



# ENERGY News

for the horticultural industry

## GrowSave - your one stop shop for energy saving information



**Following the success of the GrowSave project in 2007, the HDC is extending the work for two more years.**

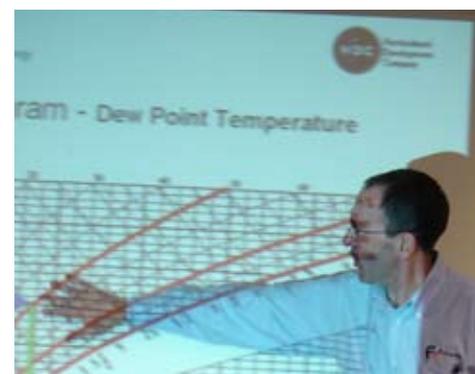
In addition to a programme of visits to case study nurseries, GrowSave will also provide a range of energy saving information including factsheets, training workshops and HDC energy project updates. All of the project information can be accessed through the new GrowSave website [www.growsave.co.uk](http://www.growsave.co.uk).

The programme for 2008/09 kicked off in early November with visits to Coletta &

Tyson's Millbeck Nursery in East Yorkshire and Roundstone Nurseries Ltd's Newlands site in West Sussex. Over 60 growers attended to look at how effective humidity control can be achieved with minimised energy consumption. Horticultural energy consultants at FEC Services led the discussions at the meetings and are continuing to work with the host sites to implement any changes that can improve humidity conditions and save energy. Progress can be tracked in the HDC Members Area of [www.growsave.co.uk](http://www.growsave.co.uk).

"GrowSave is a key part of our long-term commitment to helping growers of all crops meet the challenge of reducing energy use" said HDC senior communications manager Jenny Lang. "The programme of nursery visits, training courses and energy saving information will continue through to 2010 and I am confident that it will meet growers needs for the most up to date information on how to save energy".

The topic of energy saving through better humidity control will continue over the forthcoming months and HDC members will be invited to two new host nurseries on 24th and 26th February 2009 to see how tomato growers are tackling the issue.



"By using host nurseries from both the protected edibles and ornamentals sectors growers can compare how growers of different crops can effectively tackle a range of humidity problems" comments Tim Pratt, Technical Director of GrowSave project leaders FEC Services. "GrowSave is not just about providing answers from an instruction manual, the best solutions are often found when growers share their knowledge and experience" he added.

Information on all events will be sent to you, but if you want to be ahead of the game log-on to the website and register in the members' area.

[www.growsave.co.uk](http://www.growsave.co.uk)

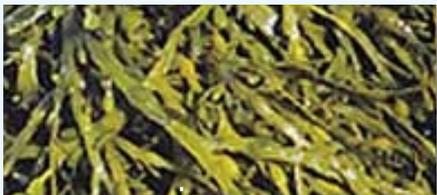


## Energy price update

**Falling oil prices and growing confidence about winter supplies of both gas and electricity have steadied some of the recent volatility in the energy markets.** This has led to some falls in contract prices despite higher demands as the weather cools.

With oil prices falling to \$61.2/barrel on 29 October 2008, its lowest levels since March 2007, there is now some indication that prices will relax compared to the highs seen during 2008.

Because of the fall in oil prices the biggest threats now appear to be from supply availability and supply interruption glitches rather than the general world demand for energy commodities.



## Researchers back seaweed as bio fuel

In a recent report commissioned by the Crown Estate, researchers have recommended the use of seaweed as a fuel source for use in heat and electricity production. Seaweed can be used in anaerobic digestion plants to produce methane gas. As it comes from the sea, this addresses the problem of requiring arable land and fresh water. The report also said seaweed had good conversion efficiency.

The Crown Estate said it planned to trial a small-scale farm off the coast of Scotland. It is also to conduct further research.

## Anaerobic digestion firms to merge

Biogen, a leading UK anaerobic digestion developer has acquired the technology provider Greenfinch.

The new company will be called Biogen Greenfinch and will be able to deliver fully integrated anaerobic digestion projects to the agricultural, food, waste and water industries and local authorities. The two companies have already delivered 12 anaerobic digestion installations in the UK.

## New bio diesel facility under review

Flex Fuels Energy, a company that recently received planning permission to build a major bio diesel production facility in Cardiff, is now considering using the plant as an oilseed processing works instead. This turnabout is due to doubts about bio fuel legislation in the UK. The facility, which was due to be built in two phases, was planned to produce 100,000 tonnes of bio diesel a year.

# Early tests with ducted air heating system show promise for future



Work is progressing on a 4 year HDC project to investigate the feasibility of using ducted air systems for heating and ventilating greenhouses in the UK (PC 278). Since commissioning the installation on the trial site at Mill Nurseries in East Yorkshire earlier this year, work has concentrated on understanding the performance characteristics of the equipment and tailoring its operation to suit the needs of a commercial tomato crop.

*Results confirm the promise of energy savings from the ducted air system.*

### System operation

One of the main focuses has been to prove the equipment reliability and ensure that it is capable of operating in a commercial environment.

Taken at face value, equipment reliability should not be a problem. This is because the installation comprises of an assembly of simple components, all of which are off the shelf products. However, due to the leading edge nature of this project and the demanding environment in greenhouses some reliability problems were encountered early on. These have now been rectified by the installation supplier, Priva UK, and the equipment has operated reliably for the latter part of this year.

Whilst the mechanical components are relatively straightforward, control of the system is complex. A significant amount of time has been spent learning the effect of

the system on the greenhouse environment and how to control it. This is expected to be a challenge throughout the project as the capabilities of the system are extended over the next 2 years.

### Uniformity of airflow and temperature

Testing involved taking airspeed and temperature measurements along the ducts when operating under a range of conditions. Smoke was also injected into the greenhouse so that a visual assessment of the resulting airflow could be made. Greenhouse temperature has also been recorded on a grid pattern in both the fan and duct greenhouse and the adjacent conventionally heated greenhouse.

Viewed on their own, the airflow and heat distribution along the ducts appeared to be quite poor. However, the uniformity of the resulting greenhouse environment was very good. Measurements showed that the maximum temperature variation in the fan and duct greenhouse was +/- 1°C. This compared favorably with the conventional system.



The project team had hoped for better uniformity in the fan and duct greenhouse, but the good uniformity in the conventional greenhouse set a very high benchmark. Some potential for improvement with the design of the ducts was also identified, and, to try and deliver better results, additional experiments and modifications to the duct design will be carried out in early 2009.

## Energy Saving

Because of the testing schedule it has not been possible to make energy use comparisons over prolonged periods. However, some side by side comparisons with the conventional greenhouse towards the end of the 2008 tomato season showed energy savings in the range of 10% to 20% per week.

These results confirm the promise of energy savings from the ducted air system. However, it will only be possible to confirm the overall performance once a full season's operation has been achieved.

## Crop yield, quality and disease levels

Compared to the conventional greenhouse, the crop in the fan and duct greenhouse

Assessments of crop quality made by staff at Mill Nurseries showed that there were no differences between the two greenhouses. Disease levels (botrytis) in the ducted air greenhouse were significantly higher than in the conventional greenhouse. Improved air movement provided by the fan and duct system is expected to give lower disease levels than in a conventional house. With this in mind the project team is now concentrating on how to monitor the onset of disease in the ducted air greenhouse so that the true potential of the system can be realised in the future.

## Moving forward to 2009 and 2010

The primary focus of this project has always been to apply the lessons learnt in this first year to good effect in 2009 and 2010. The results obtained so far have shown that the ducted fan system has enormous potential, but that it can only be realised through careful development and testing in a commercial environment.

Because of the proving work it's now possible to do carefully controlled and fully monitored trials for the entire 2009 and



## Drax announces major biomass expansion

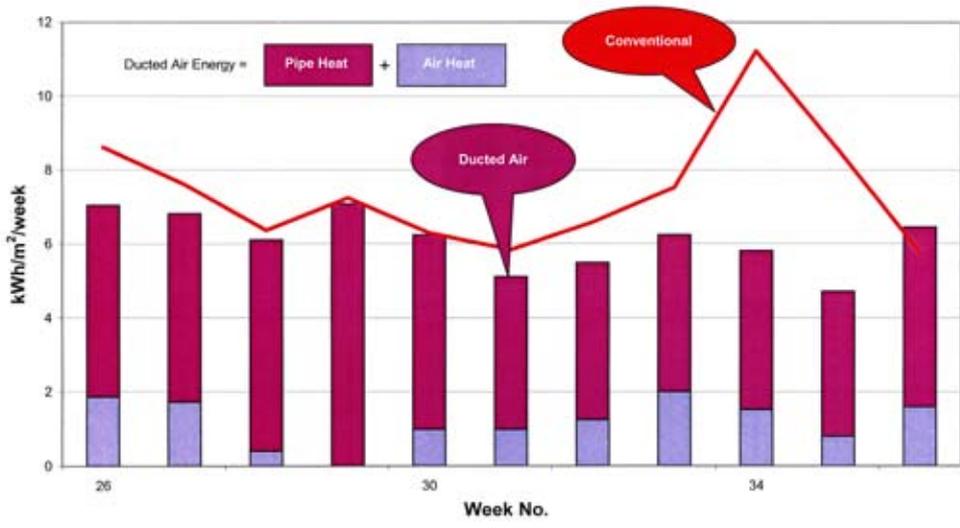
**Drax has announced a £2bn deal with Siemens to build three biomass plants in the UK to deliver 900MW electrical generation capacity.**

The company had already planned to expand biomass use at its North Yorkshire plant where it is expected to produce 500MW of electricity from biomass by 2010.

Two of the three sites have been secured at Immingham and Hull; the third is to be confirmed but may use the Drax site near Selby. The planning process has already started on the first two sites and, if successful, construction is expected to start in 2010. The company estimates that once operational the plants could generate 10% of the UK renewable electricity supply.

This is the latest in a series of announcements on significant biomass developments totalling over 2GW capacity, stimulated by the Government's recent decision to increase renewable energy targets and to increase incentives for technologies. From April next year dedicated biomass generation will earn 1.5 Renewable Obligation Certificates (ROCs)/MWh rather than one ROC/MWh as at present.

Comparison of Energy Use - Ducted Air v Conventional



produced 1% less tomatoes. This was considered a good result as the initial teething troubles meant that the greenhouse climate was often far from ideal. For this reason no firm conclusions can be drawn from the results to date.

2010 tomato season. When these trials are complete it will be possible to fully assess the impact that this innovative system can have on energy use and production in protected cropping facilities in the UK.

## Trial site installation details

Details of the installation at Mill Nurseries can be found in the February 2008 edition of HDC Energy News. To obtain your back-copy visit [www.growsave.co.uk](http://www.growsave.co.uk) and click on the Energy Saving Information page.

# Does flue gas quality affect crop performance?

Although it is common practice to use flue gases from boilers or CHP units for CO<sub>2</sub> enrichment, little is known about how system age and design affects CO<sub>2</sub> gas quality and crop performance.

Whilst it is well known that gases such as ethylene and NO<sub>x</sub> can have a detrimental and sometimes catastrophic effect on crop growth, it is not clear how much of these potentially harmful gases are produced by the different systems.

HDC Project (PC 228) investigated the response of tomatoes to CO<sub>2</sub> enrichment from the flue gases of a micro-turbine CHP unit and found that the yield benefits were higher than expected. It was thought that this result was due to the CO<sub>2</sub> containing less harmful pollutants than from other sources. However, because there was no conclusive information available, this theory could not be confirmed.



To investigate this further the HDC has commissioned a new project (PC 287) which will quantify the amount of pollutant gases in CO<sub>2</sub> produced by a range of systems.

Five commercial tomato growing sites with different types of heat and CO<sub>2</sub> generation have been chosen to participate in the new project which will run from September 2008 to January 2010.

With the first set of measurements complete, the project is already showing some interesting results. The graph shows the relationship between measured NO<sub>x</sub> and CO<sub>2</sub> and demonstrates the comparative



'cleanliness' of the flue gases. It demonstrates that the micro-turbine has 1.5ppm NO<sub>x</sub> to every 10,000ppm of CO<sub>2</sub>; and can therefore be considered as clean burning, especially when compared to the reciprocating engine at 7ppm NO<sub>x</sub> to every 10,000ppm CO<sub>2</sub>. As expected the results from the boilers fall between these two, with the new boiler burning cleaner than the old boiler.

These early results suggest that the findings of the previous project may well have been due to the cleanliness of the CO<sub>2</sub> produced by the micro-turbine; however there is some way to go yet. Further measurements taken throughout 2009 will relate more measurements of flue gas pollutant levels to tomato yield and quality.

Ultimately the project aims to give growers recommendations on how to maximise the effect of CO<sub>2</sub> enrichment and provide guidance on which systems can give the best returns.

