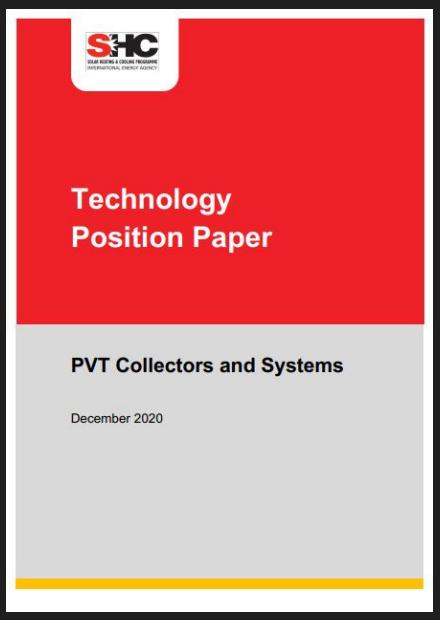
REPORT

DECEMBER 2020



PVT COLLECTORS AND SYSTEMS

TECHNOLOGY POSITION PAPER

INTERNATIONAL ENERGY AGENCY

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OVERVIEW

Photovoltaic Thermal (PVT) can increase energy yield per square meter by extracting heat from PV panels, and diverting that energy into the building's heating or cooling. However, this new technology faces several challenges that are hampering its uptake in Australia.

WHAT IS PVT?

PVT is a hybrid technology that **combines photovoltaic solar cells**, which converts sunlight into electricity, **with a solar thermal collector**, which transfers the otherwise unused excess heat from the PV module to a heat transfer fluid. By combining electricity and heat generation within the same component, these technologies can reach a higher overall efficiency than PV or solar thermal alone.

BENEFITS

#1 **SPATIAL EFFICIENCY**
PVT uses the same area as a PV array or solar thermal system to provide both electricity and heat

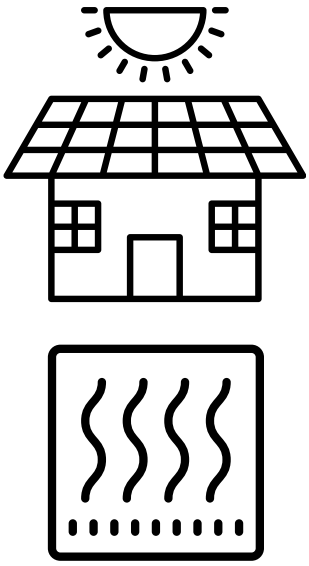
#2 **PV ELECTRICAL EFFICIENCY**
removing heat from PV modules increases their efficiency

#3 **COOLING OPPORTUNITY**
can use night radiation phenomena conditions for cooling

#4 **IMPROVED PV CELL LIFETIME**
lower thermally-induced degradation of PV cells can result in a potential PVT lifetime of 20-40 years

#5 **STRONG ROI**
payback very strong depending on maximum electricity self-consumption and local electricity rates

#6 **LOW SOCIAL IMPACT**
no noticeable noise, no detrimental visual impact



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KEY STATS

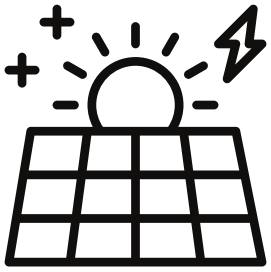
Two million m2 of PVT have been installed worldwide over the past five years (representing 270 MW of PV and 1,400 MW of solar thermal).

Total installed PVT by end of 2019

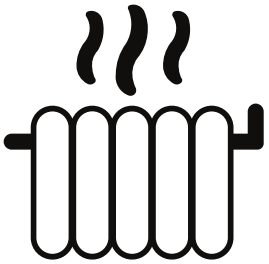
- France - 485,000 m2
- South Korea - 281,000 m2
- China - 133,000 m2
- Germany - 112,000 m2
- Australia - 547 m2

CHALLENGES

1. Lack of mandated renewable targets for heating/cooling and molecular fuels.
2. Harder to sell than PV - ROI modelling is complex, a lack of adequate case studies, additional sales and installation training required
3. Low appetite for adoption of emerging technologies
4. Poor visibility amongst governments, architects, planners, educators and industry
5. Spatial constraints are less of a problem in Australia than in Europe



> Globally, heating typically accounts for more than 50% of final energy consumption, very little of which is powered by renewable energy. PVT allows us to harness clean solar energy, improve PV panel output, and convert the heat removed for application directly such as space heating or enhancing it by combining it with heating appliances such as heat pumps. It's a remarkable combination of technologies that is improving efficiency, output and longevity of PV modules and allowing more applications to access clean energy.



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