

THE NETHERLANDS

PV TECHNOLOGY STATUS AND PROSPECTS

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GENERAL FRAMEWORK

At the start of 2007 the new centre – left government announced an ambitious sustainability plan aiming at an annual energy consumption reduction of 2 %, a reduction of CO₂ emission of 30 % by 2020 (compared to 1990) and a contribution of 20 % of renewable energy to the energy needs in 2020. With these targets the Dutch government surpasses the already ambitious targets of the European Commission. Following these ambitions the government initiated the set up of a new market implementation programme, called SDE (Stimulation Sustainable Energy Production), which will be launched in early 2008.

The new political direction also resulted in extra attention for the Energy Transition plan initiated in 2006. Within this programme the Dutch government collaborates directly with market players through a number of Energy Transition Platforms, which advise the government on desired and required legislation, and support schemes to realise the above mentioned targets.

NATIONAL PROGRAMME

In 2007, as in 2006, the main objective was still to implement proven renewable energy technologies (wind and biomass) and to support R&D activities in future renewable energy technologies (PV, fuel cells, etc.). Support for future energy technologies is organised in four EOS (Energy Research Subsidy) programmes, and one Transition programme, which together cover the full spectrum from fundamental new ideas and fundamental research to demonstration (Figure 1):

- EOS NEO: New Energy Research, focussing on new, unconventional ideas. This programme is mainly intended for inventors. The programme covers all new energy options.
- EOS LT: Long term energy research, focussing on a selected range of promising energy saving or renewable energy technologies; with expected serious impact between 2020 and 2050.
- EOS ES: Collaboration projects, focussing on technology transfer from research to industry; in order to convert technologies into products. This programme replaces the energy part of the IS (Innovation Subsidy for Collaboration Projects) programme, which appeared ineffective for energy technologies.
- EOS Demo: Projects, focussing on testing and demonstrating new energy saving - or renewable energy applications in a realistic user environment.
- Transition UKR: "Unique Opportunities Scheme," focussing on improvement of material - and energy use and on the application of renewables, in general and biomass, in particular.

EOS NEO and EOS LT are still the most interesting sub-programmes for PV, which resulted in 4 new EOS-NEO projects and 1 new EOS-LT project in 2007. The research activities in the past however have led to results which are now ready for transfer to the industry or even for demonstration resulting in 1 EOS ES project in 2006 already and 1 EOS- ES plus one EOS Demo project in 2007. The total budget going towards PV RTD activities in 2007 was around 9,4 MEUR of the total EOS / UKR budget of around 100 MEUR.

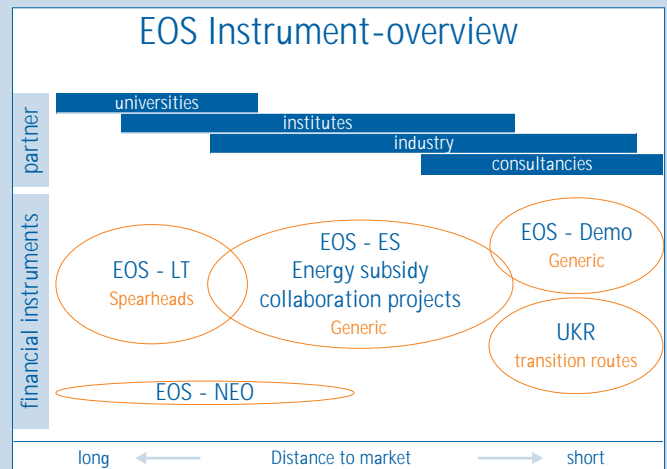


Fig. 1 - Position of the EOS and Transition sub-programmes SenterNovem.

RESEARCH AND DEVELOPMENT ACTIVITIES

In 2007 the RTD activities continued along the three existing main lines for PV RTD in the Netherlands:

- Solving the silicon shortage problem by reducing the silicon consumption per Wp and developing production processes for SoG (solar grade silicon): NUON Heliantos continued on the path towards roll-to-roll tf-Si cell production, expecting to realise a commercial pilot production line in 2008, ECN, Solland Solar, ECN, Tempres and Mallinckrodt Baker started new activities in the field of high throughput emitter processing.
- Improving cell production processes, using new cell concepts and new or improved production technologies. Here two projects stand out: 1) continuation of the development of CIS cells based on 0,2 mm CIS coated glass spheres, homogeneously distributed over a grid-shaped substrate at Scheuten Solar and 2) Further optimisation of the spray deposition process for CIS cells.
- Improving the efficiency of future generation cells through hetero-junctions and up- and down conversion of photons. In this field several projects, running or initiated in 2005, were still ongoing in 2007. A good example of these projects is the project on photon management for solar cells from the university of Utrecht (Figure 2)

The main players in the fundamental Dutch PV RTD activities are ECN, Solland Solar, Scheuten Solar, NUON – Heliantos (Formerly AKZO), TNO, AST, the Universities of Utrecht, Eindhoven, Groningen and Delft and FOM-AMOLF.

As the programme's focus for PV was still on (long term) RTD, very little RTD work was done in the field of BOS. A change is foreseen for 2008, when the installation of the market stimulation scheme is expected to generate new RTD activities in the field of PV building integration.

At the international level, Dutch PV RTD centres and industries collaborate in several networks, amongst which is the CrystalClear project; that is co-ordinated by ECN and started early 2004. Other significant ongoing PV RTD or PV RTD related projects with Dutch participation are PV Upscale, Flexellence, Full Spectrum, cRRescendo, PV-ERA-NET and the PV Policy Group.

PV-ERA-NET opened a special PV dedicated Joint Call, allowing international teams from the participating countries to submit projects for funding in the field of polymer and molecular PV solar cells. The pre-proposal phase was closed successfully with 9 pre-proposals with Dutch participation in six of these. The final proposals are due for 7 March 2008.

INDUSTRY STATUS

In spite of the still low level of implementation, the PV industry sector continued to grow. Besides the existing plants of Solland Solar, Scheuten Solar NUON Heliantos, Ubbink Solar and RGS Development, three new initiatives should be mentioned: Solland Solar started the construction of a second production line, tripling its annual production capacity 60 MW. Scheuten Solar decided to bring the new CIS factory to Venlo, and expects to have a 250 MW CIS factory running at the end of 2009. APA started the preparation for a small initial CIS factory, based on the spray deposition technique developed by AST.

DEMONSTRATION PROJECTS, IMPLEMENTATION AND MARKET DEVELOPMENT

Though final numbers are not yet available, the implementation of PV is expected to have stabilised at 1,5 MW per year. The only significant implementation was generated by some larger projects profiting from both the EIA support mechanism, which allows companies to deduct the cost of sustainable energy systems from the company profit, and local or regional investment subsidies (Figure 2).

FUTURE OUTLOOK

The new SDE (Subsidy for Renewable Energy), which is expected to be opened early 2008 will generate a new impulse for investment in renewable energy systems. Though mainly targeted at large scale implementation of proven renewable energy technologies, a specified budget is allocated to PV. The goal of the PV subsidy is to prepare the Dutch market for the large scale implementation in the near future, when the price per kWh for PV reaches grid parity. The scheme is expected to initiate a market of somewhere between 10 and 20 MW in 2008.

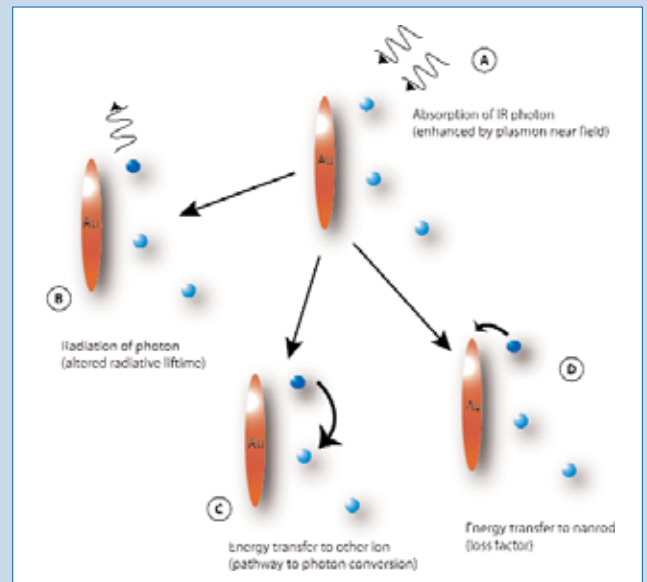


Fig. 2 - Interaction between the optically active ions and the plasma resonance in metal nano-rods. A.M. Vredenberg en J.T. van Wijngaarden, University of Utrecht.



Fig. 3 - 42 kWp flat roof – top PV installation in Groningen, The Netherlands Oskomera.