



## **SOPRO PROJECT**

# **WP2- PRIORITY APPLICATIONS SELECTION SUMMARY**



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## 1 Introduction

Based on the screenings and considering the preliminary information from the regional inventories, the data obtained from key stakeholders and the previous experiences on process by partners, three priority applications have been selected. These applications present a great potential on solar process heat and will be considered in the following WPs, as for WP3 tools development and WP5 pilot projects installations.

## 2 Priority applications selection

### 2.1 Background

Regional inventories, screenings and information obtained from key stakeholders in 6 European regions have provided a sensible amount of information to detect the most promising applications for solar process heat. Technical, economic, market and social behaviors have been considered in order to promote solar installations in industries. Priority applications will be used in the following project activities, particularly in the selection of the tools for solar promotion in industrial applications, the development of pilot projects and the dissemination activities.

Even when solar applications in buildings are well known at present in most European regions, solar process heat has still low applications and dissemination. The selection of priority applications will be relevant, not only during SOPRO development and results, but also for the dissemination in other European countries different than partners involved in the project and moreover after the project end for the sustainability of projects results.

The integration of the information gained in the SOPRO project has led to a clear selection of the priority applications.

### 2.2 Conclusions on the selection

The priority applications selected have been:

- Cleaning and washing
- Heating of baths/vessels
- Drying



The reasons for their selection, which are explained in this section with detail, are mainly related to the relevance of the industrial sector and processes, regular energy demand and temperature level of the demand.

⇒ Cleaning and washing:

Cleaning and washing is one of the most wide-spread applications in all sectors of industrial processes. Hot water is needed for cleaning of machineries and equipment in chemical industry and in the food and brewery industry where cleaning the entire daily used machinery and equipment are absolutely necessary. The typical range of temperature is of 30 to 80°C, with priority on 40 to 60 °C. These industrial processes demand heat everyday at analyzed industries.



*Washing of cheese molds*

Frequent washing of equipments during daily batch processes is also common in these industries, as vessels in chemical industry. Cleaning can also be part of the production process itself, as it is required e.g. in food industry to prepare the goods for preparation, the final washing before drying and packaging, cleaning of packaging materials etc.

There is a wide range of specific applications for water at different temperature levels. Depending on the process, the systems are continuous and discontinuous and differ between open systems without any water or heat recover technology and semi-closed systems in which waste water heat recovery systems are included.



Some specific examples are:

- Cleaning of cheese molds
- Washing of vessels where meat or mixtures (sausages) are prepared and produced
- Washing of molds at meat processing industry
- Washing of vessels at dairy products industries
- Preliminary washing of meat units at meat processing industries
- Washing of meat or vegetables before packaging or freezing process
- Vessels cleaning at wine production industry
- Cleaning of bottles at bottling industry (for drinks as wine or juice)
- Washing of vessels where products are prepared, every time that they have to produce a different product at chemical industries
- Industrial washing machines
- Cleaning of tanks and machinery at recycling industry

The integration of solar thermal heat in washing processes is comparatively easy to realise from a technical point of view. The solar heat is used for heating a buffer storage. If the solar plant cannot cover the whole heat demand, the existing conventional system can provide back-up heating.

⇒ Heating of baths/vessels:

Wherever baths filled with very different liquids (water, grease, oil, chemicals, etc.) which need to be heated, in principle solar heat can be used. Present heating systems are supplied by oil or gas boilers which produce either steam or hot water, either centrally for the whole plant or decentrally for the specific process.



*Chemical treatment bath*

For most applications, vessels with large capacities are installed and (re-)filled or reheated, frequently more than once a day. In these cases, solar heat can be suitable as storage tanks can be designed exactly for the expected demand of heat. In processes which require hot baths, the hot liquid as such can be used as storage medium for solar heat.

Some specific examples are:

- Raw materials at chemical industries need heat to maintain the properties of chemical products. Mixtures at those industries need also heat to produce the desired product. (e.g. hair products, plastic production)
- Scald process at chicken industry
- Cooking of food
- Chemical treatments in baths at metal industry (e.g. electroplating, thermofore-sys, galvanizing, aluminium pretreatment, steel pretreatment )
- Temperature providing for painting and resin tanks heating
- Degreasing of metal elements at metal or machinery industry
- Degreasing of food intermediate products (e.g. fat production)
- Heating of baths for aquariums
- Heating of baths for textile dyeing



Heating of baths together with other heating and hot water applications in general occurred in 8 of the screenings described above.

⇒ Drying:

The process of drying includes many applications in a wide range of industrial sectors. Drying is usually the final step in a series of operations and the product from a dryer is often ready for final packaging. Drying is a very energy intensive process as it is the process of evaporating water out of solid materials. For many drying processes, particularly slow drying, temperatures below 70°C are required which allows the usage of waste heat from other steps of the production. Dryers are often run continuously with a constant heat demand, what makes them interesting for the use of solar heat. Solar heat integration solutions can be found for a wide range of different system concepts.

Some specific examples are:

- At food industries, like pasta or dried condiment, heat for drying is needed
- Wood drying in slow drying process
- Painting drying at metal supporting industries
- Drying of metal spare parts in intermediate processes
- Heating/Drying of plastic skins for ductility optimization (before modeling)
- Heating/Drying halls for production
- Drying of ceramics at building industry



*Painting drying treatment*