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Project number:	PE/PO 011a
Project leaders:	Chris Plackett & Jonathan Swain, Farm Energy Centre
Report:	Year One, July 2015
Key staff:	Andrew Kneeshaw, Tim Pratt, Jenny Beynon & colleagues, Farm Energy Centre
Location of project:	Farm Energy Centre, Kenilworth, CV8 2LS, commercial nurseries and various meeting venues.
Industry Representatives:	Neal Ward, Roly Holt, Chris Need & Colin Frampton
Project start date:	1 st August 2014
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AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Chris Plackett
Commercial Director
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Signature. 

Date. ...31st July 2015...

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GROWER SUMMARY

Headline

GrowSave delivers a programme of technology transfer and information dissemination activities to AHDB Horticulture protected crops (PC) sector levy payers and provides up to date information about energy saving and energy efficiency.

Between August 2014 and July 2015 the project has delivered the following activities;

- Five grower workshops / technical seminars covering the topics of renewable heating, humidity control and efficient heating system operation
- Technical presentations at three PC sector events / technical conferences
- Three editions of AHDB Horticulture Energy News (formerly HDC Energy News). This is a newsletter dedicated to energy topics.
- Regular news and technical updates delivered via AHDB Grower (formerly HDC News) and the GrowSave website.
- Energy benchmark data via the GrowSave website
- Authored Technical Update publications covering the topics of heat pumps, thermal screens, greenhouse fans and measuring energy consumption

All of the activities were designed to encourage growers to take energy saving actions in their own business.

Background & Introduction

GrowSave is AHDB Horticulture's communications platform that disseminates energy saving information and supports the implementation of energy saving technologies by the UK protected cropping (PC) sector. The programme has now run for 8 years, is delivered by the Farm Energy Centre (FEC) team, and steered by a group of edible and ornamental growers. The format of outputs and the project programme are deliberately kept flexible. This is to allow the project to respond to the energy issues that the industry is facing at any given time.

The current phase of the project builds on previous activities that were funded under a series of AHDB Horticulture (formerly HDC) projects, the latest of which was project reference PE/PO 011. This report gives outlines the activities delivered in the first year of the current project which started on 1st August 2014 and is scheduled to run for 5 years.

Summary of Work Completed

The following table summarises the deliverables over year one of the project and compares them to the work plan specified in the contract:

Activity Area	Contracted Activity	Delivered Activity
Website	Provide at least one update per week	News stories added as per contract. Also “blogs” from FEC energy specialists added on a regular basis Glossary of energy terms
Grower workshops / technical seminars	Deliver four workshops / seminars	Five workshops / seminars were delivered; <ol style="list-style-type: none"> 1. Greenhouse energy saving research update seminar; held at Stockbridge Technology Centre (STC) on 13.11.14. 2. Biomass heating study tour; held at various venues in Hertfordshire and Bedfordshire on 11.02.15 and 12.02.15. 3. Humidity control workshop; held at STC on 10.03.15. 4. Optimise your heating system. Two workshops on this subject were held; one near Southport on 09.07.15 and one near Chichester on 15.07.15.
Technical presentation at PC Crop Association conferences /meetings	Provide presentations / technical support to two Crop Association conferences / meetings	Presentations were given to three Crop Association events; <ol style="list-style-type: none"> 1. TGA Conference, 25.09.14 2. CGA Conference, 16.10.14 3. Bedding Plant Centre event / HTA Plant Show, 23.06.14
Energy benchmarks	Deliver information and data via the GrowSave website to allow growers to do energy use comparisons	Done via the Managing Energy section of the website where information is given on comparison methods using degree-days. Degree-day data and ambient temperature data given to allow comparisons to be made
AHDB Horticulture Energy News	Deliver three editions of this energy specific newsletter	Delivered to contract with three editions completed in Dec 14, Apr 15 and July 15.
AHDB Grower News Columns	Deliver columns of approx. 750 words in each edition of HDC News	Delivered to contract.
Technical updates	Publish four technical updates covering topics relating to recent energy developments	Updates have been written on the following topics; <ol style="list-style-type: none"> 1. Heat pumps for greenhouse heating 2. Thermal screens 3. Fans for greenhouses

Description of Activities

The activities of the GrowSave project were discussed and planned with the grower coordinators at two advisory group meetings held on 15th October 2014 and 25th March 2015. In addition regular contact was maintained with industry groups including the TGA, CGA, PTG and BPOA. These industry inputs formed the basis of the work programme described here.

Website

The project website has been continually updated with articles and news items. In addition reports from GrowSave events have been posted together with any associated hand-outs or presentations.

There were 9,182 website visits with 21,044 page views between 1st August 14 and 31st July 15. New visitors accounted for 6,989 (76%) of these visits. 3,295 website visits came direct and 4,172 were directed via Google.

The number of visits to the website has increased over the period covered in this report. Compared to the same period in 2013/14 the number of visits has changed by 5.4%. This increase indicates that the website is now being used more frequently by growers as an energy information source.

The five means of accessing the GrowSave website were:

Topic	% of sessions
Search	45.5%
Direct access	36%
Referral from other sites	17%
Email links	1%
Social Media	<1%

The top five most popular subject pages were:

Page	No. of Visits
Homepage	3,117
LED lighting	1,039
Biomass study tour	520
Events	499
Energy saving	468

A website improvement that has been delivered at the request of growers and the project advisory group is the addition of an energy terms glossary. This new Energy Glossary

explains many of the commonly used terms and allows the user to search and suggest new terms.

Workshops and Seminars

The topics for workshops / seminars were decided based on grower demand and the guidance given by the project advisory group. Where possible, events were held that would attract both edible and ornamental crop growers.

Details of the four GrowSave seminars, the background to them and the number of attendees are given in table below.

In addition to the specific GrowSave events, technical support on energy topics has been given to several PC sector events / Crop Association meetings. Details of these events are as follows;

1. **TGA Conference, 25th September 2014.** Chris Plackett from Farm Energy Centre gave delegates an update on the latest issues affecting energy use in greenhouse horticulture. This covered several topics including energy pricing, the viability of renewable heating systems and Climate Change Levy targets.
2. **CGA Conference, 16th October 2014.** Tim Pratt from Farm Energy Centre presented information on practical ways to reduce energy costs.
3. **Bedding Plant Centre Event / HTA Plant Show, 23 June 2015.** Tim Pratt contributed to a seminar that was hosted at Stoneleigh Seminar Rooms at Stoneleigh Park. Tim's presentation covered the essentials of achieving effective and energy efficient humidity control.

Some work was done to investigate how short video presentations taken at workshops / seminars could be posted on the GrowSave website and used to communicate key points to levy payers who did not attend. Although some progress was made with this a satisfactory solution was not reached. Given that project resources have been diverted to delivering more seminars¹ than required to fulfil the contract, time and finances were not available to find a satisfactory solution. This area will be re-visited in year 2 of the project.

¹ Over and above the contract requirements, one additional workshop / seminar and one additional presentation at a Crop Association meeting was delivered. Also, the 'Biomass Study Tour' was a two day event rather than the single day format required to meet the contract.

Workshop / seminar title	Meeting details	No of delegates	Other comments
Greenhouse energy saving research update Venue – STC Dates – 13 th Nov 2014	This event was designed to update growers on some of the latest energy saving R&D that is being done in various parts of Europe. Topics covered included LED lighting and light management, humidity control methods and novel heating systems including gas driven heat pumps and energy saving greenhouse construction. The presentations were given by STC (on the LED lighting work) and by representatives of a European consortium carrying out a project known as Green Growing. Presenters included Carl-Otto Ottensen from Aarhus University in Denmark who covered both lighting response and humidity topics.	21 growers 1 consultant 3 manufacturers / suppliers 1 journalist	
Biomass heating study tour Venue – nurseries around Hertfordshire Dates – 11 th & 12 th Feb 2015	Interest in the Renewable Heat Incentive (RHI) continued amongst growers who were considering switching to renewable fuels (such as wood and straw) for greenhouse heating. This event was split over 2 days. On day 1 delegates heard from industry experts about topics including the latest RHI payment rates & regulations and how to select a renewable heating system for their business. On day two visits were arranged to three nurseries who had successfully installed biomass heating systems of differing configurations and fuel types.	19 growers 5 manufacturers/suppliers 2 journalists	Delegates will be contacted in August 15 to see what they have implemented from this event.
Humidity control workshop Venue – STC Dates – 10 th March 2015	René Beerkens from Hoogendoorn Growth Management in Holland gave delegates information on the latest thinking on humidity control. He explained how growers can use absolute humidity measurements to monitor crop activity and control energy inputs. He also emphasised how work in Holland on “The New Way of Growing” has highlighted the importance of an even greenhouse environment. He showed delegates how to implement a thermal screen operation strategy that improved climate uniformity by removing screen gapping.	11 growers 4 manufacturers/suppliers 1 consultant 1 journalist	Rene Beerkens is scheduled to make a follow up presentation at the 2015 TGA conference.
Optimising your heating system Venues – Lovania and Roundstone Dates – 9 th & 15 th July 2015	This was a series of two workshops, one at a ‘northern’ venue (Lovania Nurseries nr. Southport) and a second at a ‘southern’ venue (Roundstone Nurseries nr. Chichester). The subjects covered helped growers and their senior supervisors get a better understanding of the operation of a greenhouse heating system. This included explaining the role of the key heating system components. Delegates were also shown how to maintain and operate a heating system to ensure that optimum efficiency was achieved. The events used a mixture of seminars and a nursery walk round to give a mix of theoretical and practical activities. Follow up is planned to get feedback from delegates for this event.	Lovania Ltd – 16 attendees, a mix of growers, maintenance staff and support staff Roundstone Nurseries – 10 attendees a mix of growers, maintenance staff and support staff & 1 consultant	Delegates will be contacted in October 15 to see what they have implemented from this event.

Energy Benchmarks

GrowSave provides information to allow growers to benchmark the performance of their nurseries against other similar facilities. However, factors like the wide range of protected crops grown in the UK and the existence of some established industry initiatives like the Tomato Working Party means that providing energy use benchmarks is not feasible under the current project.

Two of the largest factors affecting the energy use of greenhouses are the prevailing weather conditions (and most particularly the ambient temperature) and operating temperature. Therefore, if information on these two parameters is used by growers alongside their own energy use data they can compare their own performance against others.

Throughout the project the GrowSave website has provided weather data (temperature and solar radiation) and degree-day information so that growers can use this to carry out energy performance benchmarking.

AHDB Horticulture Energy News and AHDB Grower²

Three editions of AHDB Horticulture Energy News (previously HDC Energy News) have been produced. They have been delivered as inserts within AHDB Grower (previously HDC News). The content of each of the editions focused on topical stories and information at the time of publishing. In all cases the stories were designed to appeal to as wide a cross section of levy payers as possible.

A short (500 to 750 word) column with topical news on either the GrowSave project or energy related projects has also been included in all AHDB Grower editions, apart from September 2014. Topics covered include news on upcoming events, reports of recent meetings, information on the progress of AHDB Horticulture energy projects and general energy developments.

The table overleaf describes the articles and the publications they appeared in.

² Note that the previously branded HDC Energy News was re-branded for the July 2015 edition. This coincided with the rebranding of HDC to AHDB Horticulture.

Date	Topic	Publication
July/August 2014	GrowSave take on GreenTech	HDC News
October 2014	Keep up to date with renewables incentives	HDC News
November 2014	Info on GrowSave biomass, heating and humidity control workshops	HDC News
December 2014	Dehumidifiers (PC 013), LED lighting and Sandylands LED case history, ESoS information, energy market update	HDC Energy News
December 2014/January 2015	Report on Stockbridge meeting about European attitudes to energy saving	HDC News
February 2015	Energy efficiency, biomass and humidity control	HDC News
March 2015	Humidity control: René Beerkens workshop at Stockbridge	HDC News
April 2015	How the budget affects energy costs	HDC News
April 2015	Biomass seminar and study tour, RHI qualification, energy market update	HDC Energy News
May 2015	Is your crop store wasting energy?	HDC News
June 2015	Know your heating system. Information about two workshops	AHDB Grower
July/August 2015	Putting humidity control theory into practice	AHDB Grower
July 2015	Greenhouse climate, Biomass sustainability regulations, ESOS update, energy market update	AHDB News Energy

Technical Updates

The technical updates are short (one or two page) documents designed to summarise information about the latest energy topics and techniques. They can provide information about topics such as new commercial developments or latest research results.

In the period covered by this report text has been prepared for Technical Updates on the following topics;

1. Heat Pumps for Greenhouse Heating.

Ground source heat pumps are eligible for the RHI, and as a result they can provide a cost effective and energy efficient way to heat a greenhouse. However, integrating a heat pump into a traditional greenhouse heating system is not straightforward because the maximum water temperature generated is significantly lower than from a boiler.

This update examines the current economics of heat pumps in the UK and explains how to overcome the problems of system integration.

2. Thermal Screens

Thermal screens are now common in UK greenhouses, especially where the crops grown have a significant requirement for heat. However, many installations are quite old and the screen material has lost some of its effectiveness. This Update helps growers select suitable screen materials and decide if / when the material in an existing installation should be replaced.

The economics of side screens are also explained and the differences between proprietary and temporary screen materials (e.g. bubble wrap, Visqueen etc.) are discussed.

3. Fans for Greenhouse Air Movement.

Fans are a useful tool for helping to achieve an even greenhouse environment, and recent developments have seen the commercial uptake of several new fan designs. This Update looks at the economics and performance of fan systems and describes the key technical features of the leading fan designs for greenhouse applications.

At the time of writing this report these Updates have not been made available to levy payers via the GrowSave website because the design and layout of the communications has not been completed. This work is expected to be finished in September 2015, after which all of the updates will be available on www.growsave.co.uk.

Other Work

Some other work has been delivered under the GrowSave project identity to non PC sectors. All of this work has been separately funded and was not covered by the contract for project PC/PO 011a. However, it should be noted that foundation information used as the basis of this additional work came from the resources of PC/PO 011a and its predecessors.

The specific pieces of work that have been delivered are;

1. An energy efficiency study day for the soft fruit sector.
2. A series of two storage workshops for bulb growers.
3. Technical input to a refrigerated storage study tour for ornamentals growers.

Financial Benefits

Despite some recent falls in the cost of energy, estimates are that the energy costs for the PC sector are still in excess of £125 million/year.

CCL discount available to the sector is worth £20 million over the remainder of the current phase that runs to 2023. For this discount, growers will need to achieve 14% energy savings compared to 2008. Therefore, providing information to growers so they can make the savings needed to achieve the imposed savings targets has significant financial value.

Assuming that this programme has helped stimulate a modest 5% saving over just 10% of the protected cropping sector, the savings have been over £300,000.

Summary & Highlights

1. The GrowSave website has continued to be regularly updated with the latest energy information for growers. Also, the materials from GrowSave events such as technical meetings have been made available via the website. Statistics show that there were 9,182 website visits over the period covered by this report and the most popular topics included LED lighting, Biomass & energy saving.
2. A series of seminars and grower meetings have been delivered. These have concentrated on working with growers to identify the best energy efficiency solutions for their business. Biomass heating and the RHI, humidity control and setting up heating systems for optimum efficiency are the main topics that have been covered in these events
3. Three Technical Updates and a website based energy terms glossary have been written which give information on some of the latest developments in greenhouse energy saving. These feature information on heat pumps, thermal screens and greenhouse air movement fans.