

Design and Characterization of an Asphalt Solar Collector

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Motivation

Research theme

Planning

Main reasons:

- To believe in a more sustainable development that allows to have a better future
- The nowadays increasing demand of energy and the shortage of resources
- Global warming problem
- The deterioration of the quality life in urban areas
- The aim to improve the service conditions of roads and the safety
- The aim to improve the lifespan of the roads and therefore, to reduce maintenance costs
- The aim to get a cheaper energy than conventional for people who have economical problems

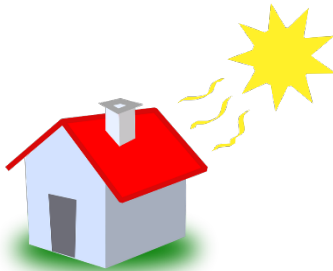


Photo source: <https://sustainablenano.files.wordpress.com/2013/01/solar-powered-house.png>



Photo source: <https://openclipart.org/detail/167242/country-road>

Motivation

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Development of an asphalt solar collector for solar thermal energy harvesting.

It consists on:

- A net of pipes within the pavement
- A fluid which extracts the energy in form of heat
- Storage system

Depending on:

- Pipe material
- Collector material
- Incident irradiation
- Water flow
- Collector size

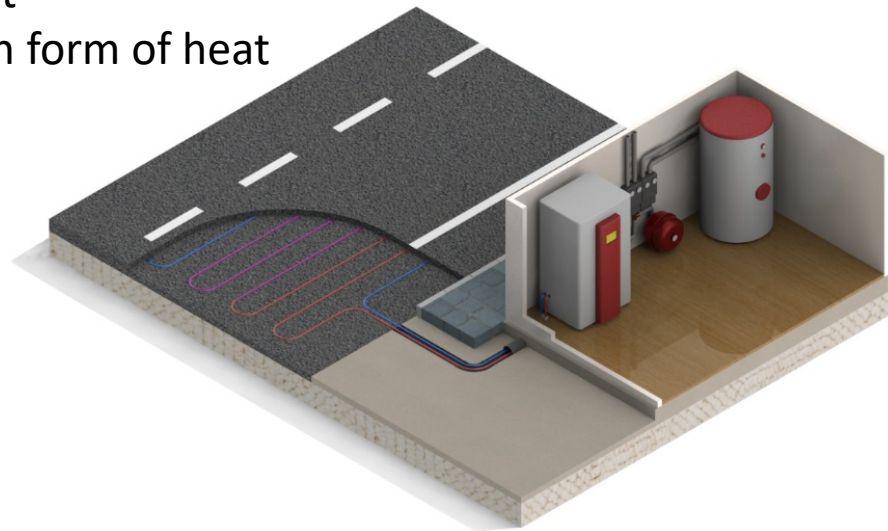


Photo source: Carlos Real Gutiérrez (GITECO)

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Benefits of this technology:

- Reduction the CO₂ emissions
- Reduction of the electric energy consumption
- Reduction of the pavement surface temperature
- Cheaper energy than conventional systems
- Seasonal storage for the use of energy when it is more necessary



Photo source: <https://www.flickr.com/photos/herlitzpbs/5186924145/>



Photo source: https://it.wikipedia.org/wiki/File:Leaf_icon_15.svg

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Energy uses:

- Hot water for housing
- Swimming pools water warming
- De-icing and melting snow of the pavement surface
- Building heating



Photo source:
<https://www.flickr.com/photos/1f2frfbf/5293809716>



Photo source:
https://commons.wikimedia.org/wiki/File:Qu%C3%A9bec_D-320.svg

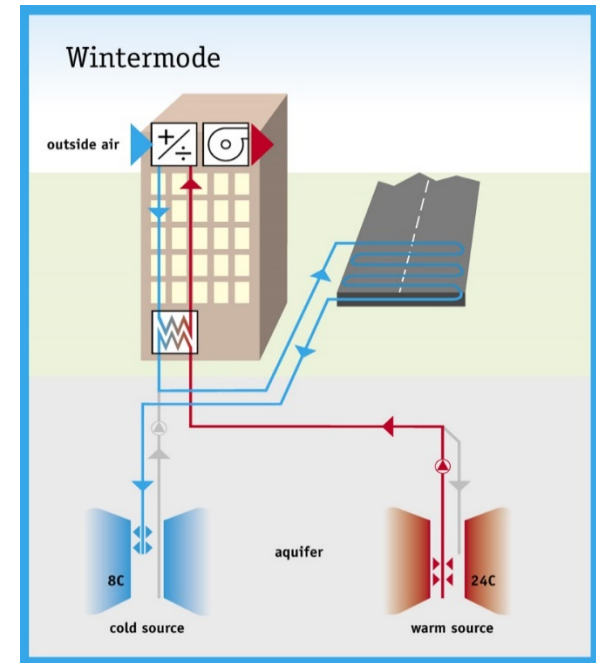
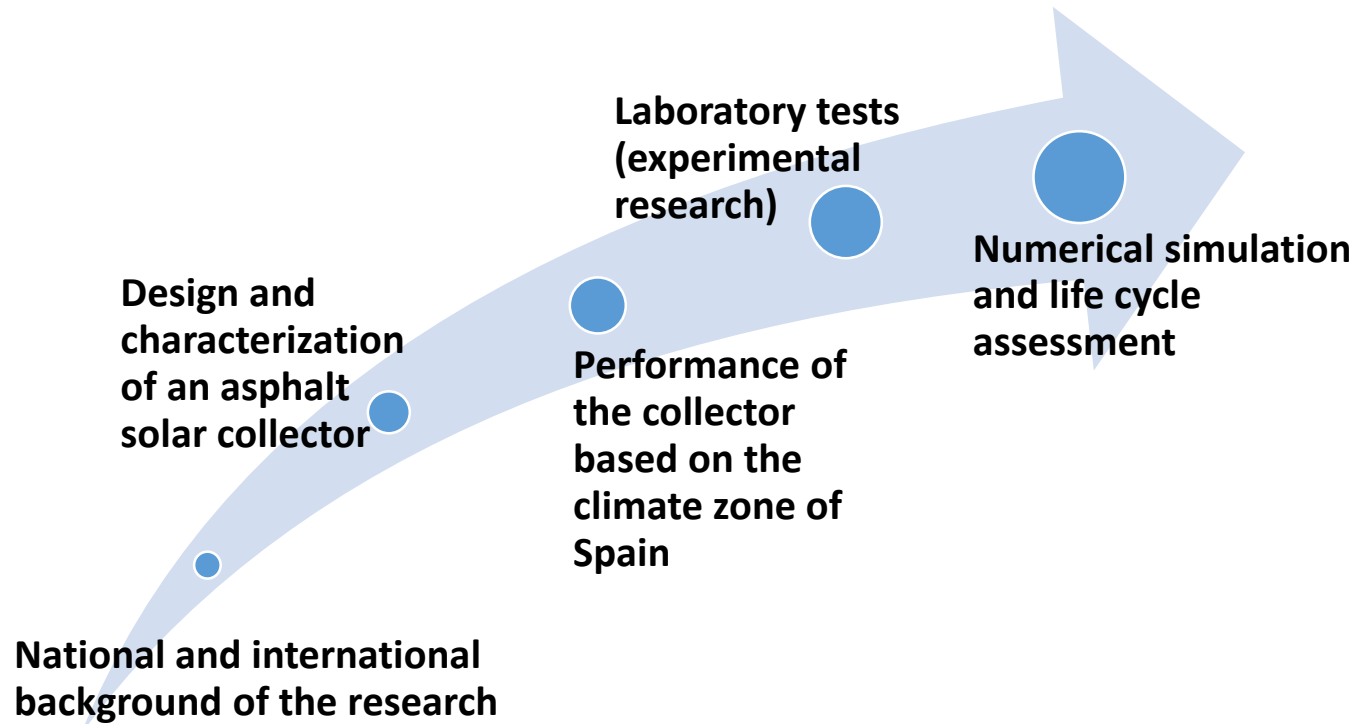


Photo source:
<http://www.gaszappers.com/2008/02/27/save-energy-by-using-asphalt-road/>

Motivation

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Motivation

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Planning

Objectives:

1. The characterization of the most suitable materials, as well as the system geometry and layout, for the collection of the highest amount possible of solar energy
2. The study of the system efficiency in relation to the climatic area in order to adapt the design to every specific need
3. The study of the degradation of the materials used in the collection of heat and the development of the Life Cycle Analysis (LCA) of the constitutive elements of the system

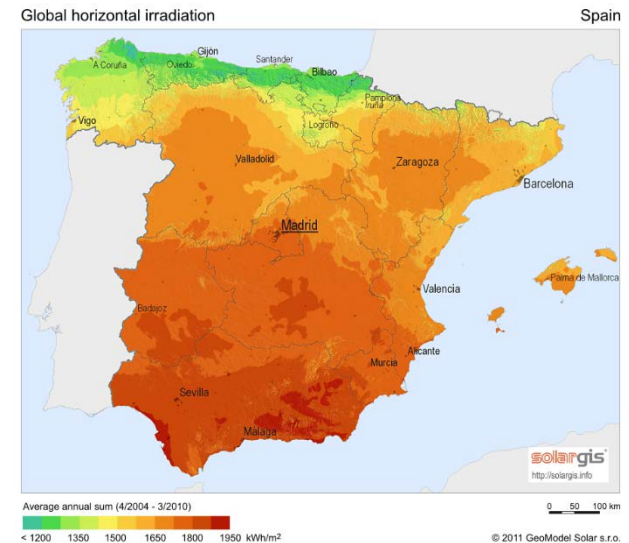


Photo source: <https://commons.wikimedia.org/wiki/File:SolarGIS-Solar-map-Spain-en.png>



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