

Renewable Thermal Technologies (RTTs)

Renewable thermal technologies (RTTs) are technologies that provide heating and cooling services based on renewable energy resources. RTTs can deliver energy for thermal purposes: Domestic hot water, process heating, cooking, and space heating and cooling. RTTs utilize a broad range of renewable energy sources that otherwise would be lost. For the purpose of this project, the following RTTs are included:

- Heat pumps such as Air Source Heat Pumps and Ground Source Heat Pumps
- Solid biomass, such as wood chips, wood pellets and wood
- Liquid biofuel such as biogas and biodiesel
- Solar thermal
- Waste heat technologies

Different RTTs deliver heating and cooling at different temperature levels. Temperature levels are important to define the suitability of different technologies for meeting specific heat requirements in the various end-use sectors. RTTs can range from small domestic applications to large scale applications used in industrial processes and district heating and cooling networks. As RTTs often utilize locally available energy resources to meet the on-site heating and cooling demand, customized solutions often are required.

For the purpose of this project, only technologies delivering thermal energy to a dominant part of the building or process are included. This would typically be ductworks or hydronic systems.

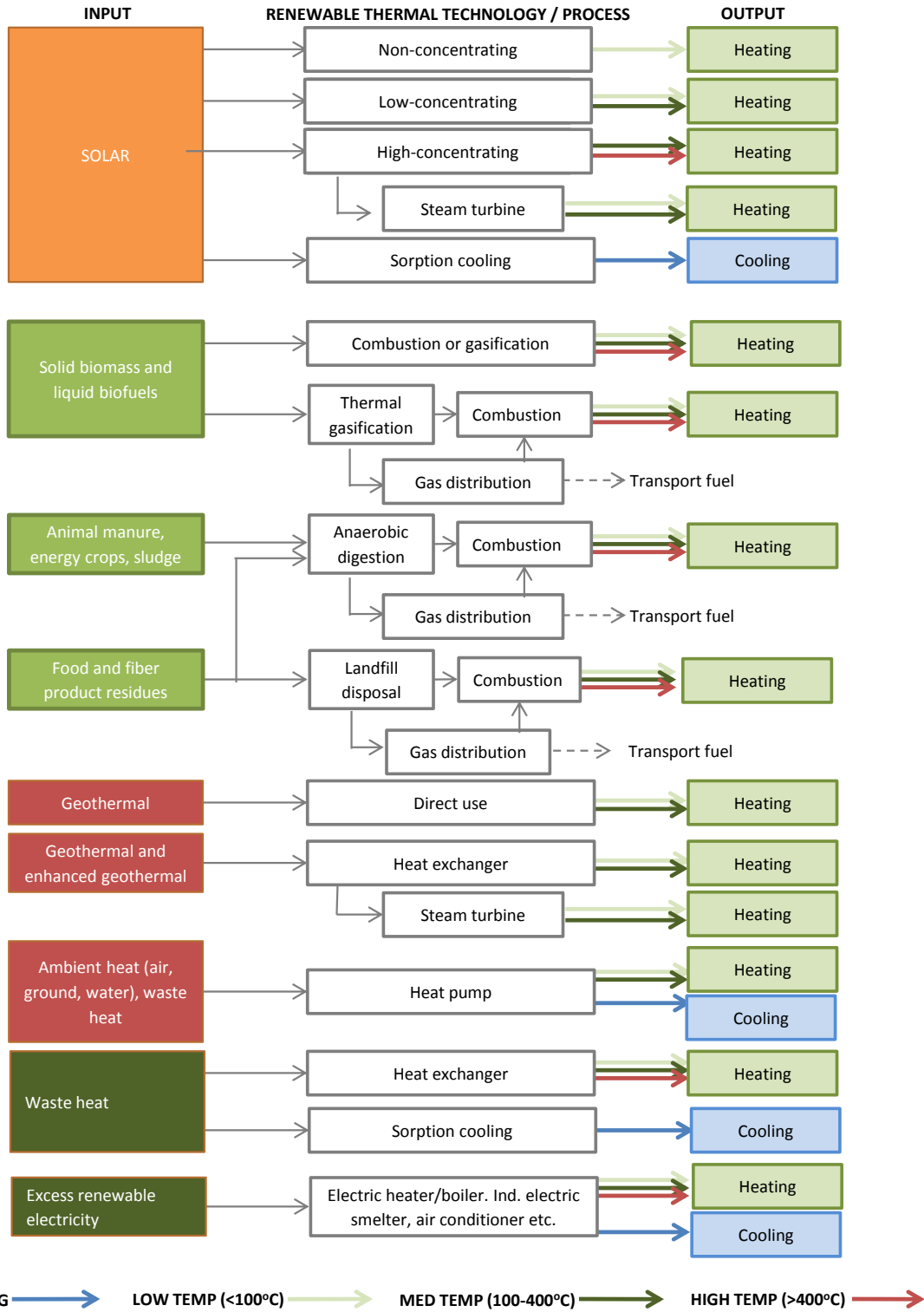


Figure 1 Overview different renewable energy sources and main technologies (Based on IEA 2014)¹

Renewable energy resources represent the annual energy flows available through sustainable harvesting on an indefinite basis. Except for biomass, technologies harvesting renewable energy flows convert resource flows directly into electricity, heat, or cooling. Their technical potentials are limited by factors such as geographical orientation, terrain, or proximity of water, while their economic potentials are a direct function of the performance characteristics of their conversion technologies within a specific market setting.²

¹ International Energy Agency (IEA): [*“Heating without global warming. Market developments and policy considerations for renewable heat.”*](#) 2014

² Grubler A, Nakicenovic N, Pachauri S, Rogner H-H, Smith KR, et al., 2014: Energy Primer. International Institute for Applied Systems Analysis, Laxenburg, Austria, p. 40.