DSMSpotlight

The Newsletter of the International Energy Agency Demand-Side Management Programme December 2011

XVI

Financing Options for Energy Contracting Projects

A new manual, "Financing Options for Energy Contracting Projects – Comparison and Evaluation", is now available online. This manual brings the complex landscape of financing closer to those professionals whose business it is to develop and implement energy efficiency projects. It's objective is to educate Energy Efficient project developers and multipliers, such as energy agencies or others, to become more knowledgeable partners with financing institutions and real estate owners and vice versa.

In the past, the financing and the energy efficiency (EE) communities have had rather little contact. The EE approach is often from a prevailingly technical perspective rather than a business or finance oriented one, and EE actors are not necessarily educated in business management matters. They often have a technical, environmental systems or communicative background, using different approaches and languages then actors from the world of economics. Conversely, the same applies for the financing community.

Communication is as important to the success of an Energy-Contracting (EC)[1] project as the availability of financial resources. Financing energy efficiency investments has become increasingly burdensome for ESCOs as well as their customers. Consequently, innovative finance options like

[1] Also referred to as "ESCO or Energy Service". We prefer the term "Energy-Contracting" to emphasize the difference to a standard fuel supply or maintenance contract, which does not imply any outsourcing of risks or provision of guaranties for the overall system performance.

continued on page 2

NOTE FROM THE CHAIRMAN

DSM - The Next Generation

How many people does it take to achieve a global approach for combating climate change?

There is no answer to this question, but it must be more than 10.000 because that's the number of participants at the COP meetings. The meetings where participants decide to not even compromise. And how cynical it may sound, that's good. A compromise would lead to a dead end street ratification process.

Dead end, as we all know the United States is unable to ratify any climate change proposal because the Republicans and Democrats have politicised the topic beyond the point to where the content matters.

The U.S. is not unique. The E.U.'s struggle to set a new energy directive to replace the Energy Services Directive shows that the "genie" who supported the Kyoto Treaty is back in his bottle. Support for any agreement that realises the IEA's "blue scenario" that will reduce energy consumption to 18 Gt/A in 2050 seems a sheer impossibility.

Sad to say, these are just two examples on the not so shortlist of bad guys. You may call me a pessimist, but in my opinion we should forget an effective global agreement within the timeframe that's left to stop and possibly reverse the effects of the exhaust of greenhouse gasses. It would only distract us from taking our own responsibility and start doing it right "on the ground floor". Although bottom-up work is often less effective than a top-down approach, this seems the only road we can take at the moment.

continued on page 2

PARTICIPATING COUNTRIES

Austria
Belgium
Canada
Finland
France
Greece
India
Italy
South Korea
Netherlands
Norway
Spain
Sweden
Switzerland
United Kingdom
United States

Task XVI *from page 1*

operate, finance lease and "pure" forfaiting options need to be considered (and developed further!) and compared to classical finance instruments like credits.

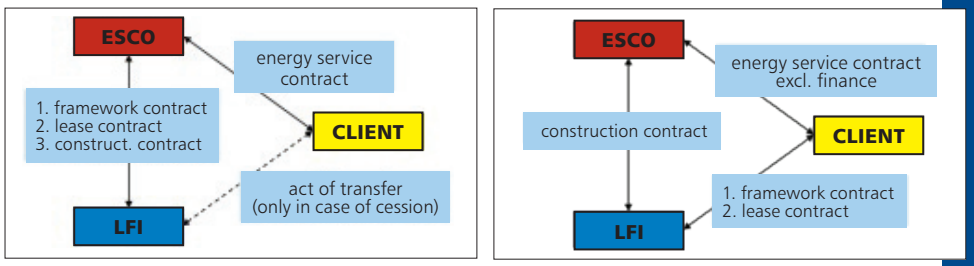

Figure 1. Contract relationships of a leasing agreement with ESCo (left) or Client (right)

These external financing options have implications on a variety of factors, such as direct financing cost, provision of securities, taxation and financial statements. Simply looking at direct financing cost, as expressed in interest rates or fees, will not deliver an optimal financing solution.

Leasing

One of these external-financing options is leasing – obtaining the right to use an asset not the possession of this asset. Assets in EC projects mean investments in energy conservation measures or energy supply plants.

Leasing is a contract between the owner of the asset (lessor) and the user (lessee), wherein the former grants exclusive rights to use the assets for a certain period (basic lease term) in return for payment of a lease. The lease is typically paid in annuities to the Leasing Finance Institute (LFI). The lessee can be either an ESCO or the Client (building owner) as illustrated in Figures 1 and 2.

Basically, there are two types of leases that are relevant for Energy-Contracting: operate leasing and finance leasing. Specific characteristics of both are described in the full report, but the basic contract relationships of a leasing agreement are detailed in the Figure. 1.

In Figure 1:

- The ESCO implements the EE measures and takes over technical, economical and organisational services and risks of the EC-contract and (in many cases) arranges for the financing.
- The LFI takes over the financial and administrative services and risks and concludes a framework and lease contract either with the ESCO (sometimes including a cession agreement for part of the contracting rate) or with the client.
- The LFI signs a construction contract for the energy efficiency investments with the ESCO.

The typical cash flow relationships of a leasing agreement are displayed in Figure 2.

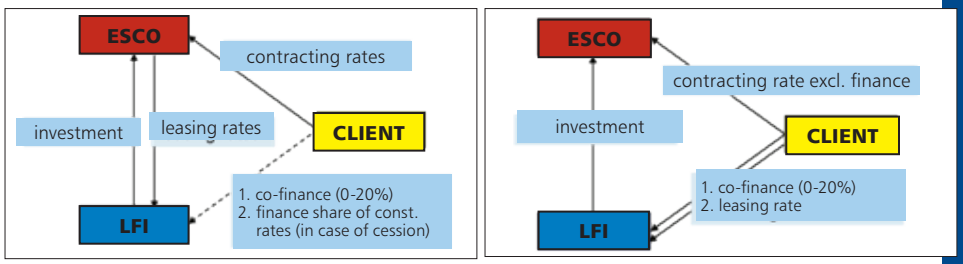

Figure 2. Cash flow relationships of a leasing agreement with ESCo (left) and Client (right).

continued on page 3

Chairman *from page 1*

Fortunately, there are quite a number of regions, countries and companies that are willing to face the challenge. Some because they understand the need to act to avoid global warming, others because they realise sustainability is the most reliable way to be competitive in a market where resources are growing scarce.

The IEA Technology Network supports these attempts in several ways, with technology and beyond. At the last Executive Committee meeting of the IEA DSM Programme, members initiated new projects to create added value to the bottom-up approaches. Task XVI: Competitive Energy Services (Energy Contracting, ESCO Services) will be expanded to add to the knowledge we have on ESCO's. And the new work, Task XXIV: Closing the Loop: from Behaviour Change Theory to Measurable, Practical Outcomes will increase the knowledge of behaviour change and thereby contribute to the underlying instruments of Demand Side Management.

Ultimately, the extension of this Programme's work will contribute to the effective involvement of the end user in choices that will result in the rational use of energy. The list of good examples and best practices is already long and will only increase through these and other new activities.

The thousands of participants in the COP negotiations may not even notice, but out here in the real world exciting things are happening.

Rob Kool
Chair, IEA DSM Programme

In Figure 2:

- In both cases the LFI pays for and the ESCO builds the energy efficiency investments and arranges for the financing agreements
- The LFI should handle co-financing (e.g., subsidies)
- In the case of ESCO finance, the finance part of the ESCO's claims to the client can be ceded to the LFI to directly repay the ESCO's debt
- In the case of Client finance, the financing share of the contracting rate is paid directly to the LFI at a leasing rate. The rest of the contracting rate share (operation & maintenance, assets, etc.) should go directly to the ESCO.

Case Study – Operate Leasing

Pharmaceutical Plant uses Operate Leasing for EPC in HVAC-System

An Austrian production site of an international pharmaceutical company wanted to improve its energy use. As the company's investment funds were reserved for research and production, they looked to a third party to make the improvements. An ESCO was hired and offered the company not only the know-how, but also guaranteed the savings, which was an additional incentive.

The project goals were to maintain and improve the energy supply and distribution facilities, to ensure reliable system operation availability, and to increase maintenance intervals and the useful life of the equipment. And of course, to tap cost saving potentials and meet a short payback time for the investments.

Pharmaceutical plant production site in Austria.

Before the improvements, the 48,000 m2 building consumed 1.5 million Euro per year of heat and electricity.

Implemented Measures

A feasibility study conducted jointly by the client and the contractor explored all possible measures for heating, cooling, ventilation, air conditioning (HVAC) and electrical engineering. However, demand side building measures (e.g., refurbishment of building envelope) were not considered. The measures, which were implemented during the plant's operation, included:

- Recirculation units for the ventilation system (reduction of outside air flow intake).
- Installation of three new ventilation units with a total airflow of 120,000 m3/h.
- Exhaust gas heat recovery system for natural gas fired thermo-oil boilers.
- Rehabilitation of hot water system.
- Adaption of a complete building control system.
- Implementation of a continuous energy control system, monitored by both contract parties.
- Electricity savings from improved ventilation and cooling systems (not accounted for => extra benefit to customer).

The total investment was 1,150,000 Euro (excluding VAT). And, the ESCO's guaranteed energy savings was 229,560 Euro per year based on the implemented saving measures plus a reduction of 1,300 tons of CO2 per year.

Contract Relations and Financing Model

In this financing model, the ESCO formally takes over responsibility for the complete energy service project including a savings guarantee over the contract term of six years. The ESCO and Client entered into an energy service contract, including financing. This

Figure 3. Pharmaceutical plant's contractual relationship of operate leasing ESC-project.

contract also contained a cession agreement of the ESCO's claims to the Financer (FIN). Other than that, the FIN has no direct contract relationship with the Client.

At the same time, the ESCO and FIN entered an operate lease agreement. This type of agreement avoids entering the investment on the ESCOs balance sheet. The FIN also accepts the risk of an economic downfall of the Client, which is recorded in a project framework contract between the FIN and the ESCO. To assure completion and technical and economical performance of the measures, the ESCO must provide a bank guarantee to the FIN to secure the amount of the total savings. The contracts concluded are shown in Figure 3.

All operation & maintenance (O&M) tasks remain the responsibility of the Client, which results in additional savings for the Client due to the extended O&M intervals.

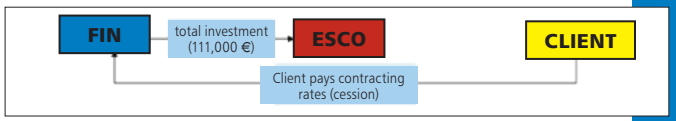

Figure 4. Pharmaceutical plant cash flows of the operate leasing ESC-project.

Financing Model

The Client provides no equity capital or building cost subsidy so the investment is paid with 100% external capital, provided by the FIN. The ESCO invoices the total investment of 1,150,000 (excluding VAT) to the FIN and is paid according to a payment plan.

continued on page 4

The Client pays the ceded contracting rates directly to the FIN. The guaranteed energy and maintenance savings cover the Client's payments. The cash flows are illustrated in Figure 4.

Electricity savings are an additional benefit to the Client, which are not accounted for. In addition, any savings above the guaranteed level go directly to the Client.

Innovative aspects of the model include:

- The Client has only one contact for all energy matters. Financing is in the background.
- Assets were activated by the FIN and do not appear in the books of the ESCO or Client.
- FIN (rather than the ESCO) accepts the economic risks of the (industrial) Client.

Case Study – Finance Leasing

City of Laa, Austria uses Financing Leasing to Refurbish Street Lighting

The city of "Laa an der Thaya", located in Lower Austria, decided it was time to replace the 40-year old public street lighting as the wiring, lamp poles, lighting heads and lamp technology did not comply with the current norms and safety regulations. Not to mention the very poor energy efficiency of the system.

Modernized street lighting with advertising boards in Laa, Austria.

Specific requirements for this project included a close cooperation with the city's building department, meeting a very tight timeframe and finding an innovative finance solution to credit the municipal budget.

The project's total investment of 450,000 (excl. VAT) included the following refurbishment measures:

- Installation of 163 light points in the main streets of Laa including masts, civil engineering below ground level, wiring and switching units.
- Provision of auxiliary services, such as removing old installations, assembling new streetlights, and protective earthing.
- Installation of 57 lampposts equipped with illuminated advertisement boards to generate income for the city.

Contract Relations and Financing Model

For this project, the Financer and client agreed to use a financing lease agreement. An operate leasing model would not have been feasible, because the majority of the investment (e.g., underground engineering, wiring, etc.) would not qualify for operate leasing according to Austrian leasing regulations (VAT law). Figure 5 illustrates the main contract relationships.

In this case study, the new street lighting was planned and built by an ESCO as ordered by the Financer using a purchase contract. There was no direct contract relationship between the ESCO and the client, and all operation & maintenance (O&M) tasks remained the responsibility of the community as before the modernization work. This arrangement has meant additional savings for the community due to the longer O&M intervals.

To keep the model simple, no energy savings guarantee was included because the achieved savings are partly compensated by an increase in illumination levels at flash points (e.g., pedestrian crossings, crossovers) and the additional illumination of the advertisement boards. As a result the remaining

Figure 5. Modernisation of street lighting using a finance-leasing ESC-project contractual relationship.

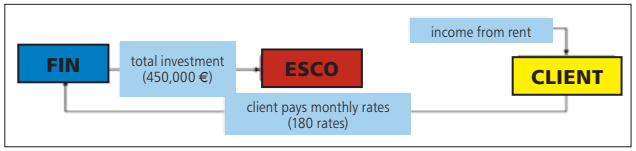

Figure 6. Modernisation of street lighting with finance-leasing ESC-project cash flows.

savings were considered too small to bother with a measurement and verification procedure. Guarantees were given by the ESCO for the total investment cap and the agreed upon timeframe. The main cash flows are displayed in Figure 6.

The total investment was capped at 450,000 € (excluding VAT) and the city provided no equity capital or building cost subsidy. The Financer paid the investment with 100% external capital. The client is repaying the debt in 180 monthly rates over a contract period of 15 years. By renting out the advertising boards on the lampposts, the city generates an additional income of approximately 30,000 Euro per year.

This case study, as with the others included in the manual, demonstrates the importance of a comprehensive look at the sum of all business implications of any external financing option before taking a financing decision. ■

This article was contributed by Jan W. Bleyl-Androschin, DSM Task XVI Operating Agent, Bleyl@grazer-ea.at and Daniel Schinnerl, DSM Task XVI expert, Schinnerl@grazer-ea.at. *The next DSM Spotlight newsletter will discuss other case studies detailed in the manual,* "Financing Options for Energy Contracting Projects – Comparison and Evaluation"*. To download the manual or to learn more visit the Task webpage.*

case study

Tempo Electricity Tariff – France

This is the 11th article in a series highlighting the case studies of DSM Task XV, Network Driven DSM. This Task demonstrated that DSM can be successfully used to support electricity networks in two main ways 1) by relieving constraints on distribution and/ or transmission networks at lower costs than building 'poles and wires' solutions, and 2) by providing services for electricity network system operators, achieving peak load reductions with various response times for network operational support.

In France, electricity bills for residential and small business customers include a standing charge determined by the level of maximum demand (in kVA) nominated by the customer (puissance souscrite), and an energy usage charge based on the type of tariff chosen by the customer (type d'abonnement). There are three types of electricity contracts from which residential and small business customers can choose.

#1 Option Base

Option Base is suitable for lower usage, smaller homes and holiday homes with only occasional usage. This is the simplest of the three contract types with the lowest standing charge and a flat rate for electricity usage all the time throughout the day and year.

#2 Option Heures Creuses (Option HC)

Option HC suits the majority of houses occupied full-time where heating is non-electric. This is a two-part time-of-use tariff with normal (heures pleines) and off-peak (heures creuses) rates. The standing charge is slightly higher than that of the Option Base, but this is offset against a lower off-peak rate for part of the day. The off-peak period is from 10 pm until 6 am each night and, in some regions, also at midday. Option HC is usually used in conjunction with a water heater operated by ripple control so that the heating element is switched on only during off-peak periods.

#3 Option Tempo

Option Tempo is for high use households, such as very large houses, and those with electric heating and full-time occupation, and for small business customers. This is a quite complicated charging system with six rates of electricity pricing based upon the actual weather on particular days and on hours of use. Under Option Tempo, each day of the year is colour coded. There are three colours, blue (jours bleus), white (jours blancs) and red (jours rouges), which correspond to low, medium and high electricity prices.

The colour of each day is determined primarily by the electricity provider Électricité de France (EDF) based on the forecast of electricity demand for that day - the level of demand is mainly influenced by the weather. The French transmission network operator also has the ability to determine the day colour if there is significant congestion on the electricity network.

In addition to a colour, each day also has normal and off-peak periods based on Option HC outlined above, with 10 pm until 6 am being the off-peak period.

The rules for the Option Tempo are as follows:

- Tempo year starts on 1st September;
- Tempo day starts at 6 am;

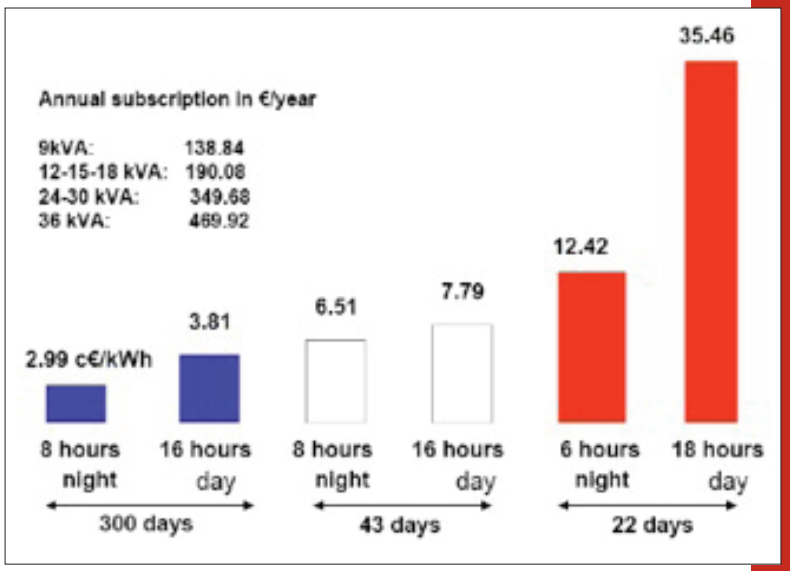

Figure 1. Tempo Tariff Rates in France on 18 August 2010.

- number of days per year of each colour is fixed - there are 300 blue days, 43 white days and 22 red days;
- Sunday is always a blue day; and
- red days cannot fall on a holiday or a weekend or on more than five weekdays in a row.

On blue days, the electricity price is by far the lowest – during the off-peak period on a blue day the price is extremely low (see Figure 1). On white days, the price is higher than under Option Base or Option HC. On red days, the price is very high to encourage lower electricity usage - the normal rate on red days is nine times that of the off-peak rate on blue days. Red days are usually the coldest days in winter.

continued on page 6

There are four different versions of Option Tempo, depending on the metering, communications and load control equipment installed at the customer's premises:

- standard Tempo (the customer has only an electronic interval meter);
- dual energy Tempo (the customer's space-heating boiler can be switched from one energy source to another);
- thermostat tempo (the customer has load control equipment which is able to adjust space heating and water heating loads according to the electricity price); and
- comfort Tempo (the customer has a sophisticated energy controller).

Customers who choose Option Tempo are informed each night about the colour for the next day. At 8 pm a signal is sent down power lines using a ripple control system. Most Tempo customers have a display unit that plugs into any power socket and picks up the signal. The display unit shows the day colour with lights, both for the current day and (from 8 pm) for the next day. An optional beep informs the consumer if the following day will be a red day. The display unit also shows whether or not the current electricity price is at the off-peak rate. For older systems without a display unit the information is available over the telephone or via the internet.

Customers can adjust their electricity consumption manually by switching off appliances, adjusting thermostat settings, etc. Some customers who have the necessary communications and load control equipment are able to select load control programs that enable automatic connection and disconnection of separate water-heating and space-heating circuits.

Figure 2 shows that, compared with blue days, the Tempo tariff has led to a reduction in electricity consumption of 15% on white days and 45% on red days, on average 1 kW per customer. Tempo customers have saved 10% on average on their electricity bill and 90% of the customers are satisfied with the tariff. However, customers do not appreciate red days occurring consecutively.

While the Tempo tariff has been successful, less than 20% of electricity customers in France have chosen Option Tempo. Tempo customers have very particular customer profiles and are interested in managing their energy use. They are prepared to constrain their lifestyles to make comparatively small financial savings relative to their incomes.

The Tempo tariff was designed specifically for the situation where EDF is a monopolistic generator and retailer of electricity. However, it is not adapted to the competitive electricity market that is being introduced in France. In this market:

- the network use of system charge does not vary between seasons; and
- the value of peak load reduction is not reflected in spot prices for energy which are less volatile than the marginal costs of supply.

When EDF needs to manage its global load curve in a competitive electricity market, it will have to develop other types of dynamic pricing for mass-market customers. In July 2009, EDF discontinued the Tempo tariff for new customers and for customers who were on the tariff at their current residence and then moved house. ■

This article was contributed by David Crossley, Managing Director of Energy Futures Australia Pty. Ltd and Senior Advisor at The Regulatory Assistance Project, crossley@efa.com.au. For more information on this case study and others, visit Task XV, Network Driven DSM.

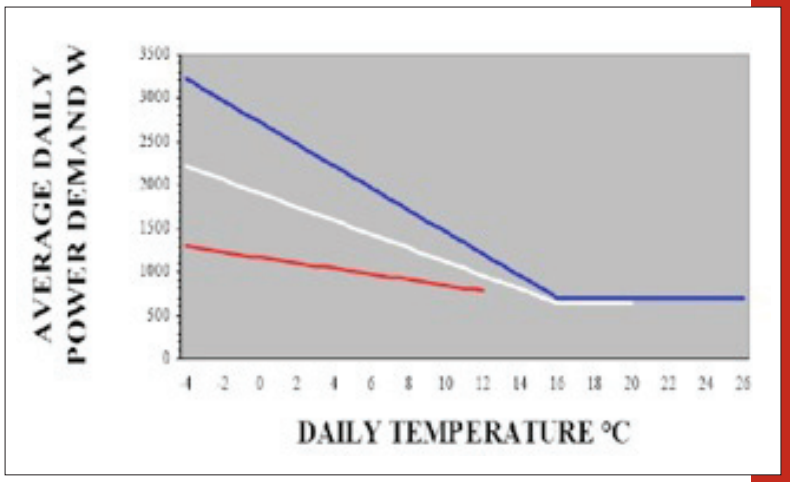

Figure 2. Tempo Customer Power Demand vs. Outdoor Temperature.

new work

Closing the Loop on Behaviour Change Theory

The IEA DSM Programme has initiated new work to focus on the complexities of human behaviour when using energy. Participants will begin to unravel these complexities in order to access the huge end user behaviour change potential for DSM programmes. Only once the 'loop' between behaviour change researchers, funders, policy makers, DSM implementers, and energy end users is closed will this potential be realised.

The year 2012 will bring the start of new work that concentrates specifically on energy end user behaviour change. There is, of course, huge potential for Demand Side Management programmes if this potential (estimated to be as vast as 30% of total energy demand - *Gardner and Stern 2010*) could be easily accessed and directed. However, as many other IEA DSM Tasks have discovered, the 'market failure' of energy efficiency is often due to the vagaries of human behaviour and choice. The best ideas, policies and programmes have been shown to fail again and again in achieving their desired outcomes. The current social norm is still NOT to see energy saving behaviour as a major priority in achieving a transition to a sustainable energy system.

There are several reasons for these challenges and this Task sets to uncover, unravel and define them in order to provide clear recommendations to policy makers and DSM implementers. One of the main challenges is that humans are often still regarded as economically rational actors whose behaviours can be influenced by fiscal incentives alone. However, the complexities influencing human behaviour are so vast and manifold that such simplistic approaches almost invariably fail. It is imperative to uncover the context-specific factors (from infrastructure, capital constraints, values, attitudes, norms, culture, tradition, climate, geography, education, political system, legislature, etc,) that influence human behaviour in specific sectors (the factors that influence our transport behaviours often differ from the ones driving our hot water usage, for example).

In addition, there are a large variety of research disciplines that endeavour to study human behaviour (social and environmental psychology, environmental and behavioural economics, anthropology, science technology studies, practice and innovation diffusion theory, etc.), each with their own models and frameworks, advantages and disadvantages. Unfortunately, they usually do not communicate well - not with each other and not with the end users of their research - the policy makers and DSM programme designers and implementers. This leads to confusion and lack of context-specific programme or policy design that is based on the best behavioural information or models.

Another crucial issue relates to monitoring, understanding, learning about and adapting initiatives in a more systematic manner. DSM projects demonstrate great diversity of goals, scope, participants, resources, etc. to meet the diversity of implementing environments. As a consequence, developing a generic evaluation and monitoring

continued on page 8

Planned Deliverables

- Interactive expert platform using social media, open innovation and crowd-sourcing principles to get greatest value
- Baseline report listing different models, frameworks and research discipline and recommendations for DSM implementors
- Country- and sector-based baseline report with analysis of context factors influencing DSM in these countries
- Report on country and sector specific successful and less successful approaches to work with, or around, various context-factors
- Database of successful and unsuccessful examples from participating countries
- Set of stakeholder-tailored "to do's" and "not to do's" to increase the effectiveness of different types of DSM activities
- Handbook on indicators/metrics/tools to monitor and evaluate behaviour change DSM programmes (both research and practice) and case studies of best practice
- Handbook on what to consider when designing, funding, monitoring and evaluating a new DSM programme to ensure successful outcomes

Why Participte?

- Know how and why to prioritise DSM research and implementation (ex ante evaluation)
- Share each others' best practice/lessons learned and build strong expert network
- Be able to prove ongoing, lasting success and long-term behaviour change outcomes from DSM policy and programmes (ex post evaluation)
- Be able to design policies and programmes that better suit the national context to effectively target households and SMEs with DSM interventions
- Build capability of multi-disciplinary research networks and influence of research end users to ensure their needs are met to address 'real life' problems
- Increase ability to secure funding, as end-user engagement and multi-disciplinary research approach, together with a strong evaluation scheme to prove successful outcomes
- Achieve better DSM intervention designs to increase energy system security, economic efficiency, energy affordability and meeting environmental and climate targets

framework that is widely applicable and does justice to this diversity is difficult. However, there is a real and urgent need for more appropriate and effective monitoring, evaluation and learning of successful DSM implementation.

The fact that there is little robust and concrete evidence on the contribution of DSM to a more sustainable energy system is not helpful when trying to garner support and demonstrate value to investors, policy makers and other relevant actors – especially when different actors are likely to be interested in different contributions and outcomes. Currently, DSM policy makers and other relevant stakeholders fund and/or support DSM programmes on a rather ad-hoc basis because they lack the means of assessing their impact on contributing towards a more sustainable energy system.

In conclusion, there is no behaviour change silver bullet, like there is no technological silver bullet. Designing the right programmes and policies that can be measured and evaluated to have achieved lasting behaviour and social norm change is difficult. We hope that this two-year Task will help address these difficulties and come up with guidelines, recommendations, and examples of best (and good) practice and lessons learned from various cultures and contexts. We will rely on sector-specific experts (researchers, implementers and policy-makers) from all countries to engage in an interactive, online and face-to-face expert platform and contribute to a comprehensive database of best (and good) practice examples, pilots and evaluations. In the end, there will be several deliverables, the most important being the platform for continued exchange of knowledge and successes. ■

This article was contributed by Dr. Sea Rotmann. For any questions, suggestions or expressions of interest to participate, please contact Dr. Sea Rotmann drsea@orcon.net.nz (Task Operating Agent) or Dr. Ruth Mourik info@ruthmourik.nl (Task Coordinator).

Visit the DSM Programme's website for easy access to reports, news and contact information.

www.ieadsm.org

No. 43, December 2011

Editor: Pamela Murphy
KMGroup, USA

For information on the Programme, its work and contact addresses, visit our website at **www.ieadsm.org**