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## Company Overview



Naked Energy has developed Virtu, a breakthrough hybrid solar technology generating both heat and power. Virtu is a compact, high energy density solution for the built environment ideally suited to flat commercial roofs. Unlike existing flat panel PVT (photovoltaic thermal) products, it can achieve higher output temperatures, enabling it to address the enormous global market for heating and cooling. Combining the provision of heat and power in one modular product reduces equipment and installation costs as well as the space required, creating a high efficiency differentiated solution.

Having won multiple awards and progressed to commercial trials, the company has a global manufacturing agreement with Jabil, and is targeting commercial launch during the second half of 2018.

solar redefined



# Technology



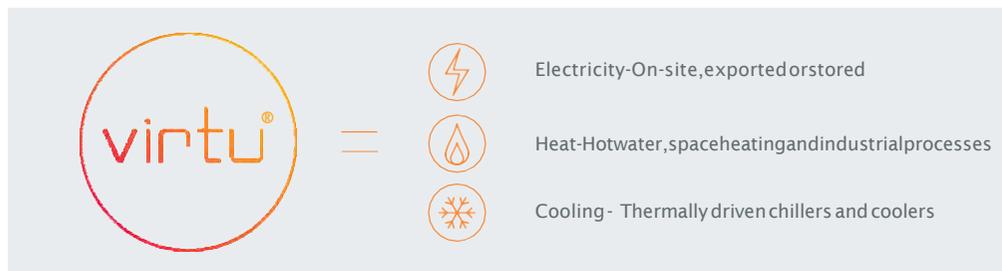
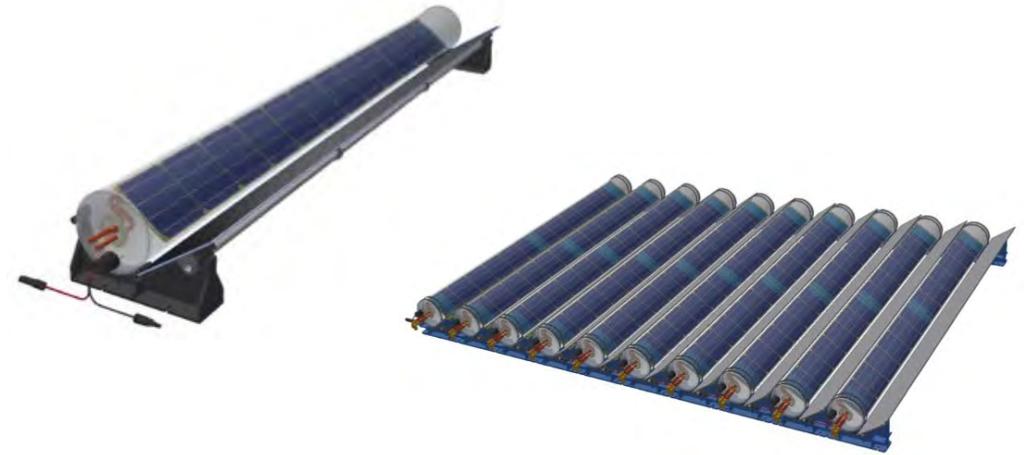
How it works - Virtu is a game changing solar collector generating both heat and electricity at high efficiency, producing more useful energy per square metre than standard solar panels.

The efficient heat exchanger and vacuum tube technology deliver higher thermal output and higher water temperatures even in cold climates.

At the same time, the heat exchanger draws heat away from the photovoltaic cells, so that they are maintained at a uniform temperature, maximising their electrical output.

The Virtu PVT collector can therefore replace two separate conventional panels (thermal and PV), dramatically reducing installation time and cost whilst maximizing useable installation area.

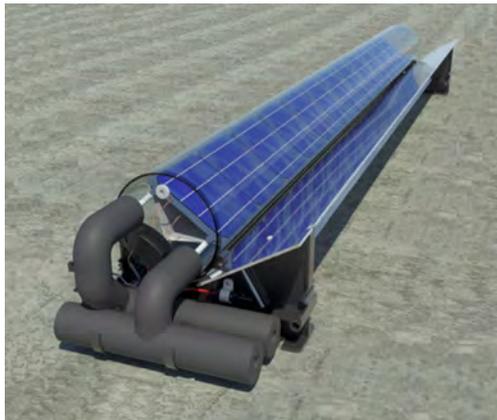
The ability to operate at higher temperatures opens up large markets, such as domestic hot water, space heating, and even desalination and cooling. In the case of cooling, the hot water can be used to drive an absorption chiller for building air conditioning – this is a rapidly growing market sector.



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## Advantages Over What Exists

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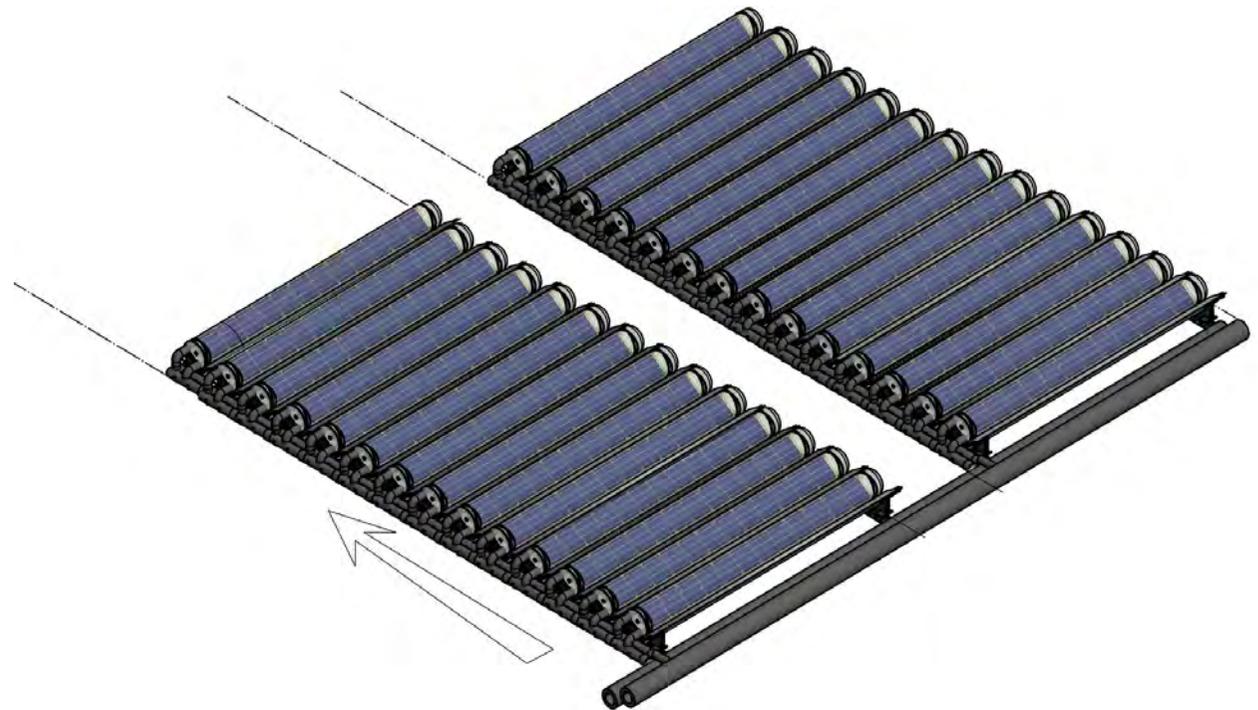


Highest roof top installed energy density

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- > Patented high efficiency vacuum tube technology – Hybrid design is much more effective than standard solar collectors
- > More energy per m<sup>2</sup> – The combined outputs deliver unprecedented performance. Up to 50% space savings
- > Patented heat transfer system – Protects and improves the life and long term performance of the photovoltaic cells
- > Versatile low cost installation – Can be installed anywhere, pitched, curved, angled or flat roofs and walls. No requirement for expensive A frames on flat roofs

- > Higher energy collection – Each individual tube can be angled for optimal solar collection and is designed to avoid winter shading
- > Versatility – Modular tube design allows quicker and cheaper installation maximising available roof space. End users can select to generate more electricity or heat depending on their own energy demands
- > Greater return on investment – More energy is generated for a given area, providing greater savings and financial returns



## Commercial Sector focus

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- 1 Large commercial roof space such as hotels, leisure centres, public amenities where requirement is for large amounts of electricity, heat for water, space heating and chilling.
- 2 Commercial and industrial processes, light industrial roof space where requirement is for large amounts of electricity, hot water, space heating or chilling.
- 3 Installation on vertical surfaces where roof space is limited and to increase winter yields.
- 4 Longer term, utility scale installations where the electrical output can be used to supply grid power in tandem with heat output for district heating and cooling, water purification and desalination. Heat can also be stored interseasonally.



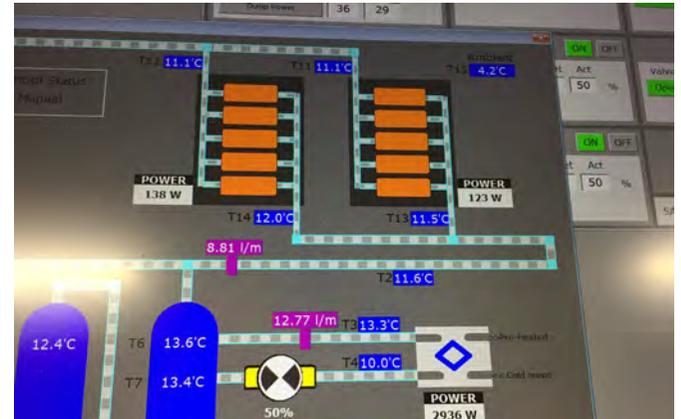
# UK supermarket pilot



The first UK pilot of Virtu has been operational for over 19 months at a large superstore close to the Naked Energy office in Crawley. The installation has been supported by an Energy Entrepreneurs' Fund grant from DECC (now BEIS).

With positive results, the site will provide an excellent reference for future customers. The superstore (one of the top 5 UK supermarkets) has requested a 10x scale-up of the installation, with a potential roll out across its significant UK estate.

Whilst the installed capacity of the pilot system is quite small it is entirely scalable and represents Naked Energy's first commercial contract with a major retail customer.



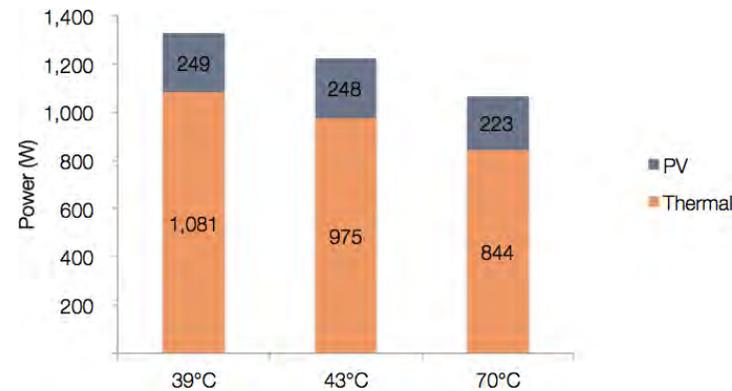
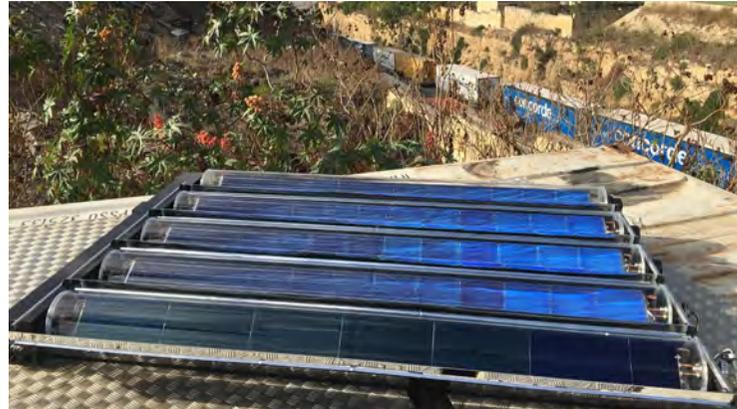
# Malta hotel pilot



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A first generation Virtu prototype, built with Jabil sourced components, was installed in September 2016 at a hotel in Malta. The performance data validates Virtu's market leading efficiency compared to best in class separate solar thermal /PV panels and direct hybrid collector competitors.

Malta itself continues to be an attractive market due to the combination of high levels of solar irradiation and high energy prices (in common with a number of other small island economies with both political and economic interests in promoting renewable energy strategies).



# Deltares

## ATES 'Aquifer Thermal Energy Storage'



This 'ATES' innovation project is supported by the Climate-KIC. It is a pan-European innovation project aimed at demonstrating the use of aquifers to store solar thermal energy. The 29kWp thermal demonstration is located at the headquarters of Deltares, an independent institute for applied research, on the Technical University of Delft campus in the Netherlands.

Not only does this project present an opportunity to demonstrate a larger scale installation of Virtu, but it also enables Naked Energy to validate inter-seasonal storage, which could open up huge commercial opportunities for an attractive and growing solar district heating market.

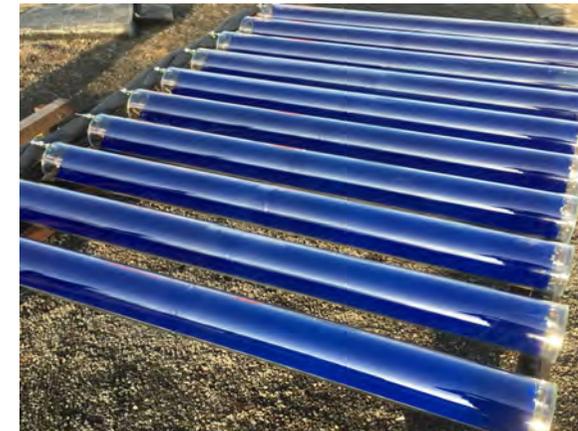
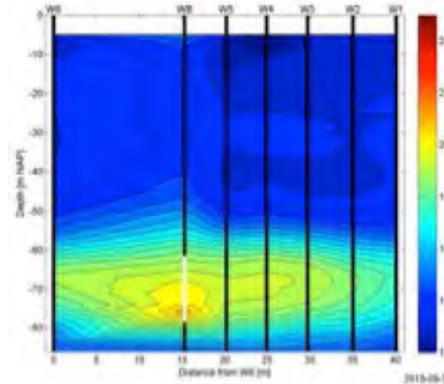
The ATES system consists of two aquifers approximately 120m apart. By carefully controlling the energy balance the water in the aquifers can be used to heat and cool the Deltares buildings throughout the entire year reducing reliance on conventional heating and cooling from grid based fossil fuels.

Full commissioning of the project will be complete at the start of September 2018, at which time the energy outputs will be sufficiently large to provide all of the heat necessary for year round usage.

Aquifer thermal energy storage is already quite widespread in the Netherlands with the potential for dramatic growth.



- Deltares campus
- Tetra buildings with ATES system with heat surplus
- Location of cold well
- Location of Virtu PVT array
- Location of warm well
- ZZH building High heat demand



# Specific - Active Office

## Buildings as powerstations



The aim of this project is to transform buildings into power stations by enabling them to generate, store and release their own solar energy. The Active Office is the UK's first energy positive office. The building was manufactured using cutting edge off-site manufacturing techniques and incorporates innovative energy generation, storage and release technologies.

This projects represents the first large scale commercial installation of Virtu PVT (photovoltaic thermal) and will provide 2.4kWp electrical energy as well as 9.6kWp thermal energy to the Active Office

40 Virtu tubes have been designed to integrate on the South facing facade, in order to increase the solar gain in the shoulder and winter months.

'Specific' is an academic and industrial consortium led by Swansea University, with strategic partners Akzo Nobel, NSG Pilkington, Tata Steel and Cardiff University.

It is funded by the Engineering and Physical Sciences Research Council, Innovate UK and the European Regional Development Fund, through the Welsh Government.



Designed and conceived by:



Funded by:



We work with  
**Innovate UK**



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## Mission Statement

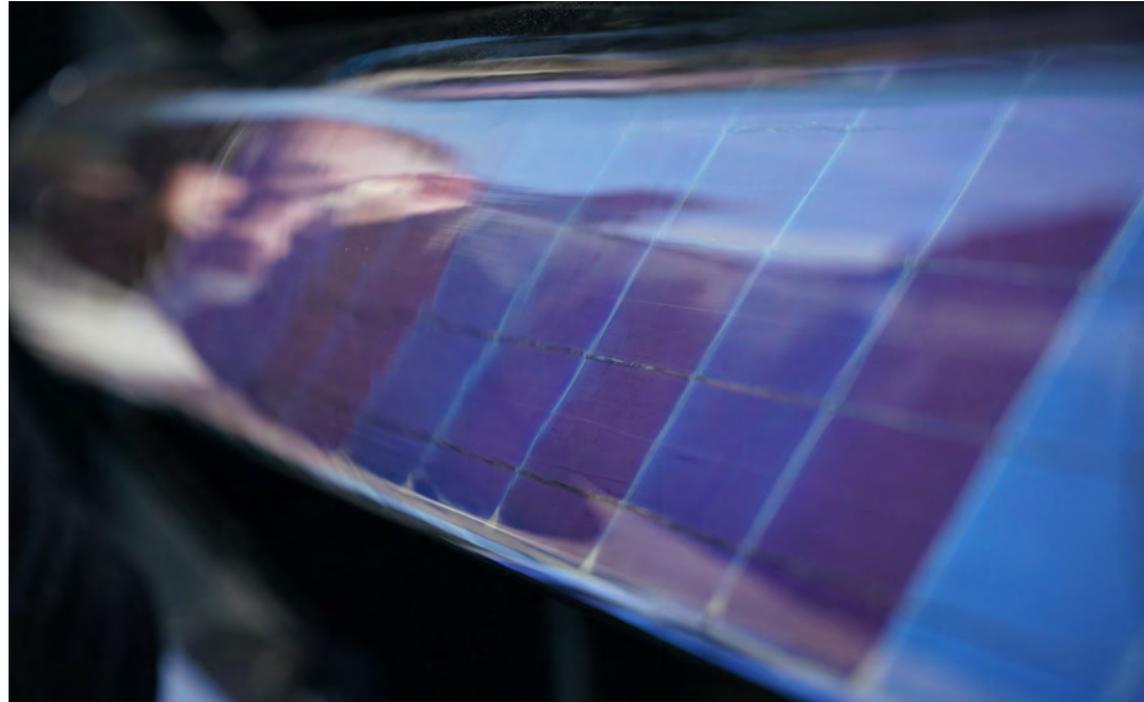
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Naked Energy believes it has created the world's first viable mass market photovoltaic-thermal (PVT) solar collector for renewable tri-generation (heating, cooling and power).

Virtu is capable of operating at higher temperatures opening up the potential to effectively address solar heating and cooling applications not previously possible with other hybrid (PVT) products. Heating and cooling buildings account for 50% of global energy consumption and responsible for 40% of all CO2 emissions. With its unique technology, Naked Energy wants to decarbonise buildings on a global scale.

Christophe Williams, CEO, says that what makes the company's unique product so compelling is the fact that it can deliver more energy per square metre at a lower cost than existing technology. Not only does this mean a much quicker payback and improved internal rates of return, but it also has the potential to dramatically improve buildings performance codes and reduce carbon emissions.

Naked Energy aims to be known as a customer focused global brand in the distributed energy sector - synonymous with innovation, quality and value for money - creating sustainable new products.



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## Awards



2016 innovation award  
2012 Winner Venture Competition  
2012 Winner - EIT European Entrepreneurship Summit Awards



Regional Winner  
National Finalists

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## Partners / Affiliates



Jabil Inc  
EIT Climate KIC  
Dentons - International law firm  
Imperial College London  
TUV Rheinland

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Naked Energy Ltd is open to strategic partners for a wide range of business activities from distribution and installation for both roof mounted and utility scale projects.