Greenhouse growers worldwide face despairingly high energy costs

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Rising energy prices are a grave concern for all greenhouse growers, not only in New Zealand. Recently a detailed analysis was published on energy prices for the greenhouse industry in the Netherlands (Holland). This article presents some information from that so-called LEI report: trends, predictions, consequences, a comparison with energy prices in NZ, and a brief note on innovations.

Energy prices in the Netherlands

The greenhouse industry in the Netherlands consists of over 10,000 hectares glasshouses (for comparison: NZ has about 250 hectares of greenhouses). It creates a multi-billion dollar income and also sustains a huge supporting industry. It is important for the country's economy. The rapidly rising energy costs are a huge concern, and hence an in-depth analysis was commissioned. The report came out recently, called 'Effects of increasing energy prices for the Dutch greenhouse industry', written by Nico Van De Velden of LEI (agricultural economic institute). We summarise some parts of this report.

Natural gas is by far the main fuel for greenhouse heating in the Netherlands. The price in 2004 was NZ$6.28 per GJ (0.11 Euro per m3). In 2007 it had jumped to $13.70 per GJ, which equals 108% in three years. It is predicted to rise to $22.26/GJ in 2010; another 62%. This is a three-fold increase between 2004 and 2010, which is much steeper than seen ever before. It will have disastrous effects on profitability, growers income and investment capability. (Note: heat content of Dutch natural gas is 35 MJ per m3 gas, and currency rate is assumed 1 Euro = 2 NZ$).

Combined Heat Power (CHP) and 'net energy use'

First an explanation is needed about the typical situation in the Netherlands. A large proportion of modern greenhouse operations in Holland uses CHP (combined heat power aka cogeneration). A CHP installation uses natural gas, and produces electricity that is sold to the grid. Since 2006, the Dutch greenhouse industry is a net electricity provider, due to the large-scale use of CHPs. Economist therefore use the term '*net energy costs*' of a greenhouse, meaning costs of energy coming in (gas) minus costs of energy going out (electricity). Obviously the net energy costs are a lot lower than the gas bill.

Electricity prices, too, have increased rapidly over recent years. In the Netherlands, a low in 2004 was 7.20 cent per kWh (kiloWatthour), and a peak in 2008 was 13 cent per kWh (this is NZ$-cents). Therefore growers with CHP saw their income from electricity increase. This dampened the effect of the rising gas price. However, the strong rise in electricity prices is expected to slow done, which means that the 'net energy use' will not be dampened down anymore. This causes concerns as well.

Effect of higher energy prices in the Netherlands

Here follow some of the conclusions of the recent LEI report, mentioned above. Obviously greenhouses with heavy heating and those with artificial light will suffer most from the rising energy prices. Interestingly, the average energy costs of the whole industry is strongly influenced by the large-scale usage of CHP. This is evident from the average 'net energy costs' (see above). Between 2004 and 2007, the average net energy costs per m2 glasshouse increased by 'only' 40%: roughly from $15 to $21 per m2 (7.40 to 10.50 Euro/m2). This 40% increase in net energy costs is low compared to the 108% increase in gas price. This is thanks to electricity production by CHPs. Between 2007 and 2010, the average net energy costs per m2 is expected to increase by another 45%, to $30.20/m2. By 2010, the average net energy costs will be about double of that in 2004, which is not as bad as over three-fold increase in gas price (again, thanks to large-scale adoption of CHP).

Short term prospect

The LEI report looked at the consequences of the energy prices. For the short term, they compared the expected situation in 2010 with that of 2007. The net energy costs as part of total costs will rise from 16 to 25%. The rising energy costs will cause 30% rise in total production costs, and will reduce profitability from 96% to 88%. The average family income in 2007 was $54,000 (27,000 Euro) per annum, and will be negative $32,000 p.a. in 2010. Business loss will be a staggering $132,000 p.a. Hence there will be no investments in CO2 mitigation or renovation. This will lead to rapid aging and deterioration of the greenhouse industry.

Long term plan

The LEI report says that industry will keep its competitive edge in the long term, assuming that the growers survive the short-term financial trouble. The recommendation is that the Dutch greenhouse industry should not seek the solution in less energy-intensive growing, since a niche market for top quality produce. The report recommends aiming for sustainable energy supply, based on innovative investments.

A direction for long-term development was chosen in 2004. Decision makers and advanced growers then started programmes such as 'closed greenhouses' and 'energy-producing greenhouses'. A multitude of new large-scale projects came of the ground. Some are closed glasshouses, some are semi-closed, meaning that they harvest and store solar energy. Most of them use seasonal storage of heat in the aquifer, which is very costly and perhaps also risky. Some others use heat from deeper ground layers. This seems to work well, although Holland is not known as a geothermal area. Some methods are so successful that they don't use any fossil fuel at all, and even don't have a connection to the gas pipe. Most of these projects are on a scale of several hectares. It must be added that these innovations get significant government support for innovative research. The government's policy is that all new greenhouses must be energy neutral and economically feasible by 2020.

Energy prices in New Zealand

To put the prices in perspective, we show some energy prices in New Zealand, although such comparison is tricky. Gas prices are governed by contracts, and fixed costs complicate the comparison. A rough indication is that now (late August 2008) the gas price for greenhouse growers in the wider Auckland area vary from around $12 to $16 per GJ, or 4.33 to 5.77 cent per kWh.

Coal too has a wide range in price and also in quality. Quality means energy content, which varies from 15 to 32 MJ per kg (equals to GJ per tonne). It is fair to include the delivery costs in the total price, and obviously the delivery costs depend on the distance between mine and end-user. Some anecdotal information is that a grower on the South Island pays $120 per tonne (delivered) for coal with a heat content of just under 20 GJ per tonne. This equals 120/20 = $6 per GJ for his coal. Another grower on the South Island pays $185 per tonne for coal with heat content nearly 25 GJ/tonne. This is equivalent to $7.50 per GJ. Other growers pay more. Rumours are that the price of hot coal will go up very drastically in September due to demand from China.

World-wide

Reports from other countries about the rising costs of fuel for the greenhouse industry are equally despairing. In most countries, the industry faces the energy crisis, and is seeking ways to improve energy efficiency in greenhouses. A general trend in many countries is to look at CHP (combined heat power or co-generation) and also at waste heat from power plants or industries. The benefit of CHP is obviously that electricity produced will create income. However, CHP is only cost-effective on very large-scale greenhouse operations. There are many initiatives with CHP on the drawing board. Interestingly, there are also many other initiatives where heat can be produced 'cheaply'. Often the entrepreneurs are seeking greenhouse growers who want to use their heat. This occurs worldwide including in NZ. What seems to hold back these innovations is that the heat production is often in a location where no greenhouses are at present. Another factor is that growers are reluctant to invest in new greenhouses in new locations, especially when the future is so uncertainty.