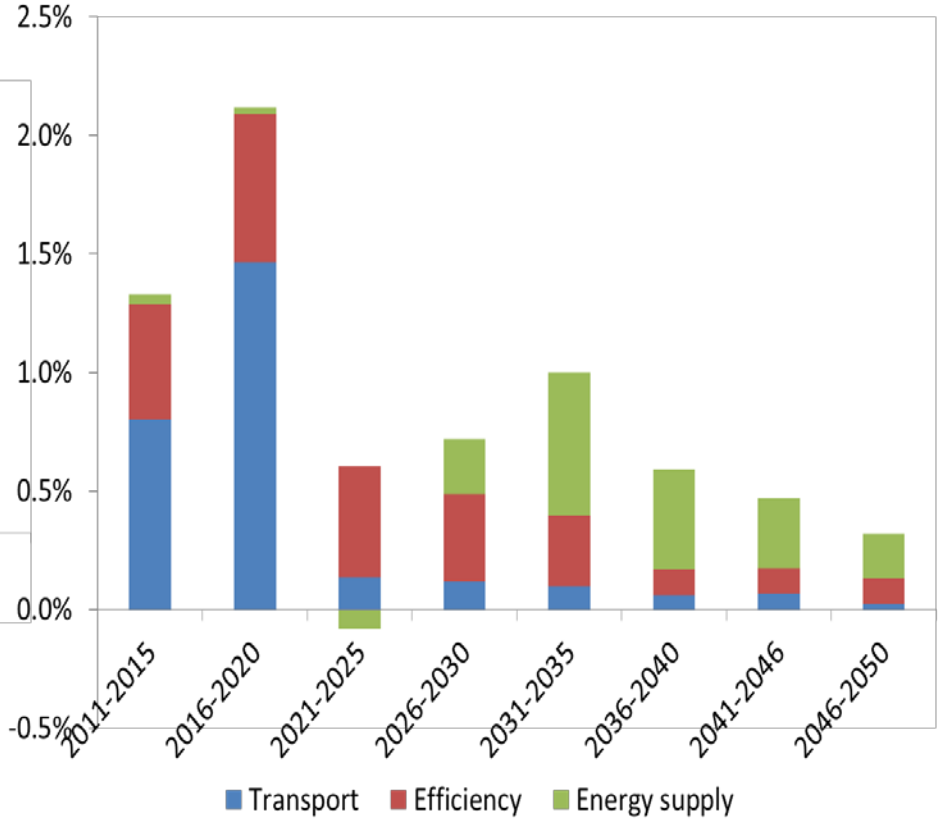
Section II. Country Assessments
FYR Macedonia: A Low Carbon and Resilient Growth Path

Incremental investment in mitigation measures (as a percentage of GDP)

Green scenario

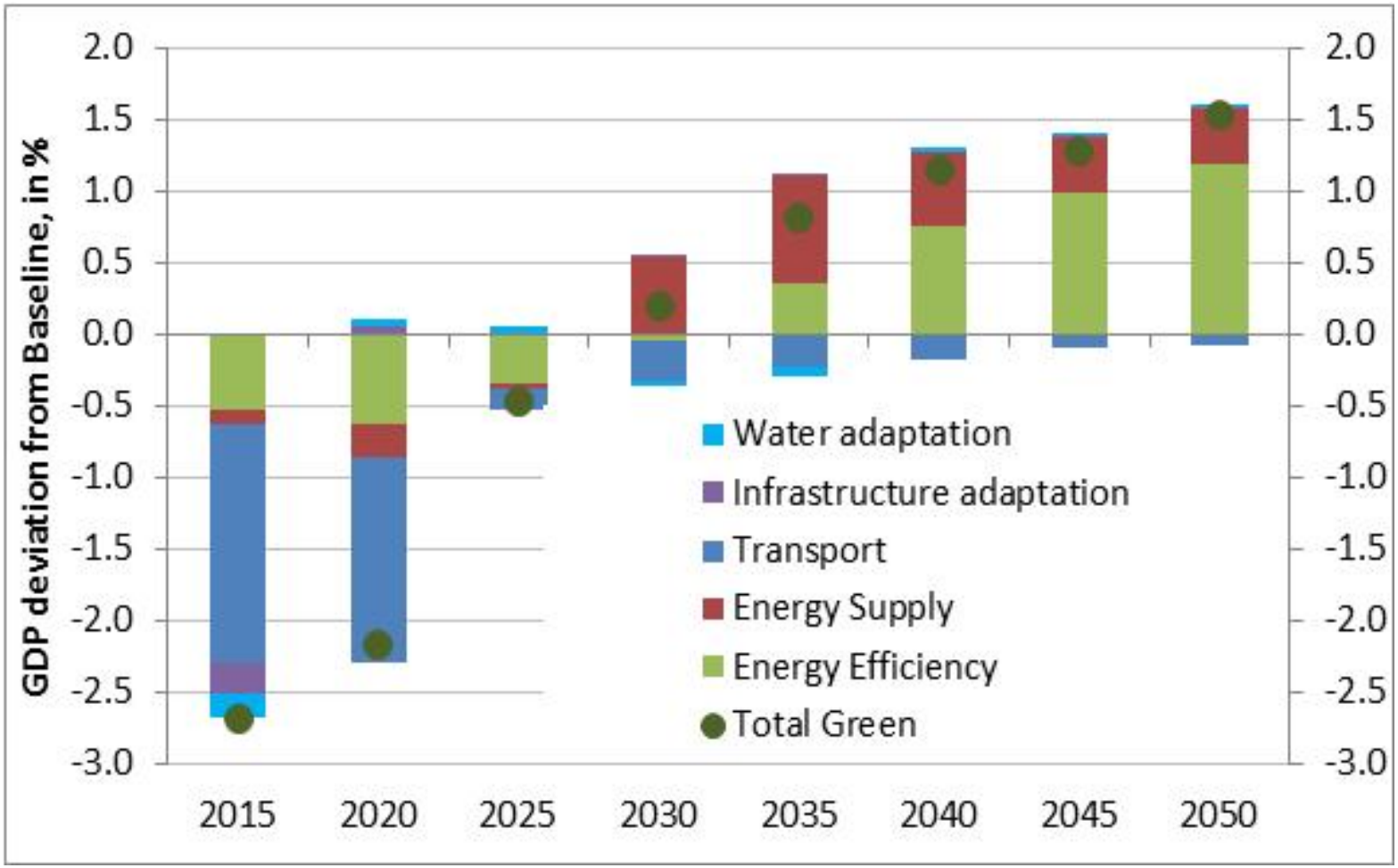


Supergreen scenario



Section II. Country Assessments
FYR Macedonia: A Low Carbon and Resilient Growth Path

Decomposition of GDP impact of Green scenario



Section II. Country Assessments
Economics of Green Growth Peer-Assisted Learning

- EGGPAL (Economics of Green Growth Peer-Assisted Learning Network) is a new regional network for peer learning and technical cooperation among senior technical specialists from governments across Eastern Europe and Central Asia on the economics of green growth and climate change.
- Launched with first annual conference, May 2013 in Warsaw.
- Eggpal.org collaborative website soon to go live.

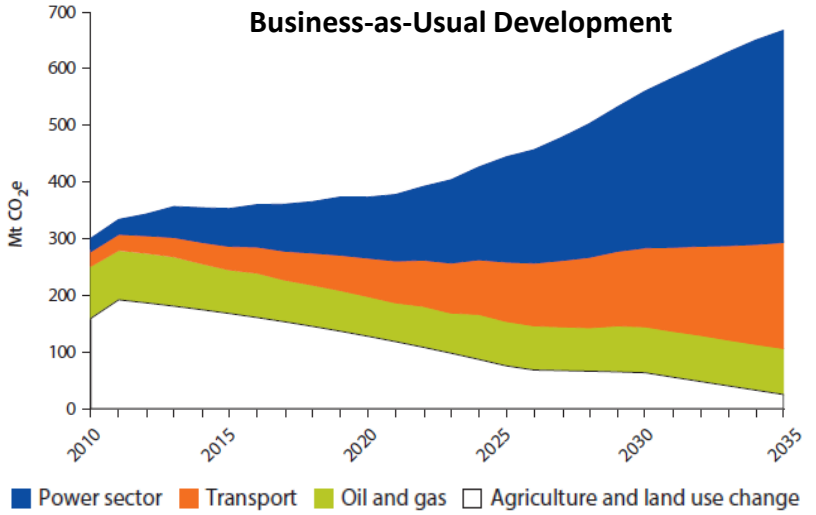
Section II. Country Assessments
Nigeria: Towards resilient, low carbon development

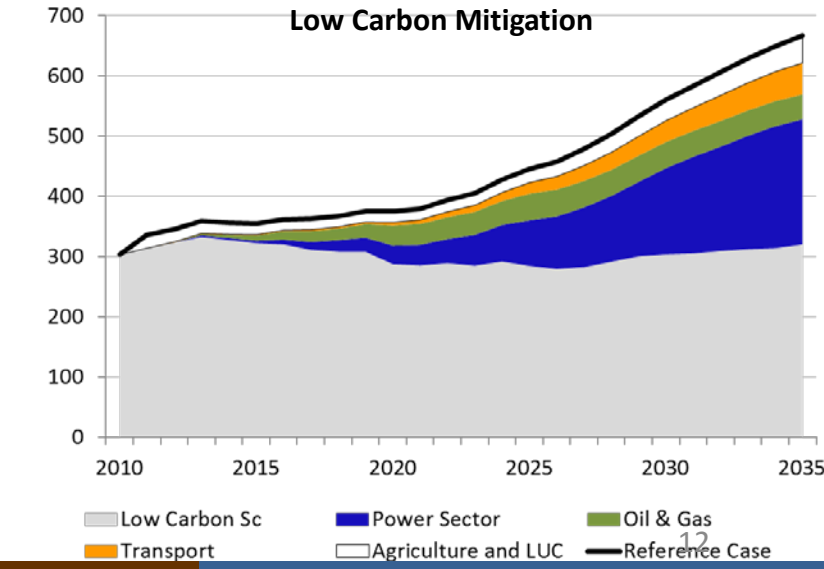
By 2035, under normal development:

- GHG emissions expected to double with shift from oil & gas to the power sector
- Climate change could worsen vulnerability to weather swings, impact delivery of Nigeria's Vision 2020

Low carbon resilient development can help Nigeria:

- Achieve Vision 2020 goals, stabilize GHG emissions at 2010 levels, deliver net domestic benefits (≈2% of GDP over 2010-35)
- Address current climate variability AND prepare for future change
  - CSA strategy can cut GDP impacts by 50%
  - But need decisions soon on long-lived investments (e.g. hydropower), and cross sector policy coordination

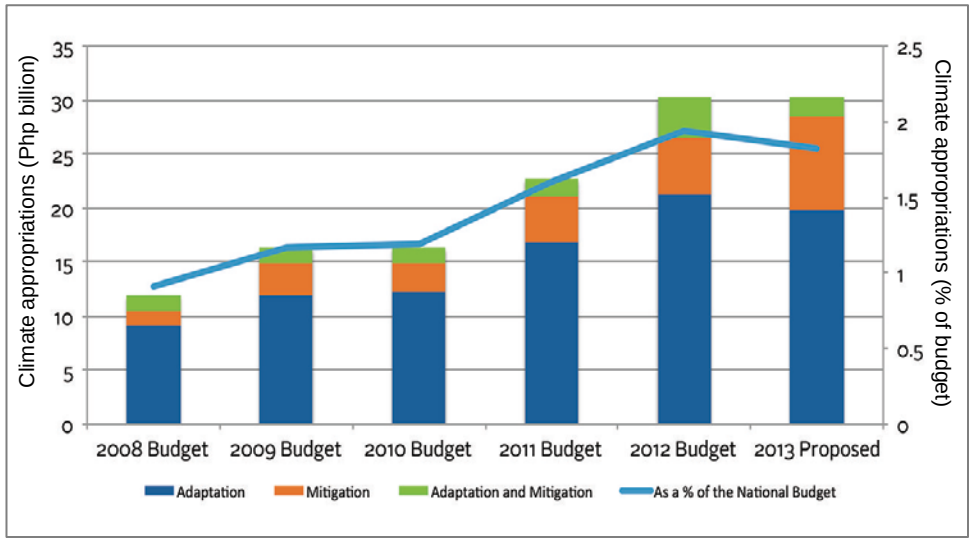




12

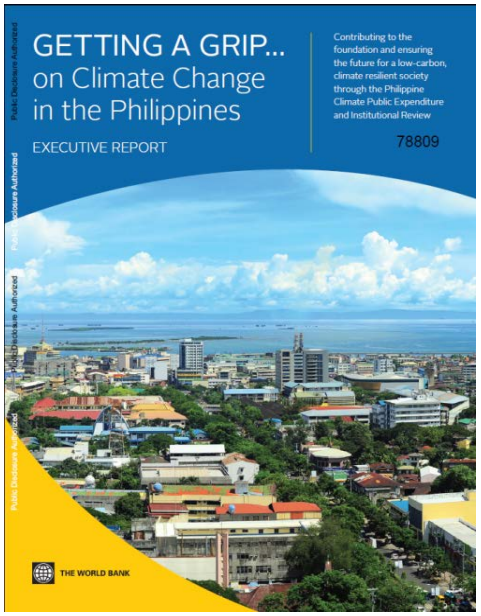
Section II. Countries Assessments
Philippines: Transforming policies and institutions

Climate Public Expenditure and Institutional Review (2013) – looks at innovations and gaps in policy and finance for strategic climate reform agenda initiated in 2009



Climate appropriations have grown faster than the national budget:

- 1.9% of national budget in 2012 (about 0.3 % of GDP)
- funding low compared to projected needs



Can improve climate finance readiness by:

- Strengthening the planning, execution, and financing framework for climate change
- Enhancing leadership and accountability through M&E and review of climate policies and activities
- Building local capacity to manage change

Section III. Financing climate action: How the WBG can add value

Mobilize Resources

Innovative concessional finance, avoid fragmentation
- ✓ $7.6 bn for Climate Investment Funds

Access to climate finance (e.g., carbon finance, CIF, GEF, Montreal Protocol, bilateral funds)
- ✓ $1 bn p.a. FY12-13 (WB)
- ✓ $126 m in FY13 (IFC)

Capital markets & investors
- ✓ $4 bn, WB Green Bonds
- ✓ $2.2 bn, IFC Green Bonds
- ✓ $347 m, IFC Catalyst Fund (one of IFC's Asset Management Company's six funds)

Deploy Finance

Finance climate action
- ✓ $5.9-10.2 bn p.a. in WB lending since FY11, or 20-30% of commitments
- ✓ $2.5 bn for mitigation at IFC in FY13 (14% of commitments), up 50% from FY12
- ✓ $1 bn in new guarantees for mitigation in FY13 at MIGA

Package & leverage instruments
(e.g., risk-mitigation, policy and institutional reforms, capacity strengthening)
- ✓ 3-6x for products on commercial terms
- ✓ 5x for commercial guarantees
- ✓ > 8-15x for concessional blended finance

Build Readiness

Policy & institutional platforms
- ✓ $4.8 bn, WB Development Policy Operations in FY11-13
- ✓ Climate Public Expenditures and Institutional Reviews in Morocco, the Philippines, and Vietnam

Groundwork for new instruments
- ✓ $260 m, 36 countries with the Forest Carbon Partnership Facility
- ✓ $120 m, 16 countries with the Partnership for Market Readiness

Bankable projects & programs
- ✓ ESMAP, CIF

Catalyze Markets

Broaden scope & reach of carbon markets
- ✓ $3.4 bn through 15 WB carbon funds and facilities
- ✓ Supporting 150 projects in 65 countries, reducing over 181 million tons

Pilot performance-based approaches

Innovative products and advisory services for CAT-risk financing
- ✓ 24 governments covered through WBG operations since 2005
- ✓ 1 million farmers and herders benefit from WBG schemes

Section IV. Working Where it Matters Most
Getting Prices Right-Putting a Price on Carbon

New emissions trading schemes are under preparation and being launched: The Case of the Shenzhen

- **Emission target**: to reduce carbon intensity by 21% between 2010 and 2015
- **Growth target**: to maintain at least 9% growth
- **Jobs target**: to increase green jobs across the city
- Launched emissions trading scheme piloting in June 2013 as an important means to achieve emissions targets and promote efficiency of the economy
  - 635 industrial companies participate in the ETS covering power, industrial and service sectors
  - 26 sectors will be included and will have mandatory compliance

Two related initiatives to support new carbon pricing approaches and to maximize the Climate Change mitigation benefits.

Partnership for Market Readiness

Representatives from many jurisdictions operating or considering market mechanisms for carbon pricing:

- Share lessons
- Peer review processes
- Develop knowledge tools for carbon pricing policy development & implementation
- Provide technical assistance for early stages of market design & development

Globally-Networked Carbon Markets

Looking ahead: Exploring ways to achieve price signal and scale of a global carbon market, in a world of bottom-up heterogeneous markets.

- Taking a risk-based approach to rating climate change mitigation value of various carbon assets across markets
- International Carbon Reserve
- Cross Boarder Settlement Platform

Section IV. Working Where it Matters Most
Getting Prices Right-Reducing Harmful Fossil Fuel Subsidies

- Getting energy prices right will send a strong signal for investment to flow into low-carbon growth.
- Fossil fuel subsidy reform is an economic issue as much as a climate issue. At its core, reforming subsidies to fossil fuels can be a mechanism to raise revenues.
- Yet – it is difficult. Many emerging economies have attempted reform but implementation is complex, takes time and has high risk of being reversed

The World Bank Group is playing a key role in facilitating, catalyzing and accelerating action with partners on this issue, with two main areas of emphasis:

Building Coalitions and Advocating for Removal of Fossil Subsidies

Increasing Client Country Alignment & Support

Section IV. Working Where it Matters Most
Livable Cities

LOW-CARBON LIVABLE CITIES (LC2) INITIATIVE

As climate change and rapid urbanization coincide, cities need support designing low-carbon development paths.

LC2 offers a comprehensive suite of tools and activities tailored to cities' specific needs and level of progress, ranging from:

- **Greenhouse gas inventories and low-carbon investment planning to**
- **Enhancing city credit-worthiness and creating large scale-financing solutions for low-carbon growth**

We aim to reach 300 of the largest developing country cities within four years.

Section IV. Identifying gaps for growth and competitiveness: Rightsizing climate ambition – an example from Mexico

Mexico- Investing in Mitigation

The Situation

- Mexico is 14th largest emitting country worldwide (1.5% of the total CO_2 emissions), largest energy emitter in LAC. 61% of the CO2 emissions from energy consumption (transport, energy generation, industry, gas flaring). Emissions are predicted to grow more than 24% by 2020 and almost 54% by 2050 compared to 2006.
- Mexico announced a goal to reduce its 2050 GHG emissions to 50% below 2002 levels. "No-regret" low-carbon interventions will boost economy and competitiveness. Many low-carbon interventions (LCIs) have significant co-benefits.
- Mexico is likely to suffer disproportionally from global warming.

No-regret and Low-Cost Mitigation Opportunities

Electric Power Sector → *Supply Efficiency and Renewables*
- Increased cogeneration can provide +13% of new capacity at net costs that are lower than current marginal costs of power generation in Mexico.
- Expansion of renewable energy and energy efficiency requires policy and regulatory changes.

Oil and Gas → *Increase Efficiency and Gas Production*
- Reduce gas distribution leakage.
- Increase efficiency at Pemex oil, gas, and refining facilities.
- Realizing cogeneration potential at Pemex refineries.
- Strengthen regulatory framework to enable the sale of excess energy and capacity to the electricity grid.
- Allow contracting with private sector.

End-Use Energy → *Access Available Low-Cost Interventions*
- Most energy-efficiency measures (including electricity supply improvements, lighting, and refrigeration).
- Low-cost energy supply options such as industrial (and Pemex) cogeneration and solar water heating.
- Enforce efficiency standards and policies for lighting, air conditioning, refrigeration, and buildings.

Transport → *Enhance Public Transport and Vehicle Fleet Efficiency*
- Increase use of public transportation and improvements in vehicle efficiency through private concessions.
- Promoting sustainable transport policies can provide co-benefits (i.e. reductions in traffic congestion and improvements in public health.

Agriculture and Forestry → *Expand Forest Management Programs*
- Substitute fossil fuel use through sustainable production of biomass energy
- Reduce deforestation and forest degradation

Policies to Promote Low-Carbon Development
- Electric power from renewables: *Establish small power purchase agreements as a useful first step.*
- Energy-efficiency standards: *Standards need to be complemented by measures such as vehicle inspection and maintenance programs.*
- Changes in public procurement rules: *Will help public institutions save energy and reduce operating costs*
- Urban planning and public transport
- Forestry programs: *Control illegal logging, prevent fires, and manage pests*
- Air quality standards: *Improved fuel quality standards and better enforcement of air quality standards.*

Mexico Quick Facts

ECONOMY
Projected annual economic growth: 3–3.5%

ENERGY
Projected annual electricity demand growth: 4.8%
Renewable generation capacity (% primary): 7%
Renewable energy target (% total, 2024): 35%
Thermal-based energy supply (% new, 2008–30): 62%

CLIMATE
Total GHG emissions (2008) 138 MtCO2e
Business-as-usual GHG emissions (2030): 312 MtCO2e (+229%)
GHG emissions reduction target (2050, vs. 2002) –50%

KEY ELEMENTS OF A LOW CARBON PROGRAM
Transport: increase share of public transport and non-motorized transport, raise motor vehicle fuel economy
Electric power: cogeneration and renewables
Energy efficiency: residential, commercial, and industrial electricity use
Forestry: creating a GHG sink

EMISSION REDUCTION POTENTIAL AND COSTS
Clean Technology Fund: Expected GHG Impact (vs. Business-as-usual to 2030): -16%; Costs US$7.4 billion
Market Readiness Program: Expected GHG Impact (vs. Business-as-usual to 2020): -9%; Costs US$ 41 million

Mexico Climate Change Law – June 2013

Mexico – Investing in Mitigation

Potential Near-Term Interventions

Potential Near-Term Interventions	Mitigation Cost or Benefit ($/t CO2e)	Total New Investments ($ millions)	Total Emissions Reduction (MT CO2e)	Max. Annual Emissions Reduction (MT CO2e)	Implementation Timeframe
Bus System Optimization	97 (benefit)	-	360	32	Short/medium term
Border Vehicle Inspection	69 (benefit)	-	166	11	Short term
Bus Rapid Transit	51 (benefit)	2,332	47	4	Short term
Non-motorized Transport	50 (benefit)	2,252	51	6	Short/medium term
Road Freight Logistics	46 (benefit)	-	157	14	Short/medium term
Cogeneration in Pemex	29 (benefit)	3,068	387	27	Short/medium term
Residential Lighting	23 (benefit)	237	100	6	Short term
Nonresidential Lighting	20 (benefit)	420	47	5	Short term
Utility Efficiency	19 (benefit)	286	103	6	Short term
I&M in 21 Cities	15 (benefit)	-	109	11	Short term
Solar Water Heating	14 (benefit)	4,464	169	19	Short/medium term
Forest Management	13 (benefit)	148	92	8	Short term
Fuel Economy Standards	12 (benefit)	7,145	195	20	Short/medium term
Improved Cookstoves	2 (benefit)	434	222	19	Short term
Wind Power	3 (cost)	5,549	240	23	Short/medium term
Afforestation	8 (cost)	1,084	153	14	Short/medium term
Reforestation & Restoration	9 (cost)	2,229	169	22	Short/medium term

Section IV. Working Where it Matters Most
Identifying gaps for growth and competitiveness – an example from Mozambique

Mozambique – Investing in Resilience

The Situation

- **Natural disasters:** 68 natural disasters in past 50 years; killed > 100,000 people; affected 28 million.
- **Flooding**: The 2000 floods killed around 800 people, displaced 540,000, and inflicted costs of around 10% of annual GDP.
- **Seawater inundation**: affects more than 12.6 million living in coastal areas; 2,700 km long highly vulnerable coastline. Storm surges can temporarily raise sea level as much as 5 m; poses threat to coastal infrastructure.
- **Cyclone**: 3 or 4 cyclones each year; increases risks of extreme wind and rainfall, seawater inundation and storm surge.
- **Vector-borne diseases**: Malaria causes 44,000 to 67,000 deaths annually in all age groups; warmer temperatures may prolong the seasonality of its transmission.
- **Future climate**: Temperature is predicted to increase between 1°C and 2°C by 2050; precipitation is likely to become increasingly variable and uncertain. By 2080-2100, sea-level is projected to be more than 100 cm above the 1986-2005 level.

Mozambique Quick Facts

- Mozambique ranks third amongst the African countries most exposed to risks from multiple weather-related hazards
- More than 60 per cent of Mozambique's population of 21 million lives in coastal areas
- GDP falls between 4 per cent and 14 per cent relative to baseline growth in the 2040-50 decade if adaptation strategies are not implemented
- The net present value of climate change damages in Mozambique reaches to an annual payment of a bit more than $400 million by 2050.

Economic Impacts

- **Agricultural loss**: The impact of climate change over the next forty years would lead to a 2-4% decrease in yields of the major crops. Production losses due to drought could range between $12 and $170 million for maize alone in Zambezi Province.
- **Road damage**: Maintenance costs of paved and unpaved roads, are currently about $250 million per year representing about 12 per cent of total government spending, are increasing due to temperature and precipitation changes.
- **Water sector**: 5.5% average decrease in GDP due to water shocks.

“If we don't confront climate change, we won't end poverty.”

-Jim Yong Kim, June 2013