

The background features a dark blue grid. A white line chart with small circular markers is overlaid on the grid, showing a fluctuating trend across the width of the image. The text is centered and rendered in a white, sans-serif font.

# 2nd Regional Exchange of Modelling Experts involved in the Development of NECPs

# HEAT PUMPS

Applicable for:

- Commercial
- Industrial
- Residential



# HEAT PUMPS

Application of heat pumps has been increasing significantly. Primarily, this is due to the high coefficient of performance (COP) and the low cost of electrical energy. Some use them primarily for heating, some for cooling, but in both cases, their use is in both winter and summer.



## HEAT PUMPS...BUT

But in modeling, it is difficult to find data on where everything is used and what their number is. Looking at the Agency of Statistics, it is very difficult to get this information. The same situation is with the national documents.



## HEAT PUMPS...BUT

As the production is placed in foreign countries, all WB6 countries are importers of these devices. The only place where the real data can be found is the customs administration, because it must be registered due to the law on import of Freon type (environmentally friendly or not).

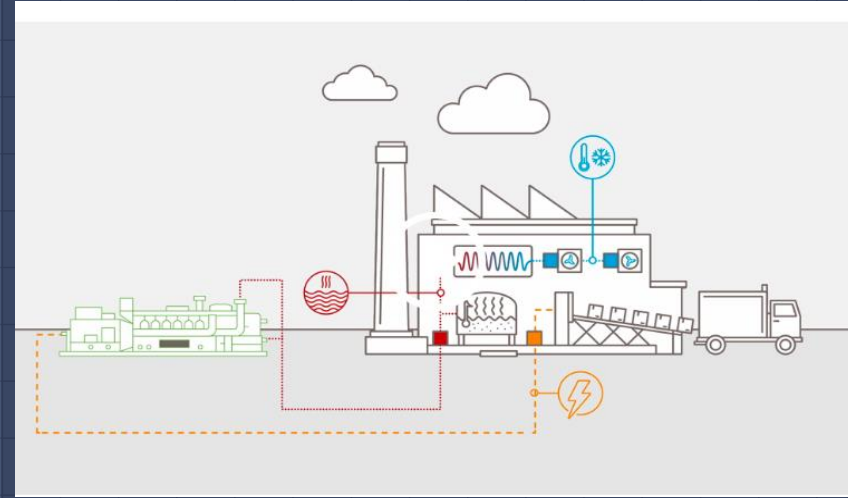


## HEAT PUMPS...BUT

We are putting them in the "basket" as new technologies and we believe that their place is not in renewable energy sources. But their use, especially in larger industrial cities, may be reduced by the use of three-generating devices. Even more important is that the final energy, which is electricity, will not be used for this purpose.

# Trigeneration/CCHP

Trigeneration or combined cooling, heat, and power (CCHP), is the process by which some of the heat produced by a cogeneration plant is used to generate chilled water for air conditioning or refrigeration. An absorption chiller is linked to the combined heat and power (CHP) to provide this functionality.



## Trigeneration/CCHP – benefits:

- High-efficiency production of electricity and heat
- Reduced fuel and energy costs
- Lower electrical usage during peak summer demand
- Engine heat can be used to produce steam or hot water for onsite use
- Significant reductions in greenhouse gas emissions
- No harmful chemical pollutants since water is used as the refrigerant
- Beneficial for improving the building's energy efficiency ratings



## Trigeneration/CCHP

Absorption chillers provide an economical and environmental alternative to conventional refrigeration. Combining efficiency, low emission power generation equipment with absorption chillers allows for maximum total fuel efficiency, elimination of harmful refrigerants, and reduced overall air emissions.

# Trigeneration/CCHP

There are several different configurations of CHP units where refrigeration can be derived. These include:

## 1. Absorption Chillers

- Operation using hot water
- Operation using steam
- Direct heat via combustion

## 2. Compression-type refrigeration machines

- Direct drive power
- Electrical drive power

## Trigeneration/CCHP

Combining a cogeneration plant with an absorption refrigeration system allows the utilization of seasonal excess heat for cooling. The hot water from the cooling circuit of the plant serves as driving energy for the absorption chiller. The hot exhaust gas from the gas engine can also be used as an energy source for steam generation, which can then be utilized as an energy source for a highly efficient, double-effect steam chiller. Up to 80% of the thermal output of the cogeneration plant is thereby converted to chilled water. In this way, the year-round capacity utilization and the overall efficiency of the cogeneration plant can be increased significantly.

**A good solution for future technology projections.**

Utilization of the flue gases from all existing boilers

Another process or technological innovation must always be present in our thinking, and its benefit is enormous.

This will increase the efficiency of the boilers and will also help reduce harmful emissions.

**It should be considered as an applicable technology in modeling projections.**

