Batch Chemical Sector and climate change mitigation

It's difficult to generalize the impacts from greenhouse gases emissions of the batch chemical industry, because of its diversity and the different number of processes and sub-processes that can be found. But must processes have the need of heat and/or cold in common for the development of their production process. In most cases, these energy needs are obtained from fossil fuels, whose combustion releases CO_2 and other greenhouse gases. We also can find some processes where the chemical reaction itself releases greenhouse gases.

Among the mitigation measures implemented in the batch chemical sector, we can distinguish three main groups:

- The use of cogeneration as a source of electricity creation, by the combined generation of heat and power, where higher thermal efficiencies can be reached.
- The use of cleaner fuels, as biomass or natural gas if it's not possible.
- The use of energy-saving generic alternatives.

Impacts of the chemical industry in the gases emissions of greenhouse effect

ORIGIN OF EMISSIONS

Heating and cooling need for the development of chemical industry production process.

- Emissions from direct combustion:
  - Use of fossil fuels for production of heat or cold:
    - Mostly used: diesel, fuel oil and natural gas.
    - It represents a very important part of overall gases emissions of greenhouse effect of the whole chemical sector.
  - Emissions from waste gas combustion generated in the batch chemical industry:
    - The mainly gases generated are: CH_4, CO, CO_2 and VOCs.
    - Reusing the heat generated by burning the waste gases in the industry processes.
    - The mainly industrial processes where waste gases are generated are: manufacture of black carbon (CH_4, CO, CO_2, VOCs...), methanol manufacture (CH_4 and VOCs) and polymers manufacture.
- Emissions from the process:
  - Reforming:
    Applied for the production of synthesis gas made from methane.
  - Venting:
    Releasing the gases contained in the reaction tanks to the atmosphere.
  - Use of fluorinated gases in refrigeration systems:
    Substituting them for other gases with less heating potential (higher than CO_2) or reducing their use

Proposal of mitigation alternatives of gas emissions with greenhouse effect in the chemical sector

USING COGENERATION

- Combines heat and electricity to reduce losses.
- Needs high production volumes to be economically viable.
- The energy requirements and the relationship between heat and electricity of some chemical processes are suitable for the cogeneration use.
- This is a well known and developed technology that can be applied to both new and existing plants.
- The overall thermal efficiencies may reach 93%, reducing the carbon dioxide emissions rate about 50%.

USING CLEANER FOSSIL FUELS

- Using biomass as a fossil fuels alternative.
- Among the fossil fuels natural gas has a lower emission factor per heating unit.

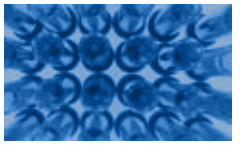
ENERGY-SAVING GENERIC ALTERNATIVES

- Aim at rational use of heat and cold.
- Use of higher energy yields fuels.
- Implementation of heat recovery systems in the production processes.
- Monitoring and control of energy consumption to identify opportunities for optimizing processes.
- Installing thermal insulation systems in hot and cold pipes.
- Maintenance and regular cleaning of equipment and facilities.
- Training and awareness of the staff.
- Adequate lighting design and efficient systems installation.
- Proper management of refrigeration systems fluorinated gases.










Case study:
Hikma Pharmaceuticals PLC (Jordan) (Source: MedClean-104)

Hikman Pharmaceuticals PLC is a pharmaceutical company. Their manufacture and operations are energy intensive, and they are investigating ways to reduce the energy use. One of the major accomplishments in 2007 has been the collection for the first time of consistent data on energy usage, water usage and waste production at main production sites. The company began a thorough review of his social and environmental impact, in order to better align its desire to act responsibly with its strategic business objectives. Their continuing commitment to Corporate Social Responsibility (CSR) is their strategic response to this goal. They also gain a business benefit through greater efficiency and control of resource input costs.

In 2007 the company adopted a Group wide environmental policy, which will help them to embed environmental efficiency into their operations. The main environmental impacts are in the area of energy consumption, water usage, and waste production by the implementation of a quality management system, QMS

GENERAL MEASURES TO REDUCE EMISSIONS

This QMS originates from a Cleaner Production assessment carried out at a water and steam system networks and plant. It shows what the company did and what the assessment achieved. Hikma implement the following actions to achieve the desired objective:

- Water system rehabilitation.
- Compressed air supply system.
- Upgrade cooling, heating and steam generation system.
- Improvement of power supply efficiency.

INVESTMENT COST AND AMORTIZATION

Action	Investment ($)	Economic savings ($/year)
Water system rehabilitation.	25,000	20,000
Compressed air supply system.	39,000	28,000
Upgrade cooling, heating and steam generation system.	119,000	96,000
Improvement of power supply efficiency.	73,000	66,000

The total investment was $254,000 and the achieved annual savings were $210,000. The payback period estimated was 1.2 years.