



## CITY HALL PHOTOVOLTAIC SYSTEM LAUNCH – 21 FEBRUARY 2008

### POTENTIAL QUESTIONS AND ANSWERS

#### **Potential Questions:**

#### **1. How much did the project cost?**

The cost of the PV installation to the LCCA was £540,000. Grant support from the DTI (BERR) Major Photovoltaic Demonstration Programme was £190,000.

The cost of the PV project represents just over 1% of the City Hall building costs of £65 million.

#### **2. How much did the project cost in comparison with other PV projects?**

The cost per kW to the LCCA was £8,060/kWp compared to the costs that PV manufacturers are currently specifying and quoting for standard PV panels for new build is £5,000/kWp. Retrofitting PV in existing buildings costs more than this.

The City Hall PV project was a retrofit project using completely bespoke PV panels for the curved and domed roof and curved solar shading eyebrow installed in a fully occupied building without disruption. The cost of the project would have been cheaper if installed as part of the City Hall construction.

#### **3. What is the financial payback of the project?**

The simple financial payback for the project is between 25 and 30 years.

#### **4. How was the financial payback calculated?**

The simple financial payback was calculated by adding the value of the electricity to the value of the exemption from the Climate Change Levy and the income from the Renewable Obligation Certificates or ROC's and comparing this to the capital cost of the project.

#### **5. What are ROC's?**

Licensed energy companies are required to generate a minimum of 10% of their energy supply from renewable energy. If they do not produce the required amount of renewable energy themselves they must buy Renewable Obligation Certificates or ROC's on the open market to make up the shortfall, or otherwise be subjected to fines for not achieving their targets.

A ROC is issued for each 1MWh of electricity generated a year and can be traded separately from the electricity generated/supplied. The LCCA obtained a buy and sell back agreement for the ROC's from a licenced supplier by a competitive procurement process. EDF Energy was the successful tenderer with the most competitive ROC price.

## **6. What is the Carbon Reduction Commitment or CRC?**

The Carbon Reduction Commitment (CRC) was announced in the Energy White Paper 2007, which applies a mandatory auction based emissions trading scheme to cut carbon emissions from large commercial and public sector organisations (including supermarkets, hotel chains, government departments, large local authority buildings) by 1.1 MtC per year by 2020.

The CRC will set energy use by large organisations whose annual mandatory half hourly metered electricity use above 6,000MWh, focussing on those emissions outside of the Climate Change Agreements and outside the direct emissions covered by the EU Emissions Trading Scheme.

The government consulted on the scheme in 2007 and are expected to publish their response to the consultation in 2008. The CRC is to be introduced under enabling powers in the Climate Change Bill with the introductory phase potentially starting as early as 2009.

## **7. What is the percentage of renewable energy generated compared to City Hall's energy consumption?**

The PV scheme generates over 1.5% of City Hall's annual electricity consumption. However, this percentage will increase with reduced energy consumption brought about by energy efficiency retrofits under the Clinton Climate Initiative Programme currently being procured. Further decentralised energy measures at City Hall are also likely to result from the outcome of this programme.

## **8. What is carbon payback?**

Carbon payback is the amount of carbon produced to make the technology compared with the amount of carbon saved by the technology. In the case of the City Hall PV project the carbon payback is less than 4 years.

Data was taken from the National Renewable Energy Laboratory, US Department of Energy, taking account of the different carbon factors between the USA and the UK.

## **9. How much carbon will the project save?**

The PV project will reduce CO<sub>2</sub> emissions by 33 tonnes a year or approximately 1,000 tonnes over 30 years.

## **10. How long will the system last?**

PV modules have no moving parts and as a result require minimal maintenance.

The PV modules will still be generating electricity in 50 to 60 years time.

### **11. The installed capacity is 67kWp – will it ever generate that capacity?**

Photovoltaic systems are designated by their 'peak' output potential in full sunlight. This capacity will vary at different times of the day at different times of the year with the movement and brightness (taking account of cloud cover) of the sun.

As an example, solar electricity generated at low winter sun will produce about 30% of peak capacity.

### **12. Is the sun hot enough in the UK to generate solar energy?**

Photovoltaics do not generate electricity from the heat of the sun but from the light of the sun. Although temperate climates do not have the same intensity of light from the sun as in the tropics they do have the advantage of having longer daylight hours from which to generate solar electricity.

The first photovoltaic project installed in the UK was at Northumbria University, Newcastle upon Tyne in 1995. However, PV has been installed much further North than this.

### **13. Why did the LCCA implement renewable energy projects which have such long financial paybacks?**

Renewable energy is a key component of the Mayor's Energy Strategy and the London Plan. The Strategy sets a target for London to install 15MW<sub>p</sub> of domestic photovoltaics, 12MW<sub>p</sub> of photovoltaic applications on commercial and public buildings and 500 small wind generators on buildings. The Mayor's Energy Strategy set out a suite of measures to reduce CO<sub>2</sub> emissions in London based on short, medium and long term financially viable technologies. All technologies identified will be needed to achieve the reduction in CO<sub>2</sub> emissions which has been further amplified by the Mayor's Climate Change Action Plan.

Photovoltaics and building integrated wind turbines are some of the longer term financially viable technologies but they play an important part of the long term aim to reduce CO<sub>2</sub> emissions. The sun is available every day and one thing that London has a lot of is roofs on which to mount photovoltaics and wind turbines on so the technical potential is quite substantial. However, if these technologies are not supported now the market for these technologies may fail and there will be no opportunity to reduce costs through further innovation and mass production, quite apart from the loss of a proportion of London's potential renewable energy capacity and one of the tools to reduce London's CO<sub>2</sub> emissions.

Although the financial payback is long term the carbon payback is quite short, typically 6 years, or less, for photovoltaics.

### **14. How do photovoltaics work?**

Photovoltaics (photo = light, voltaic = electricity), convert sunlight directly into electricity. Photovoltaic or PV cells are made of special materials called semiconductors such as silicon. When light strikes the cell, a certain portion of it is absorbed within the

semiconductor material. This means that the energy of the absorbed light is transferred to the semiconductor. The energy knocks electrons loose, allowing them to flow freely.

PV cells have one or more electric fields that act to force electrons freed by light absorption to flow in a certain direction. This flow of electrons is a current, and by placing metal contacts on the top and bottom of the PV cell, current can be drawn off to use externally.

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