

Project profile

SmartPM

Smart power management in home and healthcare



Sub Programme

- Nanoelectronics for Energy & Environment

Worldwide energy consumption is rising dramatically and will double in the next 20 years, with a similar rise in CO₂ emissions. Energy savings should reduce Europe's predicted power consumption by up to 30%. Achieving the efficient use of energy without imposing restrictions on end-users is the challenge for the next decade. The primary objective of the ENIAC JU SmartPM project is to develop application-specific, efficiency-optimised power semiconductor technologies, allowing the deployment of intelligent systems in large-scale, energy-critical application fields such as the home and healthcare.

EU-wide energy consumption is expected to increase by approximately 25% by 2012 and will double in the next 20 years with carbon dioxide (CO₂) emissions rising accordingly. A substantial reduction in electrical energy consumption is therefore one of the major challenges in the design of new products.

The energy consumption of multimedia equipment, personal computers, printers, scanners, modems and mobile-phone chargers can already amount to 20% of household consumption. And about half of this is due to stand-by losses.

Redefining techniques

Applications for electronic control systems in the home and for healthcare systems are of growing importance as candidates for power-consumption reduction. Consequently, the ENIAC JU SmartPM project has brought together leading European specialists – including chipmakers, systems designers and research organisations – to redefine the tech-

niques for delivering and controlling the supply of energy to a wide range of domestic and medical equipment. SmartPM will develop new hardware and module platforms providing intelligent drives for high-efficiency motors and electrical actuators in industrial, domestic and healthcare applications. The project will also work on efficient power supplies and power-management solutions.

The technologies developed will cover different voltage ranges including:

- Low voltage – less than 100 V;
- Mains voltages – 120 to 400 V; and
- High voltage – greater than 1 kV.

Power-supply and power-management solutions will be applicable to almost all home appliances – including solid-state lighting, personal computers (PCs), peripheral equipment, TV sets, video recorders, audio receivers, amplifiers, DVD players, microwave ovens, rice cookers, dishwashers and washing machines, as well as automatic meter-reading equipment and home networking. They will also be usable in security systems, process-

control equipment and a significant range of medical devices.

Energy-efficient products

The project partners will develop new systems architectures and innovative circuit-design concepts as well as specific driver circuits and power components. These will facilitate the design of energy-efficient home appliances and healthcare and medical equipment, which will consume up to 25% less energy by 2012, compared with systems offered today.

The ENIAC JU project will achieve this by integrating energy-efficient silicon technologies including circuit designs, components, chip sets, memory, power management and new power-supply modules for next-generation home appliances and medical equipment. The design focus will be on noiseless power conversion and high conversion efficiency as well as on control concepts for computer power supplies with and without uninterruptible power supply.

SmartPM will achieve this by the selection and/or design of circuits, converter topologies, output transformers, operation modes, CMOS switches and rectifiers.

Novel chip materials

The project will develop and use new semiconductor materials such as silicon carbide (SiC), thin substrates and interconnect materials to improve performance and reduce the cost of the power supplies and medical equipment that will be demonstrated at the end of the project.

The latest SiC and silicon-on-insulator/BCD technologies will be optimised for low power consumption and extended lifetime and be used to implement the modules and systems.

For each relevant semiconductor technology, the required characteristics for high energy efficiency will be defined on the basis of:

- The lowest possible power consumption in standby;
- High efficiency in active mode;
- A reasonable wake-up time; and
- Conformity with standards and legislation.

The technology and the modules developed will be integrated with tools and resources to plan and manage power consumption. This will help stakeholders to save energy by providing functionality to set and maintain energy configurations more effectively across home appliances and medical equipment. In this way it will be possible to evaluate configurations to determine annual cost savings and CO₂-emission reductions through the use of energy-efficient power supplies in domestic and medical systems.

Creating new markets

Implementation of the project results will save up to 25% of the electrical energy consumption and CO₂ emissions without losing performance, comfort or safety. It will reduce Europe's dependence on energy suppliers and increase economic competitiveness by creating new market sectors and innovative applications for Europe and the world.

Energy & Environment

Partners:

- Centro Nacional de Microelectrónica (CNM-CSIC)
- Delft University of Technology
- Dublin City University
- ebm-papst Mulfingen
- Elec-Con technology
- Fraunhofer Gesellschaft
- GE Vingmed Ultrasound
- Infineon Technologies
- JLT Mobile Computers
- Kontron Embedded Modules
- Microspire
- ON Semiconductor Belgium
- Philips Consumer Lifestyle Innovation Lab
- Philips Technologie Forschungslaboratorien
- STIFTELSEN SINTEF
- STMicroelectronics Italy
- Telefunken Semiconductors
- Thales Research & Technology

Project co-ordinator:

- Werner Weber, Infineon Technologies

Key project dates:

- Start: February 2009
- Finish: January 2012

Countries involved:

- Belgium
- France
- Germany
- Ireland
- Italy
- The Netherlands
- Norway
- Spain
- Sweden

Total budget:

- €19.83 million



The ENIAC Joint Undertaking, set up in February 2008, co-ordinates European nanoelectronics research activities through competitive calls for proposals. It takes public-private partnerships to the next level, bringing together the ENIAC member states, the European Commission and AENEAS, the association of R&D actors in this field, to foster growth and reinforce sustainable European competitiveness.