

Determination of the potential for active solar thermal energy in a country or region

A basic approach.

With this approach the potential for active solar thermal energy in The Netherlands was determined. The results form the base of the long-range plan for solar thermal energy of the Dutch government and are used by many other parties like utilities, NGO's and manufacturers when they are considering market introduction strategies.

Useful for policy and business,

Scope: continents, countries, regions, techniques, markets

The approach

With examples from the Dutch situation

1) Identify techniques

- Specify possible [technologies](#)
- Identify [relevant figures](#) for the various techniques.

Possible [technologies](#):

- domestic solar water heaters
 - large solar water heaters for collective hot water supply
 - solar water heaters combined with seasonal storage
 - solar dryers
 - swimming pool solar heaters
-

Examples [relevant figures](#)

system cost	\$/m ²
cost CO2 emission reduction	\$/ton
Annual energy output	MJ/m ²

2) Identify markets

- Gather [market data](#)

[Market data](#)

- domestic households
 - homes for the elderly
 - sport accommodations
 - camping sites
 - swimming pools
 - drying processes in agriculture
-

3) Determine theoretical saving potential

- In primary energy
- Based on key figures in 1) and market sizes in 2)
- Analyse product/market combinations (pmc) and make them comparable to each other
- Combine 1 and 2
- Select important [pmc's](#)

Some [PMC's](#)

- solar water heaters in domestic households
 - solar swimming pool heaters for private swimming pools
 - solar air dryers for drying flower bulbs
-

4) Determine practical potential

- on the basis of:
 - the specifications of the heat demand
 - the limiting conditions

some limiting conditions

- needed and available space for the solar collectors
- can solar energy cover a significant part of the heat demand

Example: the practical potential for solar water heaters in domestic Households in The Netherlands is 50 PJ (see fig. 2)

5) Determine alternative energy saving measures

- Be aware of the competition

Possible competition

- heat distribution
- combined heat and power generation

6) Determine the economic potential

- Consider some basic assumptions
- Subdivide the practical potential in a number of categories based on e.g. cost-benefit analysis

Basic assumptions

- Financial: payback time, real interest, annuity
- Prices: of techniques for some year in the future, of energy
- Environment: CO₂ emission (e.g. 1,8 kg/m³ natural gas)

Possible basis for cost-benefit analysis

- (extra) cost per ton CO₂
- (extra) cost per unit avoided primary energy use (Gj_{prim}, kWh, m³)
- annual profit

Example: the economically wise potential for solar water heaters in domestic households in The Netherlands is 12 PJ (see fig. 2)

7) Draw up market introduction plans for selected pmc's

- Don't forget the slowness which goes hand in hand with the introduction of new techniques when you determine the potential in a few years

For more information see the Ecofys report 'Overzicht potentieel actieve zonne-energie' (in Dutch), Ecofys number: E1036 or contact P.G. Out at Ecofys (p.g.out@ecofys.nl)/+31302808314).

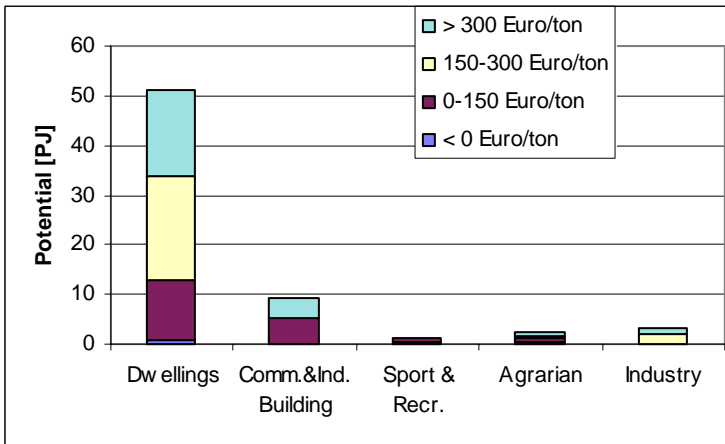


Figure 2 Division of the Dutch potential to market group

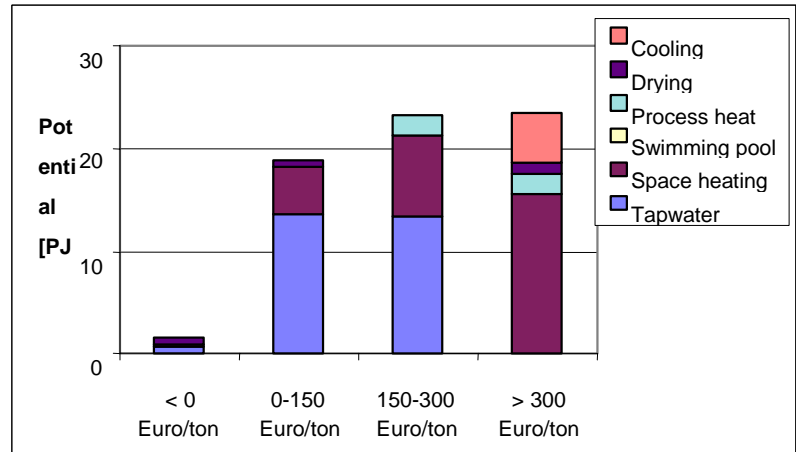


Figure 1 Division of the Dutch potential to CO₂-reduction costs (without taking subsidies into account).