

Global Warming

New Opportunities for the HVAC Industry

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This article explains how CDM (Clean Development Mechanism) presents opportunities to the HVAC industry to undertake end-use energy efficiency (EE) projects, and earn carbon credits (CER) in the bargain. With each CER trading at 7 to 10 Euro, subject to market fluctuations, CDM can be a big revenue booster for developing nations. What's more, CDM projects bring in sustainability and infusion of new technology, which in turn leads to overall development.

Energy and environment are increasingly being intertwined in today's globalized world. The consequences of man-induced destruction of environment and ecosystem balance are all there

to be seen. First it was the ozone depletion issue linked to the CFC's which spurred the world's politicians and scientists to come together. HVAC industry has more or less successfully gone

through and solved this problem. However, the second (and the current) major environmental issue i.e. "global warming" is looking to be of a much larger proportion and seemingly difficult to solve. Although the HVAC industry as such is comparatively less affected

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directly by this issue but the enormity and complexity of global warming is such that practically no industry can afford to remain isolated from it.

The Kyoto Protocol binds 36 industrialized countries with emission reduction targets for the so-called GHGs (Greenhouse Gases). The GHGs defined by the Protocol are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), HFCs, PFCs and SF₆. CO₂ is the chief contributor to the phenomenon which acts as a shield in the earth's atmosphere not allowing the heat to escape and thus causes the warming. The parties to the KP have been given on an average, a target of 5% reduction in emissions of GHGs during the 1st commitment period of 2008-12; compared to the baseline emission levels in 1990. Two major developed nations viz USA and Australia have yet not ratified the Protocol and hence are not bound to reduce their emissions. At the same time, two major developing economies of the world viz China and India are among the non-Annex I parties who have no quantified emission reduction targets. Unlike the Montreal Protocol which was a kind of consensus agreement amongst almost all the countries in the world, the Kyoto Protocol has been facing the contentious issue of non-ratification by major developed countries, right from its birth.

CDM (Clean Development Mechanism)

This is one of the three novel market mechanisms introduced by the Kyoto Protocol which is designed to help the Annex I parties to meet their emission reduction targets by implementing projects in non-Annex I countries and in turn claiming credits. The other two mechanisms are the JI (Joint Implementation) and IET (International Emissions Trading).

The fundamental proposition in a CDM project is that it must reduce the GHG emissions below the BAU (Business-As-Usual) scenario i.e. if the CDM project was not implemented. In addition, CDM projects should have features of sustainability and infusion of new technology so as to contribute to the overall development of a host party; typically a developing country. Till date, a large chunk of CDM projects have been registered in India, China and Brazil. The major types of CDM projects registered so far have been in the areas of renewables (hydro, wind, biomass & solar), energy-efficiency (both supply-side & demand-side) and others such as fuel switching, HFC destruction, etc. Each CDM project results into issuance of CER's i.e. Certified Emission Reductions. One CER is equal to one tonne of CO₂ (equivalent) emission avoided. These CERs can be traded in the international market

(somewhat similar to shares of listed companies). The CER's are in demand mainly in EU, Japan and Canada as they help them to meet their Kyoto targets. Obviously, like any other commodity which is traded, the laws of demand and supply take over. As the 1st commitment period of 2008-12 nears, the demand for CER's is expected to grow further. Currently the price of one CER in the international market is between 7 to 12 Euros. A typical stand-alone CDM project cycle consists of the following activities:

- 1) Planning a CDM project activity
- 2) Preparing the PDD (Project Design Document)
- 3) Getting approval from each party involved
- 4) Validation
- 5) Registration
- 6) Monitoring a CDM project activity
- 7) Verification and certification
- 8) Issuance of CERs
- 9) Distribution of CERs

The overall implementation and coordination for Kyoto Protocol and CDM-related activities rests with the CDM EB (Executive Board) which operates under the umbrella organization of UNFCCC (United Nations Framework Convention on Climate Change).

pCDM or Programmatic CDM

The CDM is alive and kicking. However, the experience so far with the traditional stand-alone approach has been that it is more suited to large, single-owner projects which result into a large volume of CER's. End-use energy efficiency (EE) is one of the most promising sectors for reducing emissions of sustained growth and increasing energy security in developing countries. EE is, however, severely underrepresented in the CDM due in large part to its dispersed nature, which cannot be easily accommodated into traditional CDM modalities. A recent decision to include program of activities (PoAs) in the CDM provides an interesting alternative for registering CDM activities that are distributed over space and time. When a large number of small to medium units are geographically dispersed and occur over a period of time such as the case of end-use EE, pCDM is more appropriate. Typically there are a large number of potential owners, a number which may be unknown at the outset, who participate in the programme.

A CDM PoA is considered a "voluntary coordinated action by a private or public entity which coordinates and implements any policy/measure or stated goal, which leads to GHG emission reductions that are additional to any that would occur in the absence

of the PoA, via an unlimited number of CDM program activities (CPAs).” Examples could include a program to implement an EE standard, a demand-side management (DSM) program, or a concerted effort to switch industrial facilities from fossil fuel to natural gas. A CPA is identical to a traditional stand-alone CDM project in the sense that both must comply with all the procedures and modalities of the CDM and each must include activity that has a direct, real and measurable impact on emission reductions. A PoA does, however differ from a stand-alone CDM project in the following ways:

- i) **Multiplicity of activities to reduce GHGs:** The program is a deliberate effort that results in a multitude of GHG reduction activities occurring over time in multiple sites. The sites could be located within one or more city, region or country, as long as each involved country submits a Letter of Approval (LoA).
- ii) **Managing entity:** The program is coordinated or managed by one entity, which can be private or public, and does not necessarily achieve the reductions but promotes others to do so. The entity must identify measures to ensure that all project activities under its program are neither registered as single CDM project activities nor as part of another registered program. The coordinating entity is responsible for making any arrangements for the distribution of CERs and for communicating with the EB.
- iii) **CPAs:** A program is implemented via an unlimited number of CPAs. A CPA is a single measure or set of interrelated measures, designed to reduce GHG emissions within a predefined area. This area can include one or many locations, as long as they are of the same type. All CPAs in a program must apply one approved baseline and monitoring methodologies. At registration, the program must define the type of information that is to be provided for each CPA to ensure that the CPA is eligible under the program and that the emission reductions are real and measurable. As with all other project activities, the crediting period of a CPA is either a maximum of seven years, which may at most be renewed two times, or a maximum of ten years with no option of renewal.
- iv) **Duration:** The GHG-reducing activities do not necessarily occur at the same time. A program can have duration of up-to twenty-eight years. Although all actions respond to the same program, they can occur either simultaneously, or throughout the

duration of the program. The managing entity can add a CPA to the program at any time during the duration of the PoA.

- v) **Monitoring and verification:** The total volume of emission reductions to be achieved by a program may not be known at the time of registration. Each CPA shall be monitored according to the monitoring methodology that has been approved for that type of project activity.

A good example of a PoA can be replacement of incandescent bulbs with CFLs in all households in a city.

Potential in HVAC & R

The air conditioning and refrigeration industry in India has progressed substantially in the last three decades or so with the introduction of new, energy-efficient products. Gone are the days when bulky, open-type reciprocating compressors were site assembled with huge condensers and chillers. We now have compact, packaged, factory assembled and tested products which meet international standards such as ARI 550/560. Screw and scroll compressors have virtually replaced the old workhorse i.e. the reciprocating. Similar is the case in air-side products with the new efficient blowers (tested to AMCA standards) taking center stage in double skinned units. As for the unitary products, the overall energy efficiency has improved with the use of inner grooved tubing in coils. On the controls front, EEV's (electronic expansion valves) are rapidly being introduced in the market. Also, irrespective of the type and capacity of the product, use of microprocessor based controls is seen everywhere. VAM's (vapour absorption machines) are finding their own marketplace created by either the scarcity of electric power and/or availability of waste heat source. The latest technological innovations like the VRF (variable refrigerant flow) systems are on the product list of virtually all the major players in the country.

With the above background, the question remains as to what kind of pCDM projects can we have? Well, there can be a long list but I have listed down a few of them which could possibly be explored:

- i. Replacement of old RAC's by star-rated units (possibly with BEE's involvement in the project)
- ii. Replacement of old, open-type, reciprocating compressor based ice plants by packaged screw compressor units
- iii. Use of VFD's particularly on pumps and AHU fans
- iv. Use of small-capacity, gas-fired VAM's in place of

Electronic Control Valves



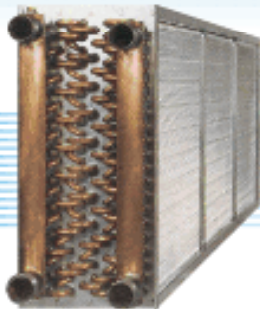
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- old packaged units (especially in areas where piped gas is available)
- v. Addition of evaporative cooling units to precool the condenser air in dry climates
 - vi. District cooling facility to serve a large residential cum commercial complex
 - vii. Tapping of all possible sources of heat such as DG set coolant, exhaust gas, jacket cooling and solar hot water to operate VAM's
 - viii. Biomass fired cogeneration units to operate single-stage VAM's by low pressure steam
 - ix. Redesigning of a complete facility to minimize the penalty in efficiency due to part load operation
 - x. Ice thermal storage system specifically designed to reduce kWh (rather than kW demand as is more commonly done).
 - xi. Reducing fresh air load by use of energy - saving devices e.g. heat pipes.
 - xii. Installing an IBMS (Integrated Building Management System) to optimise use of lights and HVAC equipment.

The above is only an indicative partial list of pCDM projects. A rule-of-thumb should be noted that – for every kWh energy saved, approximately 0.9 kg of CO₂ emission is avoided. Based on this figure, with the size and annual operating hours of the units, it is possible to calculate the expected amount of CER's per year.

In conclusion, programmatic CDM offers real incentives to promote EE improvements in developing countries. It is difficult to convince a home or business owner to invest in reducing GHG emissions if there is no guarantee of revenue. Programmatic CDM can reduce regulatory risk for investments in the long run, where predefined PoAs (validated and registered) can offer real incentives to GHG abatement actions in SME's or households. HVAC industry, on its part, can contribute its share in the global efforts to stabilize GHG levels in the atmosphere so as not to face, as the title of Al Gore's film suggests, **"An Inconvenient Truth"**.

References

1) The most authentic and exhaustive source of information on Kyoto Protocol and CDM related matters is the UNFCCC website : www.unfccc.int

2) *CDM and JI in Charts*; Institute for Global Environmental Strategies, Ministry of the Environment, Japan. www.iges.or.jp

3) *Potentials and barriers for end-use energy efficiency under programmatic CDM*; CD4CDM Working Paper No 3, September 2007. UNEP RISO Centre. www.cd4cdm.org