

# Innovation results

AN R&D CASE STUDY

#013

## Big energy savings for process industries

**More efficient production of radio frequency power, used in energy-intensive processes around the world, could save the same amount of electricity as consumed by a quarter of a million UK residents.**

### The need

Heavy process industries use huge amounts of electricity. For example, this project discovered that mineral production alone uses 3% of the world's electricity output. Improved system efficiencies offer big savings and CO<sub>2</sub> emission cuts against a backdrop of rising energy prices.

The UK's domestic power supply 'alternates' at 50 cycles every second. However, many large-scale industrial processes need power that alternates at radio frequency – typically several million cycles every second. This project enables energy to be converted to radio frequency power in a more efficient, cost effective and controlled way.

### The results

In this project, e2v led a consortium of industrial and academic partners to develop a highly efficient, radio frequency, pulsed power system for industrial processing (HiPPoS). The initial aim was to make a major reduction in electricity demand by heavy industrial processes that use pulsed power (big, quick pulses of energy) at radio frequency.

One obvious application is the minerals industry, which uses electricity to break down ores in order to extract precious minerals. Here, the project forecast energy savings of a whopping 60%.

#### New direction

However, the consortium conducted a market survey which revealed that there was greater demand from heavy industrial users for efficient generation of continuous power (non-pulsed power) at radio frequency, than pulsed power.

So the project pursued improvements in both types of radio frequency power, with the target of providing solutions for both markets.

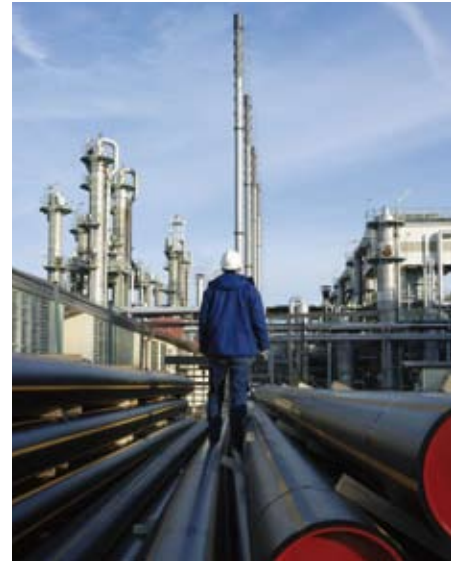
The consortium combined the latest high frequency power conversion R&D from the University of Nottingham, Dynex Semiconductors' class-leading power control and conditioning technology, and e2v's range of industrial radio frequency and microwave generators.

It predicts that adoption of this radio frequency process technology, by even a small number of the users within the large industrial process sector, will significantly improve process yields while reducing electricity demand and CO<sub>2</sub> emissions.

## Market potential

The University of Nottingham calculated that even a few percentage points' improvement in efficiency of processes using pulsed radio frequency power would avoid huge amounts of electricity being generated. For example, the mineral processing sector could save 250GWh of electricity each year.

Additionally, the university anticipates a similar reduction in electrical demand for non-pulsed radio frequency power in the oil, waste processing and recycling industries, making a total of about 500GWh per year. This is equivalent to the electricity consumed by about 250,000 UK residents.



'Without this investment, we would not have discovered the much bigger continuous wave power market that changed our direction.'

e2v



## Next steps

The consortium is now concentrating on developing the demonstrator that will pull together all the elements of the technology into a device that is suitable for industrial users.

In the long term, there is potential to exploit this innovation as an advanced enabling technology for generating electricity using nuclear fusion. The HiPPoS consortium expects fusion power research to radically alter how we generate a sustainable supply of 'green' electricity in the future.

### Technology Strategy Board Driving Innovation

Collaborative research and development projects are one of the tools that the Technology Strategy Board uses to drive innovation in the UK. The Technology Strategy Board is a business-led executive non-departmental public

body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department for Business, Innovation and Skills (BIS).

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#### Project

H0056A

#### Project partners

e2v, University of Nottingham, Dynex Semiconductor

#### Technology Strategy Board

#### investment

£680,000

#### Total project investment

£1.4m

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