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HAL R&D project number: VG13051

Project VG13051 explored the practicalities of implementing solar, wind, biogas and natural gas/LPG technologies for Australian vegetable growers.

- **Development of a vegetable education kit.**

HAL R&D project number: VG13089

Project VG13089 aims to develop a Vegetable Education Kit for children in Australian classrooms.

On-farm power generation - options for vegetable growers.

Facilitators:

Project VG13051 was completed by project leader Dr Gordon Rogers, from Applied Horticultural Research Pty Ltd.

Introduction

Australian vegetable growers are major consumers of electricity, with on-farm irrigation, heating and cooling, processing and packing plants creating significant power demands. From 2009-13, electricity retail prices have risen on average by more than 60 per cent, putting increased financial pressures on growers.

At the same time however, incentive schemes and falling installation costs of some renewable sources of power have created opportunities for growers to reduce energy costs and meet sustainability goals by adopting on-farm power generation.

About the project

Research carried out by Dr Gordon Rogers, of Applied Horticultural Research Pty Ltd, has produced details of on-farm power generation options and the practicalities of implementing solar, wind, biogas, natural gas, and LPG technologies.

The research findings, generated through case studies conducted by Parkside Energy in Queensland, Western Australia, Tasmania, New South Wales and Victoria, as well as economic and regulatory studies, were presented at vegetable levy-funded workshops during September and October 2014.

Delivered by Applied Horticultural Research and InfoTech Research, the workshops outlined the most viable electricity generation options for specific locations based on feasibility studies and the experience of growers.

"Growers can use this research to help them make informed decisions about the economic, technical and operational costs, and associated benefits, of various technologies, the challenges of installation and operation, and the suitability of systems to individual ventures," Dr Rogers said.

Wind farm.

"Presenters also deciphered electricity bills and gave growers and advisors strategies to improve current farm energy efficiency."

Main Findings

Solar photovoltaics (PV)

The research indicated that solar PV—already widely used by growers—is one of the key options for on-site power generation.

Dr Rogers said solar PV should be economically viable for most vegetable growers, including those in less sunny regions, provided the Small-Scale Technology Certificate government subsidies paid under the Renewable Energy Target (RET) remain and up to 90 per cent of the electricity produced is consumed on-site, as energy storage remains an issue and feed-in tariffs are no longer a significant economic factor.

"Should the RET be repealed, this same solar PV plant requires the current cost of electricity to be more than 19-22c/kWh to be viable," he said.

Wind turbines

In Australia, wind turbines in the 100kW-2MW range are likely to be the main growth market.

Dr Rogers' analysis focused on 50-500kW capacity wind turbines.

"There is significant cost sensitivity to the quality and location of the wind resource, and the necessary environmental approvals can sometimes be difficult to obtain," he said.

"Second-hand turbines are worth considering, as they cost significantly less than new plants."

"Viability improves if electricity costs over 10c/kWh and most of the electricity generated is used on-site."

Biogas

"The analysis of the current financial situation shows that both biogas from waste materials (if an appropriate scale can be achieved) and a natural gas fuelled generator can be consistently financially viable at current prices," Dr Rogers said.

Natural gas and LPG technologies

Dr Rogers said the key issue for viability was the cost of gas.

"The analysis found that simple generation (electricity only) or cogeneration of electricity and process heat/cooling requires fuel prices that can compete with the amount paid for electricity," he said.

"Only network delivered natural gas is priced to reasonably compete with most current electricity prices."

"For example, a gas-fuelled generator with a capacity factor of 50 per cent or more should be viable when the price being paid for electricity is more than 10c/kWh."

"With LPG not viable, on-site engine generation will not be viable for growers who do not have access to network delivered natural gas."

Dr Rogers said the combustion of both natural gas and LPG in reciprocating engines could result in significantly lower levels of greenhouse gas and regulated pollutant emissions than coal and diesel.

Conclusion

Dr Rogers said solar PV generation, wind generation and power generation using natural gas could be viable given the right site, operation and economic conditions, all of which were examined and costed for several detailed case studies.

"In addition to financial savings, growers adopting on-farm power generation could also benefit from greater sustainability, and a diversification of energy sources," he said.

THE BOTTOM LINE: VG13051

- Australian vegetable growers can save money by generating their own power and using electricity more efficiently.
- Growers looking to adopt on-farm power generation need to investigate the availability of government subsidies, their capacity to invest in capital equipment, the suitability of the site for specific technologies and government regulations impacting the technologies.

Acknowledgements

This project has been funded by HAL using the National Vegetable Levy with matched funds from the Australian Government.

Development of a vegetable education kit.

Facilitators:

Project VG13089 is being completed by CSIRO Food and Nutrition Flagship and CSIRO Education.

Introduction

Australian research shows that children's consumption of vegetables is too low. As food preferences and intake have been shown to track from childhood into adulthood, increasing children's vegetable knowledge, awareness and consumption provides the opportunity to establish lifelong healthy eating habits.

About the project

Project VG13089 is a collaboration between scientists from CSIRO Food and Nutrition Flagship and educators from CSIRO Education. It aims to develop a Vegetable Education Kit as a classroom-based educational resource for use in Australian schools.

The program, which will be delivered by teachers, will expose children to the taste and texture properties of vegetables, their regionality and seasonality, cultural diversity, and aspects of vegetable growing and production in Australia.

The 18-month project has just completed its initial phase - a feasibility study to identify crossover with the national curriculum objectives.

A literature review was also undertaken to collate selected relevant overseas and national classroom-based educational programs to determine best-practice approaches.

Project leader Astrid Poelman said the aim was to encourage and support educators to reinforce in children the lifelong importance of enjoying vegetables and eating well.

"It is hoped that teaching children with the Vegetable Education Kit in the classroom will lead to an increased awareness, acceptance and willingness for children to consume vegetables," said Ms Poelman.

"It is also hoped that the Vegetable Education Kit will promote positive awareness of the Australian vegetable industry."

"Eventually, the kit is expected to help positively influence vegetable consumption, therefore increasing demand."

"As children's food preferences have been shown to flow on into adulthood, this program may also contribute to setting lifelong eating habits, potentially increasing future demand for Australian vegetables even further."

Main findings

"The literature review has shown that there are several established overseas programs in place that use a classroom-based approach and are relevant when aiming to increase children's vegetable consumption," Ms Poelman said.

"These include programs in The Netherlands, France, the United States and several other European countries."

"There is also an Australian program, the Stephanie Alexander Kitchen Garden Program, which aims to provide children a pleasurable food education by setting up a garden and cooking classes in schools."

Ms Poelman said effectiveness evaluations of the programs revealed that changes in children's behaviour were consistent with several aims of the programs.

Measures of effectiveness included increases in knowledge, attitude and willingness to taste new foods.

"Across the programs, 'enjoyment', 'fun' and 'tasting of products to increase appreciation' were all common elements," she said.

"The programs reviewed were also found to focus their efforts on primary schools, with stronger effects found among younger age groups."

"Even when we conducted a wider review of classroom-based educational programs aimed to increase vegetable consumption around the world, we found that most programs targeted children at primary schools."

"While they can be fussy eaters, primary school-age children (between the ages of five and 12) are more likely to be malleable and open to change compared to older children."

Ms Poelman said younger children were therefore a good target group to learn to enjoy the sensory properties of vegetables.

"It is important that the kit focuses on experiential learning and teaching children to use their senses to appreciate how the food tastes, looks, feels and smells," she said.

"By letting children form 'hands-on' relationships with vegetables, they will become more familiar with them, maybe more willing to try them - and discover that they are actually enjoyable."

"But we think an explicit health focus should be avoided because there is evidence that if you tell a child something is healthy they automatically assume it tastes bad."

Ms Poelman said overall, the feasibility study showed there was good potential to develop a Vegetable Education Kit in Australian schools.

"There are good opportunities to align materials to fit the Australian curriculum across a range of key learning areas, as well as with cross-curriculum objectives and general capabilities."

"We also want to look at possibilities to involve growers in the program," she said.

Conclusion

Ms Poelman said the recommendation drawn from the feasibility study was to develop an in-depth unit of work in vegetable education across all stages of primary school.

"This has been deemed critical for achieving change in existing programs," she said

The Vegetable Education Kit will be piloted in a primary school. Pathways for future dissemination and roll out of the kit will then be developed.

THE BOTTOM LINE: VG13089

- Increasing children's vegetable knowledge, awareness and consumption has the opportunity to establish lifelong healthy eating habits.
- The Vegetable Education Kit will be an in-depth unit of work across all stages of primary school, providing a long-term education and found to be critical for achieving change.

Acknowledgements

This project is funded through HAL by the National Vegetable Levy with matched funds from the Australian Government.

Those in the education field may also be interested in the School Vegetable Garden Drip Kit, a joint project by Netafim, Syngenta, and AUSVEG. Complete with a variety of vegetable seeds, the kit is helping schools teach kids about where their food comes from!
Go to http://schooldripkit.com.au/ for more information.

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Please contact Shaun Lindhe at AUSVEG on 03 9882 0277 or email shaun.lindhe@ausveg.com.au to submit topics for potential inclusion in future editions of **vege**notes.

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