



Center for
Clean Air Policy

Sectoral Approaches: Mexico Case Study

Daniel E. Klein, Center for Clean Air Policy

Japan Stakeholder Workshop

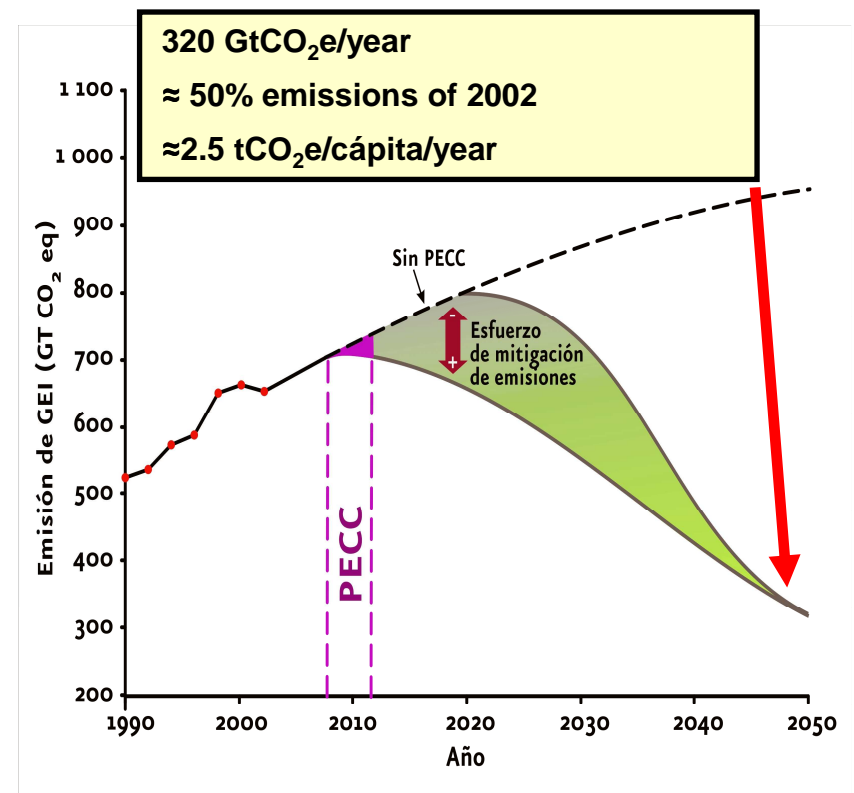
Tokyo, Japan

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Sectoral Programs in Mexico – Implementation

- In Poznan, Mexico announced a national goal to cut emissions to 50% below 2000 levels by 2050.
- Hard caps for 2011-2020 could be derived from emissions intensity goals & expected production levels, to be adjusted in subsequent periods
- Mexico will pursue a trans-sector cap-and-trade program
 - » Includes electricity, oil, cement, and iron and steel sectors
 - » Slated to begin in 2011 (iron and steel may be later)



Mexico's challenge: decoupling economic growth from CO₂ emissions

- Technology needs will be defined in the context of that long-term vision (2.5 tCO₂/capita by 2050).
- Mexico has created a new Energy Transition Fund (3 billion Mexican pesos or about \$210 million per year). Could be combined with up-front international support for advanced technologies.
- Mexico is also putting some complementary policy reforms in place:
 - » Energy Reform – provides more budgetary flexibility for PEMEX and permits some degree of private investment
 - » New law allows CFE to consider externalities in pricing decisions and gives Energy Regulatory Commission (CRE) more control over contracting terms with independent power producers

Sectoral approaches and domestic policies in Mexico

- Stern-like review and CCAP studies will provide baselines and sectoral targets for key energy-intensive sectors.
- Potential targets are being developed through assessment of technology penetration, mitigation costs, emissions reduction opportunities and policy barriers.
- The plan is to achieve the targets by linking the oil, electricity, cement and steel sectors in a **trans-sectoral cap-and-trade program**.
- Reductions by companies beyond the cap can be sold to the international carbon market.

Setting Goals for Mexico's Cement and Oil Refining Sectors

- CCAP performed a preliminary analysis of Mexico's cement and oil refining industries to estimate their GHG emissions reduction potentials in 2020
- The analysis involved estimating:
 - » BAU emissions through 2025, based upon expected growth in production and projected changes in production capacity, energy intensity, electricity intensity, fuel mix, industry practices
 - » Current penetration of different technologies in the sectors
 - » Impacts of projects currently in the pipeline (CDM, other)
 - » Emissions reduction options and implementation costs
 - » Maximum deployment of mitigation options, both individually and as packages of options
- CCAP then suggested unilateral and no-lose sectoral goals for the Mexican cement and oil refining sectors

Setting the Cement Sectoral Targets

- Cement production in Mexico is expected to grow by as much as 50% from 2006 to 2020.
- The cement sector in Mexico is among the world's most energy-efficient. Further efficiency improvements are relatively costly.
- The most promising cement sector opportunities are:
 1. increased blending of cement and
 2. replacement of fossil-fuel-based electricity with self-generation from renewable sources.
- Preliminary results indicate that the potential for emissions reductions from unilateral efforts in Mexico's cement sector range from **5-9%** of BAU in 2020.
- Mitigation of cement industry emissions can grow to **more than 20%** of BAU in 2020, depending upon the level of international assistance provided.

Setting the Oil Sectoral Targets

- Focus on refineries, which are relatively inefficient
- Mexico's oil refining sector has significant emissions reduction opportunities through (1) energy efficiency improvements and (2) cogeneration.
- Preliminary results show that the potential for emissions reductions from unilateral energy efficiency improvements at Mexican oil refineries ranges from **5-11%** of BAU emissions in 2020. With international assistance, this could increase to **19% (4.5 MtCO₂)** of BAU in 2020.
- PEMEX has estimated that it has the potential to construct over 3,000 MW of cogeneration facilities. Full implementation of this capacity would reduce emissions by **over 9 MtCO₂** annually.
- Policy barriers include the pricing of power sold to the electricity grid and financing limitations.

Boundary Issues Across Sectors

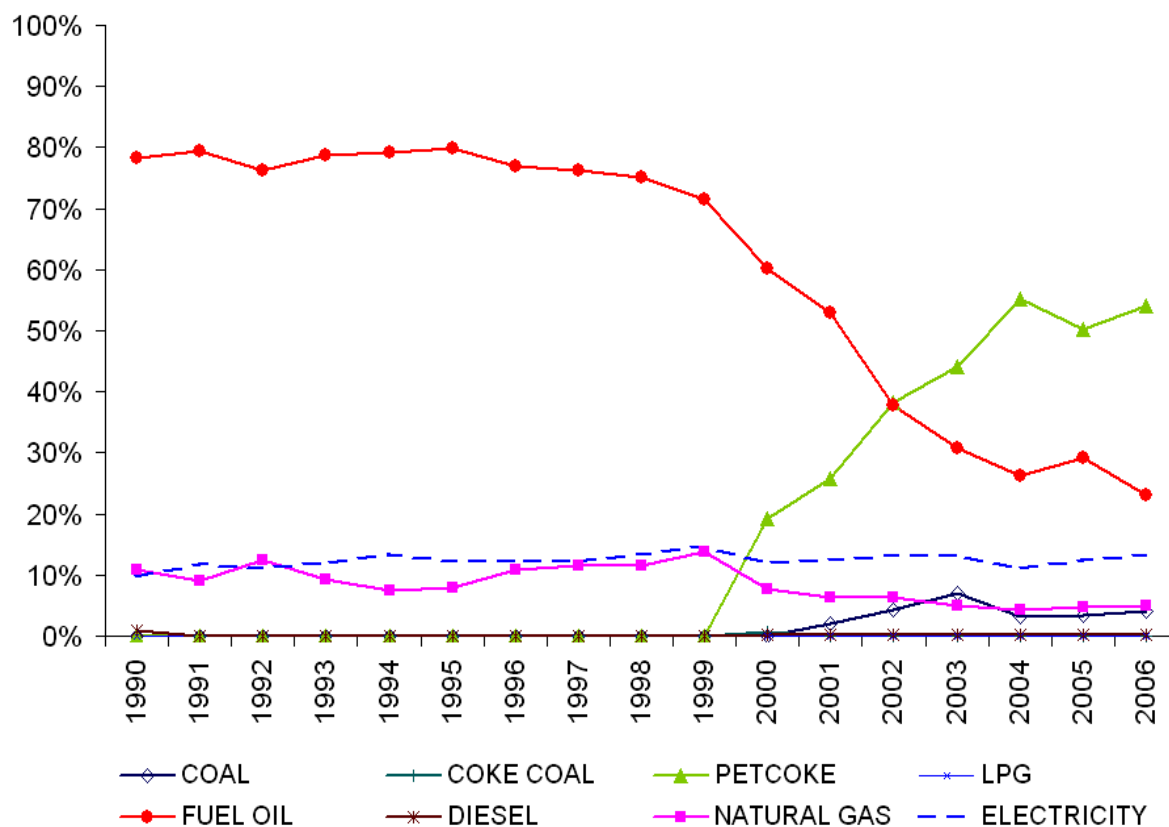
- Where we draw the measurement boundary, or “fence,” has important implications for sectoral agreements
- Need to avoid double-counting & “orphaned” opportunities
- Poor choices for boundaries and metrics can limit the potential benefits
 - » Attractive opportunities may be overlooked
 - » Good actions may be taken but not counted
 - » Unproductive activities may be rewarded
 - » “Gaming” opportunities can undermine public confidence
- Cement: kiln production or shipped product?
- Petroleum: Refineries only or all operations?
- Electricity: What sector for renewables and cogeneration?

Measurement Issue: Btu or GHG?

- Question: Does a shift in demand get matched by similar supply increases?
 - » Or, do fuel markets shift?
- In Mexico, cement kilns shifted from fuel oil to pet coke. What if they switch to natural gas?
 - » Some global increase in natural gas production?
 - » Would global use of fuel oil & pet coke decline?
 - » Or, higher natural gas prices encourage more conservation?
 - » Or, might some gas users shift to coal?
- Net global GHG emissions may be higher or lower than changes at the end-user might suggest
- The effect is more pronounced when boundaries separate some countries and/or sectors

Measurement Issue: Btu or GHG?

Mexican Cement Sector Fuel Mix, 1990-2006



- Cement kiln fuel mix has changed over time:
 - » Refinery operations
 - » Electric power fuels
- These fuel changes have relatively little effect on energy efficiency, but bigger GHG impact
- Question: If the fuel markets are fungible, are the shifts at the kilns offset elsewhere? What do you measure?
 - » GHG intensity?
 - » Btu intensity?
 - » Fossil fuel Btu intensity?

Life-Cycle accounting for fuel shifting?

- Natural gas has a clear GHG advantage at the burner tip
- But upstream emissions can narrow the savings:
 - » Higher upstream footprint for gas than for coal
 - » Higher still for LNG

Life-cycle GHG Emission Factors (units: lbs/MMBtu of Fuel Produced)

Life-cycle Stages	North American NG		LNG		Coal	
	Min	Max	Min	Max	Min	Max
Upstream	15.3	20.1	29.6	72.3	8.2	16.4
Combustion (no CCS)	120	120	120	120	205	205

Source: Jaramillo et al., CMU, *Comparative Life-cycle Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation* (supporting information), 2007.

- Question: Can sectoral accounting create unhealthy incentives?

Measurement Issue: Multiple Products

- Many products are commodities, traded using standard specifications
- Where single-product outputs are typical, metrics are easier to identify
 - » Btu per kWh
 - » Btu per ton of clinker
- But many industries produce multiple products, making the output metrics more complicated
 - » Refineries are especially complex
 - » Use of Solomon Index (EII) provides a useful proxy
 - » But what about chemicals? Pulp & paper? Others?

Lessons Learned to Date

Sectoral Goal-Setting Lessons

- No “one size fits all” for sectoral approaches
 - » Reality is often messier than theory
 - » Variations within industries
 - » Variations across different industries and countries
- Our experience shows importance of bottom-up, country-specific design of sectoral targets and policy measures.
 - » Flexibility is important in benchmarking & measurement
 - » National circumstances and data availability
 - » Sector boundaries (e.g., Mexico cement and oil refining)
- These issues are especially important when requirements and/or incentives are introduced
 - » *What* you measure, and *how* you measure, affects how rewards/penalties are distributed
 - » Resolution of measurement and boundary issues reflects policy¹⁴ and preferences

Going from theory to “Proof of Concept”

- Significant data gaps exist – lack of plant-specific and cost data, and concerns about confidentiality → we cannot create “objective” intensity goals
 - » EU followed similar process in pilot phase of ETS when data on industry emissions and costs was lacking
- There is no substitute for in-depth bottom-up analysis and consistent data – capacity building for developing countries needs to begin immediately
- Proxy measures can sometimes give a better picture than direct GHG measurement
- Creativity can improve the metrics & analysis
 - » Technology-based goals can be more effective in some settings and more easily implemented (e.g. China; Mexico co-generation)
 - » Can also serve as transitional goals while data capacity is built

Questions?

sectoral@ccap.org