

# Improving Energy Efficiency in Industry in time: A search for suitable instruments.

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## 0. Summary

Modeling and potential scans show a huge potential for energy efficiency improvement in industry. There is evidence to assume the pace of reduction of the use of energy can remain > 2%/annum until 2030 in the Netherlands. This potential obliges us to keep testing and promoting the best instruments to continue the improvement of industrial energy efficiency .

A number of studies have been done on the relation between Energy Efficiency and organizational change. In industry this line of research and deployment of this topic is limited so far. Some policy makers claim that a strong economic incentive by cap and trade are enough to speed up the energy efficiency process and supporting policies aren't necessary.

The Long Term Agreements (LTA) in the Netherlands showed that other instruments can be at least as successful one unique financial instrument.

In this study instruments used to promote energy efficiency in industry are linked to a organizational change- and a planning model. This is done to make a structural evaluation of used instruments possible.

The analyses is supported by qualitative data from projects in which NL Agency<sup>1</sup> is, or has been involved in the broadest possible way.

The results can be used for a more systematic research and implementation of policies that support the improvement of energy efficiency in industry.

## 1. Introduction

The pre assumption of this article is the necessity of a timely reduction energy use and reduction of greenhouse gasses (GHG) emitted by industry as part of a global strategy to minimize the effects of climate change. (IEA2007)

Over the last decades the European industry as a whole became more aware of the possibilities to reduce cost and increase competitiveness by working more energy efficient. Competiveness raises often beyond the efficiency measures, as innovation often also influences the use of materials and makes production cycles more effective. (SenterNovem, 2008)

Data from the Odyssey/Mure database clearly indicate decline of the energy intensity of industrial products. In 16 of the 27 member states the percentage of energy use in the total final energy is declining, only 4 states show a development in opposite direction.(Lapillonne & Pollier, 2008). Since 2004 the final energy intensities are especially decreasing very rapidly in the New EU member states.

Still the energy intensity of products is much higher than in Japan. Compared with the United States the EU was doing well in the near past (B.Meffert, 1990). The latest indicators of the IEA show there are still big differences in energy use / but the US is catching up (IEA 2009).

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<sup>1</sup> NL Agency is the name of the Dutch agency that has SenterNovem as one of its merging partners as of 2010.

All and all there are enough possibilities to come to a global reduction of energy use and reduction of GHG. Not everyone is convinced this is possible: the international energy outlook of USA-EIA predicts an annual increase of consumption of 1.4%/annum until 2030 (Energy Information Administration 2009).

The general public is divided on this topic. Alarming figures can be found in the PEW survey of December 2009: a majority in the USA, China and Russian population don't think global warming is a serious problem (PEW 2009). In Japan the support of climate action is declining. This weakens the possibility of the leadership of these countries to act as strong as desired as they should according to accepted CO<sub>2</sub> reduction models as the IEA Blue Scenario (IEA Energy Outlook, 2008)

An increase in energy use can be explained by a growing economy and a growing population. Specially in emerging countries like China and India the combination of both factors lead to a strong increase of energy use.

Despite the increasing production of renewable energy and the decreasing energy intensity of products, the overall effect is growing greenhouse gas emission. Although the increase is tempered by the economical crises, increase is unwanted if we're aiming to reach the Kyoto goals. This is firmly underlined by the EU (EU 2006).

From the non-Kyoto countries the USA presidency made clear they want to make a change (Obama, 2009), and the US Department of Energy is taking steps to start up or speed up this process towards an energy efficient economy (Cresko, 2009).

Less detailed, but also firm in support of a route towards sustainability is the declaration of the G8 (G8,2009), followed by stronger national commitment by the Russian leadership. Elsewhere speed, potential and even necessity of GHG are debated. In line with this debate, types and intensity of policy instruments are under strong consideration.

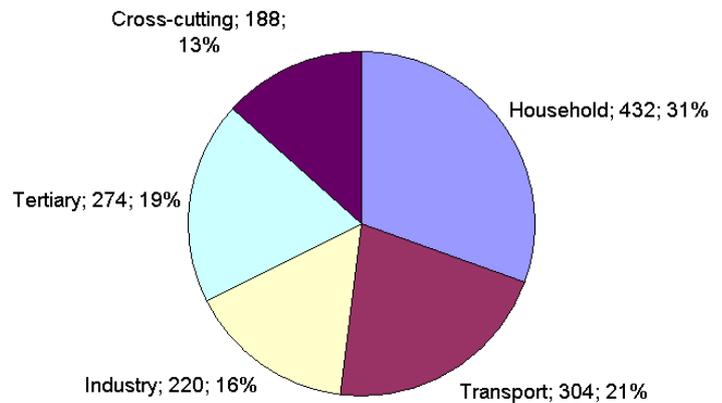
For that reason we look at a possibility to channel this discussion. We do this by analysing some of the policies used by models that emerged from other fields than that of energy efficiency. By doing this we want to contribute to the improvement of energy efficiency programs.

More specific we studied the potential contribution of organizational change & behaviour models that can be linked to (groups of) policy measures that are used on the moment. Then we link the theory to the experience of the Dutch Long Term Agreements (LTA's) and the Dutch/European collaboration on Long Term Agreements.

## 2. A more detailed description of the present energy efficient policies..

One can only estimate the number of policy instruments globally in use to strive for an energy efficient economy. Within the EU this variety is monitored by the Odysse/Mure database. Hundreds of policy measures are used at a national level to promote energy efficiency in industry. And that's only on governmental level. Little is known about the quantity and quality of regional and local actions. Some case studies give more insight in the possible benefits of local collaboration. The studies of Carter (2009) on the Kansas Pollution Prevention Intervention Intern Programme on using interns for bright ideas and Sandin (2009) on creating a champion paper mill at Hoquiam are just to good examples of qualitative descriptions.

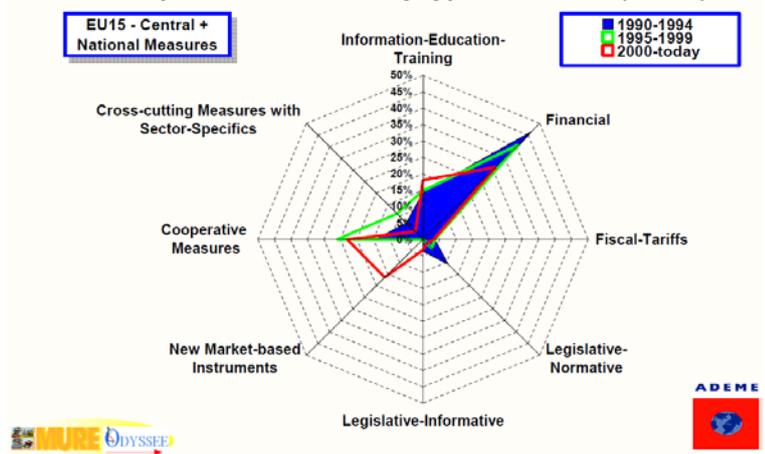
Number of policy measures EU27 in numbers & % (Mure Database 2008)



To study the policy measures more closely we clustered them. First of all we looked at the Mure database again, being the most detailed and complete list on EU policy. According to Bosseboeuf (2008) we can distinguish eight measure area's. For industry they can be reduced: legislative-informative measures are not known in this sector. So judicial instruments is a good term to combine everything that has to deal with legislation. Cross-cutting measures can be assigned to other parts, while "Financial" and "Fiscal Tariffs" can be combined to Economic instruments.

The same can be done with cooperative measures and new market based instruments. They can be seen as Structural Provisions. Together with communicative instruments we end up with the total of four clusters of instruments.

Energy efficiency measure patterns industrial sector: development of measure by types over time (EU-15)



## 3. LTA's, an important tool in Dutch Policy.

In the Netherlands, a clear choice is made to use the LTA's as mayor policy instrument to improve energy efficiency within the setting of the national environmental policy goals.

The Dutch Policy Paper Clean and Efficient (Cramer et. All, 2007) is the document that gives guidance to the way the Netherlands that will reach the Kyoto goals within the possibilities European setting. It even reaches at results beyond the EU targets, in line with the Dutch Energy Efficiency policies of the past decades. (Kool & Bruel, 2009).

Cornerstones for implementing energy efficiency in industry are the LTA's. The concept of Long-Term Agreements was introduced in the Netherlands in the early 90s. The initial agreements between governments and participating branches ended in the year 2000. Industry and Governments decided to continue with new agreements, the LTAII. This covenant spans from 2001-2012.

The agreements were developed and implemented by the NL Agency. The LTA's are used to refund the Green Tax in the Netherlands, a such giving a financial stimulus.

NL Agency reports annually on the savings made by the industry (SenterNovem, 2008). Data for this report are derived from the mandatory progress reports of industry itself. An independent program evaluation, commissioned by the Ministry of Economic Affairs underlines the annual reports.

In 2008 the private sector companies and sector associations that participated in earlier LTA programs signed the LTA3 covenant for the period 2001-2020. This covenant replaced earlier and existing covenants like the LTA2.

The main elements of the LTA3 are:

- An overall energy efficiency goal of 30 % in the period 2005-2020;
- Trade branches will produce sector roadmaps aimed at long- term innovation in the field of energy efficiency;
- The Dutch government will support the private sector with number of instruments which are developed and maintained by the national agency NL Agency. We will elaborate on this in the next paragraph.

As the LTA has become a long standing and appreciated approach, the design of the LTA3 was a careful process in which the Ministry of Economic Affairs, SenterNovem and representatives of industry negotiated the goals and the contributions of all parties involved in detail. (Kool & Tajthy, 2009)

Calling the LTA a success after 15 years is justified by the 2,1% energy savings /annum (SenterNovem, 2008). As new policies are being developed on the moment it's important to analyze why the LTA approach works. Especially if we want this instrument to be improved and implemented in the mainstream policies in Europe.

The later is a realistic goal. The Energy Savings Directive (ESD) mentions the possibility to use LTA's (EU-2, 2006). About half the EU members are (planning to start) investigating the use of LTA's as part the National Energy Efficiency Action Plan (NEEAP) (DiFranco, 2009)

#### **4. Energy efficiency on basis of a behavioral approach**

So far the industrial policy approach seems to be more a trial and error effort to use of the four groups of policy instrument in most countries than designed intervention mapping using a structured model.

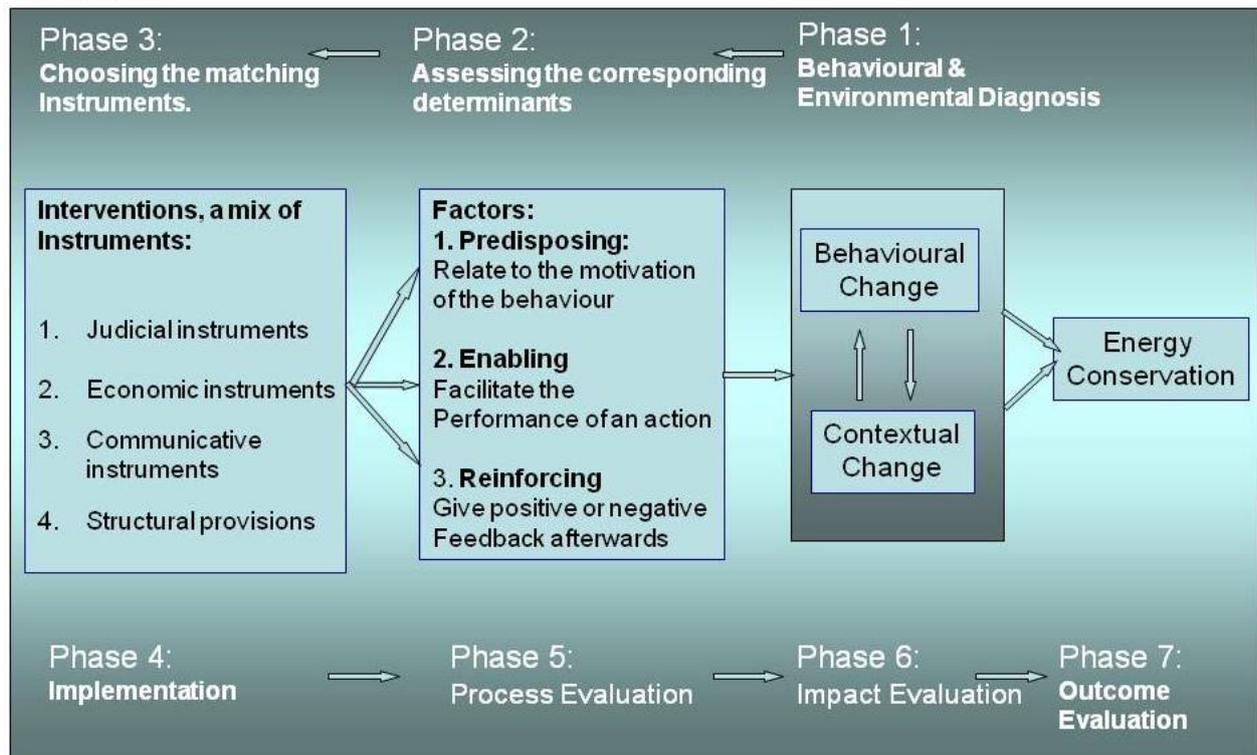
We distinguish two main directions based on the Odysee/Mure chart. On one end of the spectrum there is energy efficiency on basis of finance (cap and trade), on the other end the cooperative measures: voluntary approach. These instruments are often seen as possibilities that exclude one-another.

Bosseboeuf (2007) showed a growing trust in, and the use of cap and trade approach the last five years, while the use of cooperative instruments stays stable . At the same time there is no evidence cap & trade instruments deliver better results. During the first ETS period 2005-2007 the level of allocations were above annual emissions, causing prices to stay low. In 2008 the verified emissions were higher than allocated emissions, still the relatively easy compliance may last until 2013 (C.Bowyer et all. 2009)

In this article we focus on the cooperative measures. In our approach we look at two models, Green & Kreuter and Rogers, which we combine to one model to analyze the cooperative measures..

In health promotion Green & Kreuter (1999) developed the Precede-Proceed model to analyse the factors that determine the best possible option to implement a desired change in behaviour.

### Precede



### Proceed

Precede–Proceed Model (Modified from Green and Kreuter, 1999)

This model proved its value for intervention modelling. Egmond (2006) showed the model could be used outside the health sciences. Specially in energy efficiency in housing associations the model was put into practise.

Egmond was able to pinpoint the deciding persons of units within associations, he also diagnosed the determinants necessary to change behaviour.

A well designed set of instruments bundled by SenterNovem let to a successful implementation of a energy efficient programme (Eck, Hans van, Kompas 2008).

Although the method was highly valued when put into practise on housing associations, so far it hasn't been possible to add statistical evidenced.

The use of the Precede-Proceed model in energy efficiency got a follow up in the marketing oriented projects of energy efficiency (Motiva, 2007).

There are an number of reasons for industry to design their business sustainable. Evaluations of the LTA's in Netherlands show that the main motivators for decision makers in industry team up in the LTA are, in order of importance, economical profitable measures, stable

business development, a lasting relation with government and a green image.(SenterNovem, 2008)

Looking at the precede – proceed model, cap and trade doesn't help either of the motivators mentioned. Only if decision makers have the capability to calculate investment in energy efficiency against avoided taxes they have a motivator to change behaviour.

Programmes in the USA showed on several occasions that the accepted ROI<sup>2</sup> of energy efficiency measures is less than 2 years. If decisions on cap and trade are made by branches on a more or less equal basis, entrepreneurs are more likely to tax consumers instead of looking for innovation and organisational change. Only if the cap and trade burden is both heavy and strictly enforced change will occur.

Such heavy extra burdens implemented by governmental measures in a time of economical turmoil are unlikely and regarded unwanted.

Although cap and trade can offer a strong incentive, especially in supranational regulations like the European Trading System (ETS), we need additional effective programmes to reach the goals set by the Kyoto treaty, the post Copenhagen discussions and the EU policies.

For the first trigger to change behaviour (Phase 1 of the Green & Kreuter model) we have to look at the way organisations formulate their goals. Planned strategy to achieve these goals looks for surprise free implementation in an environment that is benign, controllable or predictable. Although strategies differ like organisations differ, there will be an emphasis on profit, safety of capital and return on investment (Mintzberg, 1991)

Coping with external factors like the effects of Climate Change causes deep debates within industry (EarthTimes).

In phase 2 of the model we analyse the determinants for organizational change which is in theory not different from the health related behaviour change research performed by Green & Kreuter. In practise the analyses of the determinants gets mixed up with the negotiations on the content of an agreement. A completely analytical approach is hard, and in practise based on experience. The key to change in industry is knowing the business (Price, 2008).

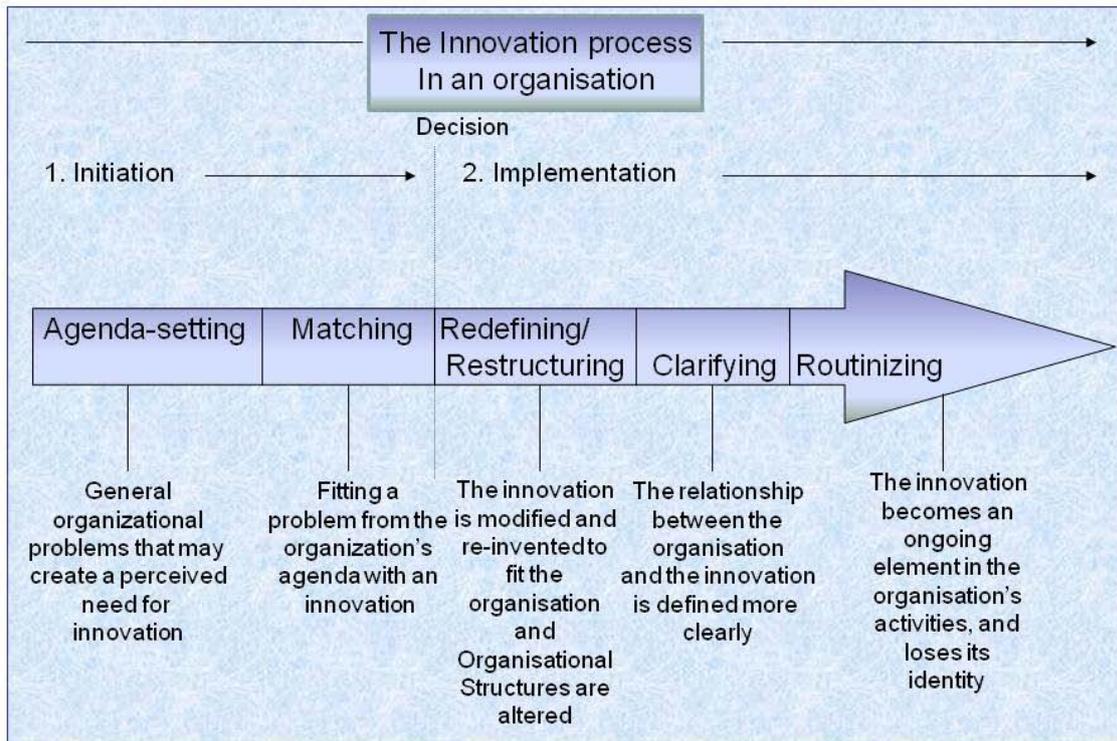
This is confirmed by the Dutch LTA programme managers. Then, and only then it's possible to truly analyse what is necessary to create a programme that will convince management to assign resources to the process.

The main reason to start modelling is to create a platform to discuss both design and performance of public programmes on industrial energy efficiency. Although a major part of the results presented and discussed are derived from the successful Dutch LTA programs it's neither said this is the best model nor that it can't be improved.

The Dutch supported knowledge transfer within programmes and bi- and multilateral (EU) cooperation. Qualitative analyses made it clear that the core elements of the approach are valuable and can be used in different circumstances. Cultural elements make it hard to transpose the LTA from one country to another without a careful analyses. The model and theory presented in this article aim to support a smooth transition of lessons learned between cultures.

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<sup>2</sup> ROI: Return on Investment



Five stages in the innovation process in an organisation  
From: Rogers, (1995)

The Green & Kreuter model aims at behaviour change, which has to result in organizational change. In the policy process this is one topic: what do we want to change. After that we have to determine an efficient and timely introduction. That's why we add a second model: Five stages in the innovation process in an organisation.

The core elements of the agenda-setting stage are described by Rogers as continuous, result of a general perceived organizational problem and also a period that takes time, up to several years. A last element in Rogers description is the notion that the perceived problem is often not limited to one organisation.

Looking at possible general organizational problems that will set the agenda in industry, we can argue the two most important drivers are:

- The pressure from outside to be green, caused by national politics and the general public.
- The economical necessity to stay in competition.

The IEA publications Energy Technology Transitions for Industry and Implementing Energy Efficiency Policies (2009) show a number of data for this assumption: The improvement of efficiency globally has been remarkable over the years, at the same time a big potential is still there. This is in line with the results of energy potential scans performed within the programs of NL Agency<sup>3</sup>

As industry consumes proximately a third of our total energy use it has to be a major focus in any governmental energy and climate policy.

The matching stage of Rogers's model is the point where a problem from an innovation agenda and an innovation have to match.

To speed up the innovation pace by a well designed policy to speed up the deployment of energy efficiency, as described in the Green & Kreuter model, innovations have to be used. Availability of suitable innovations is the first necessity, if we're dealing with large scale implementation. From a policy side we simply can't afford tailor made solutions for each company.

Years of implementation programs led to information on a huge variety of simple and effective innovations that are immediately applicable and freely available on the internet<sup>4</sup>. In the stages 3-5 of the model of Rogers innovations are "re-invented" to match the organisation and introduced and integrated into the everyday routine of the organisation. This can be done within the organisation by (training of) energy managers or outsourced to for instance energy service companies (stage 3).

International cooperation will lead ISO certification of energy management that supports the process of integrating energy efficiency projects into the daily operational activities (stage 4-5). (ISO 2008)

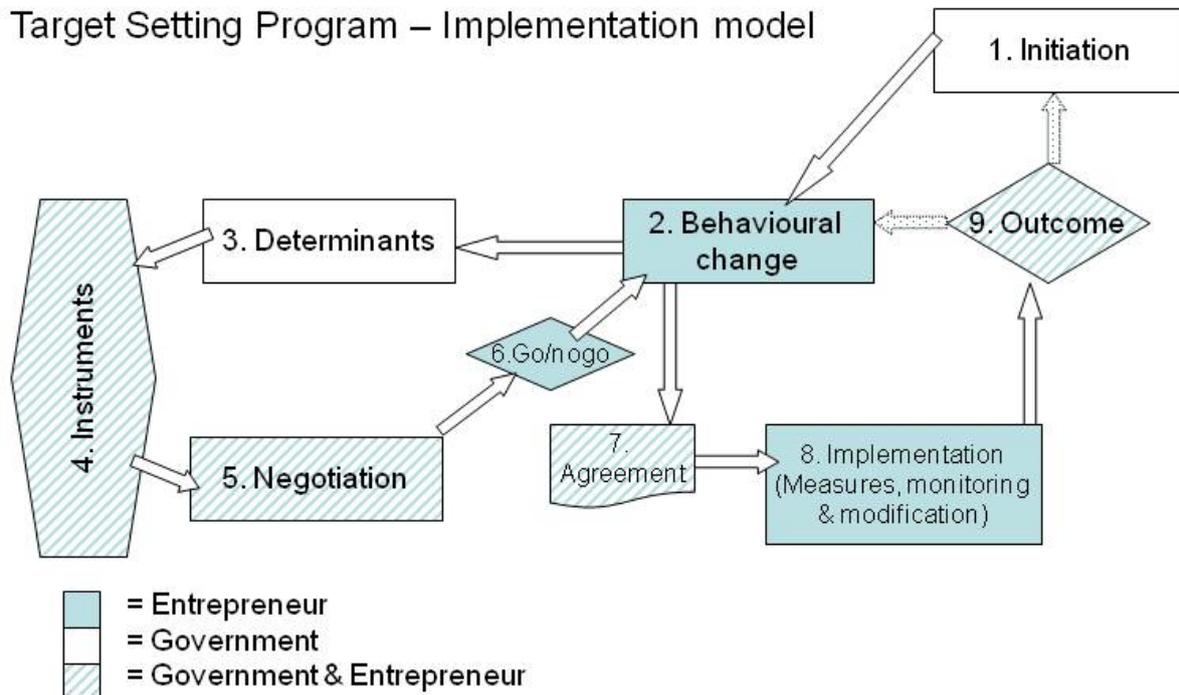
## 5. Integrating both models

The most advanced policy to implement energy efficiency in industry are the Long Term Agreements or LTA. It's in use in a number of countries with (slightly) different conditions (Price, L et al. 2008). As such this is the obvious choice for further analyses.

We integrated the Green & Kreuter and Rogers models into the Target Setting Implementation Model (TSI model). This integrated model can be used to evaluate both process or program of a LTA. This can be done to avoid skipping steps or make adjustments to make policies fit to local/regional cultures and circumstances.

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- <sup>4</sup> The Bess site offers a complete model to start energy management [http://alpha.cres.gr/bess/servlets/bessStatic/en/ex\\_index.html](http://alpha.cres.gr/bess/servlets/bessStatic/en/ex_index.html))
  - SenterNovem- LTA promotes the Energy Efficient Product Development, measure lists and access to knowledge networks. (<http://www.senternovem.nl/lta/index.asp>)
  - The Department of Energy offers a lot of solutions for different possibilities of industrial energy efficiency. <http://www1.eere.energy.gov/industry/>

## Target Setting Program – Implementation model



Using this TSI model we assume government initiates a target setting implementation project/program like the LTA. At the same time, the LTA is by its nature, a contract between partners. In the model there are steps that are uniquely governmental, some have to be in cooperation and others belong clearly to the entrepreneurs.

In step 1 the public sector has a policy goal and a general framework (time, money and (accessibility to) expertise to negotiate collaboration with the private sector.

It's important that a first attempt is made to quantify the change desired by a policy based on behavioral and organizational change. A general goal on the moment is 2% energy improvement/annum over a period of 10 years. This has to be specified to a more realistic goal within the framework of a specific agreement. These figures differ regional (IEA 2009, Energy Technology Transitions for Industry)

In order to create a package that will persuade entrepreneurs to get engaged in a project that will change organizational aspects of their way of running the business, government has to evaluate the determinants of the present "behavior" (step 3).

With this knowledge instruments (4) can be designed that can be negotiated in step 5

The Dutch LTA Experience provides a lot of information both in general and on a more exemplary basis in different branches on the motivation of the decision makers in industry thereby covering in general the first two phases of the Green & Kreuter model (SenterNovem 2008). As such a strong basis is available to design applicable instruments. We distinguish judicial instruments, financial incentives, communicative instruments and structural provisions.

In step 5 partners have to agree on the specifics of targets and instrumental support. Then it's up to the private sector to decide to sign (step 7) an agreement and implement measures that can be implemented and monitored (step 8). The outcome of the process (step 9) should be a reinforcement to continue the process by the entrepreneur and or to take new steps (and go back to step 1).

### 5 European collaboration on LTA's

After this theoretical analyses of the LTA's we explore a number of actual projects that are running or have been ran, especially the projects to (analyze the possibilities to) implement the LTA in countries without LTA experience.

Showing best practice cases with good results is an established element in the development of EU policies. For that reason, and to improve the methodology, SenterNovem participated in a number of EU projects. Most of them have been described in more detail in an earlier publication (Kool & Tajthy, 2009). They are summarized in the table below.

**Participating countries**

<b>Program</b>	Austria	Belgium	Bulgaria	China	Czech Republic	Finland	Greece	Ireland	Italy	Latvia	Lithuania	Netherlands	Norway	Poland	Portugal	Romania	Slovenia	Slovakia	Spain	Sweden	Turkey	
BESS	✓		✓			✓	✓	✓			✓	✓	✓					✓	✓	✓		
ExBess		✓			✓		✓		✓	✓		✓	✓	✓	✓	✓		✓				
AsiaProEco I & II				✓								✓										
G2G												✓				✓						✓
LTA-uptake		✓	✓		✓	✓	✓					✓	✓	✓							✓	
G2G 5+1			✓		✓							✓		✓		✓						

The projects can be divided in 2 categories:

1. *Instrumental* projects to improve the instrument(s) and make the LTA suited for further outreach: Bess, ExBess and LTA-Uptake. (Implicitly building stones of the TSI model were either built or described in these projects)
2. *Implementing* projects to (analyze the possibilities to) implement the LTA in countries without LTA experience.

We'll describe them in more detail for further analyses.

## 5.1 The Instrumental projects.

The projects BESS (Huenges Wajer,2007) and ExBESS (Tajthy 2009)<sup>5</sup> were used to develop a toolkit to implement energy management that was tested in 53 (Bess) and 80 (ExBess) pilot companies. The principle of the BESS implementation of energy management is based on the Plan Do Check Act (PDCA) cycle and is elaborated of a “translation” of the ISO 14001 standard.

At the start the BESS project had no more (but also no less) basis than the idea to share good experience within Europe.

The idea of “be good and tell” worked well. At the end conclusion was that BESS products are very useful, but not enough for a broad scale market implementation. The models show that, in order to change behavior of an organizational setting, both good instruments and a process with clear goals are necessary.

The work of Egmond (2006) were a start to discuss the gaps and shape new IEE financed projects.

ExBESS kept working on the instrument part of the model, but it looked more at SME's, was translated into more languages and the internet interface was improved dramatically. Thereby a next step for participants to act was created in a far better way.

The process part of the LTA implementation was the topic of the other IEE proposal, LTA-uptake.

Both IEE proposals were created and ran by the same team within NL Agency. For several reasons it was decided not to integrate the two proposals. Important for this paper are following reasons:

- the fact that, although we assume energy management works better within a supportive system like the LTA, the energy management instrument can be used as single instrument. As such, BESS has it's own "reason d'être"
- In a fully operational LTA, the participants that implement the actual energy efficiency measures are a multitude of those that participate in the actual process of formulating, negotiating and signing the LTA.

The Dutch National experience has learned that only a few companies are big enough to directly sign a covenant with the government. Industry associations are usual the third party within the LTA-process. In that multi-actor setting a more precise description of the LTA negotiating process is a necessity.

The LTA-Uptake project describes the multi-actor process in detail and produced ready to use material. It's result is a toolkit for the process of establishing a LTA. The basis for the toolkit is a slightly simplified Rogers model.

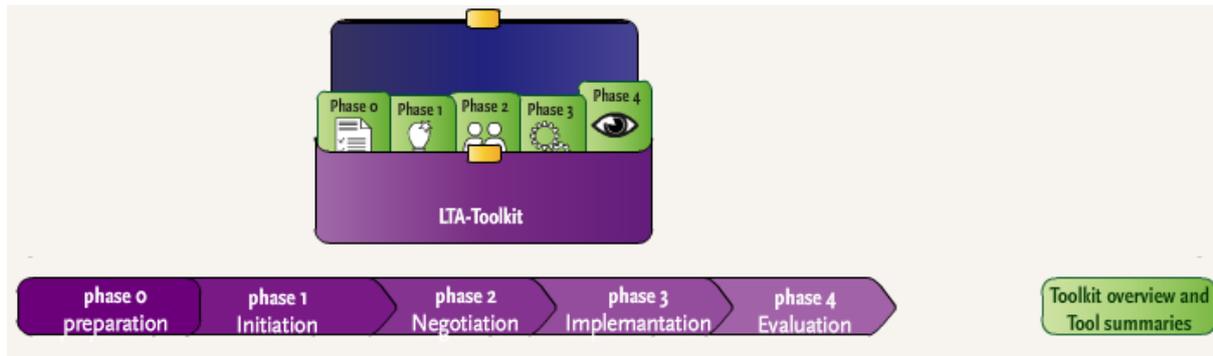
The models described so far are simplified even more to get a simple project diagram. This is the main deliverable of the LTA-uptake project.

The toolkit is, like the BESS project, internet based, and is validated by the participating partners and pilot companies. Important elements for its success are the flexibility and the

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<sup>5</sup> For more information on Bess and ExBess: <http://www.bess-project.info/>

availability in a number of languages. By the flexibility it's possible to use the toolkit in small companies with limited energy management but also in a more complex environment with dedicated personnel working solely on energy efficiency.



A short description of LTA-Uptake.

In phase 1. (Initiation) a match between expectations and obligations of parties involved is made. As soon as possible the development of financial incentives has to start. Budget claims in most governments are framed in an annual process which sometimes can be bypassed in the case of demonstration projects, but seldom during multi annual commitments.

As soon participants agree on the fact that collaboration on energy efficiency presumably will have a mutual benefit in phase two the agreement is negotiated. The most important topic is the efficiency percentage that has to be met within the timeframe of the covenant. For industry a potential scan is a tool that can be used to determine a realistic percentage and a first rough estimate of the return of investment.

Government is faced with the difficult task of making an estimate of the effect of other instruments, like cap & trade, white certificates etc. Then they have to decide on the budget they are willing to assign to the policy item at hand. These instruments support the implementation of energy efficiency innovation in phase 3

One of the important conclusions of LTA-Uptake was that making good analyses on both sides and the link with national budget cycles the time necessary to establish an agreement is 12 to 18 months.

## 6. The Implementing projects.

As stated earlier, the Odysee/Mure shows no growth of collaborative measures within the scope of used policies. This is surprising in the light of the theory presented and the results of countries that did fully implement the LTA.

We give a very short overview of some Dutch LTA outreach programs:

- Government to Government (G2G) projects, which are financed by the Netherlands, which last 6 to 24 months. For the promotion of LTA's G2G was used for:
  - o Bilateral projects, one between the Netherlands and Turkey and one between The Netherlands and Romania.
  - o "LTA5+1" between the Netherlands and five Mid-European countries

- APE I & II were financed by the IEE fund. This programmes introduced the LTA in China.<sup>6</sup>

All projects were aimed at starting LTA's. The number of projects and participants is too small to make a quantitative analyses. A qualitative analyses is possible.

Within "LTA 5+1" Four countries (Czech Republic, Hungary, Romania & Poland) didn't continue to implement LTA after the finalization of the project.

In Hungary, the country's industry was interested, but the government did not get to the point of decision making in favor of LTA's. The Polish government feared the financial consequences. (Gay & Mirowska, 2007).

In the Czech Republic the influence of president Václav Klaus<sup>7</sup> made it impossible to define determinants that could lead to change in the government's way of thinking within the frame of the project. Romania reached the second phase, but government decided the important monitor system was not a Romanian internal problem, but an EU issue. (NL Agency program manager, oral information). In Bulgaria the results were also very poor in terms of numbers of participants. Bulgaria continued working on the LTA concept after finalization of the project and is now reporting the first success as agreements with 8 companies have been signed (DiFranco, 2009)

Looking at the model it is no surprise the results are poor. There has to be a clear environmental or energy efficiency goal of a government to start the process. This goal must be translated into a realistic goal of behavioral change of the entrepreneurs.

In the case of countries with successful LTA like Sweden, Finland and the Netherlands these goals are set by governments and implemented under the leadership of top civil servants. (Representatives of) industry are involved in the earliest stages, to translate policy goals in business goals. Only one project (Turkey) had, at the start, the backing at the highest policy level with industry present.

The LTA programme in Turkey was the last to be finished. It is a success as all instruments are in place and the first agreements have been signed. Here the Turkish Ministry IEE was involved at a high level from the start. (L. Minere, G2G PAC, internal NL Agency reports 2009-2010) .

A bilateral program between China and the Netherlands, co-financed by the EU, was finalized in November 2009. Like the project in Turkey it was a three year program. Like Turkey it is a successful LTA implementation where all elements of the LTA are met. The presence of universities, technical expertise, representatives of the participating enterprises and governmental officials in the project made it possible to make the behavioral and environmental diagnose according to the Green and Kreuter model and provide fitting instruments for the implementation (Avest, 2010). A more in depth analyses of this project has been made by the Wupperthal Institute (Bongardt and Eichhorst, 2009)

The project in China was shaped as a demonstration project. Upgrading it to regional or national policy is an option that has to be explored in the near future.

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<sup>6</sup> In this project LTA was called VA: Voluntary agreement: see: <http://www.va-china.com/index.htm>

<sup>7</sup> See the personal website of Dr. V.Klaus: <http://www.klaus.cz/klaus2/asp/clanek.asp?id=pnHwpGc13sXM>

## 7. Discussion

Quite a number of countries involved in the described projects quitted the before starting an actual agreement.

When we evaluate this with the theory presented, we can conclude they were almost bound to fail. The G2G project had a maximum runtime of 9 months. Rogers already mentioned a timeframe from at least one year to come from a perceived organizational problem (step 1) to implementation. The Dutch LTA experiences learned that the start of a LTA is a long process, especially the first agreements all took more than a year.

Experience in the LTA-uptake program underlines this assumption.

The timeframe present in their shown on the LTA-uptake website show that's such a timeframe is too short to get from step 2 to step 3 and in a number of cases even from step 1 to step 2.

Another reason to why results could have been better is already mentioned. Projects with the purpose to promote LTA's were not ran by, or under the supervision of officials that are able to take long-term decisions. ,

Bongardt and Eichhorst choose "*Old wine in new skins?*" as title for their publication stating that regular policies were folded into a LTA, questioning the true "LTA" nature of the Chinese project. We don't agree with this conclusion. It's true Chinese policies differ considerable from those in the democracies in the other projects. Sometimes the LTA's are named Voluntary Agreements. . In the case of China, the program participants might have been less voluntary as in other countries, but the program was executed exactly according the theory. In the APE II projects the involved ministries, universities and industries looked very carefully for the incentives and innovations that were necessary to make a success of the program, with energy savings that were much bigger then calculated at the start.

## 8. Conclusions and recommendations

LTA's or voluntary agreements are proven instruments to improve energy efficiency in companies. They can add to cap and trade systems bringing energy efficiency to a annual improvement of slightly over 2%, which is higher than the natural efficiency development. As such cooperative measures should be regarded as complementary to cap and trade instead of a competition. This is in line with the IEA ideas for technology transitions in industry. The to estimate the time span to cap and trade effects that will deliver an overall 50% CO2 reduction much to long (IEA 2009)

On basis of the model of Green & Kreuter the right drivers to get participants to act on energy efficiency proposals can be addressed and the instruments for a successful implementation can be formulated. These instruments are well developed, although improvement is still possible (f.i. ISO50001) The Model of Rogers gives a good basis for the implementation of LTA's.

The fact that motivation, behavior and project implementation can be analyzed and used for a structural change in industry doesn't imply that there is only one possible agreement as outcome. Budgets, policy goals, but also cultural differences can lead to different solutions. Even old wine in new skins might lead to a considerable increase in the motivation to tackle the problems that lie before us.

An in depth analyses on a bigger number of projects could be a increase the use of the combined model.

Among these new potential projects are LTA's in Russia, that's now exploring the possibilities at ministerial level, backed up by national goals formulated by Russian leaders. Also the implementation of the European Services Directive has the potential of starting LTA's.

Avest, E (2010, upcoming), *APEII Final Report*, NL Agency

Bongardt, Daniel and Urda Eichhorst (2009) *Old wine in new skins? Experiences from adopting voluntary agreements in Chinese state-owned enterprises*, ECEEE, Colle sur Loupe

Bosseboeuf, D et al. (2007) *Evaluation and Monitoring of Energy Efficiency in the New EU Member Countries and the EU-25*, ADEME, Paris

Bosseboeuf, D (2008) *Monitoring of Energy Demand Trends and Energy Efficiency in the EU Third meeting*, Ademe, Prague

Bowyer, Catherine et al. (2009) *Action taken to address climate and energy priorities in the EU Member States, and prospects for implementation of the climate action and renewable energy package*, IEEP, London

Bartholomew, L. Kay Guy S. Parcel, Gerjo Kok, Nell H. Gottlieb (2006) *Planning health promotion programs*, John Wiley & Sons, Inc., Hoboken

Carter, D. (2009) *Energy Efficiency/Pollution Prevention Intern Programs Provide Low-Cost Alternatives for Implementing Energy Efficiency Projects*, ACEEE, Washington DC, Niagara Falls

Church, G., LaPalme, G. & Stevens G. (2009) *Energy Project Financial Analysis: What Have We Been Missing?* ACEEE Washington DC, Niagara Falls

Cramer, J et al. (2007) *Werkprogramma Schoon & Zuinig*, VROM, Den Haag

Cresko, Joseph (2009) *Impacts of Increased Energy Efficiency in Buildings and Transport on Energy Intensive Materials Industries*, ACEEE Washington DC, Niagara Falls

DiFranco, Nino et al. (2009) *Motivation for Voluntary Agreements Core theme 3 – Concerted Action ESD, Internal report CA-ESD Utrecht*, London

Eck, H. van (2008), *Resultatenbrochure Kompas 2006-2007*, SenterNovem, Sittard

Egmond, C (2006): *Focus on change*, De Gouwzee, Doorwerth.

END's (2009), *Recession drags CO2 down*, Ends Europe Report, Brussels

Energy Information Administration (2009) *International Energy Outlook*, DOE, Washington DC.

EU (2006) *GROENBOEK, Een Europese strategie voor duurzame, concurrerende en continue geleverde energie voor Europa*, Brussel

EU (2006-2) *DIRECTIVE 2006/32/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 April 2006 (Article 1-25)*, Official Journal of the European Union, Brussels

G8 (2009) *Joint Statement By The G8 Energy Ministers and the European Energy Commissioner*, Rome

Gay, H. and Mirowska, K (2007) *PPA LTA Poland, Feasibility Study*, Ecofys, Poznan

Green, L.W. and Kreuter, M.W. (2005) *Health Program Planning: An Educational and Ecological Approach. 4th edition*. McGraw-Hill Higher Education, New York

Huenges Wajer, B (2007) *Intelligent Energy – Europe (EIE). EIE/04/246/S07.38678 BESS (Benchmarking and Energy management Schemes in SMEs)*, SenterNovem, Sittard

IEA (2007) *Energy Efficiency Policy recommendations to the G\* 2007 Summit, Heiltingendam*, IEA, Paris.

IEA (2009) *Energy Technology Transitions for Industry*, OECD/IEA, Paris

IEA (2009) *Implementing Energy Efficiency Policies, Are IEA member countries on track?*, OECD/IEA, Paris

ISO (2008), *ISO launches development of future standard on energy management*, Geneva, Switzerland

Klaus, V (2007) *Notes for the speech of the President of the Czech Republic at the UN Climate Change Conference*, Website V. Klaus, Prague

Kool, R.P. & R. Bruel (2009) *Efficiency within Dutch Policy*, Energy Bulletin, Unesco, Moscow

Kool, R.P. & M. Tajhty (2009) *Can Long-Term Agreements Conquer the World?*, ACEEE Washington DC, Niagara Falls

Lapillonne, Bruno & Karine Pollier (2008) *Energy efficiency trends in industry: EU versus other OECD countries*, Odysee/Mure, Paris

Meffert, B (2009) *Development of an Energy Management Standard: ISO50001* Presentation at IAC Director's Meeting, Niagara Falls

Mintzberg, H and J.B Quinn(1991) *The Strategy Process*, Prentice-Hall, New Jersey

MOTIVA (2007) *Behave, Evaluation of Energy Behavioral Change programmes Final Report WP 3 EIE/06/086/S12.443358*, Finland

Obama, B (2009) *Climate Change*  
[http://www.whitehouse.gov/issues/energy\\_and\\_environment/](http://www.whitehouse.gov/issues/energy_and_environment/) accessed on Mar. 19 2009, Washington

Pew Global Attitudes Project (2009) *Global Warming Seen as a Major Problem Around the World*, [PewResearchCenter](http://www.pewresearchcenter.org) Publications

Price, L et al. (2008) *International Experience with Key Program Elements of Industrial Energy Efficiency or Greenhouse Gas Emissions Reduction Target-Setting Programs*. LBNL, Berkley

SenterNovem (2008) *15 Years Long Term Agreements 1992-2007 (in Dutch)*, SenterNovem, Utrecht

SenterNovem (2009) *Long term agreements on Energy Efficiency in the Netherlands 2008*, SenterNovem, Utrecht

Rogers, W (1995) *Diffusion of innovations*, The Free Press, NY

Sandersen, Joel et al. (2009) *Collaboration among Government, Public Utility and Regional Industrial Efficiency Alliance: Designating an Energy Champion Case Study at a Paper Plant*, ACEEE Washington DC, Niagara Falls

Sandin, J et al. (2009) *Collaboration among Government, Public Utility and Regional Industrial Efficiency Alliance: Designating an Energy Champion Case Study at a Paper Plant*, ACEEE Washington DC, Niagara Falls

Tajhty, M (2009) *Intelligent Energy – Europe (EIE). ExBESS (Extend Benchmarking and Energy management Schemes in SMEs)*, SenterNovem, In the press.