



**NOTTINGHAMSHIRE**  
**Fire & Rescue Service**  
*Creating Safer Communities*

Nottinghamshire and City of Nottingham  
Fire and Rescue Authority  
Finance and Resources Committee

# **UPDATE REPORT ON THE INVESTMENT IN SUSTAINABLE ENERGY TECHNOLOGIES**

Report of the Chief Fire Officer

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**Agenda Item No:**

**Date:** 5 April 2013

**Purpose of Report:**

To provide members with an update concerning the capital investment and revenue income return of the sustainable energy technologies project carried out in 2012.

## **CONTACT OFFICER**

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## 1. BACKGROUND

- 1.1 The aim of the project was to use this technology and allow NFRS to claim the feed in tariff (FiT) for the electricity generated, reduce the reliance on the wholesale energy market and to reduce the annual revenue cost of buying electricity from energy suppliers. The FiT is payable for twenty five years from the commencement of electrical generation at each of the sites.
- 1.2 The investment in sustainable energy technologies was initially approved by the Finance and Resources Committee in December 2011 for the installation of photovoltaic (PV) panels to a number of suitable NFRS sites. A second report was submitted in March 2012 as an update and included two further potential sites, Tuxford and Ashfield fire stations.
- 1.3 The reports mentioned in paragraph 1.2 are at Appendix A for reference.
- 1.4 The total project budget was approved at £580k.
- 1.5 The estimated payback period as detailed in Appendix A was between 11 and 12.5 years.

## 2. REPORT

- 2.1 The following narrative provides information on the project to-date and the income and savings made. It should be noted that the installations are complete, however the defects liability period will not finish until July 2013; this being the first anniversary of the last system installed (in this case Tuxford Fire Station).

### THE SCHEMES AS INSTALLED

- 2.2 **NFRS Headquarters** – The Headquarters scheme received planning permission in February 2012; the installation of the PV system was completed and commissioned by 31<sup>st</sup> March 2012. The original system was designated to have a maximum output of 50 kW; however the final design was installed at slightly below this figure at 48 kW maximum output. The size difference was due to the final design of the PV panels and the associated inverter capacities. The system at the HQ started electrical generation by 31<sup>st</sup> March 2012.
- 2.3 **Highfields Fire Station** – The installation of the system at Highfields Fire Station was designated to have a maximum output of 50 kW; however the final design was installed at slightly below this figure at 48 kW maximum capacity for the same reasons as the HQ system. The system at Highfields Fire Station started electrical generation by 31<sup>st</sup> March 2012.

- 2.4 **Stockhill Fire Station** – The installation of the system at Stockhill Fire Station was originally envisaged to have a maximum output of 50 kW; however the final design was installed at 34.4 kW due to some difficulties relating to shading on the station roof. The system at Stockhill Fire Station started electrical generation in May 2012.
- 2.5 **SDC** – The system at SDC was installed at 10.0 kW and started electrical generation by 31<sup>st</sup> March 2012.
- 2.6 **Mansfield Fire Station** – The scheme for Mansfield Fire Station proved to be problematic in both the planning application and the practical installation of the PV panels onto the fire appliance bay; for these reasons the installation wasn't completed until late May 2012. Although initially designated to have a maximum output capacity of 31.8 kW this was revised to 20.0 kW and split between the main station building and the Annex to the rear of the site (10.0 kW per system). The systems started electrical generation in late May 2012.
- 2.7 **Tuxford and Ashfield Fire Stations** – As the project progressed the potential to add a further two stations to the scheme in order to compensate for the reduction in electrical generation sizes of Mansfield, SDC and Stockhill became a possibility. A further £50k was approved by the F&R Committee for the project to look at potentially including Tuxford and Ashfield fire stations.
- 2.8 On completion of a cost analysis it became apparent that only one of these stations could be progressed due to affordability; to include both stations within the project would have exceeded the project budget.
- 2.9 As Tuxford Fire Station is wholly reliant on electricity (there isn't a mains gas supply to the site) this site was given the priority for the installation of the PV system. Once planning permission was granted the system was installed as a 20.0 kW system and started electrical generation in July 2012.

## ESTIMATED ANNUAL GENERATION AND TARIFFS

- 2.10 In total six sites have been fitted with PV systems under the project; the details are as follows:

Station / Site	Maximum Output Capacity (kW)	Estimated Annual Generation (kW)	Current FiT Tariff (pence per kWh)	Export Tariff (pence per kWh)
HQ NFRS	48.0	39,611	15.2	N/A
Highfields FS	48.0	40,106	15.2	N/A
SDC Ollerton	10.0	8,291	15.2	3.1
Mansfield FS	10.0	8,850	16.8	3.1
Mansfield Annex	10.0	8,799	16.8	3.1
Stockhill FS	34.4	28,164	15.2	N/A
Tuxford FS	20.0	15,500	15.2	N/A
<b>Totals</b>	<b>180.4</b>	<b>149,321</b>		

- 2.11 The total annual estimated electrical generation across the six sites (Mansfield has two separate systems on the site) is 149,321kW.

2.12 From the estimated annual generation the FiT income and the savings made in not purchasing electricity from the national grid the total for the current financial year would be in excess of £36,500. Details of this are at Appendix B.

## ACTUAL ANNUAL GENERATION

2.13 The actual generation up to and including February 2013 is shown at Appendix C. It should be noted that at the time of writing this report none of the systems had been generating for a full year; the systems have been generating as follows:

Station / Site	Full Months of Generation	Comments
HQ NFRS	11	Generation from Apr 12 to Feb 13
Highfields FS	11	Generation from Apr 12 to Feb 13
SDC Ollerton	11	Generation from Apr 12 to Feb 13
Mansfield FS	9	Generation from May 12 to Feb 13
Mansfield Annex	9	Generation from May 12 to Feb 13
Stockhill FS	9	Generation from May 12 to Feb 13
Tuxford FS	7	Generation from Jul 12 to Feb 13

2.14 The actual income to-date is estimated to be over £29,000; this is based on the meter readings up to the end of February 2013 and doesn't take into account any income for the month of March 2013. It should be noted that the electricity companies only pay the tariff every 6 months and therefore some of the monies due will not be received until after April 2013.

2.15 The current difference between the estimated generation and actual generation up to the end of February this year is as follows:

Station / Site	Estimated Annual Generation - kWh's	Actual Generation kWh's to-date (Incl Feb 13)	Difference
HQ NFRS	39,611.00	34,403.25	5,207.75
Highfields FS	40,106.00	35,417.86	4,688.14
SDC Ollerton	8,291.00	7,890.09	400.91
Mansfield FS	8,850.00	5,902.25	2,947.75
Mansfield Annex	8,799.00	6,275.51	2,523.49
Stockhill FS	28,164.00	21,752.55	6,411.45
Tuxford FS	15,500.00	7,459.99	8,040.01
<b>Totals</b>	<b>149,321.00</b>	<b>119,101.50</b>	<b>30,219.50</b>

## ASSUMPTIONS FOR VARIABLES

2.16 In order to calculate the estimated future income from the feed in tariff and the potential savings made from not purchasing electricity from the national grid a number of assumptions are required to be made. These assumptions are based on the variable figures listed below and are required in order to calculate the estimated payback, these are as follows:

- The annual increase of the tariff rates based on the Retailed Price Increase (RPI).
- The estimated annual future electricity price increases.
- The annual number of sunshine hours falling on the PV panels.
- The actual annual electrical generation.

2.17 **The Annual Increase of the Tariff Rate** – The FiT rates are subject to an annual increase in line with the RPI (the current rates are shown in the table at paragraph 2.10). This figure is announced prior to the start of the financial year in which it is to be paid; for the financial year starting April 2013 it is 3.1% (RPI for the previous year was 4.6%).

2.18 **The Estimated Annual Electricity Price Increase** – The estimated annual future price rises for electricity can only be estimated through the use of previous year’s annual price increase data. Annual electricity price increase between 2002 and 2012 as a component of the Retailed Price Increase has been in the region of 10.7% per annum (averaged over the ten years). This is shown at Appendix D and has been taken from the figures published by the Office of National Statistics. As an initial assumption it is assumed that future electricity prices would rise annually by 10% over the medium to long term.

2.19 **The Annual Number of Sunshine Hours** – It’s been widely acknowledged that the summer of 2012 was a poor year for sunshine within the UK. This is backed up by the figures taken from the Meteorologist Office shown in the table below; this details the recorded sunshine hours per year over the past 10 years:

Year	Hours of Sunshine
2002	1,240.9
2003	1,513.1
2004	1,332.6
2005	1,326.9
2006	1,412.6
2007	1,391.7
2008	1,256.4
2009	1,344.0
2010	1,362.8
2011	1,460.8
2012	1,294.4

2.20 **The Actual Annual Electrical Generation** – The actual electrical generation will vary dependent on the available sunlight falling on the PV panels during the year.

## CONSTANTS

2.21 There are a number of constants to be taken into account to allow the payback period to be estimated; these are:

- The cost of the project.
- The estimated annual electrical generation.
- The current price of electricity.

2.22 **The Cost of the Project** – The total cost of the project is expected to be within £560k once all the contract sum retentions and outstanding fees have been settled. This is £20k under the approved budget.

2.23 **The Estimated Annual Electrical Generation** – For the purpose of calculating the projected payback the estimated annual electrical generation figure of 149,321 kWh's will be used for the following reasons:

- The hours of sunshine for the year 2012 was below the yearly average compared with previous years
- Although we do not have a full year of generation and based on the poor summer last year the actual generation figures only just fall short of the estimated electrical generation especially for those systems installed in April 2012.
- Based on the information we have at this point in time there's no reason not to use this figure for the 25 year life span of the FiT payment scheme in order to provide an estimated payback.

2.24 **The Current Price of Electricity** – The current daytime price NFRS pay for electricity for the sites where PV systems are located is as follows:

Site	Price - pence per Kwh
HQ NFRS	9.62
Highfields FS	8.57
SDC Ollerton	9.15
Mansfield FS & Annex	9.02
Stockhill FS	9.97
Tuxford FS	9.53

2.25 As a basis for calculation the estimated payback period a conservative rate of 9.0 pence per kWh has been used.

## ESTIMATED PAYBACK PERIOD

2.26 The anticipated payback period based on the estimated annual generation of 149,321 kWh's and a current purchase price of 9.0 pence per kWh for electricity, and using the assumptions above, the payback will be as follows:

Annual Electricity Price Increase	Annual RPI Applied to the FiT	Years in Which the Payback Occurs	Estimated Income and the Years in Which it Occurs
10%	3.1%	Between years 11 & 12	Total income end of year 11 = £548k Total income end of year 12 = £619k

## SENSITIVITY CHECK

2.27 In order to test the sensitivity of the variable figures of the potential annual electricity price increase and the RPI applied to the FiT:

Annual Electricity Price Increase	Annual RPI Applied to the FiT	Years in Which the Payback Occurs	Estimated Income and the Years in Which it Occurs
5%	3.1%	Between years 12 & 13	Total income @ end of yr 12 = £545k Total income @ end of yr 13 = £603k
5%	2%*	Between years 12 & 13	Total income @ end of yr 12 = £525k Total income @ end of yr 13 = £579k
12%	3.1%*	Between years 10 & 11	Total income @ end of yr 10 = £503k Total income @ end of yr 11 = £576k

\*Government's annual inflation target.

## SUMMARY

2.28 The project was delivered £20k under the approved budget and will be closed later in the current year once the defects liability period has expired; the PV systems will then fall under the normal NFRS operation and maintenance regime.

2.29 As we are still in the very early period of the PV system's life span it has been necessary to make some basic assumptions in order to assess potential future income and savings. These assumptions have in the main been made by using historical data in order to provide a benchmark from which to work.

2.30 A budget will be set for the estimated annual income expected to be received in respect of electricity generated. This income budget will contribute to the Authority's requirement to find budget savings in future years.

2.31 The initial estimates show that the project capital expenditure of £560k will be paid back through income and savings between the end of years 11 and 12 from the installation date of the PV systems.

## **CONCLUSION**

2.32 Although the PV systems installed under this project have not had a full year of generation, early indications show that the project is on track to deliver the savings to the annual revenue budget and payback the capital expenditure as initially predicted. However, confirmation of the project meeting these future savings in practice can only be determined with a high degree of certainty over a period of time as income is generated and savings made.

### **3. FINANCIAL IMPLICATIONS**

The financial implications are set out in the body of the report.

### **4. HUMAN RESOURCES AND LEARNING AND DEVELOPMENT IMPLICATIONS**

There are no implications for human resources or learning and development arising from this report.

### **5. EQUALITIES IMPLICATIONS**

An equality impact assessment has not been undertaken because this report does not seek to amend policy.

### **6. CRIME AND DISORDER IMPLICATIONS**

There are no implications for crime and disorder arising from this report.

### **7. LEGAL IMPLICATIONS**

There are no legal implications arising from this report.

### **8. RISK MANAGEMENT IMPLICATIONS**

Any risk management implications are set out in the body of the report.

### **9. RECOMMENDATIONS**

That Members note the content of this report.



**10. BACKGROUND PAPERS FOR INSPECTION (OTHER THAN PUBLISHED DOCUMENTS)**

None

Frank Swann  
**CHIEF FIRE OFFICER**



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Finance and Resources Committee

# **PROJECT UPDATE REPORT ON THE INVESTMENT IN SUSTAINABLE ENERGY TECHNOLOGIES**

Report of the Chief Fire Officer

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**Agenda Item No:**

**Date:** 30 March 2012

**Purpose of Report:**

To provide members with a project update concerning the current sustainable energy technologies project.

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## **1. BACKGROUND**

- 1.1 The investment in sustainable energy technologies was approved by the Finance and Resources Committee last year for the installation of photovoltaic (PV) panels to NFRS sites.
- 1.2 This technology will allow NFRS to claim the feed in tariff (FiT) for all the electricity generated, to reduce the reliance on the wholesale energy market and to reduce the annual revenue cost of buying electricity from energy suppliers.
- 1.3 The FiT is payable for twenty five years from the commencement of electrical generation at each site.
- 1.4 The anticipated payback period of the capital installation costs is between 11 and 12.5 years, this is based on the tenders received back and the changes the Government have made to the FiT payment levels.
- 1.5 The capital budget for the project was approved by the Finance and Resources Committee at £530k.

## **2. REPORT**

- 2.1 The following narrative provides information on the project progress so far and includes the external influences.

### **THE GOVERNMENT'S CHANGES TO THE SCHEME**

- 2.2 The Government's proposed changes through consultation to the FiT scheme were announced by the on 31<sup>st</sup> October 2011 and their document was made public at around the same time. The proposal was to reduce the feed in tariff (FiT) rates to be paid for the generation of electricity by PV technologies.
- 2.3 It seems the popularity of PV schemes for the generation of electrical power was to become a higher than expected financial burden to the government over the predicted 25 year period of the scheme. To this end the Government proposed an immediate reduction in the tariff payable for PV schemes.
- 2.4 The consultation document proposes that the reduction of the tariff will be applied to schemes registered from 12<sup>th</sup> December 2011. However the consultation process was challenged through the courts and upheld; this required the Government to follow due process for the consultation period. Once this period had expired the modified proposal are to be referenced from 1<sup>st</sup> April 2012 but will be subject to the outcome of any judicial review.
- 2.5 The payback in paragraph 1.4 above is based on the Government's proposed changes to the FiT scheme.

- 2.6 The proposed Government changes to the FiT scheme are detailed at Appendix A.

## **THE PROGRAMME**

- 2.7 The tenders for the project were returned 25<sup>th</sup> November 2011 and the successful contractor, Evoenergy, was appointed just before Christmas. The final design, works planning and mobilisation was carried out through January and February with the installation of the PV panels starting in March through to June / July 2012.
- 2.8 **NFRS Headquarters** – The Headquarters scheme required some amendments to the plans submitted to the Local Authority (LA) in order to avoid a number of shading issues with the PV panel locations. Planning permission for the proposed changes was received in February 2012 and installation of the PV panels started the second week of March. The system is to be 50kW in size which is the maximum size allowable to receive the FiT rate of 15.9p per kWp.
- 2.9 **Highfields Fire Station** – The installation work at Highfields Fire Station is due to commence in the third week of March and this will be installed as per the original planning submission. The system is to be 50kW in size.
- 2.10 **Stockhill Fire Station** – As with the HQ there was a requirement to amend the original planning application; the planning decision is due imminently, however no objections to the revised scheme have been lodged to-date. The PV system at Stockhill is smaller than originally planned due to shading and therefore reduces from a 50kW to a 35kW system. The installation is due to start in the third week of March.
- 2.11 **SDC** – There have been no planning issues with the site at SDC, however the system will be smaller than originally planned as a review of the risk assessment highlighted potential vandalism damage on one of the roofs selected for PV installation. The system for SDC will reduce from 17.25kw to 9.84kW.
- 2.12 **Mansfield Fire Station** – After a review of the proposed installation by the structural engineer and the contractor the potential to install over the appliance bays has been discounted. The reason for this is primarily due to the construction of the vaulted roof and the inability to adequately fix the PV panel frames to the standing seam roof. The PV panel locations have therefore been changed and a new planning application submitted; this is due for a decision by the LA at the end of March early April.
- 2.13 The installation of the system will be carried out once planning permission has been granted.
- 2.14 The PV panel system size for Mansfield Fire Station will be reduced from 39.5kW to 31.8kW.
- 2.15 Tuxford and Ashfield Fire Stations – As the potential for the full planned area of PV panels has been reduced on Mansfield, Stockhill and SDC panels will

be fitted to Tuxford and Ashfield Fire Stations subject to planning permissions.

- 2.16 The application of the PV panels at Tuxford Fire Station will be particularly useful as there's no mains gas supply to the site and the electricity generated will assist in the heating of the building through the air source heat pump installed at the station.
- 2.17 Both sites are suitable for the installation of PV panels and the size will be subject to the potential clear south easterly aspect of available roof and the project budget.
- 2.18 Planning applications will be submitted in the third / fourth week in March for both of these sites.

### **FINANCE**

- 2.19 The project is predicted to come in within the authorised budget.

## **3. FINANCIAL IMPLICATIONS**

The financial implications are set out in the body of the report.

## **4. HUMAN RESOURCES AND LEARNING AND DEVELOPMENT IMPLICATIONS**

There are no implications for HR or training arising from this report.

## **5. EQUALITIES IMPLICATIONS**

An Equality Impact Assessment has not been undertaken because this report does not seek to amend policy.

## **6. CRIME AND DISORDER IMPLICATIONS**

There are no implications for crime and disorder arising from this report.

## **7. LEGAL IMPLICATIONS**

There are no legal implications arising from this report.

## **8. RISK MANAGEMENT IMPLICATIONS**

Any risk management implications are set out in the body of the report.

**9. RECOMMENDATIONS**

That members note the content of this report and agree to receive future reports on this matter as further information becomes available.

**10. BACKGROUND PAPERS FOR INSPECTION (OTHER THAN PUBLISHED DOCUMENTS)**

None

Frank Swann  
**CHIEF FIRE OFFICER**

## Appendix B

### The Estimated Annual Generation Income From the FiT and Electricity Savings

Site	Estimated Annual kWh's	Generation pence per kWh	Export Tariff @ 50%	Generation Sum (£)	Export Income (£)	Total (£)
HQ	39,611.00	15.2		£6,020.87		£6,020.87
Highfields	40,106.00	15.2		£6,096.11		£6,096.11
SDC	8,291.00	15.2		£1,260.23		£1,260.23
Mansfield	8,850.00	16.8	3.1	£1,486.80	£137.18	£1,623.98
Mansfield Museum	8,799.00	16.8	3.1	£1,478.23	£136.38	£1,614.62
Stockhill	28,164.00	15.2		£4,280.93		£4,280.93
Tuxford	15,500.00	15.2		£2,356.00		£2,356.00
<b>Total</b>	<b>149,321.00</b>					<b>£23,252.74</b>

<b>Total (£) Generation &amp; Export</b>	£23,252.74
<b>Total (£) Saving on purchase of Electricity @ 9p per kWh</b>	£13,438.89
<b>Total Gross saving in financial year</b>	<b>£36,691.63</b>

Appendix C

Actual Generation up to and Including February 2013

FY 2012	kWh's Produced												Total kWh's	Generation - per kWh	Export Tariff @ 50%	Generation Sum (£)	Export Income (£)	Total (£)
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar						
HQ	2,956.87	6,241.58	4,698.21	5,382.17	4,878.84	3,978.82	2,352.59	1,129.00	758.68	558.55	1467.94		34,403.25	0.152		£ 5,229.29		£ 5,229.29
Highfields	2,592.35	6,384.99	5,198.08	5,952.01	4,796.26	4,022.88	2,365.67	1,190.65	818.73	624.41	1471.83		35,417.86	0.152		£ 5,383.51		£ 5,383.51
SDC	493.05	1,322.03	1,069.13	1,198.36	1,095.67	937.86	583.73	339.75	270.03	199.35	381.13		7,890.09	0.152		£ 1,199.29		£ 1,199.29
Mansfield		171.57	1,138.89	1,282.01	1,151.00	866.61	515.40	233.65	138.28	115.61	289.23		5,902.25	0.168	0.031	£ 991.58	£ 91.48	£ 1,083.06
Mansfield Museum		124.83	945.31	1,090.69	1,045.64	951.75	699.69	398.88	304.86	269.53	444.33		6,275.51	0.168	0.031	£ 1,054.29	£ 97.27	£ 1,151.56
Stockhill		3426.39	3,391.20	3,958.74	3,444.76	2,861.28	1,696.17	863.33	586.88	431.76	1092.04		21,752.55	0.152		£ 3,306.39		£ 3,306.39
Tuxford				1235.01	2,084.89	1,678.15	957.68	434.63	280.09	219.02	570.52		7,459.99	0.152		£ 1,133.92		£ 1,133.92
<b>Total</b>	<b>6,042.27</b>	<b>17,671.39</b>	<b>16,440.82</b>	<b>20,098.99</b>	<b>18,497.06</b>	<b>15,297.35</b>	<b>9,170.93</b>	<b>4,589.89</b>	<b>3,157.55</b>	<b>2,418.23</b>	<b>5,717.02</b>	<b>0.00</b>	<b>119,101.50</b>	<b>1.096</b>	<b>0.062</b>	<b>£ 18,298.27</b>	<b>188.755</b>	<b>£ 18,487.03</b>

System not installed or commissioned  
 System commissioned part way through the month

Total (£) Generation & Export    £ 18,487.03  
 Total (£) Saving on purchase of Electricity @ 0.09p per kWh    £ 10,719.14  
**Total Gross saving in financial year    £ 29,206.16**



## Appendix D

### Figures Published by the Office of National Statistics

Table 2.1.1 Retail prices index: fuel components									
United Kingdom									
		Coal			Heating	Fuel	Petrol	Fuel, light	RPI
		& smoke-less fuels	Gas	Electricity	oils	and light	and oil	petrol and oil	all Items
Current fuel price index numbers 2005=100									
2002		84.5	79.7	84.4	61.8	80.6	84.0	82.6	91.8
2003		86.3	81.2	85.3	68.5	82.2	87.1	85.0	94.4
2004		90.8	87.1	90.4	77.9	88.0	91.9	90.3	97.2
2005		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006		107.5	131.9	121.7	113.2	124.6	105.5	114.0	103.2
2007		115.2	142.1	131.4	114.2	133.4	108.4	119.5	107.6
2008		137.2	170.1	151.9	164.9	158.7	124.7	139.2	111.9
2009		161.3	193.5	158.8	126.4	168.6	114.7	136.8	111.3
2010		161.3	182.0	154.9	161.2	164.0	134.1	146.2	116.5
2011		169.1	201.4	166.1	201.4	181.4	153.5	165.0	122.5
2012		175.1	222.8	175.5	206.8	195.2	156.5	172.7	126.4