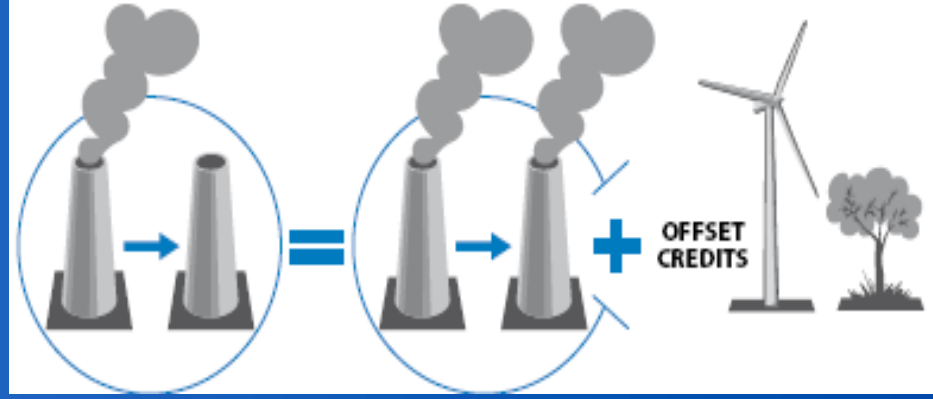


Emissions Trading



The Basic Principle of Emissions Trading

- Suppose there are two firms, X and Y that are polluting the atmosphere.
- The country wants to decrease overall level of pollution and mandates that *both* firms reduce the amount of pollutants they emit into the atmosphere.
- The cost of emissions reduction might differ markedly for these two firms. Firm X might be able to reduce its emissions at a much lower cost than Y.
- The difference in the cost of emissions reduction creates a market opportunity: the firms could reduce the same amount of total emissions at a lower cost if firm X reduces more than what it has to and sells its extra reduction units to firm Y at a cost lower than the cost of emissions reduction for firm Y.
- Firm X will gain because of the difference between the cost of emissions reduction for firm X and firm Y. Firm Y will also gain for the same reason.

Cap-and-trade

- Regulatory bodies establish a cap called *emissions cap* on the level of emissions permitted in a jurisdiction.
- The participants in the program receive credits distributed (sometimes given, sometimes purchased through auction) by the regulatory authorities, which correspond to the amount of pollution (defined as the number of tons of pollutants in a year) that they are expected/allowed to emit within one year.
- If they exceed the cap, they have to buy credits from other participants who have excess credits (i.e., they have polluted less than their allowance).
- Hence, total pollution is limited to a total amount (cap) and trading allows for an efficient allocation of pollution as those participants who can reduce emissions in a cost-effective way will do so and benefit from trading with those who cannot.

Cap-and-trade-Example

- There are two power plants. Plant A emits 100 tons of CO₂, and plant B emits 200 tons of CO₂, so total emissions is 300 tons.
- The regulatory authorities put the cap at 210 tons of CO₂ in total (30% reduction). Both plants have to decrease pollution by 30%. i.e. A can emit only 70 tons of CO₂ & B can emit only 140 tons of CO₂.
- The cost of reduction of one ton of CO₂ for plant A is \$20 (for the first 30 units of emissions) and \$50 for plant B (for the first 60 units). If plants A and B reduce pollution *separately*, the total cost to reduce emissions to 210 tons will be \$3600 [(\$20 × 30) + (\$50 × 60)].
- Plant A is able to reduce its emissions at a lower cost than plant B. If it can reduce more than 30 units, it can sell permits to plant B.
- If plant A reduces 60 tons of CO₂ at \$20, and plant B could reduce 30 tons at \$50, implying that the total cost to reduce total emissions to 210 tons would be \$2700 [(\$20 × 60) + (\$50 × 30)].
- A can sell extra 30 units to B at a cost between \$20 and \$50 and get profit for extra emissions reduction. B also benefits, as the average cost of reducing emissions is lower than \$50
- **A and B could be in different continents**

Offset

- A carbon offset is another type of commodity that represents the reduction of one metric ton of carbon-dioxide equivalent (CO₂) by a qualifying carbon-reduction project.
- The offset may or may not represent the actual reduction of CO₂ emissions.
- Examples of offset projects include renewable-power generation, energy efficiency projects, & forestry and industrial-waste remediation.
- There are governing bodies that attempt to ensure offsets are real & accounted for properly.
- A renewable energy certificate (REC) can be converted into carbon offsets, by proving the renewable energy generated is actually offsetting an equivalent amount of carbon-based electricity production

Green Supply Chain Network- Definition

- GSCN is a strategically designed inter-organizational network delivering green products
 - Designed and produced using environmentally friendly green procurement and manufacturing strategies processes
 - Deliver low carbon foot print products or solutions to the customers
 - Reduce resource usage, waste and pollutants following the cradle to cradle protocol and encouraging re innovations: reuse, repair and recycle. Backward SCN and Reverse Logistics networks in place
 - Minimal carbon foot print using efficient trading mechanisms
- **The GSCN functioning is Coordinated & Executed so that its outcomes conform to the objectives of triple bottom line: Sustainability, Economic development & Social wellbeing**

Sustainability Initiatives in Practice

Green Supply Chain Innovations

- Low-carbon innovations aren't just new products and technologies. They also include new services and processes in such industries as ICT, chemicals and materials, agriculture, law, accounting, and consulting.
- Examples:
 - **The Dutch flower industry** cultivate flowers in rock wool & transport in the same trays, reducing shipping time and cost.
 - **Best Buy** partnered with GE to bring new home energy management systems, smart appliances, and renewable energy products to market more rapidly
 - **Morrison & Foerster** LLP began law practice focused on clean technology offering corporate and litigation services, along with technical expertise in intellectual property, energy, and environmental law. Billings grew from \$6 million in 2006 to around \$100 million in 2011.
 - Automakers are adopting new “start-stop” battery systems from **Johnson Controls** that turn vehicles' engines off rather than idle when the vehicles stop.

Green Delivery

- **Videoconferencing system** substitutes for many forms of business travel. HP and its customers saved 66,000 metric tons of carbon dioxide-equivalent (CO₂e) greenhouse gas (GHG) emissions in two years, and HP reduced its employee business travel by 43 percent.
- **SAP** introduced Carbon Impact On Demand 5.0 carbon management software in 2010, leading the \$1.3 B Enterprise Carbon Accounting (ECA) marketplace.
- **HP** works with corporate customers to design, implement, and manage an imaging and printing infrastructure. For one customer with 10,000 employees, HP has reduced printing energy consumption by 66 %. Fortune 500 companies could avoid about 2.3 million metric tons of CO₂ annually by reducing printing.
- **For low-carbon innovations to take root, companies must develop the necessary networks of external partners that enable them**

**Ecosystem Aware
Global Supply Chain Management**

Sustainability Initiatives @ CEMEX- Building Solutions Company

CEMEX: Sustainability Initiatives

- The cement industry is conventional and low-tech, but CEMEX stands out as an emerging economy Giant
- CEMEX is a “best-practice” model—since the late 1980s it has grown rapidly from a local cement producer to become the Third Largest Cement Company in the world.
- The success of the company is because of it has built superior information and logistics capabilities, Excellent business models, and an efficient supply chain with risk green operating practices.

What are CEMEX's Offerings?

- CEMEX is a growing **global building-solutions company** that provides products of consistently **high quality and reliable service** to customers and communities in Americas, Europe, Africa, the Middle East, and Asia.
- The operations network produces, distributes, and markets **cement, ready-mix concrete, aggregates**, and related building materials to customers in over 50 countries

Carbon Foot Print of Cement

- The production of cement is carbon-intensive, requiring high temperature sintering of limestone, clay, and iron oxide to create clinker—the base material for cement.
- This heating process takes place in large rotary kilns that reach temperatures over 1,400°C (2,500°F) to catalyze proper chemical reactions.
- Both the fuel requirements of the kilns and the reaction processes, result in significant releases of CO₂ into the atmosphere.
- The cement industry as a whole represents 5% of all carbon emissions associated with human activity—an issue that has spurred widespread effort to reduce the carbon footprint of cement production

Sustainability Initiatives

CEMEX's Three Main Sustainability Objectives

- **Enhance its Value Creation:** CEMEX aims to deliver the innovative, high-performing products, services, and solutions to the resource-constrained society requires for building a low carbon economy
- **Manage its Carbon Footprint:** CEMEX strives to minimize the ecological impacts of its operations in the communities in which it operates by carefully identified by carefully measuring and reducing its carbon footprint to technically and economically feasible lowest levels
- **Engage Stakeholders:** With highly committed & empowered employees, CEMEX closely collaborates with a variety of institutions with complementary core competencies to strengthen the local communities

CEMEX Carbon Strategy

- CEMEX has designed its carbon strategy to help reduce the environmental impacts of its operations, while creating economic value and driving the construction industry's participation in the development of a low-carbon economy.
- The key components of CEMEX carbon strategy:
- Reducing the ecological footprint of our production process
 - Replacing traditional fossil fuels with lower-emission alternatives
 - Reducing the clinker content in cement
 - Increasing our use of renewable electricity and the energy efficiency of operations
- Aligning operations and initiatives with international standards, regulations, and market-based mechanisms for emissions reduction

Carbon Footprint Tool

- A key pillar of our CO2 reduction efforts is our Carbon Footprint Tool (CFT) that helps us to quantify the direct and indirect amount of CO2 emitted during the production process of cement, concrete and aggregates up until the product leaves our facilities.

Waste to Value

- Cemex's carbon strategy is to reduce the environmental impacts of its operations, as well as to drive the development of a low-carbon economy from waste to value
- Cemex uses residues or by products from industrial, domestic, agricultural, and forestry processes to fuel its cement facilities .
- The wastes include Used tires, Spent solvents and waste oils, Processed municipal solid waste, Household waste, Agricultural wastes such as rice, peanut shells and coffee husks and animal meal, Sewage sludge
- The process reduces our reliance on fossil fuels
- Cemex's use of alternative fuels increased to 27.1 % of total fuel mix from 20.3% in 2010
- Mimics Bioecosystems where waste for one entity delivers value for another

Developing Alternative Energy Sources

- CEMEX owns a wind farm in Oaxaca, Mexico with a capacity to provide 25 percent of the energy needed to run Mexican operations, and in 2011, allowed CEMEX to avoid 489,169 tons of CO2 emissions.
- CEMEX reduces carbon footprint by using efficient process technologies and changing the way it sources electricity.
- In 2011 CEMEX Philippines launched a collaborative project with Sinoma Energy Conservation Ltd to devise a system for capturing waste heat from kilns to produce clean, alternative electricity.

Drivers of Green Initiatives

- **Physical change** in the environment is the basis for policy decisions on environmental regulation.
- **Regulation**, in turn, can affect the development, availability and dissemination of technology.
- **Regulation and availability of technology** affect national and global markets.
- **Consumer habits, and thus the demand for greener products**, can affect the way companies do business and encourage them to adopt new technologies that allow them to meet new consumer needs.

Green Vs Customer Value

- No new low-carbon innovation will survive in the marketplace if it fails to maximize customer value along multiple dimensions.
- Reductions in carbon emissions alone will not make low-carbon innovations successful in the marketplace; the innovations must also bring bottom-line value in terms of total cost reduction, enhanced performance, or competitive edge.

Conclusions

- Green supply Chains is a very important subject that effects all the three sectors of the economy and also the livelihood, health and well being of the humans and other species
- Not given enough attention as yet.
- Green SCN design is an important topic that deserves the attention