Name of the technology: 2.3 Solar thermal systems for heating and cooling

Stage of development:

Widely used technologies (the technology is used by many actors on global/EU level).

Technical application:

Domestic heating and cooling, hot water, some industrial applications.

Short summary (up to 200 characters):

Solar thermal technologies could be divided into two main categories: solar passive and solar active systems. Passive solar design is used in the architecture to ensure less energy needed for space heating and cooling by utilizing solar energy in winter and preventing its penetration in summer. Solar passive technologies do not use external energy for solar energy collection and utilization. Active solar systems use solar collectors and additional electricity to power pumps or fans to distribute the gained sun's energy.

Justification – why was this technology selected (up to 500 characters).

Solar thermal energy can be used to efficiently cool in the summer, and also heat domestic hot water and buildings in the winter. Active solar cooling uses solar thermal collectors to provide solar energy to thermally driven chillers (usually adsorption or absorption chillers). Absorption chillers operate with less noise and vibration than compressor-based chillers.

Characteristics (up to 500 characters):

- Typical size of solar thermal installations: small < 25 m^2, medium size – 25 – 100 m^2, large scale > 100 m^2.
- Typical coverage of the heat demand (for DHW) : 50% - 60%
- Typical efficiency – 50-80%
- Investment costs of solar installations in the EU: €400 –€1000/m^2
- Investment costs for solar cooling depends strongly on the collector technologies and chillers equipment.

For active space heating and cooling systems 3 main types of collectors are used:

- Absorber only –The absorber systems are used for low thermal applications.
- Flat plate collector - this is the most common type of solar thermal collector.
- Evacuated (vacuum) tubes collectors - these collectors have evacuated glass tubes.

Evacuated tube collectors are one of the most efficient and effective producers of solar hot water. Therefore, absorption chillers run very effectively with a proper solar thermal configuration.

Impact on the economy (up to 1000 characters):

If solar cooling can be combined with solar heating, the solar system can be more fully utilized and the economic benefits should increase. Solar cooling systems are attractive because cooling is most needed when solar energy is most available. Solar absorption chillers are very low in operating and maintenance costs, and consumes little or no electrical energy. All of these small electrical loads can run from solar PV panels if desired, meaning zero operational costs for the solar air conditioning system.

Solar thermal technologies are mature and popular within installers and people. This is one of the least expensive forms of alternative energy, creates new jobs at local level and contributes to combating climate change, security of supply and improvement of living standard.

Global development (up to 1000 characters):
In 2012, the European market experienced a reduction in the overall newly installed capacity which amounted to 2.4 GWth (approximately 3.4.106 m²). The total installed capacity registered a net increase of 2 GWth, now reaching 28.3 GWth (40.5.106 m²). This represents an increase of 7.7% compared with the 2011 total installed capacity. (Source: ESTIF).

Solar cooling systems by themselves, however, are usually not economical at present fuel costs. Combining solar heating and cooling systems is not easy because of the different system requirements. Absorption chillers are powered by heat (hot water). Many thousands have been installed using gas boilers or by harnessing waste heat from generators or other sources. The state-of-the-art of solar cooling has concentrated primarily on the developmental stages of systems in the last few years. But solar powered air conditioning systems is one of the most efficient and cost effective solutions for commercial air conditioning

Milestones[1] *(List at least one milestone per year against which the progress towards the achievement of the local/regional 2020 targets can be measured)*

Given the scope of the roadmaps (municipally or regionally based) technological improvements that would require major research and development processes would tend to fall outside of the scope of these roadmaps. This does not necessarily mean that such technological improvements cannot be used as milestones, but that before any such technological improvements are stipulated in the milestones, the capacity of the municipal and/or regional stakeholders, and the capacity of the municipality/region to collaborate with external partners, should be carefully considered.

Milestones more likely to fall within the scope of this roadmap are those that are able to help measure desired changes in the deployment and/or wider usage of the previously identified key energy technologies or those that measure the effects of this changed deployment or usage (i.e. production of thermal energy (GWh); increase of thermal energy production (%); installed capacity (GW or m2); increase of installed capacity (%); CO2 reduction (t)).

Year	2015	2016	2017	2018	2019	2020
Milestones		**1.25 MWt installed capacity**	**1.25 MWt installed capacity**			

The group assumed a hypothetical amount of 2.5 MWt of installed solar thermal systems for heating and cooling until 2020.
They assumed an installed capacity of 1.25 MWt per year in 2016 and 2017.

Financial Gaps
(List financially related challenges that need to be addressed in order to increase the uptake/wider usage of this technology)

1. **Lack of predictability when launching the financial instruments at national level.**
2. **Lack of institutional capacity of existing Programs Implementation Units (ESIF)**
3. **Lack of cooperation between public authorities and private investors.**

Policy Gaps

(List important policy gaps that prevent the uptake/wider usage of the key technology)

1. **Contradictions and major issues in promoting, developing, implementing and operating RES in terms of financial and legal environment**
2. **Lack of interest and active involvement on behalf of local authorities**
3. **Lack of interest from projects developers for disseminating, sharing experience, know-how and best practice**
4. **Lack of awareness-targeting actions meant to increase knowledge on legislative provisions, financial and technical solutions**
5. **Lack of institutional transparency and high bureaucratic public procurement procedures.**

Financial Instruments and Period of Implementation

(List all relevant financial instruments that can address the above financial gaps and will contribute to the uptake/wider usage of the key technology. Please add the start year and years of important developments for the financial instrument.)

1. **Support Actions for public-private partnership (PPP)**
2. **Financial Incentives for individuals to use green energy (building and land tax deduction for a percentage of project value)**

Policies and Period of Implementation

(List all relevant policies that can address the above policy gaps and will contribute to the uptake/wider usage of the key technology. Please add the start year and years of important developments for the policy.)

1. **Rising the level of importance and involvement of the local authorities**
2. **Creating an association of stakeholders for submission of applications to the energy funds and for building a reputation that may help in applying for public procurement contracts in the future**
3. **Transposition of the new Public Procurement Directive as well as the ex-ante conditionality on Public Procurement for accessing EU Structural funds 2014÷2020**

Stakeholders

(List all relevant stakeholders for the implementation of the policy and/or financial instrument above)

1. **Municipalities, administrations, ministries.**
2. **Building associations, corporations.**

Policy Recommendations

(*Relevant policies for this particular technology have already been identified above. This section aims to provide the steps needed for the practical implementation of the policies and financial instruments listed above.)*

1. **Identification of "Champions" that could be the motivated players in starting the association.**
2. **Organise meetings to develop the association.**
3. **Formally launch association and start procuring solar thermal systems at preferential prices.**