Energy Efficiency - the 'cleanest' energy is that which is never used

Eliminating energy wastage is an increasingly important area of focus for governments and corporations and forms a key consideration in the transition to a low carbon economy. The concept, which is typically referred to as Energy Efficiency, can deliver a variety of benefits including reductions in greenhouse gas emissions, the need for energy imports (linked to constrained energy supply) and to energy-related costs. Energy efficiency has been dubbed the third pillar of infrastructure investment and it is a rapidly growing sub-sector of the global infrastructure market, complementing the ongoing build-out of renewable energy generation capacity.

The opportunities to improve energy efficiency are vast and span all areas of the economy, whether it is increasing the performance of buildings, improving efficiencies within energy generation and distribution, or efficiencies linked to transportation and industrial/agricultural production. Sustainable Development Capital (an established specialist in energy efficiency project development) estimates that up to 75% of the original energy resource is lost through the process of generation, transmission & distribution, and end usage. Meanwhile, the International Renewable Energy Agency forecasts that of the $120tn of global energy sector investment required to achieve the ambitions laid out in the Paris Climate Accord, 44% will need to be directed towards energy efficiency.

Buildings: According to the International Energy Agency (IEA), buildings were responsible for 28% of global energy-related CO_2 emissions in 2019, while buildings and the building construction sector combined were responsible for over a third of global final energy consumption – the majority consumed by residential buildings of which most is used to heat space and water. Space cooling and heating requirements, increased use of appliances (leading to higher electric 'plug-loads'), reliance on fossil-fuel based heat and power provision, and insufficient regulation of sustainability and energy efficiency requirements, have all contributed. As a result, buildings offer huge potential for improvement and a consequent reduction in emissions.

Simple policies such as the phase out of incandescent lamps and, more recently, halogen lamps in favour of LED lighting, can drive efficiency improvements. More significant improvements can be made through improvements in 'building envelopes' – the components of a building's structure such as insulation, window materials and air sealing – and this is where the largest element of energy-related investment in buildings is being directed.

In terms of emissions reductions, buildings' reliance on fossil fuel-based heating technologies will be a key area of focus. Moving away from natural gas boiler systems in favour of heat pumps (which can also provide a cooling function) is a good example. In the UK and across the Northeast US, commercial and residential properties are highly reliant on natural gas-based central heating systems, with very limited penetration of heat pumps or electric heating systems. By contrast, in Sweden, domestic heating requirements are provided for by heat pumps, electric heating

RENOVATION WAVE

The EU's 'Renovation Wave' Strategy, published this month, aims to accelerate the rate of buildings renovations over the next decade and drive a 60% reduction in emissions from buildings.

The EU's ambitions are to target 35 million building renovations by 2030 focusing on improving energy efficiency performance. The process is likely to cost €275bn p.a. and could create up to 160,000 additional 'green' jobs.

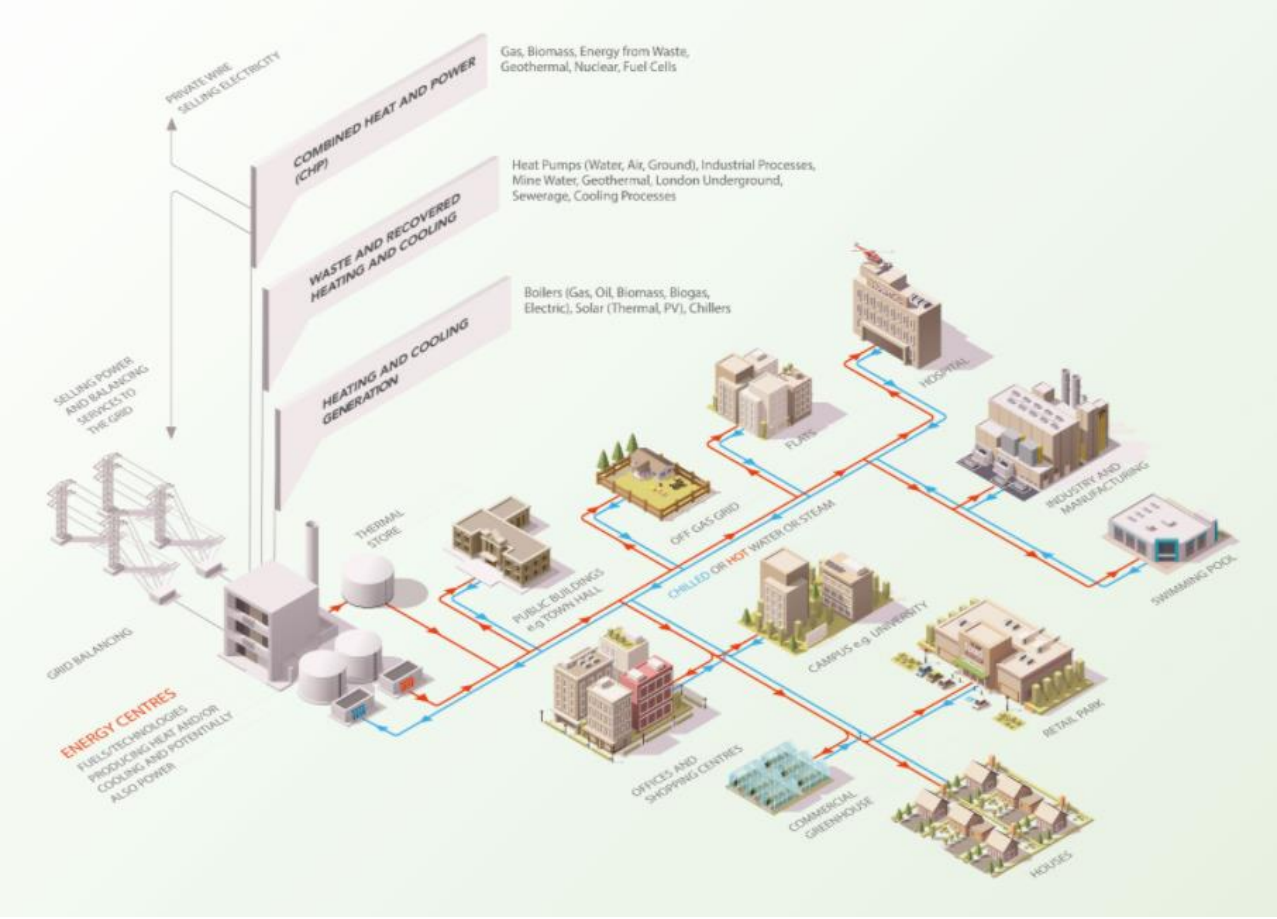
Buildings are responsible for 40% of the EU's energy consumption and 36% of the EU's greenhouse gas emissions from energy. Renovation Wave aims to reduce heating and cooling demand by 18% over ten years.

systems, and most significantly; district heating networks (see below). Reliance on fossil fuel heating systems is largely non-existent.

Energy Generation & Distribution: In many developed economies, and the UK is a good example of this, incumbent power networks are centralised and inefficient. That is to say, electricity is generated at very large scale facilities, such as fossil-fuel driven power plants and nuclear power plants, or large scale hydroelectric facilities and wind farms, that are typically sited in remote locations, far away from the end-users. They are typically connected to a network of high-voltage transmission lines before being distributed at far lower voltage to many ultimate end users in multiple locations. During this process there is significant wastage: much of the energy content of fossil fuels is wasted in the process of power generation, conversion losses (when energy is converted into different forms), and through transmission losses as the power is distributed across long distances. A good illustration of this is provided by the US Energy Administration, which shows that in 2019 more than 60% of the energy used for electricity generation is lost in conversion:
https://www.eia.gov/totalenergy/data/flow-graphs/electricity.php

A more efficient (and less polluting) energy network for the future is one that is decentralised. This term broadly refers to energy that is generated away from the main grid and may refer to energy-from-waste plants, district heating and cooling projects, combined heat and power plants (CHP) or smaller scale renewables including biomass, solar or geothermal assets. Decentralised networks can serve individual buildings or serve communities as large as cities and will ultimately reduce inefficiencies associated with centralised networks, reduce carbon emissions, and reduce energy costs in the medium to long-term.

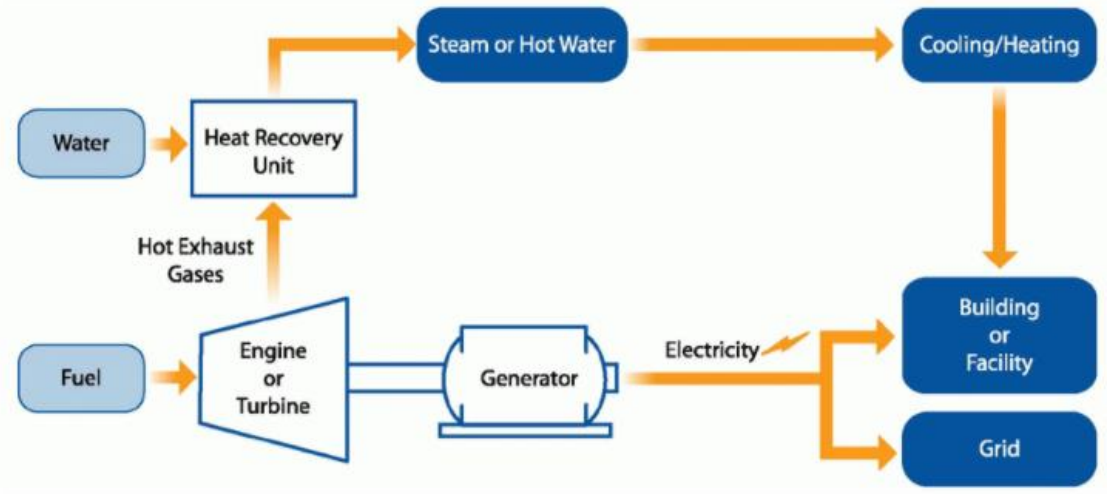
Example: District Heating Network



Source: BEIS, Triple Point

District heating plants provide higher efficiencies, lower costs, and better pollution control than localised boilers, reducing carbon emissions. Heat generation accounts for approximately a third of the UK's carbon emissions. The UK government has established a £320m investment programme, called the Heat Networks Investment Project (HNIP), to help deliver more district heat networks alongside the private sector, which may introduce an additional £1bn of investment.

Example: Combined Heat & Power Plant



Source: US Environmental Protection Agency

Combined heat and power (CHP) is a highly efficient process that captures the heat by-product of the electricity generation process. A CHP plant generates heat and power simultaneously and can reduce carbon emissions by up to 30% compared to conventional generation via a separate boiler system and electricity sourced externally.

CHP systems are highly efficient, making use of the heat which might be wasted when generating electricity and catering for heat requirements that would otherwise require additional fuel to be burnt in a separate boiler. For many companies with commercial or manufacturing facilities, or for residential communities, CHP can offer the most significant single opportunity to reduce energy costs and to improve environmental performance.

Transportation: The transport sector has the highest final energy consumption of all sectors and its reliance on fossil fuels makes it a major source of greenhouse gas emissions. In terms of efficiency, the opportunity comes from the lower cost (over time) of alternatives such as electric vehicles (EVs) vs. conventional petrol/diesel vehicles where the cost of the electric charge over 100 miles may be some 75% cheaper than petrol. The electrification of transport using batteries (and hybrid solutions), alongside renewable energy generation technologies, is an option for rail and light-duty road transport (i.e. cars, buses, and smaller HGVs). A shift toward EVs will require considerable investment in developing networks of public charging points and this is emerging as an investible area within the energy efficiency infrastructure theme.

Notwithstanding tougher regulations from central policy-makers relating to energy efficiency requirements in buildings or emission reduction targets, for example, corporate entities and local authorities are incentivised to undertake energy efficiency initiatives owing to the achievable cost savings as well as sustainability ambitions (an increasingly important aspect of corporate strategy). The increased focus on energy efficiency provides scope for the private sector to inject capital into projects that generate returns linked to the savings delivered to the end client or can simply be structured for the provision of long-term capital. Energy efficiency projects typically attract long-term, infrastructure-like cash flows and in the prevailing environment such opportunities are likely to be highly sought after.

The **VT Gravis Clean Energy Income Fund** has identified investable opportunities within the global energy efficiency sector, through publicly listed companies. These entities provide exposure to diversified portfolios of energy efficiency projects which typically attract long-dated, availability-based cash flows to the investor while providing cost and emissions benefits to counterparties operating in a variety of segments of the global economy or representing governmental entities.

William Argent
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Gravis