september 2015

DSM Spotlight

The Newsletter of the International Energy Agency Demand-Side Management Programme

ieadsm energy efficiency

Task 24 *Helping the Behaviour Changers*

In April 2015, we formally kicked off Phase II of IEA DSM Task 24. This phase builds on all the theoretical groundwork we did in Phase I, which resulted in over 40 publications. We will now take the theory firmly into practice with our participating countries. So far, we have four participating countries (Austria, Netherlands, New Zealand and Sweden) but we hope to attract quite a few more. The more countries that join this Task, the more case studies we can develop and analyse in-depth in light of different cultural and country contexts. Seeing we are also developing an internationally-validated, standardised evaluation tool for behaviour change interventions (called 'Beyond kWh' and co-funded by PG&E and Southern California Edison), the more countries that help us validate this tool, the more 'standard' we can make it.

This Phase builds on the main recommendations from Phase I of DSM Task 24. We need a mix of interventions that:

- focus on both the individual and social level,
- aim at changing both investment and habitual behaviours,
- target multiple motivations (not only economic and informational ones),
- add strong quantitative and qualitative evaluation (of actual and perceived/modelled behaviour changes) into project design,
- make sure the middle actors who engage with the end users are well trained and customer focused, and

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Member Countries

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Note from the Chairman

Is DSM Getting Old?

It's true, I've really been asked "Isn't DSM getting old?"

My first reply was "I hope so", as I'm convinced DSM is still the first choice to achieve Energy Efficiency.

But on another level, the question sounded as if I was being asked, "Haven't you figured it all out by now?"

Recently, I attended a series of workshops that had smart grids & DSM as the topics. One of the workshops was in Eindhoven and organized by our Operating Agent of DSM Task 17 on the integration of DSM, energy efficiency, distributed generation and renewable energy sources.

The participants in this DSM Task have performed and are performing excellent studies on these topics, which support my belief that we're heading towards a new revolution in energy supply and demand.

ICT power (speed/capacity) keeps doubling every two years. One of the consequences of this is

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- focus on the lifestyle in which energy is key to performing functions so that we have a chance at achieving long-term success.

But these won't matter if you forget the most important thing: IT'S ALL ABOUT THE PEOPLE!

That's why Phase II concentrates on the *human* element of the energy system. You can see how the energy system is now mostly viewed through the technocratic lens (Figure 1) as opposed to the human lens (Figure 2). We believe that the *Energy System begins and ends with the human need for the services* derived from energy (warmth, comfort, entertainment, mobility, hygiene, safety, etc.) and that behavioural interventions using technology, market and business models and changes to supply and delivery of energy are the *all-important means to that end.*

So, in order to design, implement and evaluate a whole system, bottom-up and top-down behavioural intervention focused on long-term (societal) change, we need to bring together all the main players in the system – the so-called 'Behaviour Changers'. We have identified five main groups of Behaviour Changers:

1. **Decisionmakers** (usually Government and policymakers)
2. **Providers** (energy or technology providers eg lines companies, generators, utilities)
3. **Experts** (researchers and consultants from all disciplines involved in the energy system)
4. **Conscience** (NGOs, community groups, transition towns, etc.)
5. **Middle Actor** (retailers, plumbers, electricians, general customer focus).

There are also some groups seemingly sitting outside of the energy system that have a lot of influence over it:

- **Media** (all kinds of media and communications about the energy system and its players)
- **Funders** (investors, shareholders, banks, community trusts, etc.)
- **Other Behaviour Changers** (especially from the fields of health, education, water and waste)
- **Family and Friends** (potentially the single greatest influence over **the End User**)

Ultimately, what we are trying to do is to bring these different groups together using a collective impact approach to make sure that such disparate groups with so many different mandates, restrictions, stakeholders and tools can learn about each other, these mandates and restrictions, and work together in true

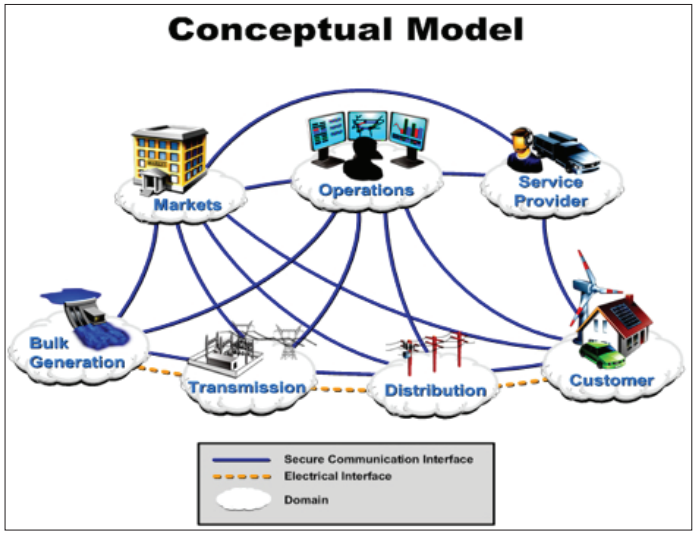

Figure 1. Current linear way of looking at the energy system (starting with supply).

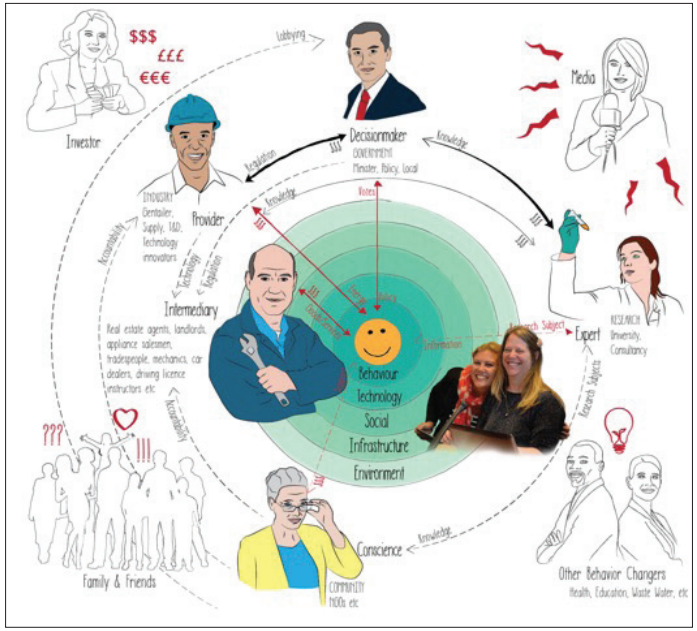

Figure 2. Diagram of the Behaviour Changer Framework that works on behavioural interventions on the Energy End User in a generalised energy system. For an explanation, click here to see a step-by-step presentation of the diagram.

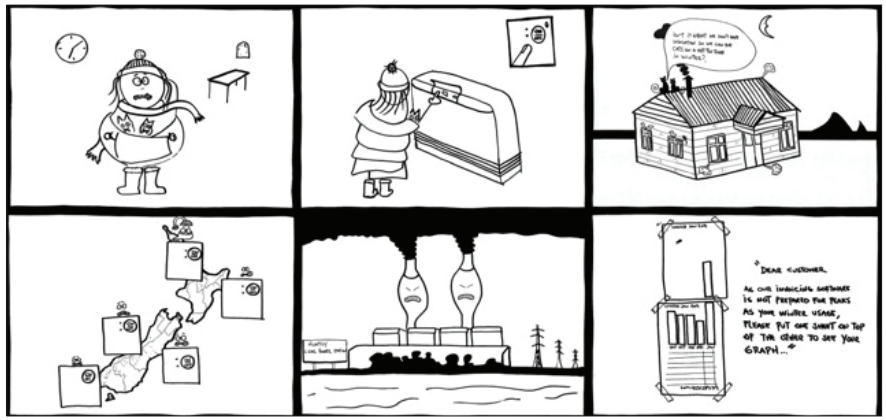

Figure 3. An alternative way of looking at the energy system (starting with the end user). Click here to watch an explanation of the diagram.

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collaboration. This will mean understanding each other's stories, boundaries, inherent conflicts and relationships with one another and the end user, and being willing to learn and change. We will, using this Behaviour Changer Framework, frame the status quo on a specific DSM issue with a very clearly defined end user and their intended behaviour that we want to change. Then we will co-create a roadmap of where we ultimately want to be – a clearly defined and practical goal. Each Behaviour Changer will have specific roles and tools to get us to that common goal and we will use the Framework over time to evaluate and measure how we are tracking towards that common goal, and what may need to be re-iterated in order to get us there.

We have started some of these workshops in Canada, New Zealand and Sweden, and more will follow in the Netherlands and Austria later this year, and have presented the Framework, to strong acclaim, at the eceee summer study in June. We will also run a formal workshop on the Framework at the Behavior, Energy and Climate Change conference in Sacramento, California on October 18th. If you are going to the conference, we hope to see you there.

We strongly believe that the only way forward with this most complex of problems is to stop designing interventions in isolation, and start doing it in a systemic approach with all the relevant players (and the end user!) around the table. Everyone holds an important piece of the puzzle, yet no one can form a full picture in a silo.

If you are interested in participating in this exciting phase of DSM Task 24, please contact the Operating Agent, Dr. Sea Rotmann drsea@orcon.net.nz and visit the Task 24 Phase II webpage.

Task 26

The Multiple Benefits of Energy Efficiency

The easiest, quickest and cheapest way to reduce energy consumption and to decrease greenhouse gases emissions is to improve energy efficiency. The International Energy Agency's (IEA) *Energy Efficiency Market Report 2014* confirms energy efficiency's place as the "first fuel" and "Avoided energy use was larger than the supply of oil (1 202 Mtoe), electricity (552 Mtoe) or natural gas (509 Mtoe) in 2011; these savings equate to 59% of total final consumption (TFC) in the 11 IEA member countries that year"[1].

However, an under-investment in energy efficiency — an "energy efficiency gap"— is observable in all countries. Public policy efforts to curb energy consumption and greenhouse gases emissions have often attained insufficient results, and there is still a significant potential to improve energy performance in all sectors of energy consumption. According to the IEA, if current trends continue in the years to come, two-thirds of the economic potential to improve energy efficiency will remain untapped until 2035, including 55% of the energy efficiency opportunities in the industrial sector[2].

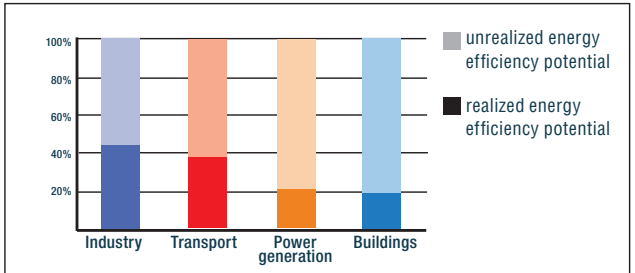

Figure 1. Unrealized and realized energy efficiency potentials.

With regard to businesses activities (in industrial facilities and tertiary buildings), this situation can be explained by several barriers facing energy efficiency investment. As shown in Figure 2, these barriers can be grouped in four levels, each of them influencing the level(s) below. These four barriers are labeled Base, Symptom, Real, and Hidden[3].

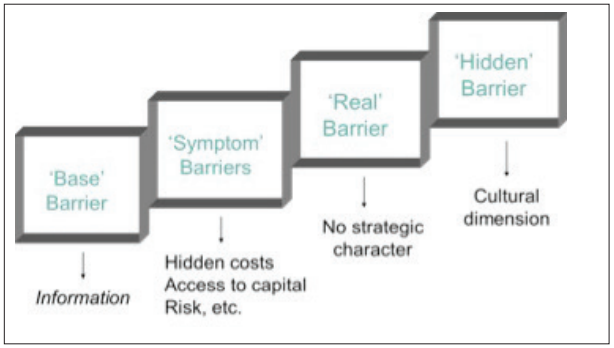

Figure 2. Organisational barriers to energy efficiency.

- **Base barrier.** The first-level barrier concerns the lack of knowledge regarding energy efficiency measures. Although this is an important barrier, it is not sufficient to explain firms' negative decisions regarding energy efficiency investments.
- **Symptom barriers.** These are designated as such because they express signs of deeper, invisible problems, or of mistaken interpretations. For instance, capital is not lacking but is allocated to other investments; risk is said to be high, when in fact it is not even assessed. The symptom barrier level thus explains many factors often mentioned as preventing energy-efficiency investment: lack of capital, high level of risk, no time of managers, and lack of top management involvement.

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- **Real barrier.** The third level is the invisible problem at the source of second-level symptoms, the real obstacle to energy-efficiency investments: the non-strategic character of energy efficiency investments for businesses, that is a lack of investment's impact on a firm's competitiveness. Thus businesses don't consider energy or energy use as a contributor to their competitive advantage.
- **Hidden barrier.** The fourth level comprises the various cultural influences that drive organizations and their decision makers to consider energy efficiency investments as weakly strategic, beyond possible objective reasons. It is "hidden" because it influences an organization's behaviour and investment choices in a subconscious way.

Non-energy benefits (NEBs) of energy efficiency offer a way to overcome barriers to energy efficiency. NEBs include all the benefits resulting from new equipment, which are not energy benefits (i.e., energy savings translated into monetary savings) in and of themselves. Often observed examples of NEBs include maintenance cost reduction, increase in workplace comfort or safety (for instance when an old oven is replaced by a new, better insulated one), increase in industrial productivity (thanks to lower production time or a reduction of the rejection rate), and product quality improvement. A reduction in GHG emissions is another frequently observed NEB of an energy efficiency project.

In 2014, in an effort to activate the huge untapped potential of energy efficiency, the IEA issued a report on the "Multiple Benefits of Energy Efficiency". As emphasized in this report, "identifying the multiple benefits that may be linked to energy efficiency measures in industry could enhance the business case for action"[4]. Similar to energy benefits, NEBs translate into financial benefits for the investor. According to an IEA literature review, the monetary value of NEBs can be in the range of 40% to 50% of the value of the actual energy demand reduction per measure, and may lower energy efficiency project paybacks by more than half[5].

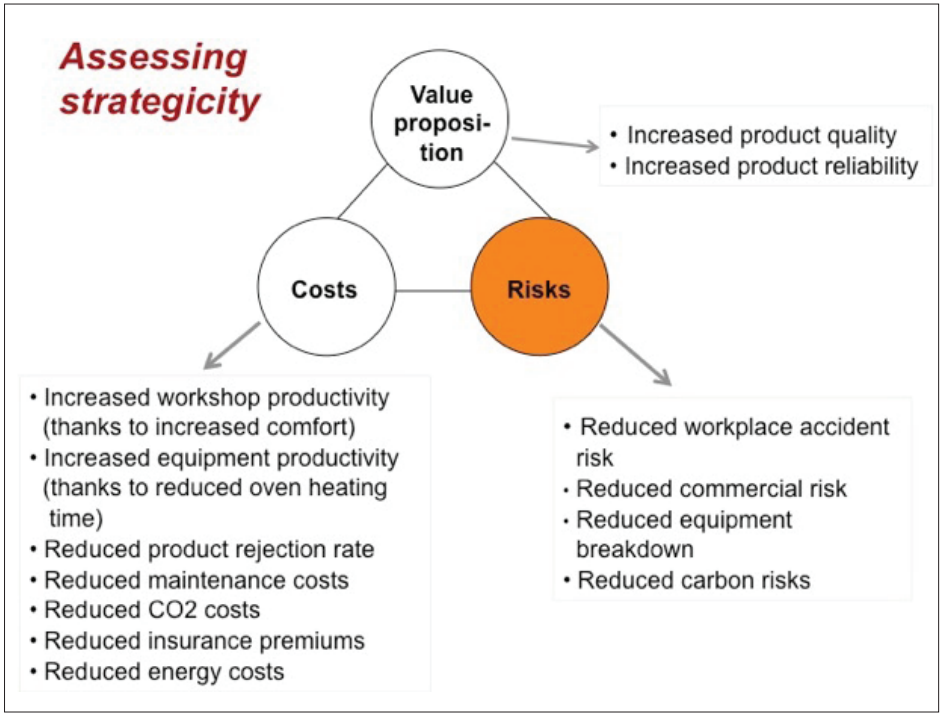


Figure 3. Multiple benefits of energy efficiency for an industrial bakery.

Multiple benefits of energy efficiency investments not only improve the financial attractiveness of projects, but more importantly, they raise the strategic character – or "strategicity" – of energy efficiency investments by contributing to the businesses' competitive advantage in its three components: the value proposition a firm offers to its customers, the costs, and the risks borne to create this value proposition. As an example, Figure 3 lists the multiple non-energy benefits of energy efficiency in an industrial bakery[6].

At the 45th meeting of the IEA Demand-Side Management Programme last March, the Executive Committee approved the start of a new project, Task 26: Multiple Benefits for Energy Efficiency, which will build on the ground-breaking work of the IEA report.

In close partnership with other IEA Programmes (especially with the Industrial Energy-Related Technologies and Systems Programme, IETS), DSM Task 26 will work in two main directions in order to make the "Multiple benefits of Energy Efficiency" operational and applied in DSM activities:

- Deepening the knowledge about issues and actors concerned and do so in a way that takes into consideration different applications in different countries and different planning environments. This to make MBs relevant for applications locally.
- Improving quantification of multiple benefits based on real examples.

A detailed Action Plan for DSM Task 26 will be presented at the 46th DSM Executive Committee Meeting in Nova Scotia, Canada on 20-22 October 2015.

This article was contributed by Dr. Catherine Cooremans of the University of Geneva, Switzerland. For more information on this new Task contact Catherine at Catherine.Cooremans@unige.ch

[1] IEA, Energy Efficiency Market Report, 2014, p. 16.
[2] Philippe Benoit, Several IEA strategic actions to increase energy-efficiency, EEMR 2015 and Multiple Benefits, European Council for an Energy-Efficient Economy (ECEEE) workshop, Brussels, October 21, 2014.
[3] Cooremans, C. (2012). Investment in energy-efficiency: do the characteristics of investments matter? Energy Efficiency Journal, 5:514.
[4] IEA (2014). The Multiple Benefits of Energy Efficiency, p. 134.
[5] IEA, idem, p. 136 and p. 138.
[6] Cooremans, C. (2015). Competitiveness benefits of energy efficiency: a conceptual framework, In Proceedings of the 2015 Summer Study, European Council for an Energy Efficient Economy, 1-340-15:6.

Task 16

New Partners Welcome in Next Phase of EE Work

IEA DSM's work on performance-based energy services is on track for another three years. Phase 4 started in July and will focus on life cycle costing and economic rationale of energy efficiency (EE) and renewable energy systems (RES), the deep retrofit of buildings, innovative financing mechanisms, such as crowd financing, simplified M&V approaches and an energy services taxonomy paper.

The detailed work programme will be adapted to suit the needs of the participating countries. Research topics to date include:

Life Cycle Costing and economic rationale of EE and RES

- How to do Life Cycle Cost appraisals
- Investment-grade calculation => bankable projects + financing
- Methodologies: own tools, RETScreen, etc.
- Real cases from different DSM applications: deep retrofit, etc.

Comprehensive refurbishment (deep Retrofit, NZEB) through **Energy Services** (in cooperation with **IEA EBC Annex 61**):

- Economic feasibility and opportunity cost
- Investment-grade calculation and financing (business cases)
- Business models advancement with stakeholders, including financiers
- How to factor in Multiple Energy Benefits
- Policy implications/recommendations

Financing: Crowd financing for EE and RES investments, for example:

- Access to CAPEX for smaller projects in SME, communities
- How to bridge, in particular, bridge financing or bridge loans

Energy Services taxonomy for an **academic journal paper**

Simplified M&V continued: Dialogue with IPMVP + other stakeholders, more in-depth examples, adaption and publication of national versions

Knowledge transfer to **developing markets** including the **DSM University**

- Methodologies, lessons learned for project and market development (e.g., Facilitators, simplified M&V, etc.)

For more information on the Task work and how to join contact the Operating Agent, Jan W. Bleyl, EnergeticSolutions@email.de and visit the IEA DSM 16 Task webpage.

New (and current) participants will benefit from the wealth of experiences and open-minded sharing on how to develop energy efficiency projects and markets.

JAN BLEYL

IEA DSM TASK 16

Join this Task and…

- Gain know-how and capacity building skills for innovative and competitive Energy-Contracting and financing models
- Exchange feedback, coaching and experiences on country specific market development activities
- Participate in the IEA DSM Energy Services Expert Platform and communicate with external stakeholders
- Develop and assess the feasibility of business models for demand response energy services
- Help with the international and national dissemination of competitive ES and assistance services for the market development in other countries
- Work to enlarge national and international markets for ESCo and demand response services and to develop business opportunities for nationally and internationally acting ESCOs

Facilitators

A Role for Facilitators to Play – National Perspectives

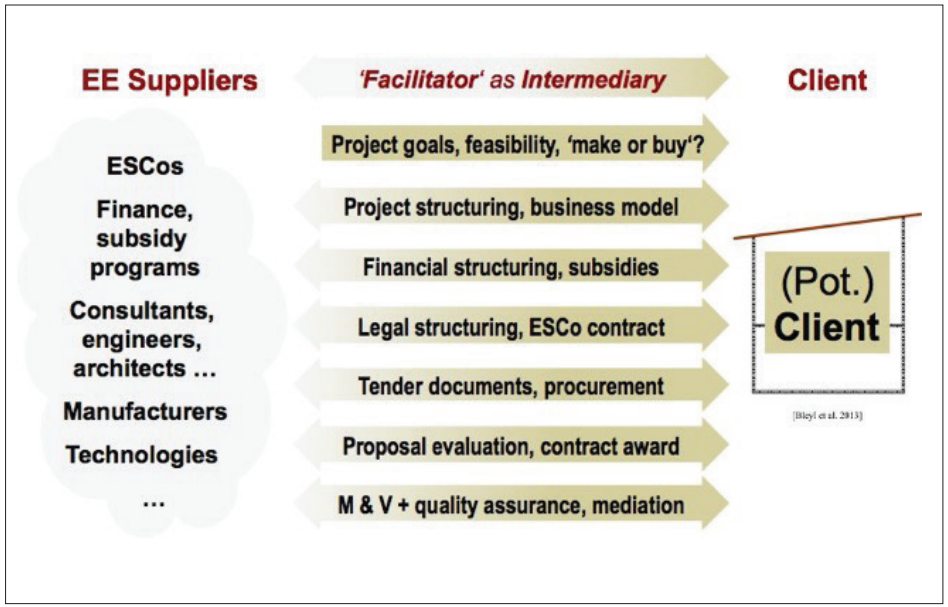
This is the second article in the Facilitator series highlighting national perspectives. In this issue, the work of Facilitators in the Netherlands and South Africa shows how to support ESCo clients and successfully contribute to ESCo market development. You can also read the series on "Facilitators in the ESCo Market" published in the DSM Spotlight newsletter, issues 50-53, and available on the DSM website.

Most facility owners require professional support to overcome the multiple barriers they face on the way to developing and structuring comprehensive energy efficiency projects. As a solution, IEA DSM Task 16: Competitive Energy Services (Energy Contracting, ESCo Services) has introduced the figure of a 'Facilitator', which could be rephrased as Energy Efficiency Architect.

Facilitators, who mostly consult on behalf of a client, can play an important and enabling role and have successfully done so in Europe and other Energy Contracting markets. Besides enabling project development, another important advantage of this buyer-led approach is that it fosters competition between ESCos, other EE suppliers and also financiers. Equally important, the Facilitator approach provides a fair and level, but also knowledgeable playing field for this competition. Facilitators also serve as intermediaries between clients and ESCos "(corporate) cultures", interests and expectations in different phases of the project cycle.

To foster ESCo market development, the Facilitator approach will need to be multiplied and better funded. It will also need to become a standard procedure in public and private sector administrations in order to support structuring and procuring of comprehensive energy service projects. This is particularly true, if the market is to develop from individual projects, led by highly motivated individuals, to mass rollouts of comprehensive building refurbishment portfolios. Only then will the energy services industry be able to provide more significant contributions towards energy policy goals.

Market development in a (largely) non-regulated environment is ultimately determined by its (potential) client's decisions to buy or not to buy. Therefore this paper has taken a look at the ESCo market development, predominantly from a client's perspective, both public and private sector.



LESSONS LEARNED

NETHERLANDS

The interest in ESCos in the Netherlands is still young, but over the past few years' interest has been growing. The increase in interest is due to several factors. The first was the creation of an appealing ESCo project at nine swimming pools in the city of Rotterdam in 2012 followed by the establishment of ESCoNetwerk as a Market Facilitator to overcome barriers and raise awareness

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about ESCos. ESCoNetwerk is a sister network of PPS Network Netherlands, which with 8,000 members and 40 participants is the largest independent Dutch organization in the field of public-private partnerships.

ESCoNetwerk has about 40 members with very diverse backgrounds, including lawyers, bankers, accountants, government officials, consultants, contractors, and businessmen from companies focused on large infrastructure projects and large international ESCos.

The structure is not that of your typical ESCo. The sample projects are largely based on supply contracting and some are based outside of the Netherlands. Plus, the role of the Project Facilitator is indistinguishable. Companies such as Deloitte and AT Osborne have the best fit for the role of a Project Facilitator as these companies focus mainly on public procurement.

ESCOPLAN is a member of Task 16 and acts as an independent Project Facilitator focused on comprehensive refurbishment and in another, strictly separate role as advisor to Manesco, a cooperative ESCo.

The challenges now for the Netherlands are to better structure the role of the Market Facilitator and to establish more independent Project Facilitators.

SOUTH AFRICA

The 'ESCo Facilitator' idea in South Africa is the result of a recommendation after an international experts mission in 2012. During this mission, the experts identified the potential for the development of an energy service market in South Africa. However, out of some estimated 200-500 ESCos in the country, only 5-10 qualified as a real ESCo according to the international definition that aligns the financial and technical risk with the ESCo. A large share of South African ESCos instead was operating as energy auditors, which developed in South Africa as a result of an IDM (integrated demand management) funding program from the country's state-owned electricity provider, ESKOM.

A Facilitator…

- Is an independent intermediary between ESCos and (potential) clients.
- Enables a client to develop, structure and procure energy service projects.
- Serves as a mediator between clients and ESCos "(corporate) cultures", interests and expectations in different phases of the project cycle.

The interventions from these funding programs primarily targeted the replacement of light bulbs with energy efficient lighting and worked to reduce South Africa's peak demand in the late afternoon. Products were often supplied by ESKOM and the risk was borne by the client, not the ESCo.

Due to South Africa's historically low energy prices, energy efficiency was not a top priority for many years. In recent years, however, there were massive tariff increases of up to 30% annually and so awareness of energy efficiency solutions has increased. In addition, ESKOM's IDM program was put on hold because of financial challenges due to the delay of two large new coal power plants and the restricted electricity price increases by the National Energy Regulator of South Africa (NERSA).

As a result of these situations, both large and medium-sized enterprises require energy efficiency solutions in the short run, in order to save money, to generate electricity independently, and to avoid power failures and rolling blackouts as experienced on a large scale in 2008. At the same time, South Africa's energy intensive industries still account for almost 50% of the country's energy consumption and faces suppressed demand as a consequence of insufficient generation.

For ESCos, this situation creates a unique opportunity for contracting models, such as energy performance and energy supply contracting. Supply contracting however, is limited to on-site generation, as the country does not provide any feed-in tariffs.

ESCo/Cogen Facilitator Approach

GIZ (Deutsche Gesellschaft fuer internationale Zusammenarbeit), who is implementing the South African-German Energy Program (SAGEN) on behalf of the Federal Ministry for Economic Cooperation and Development, is working on the development of an energy service market and the demonstration of energy efficient technology.

As part of this work, GIZ has set up an ESCo Facilitator at one of its cooperation partners, the South African Energy Development Institute (SANEDI). The role of the newly established Facilitator is to moderate and communicate between the ESCo and the client and to provide know how on energy related policies, financing opportunities as well as model tender and contract documents for energy performance contracting.

As South Africa's interest in cogeneration has increased significantly, GIZ opted to combine both cogeneration and ESCo into an ESCo/Cogen Facilitator approach for SANEDI. Since the country does not yet have sufficient knowledge on these topics, support services from an international consortium of experts were tendered and assigned to assist SANEDI in taking over this task.

An important precondition to sustain the Facilitator in the future was the commitment from SANEDI's side to provide internal staff as a counterpart to the experts and to take over their role in the medium to long term.

The ESCo/Cogen Facilitator joined SANEDI in

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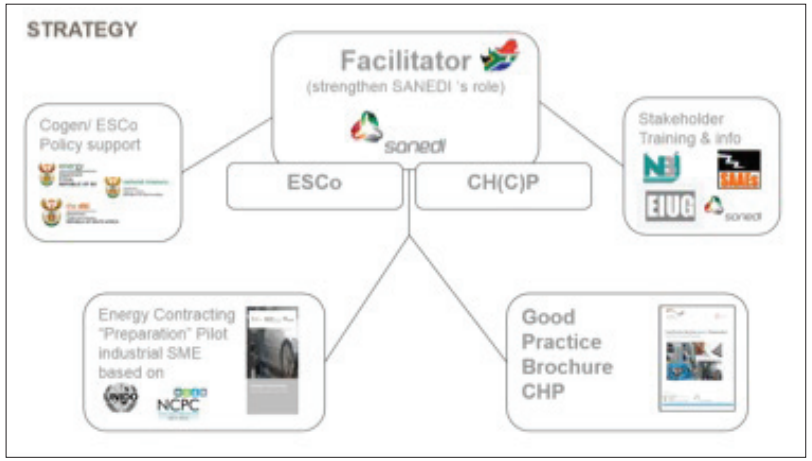

Figure 2. South Africa's ESCo/Cogen Facilitator Approach (Source: GIZ)

October 2013, and has been organizing workshops, supporting feasibility studies and assisting in the promotion of cogeneration for various associations, for example the energy intensive user group of South Africa (EIUG).

Business and technology training for ESCos will be provided through a number of workshops and the provision of good practice guides and model documents on SANEDI's website.

This article is based on the IEA DSM Task 16 report, "ESCo Project and Market Development: A Role for Facilitators to Play". For more information on DSM Task 16 visit the DSM website or contact the Operating Agent, Jan W. Bleyl, EnergeticSolutions@email.de.

Note from the Chairman – *from page 1*

that our smartphones now have far more capacity then the total soft- and hardware a system operator had when this energy technology initiative was started in the '90s.

We're also heading towards open source networks that not only allow everyone to use, produce and store energy, but also are creating networks that truly provide services.

These services will combine the usual energy functions, heating, cooling and cooking, as well as every ICT service we want to buy. Think of information, healthcare, safety, recreation and entertainment.

With the options we already have, open systems could make the "all-electric" world far more efficient and effective.

There will of course be huge problems to tackle, such as the depreciation of existing (public) systems and legislation that can't keep pace with developments.

But the revolution can't be stopped only slowed down.

And yes, there are major issues to solve. An open network will require codes and standards, and the network will still have to be balanced to create a stable system. Cybercrime, big data and privacy will be an issue too, topics we hadn't even dreamed of in the '90s.

But to answer the question, "Isn't DSM getting old?" the only answer is, "We haven't even started!"

Rob Kool
IEA DSM Chairman

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