# Appendix 11. Seafood industry

## Sector Specific Annex to Audit Guideline under the EE Incentive Scheme for energy intensive industries in Vietnam

## 1 Introduction

The purpose of this annex is to secure that the most important opportunities for energy efficiency improvements in the seafood industry are investigated.

The annex is prepared to provide more sector-specific guidance than what is presented in the general energy audit guideline prepared under the Danish/Vietnamese cooperation.

As such, the guideline describes the most important focus areas within the key technologies of:

- **Freezer** is the process of freezing the seafood products immediately after cleaning and processing them, often including ice-glazing.
- **Ice production** is the process of producing ice for packaging seafood products.
- **Air conditioning** is the process of keeping a certain low temperature in the production areas so as the seafood products can be kept at a low temperature during all stages of production.
- **Cold storage** is the process of storing raw materials and final products at a low temperature to maintain a high product quality.
- **Chilled water** is the process of producing cold water for cleaning and washing of seafood products.
- **Refrigeration:** Cooling is typically produced in a number of cooling plants matching specific temperature requirements in the production.
- **Compressed air** is used to power the machinery of the facilities and is therefore applicable to all processes powered by heavy machinery.

- **Heat recovery systems** are applied to recover heat from central refrigeration plants to supply waste heat across to any heat user.

Below, important energy efficiency measures for each of these areas are described.

## 2 Technology review compared with Best Current Practice

In the table below, best practice energy efficiency projects are listed for each of the technologies above. The energy audit should consider the possible viability of each of the measures in the specific context.

The energy audit report should document how these potential measures have been considered. For each measure it should be stated whether it is practically relevant for the specific enterprise. If it could be relevant, the report must make a pre-assessment of the technical and financial viability.

| No. | Technology | Energy efficiency measures |
|---|---|---|
| 1 | Freezers | • Is the right set-point for air temperature applied in the freezer? – according to product type (fat fish vs. lean fish), belt speed and target temperature?<br>• Is a matching evaporator temperature applied in the refrigeration plant supplying brine/glycol etc. to the freezer?<br>• Are 2-stage evaporators used to supply the freezer with cooling in matching temperature zones of the freezer?<br>• Are inlet and outlet to the freezers properly designed not allowing ambient and humid air to enter the freezer?<br>• Are doors to freezers (blast freezers) closed while freezing and the freezers loaded/on-loaded fast?<br>• Is a proper de-frosting procedure applied for the freezer and with a proper sequence? |

| No. | Technology | Energy efficiency measures |
|---|---|---|
| | | • Can fan speed in freezers be reduced (VSD) to match the actual products freezed?<br><br>• Is the right freezer used for the right purpose? – is a freezer for large products by example used for small products? |
| 2 | Ice production | • Is cooling for the ice production produced at a separate cooling plant with an evaporator temperature matching the temperature demands in the ice machine?<br><br>• Is the amount of ice produced measured on a daily basis or is production exceeding the demand for ice in production? |
| 3 | Air conditioning | • Are the set-points for inlet air to production areas properly set according to the requirements in the room?<br><br>• Are the set-point for inlet air adjusted outside working hours not to keep the premises at too low temperature?<br><br>• Are the production areas properly closed with doors, fast gates and curtains so that outside air is prevented from entering the rooms?<br><br>• Is cooling for air conditioning produced at a separate cooling plant with an evaporator temperature matching the temperature demands in the production areas? |
| 4 | Cold storage | • Is the cold storage installation properly insulated?<br><br>• Are doors sealed so as no humidity enters the cold storage? – or are fast curtains used to avoid ambient air to enter the rooms? |

| No. | Technology | Energy efficiency measures |
|---|---|---|
| | | • Is a proper de-frosting procedure applied for the evaporators in the cold storage rooms and with a proper sequence?<br>• Is low energy lighting (LED) applied in the storage rooms?<br>• Is cooling for the cold storage rooms produced at a separate cooling plant with an evaporator temperature matching the temperature demands in the rooms? |
| 5 | Chilled water | • Is chilled water produced by cooling of water (and not as water mixed with ice)?<br>• Is cooling for chilled water produced at a separate cooling plant with an evaporator temperature matching the temperature demands of the chilled water? |
| 6 | Refrigeration | • See Technology Catalogue for refrigeration systems.<br>• For freezing plants special attention shall be paid to:<br>- Air purging to remove air from condensers etc.<br>- Water purging to remove water from refrigerant. |
| 7 | Compressed air | • See Technology Catalogue for compressed air systems. |
| 8 | Heat recovery | • Heat can be recovered from refrigeration plants<br>- De-superheating. |

| No. | Technology | Energy efficiency measures |
|---|---|---|
| | | - Oil cooling.<br><br>• Heat can also be recovered from compressed air plants.<br><br>• Any hot water demand can be covered this way and not with a boiler. |