June
2017

DSM Spotlight

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

ieadsm energy efficiency

DSM: How its definition has changed over time

In broad terms, demand-side management (DSM) refers to actions undertaken on the demand-side of energy meters. The field has moved from defining DSM purely in terms of load management activities undertaken by utilities to a much broader definition:

"Demand-side management (DSM) refers to technologies, actions and programmes on the demand-side of energy meters, as implemented by governments, utilities, third parties or consumers, to manage or decrease energy consumption through energy efficiency, energy conservation, demand response or on-site generation and storage, in order to reduce total energy system expenditures or to contribute to the achievement of policy objectives, such as emissions reduction, balancing supply and demand or reducing consumer energy bills." (Warren, 2015)

This definition is increasingly being adopted in academia and governments, such as the UK, as it overcomes a number of misuses of the term, particularly with regards to the interrelationships between terms such as 'demand-side management', 'demand response', 'energy efficiency' and 'energy conservation'. DSM is the umbrella term that encompasses the five main categories of demand-side activities, as summarised below and in Figure 1:

- Demand response: the response of consumers to price changes or incentive payments
- Energy efficiency: delivering more services for the same energy input or delivering the same services for less
- Energy conservation: an overall reduction in energy use
- On-site generation: on-site behind-the-meter small-scale production of heat and/or electricity from a low carbon source (e.g. <100 kW in size)
- On-site storage: on-site behind-the-meter small-scale storage of heat and/or electricity from micro-generation and/or the grid

The definition highlights the increasing link of DSM to current global policy objectives, such as reducing carbon emissions, reducing consumer energy bills, ensuring energy access and ensuring energy security. Thus, the definition has broadened out beyond just energy security issues, as was

continued on page 2

Member Countries

Austria | Belgium | Finland | India | Ireland
Italy | Netherlands | New Zealand | Norway | South Korea
Spain | Sweden | Switzerland | United Kingdom | United States

Sponsors

EfficiencyOne | European Copper Institute | Regulatory Assistance Project

the common energy policy driver of the 1970s and 1980s, when demand-side activities were rapidly included in legislation, regulation and policy in response to the Arab Oil Embargo of OAPEC in 1973-1974 and the Iranian Revolution in 1978-1979. For example, the USA implemented the *Energy Policy and Conservation Act* in 1975 and the *National Energy Act* in 1978, which included the *National Energy Conservation Policy Act* and the *Public Utility Regulatory Policy Act.*

Although the notion of demand-side activities was around long before the energy crises of the 1970s, it was not until 1985 that the term 'DSM' was first coined by Clark Gellings at the US-based Electric Power Research Institute. A literature review of 389 DSM-related documents included within Warren (2015) highlights that since the 1970s, definitions of DSM have varied over time in what they include or exclude. Some publications include the management of electricity demand but not other forms of energy demand (such as non-electric-based heating and transport), others use the definition synonymously with that of the smart grid, some refer to DSM as measures that reduce energy demand at peak times, whilst others use a similar definition but also include the response of consumers to price changes and the shifting of load to off-peak times. Micro-generation is included in some definitions and some include or exclude energy efficiency measures. To take a small snapshot of this work, five definitions are cited in this article to show how definitions of DSM have evolved over time.

In the 1990s, a decade after the term was first coined, Gellings and Chamberlin (1993) proposed a holistic definition of DSM:

"DSM activities are those which involve actions on the demand (i.e. customer) side of the electric meter, either directly or indirectly stimulated by the utility. These activities include those commonly called load management, strategic conservation, electrification, strategic growth or deliberately increased market share." (pp. 2-3)

Here, Gellings and Chamberlin (1993) include energy conservation in addition to load management and put the focus on how the load shape might vary. Despite the relevance of this definition at the time, in the 21st century, DSM has importance beyond the electricity sector and activities stimulated by electric utilities (such non-electric-based heating and transport, and implementers such as those shown in figure one). In addition, the definition confuses the difference between energy conservation and energy efficiency, treating them synonymously. Similarly, the role of behind-the-meter micro-generation and storage is not explicitly clear in this definition. Finally, the increasing importance of DSM in carbon emissions reduction and other policy objectives is not adequately covered in this definition. Despite this, load management will still remain an important part of the energy security aspect of DSM. For example, DSM is not just focussed on activities to reduce energy consumption. In many cases, the aim of demand response is to shift loads to different periods of the day or year, resulting in no change in overall consumption, only the period within which consumption occurs. Similarly, demand response might be used to achieve carbon emissions reduction without an overall reduction in demand by shifting consumption from peak periods when generation might consist of higher carbon (and less efficient) forms of generation, such as diesel generation, to periods when there is an excess of low carbon generation, such as wind power.

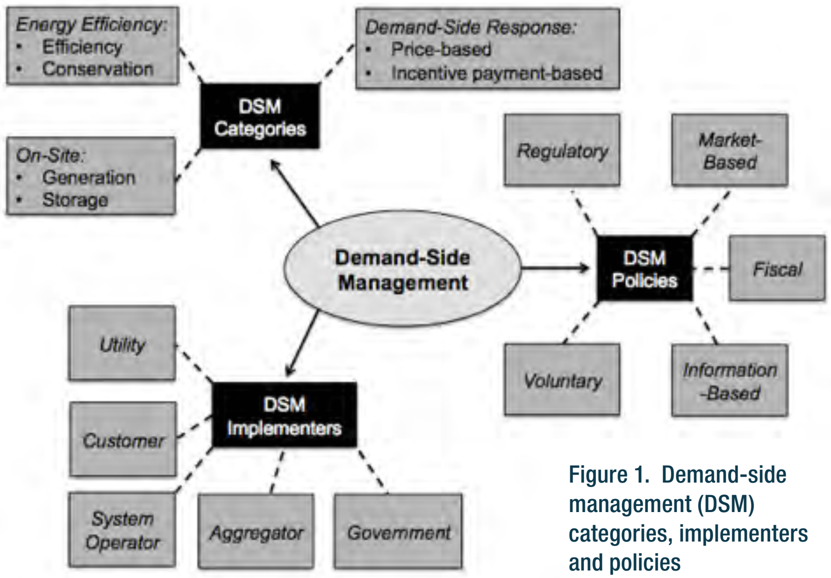


Figure 1. Demand-side management (DSM) categories, implementers and policies

In the 2000s, a decade after Gellings and Chamberlin (1993)'s definition, there was a push to move the definition away from more technically-focussed and utility-stimulated activities, to more behaviourally-focussed and consumer-stimulated activities, as summarised in the definition below:

"…many initiatives have been implemented to change consumers' behaviour towards a more efficient one. These initiatives are referred to as demand side management (DSM)."

(Didden and D'haeseleer, 2003)

continued on page 3

DSM Defined – *from page 2*

Didden and D'haeseleer (2003)'s definition focuses more on behavioural practices and actions that result from DSM programmes rather than specific technological or economic tools, and thus takes a more sociological definition of DSM. However, this definition is equally limiting, as it ignores the activities undertaken by other types of DSM implementer, such as automated demand response through aggregators, Energy Service Companies (ESCOs), local governments and utilities.

As a result of this, in the 2010s, almost a decade later, a broader definition of DSM by Eissa (2011) argues that the overall goal of DSM should now be to reduce overall energy demand and shift patterns of consumption to help smooth demand.

"Load management is the process of scheduling the loads to reduce the electric energy consumption and/ or the maximum demand…such as [through] load shedding and restoring, load shifting, installing energy-efficient processes and equipment, energy storage devices, co-generation and non-conventional sources of energy, and reactive power control…Demand Response is a subset of the broader category of end-use customer energy solutions known as Demand-Side Management (DSM). In addition to Demand Response, DSM includes energy efficiency programs."
(Eissa, 2011)

The definition incorporates energy conservation, energy efficiency and demand response, and is more in-line with current policy objectives to minimise the costs of meeting environmental targets and ensuring energy security. However, Eissa (2011)'s definition excludes some aspects of Gellings and Chamberlin (1993)'s definition that are still relevant today, such as where overall energy consumption is deliberately increased in certain periods. Although in their definition, this was not bound by the type of generation, in the 21st century, this aspect of DSM could become more common under conditions of surplus wind power where there are limited energy storage capabilities and limited international demand through interconnections (such as when weather patterns are similar between neighbouring countries). Nevertheless, the evolving development of energy storage will increasingly overcome the need for load growth. From a technological point of view, Eissa (2011)'s definition also includes micro-generation in addition to energy efficiency, energy conservation and demand response, which was not explicitly included in a number of the definitions from the mid-1980s to the mid-2000s.

Around this time in the UK, the term 'D3' developed to refer to 'demand reduction', 'demand response' and 'distributed generation'. Although this generally fits with the definition of DSM, which includes demand reduction through energy efficiency and energy conservation, and demand response, it is the latter group where clarification is needed and the boundaries are drawn. The reason why 'D3' does not fully equate to DSM is due to the definition of 'distributed energy'. DSM does not include technologies that are connected directly to distribution networks, but instead technologies that are behind-the-meter. This is the fundamental aspect that has underlined all definitions of DSM since the term was first coined. At the distribution level, technologies are also usually larger in scale, such as 100 kW-2 MW, rather than <100 kW. A final difference between 'D3' and DSM is that behind-the-meter energy storage is not explicitly discussed in the former but is a category under the latter, as shown in Figure 1.

In summary, this article has provided a small snapshot of a comprehensive temporal review of 389 DSM-related documents since the energy crises of the 1970s contained within Warren (2015; 2014), in order to identify how the definitions of DSM have changed over time. A broader definition of DSM of relevance to the 21st century, such as the most up-to-date definition presented at the start of this article, is increasingly being used in academia and governments such as the UK, and its use is encouraged as the definition that should be adopted in the International Energy Agency's Demand-Side Management Technology Collaboration Programme (IEA DSM TCP).

This article was contributed by Dr. Peter Warren of the Department for Business, Energy and Industrial Strategy, UK Government, School of Public Policy, University College London (UCL) and the UK representative on the DSM TCP Executive Committee.

References

1. Warren, P. (2015) Demand-side management policy: mechanisms for success and failure, PhD thesis, University College London (UCL), UK
2. Gellings, C.W. (1985) "The concept of demand-side management for electric utilities", Proceedings of the IEEE, 73 (10)
3. Gellings, C.W. and Chamberlin, J.H. (1993) Demand-Side Management: Concepts and Methods, 2nd Edition, The Fairmont Press, Inc., USA
4. Didden, M.H. and D'haeseleer, W.D. (2003) "Demand Side Management in a competitive European market: who should be responsible for its implementation?" Energy Policy, 31, pp. 1307-1314
5. Eissa, M.M. (2011) "Demand side management program evaluation based on industrial and commercial field data", Energy Policy, 39, pp. 5961-5969
6. Warren, P. (2014) "A review of demand-side management policy in the UK", Renewable and Sustainable Energy Reviews, 29, pp. 941-951

Deep Energy Building Retrofits:

Using Multiple Benefits to Convince Investors

As promised, the discussion on deep energy retrofits of existing buildings in the March 2017 issue is being continued. The focus of this article is on Multiple Benefits as a revenue source for Deep Energy Retrofits. Below the types, structure, and where possible the monetized Multiple Benefits for different stakeholder groups are outlined.

What are Multiple Benefits?

Investments in energy-saving projects often produce benefits beyond reduced energy consumption and peak demand. Many of these benefits contribute to the objectives of a project and can have significant added value for making investment decisions[1]. These benefits are not always understood or quantified. However, when energy-saving projects are only marginally attractive to investors or lack support from other stakeholders, a thorough understanding of the benefits and an internalization of key benefits in an economic analysis can make the difference between the project moving ahead or not. Since these impacts are usually beneficial to investors, other stakeholders and society, we use the term Multiple Benefits to describe them as used by the International Energy Agency in their 2014 paper "Capturing the Multiple Benefits of Energy Efficiency"[2].

To take a closer look at Multiple Benefits for Deep Energy Retrofits they are categorized below into three groups – financially quantified benefits, un-quantified participant benefits, and society and utility benefits.

Financially Quantified Multiple Benefits

Increased work productivity

A Deep Energy Retrofit of an office building improves comfort for the building occupants through enhanced indoor climate and air quality. Adding wall insulation and triple glazing of windows lowers noise and smog infiltration. Switching to LED lighting allows for greater adjustable illumination. Increasing the overall building comfort reduces the incidence of sick leave of employees, which, using the Netherlands as an example, can account for 4% of salary costs[3].

The satisfaction scores of employees can be measured using the "Comfortmeter", a web-based survey tool[4] to assess the impact of the working environment (thermal environment, etc.) on work productivity. In a performance-based contract, the "Comfort" score can be used as a performance target in addition to the usual energy saving target. This Multiple Benefit can financially motivate the energy service provider to optimize the comfort satisfaction and thus productivity of the building occupants. Results show an increase in productivity of about 0.3% is possible, equating to 80,000€ per year in an office of 10,000m^2, or 8€/m^2 per year[5]. This is approximately 50% of the value of energy cost savings of a Deep Energy Retrofit, and is significant as the productivity of the staff can be greater than 100 times higher than the energy cost. On top of this productivity advantage, the expected saved costs due to reduced sick leave - which is presently not yet quantified - should be added.

In Europe alone, cumulative investment demand for Deep Energy Retrofits is estimated at close to 1,000 billion Euros until 2050. (BPIE 2011)

This Multiple Benefit may provide one reason why successful companies invest in high quality office space for their employees.
The same logic can apply to higher productivity in industrial production processes, where the value may be much higher than energy cost savings.

Higher revenues from rentals or sales

There is growing evidence from studies[6] indicating that sustainable building features like energy efficiency, and its Multiple Benefits, have a positive impact on building values. The studies compare certified green buildings with non-certified buildings, and find a positive correlation with rental rates and the transaction prices of commercial property (corrected for non-energy efficiency related characteristics such as location, age and size).

According to these sources, investing in energy efficiency and obtaining a green or sustainable building certification translates into higher rents ranging from just below 4% up to 21%. Numbers for higher market valuations (transaction or sale prices) range from just under 10% up to 30% in the US and 26% in Europe[7]. In other words, businesses and individuals are willing to pay a rental or sales premium for "green" property.

However, energy efficiency is just one of several "green" building features. For the purpose of this research, we propose to conservatively allocate

continued on page 5

Deep Energy Retrofit - *from page 4*

25% of the premiums to Energy Efficiency. For the rental premium, this results in a range of 1%-5.3% of an assumed monthly net office rent of 10€/m^2. For the sales premium, a range of 2.5%-6.5% of a sales price of 4,000€/m^2 is assumed, which gives us a sales premium range of 100€/m^2 to 260€/m^2. Furthermore, it is important to consider that benefits are capitalized on by different stakeholders in the commercial property market such as tenants and buyers.

The on-going and future mandatory adoption of energy performance certifications and energy labels by the market will increase the availability and transparency of energy consumption data in buildings, and thus improve the effectiveness of the certifications and labels. For tenants and buyers, this means that it will be much easier to take energy efficiency into their financial models when making commercial property decisions.

Valuing avoided CO2 emissions

Higher energy productivity leads to a reduction in final fuel and electricity demand, and the respective CO2 emissions. Besides its social benefits, reducing CO2 emissions could lead to additional financial advantages for project proponents, depending on the country's climate cost internalization policies. This is the case if building owners can generate certificates out of the CO2 reductions that can then be traded in an emission-trading scheme or can save CO2 levies on fossil fuels.

The European Union (EU) has established the world's largest Emissions Trading System (EU ETS). There are 11,000 European businesses and aircraft operators (with flights within Europe) participating in this market-based instrument that internalizes the external cost of CO2 emissions with the goal of reducing greenhouse gas emissions cost-effectively while achieving its climate objectives[8].

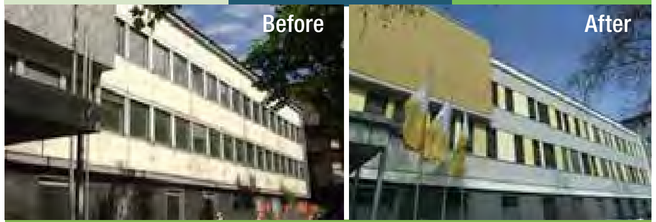
An emission allowance offers the right to emit 1 ton of CO2. Currently, there is a surplus of emission allowances leading to low costs. In the period January 2017 - March 2017, the price for one emission allowance was around 5€.[9] It remains to be seen whether new EU climate goals, based on the Paris Agreement, can lead to stronger policy measures and a substantial increase of emission allowance prices in the near future.

Besides an emission trading system, some countries impose a CO2 levy on heating fuels. For example, Switzerland introduced such a levy and currently charges 84 Swiss Francs (approximately 79€) per ton of CO2.[10] This is a significantly higher value than the current EU ETS prices. Applied to the Deep Energy Retrofit case study (see sidebar), 318 MWh of natural gas and 6 MWh of electricity are saved, which results in CO2eq savings of about 80 t/year[11]. Valued at current EU ETS prices results in savings of about 400€/year. Valued with the Swiss CO2 levy on heating fuels, the resulting savings are about 6,300€/year. In both cases, transaction costs to realize CO2 revenues are not accounted for.[12]

Maintenance cost savings

Deep Energy Retrofits also encompass retrofits of existing, and aged building technologies. Besides energy cost savings, this leads to a net reduction of maintenance cost and/or replacement investment for the building owner, which can be factored into a business case. This approach is applied in energy savings contracts with ESCOs.

Deep Energy Retrofit will typically decrease maintenance costs due to the fact that a newer installation typically requires less maintenance. In the case of performance based outsourcing of maintenance in a Deep Energy Retrofit project, the contractor will choose installations with lower maintenance costs and optimize the maintenance process. However, this positive cost-saving effect could be partially offset due to increased maintenance costs that result from a more complex and maintenance-intensive building generated by the Deep Energy Retrofit.



German office building Deep Energy Retrofit to the Passive House standard (before renovation and after renovation).

CASE STUDY
German Office Building

- 1960s era office building in southern Germany
- 1,680 m^2 of heated area
- Renovated to the 'Passive House' standard in 2010/2011.
- Energy Efficiency renovation: added ceiling, wall and basement insulation, replaced windows and doors with cost-efficient Passive House components, improved airtightness, ventilation and heating, and retrofitted lighting.
- Investment cost for the Deep Energy Retrofit was 0.56 million Euros or 330 €/m^2.[17]
- Energy costs before the renovation (baseline) were 45,000€/year (36,500€/year for gas for heating and 8,500€ for electricity).
- After Deep Energy Retrofit, heat cost savings were 88% and electricity cost savings were 17% (lower due to the additional ventilation systems). The energy and all other price increases are assumed to be on average 1.5% per annum.
- From year six on, building users receive 3% of the savings as a small incentive. Maintenance cost savings are not factored in, however, additional maintenance cost for ventilation systems are accounted for. Cost for overhaul of the heating system in year 15 and regular lamp replacements are included.

continued on page 6

Deep Energy Retrofit - from page 5

In our German case study (see sidebar), two effects on maintenance cost were observed 1) a cost reduction of 2.1 €/m² for the existing systems and 2) additional maintenance cost of 0.9 €/m² due to the added ventilation systems. In a Belgian office building case study[13], maintenance cost savings were found to be 3 €/m². It should be noted that these numbers are based on the assumption that the maintenance in the building is conducted in a standard approach.

An interesting metric to measure maintenance levels of technical systems was identified in the Netherlands. The Dutch maintenance standard NEN 2767 "advises on a uniform way to inspect and assess the construction and installation of technical infrastructures and to assess their technical condition by assigning so-called "condition scores". This allows for the quantification of maintenance levels in an objective way and can be applied as a metric.

Un-quantified Participant Benefits

The benefits in this category are challenging to quantify, but enhance the value of the project. They have not been included in the Task's economic analysis work.

Sustainable image and environmental designations

A Deep Energy Retrofit can allow a building to achieve certain globally recognized, environmentally conscious designations, such as Passive House. These designations have benefits to the building owner in the form of enhanced public image and gaining a reputation as a leader in social/environmental entrepreneurship. This directly increases building value, but is difficult to quantify, as the range of values can be large[14].

Asbestos removal

Environmental health improvements often accompany efficiency measures, such as improving attic ventilation while insulation is installed. A concern in many older buildings is the presence of asbestos, which can become a major health and environmental issue if not dealt with appropriately. Energy efficiency retrofits that include building envelope upgrades may by necessity include additional costs for safe removal and disposal of the material. Once asbestos is removed, the overall building safety has been increased, and there is a greater ease of selling or leasing the building to prospective tenants.

Building aesthetics

By retrofitting a building, the interior and exterior appearance of the building are enhanced. This can heighten tenant satisfaction and improve the overall aesthetics of the surrounding neighbourhood.

Multiple Benefits of DER	Range	Valuation EUR/ (m² * y)	Valuation NPV: EUR/m²	Beneficiaries – Different owner perspectives: Property develop.	Occupant -owner	Lessor -owner	Tenant
1. **Work productivity increase** (0.3%)	Lower	8.0	169	-	169	-	169
	Upper	8.0	169		169		169
2a. **Rental income increase** (1 - 5.3%)	Lower	1.2	25	-	-	25	-25
	Upper	6.4	134			134	-134
2b. **Building sales price increase** (2.5 - 6.5%)	Lower	100		100	[100]	[100]	-
	Upper	260		260	[260]	[260]	
3. **CO_2 savings** (5 - 79 EUR/t)	Lower	0.2	5	-	5	-	5
	Upper	3.8	79		79		79
4. **Maintenance cost savings** (2.1-3 EUR/m2/y)	Lower	2.1	44	-	44	44	-
	Upper	3.0	63		63	63	
5a. **Energy cost savings project term** (25 years)	Lower	16.8	354	-	354	-	354
	Upper	16.8	354		354		354
5b. **Add. energy cost savings over techn. lifetime** (40 y)	Lower	16.8	157	-	157	-	[157]
	Upper	16.8	157		157		[157]
Totals	Lower NPV:			100	729	69	503
	Upper NPV:			260	822	197	468

Source: [Bleyl et al. 2017]

Table 1. Pecuniary values of Multiple Benefits of DER (in EUR/m²) and their accountability to different stakeholders

Utility and Society Benefits

Benefits to Utility and Society were not deemed to have a significant influence on the business case for this project and therefore were not investigated in detail. However, their identification is still an important exercise as these benefits may have the potential to engage additional funding partners with niche interests (e.g., the prospect of job creation could potentially be used to obtain funding from local development authorities).

The Utility and Society Multiple Benefits identified were:

- Boosted local economy and job creation
- Reduced greenhouse gas emissions
- Improved local air quality resulting from reduced fossil fuel combustion and associated reduced health system costs
- Reduced fossil fuel import and improved national energy security
- Avoided electric and natural gas utility system infrastructure costs

Monetized Multiple Benefits

Financially quantified Multiple Benefits identified in the context of building Deep Energy Retrofits are 1) work productivity increase, 2a) rental income increase, 2b) building sales price increase, 3) CO2 emission reduction, 4) maintenance cost savings, 5a) energy cost savings during project term and 5b) additional energy cost savings technical lifetime (beyond project term).

The ranges of monetary values of the Multiple Benefits presented are a first attempt, to the best of our knowledge, based on case studies and literature (not on any broader empirical bases). In order to find a

continued on page 7

comparable metric that readers can more easily relate to the quantified MB value ranges are presented in €/m^2/y and the respective NPV in €/m^2[15] in Table 1[16].

The right side of Table 1 reveals substantially different benefit values for different beneficiaries. This underlines the necessity to differentiate between stakeholders for Multiple Benefits analysis. Occupant-owners have the highest benefit values of the different types of building owners, but tenants also have substantial net benefits.

The Case for Multiple Benefits

Deep Energy Retrofits can generate tangible and quantifiable benefits beyond energy cost savings – higher rents and real estate values, maintenance cost and CO2 savings, higher work productivity and other societal benefits. These Multiple Benefits offer meaningful contributions to make a business case more attractive, even if they are difficult to quantify in some cases. And they help to identify strategic allies for Deep Energy Retrofit programs and project development. However, the well-known 'split incentive' dilemma (or landlord/tenant dilemma) does require differentiating between tenants and different types of investors.

The approach of combining energy cost savings with the added values of Multiple Benefits to enhance Deep Energy Retrofit business cases appears to be promising. Nevertheless, work remains to be done to encourage a stable Deep Energy Retrofit policy framework is needed, to consolidate potential long-term and "green" investors (e.g., institutional investors like pension funds or the like) and project developers, and to increase and enhance the Multiple Benefits quantification approaches through performance-based services.

To learn more contact the DSM Task 16 Operating Agent, Jan W. Bleyl at energeticsolutions@email.de.

1 State and Local Energy Efficiency Action Network (EEAction). Energy Efficiency Program Impact Evaluation Guide. 2012. Prepared by Steven R. Schiller, Schiller Consulting, Inc.

2 International Energy Agency (IEA), Capturing the Multiple Benefits of Energy Efficiency Paris 2014.

3 Dutch Green Building Council (2015), Gezondheid, Welzijn & Productiviteit in Kantoren, page 4 .

4 The survey tool polls the comfort experience of building occupants through more than 50 questions related to different comfort aspects, such as temperature, sound and air quality, which was developed in collaboration with several European universities in the frame of amongst other the R&D-project GeoTabs. For more information about Comfortmeter: www.comfortmeter.eu/en.

5 Especially if the DER is contracted via a performance based contract. More information: GuarantEE project (www.guarantee-project.eu/be) and Coolen, J., Wuyts, S. 2012

6 Eichholtz P., Kok N., Quigley M. Doing Well by Doing Good? Green Office Buildings, American Economic Review 100 (December 2010). Kok N. and Jennen M. The value of Energy labels in the European Office Market 2011, downloaded http://immobilierdurable.eu/images/2128_uploads/KOK_The_Value_of_Energy_Labels_in_the_European_Office_Market.pdf. Chegut A., Eichholtz P., Kok N. Supply, Demand and the Value of Green Buildings, 2013, Urban Studies, 1-22, 2013. Fuerst F. and McAllister P. Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Values, 2011, Real Estate Economics, pp 45-69. Laurenceau Sylvain Analyse de la Valeur Verte dans l'immobilier de bureaux 2013, Centre Scientifique et Technique du Bâtiment, Direction Economie et Sciences Humaines.

7 These price premiums are for "sustainable buildings" whereby the "energy efficient" component is one aspect of the sustainability besides accessibility, water and waste management, indoor quality and building management. Other intangibles such as market conditions, market size, increase of global quality of buildings, the mentioned employee productivity increase and green image also play a role price premiums.

8 http://ec.europa.eu/clima/policies/ets_en (visited 26.01.2017)

9 https://www.eex.com/en/market-data/.../european-emission-allowances-auction#!/ (visited 13.03.2017)

10 https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate-policy/co2-levy.html (visited 26.01.2017)

11 CO2eq emission factors: Natural gas: 250 kg/MWh, electricity: 700 kg/MWh (Source: GEMIS http://iinas.org/gemis-de.html, visited 13.03.2017)

12 The resulting revenue of a reduced CO2 levy for an investor or landlord also depends on the cost sharing between landlord and tenant. Often the fuel costs are paid by the tenant who would profit from the investments of the landlord, which leads to the well-known landlord-tenant dilemma or principal-agent problem.

13 Coolen, J., Wuyts, S. 2012

14 Woodroof, E.A., et al. Energy Conservation Also Yields: Capital, Operations, Recognition and Environmental Benefits. Energy Engineering, Vol. 109 (5) (2012) , pages 1-14.

15 For the NPV calculation, a 25-year project term with a WACC of 3% as discount rate and 1,5%/year price increase was applied (equal to the case study analysis in section 3).

16 Except for the "property developer", the values in 2b. for the building sales price are in parentheses and not considered in the totals, because they depend on the time of sale; similar logic for 5b "tenant" values.

17 According to the differential cost approach, this figure excludes general, non-energetically relevant costs of the building renovation of 167 EUR/m^2 for building site equipment, scaffolding, plastering, facade, fire and noise protection, etc.

IEA DSM *at Work on Innovative Energy Services*

Interview with Jan W. Bleyl

The IEA DSM Technology Collaboration Programme (DSM TCP) has dedicated eight years to its work on innovations in performance-based energy services (which covers energy contracting and ESCos). At the heart of this work is DSM Task 16: Innovative Energy Services and its research and expert platform. Armed with best practices and experiences shared through stakeholder workshops, trainings, publications and conference presentations, experts can better implement their national energy efficiency activities. To learn first hand about the work of DSM Task 16, we've asked Jan Bleyl, the Task Operating Agent, a few questions.

What is the overall objective of this work?

Jan Bleyl (Jan): Task 16 is working to contribute to know-how and experience exchange as well as project and market development of performance-based energy services. To do this, Task participants:

1. Maintain a well-established Energy Service Expert Platform for the exchange and mutual support of experts, partners & invited guests.

2. Support country specific National Implementation Activities (NIAs) in order to support energy service projects and market developments.

3. Design, elaborate on and test innovative energy service and financing models. Share these findings through publications and the Task 16 Think Tank. Current Think Tank topics are: Deep Energy Retrofit and Multiple Benefits; Life-Cycle Cost-Benefit Analyses; and Simplified M&V and Crowd-Financing.

Why is the Task's work important for countries, policymakers, and customers?

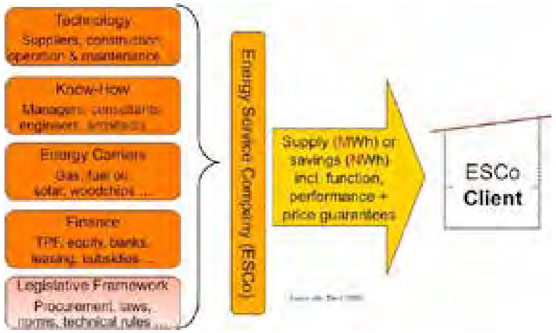
Jan: Energy services are an important 'delivery mechanism' to implement energy efficiency and renewable energy projects in the context of energy policy and climate change goals. In Task 16 "Innovative Energy Services", energy service experts from countries around the world are joining forces to advance know how, experience exchanges and market development of (mainly performance-based) energy services.

Of the Task results to date, which one do you think is having or will have the biggest impact and why?

Jan: There are two results that standout:

1. The 'Facilitator' model to structure energy service projects. This is important because it puts a focus on the client perspective of the energy service market.

2. The Integrated Energy Contracting (IEC) model is a combination of energy conservation and supply of useful energy (based on renewables) for DSM projects, which are both key pillars of the energy transition towards a carbon neutral energy system.



Why is it important to do this work through the IEA DSM Programme?

Jan: Now and for the foreseeable future there is an urgent need to join forces and to support all suitable political, regulatory and market-based instruments for the implementation of energy efficiency, renewables and CO2 reductions. International collaboration through the DSM Technology Collaboration Programme offers a unique and non-competitive environment that fosters the open exchange of experiences and know-how among participating countries and experts and the learning from best practices.

To learn more about DSM Task 16 and its work visit http://www.ieadsm.org/task/task-16-innovative-energy-services-energy-contracting-esco-services/ or email Jan W. Bleyl at energeticsolutions@email.de.

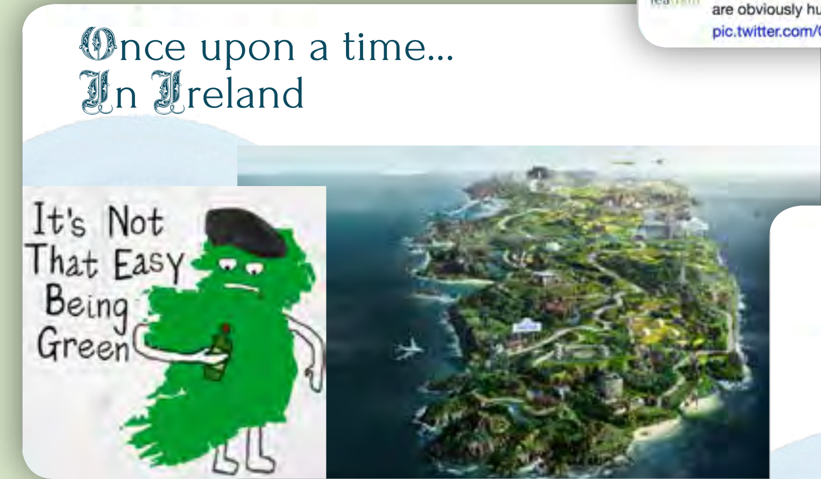
DSM Day in Dublin

Behavioural insights on energy efficiency in the residential sector

The IEA DSM Technology Collaboration Programme (DSM TCP) kicked off its biannual meeting in Dublin with a "National Day", a day set aside for the host country to share its work and the DSM TCP project managers (aka Operating Agents) to share their work, hosted by the Sustainable Energy Authority of Ireland (SEAI). It was a full day with lots of information and best practices shared so to wrap up the day, Sea Rotmann, the Operating Agent of DSM Task 24 on Behaviour Change in DSM – Helping the Behaviour Changers, showed the power of storytelling with a 'story' of the day.

You can download the full presentations of all the speakers at http://www.ieadsm.org/workshop/dublin-ireland-behvioural-insights-on-energy-efficiency-in-the-residential-sector/

1



2

3

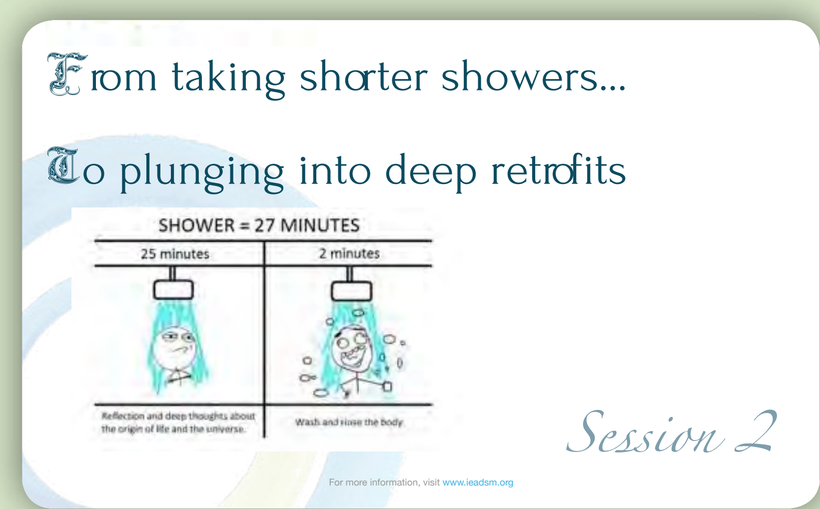
DSM Day in Dublin

4

5

6

7



DSM Day in Dublin

8

Because of that...

Mr Electric David Phelan

IEA-DSM @IEADSM · 1m
David Phelan from @ElectricIreland presents their new smart plug App which may be rolled out to their 1.2m customers @SEAI_ie pic.twitter.com/CFlpzYvtMu

9

And of course, we need some numbers...

The prolific Matthew Collins

IEA-DSM @IEADSM · 1m
The very prolific (and numerate!) Michael Collins from @SEAI_ie talking lessons of #behaviourchange scheme uptake pic.twitter.com/MLBUEDQcxc

10

And even more so...

The illustrious Prof Shipworth

Dr 🎗 Sea 🐙 @DrSeaRotmann · 1m
My friend Prof David Shipworth from @ucl talking #EnergyWise #smartmeter project @SEAI_ie @IEADSM #behaviourchange Day pic.twitter.com/KloHJAlXlz

11

Not to forget business (models)...

Jonkvrouws Renske van der Bouwknegt & Ruth van Mourik

IEA-DSM @IEADSM · 7m
Our Chair @RPKteT knew @SEAI_ie "when it was still a 3-letter word." Giving an introduction to our great @IEADSM Programme. pic.twitter.com/g2YMrtqgwE

DSM Day in Dublin

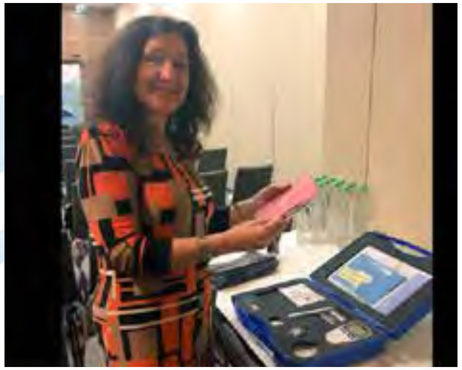
12

The routes to engagement...

Session 3

13

And then we heard from...



Saint Josephine the Brave

ieadsm **IEA-DSM** @IEADSM · 1m
Our #Task24 national expert for Ireland, the inspiring Josephine Maguire @SEAI_ie is talking #EnergySavingKits & the consumer journey pic.twitter.com/DbxpWDqGpz

14

And still, there was more...

Sir Lambe of Veolia

ieadsm **IEA-DSM** @IEADSM · 52s
Joseph Lambe of @VeoliaIrl is next: more insights into customer engagement & how important it is to hold people's hands on journey @SEAI_ie pic.twitter.com/yliRpiNOjO

15

And, from further afield...

Madame de Denizart

ieadsm **IEA-DSM** @IEADSM · 1m
A French expert, Elodie Denizart, discusses Picardie Pass Renovation @SEAI_ie #behaviour day pic.twitter.com/BzBa67i3bb

DSM Day in Dublin

16

And, ever more...

The inimitable Ruth Buggie

IEA-DSM @IEADSM · 25s
Finally, Ruth Buggie @SEAI_ie talks #SustainableEnergyCommunities - that work has been going since 2005 & is growing pic.twitter.com/lrjiYZnACp

17

Until, finally...

Doctor(pus) Sea of New Zealand

Dr Sea @DrSeaRotmann · 1m
Really enjoying myself at @IEADSM Day on #behaviourchange @SEAI_ie - this is all right up my #Task24 alley! pic.twitter.com/Bru4fUwSiC

Thank you very much for your attention!

The End

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

For more information, visit www.ieadsm.org

ieadsm

If you haven't had the chance to join a DSM University webinar, we hope you will soon. To learn more about upcoming and past webinars go to http://www.ieadsm.org/dsm-university/. In the meantime, you can watch any of the 33 completed webinars on topics ranging from behaviour change and multiple benefits to energy efficiency obligations and smart grids on the DSM University YouTube channel. The next webinar (topic to be confirmed) is September 28th by Saurabh Kumar of Energy Efficiency Services Limited (EESL) in India.

Issue No. 65, June 2017

Editor: Pamela Murphy
KMGroup, USA

Visit our website for easy access to reports, news and contact information.

ieadsm.org

Follow IEA DSM on:

The DSM Spotlight is published four times a year to keep readers abreast of recent results of the IEA Demand Side Management Technology Collaboration Programme and of related DSM issues. IEA DSM functions within a framework created by the International Energy Agency (IEA). Views, findings and publications produced by IEA DSM do not necessarily represent the views or policies of the IEA Secretariat or of the IEA's individual member countries.

For information on the IEA DSM visit our website at www.ieadsm.org.