



Photovoltaic-thermal collectors and industry Tracks for helping design the right PV-T collector

Pascal Affolter



www.solstis.ch



Why should a solar collector produce both heat and electricity ?

Because the users need both !



When does a user need solar electricity ?

1. He wants to invest « green » by feeding the grid

(kostendeckende Vergütung !)

2. He wants to cover total or part of his electricity consumption thanks solar energy (environmental or indenpendancy approach)



When does a user need **solar heat** ?

He wants to save « conventional fuel » for producing domestic hot water or space heating

- ⇒ minimizing greenhouse effect
- ⇒ less dependance on commercial fuels

There is normally no heat grid -> difficulty to sell solar heat !



The standard answer of 2004:

one **PV system** for electricity (grid tied)
and one **solar thermal** for heat
(domestic hot water and heating with backup)



PV: 45m² = 5,5 kW

Thermal: 16m²



MINERGIE

label for low energy houses in Switzerland !

Private « Minergie » house
region Lausanne, Switzerland



PV: 30m² = 2,0 kW

Thermal: 6m²





**Private « Minergie » house
region Lausanne, Switzerland**



PV: 8m² = 1,0 kW

Thermal: 10m²





The *improved* answer of 2004:

Thermal collector and PV module with the same dimensions = **proposal of thermal collector manufacturers** (Clipsol, Wagner, Roto Franke, ...)



PV: 20m² = 2,2 kW

Thermal: 20m²





Improved answer of 2004, by Clipsol, France



PV: 30m² = 3,3 kW

Thermal: 6m²





Why should a user buy a PV-T collector ?

i.e. what is the advantage compared to a side-by-side system ?

ready to pay more
for a
combined system

1. There not enough <i>place</i> on the roof	true	
2. PV-T system is cheaper		false
3. PV-T system is nicer	true	
4. PV-T system is more efficient	true	



Two approaches:

1. The PV-T is a **thermal collector** that also produces **electricity** (solar electricity as a by-product !)

Example: 6m² hot water system -> 800 W of STC power

Cover of hot water: 50 - 70%

Cover of electricity: 20 - 40%



Two approaches:

2. The PV-T is a photovoltaic system that also produces heat

Example: 2kW , low temperature heat for feeding a heat pump, for instance

Cover of electricity: 70%

Low temperature cheap heat for feeding the heat pump



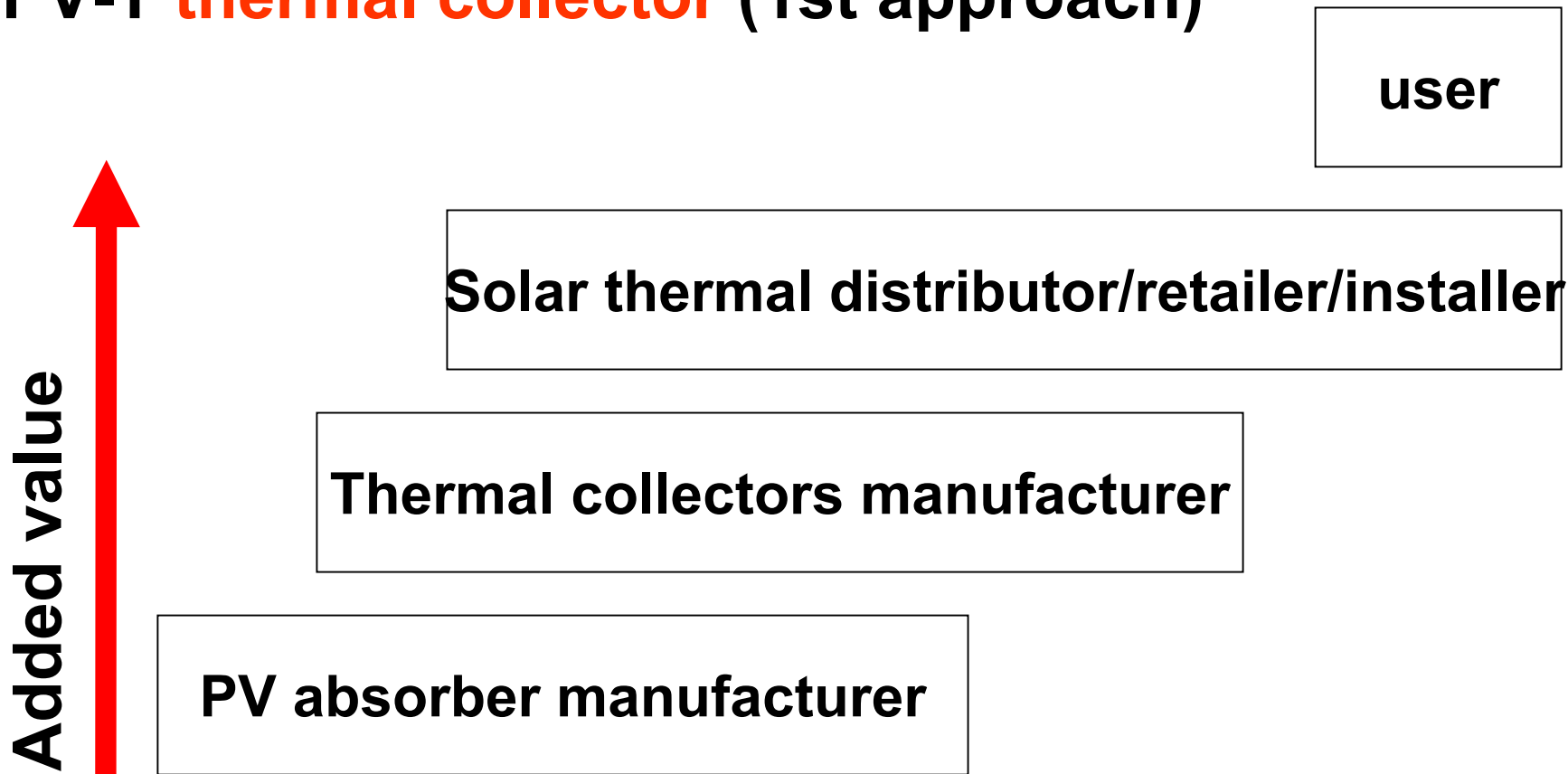
PV-T thermal collector (1st approach)

The PV laminate could be provided as a PV absorber. The thermal collector company can then build a PV-T collector

This PV-laminate should withstand very high temperature level (160° or more at stagnation !)



PV-T **thermal collector** (1st approach)





PV-T photovoltaic module (2nd approach)

The PV collector is in that case a PV laminate without additional glazing on the top. The heat is collected by exchange at the back of the PV laminate (air or water).

Lower temperature level

Electrical efficiency like standard PV

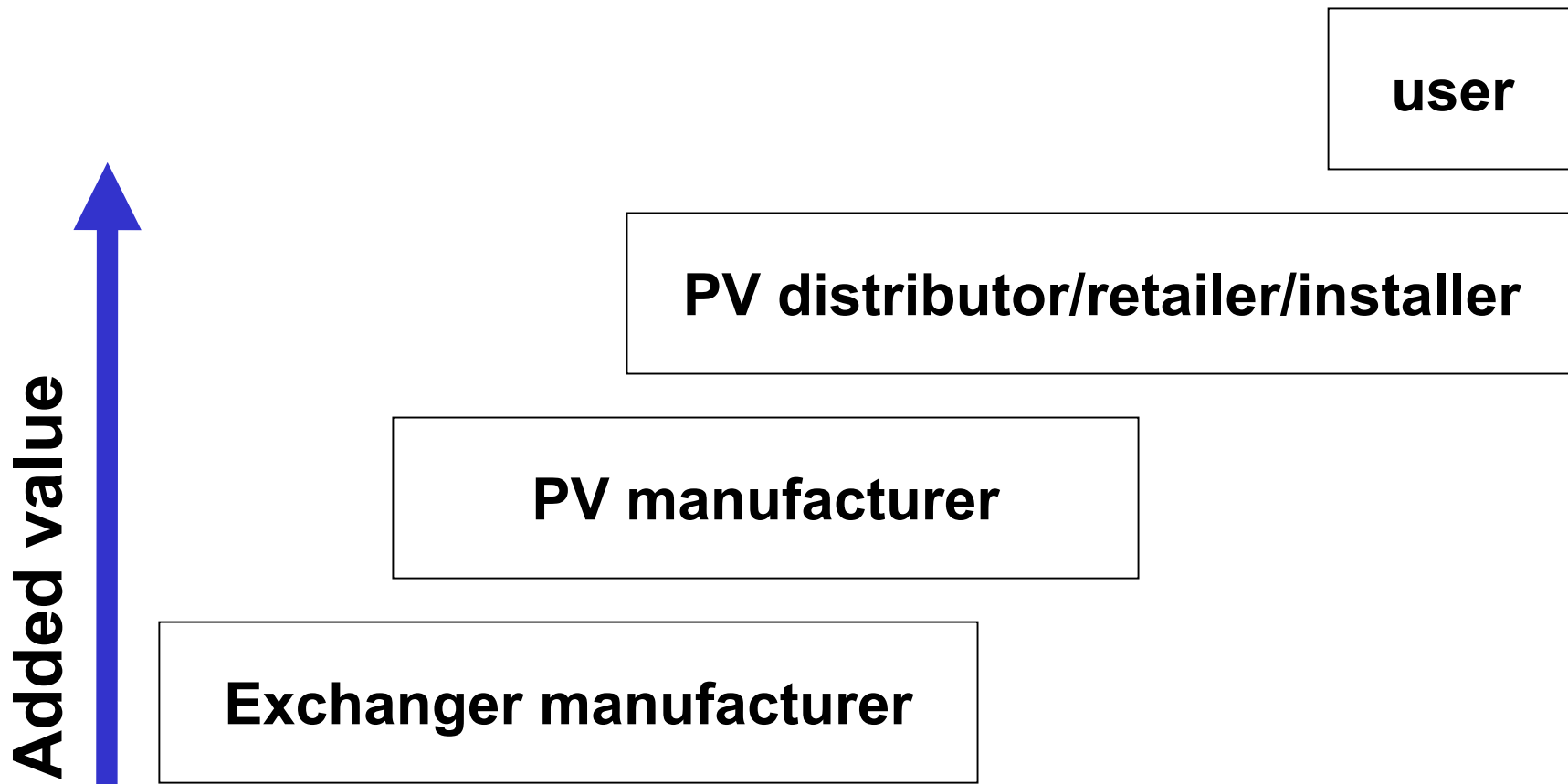
Reduced thermal efficiency

Simplified construction

Reduced risk of overheating



PV-T photovoltaic module (2nd approach)





Trend of the solar market of private houses

With low-energy houses,
size of solar thermal surface is designed to
only participate to the hot water production
(4-6 m² for a family)

Slow replacement of solar heating system by
combination of PV with heat pump that take
advantage of the utility grid as virtual energy
tank



Conclusions of a PV installer (present market to answer with an advanced product)

We would appreciate to can offer a solar product that gives a *uniform aspect* to the roof and that allows to have *only one delivering company*.

For a standard family system, we would need 4 to 6 m² for domestic hot water (this would include about 600 to 800 W) and that complete the roof, depending on available surface and customer budget with PV.



Thanks for your attention

www.solstis.ch

