
Green Investment Bank

Low energy streetlighting: making the switch

A market report by the UK Green Investment Bank
February 2014

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Executive summary

LED technology: For over 30 years, LEDs have been used in a variety of areas, including industrial systems, car lights, hi-fi equipment and advertising. The move to LED outdoor lighting has been gathering pace over the last five years with the technology improving rapidly and costs falling quickly.

LED cost: Price and product are now at the point where Local Authorities should be developing “spend to save” business cases. Research by McKinsey shows costs have been dropping by 30 per cent a year. By 2020, the energy saving compared to today’s conventional lighting is expected to reach 90 per cent.

Significant energy savings and carbon reductions: LED outdoor lighting technology can cut energy bills and significantly reduce CO₂ emissions.

Smart lighting: Central Management Systems (CMS) for smart LED lighting control allow remote dimming and monitoring.

Long life expectancy: 20 to 25 years for LED v 3 - 6 years for conventional lighting, means reduced maintenance costs, fewer lamp renewals and less scouting and physical monitoring.

Demonstrable health and safety benefits: More focused light improves nighttime visibility which can reduce vehicle accidents and crime, with less spillage onto residential properties.

Cost savings: Significant overall savings will come from reduced energy demand, protection against rising energy prices and lower maintenance and inspection costs.

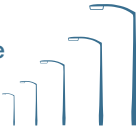
No upfront costs: All costs can be subsumed in a funding package, repaid from energy savings. Typical payback of 5 - 15 years (including finance costs).

Development support: Various UK government and devolved administrations are providing support to develop business cases and procure the appropriate LED contract. This is also happening on a global stage with Los Angeles, Las Vegas and New York implementing city-wide LED switch-overs.

Funding: The UK Green Investment Bank (GIB) has created The Green Loan for Local Authorities, a value for money financing product which can finance all LED and CMS capital expenditure including columns.

Growing market share: There is no reason why LED penetration in the UK streetlighting market should not go from its current share of less than 10 per cent to near 100 per cent by 2020.

The future: The technology is evolving to fit the Smart Cities agenda.


7.4m number of streetlights in the UK. Less than 10% are currently low energy LEDs. 

100,000 number of hours of light provided by a LED. A standard streetlight only provides 15,000 hours. **30%** of light from a standard streetlight is wasted as it is dispersed upwards.

£300m




annual UK spend on energy for streetlighting; rising in line with escalating energy prices.

£200m annual energy cost saving by switching to LED streetlighting; paying off the investment in 10 years. **30%** of a Local Authority's energy bill is for streetlighting. 

50 to 80% of energy costs could be saved by switching to low energy streetlighting.

Saving greenhouse gas emissions (CO₂) equivalent to taking

330,000  cars off the UK's roads.

Introduction

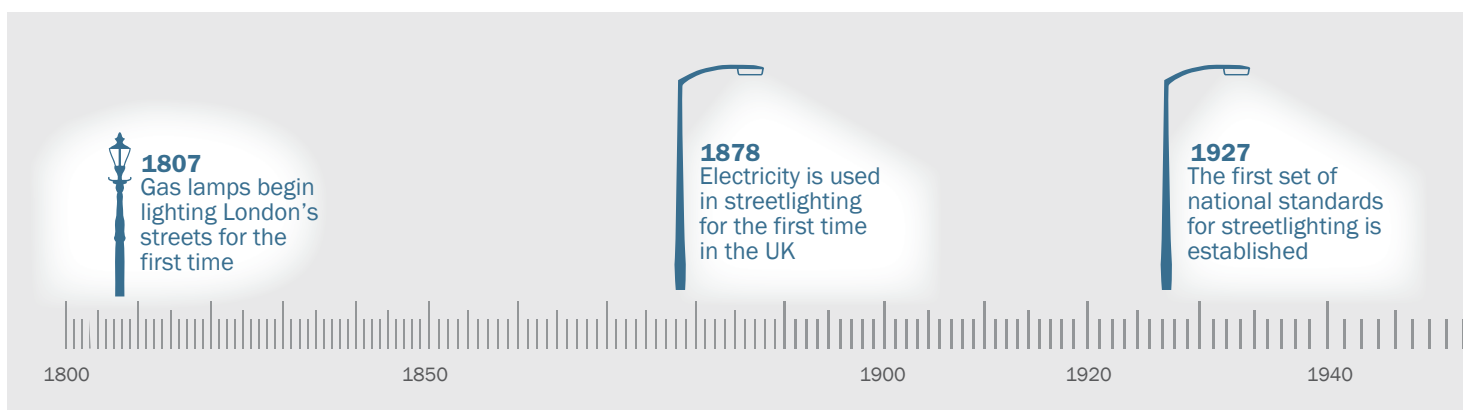
This report is aimed at anyone with an interest in Local Authority operations and capital spending for energy efficiency projects: Chief Executives, Finance Directors and Highways and Streetlighting, Energy and Estates Management departments.

The purpose of the report is to:

- Set out the opportunity available to UK Local Authorities through the conversion of their existing streetlights to new low energy technology. The report will set out the cost savings and environmental benefits created by making the transition. Details of some early movers are also provided.
- Introduce a new financing package from the UK Government-backed Green Investment Bank (GIB). GIB has created a bespoke finance package to support Local Authorities who wish to make the switch. This supported product is now being deployed into Local Authority projects fitting flexibly into the energy cost savings envelope, and on terms broadly comparable with Public Works Loan Board (PWLB) finance.

This report has been produced by GIB. GIB began operations in November 2012. Created by the UK Government and capitalised with £3.8 billion of public money, its mission is to help the UK transition to a greener economy by supporting projects that are both green and commercial. One of GIB's priority areas for investment is public sector energy efficiency.

GIB can provide the full spectrum of financing across debt and equity with the ability to fund long tenor. It has a dedicated team of energy efficiency project and finance experts set-up to work with private and public sector organisations and co-investors.



LED streetlighting: the opportunity

Low energy streetlighting

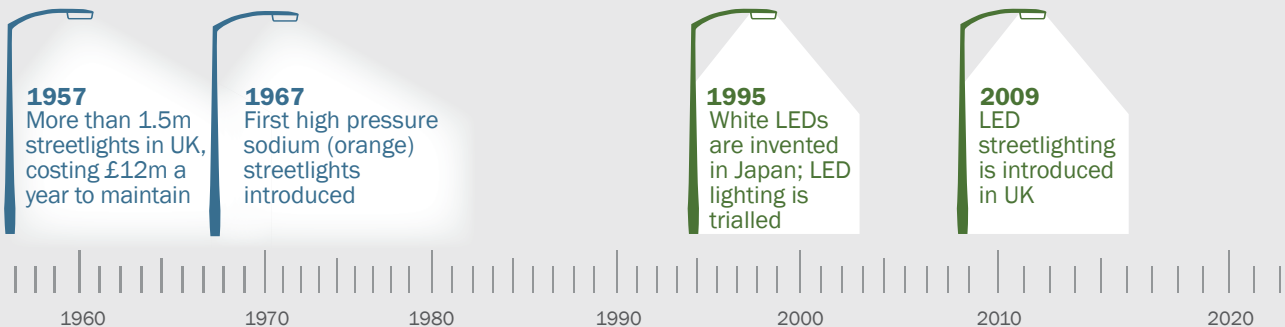
Modern energy efficient streetlighting options revolve mainly around LED, fluorescent lamps and induction lighting:

- Fluorescent lamps offer energy savings of up to 50 per cent compared to conventional lighting, have lower initial costs than induction and LED lamps but have limited lives of 4 - 5 years which increases the overall costs due to ongoing replacement and maintenance expenditure.
- Induction lighting (large diameter fluorescent tubes using electromagnets to excite mercury atoms to emit UV light) was initially developed

as a way to reduce the lifetime maintenance costs by offering long lamp lives of up to 90,000 hours with energy savings similar to fluorescent.

- LED lighting has emerged as the favoured energy efficiency streetlighting technology due to energy savings of up to 80 per cent and long-life maintenance savings. As more manufacturers have concentrated on LEDs, the efficiency, light output and quality have rapidly increased.

Despite the benefits offered by these lighting types, uptake by Local Authorities to date has been slow.



What are LED streetlights?

LEDs - Light Emitting Diodes - are a form of energy efficient lighting that offers greater efficiency and effectiveness than traditional incandescent and high intensity discharge (sodium) based lamp technology. The quantum dynamics that create light in the LED semiconductor represent as much of a technology step change as the move from candles to incandescent lamps in the 19th century.

LEDs offer advances in:

- **Efficiency:** energy savings - from 50 to 80 per cent - compared with conventional technologies, resulting in similar reductions in cost and carbon emissions.
- **Controllability:** superior control over light colour, intensity and direction allows novel lighting system designs.
- **Health & Safety:** Outdoor LEDs offer improved visibility for pedestrians and traffic, road level on-off signing, as well as reduced light pollution.
- **Lifespan:** well-designed LEDs are expected to last for up to 100,000 hours. Lifespans can be extended even further by coupling LEDs with smart controls.

LEDs are also evolving much faster than any other lighting technology. While fluorescent tubes have doubled in efficiency since 1950, LED efficiency has increased by a factor of ten since 2000.

Components of a LED lighting solution

1 Luminaire

The 'lamp' part of a streetlight consists of the LEDs and supporting equipment such as a heat sink, printed circuit board with LEDs and driver or ballast.

2 Columns

The 'post' part of a streetlight to which the light fitting attaches. New LED luminaires can be attached to existing columns.

3 Central Management System (CMS)

A CMS is a system which, operating either through wires or wirelessly, enables individual lights to be switched on or off, dimmed and monitored independently. Allows for "Dimming and Trimming" strategies to be developed, which contribute to energy savings, and also allow for lights to be independently monitored, reducing the need for scouting. Whilst increasing the initial capital costs and requiring some lifetime operating costs, CMS can increase energy savings by up to a further 20 per cent.



LED lighting: the benefits

- Energy savings of 50 – 80 per cent against incandescent and high-intensity discharge (HID) sodium lamps and CO₂ savings which can also deliver up to 80 per cent, significantly contributing to a Local Authority's 2020 carbon reduction targets.
- Streetlighting will be included in a Local Authority's carbon reduction tax commitment from April 2014, meaning carbon tax must be paid on lighting energy consumption.
- LEDs are 'greener', more robust to power fluctuations and more recyclable – up to c. 90 per cent. They contain no mercury, lead, or heavy metal, less delicate elements and emit no UV radiation.
- Ability to be dimmed to any specific level easily and linearly, including avoiding early period over-illumination.
- LEDs offer up to 100,000 hours versus 15,000 hours for HID sodium lamps versus 25,000 hours for fluorescent lamps.
- LEDs cast even, directional light, with no optical power wasted. The Campaign for Dark Skies estimates that as much as 30 per cent of current streetlighting is inefficiently dispersed upwards.
- LEDs can be instantaneously digitally controlled via CMS.

100,000 number of hours of light provided by a LED. A standard streetlight only provides **15,000** hours.

50 to 80% of energy costs could be saved by switching to low energy streetlighting.

PART 1: LED STREETLIGHTING: THE OPPORTUNITY

Technology advancement

Lighting technology is evolving quickly and energy efficient lighting solutions are maturing, whereas older, less efficient technologies such as incandescent and halogen bulbs are in the decline phase.

As high energy consumption lamps such as HID sodium are phased out, Local Authorities must migrate to new technologies. These technologies are more efficient but currently more expensive.

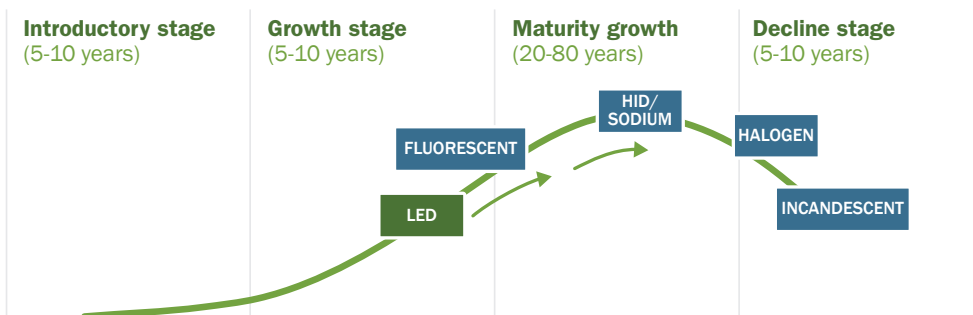
To date, advancement of LED technology has been product driven, with applications such as indicator lights, mobile devices, televisions and displays. As costs come down and technology advances their application has now widened to general lighting.

The light output of LEDs has increased 20 fold each decade for the last 40 years, while the cost has decreased ten-fold each decade over that same period.

As efficiencies increase and costs come down, the attraction of LED lighting increases. Significant energy and maintenance savings are now possible with short payback periods. Coupled with the longer warranties now offered by LED manufacturers - often as long as 20 years - the all-in package delivered by LED lights can support a compelling business case for switching to LED lighting.

With the growth in the market, options for LED design are expanding quickly so the new technology can now be used in a wider variety of settings. Whilst LED luminaires to date have had a futuristic look and been suitable for residential and highways, a number of manufacturers are now producing heritage style LED lanterns which better fit the surroundings of historic city or town centres.

Lamp technologies: Product lifecycle



Manufacturers and suppliers

Most LEDs and some electronic components are sourced from Asia alongside production of LEDs for televisions and retail displays. While other countries have their own local manufacturers and suppliers of luminaires, the big lighting manufacturers such as General Electrics, Osram, Philips, and Thorn still dominate. Some new entrants such as Toshiba are coming into the market, building on their electronics experience. These companies have factories in Europe which assemble and test the bespoke LED luminaires ordered.

In the UK the economic opportunities are beginning to be recognised and there are UK LED lighting specialists such as MHA Lighting and DW Windsor and new international entrants such as Cree, EWM (Every Watt Matters) and LED Roadway Lighting.

A number of the large international manufacturers are developing their own CMS so they can offer a fully integrated solution, which avoids interface issues. The UK has been at the forefront of independent CMS with companies such as Harvard Engineering and Telensa offering, and continuing to develop, electronic control solutions.

The large manufacturers can now show over 70,000 hours of LED testing in extreme conditions on their “older” lamps and are able to offer long warranties on the LEDs and luminaire of up to 20 years to provide assurance for their products. The drivers/ballasts are catching up and long warranties on the full package are emerging.

The large manufacturers
can now show **70,000** hrs
of LED testing

PART 1: LED STREETLIGHTING: THE OPPORTUNITY

The UK market and the scale of the opportunity

The UK has generally an old and inefficient streetlighting estate. Across the UK there are c. 7.4 million streetlights with less than 10% already considered to be low energy or in the procurement process for conversion.

- 7.4 million lighting columns.
- 2.3 million columns are older than 30 years and 1.1 million are over 40 years old.
- Streetlighting consumes 640,000 kW each hour – the equivalent to over half of the maximum output of the biggest nuclear power plant in the country, or the electricity consumption of 674,000 households.
- Over £300 million is spent annually on energy for streetlights and the costs are rapidly increasing for non-energy efficient lighting.
- The energy required by the current streetlighting estate equates to 1.3 million tonnes of CO₂ emissions each year, equivalent to around 550,000 cars on the road.
- To keep pace with natural deterioration, 185,000 lighting columns need to be replaced each year. This is not happening.

Retrofitting of streetlights can be financed from savings and involve no initial outlay. The market opportunity is substantial with an average cost of £400 per residential unit and £750 per main route unit. Assuming a 70:30 split between these two types this creates a total UK investment opportunity of over £3 billion.

GIB estimates that this investment need will be phased with £0.5 billion to 2015 and £2.0 billion to 2020 and the rest potentially beyond this horizon for late adopters or those Authorities undertaking long-term programmes using their own capital. It is hoped that this can be further accelerated.

Across the UK 80 per cent of the streetlighting estate is in England and 6 per cent in each of Scotland, Wales and Northern Ireland.

Early movers

UK

The UK's first LED streetlights were installed in 2009 in a London pilot scheme. Since this date, progress has been slow with the only whole-Authority programmes to date coming through PFI streetlighting and highways maintenance schemes. The other projects have been piecemeal, either addressing planned renewals and safety concerns, with individual major traffic routes (e.g. A5 Tamworth Bypass) and junctions (e.g. Hicks Gate roundabout, Keynsham) singled out, or small scale pilot projects (with long lead times for the follow-on projects).

The UK PFI streetlighting and highways maintenance programmes offered long-term support funding in the form of PFI credits to Local Authorities from 2000 to 2012 to invest in new lighting and columns. Whilst most of the programme used non LED lighting, some of the latter schemes included LEDs. A number of the earlier schemes are at or are coming to a point in the replacement cycle where the Authorities and their contractors are now discussing and developing business cases to move to LED.

Two of the larger PFI highways maintenance schemes, Sheffield and Birmingham, are the earliest adopters of full LED estate solutions with CMS. Birmingham City Council worked with Amey on the £70 million rollout of 90,000 LEDs across the city – Europe's largest LED streetlight scale-up project to date – which is expected to bring energy savings of 50 per cent compared to conventional technologies and an annual cost saving of £2 million. The initiative is an integral part of a much larger £2.6 billion highway infrastructure modernisation as part of a 25-year PFI contract.

Large Authorities such as Leeds City Region and Greater Manchester are sharing knowledge and developing LED business cases across their constituent Authorities. Greater Manchester Authorities have over 200,000 streetlights.

Transport for London (TfL) announced in late 2013 its intention to update 35,000 of its streetlights to LED by 2016, complete with a CMS.

A number of other Local Authorities (such as Bristol, Edinburgh and Glasgow) have taken advantage of European grant money, subsidised UK borrowing such as Salix or used their own funding to undertake pilot schemes to test performance and public reaction.

Development and procurement support is increasingly becoming available for UK Local Authorities to review the options to move to energy efficient streetlighting and develop their strategies and business cases:

- Department of Energy and Climate Change (DECC), through its Energy Efficiency Deployment Office (EEDO), is working with GIB to develop a web based toolkit informed by knowledge from

PART 1: LED STREETLIGHTING: THE OPPORTUNITY

Early movers cont...

workshops held with Local Authorities and details of where ongoing support is available. This will be available in early 2014.

- In Scotland, the Scottish Futures Trust is developing a programme to help streamline the process. This includes a web based toolkit with guides, pro forma technical and financial models and exemplar business cases for East and West Dunbartonshire Councils (which the SFT helped develop). In support of the wider programme the Scottish Government has provided funding for surveys, Scotland Excel are setting up a LED contractor framework and the Scottish Green Investment Portfolio has provided expertise to Glasgow City Council to help develop their business case.

Private sector contractors with extensive experience in delivering PFI contracts and streetlighting estate management outsourcing, such as Amey, Balfour Beatty, EoN, SSE and Vinci, are also partnering with Authorities to share their experience and resources and to help develop business cases for lighting transformation.

International

The three major markets for LED street lighting are China, USA and Europe, with India emerging quickly.

To date China has led the way with a conversion target of 30 per cent by 2015. Rapid adoption in China has been driven by a central government programme for pilot rollouts across a number of major cities, although there has been some slowdown as product quality issues were evaluated. China has also identified the wider global opportunity for its lighting businesses in leading the way in LED product development.

The USA has long been a world market leader in energy efficiency projects including energy service contracting through ESCOs. Cities such as Los Angeles, Las Vegas and New York have developed visionary programmes for full scale LED replacement using municipal funding. In late 2013, New York's Mayor Michael Bloomberg committed to transform the city's streetlighting to LED as part of a comprehensive, long-term, sustainability programme that aims to reduce greenhouse gas emissions by 30 per cent by 2017. Bloomberg believes that the installation of 250,000 LED lights will save \$14 million in taxpayer dollars, \$6 million of which is energy costs and \$8 million in maintenance costs.

Streetlighting as part of smarter cities

In the UK, 80 per cent of the population now live in urban areas and this proportion will continue to grow. The relentless march of technology empowers people to demand more and better public services, including up-to-the-minute public information at street level or on smartphones. The integration of smart LED street signs and lighting into the information network will help facilitate this.

Central Management Systems are available now which allow control of the lighting levels and automatic lamp fault reporting, compile data for billing, and will be increasingly utilised to manage essential services such as traffic monitoring, traffic lights, and to facilitate crime and public event data collection. As part of its £24 million future city project Glasgow is trialling a system that senses and records noise and movement so that lighting levels can be increased or even flashed in instances to help reduce street crime.

In the not too distant future, LED lights coupled with remote sensors and intelligent software will allow streetlighting to quickly adapt to other surrounding circumstances such as weather conditions, and car volumes. The streetlighting infrastructure is being developed now to allow data communications through WIFI hubs and in years to come potentially ultra-fast optical wireless LIFI.

The resident and community benefits of LED lighting

Many of the pilot projects have included resident surveys which show overwhelming preference for the quality of light provided by LED lighting. The Institution of Lighting Engineers claims that for every £1 invested in streetlighting, £4 can be saved through reducing crime and accidents.

“Now is the time for the UK to make the switch to low energy streetlights. The cost savings and environmental benefits are clear and so are the community benefits. I've had a number of pilot projects in my constituency and surveyed hundreds of residents. Their response shows that, despite initial reservations, they far prefer LED streetlights. 85 per cent say they feel safer in their communities and 95 per cent say the quality of the light is better. The UK needs to catch up with energy efficiency measures and streetlighting is a great place to start.”

Benefits include:

- Reduction of night time traffic accidents. A number of Local Authorities have in recent years taken decisions to dim or turn streetlights off at certain times overnight as a way to reduce energy costs. The press has reported a number of cases of fatal car accidents and linked these to the switch-off. Studies do not directly substantiate this although good uniformity of lighting is recommended.
- Reduction of street crime and the fear of street crime in residential areas. Studies have shown that lighting improvements can decrease crime by up to 30 per cent and the financial savings exceeded the cost of improving the lighting.
- Stimulating the night time economy and use of public transport.
- Development of safer routes to school.

Mike Crockart MP
Edinburgh West

Financing the conversion to low energy lighting

Economics of a LED conversion project

Costs

A typical Local Authority streetlighting estate will include a blend of lighting in the residential, urban centre, and highway settings and as such the type of LED luminaires and bulbs may range from lower powered heritage to high-powered, high-dispersion. The luminaire pricing will also vary from c. £300 up to c. £1000.

The LED project costs could be increased by column replacement, dimming and trimming technology including a full CMS, installation costs, survey costs, and adviser and project team costs. Therefore total project capital and development costs could vary from low £millions on some smaller Authorities to up to £100 million + on the largest Authorities where a large amount of columns need to be replaced.

Savings

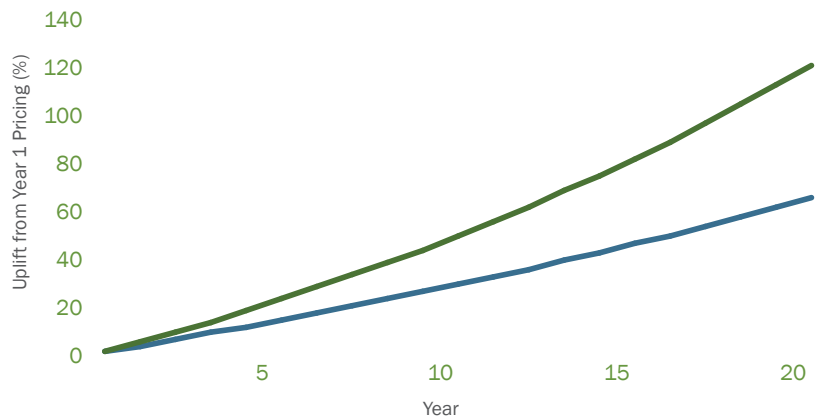
The business case should include a full options-appraisal including different lighting control strategies. For example, residential areas could include drivers set to auto-dim and switch off and on over their life with little change required whereas highways or urban settings may benefit more from a CMS from the outset to deal with more variable conditions and to future proof, or alternatively there may be greater economic benefit from whole estate CMS deployment.

The business case should forecast the inflation-linked energy and CRC savings over the project period (influenced by the forecast LED life and the warranties obtained) and the long-term inflation-linked maintenance savings achievable. Electricity costs have more than doubled over the last 10 years for Local Authorities and recent LED business cases have included long-term electricity increases at 1.5 per cent to 4 per cent above RPI inflation. DECC or Poyry long-term forecasts can be used to support this and to conduct sensitivity analysis. Maintenance

cost inflation is likely to be at least RPI but will be influenced by local views on pay.

The total LED programme costs can therefore be substantial, but so are the forecast savings. Funding is available and repayments can be largely offset by the future energy, replacement and maintenance savings. Authorities should therefore not be put off by the initial capital costs and need to carefully evaluate each component of the project on a long-term value-for-money basis.

Potential Energy Inflation and RPI Comparison



The overall project economics are likely to show a payback anywhere from c. 5 years (excluding finance) to up to 15 years including financing costs for a project with full risk transfer and incorporating control systems. Therefore, depending upon the technology mix it should be possible to develop funded projects up to 25 years with some element of column replacement and keep the annual costs inside the savings curve (see page 14 for an exemplar curve).

Financing a Local Authority LED streetlighting project

GIB estimates that a high proportion of LED retrofit will be delivered through direct on-balance-sheet corporate financing, the rationale being that:

- LED conversion is more of a capital project than a long-term services contract: streetlight conversion projects are significantly simpler than most infrastructure projects and involve reduced ongoing maintenance and inspection.
- Risk transfer (particularly on installation and long-term lamp life) should be achievable through appropriately structured contracts and warranties.
- Off-balance-sheet funding is more expensive and most Local Authorities will be able to accommodate the investment within their prudential borrowing limits (PWLB, Corporate or GIB Green Loan) using a “spend to save” philosophy.
- PFIs are hard to unpick and the PFI consortia and Authorities generally do not wish to trigger a whole project refinancing where projects were funded at lower rates. Variations can be Local Authority balance sheet funded, and there appears to be limited appetite for new complex PPP type models without additional central government incentive.

In certain circumstances other financing may be used:

- On smaller LED projects, where the Authority can draw from its own budgets.
- Where the Authority has its own cash resources; however the opportunity to deploy capital elsewhere should be looked at where external funding is available for a project.
- Where the Authority does not want to, or cannot, use external funding or increase its borrowing limit then an off-balance sheet solution using asset finance or an ESCO solution may be appropriate. Some manufacturers and third party providers are able to offer this.

Streetlight conversion projects are
significantly simpler
than most **infrastructure projects**

PART 2: FINANCING THE CONVERSION TO LOW ENERGY LIGHTING

The GIB Green Loan

GIB has developed a Green Loan product for Local Authorities to accelerate the implementation of LED streetlighting. It is a corporate loan facility to cover the installation costs of lighting upgrades to LED, with repayments sculpted to best fit inside the forecast energy, replacement and maintenance savings.

The GIB Green Loan is a competitively priced on-balance-sheet corporate loan which is a more flexible alternative to PWLB. It can show better value for money over the project life due to its structural features:

- **Fixed rate loan facility** with interest payable only on portion of loan as it is drawn through the installation period.
- **Loan repayments over the project life which are sculpted to best fit inside the LED project costs savings.** CMS should be able to be incorporated inside the savings curve but columns will depend on the size of the investment required and the project life, which could be up to 25 years.

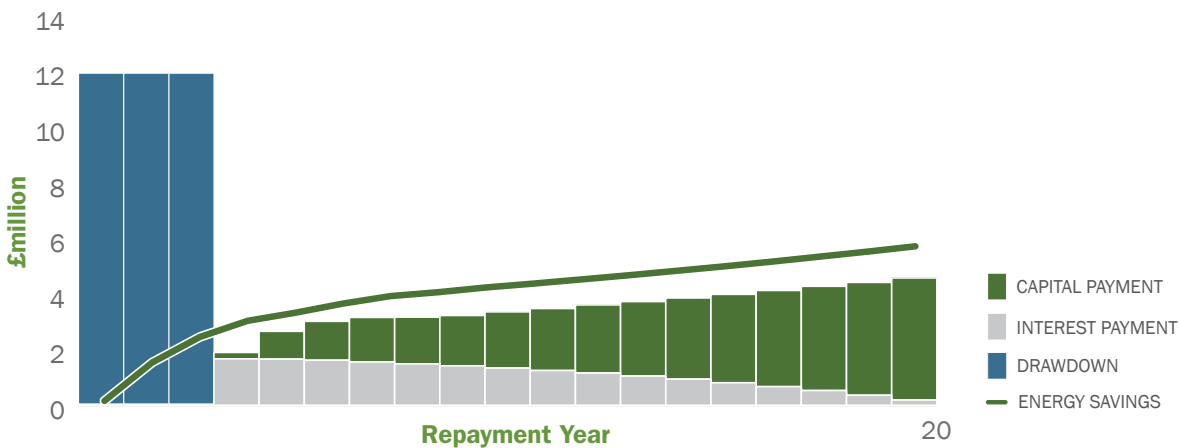
The Green Loan has been tested on pathfinder schemes and is already approved for use by the GIB’s Investment Committee.

The product also includes a number of innovative features designed to assist and accelerate the development of a Local Authority’s business case:

- Standardised and tested loan documentation and financial model for funding evaluation.
- GIB due diligence support and business case review. This will look at proposed technologies, carbon savings and cost savings. The due diligence will be substantially completed in-house on each transaction with reasonable external costs covered by GIB.
- Up to £0.5 million support for set-up costs, including Authority external advisers, which can be rolled into the Green Loan to fund the project.
- GIB green evaluation and long-term monitoring.

The Green Loan is available to fund most costs associated with the LED lighting implementation programme including set-up (e.g. survey) and adviser costs, LED luminaires, CMS and columns, and can be blended with other sources of Local Authority funding such as Salix and PWLB but is ring-fenced to the energy efficiency project. This will allow an Authority to budget across financial years and bring confidence to develop the LED lighting “spend to save” programme.

Green Loan Sculpted Repayment



GIB Green Loan outline funding terms

Fixed rate loans: against Local Authority credit risk, amortising with likely 10 - 25 year maturities. The tenor (length) will be up to a maximum of 25 years to correlate with the initial LED lamp life and allow maximum sculpting to the savings profile.

Loan pricing: the loan will be priced at a lending margin above an underlying government gilt rate (similar to PWLB). The headline rate will vary depending on the gilt rates at the time the loan is signed and the tenor, and will be higher than PWLB. The structural features however allow the Green Loan to show a lower NPV (net present value) cost over the project life.

Gearing: the projects will initially be up to 100 per cent GIB debt financed as the loan is direct to the Local Authority. The Authority is not required to invest any of its own capital.

Loan drawdown and repayment: the loan will be able to be drawn down over up to 5 years reflecting the agreed LED installation profile and there will be pro forma fixed schedules produced by the GIB Green Loan model to allow fixed rate funding.

Fees: Similar to most commercial loans, Arrangement and Commitment fees will be payable. The Arrangement fees will reflect a combination of GIB's own internal and external transaction costs to take each transaction to financial close, whilst the Commitment fees represent the allocation of GIB's capital for the facility. In both cases the fees will be at the lower end of the commercial range to maximise the value for money.

**The Authority is
not required
to invest any of its own capital**

PART 2: FINANCING THE CONVERSION TO LOW ENERGY LIGHTING

Developing a Local Authority “spend to save” business case

The benefits from moving to LED streetlighting are clear and the momentum is increasing. The following remain as the challenges and the solution options set out how GIB believes these can be overcome:

Challenges	Solution Options
Limited information on the quality of the current streetlighting estate	Procure survey. Fund internally or from GIB Starter Loan
High initial capital requirement, which is increased if CMS and column replacement included	Model whole life cost solution up to 25 years and forecast savings. Use optimum funding mix and potential for Green Loan to sculpt
Unlike PFI streetlighting there is no central government programme involving subsidisation	Recognition that PFI credits provided project focus and funding for columns and lamps. Savings curve and long-term costs reduction still achievable
Authority budget cuts and staffing reductions in recent years have left little resource to develop business cases and point Executive attention to the LED opportunity	Use market report to kick start the LED project within the Authority. Resource support is available. Select experienced advisers

Once an LED streetlighting proposal has sufficient sponsorship within the Local Authority, the next steps are:

- Review streetlighting asset register and undertake an estate survey if necessary.
 - Undertake a lighting options-analysis, relevant for the estate, including assessment of the individual control options. Whole life financial modelling will be required. Whilst exemplar Authority business cases could be used the technology and pricing is still moving and it is envisaged that each solution will be bespoke.
 - In addition to the economic and environmental benefits, the social benefits include improved public safety and aesthetic advantages. Where possible these should be monetized for inclusion in the business case.
 - Review funding options. Is on or off-balance sheet funding required; this will depend on Prudential Borrowing headroom and risk transfer required. Off-balance sheet options will be more expensive. Options to review include PWLB, Salix, GIB Green Loan and other commercial funding from Authority relationship banks.
- Discuss experiences of all the above with other Authorities.
 - Discuss with current energy supplier how the forecast energy reduction will be calculated and implemented in practice post LED installation.
 - Potentially develop pilot schemes in highways/ retail/residential areas to test different lamps, fitment to existing columns, and public views.
 - Finalise business case.
 - Procure; invite bids, assess, negotiate and select luminaires, control equipment and column replacement, as appropriate.
 - Negotiate supply, installation and warranty contracts as appropriate; use the competitive tender process to get the right deal for all the parties involved.
- Many Authorities will not have the capability to undertake all of the above themselves. That being the case, a project development team should be set up and the whole process and business case could be completed robustly and expeditiously through the use of experienced technical and financial advisers to work alongside the Authority team.

GIB Green Loan: addressing the funding issues

The structural features of the GIB Green Loan make the overall NPV of the funding costs at least similar to PWLB while offering more flexibility at a project level.

- Long-term fixed rate funding with drawdowns only made as required over the installation phase.
- Repayment profile can be sculpted to the long-term energy efficiency and other savings expected from the project.
- Certainty of programme funding enables Local Authority to secure multi-year programme and achieve long-term benefits.
- GIB Green Loan can be blended with other sources of finance available to Local Authorities, such as PWLB, Salix, JESSICA or other commercial funding.
- GIB Starter Loan of up to £0.5 million to assist with all project costs including surveys and adviser costs. Interest can be rolled-up and included in main project loan.
- GIB will undertake its own technical, legal and financial due diligence on each project. This should provide the Local Authority with much greater confidence on a project being delivered on time and on budget, the forecast cost savings as part of the “spend to save” programme, and assurance on the contractual robustness through the life of the project.

Certainty of
programme funding
enables Local Authority to secure multi-year
programme and achieve long-term benefits

Further information

Contacts

If you would like to get in touch with GIB about a LED streetlighting or other energy efficiency project please contact:

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You can find out more about GIB at www.greeninvestmentbank.com or find us on LinkedIn.

Additional resources

- Carbon Trust www.carbontrust.com
- Department of Energy and Climate Change (DECC) Streetlighting toolkit – Early 2014
- Scottish Futures Trust (SFT) Streetlighting toolkit www.scottishfuturestrust.org.uk
- Local Partnerships www.localpartnerships.org.uk
- Salix Finance <http://salixfinance.co.uk>
- US Department of Energy Municipal Solid-State Street Lighting Consortium www2.eere.energy.gov/buildings/ssl/consortium.html

Sources

- CRBD www.cbrd.co.uk
- Roads UK www.roadsuk.com
- Simon Cornwell www.simoncornwell.com/lighting/timeline/index.htm
- 'Evolution of Street Lighting and Impact of New Technologies' – Frost & Sullivan
- 'Lighting the Clean Revolution LED Report' – The Climate Group
- 'Invest to save – sustainable street lighting' - Transport Research Laboratory, CSS Lighting Group
- 'Review of the class and quality of streetlighting' - Transport Research Laboratory, CSS Lighting Group
- General Electric Lighting www.gelighting.com/LightingWeb/emea/products/technologies/led/lighting/
- Phillips Lighting www.lighting.philips.co.uk
- Harvard Engineering www.harvardeng.com
- Telensa www.telensa.com
- Institution of Lighting Professionals www.theilp.org.uk/home
- Lighting magazine www.lighting.co.uk
- Lux magazine www.luxmagazine.co.uk
- Campaign for Dark Skies www.britastro.org/dark-skies
- Wikipedia