



From Editor's Desk

Gujarat Cleaner Production Award, a Prestigious award instituted by Department of Forests and Environment, Government of Gujarat, is awarded every year to industries who have implemented exemplary work of Cleaner Production in their industry.

Gujarat Cleaner Production Award, Ceremony for the year 2006-07 was held on 23rd September '09 at Vadodara.

Gujarat is probably the leading state to be so actively engaged in promoting Cleaner Production and other environmental management techniques. As mentioned in the previous issue, Government of Gujarat has also issued Industrial Policy 2009, which further enhances Gujarat's broad mindedness and far-sightedness.

Rajiv Gandhi Environment Award for Clean Technology is given at National level and UNIDO award at International level.

Asian Paints Ltd, Ankleshwar, was the recipient of the award in large scale category. Some of their major steps are described in this issue.

Editor

Innovation distinguishes between a leader and follower
-Steve jobs

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GUJARAT CLEANER PRODUCTION AWARD 2006-07, CEREMONY

Gujarat is a state best known for its entrepreneurship spirit. The state has become the epi-centre of economic activities in the country and has emerged as one of the most prosperous and progressing state of India. It is the entrepreneurship nature of the people of the state, which has gone a long way in making the Gujarat a successful story. At present the state is one of the leading industrialized state of the country.

The Industrialization also brought about Environmental deterioration due to pollution. The Forests & Environment Department, Government of Gujarat took a holistic approach and besides the reactive approach introduced proactive approach of Cleaner Production vide GR NO: BIT-10.2005-3215-P 30th November, 2003. The GR promoted CP to entrepreneurs, environmental consultants, academic institution, etc. This GR facilitated implementation of CP in various industrial sectors of Gujarat. To further motivate industries, Gujarat Cleaner Production Award was instituted in year 2004 for Small & Medium scale industries and it was extended for Large scale industries in the January, 2007.



The Trophy and Certificate of Appreciation

Gujarat Cleaner Production Award 2006-07 ceremony was organized by F & E Department, GoG and Gujarat Cleaner Production Centre at Vadodara on 23rd September, 2009. The chief guest of the function were Dr. S.K. Nanda, PS, F & E Department. Other dignitaries present were Shri R. G. Shah, MS, GPCB and Dr. Khan, Director, GEMI. Shri. J. K. Vyas, Director, Environment and Additional Secretary, F & E Department, GoG, welcomed the gathering. Thereafter, the Award Ceremony commenced. Shri. R.G.Shah, MS, GPCB also addressed the industries and asked them to come forward for adoption of cleaner production. He also announced that the winning industries will get one year extension on their consent.

The Trophy and Certificate for large scale sector, was awarded to **M/s Asian Paints, Ankleshwar** and for SME sector, it was awarded to **M/s Canberra Chemicals, Nandesari**. Certificate of Appreciation was also awarded in Large Scale and SME categories. In Large Scale, the 1st and 2nd runners-up were **Petronet LNG Ltd, Dahej** and **Atul Ltd, Atul**, respectively. In the SME sector, the 1st and 2nd runners-up were **SBS Colores and Chemiques Pvt. Ltd, Ankleshwar** and **Asiatic Color, Naroda, Ahmedabad**, respectively.

Then after Mr. Bharat Jain, M.S., GCPC gave the presentation on incentive schemes in Industrial Policy-2009 and at the end he gave vote of thanks.

Gujarat Cleaner Production Award 2007-08

To encourage the industries for Cleaner Production implementation the “Gujarat Cleaner Production Award” for the year 2007-08 is also to be given to one industry in small and medium scale sector & one industry in large scale sector in the state. The application form for the nomination and advertisement can be downloaded from website www.gcpcgujarat.org

The last date of receipt of nomination (in duplicate) is 31/12/09.

CLEANER PRODUCTION CASE STUDY: ASIAN PAINTS LIMITED, ANKLESHWAR

Industry background

Asian Paints Ltd (APL), a leading manufacturer of paints, enamels and varnishes operating in India over fifty years is based totally on Indian technology and has been a market leader for over two decades in paint manufacturing industries. The company operates five paint manufacturing plants in India located at Mumbai (Maharashtra), Ankleshwar (Gujarat), Patancheru (Andhra Pradesh), Kasma (Uttar Pradesh) and Sriperumbudur (Tamil Nadu). Each of these plants is equipped to manufacture a wide range of paint products as well as synthetic resins. The company also has two petrochemical plants manufacturing Phthalic Anhydride at Ankleshwar (Gujarat) and Pentaerythritol at Cuddalore (Tamil Nadu). Besides operations in India, APL has also successfully set up several subsidiaries abroad for the manufacture of paints.

The major steps taken by the unit are reduction at source, recycle/reuse of waste stream. Cleaner production is continual exercise at APL. The Company has adopted cleaner production for following reasons :

- While treatment facilities focus on end-of-pipe, cleaner production focuses on beginning-of-pipe.
- While treatment facilities are reactive way of sustaining environment, cleaner production is a preventive way of eliminating environment concerns.
- Clean Manufacturing is thereby Green Manufacturing.

How Asian Paints progressed in CP:

1. Following aspects were focused for CP :
 - Raw Materials
 - Processes
 - Product
 - Waste into by-product
2. Micro Planning
 - What is obvious, get measured
 - What gets measured gets well managed.
3. Adopted the principle of Resource Flow Analysis (RFA)
4. Eliminating usage of materials whenever possible.
5. Reducing usage of materials through technology, substitution and process improvements.

Achievements of Asian Paints Limited, Ankleshwar

- ✓ The plant was awarded with “**Golden Peacock Award** for Environmental Management 2006”
- ✓ The plant won the “**National Energy Conservation Award**”, instituted by Ministry of Power & Bureau of Energy Efficiency (BEE) in 2005.
- ✓ The plant won the NITIE sponsored “**LAKSHYA**” award on Green Productivity.
- ✓ The plant won **The prestigious Rotary Award for best Environmental Performance for the year 2000-01** among all the industries in Ankleshwar, Panoli, Jhagadia & Walia.
- ✓ The Plant is certified for **ISO 14001 and ISO 9001**.
- ✓ **British Safety Council (BSC) with 5 star Rating and awarded with Sword of Honour twice respectively** in the year 2003 and 2005.

Process Description

M/s APL presently manufactures Enamels, Water based Paints, Industrial Paints, Stiff Paints, Stainers and Synthetic Resins at its Ankleshwar division. The same products are proposed to be manufactured after the debottlenecking exercise.

1 Manufacturing of paints

The paint manufacturing process involves the following steps:

- ❖ Wetting the pigment with sufficient quantity of appropriate resin / water in presence of surfactant, thereby breaking large agglomeration to make a mill base which has a correct consistency for grinding. This process called pre-dispersion or premixing is achieved in Cowl's dissolver or similar pre-disperser.
- ❖ The next step involves further breaking up of the pigment aggregates and their suspension in resins. Different machines like attritor, sand mill, bead mill and jar mill are used for dispersion. Type of paint and nature of pigment dictate the selection of a mill or a combination of mills. Ball mills can also be used as dispersion equipment. In such a case pre-dispersion is not necessary. All the ingredients are directly charged into the mill and the mill is run for the specified time to achieve requisite characteristics.
- ❖ Adjusting the shade consistency and other desired properties of the product is the next step. The milled pigments are transferred to mixers where additives like drying agents are added. The remaining quantity of materials like resins/emulsion and thinners are also added in mixers. The consistency, viscosity, colour and drying time & other parameters are adjusted in the mixer.
- ❖ The next step involves further breaking up of the pigment aggregates. Highly efficient grinding equipment, i.e. ECM Poly is used for dispersion. All the ingredients are directly charged into the mill and the mill is run for the specified time to achieve requisite characteristics.
- ❖ The final step is packing of the paints in containers. On approval of the paint against specifications, the paint is strained and packed in required pack sizes. The pack size and type of paint decide the appropriate packing machine. In case of both the types Faster Packing Machine is also being utilised, which provides more accuracy on filling.

2 Manufacturing of distemper

Distempers are wall finishes, sold in the form of stiff pastes of uniform and smooth consistency. Processing of distempers is carried out in a single stage in pug mixers that have a pair of helical mixers revolving in opposite direction. The powdered raw materials charged through PLC operated pneumatic conveying system to separate hoppers available on each pug mill. This system is helping in reduction in Dusting and material loss. Binder solution and other additives are charged in pug mill. The dispersion is achieved by the shear force and pugging action generated in the pug mill. Shade and other adjustments are carried out in the mill itself and the material is packed on special packing machines suitable for stiff mass.

3 Manufacturing of resins

A. Alkyd resins :

Synthetic resins of alkyd type are manufactured by chemical reactions of polyol, oil and polyacid in presence of catalyst and certain additives in thermic fluid heated reaction vessel. The reaction is monitored by checking temperature, viscosity, acid value and percent solids. Time required for reaction varies from 18 hrs to 48 hrs. This is followed by thinning in blender with solvents to the desired percentage solids and filtration takes place in a plate type pressure filter and after filtration the product is pumped into storage tanks.

B. Emulsion resins:

Following steps are involved in manufacturing process

1. Water and surfactants are taken to the reactor and heated to 55-60° C. On achieving desired temperature, initiator catalyst is added. The temperature of the contents is controlled to 75-80°C.
2. Monomers are added continuously to the reactor under continuous stirring.
3. On completion of monomer addition, catalyst is added to the reactor. The reactor is maintained at around 80° C for two hours to ensure complete polymerisation.
4. On cooling, the emulsion is neutralised and other additives like defoamer and preservatives are added.
5. The emulsion is strained and stored.

C. Amino Resins:

Solvent and other required additives are charged in the reactor. Remaining part is taken to premix tank. The reactor is heated to 75-80° C in atmosphere of nitrogen under continuous stirring. The catalyst is mixed with the solvents and added to the reactor at 70-80° C for 30-60 min. Temperature increase is recorded and desired temperature is maintained by cooling. The contents of premix tank are added slowly and continuously to the reactor. On completion of addition of premix solution, the catalyst is added to the reactor. The reactor is maintained at 80° C to 120° C for 4-6 hours to ensure complete polymerisation. Water of reaction is collected in a separator. After achieving desired in-process parameter, it is cooled to 35-40°C. Recovered solvent of previous batch is added to thin down the resin. Desired parameters are again checked and adjusted. Post approval, product is packed in barrels.

Cleaner Production Options Implemented

Following are the exemplary CP options for colorant solid content recovery by implementation of wash water ultra filtration technology; reuse of wash water by implementation of wash water reuses schemes, reduction in hazardous waste through implementation of advanced filtration mechanism and detoxification of raw material barrels / carboys.

(I) Colorant solid content recovery by implementation of wash water ultra filtration technology:

Background:

Apolite Machine Colourant (AMC) is the tinting ingredient used for coloring of paint in Dealer Tinting System (DTS). Manufacturing of AMC produces concentrated wash water after each change over of shade as well as during maintenance or breakdown of processing equipment and allied ancillaries. Such wash water carries significant amount of colored solid content and hence sludge generation.

Project Description:

Ultra filtration is installed to recover colourant solid content from AMC wash water. The freshwater used for washing AMC processing equipment is collected and passed through Ultra Filtration Unit. Ultra filtration unit produces two streams - permeate and reject. Reject (Concentrate) carries most of colourant solid content and is used in the next batch of same product. However, permeate is the clean water which can be used for cleaning activity or drained to effluent stream.



Environmental Benefits:

- ✓ Reduction in fresh water consumption for cleaning
- ✓ Reduction of sludge generation
- ✓ Reduction in hydro organic load at effluent treatment plant

Economical benefits:

- ✓ Approximate average AMC concentrate used back in product – 5.7 KL per month (~equivalent volume of fresh water saved)
- ✓ Also, we are able to retrieve 20% solid content from waste wash water which otherwise generated sludge at the end of the pipeline treatment
- ✓ Saving on material cost with reuse of concentrate stream in the fresh product

II. Reuse of wash water by implementation of wash water reuses schemes:

Background:

Manufacture of emulsion and paints is basically formulation process wherein all ingredients are mixed thoroughly to get the desired product. Hence there is no effluent generation from the process in the form of by product. It is mainly generated from washing of processing equipments and other allied ancillaries. Fresh water used for cleaning after each change over of shade as well as during maintenance or breakdown of processing equipment and other ancillaries generates wash water which carries significant amount of solid content.

Reuse Scheme Description:



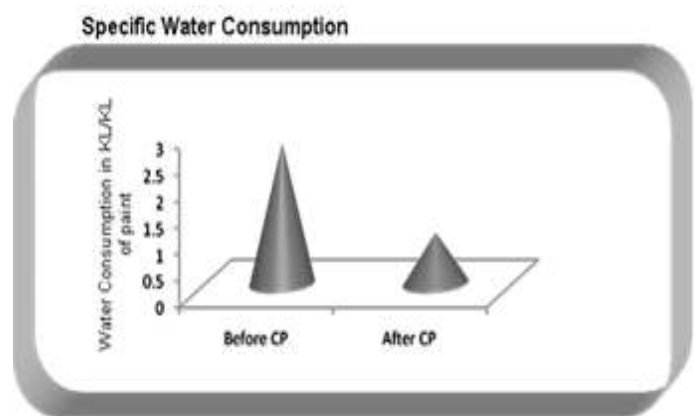
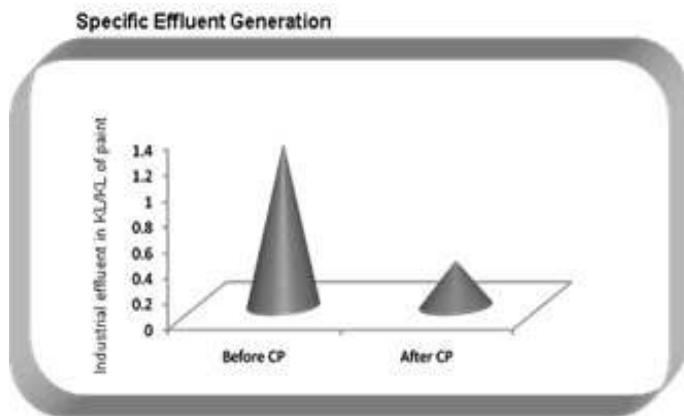
Water used for cleaning of emulsion and paint manufacturing equipments is collected in tanks / trolleys and dosed with defined quantity of biocides and fungicides. The storage tanks / trolleys are equipped with stirring or air purging facility so as to ensure no settling. This wash water is used in the final emulsion and paint as per guidelines released by technology function.

Environmental Benefits:

- ✓ Reduction in fresh water consumption
- ✓ Reduction in effluent generation
- ✓ Reduction of hydro-organic load at ETP
- ✓ Reduction of sludge generation

Economical benefits:

- ✓ Average emulsion wash water used back in emulsion – 23 KL per month (~equivalent volume of fresh water saved)
- ✓ Average paint wash water used back in product – 33.2 KL per month (~equivalent volume of water saved in different paint category)
- ✓ Also, we are able to reuse 10% solid content from waste wash water which otherwise generated sludge at the end of the pipeline treatment
- ✓ Saving on material cost with reuse of wash water in the fresh product



III. Reduction in hazardous waste through implementation of advanced filtration mechanism:

Background:

Resin processing is a polymerization process and requires proper filtration before its usage in paint. Filtration of resins like alkyds was being done using conventional plate and frame filter and leaf filter. Both of this filtration employs use of filter aid such as Dicomol or Arbocel. This filter aid is a hazardous waste at the end of the filtration cycle, which calls for incineration as a disposal method.

GAF Filtration Mechanism:

With a view to reduce waste filter aid arising out of resin filtration operation. GAF filtration system introduced for filtration of resin, which eliminates usage of filter aids. It consists of bag filters of required mesh size and is arranged parallels in pair to operate filtration in continuous fashion while one bag filter is under cleaning.



Environmental Benefits:

- ✓ No hazardous waste generation
- ✓ Reduction in air pollution

Economical benefits:

- ✓ Savings on incineration cost of hazardous waste filter aid
- ✓ Reduction in operating cost because of elimination of the usage of dicamol/arbocel as filter aid

IV. Detoxification of raw material barrels / carboys:

Background:

Resin and Paint manufacturing uses wide range of raw material. Disposal of empty raw material barrels and carboys requires proper cleaning, approval and has to be sent out to external detoxification facility.

Detoxification facility:

Dedicated detoxification facility is installed within the plant premises which consist of designated location for retrieving left over material, storage of waste barrels / carboys, hoop mixer for cleaning / detoxification, storage for cleaned / approved barrels / carboys. The barrels are cleaned with hot caustic solution using hoop mixer. Then the barrels are flushed with water and approved by third party (GPCB approved laboratory) prior to its reuse / disposal.

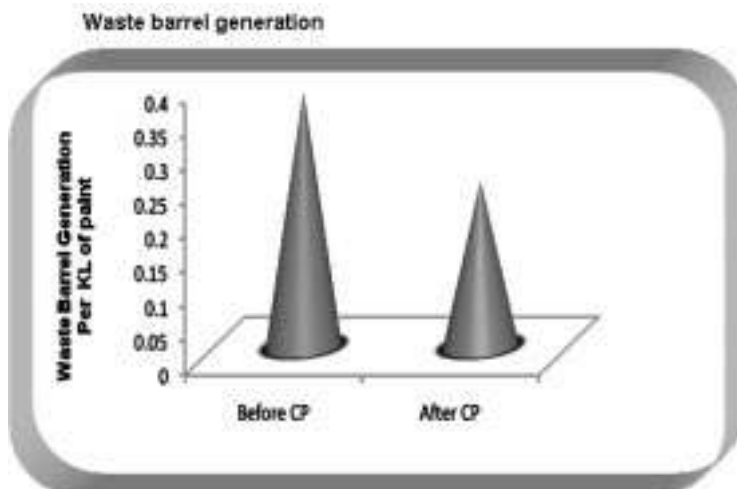


Environmental Benefits:

- ✓ Safe disposal of barrels / carboys
- ✓ Reduction in generation of barrels due to internal reuse of barrels/carbuoys after detoxification

Economical benefits:

- ✓ Reuse of leftover material (retrieved from barrels before cleaning) in the fresh product which otherwise wasted along with barrels / carboys
- ✓ Reduction in material losses
- ✓ Reduction in cost associated with transportation and treatment when sent to external detoxification unit
- ✓ Savings on barrels / carboys for in-house usage as cleaned and detoxified barrels / carboys being used in house



Environmental News

Watermelon Juice May Be Next "Green" Fuel

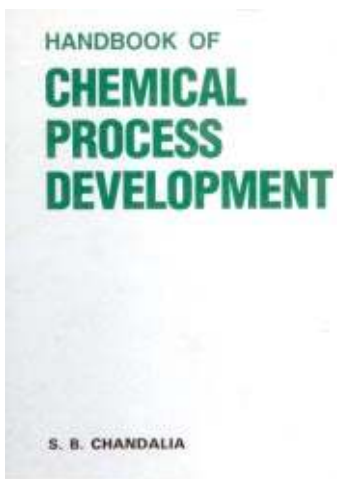
Watermelon, the quintessential summer fruit, may soon be helping to fuel your car as well as your picnic guests. According to a new U.S. government study, juice from unwanted watermelons could be a promising new source for making the biofuel ethanol.

Source :www.Nationalgeography.org

Up to a fifth of all watermelons grown each year have odd shapes or scarred rinds that turn off consumers, said study co-author Wayne Fish, a chemist with the Agricultural Research Service in Lane, Oklahoma. Instead of picking the fruit, farmers leave these reject melons on the vine. "If you figure a field of watermelon may yield somewhere between 60 and 100 tons per acre of watermelon, a fifth of that can be substantial," Fish said. When he and colleagues were experimenting with extracting antioxidant compounds from watermelon juice, they realized the waste stream of sugary fluids could be a source of ethanol. The researchers brewed several experimental batches of the fruity fuel in the lab and optimized the process to produce about 23 gallons (87 liters) of ethanol from an acre's worth of the unused fruit. "For average-size growers that have 300 to 1,000 acres [121 to 405 hectares], they may just keep the ethanol themselves and use it in their own production," Fish said. Larger farms could even produce enough fuel to sell. However, it doesn't make economic sense to haul the unwanted watermelons to a processing facility. Rather, Fish envisions mobile breweries that go from farm to farm. "In terms of the actual process that goes on, it is no different than making homebrew," he said, except on a larger scale and with a few special laboratory tweaks. Watermelon Beer? When brewing the watermelon biofuel, the researchers were focused on its energy potential, not flavor. But they couldn't resist sampling the brew. "It's not going to kill you, for goodness sake," Fish said. Their process tended to produce fusel oils, which give alcohols an "off" flavor. "Don't expect to see any watermelon beer at your local tavern anytime soon," Fish said, "at least as produced at Lane, Oklahoma."

Book Review

Description



A typical chemical processing unit processes a large amount of fluid. Given the economics of most unit operations, even small improvements in efficiency and performance can result in significant increase in revenue and savings in costs. Methods to predict the performance of a unit under a wide variety of operating conditions are required so that improvements in efficiency and hence in costs can be realized. The flow field in chemical processing equipment is very complex and conventional methods of analyses are not adequate. The Chemical Process Development diverts the interest of Chemical Engineers and Chemists with a goal of translating a theoretical concept into commercial plant.

At the preliminary stages of chemical plant development and design the choice of the chemical process route is the key design decision. In the past, economics were the most important criterion in choosing the chemical process route. Safety and environmental issues have now become important considerations. Methods are lacking

for assessing chemical process routes for environmental friendliness. It generally shows the importance of R&D center which is one of the key inputs in the industry to capitalize their development in making its process economically and environmental friendly. Due to this development and research it fills the gap between the conventional and latest process. Initially chemical engineers are not the part of R & D but for the Process Development work now they are trained at early stage of process researcher.

This handbook widely used by Chemists, Chemical Technologists and Chemical Engineers working in the inter disciplinary area of process R&D.

Tips to Go Green

- **Get rid of junk mail** - There are many services that can help you get rid of junk mail. That will lead to a lot less trees being cut down to take up room in your mailbox.
- **Use Matches instead of lighters** - Lighters are usually considered disposable so they will most likely end up in landfills. You can use the cardboard matches which are much more eco-friendly because they are made of recycled material.
- **Don't get a paper phone book** - Instead of getting a paper phone book. Use an online directory instead.
- **Give things away** - Take things that you are not going to wear or use and give it to a charity or someone who will use it.
- **Go to a car wash** - Going to a car wash is a lot more water efficient than washing your car at home.
- **Stop paper bank statements** - Why waste paper getting your bank statement mailed to you when you can just check it out online.
- **Buy Rechargeable Batteries** - Even though it will take a good investment to buy these you will find yourself gaining it back in no time.
- **Pay your Bills Online** - If every house did this then we would save 18 million of trees every year.
- **Get a reusable bag** - You can't recycle plastic bags, instead get yourself a reusable bag so that you won't have to worry about carrying your necessities.
- **Do Errands in Bulk** - Make a list of the things you have to do, and see if you can fit a couple of those things together in one ride.
- **Inflate your Tires** - If your tires are inflated at all times your car will run more miles on less gas.
- **Wrap Presents Creatively** - Without going out to get wrapping paper you can use newspaper, an old map, or anything else. It would look a whole lot more creative.
- **Plant a Tree** - It's good for the air, can keep you cool, and can increase your property value.
- **Buy Local Produce** - Consider how much energy it takes for produce from China or any other country to come here. If you have the option to buy local, do it.
- **Walk or Ride Your Bike When you can** - If you have to go somewhere close consider riding your bike or walking there instead of your car. It's better on the environment and healthier.
- **Change to Fluorescent Bulbs** - If every house changed all of the light bulbs in their house, that would be equivalent to taking one million cars off the streets.
- **Don't Rinse** - Skip rinsing your plates before putting them into the dishwasher. In average you will save 56.781 Liters of water per load. Plus, you will save time.
- **Turn off computers at night** - don't just put them to sleep. You will save an average of 4 cents a day which adds up to Rs. 671.60 a year.
- **Use Both Sides of Paper** - if you have a printer with a double sided print option use it. You will save half of the amount of paper you would have normally used. Then when you are done bring it to the recycle bin.
- **Get rid of baths** - Don't take baths, take showers. You will in average save about half the amount of water that you would if you were taking a bath.
- **Don't get bottled water** - Instead of bottled water get a reusable container to carry water. Also you can get a filter to make your home tap taste more like bottled water. It is definitely more cost efficient.
- **Turn the water off when you brush** - Your parents have said this before, now I say it. You will save 4.546 liters of water doing this alone.
- **Shorten your shower** - Every minute you cut from your shower is roughly 18.93 Liters of water. The less time your shower takes, the lower your impact on the environment.
- **Recycle Glass** - If you do not recycle this, it will take a million years to decompose.
- **Don't Pre-Heat the Oven** - unless needed, just turn the oven on after you put the dish in it. Also, to see if it's finished just look through the glass instead of opening it.
- **Use Warm or Cold Setting on Washer** - instead of the hot cycle use the warm or cold setting. This will save a lot of energy a year.
- **Turn Down your Thermostat** - Every degree lower in the winter or higher in the summer you put it is a 10% decrease on your energy bill.
- **Turn off your lights** - An easy one. Turn off your lights when you are not using them. The benefits are obvious.

Source: <http://www.squidoo.com/agreenlife>

SOLAR ENERGY

India receives solar energy equivalent to over 5000 trillion kWh/year, which is far more than the total energy consumption of the country



WIND ENERGY

India ranks 5th in the world with a total wind power capacity of 1080 MW out of which 1025 MW have been established in commercial projects



CO-GENERATION



BIOMASS

GEO THERMAL ENERGY



Geo-thermal manifestations are wide spread in India in the form of 340 hot spring sites

TIDAL ENERGY



Form of Energy: Potential/Kinetic energy

This energy is being used for: Power generation

Some of the gadgets and other devices: Turbine generators



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Gujarat Cleaner Production Award-2006-07 Ceremony on 23rd September 2009, Vadodara



Dr. S.K.Nanda, PS, F & E Dept., presenting Trophy and Certificate to Asian Paints, Ankleshwar



Shri. Babubhai Patel, Canberra Chemicals, Nandesari, giving the Presentation on Cleaner Production Option implemented in his industry



MS, GCPC Making Presentation on Incentive schemes in Industrial Policy- 2009



Participants of the Programme from various Industries.

This publication aims at disseminating information on pertinent development in its specific field of coverage. The information published does not, therefore, imply endorsement of any product/process/producer or technology by GCPC



We would appreciate if you send your comments & suggestions

Er. Bharat Jain, Member Secretary

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