Integrating Climate Issues in Energy Policy
Follow up Observations to Discussions at the
Seminar "Cambio Climático: Retos y Oportunidades para Colombia" Bogota, June 26, 2008
By Wolfgang Mostert, consultant to World Bank

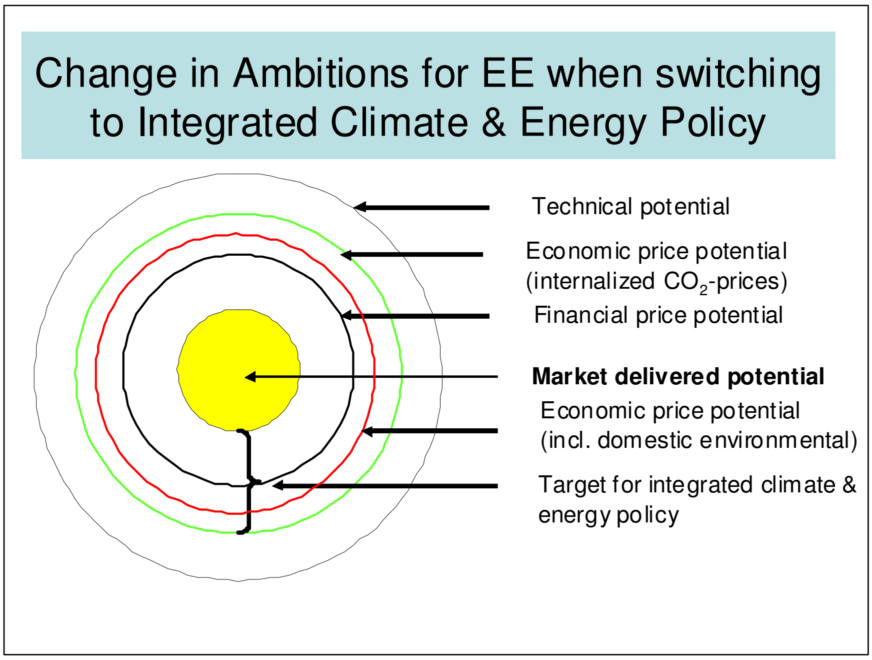
1. Dividing line between energy policy and climate policy (mitigation)

Policies and instruments to promote a more rational use of energy – energy efficiency, energy moderation (lifestyle changes lowering energy intensity of consumption), fuel diversification (except towards coal), peak shaving, use of renewable energy for energy supply – promote the climate policy goal of reduced emissions of GHGs.

A relevant question, therefore, is: "where is the border line between energy and climate policy?"; or, "when does energy policy stop being energy policy and become climate policy instead?"

The Kyoto Protocol provided an answer through the concept of "additionality" as condition for accepting certification of energy projects as emission reduction projects. In practice, this condition is interpreted too softly: many CDM projects – e.g. the wind farms and district heating projects in China – would have been implemented also in the absence of CDM finance as components of the national energy strategy. District heating in China is pushed by two national energy goals: as a means to reduce national coal consumption (reduce pressures on supply), and, above all, as a means to reduced air pollution in China's cities. Windfarms are pushed by two national energy goals: diversity of supply and employment creation; China targets to capture a large share of the international market for wind energy technology within a few years. The reference baselines used to justify "additionality" are too backward looking, too stagnant, status quo oriented, – as if energy policies do not change autonomously in the light of technological developments, changes in fuels prices and national policy priorities.

The integration of climate policy into energy policy means a shift in the level of ambitions which in turn necessitates the adoption of more "fundamentalist policies". This is illustrated in the chart with reference to energy efficiency. In any country in the world it is possible to identify energy saving measures in commercial buildings or in private industry that are financially viable, meaning that the private investor can get a positive return out of their implementation. Yet, they are not undertaken. The explanation is simple: companies, like individuals are not perfect: also in areas such as personnel, purchases, stocks, marketing, one can find scope for savings. To be efficient and



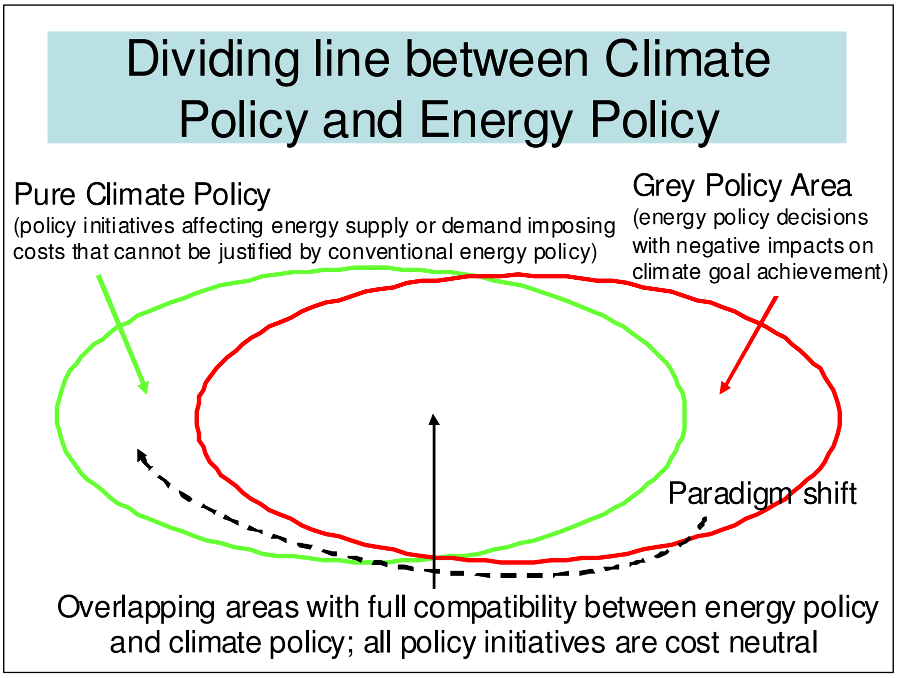
successful, individual agents try to maximise their portfolio of interventions in a way that maximises overall efficiency and effectiveness; not maximum efficiency in a single area. Energy policy encourages decision takers – firms and private households - to move as close to the financial viability frontier as possible. The imperfections are not liked but accepted as a reflection of the fact that we live in an imperfect world. Getting agents to move nearer to the "financial efficiency frontier" would require the adoption of instruments that are not economic; e.g. investment subsidies with high free rider effects.

When climate policy goals are incorporated into energy policy, two transformations happen to energy policy.

The first is the *expansion of the "economic viability frontier*" for new energy policy initiatives. Economic cost-benefit calculations include now the estimated economic value of reduced carbon emissions. Policy initiatives that before inclusion of the economic value of climate benefits were not considered to be economically viable, can pass the economic viability criterion once climate benefits are added to the equation.

The other is *"goal fundamentalism*" – non-acceptance of underperformance: the ambition is no longer to get as close as possible to the realization of the "market price" potential for energy savings; the ambition is get all the way to the "economic price" potential. This new position is reinforced by the acceptance of country-specific performance targets in international treaties. Examples such as the Kyoto Protocol's carbon emission limits and/or the EU's "20/20" targets: by the year 2020 achieving a 20% reduction in energy consumption compared to year 2005 level and a 20% penetration of renewable energy in energy supply. Goal fundamentalism necessitates increased use of "regulatory, command-and-control" instruments to achieve energy-climate policy goals. The introduction of pollution permits and of stringent minimum performance standards for the new cars are examples of this.

Thus, the dividing line between strictly climate policy and conventional traditional energy policy is defined by policy instruments that add "internal costs" on energy supply and demand that would not have been imposed according to the criteria of conventional energy-industrial cost-benefit analysis. On the opposite side of the "compatibility spectrum" we find energy policy decisions with negative impacts on carbon emissions. An example is the decision of a Government to authorise construction of a power plant making use of imported coal rather than of



imported gas in order to improve national security of supply. In between the two extremes we find a huge range of fully compatible policies: energy saving and renewable energy policies that reduce carbon emissions and make economic sense from the narrow point of view of conventional energy policy.

The chart serves to make a distinction between two levels of energy-climate policy:

1. One is *to raise the targets for goal achievement in the overlapping area*, in particular, to introduce more effective policy instruments, often in the form of integrated packages.
2. The other is *to leave out options located in the grey area* (the right hand side); this is tantamount to the taking of a "pure climate policy" decision (the left hand side). This policy implies a paradigm shift in the way decisions are taken in energy policy.

It is only since the early 1990s that climate policy slowly has started to penetrate gradually into the energy policy of Annex I countries, and since then, even more slowly, in emerging and developing countries. The "free rider effect" (or "tragedy of the commons effect") explains the slow development. But as climate policy obligations (soft and hard) are imposed on more and more individual countries during the post-2012 period, the overlapping area expands in these countries; see the explanation above concerning *the "economic viability frontier.*

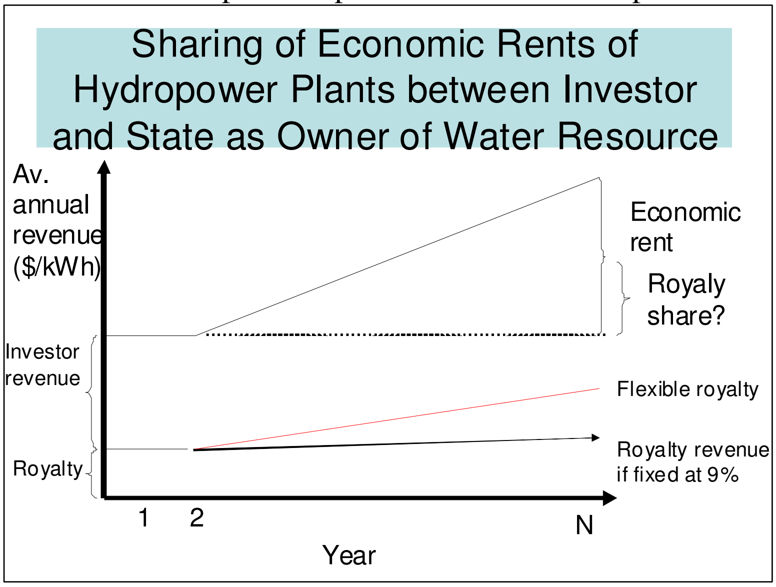
2. Tools for Integration of Climate and Energy Policies

At the level of individual policy instruments, the internalization of the external cost of GHG-emissions in market prices is achieved through "carbon taxes" or through "tradable pollution permits". Economists prefer "*carbon taxes*" because they provide investors with greater certainty in their long-term investment decisions, spread the cost across all economic agents and reduce the complexity of the overall package of climate-energy policy instruments. Political scientists prefer *"cap-and-trade for CO2-emissions*" because these systems provide greater political certainty for continuity of effort and for keeping long-term quantitative reduction targets unchanged.

The same difference in attitude can be found in the indirect monetization of reduced GHG-emissions from renewable energy systems through "feed-in-tariffs", "public tenders for new RE-capacity" or "green certificates". Economists prefer well-designed *feed-in-tariff* schemes, political scientists prefer *green certificate schemes*.

Colombia's most important renewable energy options comprise hydropower, wind energy, biomass based power and biofuels from bagasse. All of them are of international class quality. Not developing them means from the "narrow energy policy" point of view that renewable sources of energy are unused (lost potential), whereas finite fossil fuels are consumed; in the case of coal drawing down national wealth (=the NPV of the value of future exports minus costs of extraction). Biomass based power is not an option in Colombia, because enough alternative RETs (renewable energy technologies) are available for power; instead biomass is intended to be used for biofuels. Hydropower and wind-energy compete against the alternative of coal-fired power plants using low-grade coal from mines located far from the coast. Diverting first-grade coal from mines developed for exports to national coal fired power plants is an inferior alternative and is, therefore, discarded; the same holds for new natural-gas fired power plants; natural gas has an attractive export market.

Colombia has impressive potential for the development of large-scale hydropower plants that are cost-effective with coal-fired power plants at market prices without inclusion of the monetized cost of CO2-emissions. Several sites are under development; apparently some 3000 MW are expected to come on stream before the year 2020. Thus, large-scale hydropower needs no specific support, beyond the streamlining of approval procedures. Instead, the challenge is to devise effective economic rent-sharing schemes for water royalties. The present practice in Colombia of a fixed percentage of power sales revenue does not take into account that future prices of bulk power on the market in Colombia may rise both due to increased coal and natural gas prices and due to the introduction of a “cap-and-trade scheme for CO2” or of a carbon tax for power generation. Any of the two instruments will lead to wind-fall profits for hydropower plants.

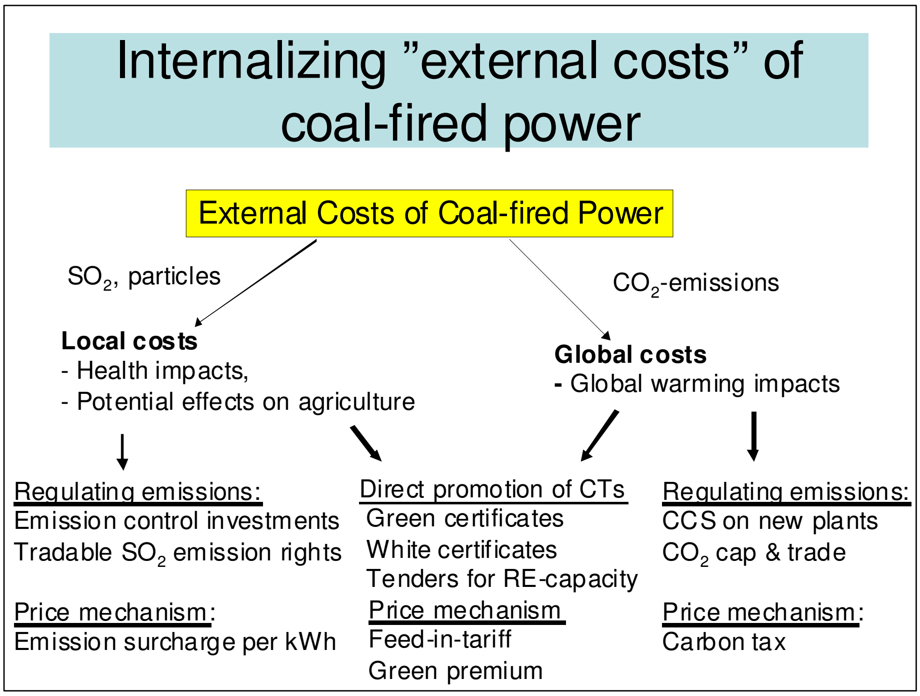


Windfarms are intermittent suppliers of power. The existence of substantial hydropower capacity is ideal; unlike power plants using fossil fuels, hydropower has no running costs in stand-by mode. It also seems that the capacity factor of potential wind farms in Colombia peaks during the dry season. Windfarms and hydropower plants, therefore, are excellent complements in Colombia. But at present, market prices for windfarms are very high due to capacity problems in supply of components; and due to high steel and cobber prices. Although a potential explosive development of the US market may change the outlook, overall it is believed that windfarm prices will begin to soften from 2015 onwards. In addition, the penetration of wind energy in Colombia faces the economic alternative of new power plants using “domestic coal”. Coal fired power provides excellent security of supply, uses a national resource with limited alternative applications and has lower costs of production per kWh; the negative side are its CO2-emissions. Therefore, the recommendation for the Colombian Government is to start slowly with a couple of demonstration scale wind farms up to the year 2015. Then, the market situation may merit the introduction of annual tenders for new windfarm capacity.

Wind Energy: Pros and Cons

Pros	Cons
Minimal CO_2-emission	Higher cost of production per kWh than coal-fired power
Use of natural ressource that releases coal for export	Lower domestic value added per kWh cost of production
Daily/monthly production highest during dry period	Intermittent source of energy = limited capacity value
Hydropower excellent for ”spinning back-up” and for acting as ”energy storage” during ”surplus production”	Generation forecasts 24-hours ahead based on metoeorlogical forcasts are uncertain

Colombia has enough economic renewable potential to develop a power system that, that like Norway's system is 99% based on renewables. Market forces will lead to the development of some coal-fired capacity in Colombia. But due to the richness of its resources, Colombia can "over-invest", becoming a net exporter of power to neighbouring countries.
New coal-fired power plants will be in operation for the next 30 years or more. Since Colombia is certain to introduce emission mitigating policies during that period, it is recommended both in cost-benefit calculations for project approval, as well as later in practical life operation to internalize the external costs of coal-fired power plants in the cost of coal-fired production. Many complementary – and partly competing (and, thus, mutually exclusive) – instruments for that exist; they are summarized in the chart.



A practical planning issue is what shadow price to use for CO2-emissions? The chart illustrates the immaturity of the international carbon market. That prices fluctuate 20 percent during a three months – or even within a month (July 2008) is normal for a financial paper. But the large price differences between in principle identical products: EAUs sold by private traders on the spot and over-the-counter markets, EAUs sold by Governments through an auction and issued CERs sold on the secondary market, all for delivery December 2008 are difficult to understand.

What is the right Carbon Credit Reference Price?

	Delivery 2008	Delivery 2012	Delivery 2013
EAU	€28 (June 20) €25.6 Gvt sale ~€23 (March) €22 Gvt sale	+€3	€27.7 (April 2008)
CER	€19 (June when EAU was €27) €15.5 (March= €6.5 discount)	Ongoing CDM projects: Upstarting CDM projects €11-13	

The choice of reference price, therefore, is a political decision.

Climate-energy policy calls for the introduction of complex, integrated packages of policy instruments. The Kirklees scheme for the promotion of energy savings is an example of a well-designed package of instruments at micro-level for the promotion of energy savings, and therefore, shown as illustration. Examples from the macro-level of potential application in Colombia are shown at the end of this paper. The first two boxes show demand side policies for promotion of energy efficient appliances and of energy efficient public buildings respectively. The third show examples of required supply side support if demand side policies are to be effective.

Kirklees Energy Services (KES)

- A 'one-stop shop' for householders, accessed by calling a freephone number: advice on energy efficiency measures, discount prices for installation and access to cashback and preferential loan schemes.
- Householders would be referred to an approved installer, from the network set up by KES, who would inspect the property and recommend appropriate energy efficiency work.
- Once the work was completed, the householder paid the installer, and would then be eligible for cashback payments from KES.
- The installers – of measures such as cavity wall insulation, loft insulation, draught-proofing of doors and windows, heating controls, hot-water tank insulation, floor insulation and condensing boilers – were selected following a tender published in local newspapers.
- The successful installers received specific energy efficiency training to help householders identify the areas where work could be most beneficial. Installers paid a referral fee of 5 % to KES, to fund the scheme's administration.
- Three local credit unions became partners in the scheme, offering preferential loan facilities for householders to install energy efficiency measures.
- The quality of the scheme was monitored through inspections of 10 % of the works, questionnaires sent out with cashback payments, and telephone surveys.

Most policies and policy instruments to promote energy efficiency belong in the "overlapping area". They can, therefore, be adopted by politicians in Colombia irrespective of the level of ambition for climate change policy; yet, prove to the outside world that Colombia is taking control of emissions seriously.

The high level of policy sophistication required in climate-energy policy calls for careful design of individual policy initiatives and for careful monitoring of results and costs during implementation. Policy instruments can in their impacts, going from the positive to the negative be: (i) complementary, (ii) neutral, (iii) duplicative, or (iv) counterproductive.

For this reason it is recommended to the Government of Colombia to introduce the principle of "evidence based policies" in the formulation of the overall national strategy for climate-energy policy as well as for the fine-tuning of individual policy initiatives and instruments. Theory based evaluation of policy instruments is important because the cost of policy failures adds to the high cost that is imposed on consumers by the heavy increase in fuel prices from 2003 to 2008. As part of the institutional set-up for the introduction of evidence based policy it is, therefore, recommended to establish a *Unit at the leading University in Colombia for ex-ante and ex-post evaluation of policy instruments*. The unit would analyse *policy effectiveness* - the likelihood of the policy achieving a specific objective – as well as *policy efficiency* - "the extent to which interacting instruments achieve a cost-minimizing pattern of goal achievement".

Instruments to promote EE-buildings in *New Construction*

- *Prescriptive codes* set separate performance levels for major envelope and equipment components, such as minimum thermal resistance of walls, roofs, glazing. Due to easier enforcement, they are the most common.
- *Overall performance-based codes* prescribe an annual energy consumption level per square meter of floor area or an energy cost budget. They provide more scope and incentives for innovation, but require better trained building officials and inspectors.

Supply Side Instruments: Getting things done better

- Creation of Master Courses in AE at universities and increase in AE-Ph.D. grants
- Government financed twinning arrangements between national and foreign research institutes
- Pilot and demonstration projects for AE-technologies
- Capacity building of technicians, engineers and architectures in AE-issues
- Accreditation of qualified technicians and firms as condition for participation in public grant-financed AE-programs
- TA to the creation of ESCOs
- TA to manufacturers of “low-tech” AE-products in how to improve quality and reduce costs of operation
- Quality control and certification of products for EE
- Random quality control with implemented works for EE