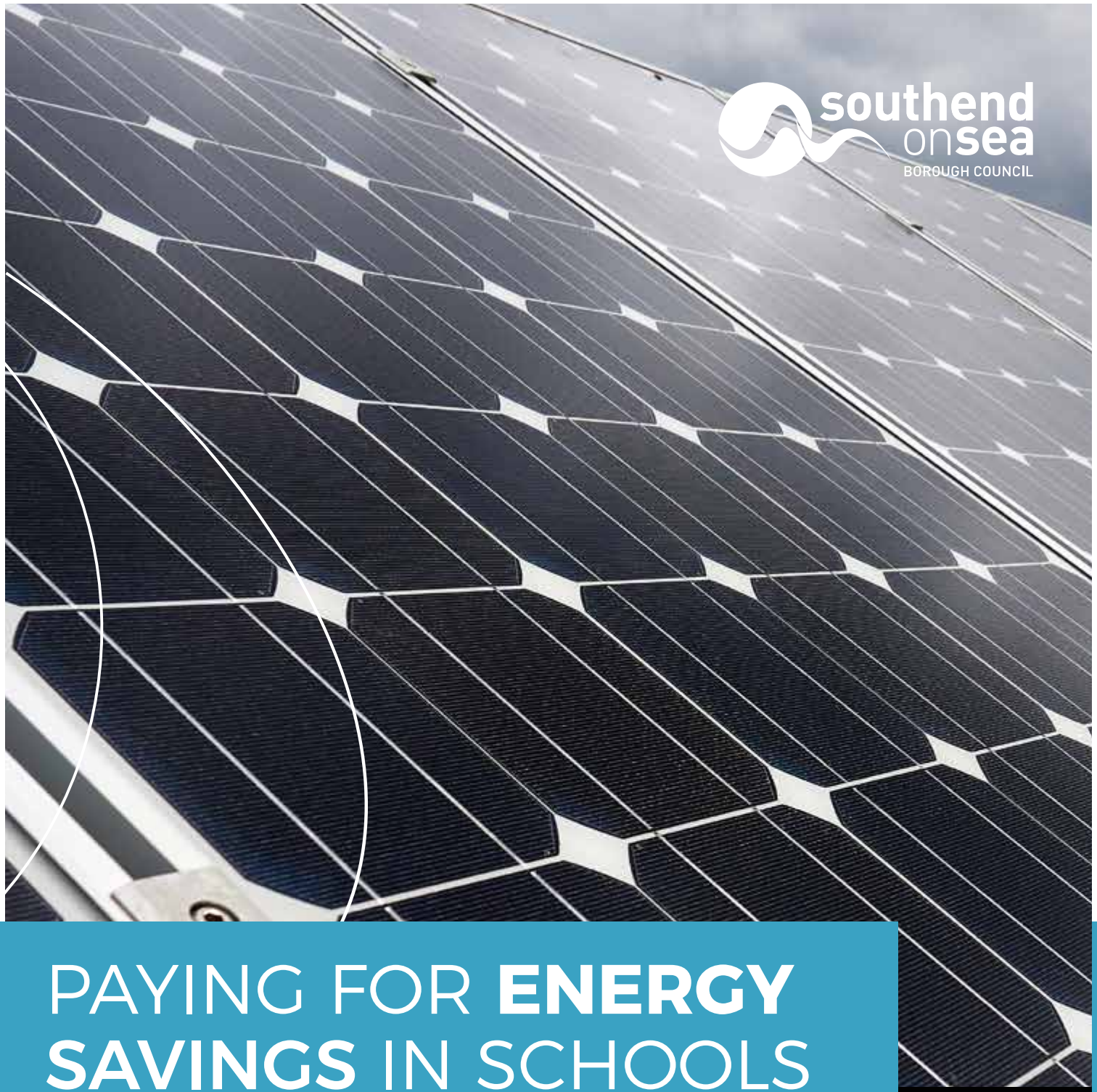

PAYING FOR **ENERGY SAVINGS** IN SCHOOLS

Input into the Financial Analysis Review for the Interreg North Sea Region project 2imprezs.

Interreg North Sea Region 2imprezs
European Regional Development Fund

EUROPEAN UNION

Paying for Energy Savings in Schools

Z/Yen Group Limited
41 Lothbury
London EC2R 7HG
www.zyen.com

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01

Executive Summary

Energy-saving programmes in schools are a rare example of the congruence of both moral and economic imperatives. Climate change is already costing the world economy billions of dollars in damage and lost productivity and is accelerating.

The energy used in schools comprises more than half of all the energy demand of Local Authorities. Energy is expensive - in the UK this results in a yearly energy bill of more than €691 million.

Implementing a programme of energy efficiency in schools could save local authorities across Europe hundreds of millions of Euros each year.

Young people want to take an active role in tackling climate change and society expects local authorities to show leadership in reducing emissions.

Local authorities seeking to make progress on energy use in schools can take three interlinked courses of action:

- Behavioural Changes: these are low cost and can be highly effective, but they are very difficult to sustain.
- Operational Changes: although some of these may carry political risk, one area that is both low risk and can yield significant results is the outsourcing of procurement for energy services;
- Technological Intervention: these require (sometimes significant) investment, but they can be highly effective in delivering energy savings. The most effective type of technological intervention is to replace ageing building stock with new stock designed to Net-Zero standards.

It should be remembered that the three areas described above are co-dependent, and savings gained through operational changes and technological intervention may be lost unless they are supported by behavioural changes.

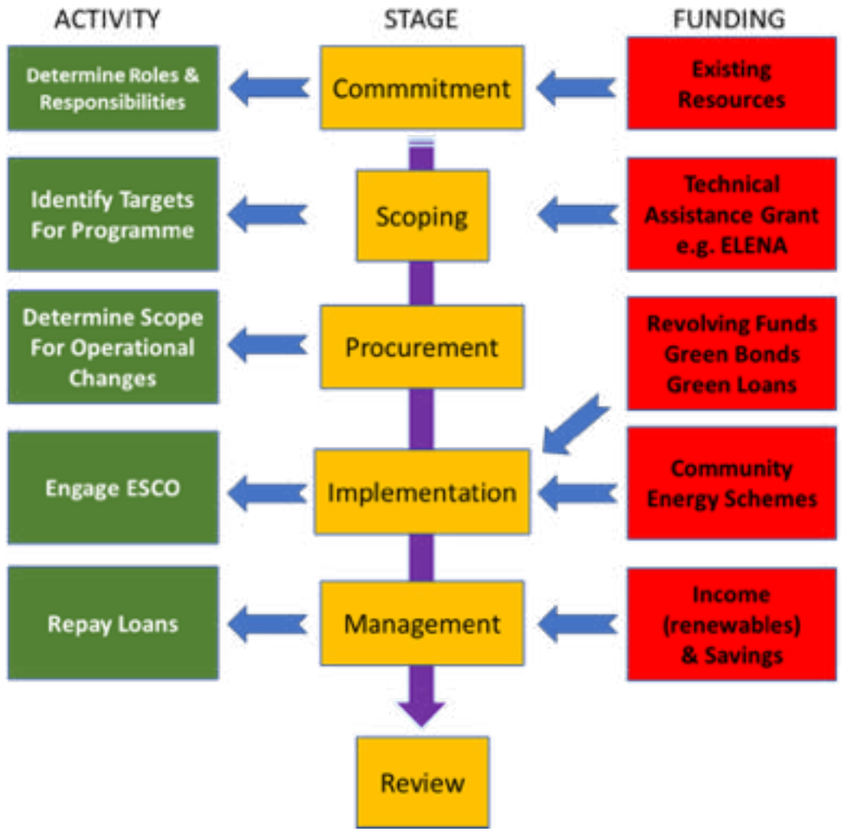
Local Authorities across Europe are under increasing financial pressure, from a combination of reduced resources and increased demand on services. Policymakers have difficult decisions to make on how existing resources are allocated. Before commencing an energy efficiency programme, Local Authorities should seek technical assistance grants to allow them to scope projects. Although some grant funding is available specifically for the purpose of reducing energy use in schools, there are also many effective sources of private capital:

- Revolving funds - These offer the best value for money, but may not cover the entire costs of a programme.
- ESCOs - These are an effective way of managing energy efficiency programmes, but care should be taken in agreeing to the terms of contracts, particularly with regards to financing.
- Green bonds and loans – These can be low-cost sources of finance, but scaling may be an issue.
- Crowdfunding – This is a new area of finance and can be an effective way of engaging local communities. Crowdfunding is a growing source of finance for both social projects and start-up ventures, but the sums that can be raised are relatively modest.
- Renewable Energy – Although renewable energy schemes can generate income streams for schools, the economics can be finely balanced so consideration should be given as to whether energy generation should be funded separately from energy-saving programmes.

Although there are many sources of funding available for investment in energy efficiency in schools, it is unlikely that one product will meet all of a Local Authority's needs so it is recommended that projects are funded using a blend of sources (see Figure 1).

Finally, policymakers must remember that energy saving is a process, not a project. Systems and equipment require maintenance, staff and pupils require training and engagement and succession planning must be made for key members of staff who control critical aspects of energy-saving programmes. Without measures being put in place to ensure this, savings will be lost.

Figure 1: Funding Energy Efficiency in Schools



02

Energy Efficiency in Schools: The Case for Action

Section Summary:

- Climate change is already costing the world economy billions of dollars in damage and lost productivity, and is accelerating.
- The energy used in schools comprises more than half of all the energy demand of local authorities. In the UK this results in a yearly energy bill of more than €691million.
- Young people want to take an active role in tackling climate change.
- Society expects local authorities to show leadership in reducing carbon emissions.

Energy Efficiency in Schools: The Case for Action

Non-domestic buildings account for 17% of energy consumption and 12% of greenhouse gas emissions in the UK [1], and the education sector accounts for 11% of final energy use for the non-domestic sector [2].

Primary schools in the UK typically consume 119kWh/m^2/year of energy , with the UK one of the few countries that have set energy benchmarks for schools- a target of 110kWh/m^2/year is considered as an ideal or "good practice" target.

By comparison, French primary schools average 197kWh/m^2/year, Greek schools consume 57kWh/m^2 and Irish primary schools consume 119kWh/m^2/year [3] (though direct comparisons should be approached with caution due to differences in climate and teaching hours).

There are approximately 25,000 primary and secondary schools in England and Wales and the annual spend on energy consumption in 2016 was €691 million [4].

Policymakers seeking a basis for action on energy efficiency in schools may look to three factors to justify investment: Evidence of the impacts of climate change, economic imperatives and social impact:

The Impact of Climate Change

The so-called 'Climate Crisis' has become a regular feature in news items across Europe [5]. Around the world, rising average temperatures have disrupted weather patterns, resulting in flooding, droughts, heatwaves and extreme weather [6].

Scientific consensus is that the cause of these events, each of which has cost billions of Euros in damage and lost productivity [7], is anthropogenic climate change [8]. Anthropogenic climate change is a description given to the rising levels of greenhouse gasses [9] in the earth's atmosphere caused by human activity [10], which result in forcing of the 'greenhouse effect' (see Figure 2).

1. DBEIS (2017). Energy Consumption in the UK. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820843/Energy_Consumption_in_the_UK__ECUK__MASTER_COPY.pdf
2. Pe´rez-Lombard L, Ortiz J & Pout C 2008 A Review On Building Energy Consumption Information, Energy and Buildings, 40 (2008) 394–398
3. Hernandez P, Burke K & Lewis J, Development Of Energy Performance Benchmarks And Building Energy Ratings For Non-Domestic Buildings: An Example For Irish Primary Schools, Energy and Buildings 40, (2008) 249–254
4. DoE 2019 Price Comparison Site Launched To Help Schools Cut Energy Bills https://www.gov.uk/government/news/price-comparison-site-launched-to-help-schools-cut-energy-bills
5. MeCCO 2018 A Review Of Media Coverage Of Climate Change And Global Warming In 2018 https://sciencepolicy.colorado.edu/icecaps/research/media_coverage/summaries/special_issue_2018.pdf
6. WMO 2019 The Global Climate In 2015–2019 https://library.wmo.int/doc_num.php?explnum_id=9936
7. EEA 2019 Economic Losses From Climate-Related Extremes In Europe https://www.eea.europa.eu/data-and-maps/indicators/direct-losses-from-weather-disasters-3/assessment-2
8. PPC 2014 Climate Change 2014 Synthesis Report Summary For Policymakers https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf
9. EPA 2020 Overview of Greenhouse Gases https://www.epa.gov/ghgemissions/overview-greenhouse-gases
10. Nasa 2020 Scientific Consensus: Earth's Climate Is Warming https://climate.nasa.gov/scientific-consensus/

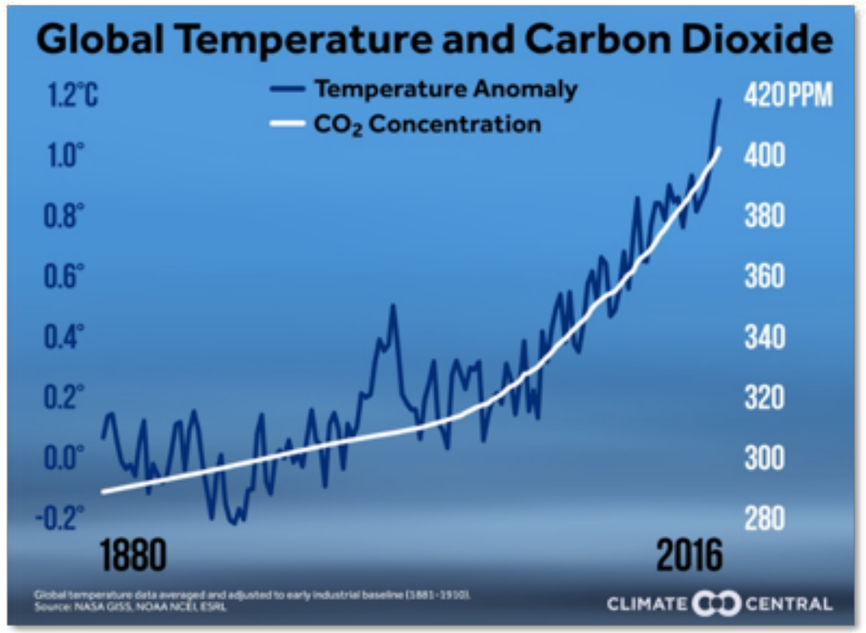


Figure 2: Global Temperature and Carbon Dioxide

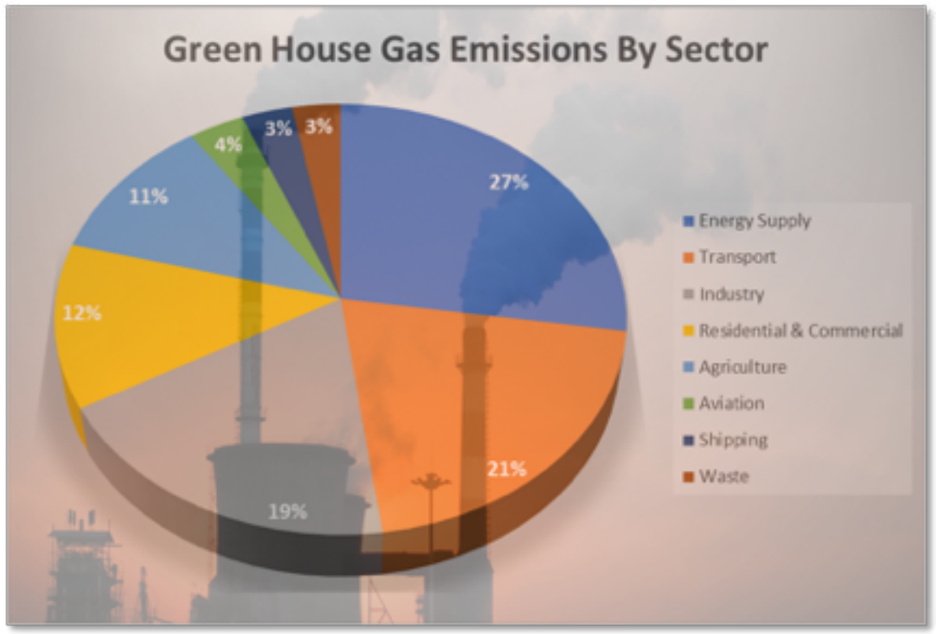


Figure 3: Sources of Greenhouse Gas Emissions in Europe (Data Source: EEA 2020 [14]

Elevated levels of greenhouse gasses act like a one-way mirror, allowing solar radiation to enter but preventing it from being reflected and radiated to space [11]. More energy is injected into the oceans, the heat engines which power the earth's climate, resulting in disruptions to the prevailing climatic conditions which have supported human society for millennia.

In Europe, 79% of greenhouse gas emission come from 4 sources, energy generation, transport, industry and residential & commercial use (see Figure 3). UK schools currently account for over half of local authorities' carbon emissions [12] and play a pivotal role both in cutting public sector's costs and slashing carbon emissions.

Unless efforts are made to curtail greenhouse gas emissions, average global temperatures will rise more than 2 degrees centigrade by the end of the century, resulting in widespread disruption to human and economic activity [13].

11. NRDC 2020 Greenhouse Effect 101 https://www.nrdc.org/stories/greenhouse-effect-101
12. Education Business 2020 Minimise Your School's Environmental Footprint http://educationbusinessuk.net/features/minimise-your-schools-environmental-footprint
13. WEF 2020 Global Risk Report 2020 http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

Economic Imperative

In most European countries, schools are classified as business energy users. This distinction is important as:

- Prices change more often than for domestic users, sometimes daily.
- Contracts last longer and there is less flexibility to switch.
- Energy is VAT chargeable, usually 20% instead of the 5% charged on home electricity tariffs.

The cost of electricity varies significantly across the EU (see Graph 1) and is governed by three factors:

1. The cost of generation – this is dependent on the primary fuel source, coal, gas, nuclear or renewables. (see Box 1)
2. Transmission costs – this is dependent on ownership and investment in national networks
3. Taxes – these vary according to jurisdiction and reflect both future infrastructure investment needs and a desire to reduce carbon emissions and drive energy efficiency

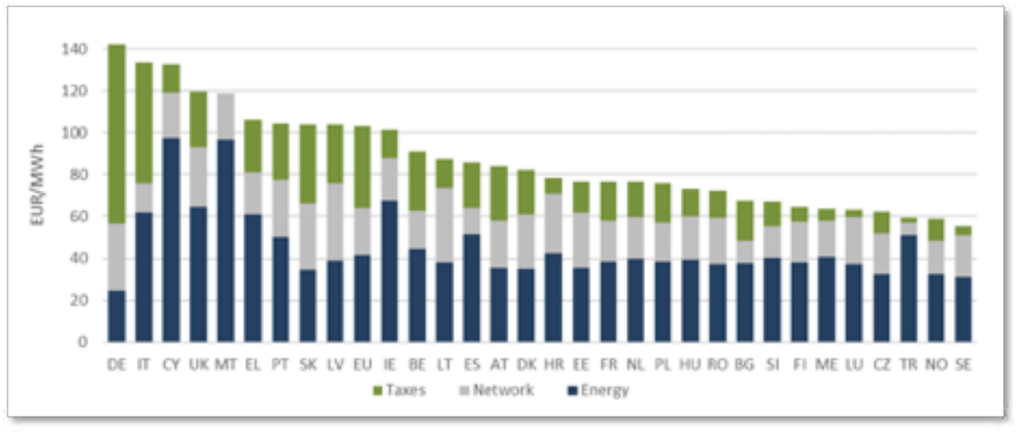
14. EEA 2020 Total Greenhouse Gas Emission Trends And Projections In Europe https://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emission-trends-6/assessment-3

Box 1 | Generation Costs
The Levelised Cost of Electricity Generation is the discounted lifetime cost of ownership and use of a generation asset, converted into an equivalent unit of cost of generation in £/MWh [15].

Levelised cost is calculated using a formula that includes: Pre-development Costs, Construction Costs, Infrastructure Cost, Fixed Operating Expenses (Opex), Variable Opex, Insurance, Connection Costs, Decommissioning Costs, Fuel Prices and Carbon Costs.

Power stations are fixed assets with a limited lifespan, typically 30 years before decommissioning. 42% of global operating fleet of coal-fired power stations were unprofitable in 2018, this will rise to 72% by 2040 [16]. At the same time, the cost of renewable energy has fallen dramatically [17] as a result of technological advancement.

Some countries are investing in upgrading their electricity generation systems and have chosen a low carbon path, this will benefit consumers by lowering generation costs over the long term, but results in higher up-front costs.



Graph 1 | Cost per MWh Electricity In EU Member States (Source: European Commission [18])

In the UK the average school energy bill (combined gas and electricity) is £31,000 [19]. In the Borough of Southend-on-Sea, there are 48 state-maintained educational establishments (including Academies and a Higher Education College). This equates to an annual expenditure of approximately €1.75 million on energy.

Energy-efficient schools use, on average, around 20% less energy [20], although, depending on the age of the buildings this figure can be considerably higher. On this basis, investment in energy efficiency in schools could save Southend Borough Council around €350,000 per year.

Social Impact

Stakeholder expectation, in the face of rising public awareness of the climate crisis, is that local authorities should play a leadership role in taking action [21].

Young people across Europe have been particularly active in campaigning for action on climate change. The Skolstrejk för klimatet, led by Greta Thunberg [22] captured the imagination of youth around the world. The implementation of energy efficiency measures in schools gives young people an opportunity to take positive action on reducing carbon emissions, particularly when technological measures are combined with stakeholder participation.

Energy-efficient schools, particularly those which have been designed for energy efficiency improve the comfort of both pupils and teachers. Comfortable students are more attentive, better behaved and research indicates that they also achieve higher academic success [23].

Today's pupils are tomorrow's parents, and involvement in energy efficiency initiatives at an early age is an effective way of changing behaviour in the long term.

15. BEIS 2016 Electricity Generation Costs https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/566567/BEIS_Electricity_Generation_Cost_Report.pdf
16. Carbon Tracker 2018 Powering Down Coal: Navigating The Economic And Financial Risks In The Last Years Of Coal Power https://www.carbontracker.org/reports/coal-portal/
17. WEF 2019 The Cost Of Generating Renewable Energy Has Fallen - A Lot https://www.weforum.org/agenda/2019/05/this-is-how-much-renewable-energy-prices-have-fallen/
18. European Commission 2019 Energy Prices In Europe https://ec.europa.eu/energy/sites/ener/files/epc_report_final_1.pdf
19. Education Business 2020 How Energy Efficient Is Your School? https://www.educationbusinessuk.net/features/how-energy-efficient-your%C2%A0school
20. Mylonas G et al 2019 A Methodology For Saving Energy In Educational Buildings Using An Iot Infrastructure https://arxiv.org/pdf/1907.07760.pdf
21. LGA 2019 Debate On Tackling Climate Change, Protecting The Environment And Securing Global Development House Of Commons 10 July 2019 https://www.local.gov.uk/sites/default/files/documents/LGA%20briefing%20-%20debate%20on%20climate%20change%20-%20100719%20WEB.pdf
22. PLU 2019 Skolstrejk För Klimatet! Greta Thunberg And Swedish School Strikes https://www.plu.edu/scancenter/exhibitions/skolstrejk-for-klimatet-greta-thunberg-and-swedish-school-strikes/
23. Higginson S et al 2005 The Impact Of School Environments: A Literature Review https://www.researchgate.net/publication/232607630_The_Impact_of_School_Environments_A_Literature_Review

03 Delivering Energy Efficiency in Schools

Section Summary:

- Energy efficiency in schools can be improved through three types of action - behavioural change; operational change; and technological intervention.
- Behavioural changes are low cost and can be highly effective, but they can be very difficult to sustain.
- The most effective operational change is to outsource procurement for energy services.
- Technological interventions require investment, but they can be highly effective in delivering energy savings.
- The most effective type of technological interventions is to replace aging building stock with new stock designed to net-zero standards.
- The savings gained through operational changes and technological intervention may be lost unless they are supported by behavioural changes.

Delivering Energy Efficiency in Schools

The European Energy Performance of Buildings Directive (EPBD) promotes improvement in the energy performance of buildings [24]. Not all member states have included schools in the EPBD framework. However, the UK has included schools [25] with floor areas over 1000m2 in the requirements to produce and display energy certificates (DECs) in a prominent and public location. Buildings are rated from A to G, with A representing a very efficient building and G a not very efficient building (see Figure 4).

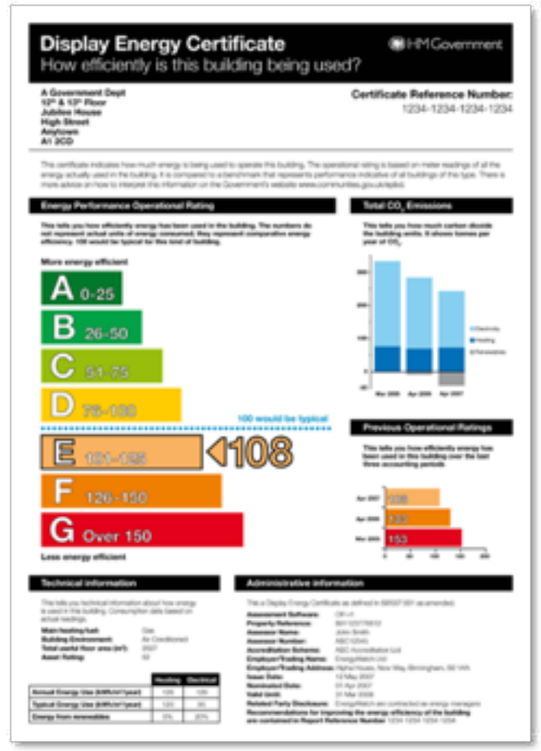


Figure 4 | Sample Display Energy Certificate

24. EC 2010 Energy Performance Of Buildings Directive https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/energy-performance-buildings-directive
25. Ministry Of Housing Communities & Local Government 2019 Energy Performance Of Buildings Directive Second Cost Optimal Assessment For The United Kingdom (Excluding Gibraltar) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770783/2nd_UK_Cost_Optimal_Report.pdf

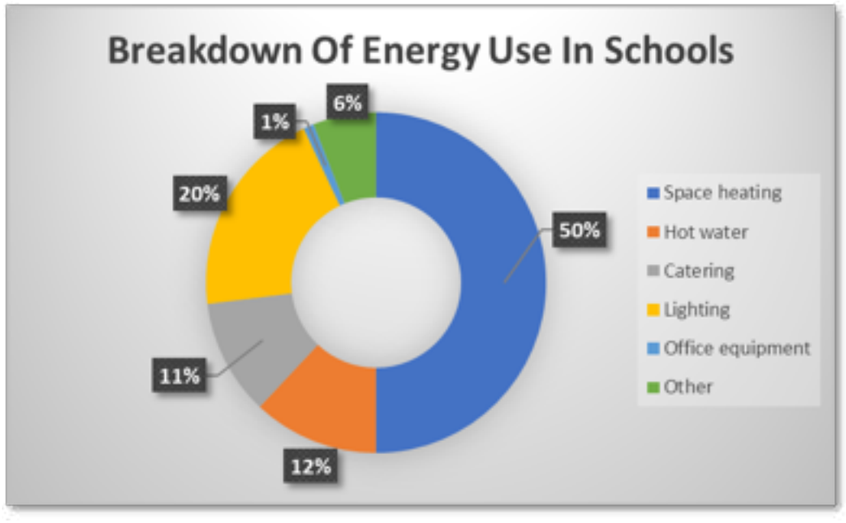
DECs are valid for one year and must be updated annually (or every 10 years for buildings less than 1,000 square metres). An advisory report must also be prepared every seven years giving recommendations to owners and occupiers about making their building more energy efficient.

Improving a school's DEC and reducing energy bills involves three interlinked action areas: behavioural changes, operations management and technological intervention. These three areas are briefly reviewed below:

Behavioural Changes

Behavioural changes are the lowest cost form of intervention for energy efficiency. Simple measures such as switching off electrical equipment, turning off non-essential lighting, keeping exterior doors and windows shut during the winter or when air conditioning units are running, reducing thermostat settings and changes to catering can save considerable sums (see Figure 5 and Box 2).

Figure 5 | Energy Use in Schools



Box 2 | Quick Wins

The UK Department of Education and Skills recommends 18°C for normal teaching, 15°C for corridors and sports halls and 21°C for low activity, special needs schools or those with very young children [26]. For every 1°C of overheating, energy consumption is increased by between 8 and 10%.

Simple measures such as avoiding prolonging the pre-heating of ovens, avoid overfilling saucepans and kettles, effective use and maintenance of refrigeration equipment and extraction fans can reduce energy use in catering by as much as 25% [27].

26. DFE 2016 Guidelines On Ventilation, Thermal Comfort And Indoor Air Quality In Schools https://consult.education.gov.uk/capital/bb101-school-design-iaq-comfort-and-ventilation/supporting_documents/DfE%20Ventilation%20guide%20consultation%20draft%2029%2006%202016.pdf

27. Opus Energy 2020 Energy Efficiency In Schools And Higher Education https://www.opusenergy.com/help/energy-efficiency-in-schools-and-higher-education/

Yet, despite financial benefits and the potential eagerness of pupils to participate, behavioural changes can be very difficult to implement and extremely hard to sustain over the long-term. Unclear roles and responsibilities, faulty or poorly maintained equipment, staff workload, competing priorities & turn-over, and apathy can all conspire to undermine efforts in this area.

Operations Management

Changes in the way that schools are managed and operated can impact significantly on energy use. For example, centralised catering removes the need for food preparation and storage on school premises, significantly reducing energy use.

Although the centralisation of office functions offers marginal energy efficiency gains (and is unlikely to be popular with parents), there is one key area of activity is likely to yield significant dividends: Energy service procurement is a complex and technically demanding specialism which school staff are unlikely to possess. Energy prices are volatile and can change by over 10% in a week, leading to unpredictable bills for public authorities. Small organisations, which purchase energy on their own, fail to take advantage of the economies of scale achieved through bulk purchasing.

For the majority of schools, municipalities are responsible for their energy procurement, however, where a municipality is small, or has responsibility for few schools, the municipality itself may benefit from outsourcing its energy services (see Box 3).

Box 3 | Energy Service Procurement

In the UK all public sector organisations are expected to buy energy via the flexible frameworks of a central purchasing body such as Crown Commercial Services (CCS). CCS accounts for 75% of the energy needs of the UK's public sector and achieves considerable savings for customers. For example, Transport of London reduced the BSP (Borough Spending Plan) by €923,748 starting in the financial year 2014/15 [28].

In Ireland, the National Procurement Service (NPS) has achieved savings in excess of €21 million by purchasing electricity and natural gas for the public service in 2011 (the NPS also helps ensure the country meets the national renewable electricity requirements target of 40% by 2020 [29]).

However, operational changes, such as the centralised procurement of energy services, cannot be fully effective in delivering cost savings without commensurate efforts to effect behavioural changes in energy usage. There is no point in having cheaper electricity if the savings gained are lost through wasteful use.

Technological Intervention

The right technology can deliver considerable savings in energy costs and substantial reductions in energy usage. Small-scale measures, such as passive infrared light sensors used to switch lights on in low traffic areas or upgraded heating controls, can deliver up to 25% savings with typical payback periods of less than three years [30].

Larger scale interventions such as double glazing, insulation and advanced Heating, Ventilation & Air Conditioning (HVAC) systems can deliver much deeper savings, but require significant capital outlay and have typical payback periods of 10 to 15 years.

Systemic changes such as rebuilding schools to Passivhaus [31], Net-Zero [32] or MINERGIE-P design [33] can dramatically reduce energy usage, and may even generate revenue.

In the UK the majority of the school estate is more than 40 years old with 60% built before 1976 [34] and the cost of repairs is expected to rise, with common defects including electrics and external walls. However, in common with many European countries, local government funding is tight, policy restrictions limit investment and the capital required for school building programmes is in short supply. Furthermore, the installation of both small, and large-scale technology is not a universal panacea. Without the active participation of staff and pupils in energy-saving programmes, technology can be misused, maintenance can be ignored, and savings lost [35].

28. EC 2016 More Efficient Public Procurement Of Electricity https://ec.europa.eu/growth/content/more-efficient-public-procurement-electricity-0_en
29. Irish Ministry for the Environment, Community and Local Government 2012 Green Tenders - An Action Plan on Green Public Procurement http://www.etenders.gov.ie/Media/Default/SiteContent/LegislationGuides/13.%20Green%20Tenders%20-%20An%20Action%20Plan%20on%20Green%20Public%20Procurement.pdf
30. Carbon Trust 2011 Benefits Of Driving Energy Efficiency In Schools https://www.carbontrust.com/news/2011/10/benefits-of-driving-energy-efficiency-in-schools/
31. Passivhaus Trust 2020 https://www.passivhaustrust.org.uk/what_is_passivhaus.php
32. World Green Building Council 2020 https://www.worldgbc.org/advancing-net-zero/what-net-zero
33. MINERGIE 2020 https://www.minergie.ch/media/20170906_flyer_minergie_allgemein_en_rgb.pdf
34. BBC 2017 More Spent On Free Schools As Older Buildings Deteriorate https://www.bbc.co.uk/news/education-39043733
35. Burman E 2015 Assessing the Operational Performance Of Educational Buildings Against Design Expectations - A Case Study Approach https://discovery.ucl.ac.uk/id/eprint/1482161/80/Burman_Thesis_combined_corrected_compressed.pdf

04 Funding Energy Efficiency in Schools

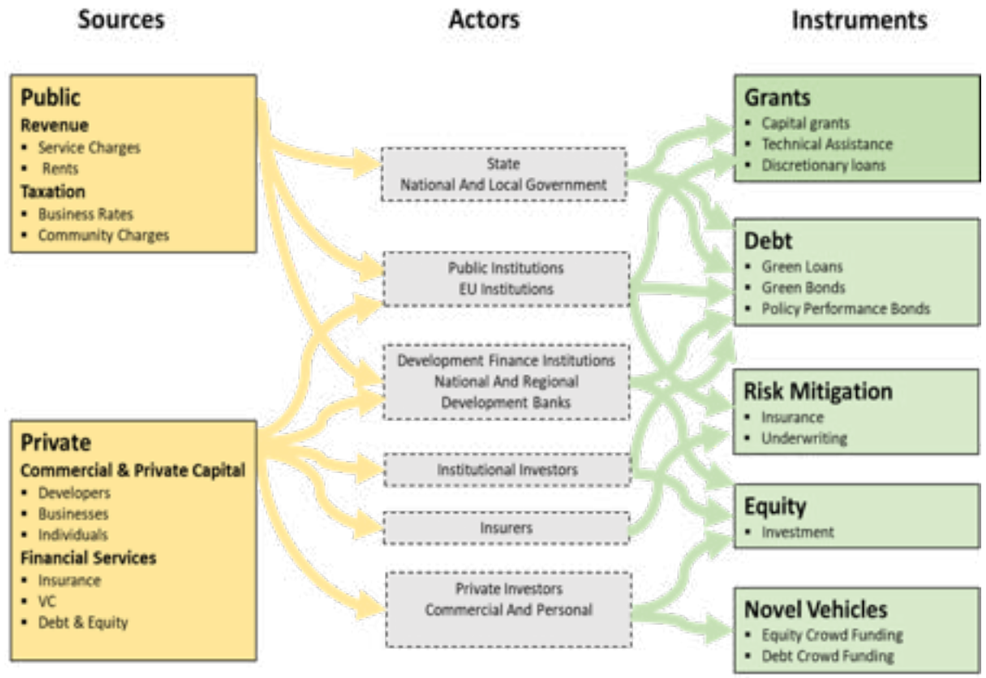
Section Summary:

- There are many effective sources of private capital available for investment in energy efficiency in schools, but it is unlikely that one product will meet all of a local authority's needs, so it is recommended that projects are funded using a blend of products.
- Before commencing an energy efficiency programme, local authorities should seek technical assistance grants to allow them to scope projects.
- Revolving funds offer the best value for money, but may not cover the entire costs of a programme.
- ESCOs are an effective way of managing energy efficiency programmes, but care should be taken in agreeing the terms of contracts, particularly with regards to financing.
- Green bonds and loans can be low cost sources of finance, but scaling may be an issue.
- Crowd funding is an effective way of engaging local communities and is a growing source of finance for social projects, but the sums raised are relatively modest.
- Consideration should be given as to whether energy generation from renewables, such as solar panels, should be separated from energy saving programmes.

Funding Energy Efficiency in Schools

In this section, we examine the types of financial instruments which could make effective vehicles for funding energy efficiency in school. The financing universe is illustrated in Figure 6.

Figure 6 | Sources of Funding for Energy Efficiency



There are several different sources of funding that may be accessed by local authorities however, it is unlikely that a single source will be a perfect fit for any but the simplest projects. In order to fund a comprehensive energy efficiency programme, or to fund large ambitious, large scale projects such as new-build programmes or HVAC replacement, it is recommended that funding is spread over a number of different products.

These product types are listed in Table 1 and analysed in detail in the subsequent text.

Figure 8 | Revolving Funds

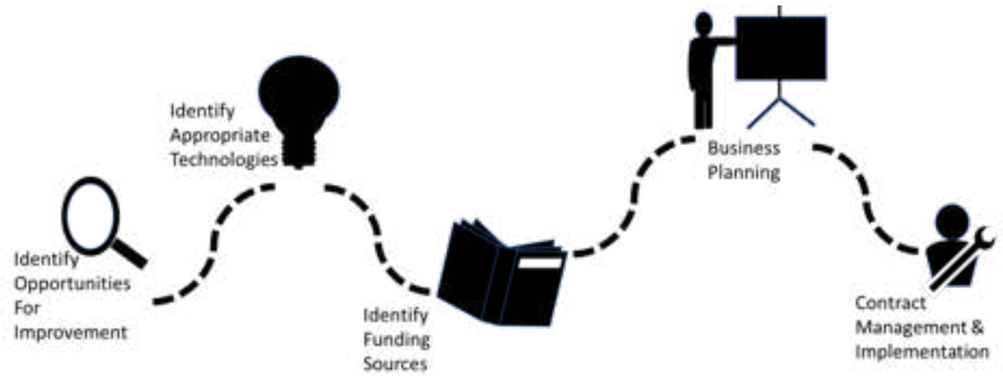
Product	Availability	Issues
Grants are sums of money, i.e., financial assistance, given by a government organization for a specific purpose. Unlike a loan, the money does not need to be paid back.	Widely available at both domestic and European level.	Grants may only partially cover the costs of energy-saving programmes, or may be tailored for specific purposes such as technical assistance.
Hybrid Approches such as revolving funds involve pools of money, from which loans can be made for energy efficiency projects. Revolving funds differ from grants as the monies loaned for projects must be repaid back to the revolving fund and may incur (sub-market) interest rates.	There are many examples of revolving funds across Europe, Salix in the UK is particularly successful.	Limitations on the size of loans and payback periods may mean that project costs are only partially covered.
Commercial Debt And Equity in the form of Energy Service Company (ESCO) contracts are a highly effective way of delivering energy-saving programmes.	ESCOs are common structure in most European countries.	Care must be taken in agreeing the contract terms with ESCOs
Green Bonds were created to fund projects that have positive environmental and/or climate benefits. Green bonds have been issued by national governments, municipal authorities and private corporations.	Green municipal bonds are a mature product in the United States.	Proceeds from these bonds are earmarked for green projects but are backed by the issuer's entire balance sheet. Aggregation is likely to be required to make the issuance of bonds financially viable.
Green Loans are loans offered by banks at preferential interest rates linked to the achievement of specific environmental targets.	Several large banks, particularly in the Netherlands, have pioneered the development of this type of financing vehicle .	A pre-requisite of green loans is effective reporting on project performance.
Crowd Funding is a way of raising money for a project by using the internet to ask large numbers of people to invest small amounts of money.	Very successful for small scale renewable energy [36].	Can be a highly effective way to engage local communities however the capital sums raised will be small.
Renewable Energy can generation income for schools with sufficiently large installations.	There are many successful examples of schools linked to community generation schemes.	The economics of procurement, installation, grid connection and payback periods are finely balanced.

Grants

All EU member states have domestic grant facilities which are suitable vehicles for investing in energy efficiency in schools. These have been examined in detail in the 2imprezs Financial Analysis Review [37]. Member states also have access to EU grant funding programmes. Some of these, such as the EURONET 50/50 MAX project [38], which ran from 2013-16 focus on behavioural change. Others such as ELENA provide grants for technical assistance (TA) focused on the implementation of energy efficiency, distributed renewable energy.

TA is an invaluable part of project planning for energy efficiency in schools. TA grants can be used to finance costs related to feasibility, programme structuring, business plans, energy audits and financial structuring, as well as to the preparation of tendering procedures, contractual arrangements and project implementation units. See Figure 7.

Figure 7 | The Benefits of Technical Assistance



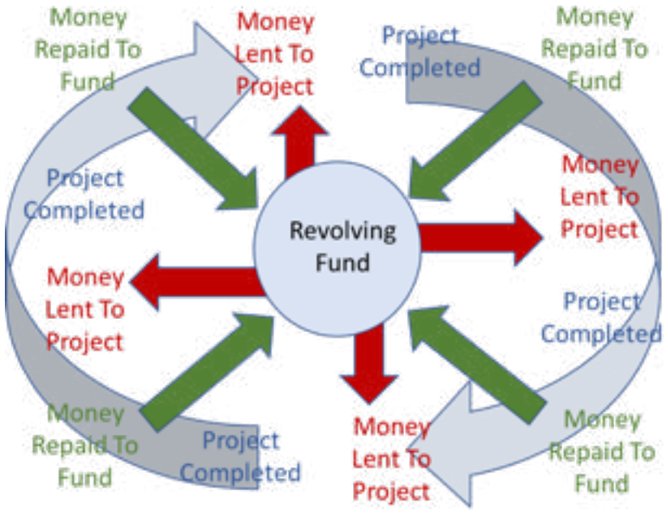
Hybrid Approaches

Revolving funds are pools of money, normally controlled by central or local government, from which loans can be made for energy efficiency projects. Revolving funds differ from grants as the monies loaned for projects must be repaid back to the revolving fund. Revolving funds offer loans at below -market-rate or zero interest, these instruments are referred to as 'soft loans'.

Revolving funds are so named, as the central fund is refilled as individual projects pay back their loans, creating the opportunity to issue other loans to new projects, creating a sustainable funding cycle while cutting operating costs (see Figure 8).

36. Adhami S et al 2017 Crowdfunding For Green Projects In Europe: Success Factors And Effects On The Local Environmental Performance And Wellbeing http://www.crowdfundres.eu/wp-content/uploads/2017/11/Crowdfunding-for-green-projects-in-Europe-2017.pdf
37. Buckle-Hodgson K 2019 Review Of Finance Available To Schools In The North Sea Region To Fund Energy Saving/Efficiency Programmes Southend-On-Sea, Interreg North Sea Region 2imprezs
38. http://www.euronet50-50max.eu/en/

Figure 8 | Revolving Funds



There are many examples of revolving loan schemes across Europe. These include:

- Estonia's KredEx Revolving Fund which offers four types of financial support: grants for energy audits, loan guarantees, renovation "soft loans" and reconstruction grants. The funds were provided by the European Regional Development Fund (ERDF), the Government of Estonia, the Council of Europe Development Bank (CEB) and by the KredEx Foundation.
- Energy Fund Utrecht (EFU), a joint initiative between the City of Utrecht and the Province of Utrecht, with an investment volume of €21 million, including €1.25 million from the ERDF.
- In the summer of 2012, the Dutch agency AgentschapNL did an inventory of the existing revolving funds for energy and climate change, they found that almost all provinces and large municipalities had set up or planned to set up a revolving fund for energy and climate change.
- In the UK Salix Finance provides interest-free Government funding to the public sector to improve energy efficiency, reduce carbon emissions and lower energy bills. Salix is funded by the Department for Business, Energy and Industrial Strategy, the Department for Education, the Welsh Government and the Scottish Government and was established in 2004 as an independent, publicly funded company, dedicated to providing the public sector with loans for energy efficiency projects.

Revolving funds are particularly effective where there are market failures or in sectors where commercial financing is otherwise underdeveloped and local banks perceive high risk [39]. In order to ensure that revolving funds do not undercut or directly compete with commercial lenders, revolving funds usually cap the total funds available for individual projects, either as a direct sum or as a proportion of project funding. Salix Energy Efficiency Loan Scheme (SEELS) provides funding for schools and colleges to reduce energy costs through the installation of energy efficiency technologies.

39. World Bank Ground 2018 Financing Energy Efficiency Part 1: Revolving Funds http://documents.worldbank.org/curated/en/561571536097283340/pdf/129733-BRI-PUBLIC-VC-LW88-OKR.pdf

The two main criteria for this fund are:

- The projects must pay for themselves within eight years through their predicted annual energy savings
- The project must not exceed a maximum cost of €265 per tonne of carbon dioxide saved, while for projects over £100,000, borrowers need to complete a business case

Commercial Debt and Equity

At a European level, the European Energy Efficiency Fund (EEEF) [40] has been created, as a joint initiative between the European Commission, the European Investment Bank (EIB), the Cassa Depositi e Prestiti (CDP) and Deutsche Bank. The EEEF provides commercial financing for public energy efficiency and renewable energy projects within the European Union.

The EEEF make direct investments in projects through developers or Energy Service Companies and also invests in local commercial banks, leasing companies and other organisations directly finance energy efficiency projects.

Energy Service Companies (ESCOs) are commercial organisations that provide comprehensive energy services to their customers in such a way as to reduce costs and increase energy efficiency. ESCOs may use one of two models for their services:

- Energy Supply Contracting (ESC): this requires a long-term arrangement with the client In order to reduce the size of the client's energy bill. In order to deliver, the ESCO may install more efficient equipment, employ more affordable fuels or implement behavioural or operational solutions in order to achieve the savings.
- Energy Performance Contracting (EPC): this is an agreement between the ESCO and the client to share the cost benefits (in terms of cost savings) and the risks as resulting from an energy-saving programme.

There are three main types of EPC:

- Shared savings: the investment in energy-saving measures is assumed entirely by the ESCO, including financing, management and control of energy consumption. The ESCO maintains ownership of any plant, machinery or technology it installs and gains its fees by absorbing the majority of cost-saving achieved. Clients may have to pay the ESCO a fee at the end of the contract period to take ownership of any plant installed.
- Guaranteed savings: under this model, the client assumes the entire investment required. The customer keeps the savings made up to an agreed level and owns the technology installed, with the ESCO gaining its fees at an agreed percentage.
- Mixed savings: a hybrid combination of the two previous models, the ESCO guarantees savings to the client with any additional savings shared between the ESCO and the client. The ESCO makes the investment in the new equipment, which is owned by the ESCO for the duration of the contract. Ownership of the equipment is transferred to the client at the end of the contract.

40. EEEF 2020 European Energy Efficiency Fund https://www.eeef.eu/home.html

Although ESCOs offer a one-stop-shop for energy-efficient solutions, the interest rates and fees they charge for arranging finance may mean that Local Authorities should look for other sources of funding. Three commercial product types offer promise to local Authorities seeking low-cost commercial capital:

Green Bonds

A bond is a fixed income instrument that represents a loan made by an investor to a borrower (typically a corporation or a government). Bonds are used by companies, municipalities, states, and sovereign governments to finance projects and operations. Owners of bonds are debtholders, or creditors, of the issuer. Bond details include the end date (when the loan is to be repaid to the bond owner) and the terms for variable or fixed interest payments made by the borrower to the bondholder. Green bonds are a particular type of bond, that are created to fund projects that have positive environmental and/or climate benefits. The majority of green bonds issued are green 'use of proceeds' or asset-linked bonds (see Table 2). Proceeds from these bonds are earmarked for specific green projects but are backed by the issuer's entire balance sheet (see Figure 9).

Figure 9 | Criteria for Green Bonds

Table 2 | Types of Green Bonds (Source: Climate Bonds initiative)

Type	Proceeds	Debt Recourse	Example
"Use of Proceeds" Bond	Earmarked for green projects	Recourse to the issuer: same credit rating applies as issuer's other bonds	EIB "Climate Awareness Bond" (backed by EIB); Barclays Green Bond
"Use of Proceeds" Revenue Bond or ABS	Earmarked for green projects	Revenue streams from the issuers through fees, taxes, etc. are collateral for the debt	Hawaii State (backed by a fee on electricity bills of the state utilities)
Project Bond	Ring-fenced for the specific underlying green project(s)	Recourse is only to the project's assets and balance sheet	Invenergy Wind Farm (backed by Invenergy Campo Palomas wind farm)
Securitisation (ABS) Bond	Earmarked for portfolios of green projects	Recourse is to a group of projects that have been grouped together (e.g. solar leases or green mortgages)	Tesla Energy (backed by residential solar leases); Obvion (backed by green mortgages)
Other debt instruments	Earmarked for eligible projects	Varies	Convertible Bonds or Notes, Schuldschein, Commercial Paper, Sukuk, Debentures

US municipal authorities have been releasing green municipal bonds since 2013. In 2017, 27% of all green bond issuance in the US were by municipal authorities [41] (with around 60% of these focussing on water), although subsequent significant changes to US Tax law, passed by Congress in December of that year through the Tax Cuts and Jobs Acts, have negatively impacted the issuance of refunding bonds.

However, one critical issue that local authorities seeking to finance projects through this route must consider is scalability. Energy projects in schools (unless they entail the building of new facilities) tend to be relatively small scale and low cost. Discussion with green finance practitioners indicates that, for a bond issuance to be commercially viable, multiple projects would have to be aggregated in order to exceed a minimum threshold of €100 million. Individual municipal authorities may not have ambitions of this scale, so the intervention of a regional, or sub-regional body may be necessary, to act as a broker who could aggregate projects, raise the bond and provide a credit facility for municipalities who wish to use this route to finance projects.

Green Loans

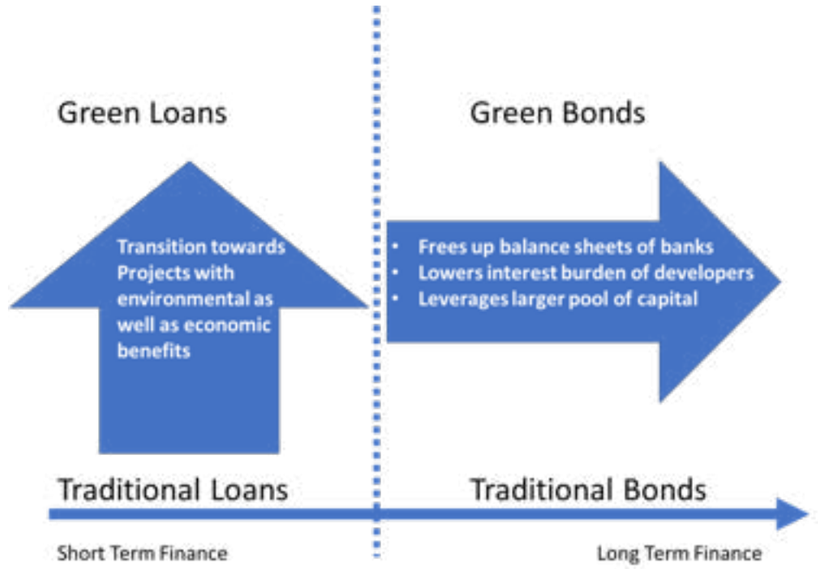
Green loans, finance extended by a bank or other financial institution for use on environmental projects or programmes, and to be repaid, with interest, over an agreed period, are a relatively recent innovation, but volumes have risen dramatically over the past few years to over US$99 billion in 2018 [42].

Green loans are an increasingly attractive proposition for banks: they offer the prospect of new markets and products, enhance the CSR credentials of the lender (particularly for projects involving education), and as the environmental, social and governance risks associated with this type of lending can be lower than for standard lending, credit can be extended at competitive rates (see Figure 6).

Green loans are loans which are used for green purposes, and there is a further subset of green loans where pricing is tied to the borrower's performance against certain pre-determined sustainability criteria. Unlike most green bonds, which are issued with specific environmental projects in mind, such facilities focus on the company's overall approach to Environmental Social and Governance (ESG)-related goals – so for example, interest rates could be tied to reductions in energy use in schools.

41. Climate Bonds Initiative 2018 Can US Municipals Scale Up Green Bond Issuance? Likely, "Yes" https://www.climatebonds.net/files/reports/us_muni_climate-aligned_bonds_11-07-2018.pdf
42. Linklaters 2019 The Rise Of Green Loans And Sustainability Linked Lending https://www.linklaters.com/en/insights/thought-leadership/sustainable-finance/the-rise-of-green-loans-and-sustainability-linked-lending

Figure 10 | The Advantages of Green Loans and Bonds



Market standards for green loans were published by the LMA in March 2018 [43] and were followed in March 2019 [44] by sustainability linked loan standards. Green and sustainability linked loans are now recognised products globally.

Finnish telecoms giant Nokia has committed to a new €1.5bn credit facility [45], which will bind it to a set of targets for reducing greenhouse gas emissions. Nokia is aiming for a 41 per cent reduction in emissions by 2030, compared with its 2014 output, and a 75 per cent fall in emissions from products it has sold. Dutch international agri-business corporation Louis Dreyfus has a similar $750m revolving credit facility, with interest payments tied to its achievement of green goals such as CO_2 reduction, power consumption, water usage, and landfill waste [46].

Green loans are ideally suited to energy-saving projects, but require careful planning for the measurement and monitoring of outcomes.

43. LMA 2018 Green Loan Principles https://www.lma.eu.com/application/files/9115/4452/5458/741_LM_Green_Loan_Principles_Booklet_V8.pdf
44. LMA 2019 Sustainability Linked Loan Principles https://www.lma.eu.com/application/files/8015/5307/4231/LMA_Sustainability_Linked_Loan_Principles.pdf
45. Georgiadis P & Asgari N 2019 Nokia Signs €1.5bn Loan Linked To Greenhouse Gas Emissions FT June 19, 2019 https://www.businesstelegraph.co.uk/nokia-signs-e1-5bn-in-sustainability-linked-credit/
46. Holder M 2019 Louis Dreyfus Company Links Interest On $750m Loan To Green Performance https://www.businessgreen.com/bg/news/3076513/louis-dreyfus-company-agrees-usd750m-green-loan-repayment-deal

Policy Performance Bonds

'Positive incentive loans' are a fast-growing part of green finance, and have recently seen some high profile issuances by major corporations. For this type of financial instrument, the cost of borrowing varies, depending on whether the borrower hits pre-determined targets linked to ESG standards.

Policy performance bonds (PPBs) are government or corporate-issued bonds where interest payments are linked to the delivery of policy-specific targets. Policy performance bonds, or surety bonds, could be an important link between government policies and real-world economies. A policy performance bond provides a hedge against the issuing country's government not delivering on its commitments or targets [47]. Policy performance bonds could help unite businesses, organisations, and governments towards shared goals.

The Italian energy company Enel [48] has issued a bond that has linked its coupon to the company's achievement of a renewable energy generation target in line with the UN Sustainable Development Goals (SDGs). The $1.5 billion, five-year issuance is for general corporate purposes, however, the coupon it pays investors will increase by 25 basis points if Enel does not achieve, by 31 December 2021, a percentage of installed renewable generation capacity equal to or greater than 55% of total consolidated installed capacity. The bond will pay a coupon of 2.650% until maturity, on 10 September 2024, but will rise to 2.900% if it does not achieve the renewables objective.

From a public sector perspective, policy performance bonds offer investors a critical advantage, the risk of failed government policy. Public policy is core to most environmental infrastructure and technology profitability. If policymakers stick to declared targets on, for example, reductions in greenhouse gas emissions, increases in renewable energy, or higher carbon prices, many environmental and cleantech projects make investment sense. If government policies are subject to sudden changes, green projects are highly risky.

Policy performance bonds are a statement to investors that a public body intends to stick by its policy pledges, and investors know that they will be compensated through higher interest rates, should the issuer renege on their word. Policy Performance Bonds can be thought of as a bet that a policy-maker will break their word, in the same way, that car insurance is a bet that an individual will crash their car, it is not a desirable outcome, but should it occur the bondholder will be compensated.

Local authorities could issue policy performance bonds as a type of municipal bond. In the case of energy efficiency in schools, the choice of index allows the public sector to eliminate quite specific risks, taking away a policy confidence blockage and enabling private sector investment to flow. The ability to choose any of a range of indices provides flexibility to target one or more specific risks in a single structure. Policy performance bonds could easily be issued by any local authority without any need for a national initiative. Documentation would be simple. Most existing government treasury mandates already allow for these types of instruments and structurally they are closely related to ESCO contracts.

47. M Mainelli and J Onstwedder Environmental Finance, Fulton Publishing (February 2010) page 17 Living Up To Their Promises (index-linked carbon bonds)
48. RenewablesNow 2019 Enel Issues USD-1.5bn SDG-Linked Bond https://renewablesnow.com/news/enel-issues-usd-15bn-sdg-linked-bond-668049/

However, although there are some complexities, such as auditing and authentication of performance figures, liquidity, leverage opportunities, stripping, etc, there is also the deeper question of the legitimacy of locking in policy goals across multiple election cycles. Given the fallout that arose from the Renewable Heat Incentive (RHI) scandal in Northern Ireland [49] policymakers exploring these instruments are advised to embrace an inclusive approach to developing policy in this area.

Crowd Funding

Traditional project funding requires the involvement of a small number of investors who are willing to invest large amounts of money. Crowd-funding is a way of raising money for a project by using the internet to ask large numbers of people to invest small amounts of money. The first online crowdfunded project is thought to have occurred in 1997 when US fans of the prog-rock group Marillion raised $60,000 to cover the costs of a US tour, that otherwise would not have taken place [50]. There are three different types of crowd-funding: debt, donation and equity.

- Debt crowdfunding is a version of peer-to-peer lending, though it is usually themed, for example, investment in renewable energy, environmental projects or international development. Examples of sites offering this type of service include https://www.abundanceinvestment.com/, https://bnktothefuture.com/, https://www.pozible.com/ and www.trillionfund.com (all links active on 10/02/20)
- Donation/Reward crowdfunding tends to be associated with a specific cause or event and does not provide a financial return. Rewards can include tickets to an event, acknowledgement in a book or on an album sleeve cover, promotional items, or just the satisfaction of donating to a worthy cause. Sites offering this type of service include www.crowdfunder.co.uk, www.just-giving.com, www.peoplefund.it, www.spacehive.com and www.hubbub.net (all links active on 10/02/20).
- Equity crowdfunding is similar to debt crowdfunding, but instead of interest money is exchanged for a small stake in the business. If the business is successful the value of the shares increases, if not, the value decreases or the money may be lost entirely. The equity crowd-funding market is still small (a report by Nesta [51] found that £193m was lent in 2013 through peer-to-peer business lending platforms, whereas £19.5m was invested through equity crowd-funding) however, it is growing. Sites offering this service include www.angelsden.com, www.crowdcube.com, www.ethex.org.uk, http://communityshares.org.uk, www.seedrs.com, and www.sharein.com

All links active on 10/02/2020.

One of the most significant opportunities associated with crowd-funding is the ability of communities to raise funds for local infrastructure. Crowd-funding also introduces creative opportunities for governance – what to invest, where, who receives the returns – and democratic control of commonly held organisations. Generally, the sums raised are relatively small – tens of thousands rather than hundreds of thousands, however, blending crowd-funding with other sources of capital is an effective way of generating a stake for local communities in green infrastructure programmes, particularly for the installation of renewable energy generation capacity, such as photovoltaics.

49. BBC 2019 Timeline: Renewable Heat Incentive Scandal https://www.bbc.co.uk/news/uk-northern-ireland-38301428
50. Drake D 2013 Crowd Rocking the Fund: From Marillion Band to the #UKCrowdfundingDay https://www.equities.com/news/crowd-rocking-the-fund-from-marillion-band-to-the-ukcrowd-fundingday
51. NESTA 2019 Crowdfunding http://www.nesta.org.uk/project/crowd-funding

Crowdfunding enjoys varying degrees of regulatory support around the world, particularly for equity type structures. The Monetary Authority of Singapore (MAS) published a consultation paper on the topic in February 2015 [52] which place constraints on this type of fundraising

Europe has been more enthusiastic in its embrace of crowdfunding. The EU has something of a laissez fair approach to crowdfunding platforms as equity crowdfunding has enabled small investors to diversify their portfolios and gain ownership in high growth startups. However, the continued growth of European crowdfunding platforms will require a legal crowdfunding framework across Europe, and a rating system to help evaluate the numerous platforms (see Table 3).

Table 3 | Examples of European Crowd Funding Organisations

Funding Circle (UK)	Funding Circle directly connects people and organisations who want to lend, with vetted, creditworthy established businesses who want to borrow. More than £285 million has been lent via Funding Circle so far.
Ulule (France)	Since its launch in October 2010, Ulule has helped finance more than 4900 creative, innovative, or community-minded projects with a 67% crowdfunding success rate in 2014.
FundedByMe (Sweden)	FundedByMe was founded in Stockholm, Sweden, in March 2011 and is one of the first crowdfunding platforms in the world to offer both reward-based and equity crowdfunding.
MyMicroinvest (Belgium)	MyMicroInvest (MMI) has a 12,500 member strong community that enables individuals to invest in innovative companies from 50€ upwards. Once a project meets its funding goal through MMI, the crowdfunded amount is invested in the said company as a single entity and the investors receive a participation note.
Booomerang (Denmark)	Booomerang.dk is Denmark's largest reward-based crowd-funding platform. It started 8 years ago developed rapidly, setting up an office in Berlin, Germany at the end of 2014.
Derev (Italy)	Derev uses platform-tools to enable projects to gain both funding and participation, from interested individuals or communities.
Companisto (Germany)	Companisto is among the leading equity-based crowdfund-ing platforms in Europe with several renowned business angels, corporate finance specialists, and venture capital companies in its network. The platform has successfully funded 30 startups and invested nearly €6 million so far.
Symbid (Netherlands)	Symbid allows investors to seamlessly become co-owners with a complete legal structure within which the new financers are bundled. Some unique features of the Symbid community include an 'Inner Circle' of involved investors who in turn can support the borrower.

Energy Generation

The generation of energy by schools through the implementation of renewable capacity, such as solar cells or wind generation is an attractive concept, which also gives a striking representation of a school's commitment to reducing greenhouse gas emissions. Renewables installations can engage pupils and staff and offer educational opportunities, as well as offering an income stream.

However, care must be taken with these schemes if they are to be more than ornamentation as the economics of procurement, installation, grid connection and payback periods are finely balanced. Although direct grants may be obtained for their installation, or they may be part of the package offered by ESCOs (see the section on Commercial Debt & Equity), it may be advisable to separate the funding of generation programmes from energy-saving programmes entirely, and put the former in the hands of one of a number of community energy associations which have sprung up across Europe.

A good example of one of this type of organisation is 'The Schools Energy Cooperative Ltd' (https://schools-energy-coop.co.uk/). The Cooperative is a social enterprise which installs community-funded solar panel systems on schools free of charge, as well as paying all its profits to its member schools. Since its foundation in 2014, the Cooperative has installed over 2.5MW of solar panels on 72 schools around the country.

52. MAS 2015 Consultation Paper on Facilitating Securities-Based Crowdfunding https://www.mas.gov.sg/publications/consultations/2015/consultation-paper-on-facilitating-securities-based-crowdfunding

05 Barriers to Action

Section Summary:

- Policymakers have difficult decisions to make with respect to resource allocation. Across Europe, local authorities are facing siginficant budgetary challenges due to demographic change, and investment which will yield tangible results within a single electoral cycle is unlikely to be prioritised.
- Missing, incomplete or misfiled data can severely hamper efforts to scope the potential for energy-saving projects.
- As high discount rates may impact on the economic viability of energy-saving programmes, there may be a case to apply different discount rates for energy-saving projects.
- Regulatory and policy barriers can form a maze for local authorities seeking to enhance the energy performance of their schools. However, with sufficient will and effective advice, the majority of these can be overcome.

Barriers to Action

Although the benefits of energy-saving in schools are pretty clear cut, historically, most Local Authorities have not prioritised action in this area.

There are a number of reasons for this:

Opportunity Costs

Resource expenditure on what has been seen, until recently, as a relatively low priority area prevents expenditure in other, more urgent areas of Local Authority activity, such as social care or economic development. Across Europe, policymakers have difficult decisions to make with respect to resource allocation. Local Authorities are facing significant budgetary challenges due to demographic changes, and investment which will not yield tangible results within a single electoral cycle is unlikely to be prioritised.

Metrics and Data

Due to confusion on roles and responsibilities for energy consumption and maintenance, records for schools may be decentralised and poorly kept. Missing, incomplete or misfiled data can severely hamper efforts to scope the potential for energy-saving projects. Even when data exists, it may lack vital information on the existence, age or performance of energy-saving measures (such as insulation and double glazing), or equipment such as lighting or HVAC systems.

Collection, aggregation and analysis of this data is a vital first step in developing an action programme, and even where comprehensive steps are put in place to collect it, a delay of up to 12 months will be necessary to gather a full set for analysis.

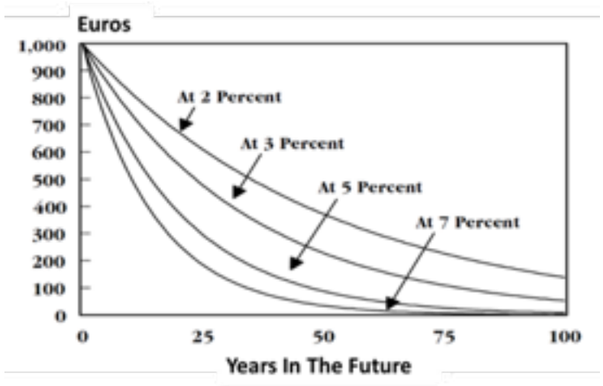
Discounting

The discounting of assets (see Figure 11), is yet another hurdle which must be overcome in the creation of an investment case for energy saving in schools. Discounting is an important accountancy tool which underscores the basic human preference for having something now compared to later and allows for the present value of future returns to be contrasted with the up-front investment costs. In other words what will €100 today be worth in ten years time.

Discounting is used to ask two main questions:

- What is the value of doing this now as compared to later? And;
- Which of the options on the table provides the best return over time?

Figure 11 | Curves representing constant discount rates of 2%, 3%, 5% and 7%



Different governments apply differing discount rates for infrastructure investment (see Table 4). The UK treasury Social Time Preference Rate (STPR), for use in UK government appraisal is set at 3.5% in real terms [53]. Even 3.5% may be too high, given the historic low-interest rates set by central banks [54].

Many 'quick win' actions, such as LED lighting systems have a short payback period - typically three to five years - but deeper interventions, such as HVAC replacement, renewable energy installation or rebuilding programmes may not pay back the initial investment for considerably longer. As high discount rates may impact on the economic viability of energy-saving programmes, there may be a case to apply different discount rates for energy-saving projects, given:

- The high social and environmental value of energy-saving programmes.
- The contribution they make to tackling climate change

Table 4 | International Discount Rates

Country	Discount Rate
Denmark	• 4% for years 0-35 • 3% for years 36-70 • 2% for years 71+
France	• 4% for projects 0-30 years • 2% for years 31+
Germany	• 3%
The Netherlands	• 5.5%
Norway	• 4% for years 0-40 • 3% for years 40-75 • 2% for years 75+
Sweden	• Recommendations vary by agency
United Kingdom	• 3.5% for years 0-30 • 3% for years 31-75 • Reducing to 1% over years 75-300+

53. HMT 2003 Further Supplementary Memorandum Submitted By HM Treasury https://publications.parliament.uk/pa/cm200203/cmselect/cmpubacc/155/2120414.htm
54. Freeman M, Groom B & Spackman M 2018 Social Discount Rates for Cost-Benefit Analysis: A Report for HM Treasury https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685904/Social_Discount_Rates_for_Cost-Benefit_Analysis_A_Report_for_HM_Treasury.pdf

Regulatory and Policy Frameworks

Regulatory and Policy barriers can form a maze for local authorities seeking to enhance the energy performance of their schools. However, with sufficient will and effective advice, the majority of these can be overcome.

Interdictions on the raising of private finance by local authorities, imposed by regional or central government, may appear as an impenetrable barrier, but the finance necessary for improvements can be gained by using an energy supply contracting and shared savings model when engaging an ESCO.

A more serious complication arises in the case of the United Kingdom, where the primary and secondary education system has been fragmented, with responsibility for provision being divided between local authorities 'free schools' and academy trusts [55].

In the latter two cases, responsibility, both for energy procurement and estate management, rest with the free school (a registered charity which usually operates a single school) or the academy trust, a charitable trust which may operate a chain of primary and secondary schools.

Local authorities have no jurisdiction over academy trusts or free schools, and furthermore, local authorities may be forced by central government to cede control of some schools to academy trusts, a process which involves the signing over of assets such as land and buildings. This raises several significant issues:

- Although they are eligible for funding from revolving funds such as Salix, Free schools and academy trusts are unlikely to have the knowledge, skills or ambition to implement comprehensive energy-saving programmes in the schools under their control [56].
- Although they are funded by the public sector, they are under no obligation to buy energy via the flexible frameworks of a central purchasing body.
- When a local authority is forced to transfer ownership of a school to an academy trust, questions arise as to liabilities for any finance raised to fund energy improvements and any contracts in place with ESCOs.

However, none of these problems is insurmountable.

In the case of forced transfers, liabilities for loans or contracts can be passed to the academy trust. In common with all other areas of the public sector, education has seen severe budgetary restrictions for the last decade. Given the high cost of energy and the relatively short payback periods for energy-saving measures, they are likely to be receptive to partnerships with local authorities on energy-saving programmes.

Free schools and academy trusts are also given additional funding by central government to invest in new buildings, and timely intervention by planning departments can ensure that energy saving is built into these from the start.

55. Academyambassadors.org 2020 What Is An Academy And What Does The Board Do? https://www.academyambassadors.org/candidates/what-academy-and-what-does-trust-board-do
56. YPO 2019 Academy trust resolves energy crisis and inflated premiums with dedicated contractual support from YPO https://www.ypo.co.uk/-/media/files/misc/ypo-bishop-wheeler-academy-energy_case-study.ashx?la=en

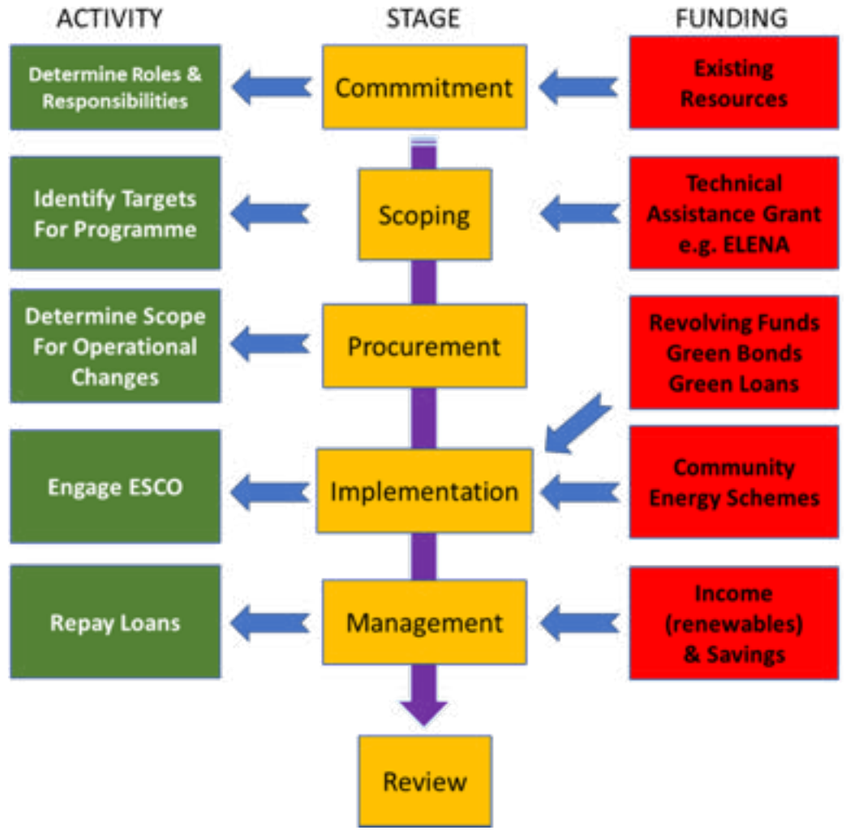
06

Conclusions

Energy-saving programmes in schools benefit from the confluence of a moral and economic imperative with a mature and well-established market of products and services for delivery.

Aside from some initial pump-priming and the determination of roles and responsibilities, both funding and technical support are available at every stage of the programme (see Figure 8).

Figure 12 | Energy Saving in Schools



However, policymakers must remember that energy saving is a process, not a project. Systems and equipment require maintenance, staff and pupils require training and engagement and succession planning must be made for key members of staff who control critical aspects of energy-saving programmes.

07

About the Authors

Southend-on-Sea Borough Council commissioned Z/Yen to undertaken a comprehensive review of the funding sources and mechansims that are available to local authorities to finance the investment that is needed to deliver energy efficiency programmes in schools. As 'Paying for Energy Saving in Schools' highlights, the energy used in schools comprises more than half of all the energy demand of local authorities. It is therefore it is vital that local authorities understand the finance that is available to them to deliver energy efficiency programmes across the region's school estate.

Paying for Energy Savings in Schools

Z/Yen helps organisations make better choices - our clients consider us a commercial think-tank that spots, solves and acts. Our name combines Zen and Yen - 'a philosophical desire to succeed' - in a ratio, recognising that all decisions are trade-offs. One of Z/Yen's specialisms is the development and publication of research combining factor analysis and perception surveys.

To discuss the report please contact:

Simon Mills

(e): simon_mills@zyen.com
(t): +44 (0) 20 7562 9562
(w): www.zyen.com

2imprezs is a project co-funded by the North Sea Region Programme 2014-2020. The project will implement energy saving measures in existing school buildings across the NSR to reduce energy consumption and costs and increase comfort. Students of participating schools will be engaged through a cross-border energy challenge initiative. The behavioural change programme is supported by the adoption of energy efficiency measures at schools.

To discuss the project please contact:

Kyle Buckle-Hodgson

(e): KyleBuckle-Hodgson@southend.gov.uk
(t): +44 (0) 1702 21500
(w): www.southend.gov.uk

Z/Yen Group Limited
41 Lothbury
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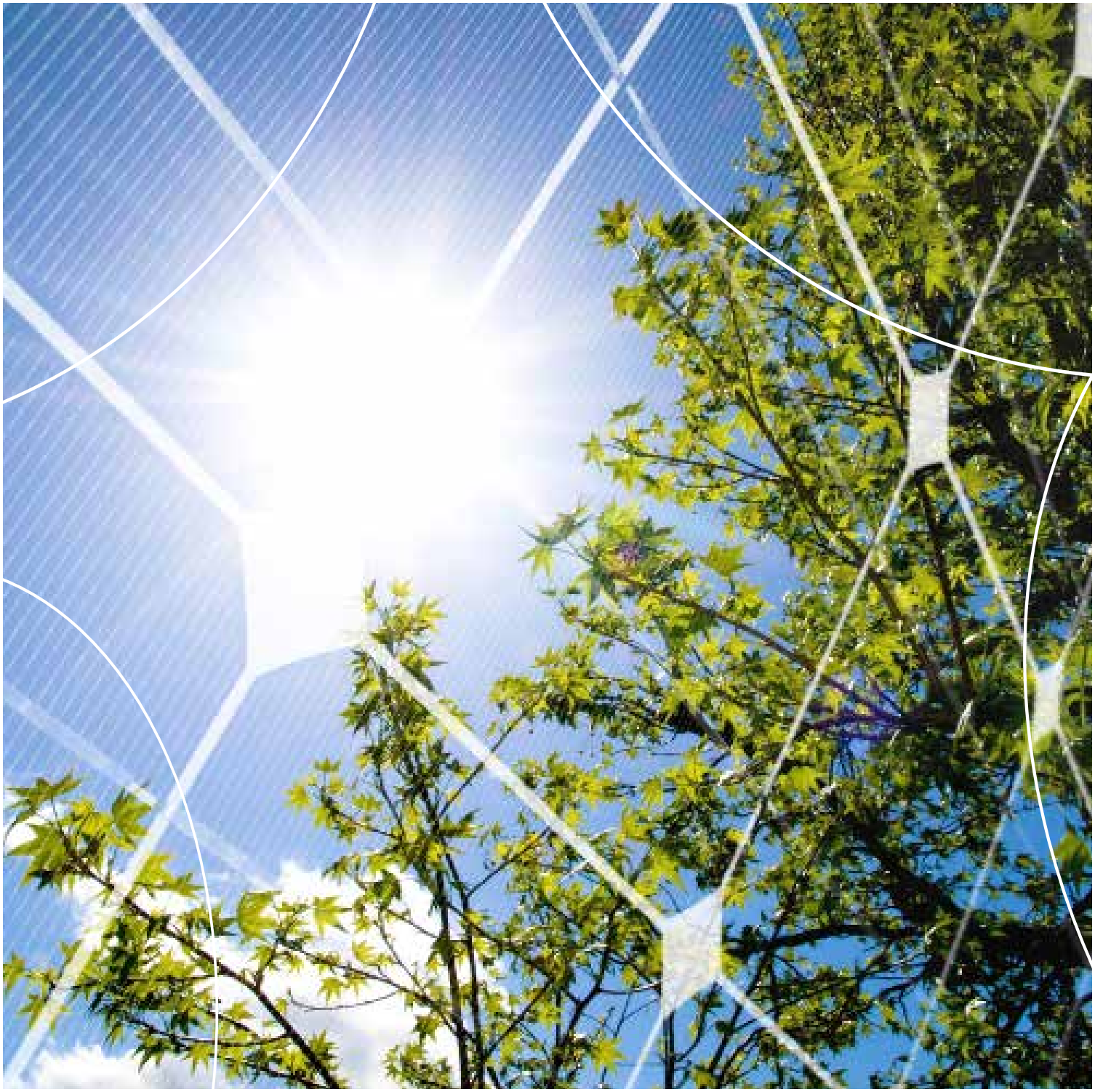

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