

## **Dutch Program ‘Green Deal efficient electric motor systems’ and Energy efficiency programs as implementing forces**

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### **Abstract**

The paper will present and document the combined efforts of producers and installers of efficient motor systems in the Netherlands and the Dutch government in developing a program for implementation of efficient motor systems.

The Dutch government has initiated a Green Deal program in order to accelerate the implementation of green climate-effective and innovative projects in the Netherlands. Core characteristics of these projects are concrete green benefits of the project, in a relative short period of time (2-3 years), and the need for removing barriers in the market (by government assistance).

Research and pilots show that optimization of electric motor systems and application of the best available technology can deliver reductions of 20 - 30% of the electricity use in industrial production systems and in cooling, ventilation and heating systems. Combined effort of industry, government and research companies is initiated to overcome these barriers the coming years.

A consortium of manufacturers and installers of efficient motor systems in industry has started the Green Deal Efficient Electric Motor systems in cooperation with the Dutch ministry of Economic Affairs. The project focusses on developing pilots and projects on motor systems based on systematic analysis applying best available technologies and life cycle costing principles. And on the potentials of financial services for investing and operating motor systems. Practices will be made available aiming at raising awareness and capacity building within the sector and transfer towards OEM and industrial end-users.

A close cooperation is established with the implementation practices of Energy management systems in industry. NL Agency facilitates this process with the large industrial companies in their work on increasing their energy efficiency (in voluntary agreements (VA's)). The Green Deal project profits also from the close operation with the Dutch ‘Knowledge Network EMS’ in order to reach the industrial end users. And from the participation in the Electric Motor Systems Annex (EMSA) for technical guidance, capacity building and knowledge on performance and IEC/ISO systems standards.

## Introduction

Electric motor systems (EMS) use up to 69% of electricity in Dutch industry. Research and projects show that system optimization and best available drive technology can deliver reductions of 20 - 30% in pumps, fans and compressors in heating, cooling and ventilation systems, and industrial handling, processing and production systems. Thus lowering the national electricity bill by 5 to 8%. Obstacles in the marketplace and a low awareness of best practice and technology hamper market penetration.

Complexity of the issue, unfamiliarity with best practices and the BAT (best available technology), the limited use of life cycle cost principles and the lack of funding make that possible savings are implemented only partially or in the long term.

For industrial users optimizing motor systems means a direct cost savings and the ability of using the resulting funds in an other way. This translates into a 1 on 1 enhance competitiveness. In addition, the focus on efficient drive systems offers the companies / equipment builders commercial opportunities as well as opportunities to (internationally) distinguish themselves.

Since June 16, 2011 the European Directive (2005/32/EC) came into force with requirements on the minimum efficiency of electric motors. This Directive, further explained in the Regulation EC 640/2009 dated July 22, 2009, offers an excellent opportunity to apply the effective system approach directly and optimize the motor systems.

Government and the Dutch motor systems industry have started the Green Deal Efficient Electric Motor Systems to accelerate the market penetration, in alignment with other initiatives like the transition within industry towards the energy management system standard ISO50001.

## Instrument of Green Deals

### *Remove bottlenecks in sustainable initiatives*

In the development of sustainable initiatives, companies, civil society organizations and other governments face barriers. For example, if they want to run project to generate energy or to use less water. The barriers can have various causes. Sometimes the laws and regulations are causing delays. Another time the initiators have trouble finding suitable cooperation partners. And sometimes



**Figure 1 From Applicant via Government to Result (See for translation the text box on the next page)**

*Translation from Dutch text in figure 1:*

*Title: 'How does the Green Deal work?'*

*Text box: 'Result': With these green deals we (Government and Dutch society) are taking concrete steps towards a sustainable society. With economical viable projects. This is the beginning. The coming period the government will continue in closing deals with Dutch society.*

they're not succeeding in getting enough money together. In those cases, the Dutch national government can help through a Green Deal. Figure 1 shows an simple scheme with the parties involved: applicant ('Indiener' in Dutch) and government ('Overheid' in Dutch), and the green result ('Resultaat' in Dutch).

*Green Deals ensure sustainable economic growth*

The Netherlands want to move towards an economy where sustainability and economic growth go hand in hand. Growth is not at the expense of the environment, but takes into account the environment and the needs of future generations. The Green Deals fit within it. They provide short-term outcome for all. This effect is even greater, as other parties will follow the Green Deal. [1]

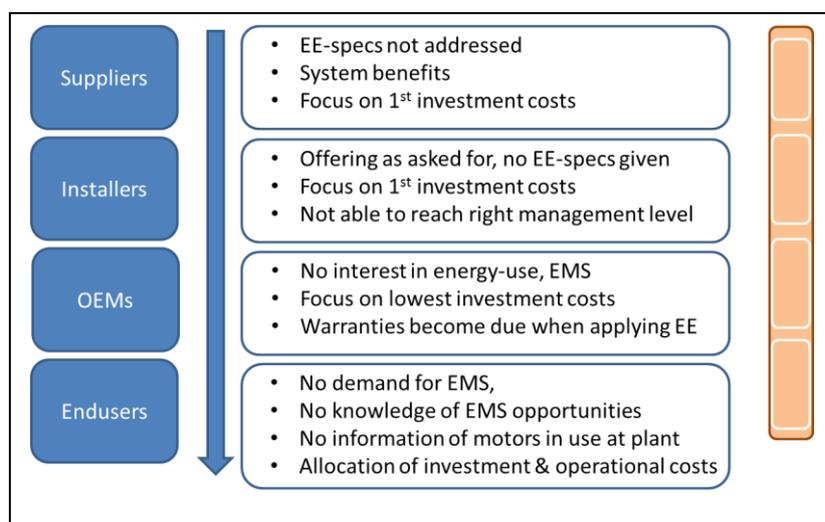
**Green Deal Efficient Motor Systems**

*Bottlenecks on the implementation of Efficient Motor systems (EMS) by industrial end-users*

(Inter) national studies, projects and practical experiences confirm the bottleneck associated with market players, such as the manufacturers / suppliers of electric systems, installers and maintenance providers, equipment manufacturers (OEM) and end-use industries (manufacturing).

Analysis of the market of electric motors supply and maintenance in the Netherlands, and the practices of the OEM's and industrial end-users shows that for a successful acceptance of efficient motor systems all market parties have to get involved.

Figure 2 shows these barriers for each party involved, starting with suppliers and – through installers and OEMs ending with the end-users. Some main barriers are the focus on lowest investment cost, focus on motors only, instead of system benefits, low knowledge of opportunities for system efficiencies and the split in allocation of investment and operational cost with the end user.



**Figure 2 Obstacles in marketplace for Efficient Motor Systems**

*Initiative Green Deal Efficient Motor Systems*

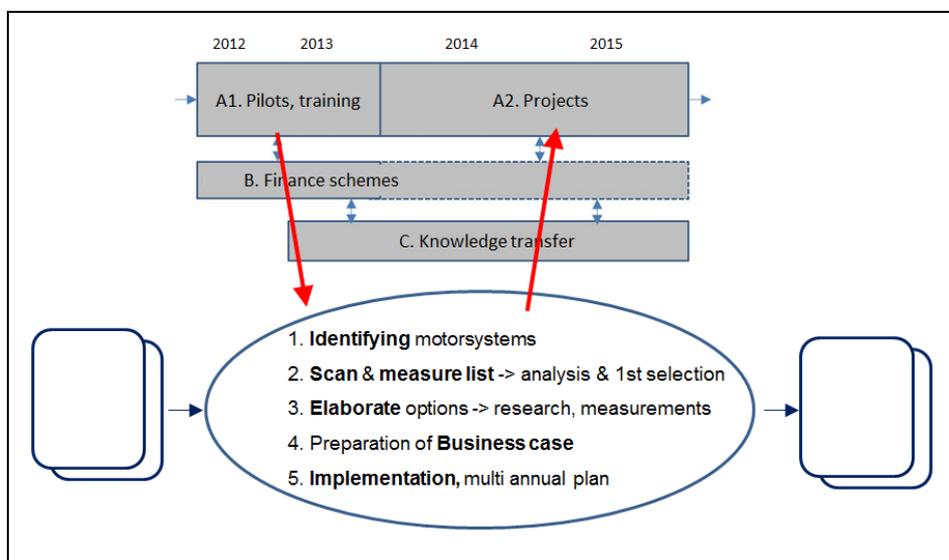
The initiators of this specific Green Deal Efficient Motor Systems are the FEDA and the Uneto-VNI. FEDA is the Federation of suppliers of Electric Motors, Drives and Automation Engineering, and Uneto-VNI is the trade association of installation and electromechanical maintenance companies.

The two organizations together with their member-companies want to encourage a wider application of efficient electric motor systems by reducing some of the above mentioned issues. And so assisting the users of the motor systems in achieving direct energy savings, and strengthening their competitiveness by developing innovative products and services, as well as developing more activities by the energy suppliers and service providers. Which translates into growth in sales and employment.

FEDA and Uneto-VNI and twenty-six member-companies from FEDA and Uneto-VNI have joined the Green Deal and are participant in the project. As well as two main pump suppliers. The project will be carried out by the 28 participants. The program management is done by TPA consultants, in cooperation with FEDA and Uneto-VNI. The government is involved via NL Agency as secretary of the project group and directly via the Ministry of Economic Affairs in a steering committee.

The project (Green Deal) consists of three components that aim at reducing some of the issues raised in the market, improving the conditions in the supply chain, and the realization of a number (example) projects by end users by which direct energy savings are realized, and following the examples is further stimulated in the market. The project duration is 2,5 up to 3 years.

The project has the following project-activities: A1 & A2. Preparation, training and performing pilots; followed by execution of projects; B. Finance Scheme(s); C. Knowledge transfer. In this paper we will focus on A1/A2 [3]. In figure 3 the project scheme is presented together with the main steps for each project or business case.



**Figure 3 Project scheme with step 1 up to 5 towards implementing the business case**

In cooperation with the partners of the Green Deal Efficient Motor Systems and the (some of the) end-users of motor systems a standard approach or working method is developed for analyzing and optimizing a specific motor system. The five basic steps are shown in figure 3. The format of the businesscase will defined by the partners, with a number of objective criteria. Depending on the specific expertise and interest of the partners and the end-users, and on the available data at start as well as the ambition (or desired scope) of the end-user these five steps will be customized in every single project [4].

Several tools are available to calculate and present energy efficient motor systems, life cycle cost, and type of drive and control component. Via the participation of the Dutch knowledge network efficient motor systems in EMSA the Motor Systems Tool became available for analyzing and calculating the motor systems of the end user. The tool is unique in its 'system approach' and is brand independent. See [www.motorsystems.org](http://www.motorsystems.org) for more information and download area. The Life Cycle Cost method is aimed at the end users' management and procurement department.

Five pilot projects will be started to make GD-partners more familiar with the standard approach, and to get some good business cases for promotion and publicity. In the same period focus will also be on identifying any specific problems in the application of this approach and in the realization of these business cases. For example the requirements by procurement and or plant management sets, the connection to internal organization and maintenance, and investment planning, etc.

### Systems approach

The maximum savings potential of efficient motor systems can only be realized by following the so called systems approach. This is a term which hints at a systematic analyses of a motor system starting with the process or the drive-load.

Applying a state of the art efficient electric motor can bring efficiency improvements of 0,1% up to 10% compared to the minimum standards in place. See the green dot-line in figure 4 below. Looking at improvements at the 'core motor system' (the blue dot-line in the figure) increases the savings potential considerably. Now also the control, the transmission and the component like a pump or compressor is part of the analyses for an optimal motor system. Potential savings are now increased up to 20-30%. The best approach however in terms of efficiency improvements is at making an analyses of the complete total motor system, i.e. including also the ducting and the process (conditions) itself, see the red dot-line in figure 4 [5].

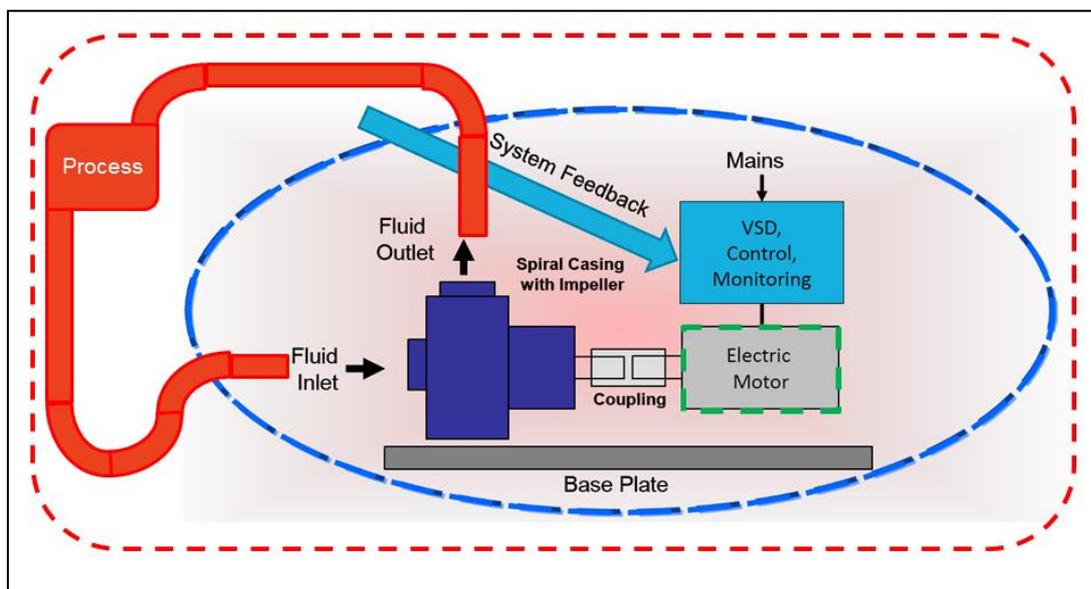


Figure 4 Systems approach for efficient motor systems

### *First pilots started*

In the first quarter of 2013 five pilots are being started, in different industrial sectors: the dairy sector, the wastewater treatment sector, paper industry and the drinking water sector. Much focus is on pump systems, and the first analyses come to a short list of potentially promising systems.

Within one pilot the first challenge is to make the analysis of the installed base in cooperation with the personnel on the work floor (maintenance). One objective of this particular project is to make a coupling with the maintenance and investment program for the short and midterm.

In another project the analyses will target at an integrated analysis of the process itself, i.e. analyzing the aeration process (process control for oxygen demand in the waste water), and the efficiency of motor, the drive, transmission and the design of the aerator itself. This will be done in cooperation with the OEM, supplier, installer and engineers.

## **Alignment with energy efficiency programs**

A close cooperation is established with the implementation practices of Energy management systems in industry. NL Agency facilitates this process with the large industrial companies in their work on increasing their energy efficiency (in voluntary agreements (VA's)).

The long lasting experience on energy management implementation was shared by the Netherlands, represented by NL Agency, respectively in the CEN project team for development of EN 16001 and in the ISO TC 242 that developed ISO 50001. These experiences formed a strong base for the development of ISO 50001. Therefore a transition from the Netherlands practice of energy management to ISO 50001 seems a logical one.

The quality of implementation of the energy management systems in place with the VA participants is monitored every year by NL Agency. Opportunities are identified to improve the system and its effectiveness. The systems are based on (elements of) the standard ISO14001 and some participants have started already a transition towards ISO50001.

In the 2012 monitoring of the energy management systems special attention has been given towards the opportunities for efficient motor systems (EMS). The areas which offer the best opportunities are Energy Planning; Implementation, operation and monitoring; Maintenance and repair of EMS; and Procurement and Design (see also paper 041).

And the Green Deal project profits also from the close operation with the 'Knowledge Network EMS' in order to reach the industrial end users. As well as from the participation in the Electric Motor Systems Annex (EMSA) for technical guidance, capacity building and knowledge on performance and IEC/ISO systems standards.

## References

- [1] Website Dutch Ministry of Economic Affairs, 2012/2013.
- [2] Efficient Electric Motor Systems, Krachtenveldanalyse (in Dutch); NL Agency, 2010.
- [3] Projectplan Green Deal Efficient Electric Motor Systems (in Dutch), GDEEA & Uneto-VNI, 2012.
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- [5] Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems, International Energy Agency, Paul Waide and Conrad U. Brunner, 2011.
- [6] The role of Energy Management Systems, Education; R. Vermeeren e.a. 2012

## Figure source

- Figure 1 From Applicant via Government to Result
- Figure 2 Obstacles in marketplace for efficient motor systems
- Figure 3 Project scheme with step 1 up to 5 towards implementing the business case
- Figure 4 Systems approach for efficient motor systems