**ENERGY SOLUTIONS WORK STREAM MEETING ON ENERGY EFFICIENCY**

***Reflections from 13th October 2016, 08:00-9:00, room 5G1, European Parliament, Brussels***

**Energy Solutions Work Stream Reflections**

Energy Solutions work stream reflections identify key challenges and solutions to the upcoming proposals on energy efficiency. The work stream meeting on energy efficiency gathered key decision-makers from the European Commission, the European Parliament and industry[1] to discuss the upcoming legislative proposals including the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

**Five reflections** sum up key messages identified by the participating parties:

---

1. **Integrate legislation across sectors** including electricity, heating/cooling, buildings, transport and energy markets to ensure policy coherence, cost efficiency and predictability for market players.

2. **Harvest untapped energy efficiency potential** by setting ambitious renovation targets for buildings and industry as well as improve credibility of energy performance certificates and enlarge energy audit obligations.

3. **Increase energy efficiency across the economy through better systemic integration** between electricity and heat, notably through electrification if it is based on parallel decarbonization of electricity supply to underpin social acceptance of increased electricity shares in energy consumption. Enhance integration of electricity and thermal storage.

4. **Prioritize savings along different energy carriers**. Saving measures should underpin needs to increase flexibility and reduce GHG emissions. Concretely, overall energy system efficiency should be better taken into account when calculating energy savings.

5. **Improve enabling environment for financing** e.g. through bundling of energy efficiency projects and the use of green requirements in public procurement.

The five reflections are elaborated into challenges and solutions. The challenges and solutions are developed on the basis of five basic principles for viable energy efficiency measures. The elaborated challenges, solutions and principles are presented on the following pages of the paper.

[1] 3M, Danfoss, DONG Energy, EDF, EON, GE, Grundfos, Microsoft, Panasonic, Rockwool, Schneider Electric, Siemens, Velux and Vestas.

**Elaboration of the Five Reflections:**

1. **Integrated legislation across sectors in the review of directives**
   Integrated legislation across sectors should be the starting point for the review of directives. Energy efficiency measures should be developed and adopted while taking into account potential effects on other parts of the energy system. Optimising the energy system as a whole should be a key component of all energy- and climate related legislation and will provide long-term investment predictability.

2. **Harvested low-hanging fruits and enable further potential with ambitious targets**
   Significant potential for cost-efficient energy savings and energy productivity are readily available across the EU, however, legislative and non-legislative barriers stand in the way. Ambitious renovation targets for buildings incorporating energy balance principle (solar gain minus heat loss) would facilitate a market pull for increased energy saving measures. Optimisation of use and maintenance of existing systems in different sectors can lead to strong efficiency increases, reducing the need for capital-intensive investments especially if the energy system is considered as a whole.

3. **Increased energy efficiency through better system integration between electricity and heat**
   Increased energy efficiency should be based on a holistic market-based approach that supports economic efficiency and decarbonization. One solution lies in district heating that provides an effective bridge between heating/cooling and the electricity market. Electrification should be pursued under the condition that the electricity mix is decarbonized – and the expected increasing shares of renewable energy will increase the social acceptance towards increased use of electricity across sectors such as transport, heating, cooling and other energy uses. Electrification can contribute to transforming commercial buildings and residential buildings from unresponsive, highly energy-demanding to highly efficient producer, storage provider and supplier. Electrification is however not the only solution to decarbonize the heating sector. The choice between electrification and decarbonized district heating systems should be left to a case-by-case decision based on cost/benefit analysis factoring in local conditions.

4. **Prioritized cost-efficient and flexible decarbonization**
   A barrier to cost-efficient and GHG-friendly savings is the discriminatory treatment of electricity when calculating energy savings. Concretely the primary energy factor (PEF) disincentives the electrification of heating with the current factor on 2.5. Current practice does not take into account carbon content when measuring electricity as part of the energy consumption in buildings. The solution lies in a transparent and accurate science based process in setting the PEF incorporating also the energy balance principle. Access to energy data is vital for Member States to reach national and common EU energy efficiency target on a competitive market in order to ensure cost efficient implementation e.g. through flexibility in electricity demand. Access to energy consumption data should be given upon explicit acceptance from customers on an aggregated anonymous level, where the customers cannot be personally identified. Rules and regulation on access to data must be uniform to develop a common European market for energy services.

5. **Improved enabling environment for bankable investment projects**
   Improved enabling environment is a prerequisite for bankable investment projects. They are in deficit due to lack of dedicated energy efficiency plans, lack of technical assistance, difficulties in bundling smaller investments, risk-sharing issues and pay-back periods. Investment mechanisms could stimulate

private investments into energy efficiency projects e.g. through the European Fund for Strategic Investments (EFSI). At the small scale, investment mechanisms should enable the aggregation of several small scale projects while only requiring one single application for funding of energy efficient projects. A solution is available through technical assistance (TA) and project development assistance (PDA) programs. Thus, solutions include European structural funds, regional green investment programmes by various regional and European financial institutions, national funds as well as public and private funding.

**Five principles** sum up pre-requisites for viable energy efficiency measures identified by Energy Solutions:

**Work Stream Principles on Energy Efficiency**

---

- **Energy efficiency first**
  Prioritize investments in energy efficiency and energy productivity on a marked-based approach. Recognize the economic benefits that come from improved energy efficiency and productivity, arising from energy cost savings, improved energy security, improved health, and reduced need to invest in new supply options.

- **Optimize the overall energy system**
  Ensure that use of energy efficiency measures, systems and technologies result in either end-use energy savings, productivity improvements or in efficiency gains in other parts of the energy value chain, e.g. through digitization.

- **Maximize greenhouse gas (GHG) reductions in the most cost-efficient way**
  Pay particular attention to reducing energy consumption from GHG emitting energy sources to reach a zero-carbon buildings stock by 2050. Low-carbon electricity is a key vehicle to decarbonize a variety of sectors such as transport as well as heating and cooling, thus, improving overall system efficiency and reducing emissions across the economy.

- **Reduce energy imports**
  In line with the European Union ambition to reduce energy dependence, energy efficiency measures should be evaluated on their contribution and ability to lowering the energy import.

- **Improve functionality and comfort of buildings**
  When designed right, energy efficiency measures should bring added value in the form of more comfortable living environments and buildings equipped for future functionality demands. Energy efficiency in buildings shall be evaluated as part of the overall energy system, leading to cost-efficiency both for consumers and for the society as a whole.

**Work Stream Issues from Political Energy Solution Makers**

Work stream issues from political energy solution makers across political parties and member states address the pathway towards an Energy Union:

***"Energy efficiency has a great potential – as the first energy source. Energy efficiency reduces our energy consumption, reduces our energy dependency as well as creates jobs and investments. Energy efficiency is by definition an integrated energy solution!"***

*Vice President to the ITRE Committee, Member of the European Parliament and President of Energy Solutions, Morten Helveg Petersen (ALDE).*

***"A comprehensive approach to energy efficiency involves increased support to innovations and creation of stable and predictable political framework which would stimulate new investments in technologies, to renovations and to modern and more flexible infrastructure. What is the key, however, is to empower citizens to become more responsible for their choices concerning the way energy is used or produced. It is the cornerstone of the energy union."***

*Member of the European Parliament and Vice President of Energy Solutions, Miroslav Poche (S&D).*

***"Energy efficiency indeed is part of an Energy Union – An Energy Union rests on reforms across the energy mix to ensure flexible, holistic energy solutions. Energy Solutions arises at a crucial point in time!"***

*Member of the European Parliament and Vice President of Energy Solutions, Ian Duncan (ECR).*

***"Energy efficiency/saving should play an important part in the energy policy of all member states."***

*Member of the European Parliament and Vice President of Energy Solutions, Angelika Niebler (EPP).*

***"Energy efficiency is the first fuel of Europe and should be acknowledged as such in all energy union legislations. Energy savings increase the competitiveness of our economy, reduce fuel poverty, diminish our vulnerability towards external suppliers, create local jobs and of course help meeting our climate commitments from the Paris Agreement. This is why we need an ambitious binding target for 2030 accompanied by solid incentives notably in terms of financing".***

*Member of the European Parliament and Vice President of Energy Solutions, Claude Turmes (Greens).*

**Work Stream Issues from Industrial Energy Solution Creators**

Work stream issues from industrial energy solution creators highlight where to set in on the pathway towards an Energy Union:

| | |
|---|---|
| 3M | In buildings, there is a vast potential for energy savings through retrofitting measures. The EED and EPBD should have as an objective to scale up renovations and reach a nearly-zero energy building stock within the EU by 2050. Fiscal incentives and market-based mechanisms should be used to encourage greater use of insulation with a high thermal performance for buildings, either to keep heat in or heat out. Furthermore, EU Energy Union should also focus on improving the energy efficiency of the grid. Greater energy efficiency in energy transmission and distribution combines a high return on investment and allows sharing the efficiency effort between producers, distributors and end-users. Coordinated action is needed to deploy smart grids, meters and wider infrastructure. |
| GRUNDFOS | Thermal energy storage and distribution can significantly reduce fossil fuel dependence while at the same time acting as a buffer for intermittent electricity supply. Furthermore, it can easily integrate various sources of energy, not least including waste heat. This requires, however, a strengthened position for district energy solutions as well as a market, which values the flexibility provided by thermal energy storage. Grundfos supplies efficient pumping solutions for all parts of the value chain in thermal energy storage and distribution. |
| GE | Industrial Internet solutions developed by GE are already at work improving energy efficiency and resource productivity, resulting in energy and water savings, improved reliability, and greater levels of output for industrial machines. Since 2012, GE has released over 40 Industrial Internet Predictivity solutions with many more on the horizon. GE's Industrial Internet solutions are built on Predix, GE's software platform for the Industrial Internet. This is just the start of the Industrial Internet era, and there is vast untapped potential. Today's Industrial Internet solutions represent the beginning of a long journey to digitize the industrial system and maximize the efficient use of all industrial resources in the process. |
| DONG energy | DONG Energy is helping both its industrial and household consumers to reduce energy consumption:<br><br>With industry: Through around 100 climate partnerships, we work with our industrial partners to reduce their energy costs and CO2 emissions, to support investments in new renewable energy and to share knowledge. For instance, in 2013, Egetæpper used 21% less energy than they did in 2006. Their total CO2 savings amount to what 2,600 Danes emit in one year.<br><br>We work with our climate partners to save energy. And by earmarking certified, climate-friendly power from offshore wind farms or biogas, we make it possible for our partners to signal their willingness to support renewable energy.<br><br>With household consumers: We have developed an app that enables Danes to keep better track of their energy consumption and save energy. In 2015, we introduced a new customer promise, i.e. we promise our customers to help them to reduce their energy bill. We have changed our prices, so that our costs are covered through a fixed subscription. |

We sell power at cost price without a profit, which enables us, in a more credible manner, to help our customers to save energy.

It is surprising to many that 59% of an electricity bill in Denmark consists of taxes and duties, which we are obliged to collect on behalf of the Danish State. The money will go to finance welfare services such as schools, hospitals and roads. The rest is payment for energy. By saving energy, you reduce your electricity bill. The new app makes this much easier.

VELUX®

Broader context: As roof windows are installed in sloped constructions, the Uw value will be higher than for windows installed vertically. The convection in the gas between the glass panes is minimum for a vertical glazing, increases when the glazing starts sloping, and is at maximum with horizontal glazing. Convection also depends on the type of gas and cavity thickness. In general, the cavity is independent slope when the cavity thickness is around 10 mm or less. This has an effect on the energy performance of a building, since the heat loss through the roof window is increased due to the larger Uw value. On the other hand, the solar gain and daylight are also increased. Roof windows are also exposed to a larger part of the sky than facade windows and are normally installed without any constructive shadows, thus increasing the amount of daylight and solar gain (G-Value). Energy solutions related to energy efficiency provided by VELUX:

Dynamic windows systems: The g value of a combination of window and accessories (for example solar shading) is dynamic and can be changed according to indoor and outdoor conditions. The shading can be controlled by the user or automatically with VELUX ACTIVE Climate Control.

Coatings: By using coated glass, part of the solar gain is blocked by reducing the g value. Depending on the type of coating, different parts of the spectrum can be blocked. For solar protective coatings the goal is usually to block as much as possible of the near-infrared radiation and allow as much of the visible radiation as possible to penetrate the coating. For clear coatings, the goal is usually to allow as much of the total solar radiation as possible to penetrate the coating. Even clear uncoated glass will reduce some wavelengths more than others. Coated glass will always affect colour perception indoors.

ROCKWOOL®

A massive 41% of the energy consumed in Europe is used in buildings, most of it for heating, cooling and ventilation. Reducing the need to import gas for heating is essential for EU energy security and for the greenhouse gas reductions required under the Paris Agreement. ROCKWOOL provides innovative insulation solutions which can renovate buildings to a Nearly Zero Energy standard, meaning that the small remaining energy need can be fully met from renewable sources. Similarly, ROCKWOOL technical insulation helps to reduce energy use in the industry sector.

EDF

The EDF Group and its subsidiaries provide a large array of energy efficiency solutions, for small household customers to large industrial consumers. Our solutions aim at helping customers to monitor and control their consumption and increase savings. EDF provides financing solutions to enable all customers to increase their energy efficiency. Solutions cover for instance the energy mix optimization (increase decarbonisation), optimized operation of installations, process optimization, smart and green buildings and cities and real time operations. Our strategy mirrors the five pillars of the European Energy Union and we support a strong ETS as a centerpiece supported by EE and RES policies.

SIEMENS

Energy efficiency is Europe's first fuel. It drives decarbonisation, creates jobs and growth, supports Europe's technology leadership and contributes to our security of energy supply. The centre-piece of EU energy efficiency policy is the Energy Efficiency Directive (EED) – it should speed up electrification and drive energy efficiency in buildings, industrial processes, the electricity system, and heating and cooling.

Vestas

The EU now imports more than half of its energy, and often at a high and volatile price. Reducing dependence on imported fuels and ensure that Europe has "secure, affordable and climate-friendly energy" is therefore a key part of the EU Energy Union strategy. Wind energy is well-placed to deliver on this objective: it is a reliable, zero-carbon energy source, it is already today the cheapest form of new power generation capacity in Europe and has the potential to cover 28% of EU electricity demand by 2030. Considering this significant renewable electricity potential, electrification should rather be considered a way to decarbonize Europe. To put it short: electrification of the European economy, and in particular of the heating and transport sectors, is a cost-efficient way of decarbonizing the European energy sector whilst significantly reducing Europe's import bill.

Panasonic

Even if the new directives are well covering the energy performances of the new buildings in term of heating and energy efficiency, there is still not a long way to improve the efficiency of the old buildings. A holistic approach should be set due to the large variety of building typologies. Insulation of the buildings, replacement of the heating and cooling systems to more efficient systems, using Low-carbon electricity is a must. We should not forget the potential energy savings the internet of things (IOT) which could optimize the complete energy demand by sharing mass information and aggregate electricity/heating/water demand. The end customer (private or society) must be incentivized in order to accelerate such investments and improve the ROI of the infrastructures.

Solutions already exists, In 2016, Panasonic have developed a complete solution of connected smart heat pumps which are able to reduce up to 23% the energy consumption of old building by monitoring the building ecosystem, collecting weather forecast, electricity tariff, occupancy of the building and much more. This smart algorithms have been tested in several environment and are now been deployed with the new heat pumps.

e·on

Integrated customer solutions can be designed to meet the specific needs of each customer business. This flexible approach means to step into energy efficiency from any angle by adjusting energy consumption and raising individual benefits and comfort for the customer. It requires several technical tools like Data monitoring and analysis, Demand-side strategies and consulting, 24/7 remote control and optimization, Solution design and project management and Operation & maintenance. To increase the amount of those solutions EED should give clear and ambitious targets while leaving highest flexibility for the implementation. It should also focus on financing by improving private finance tools i.e. making efficiency bankable (private efficiency funds).

Schneider Electric

Maximizing Europe's energy efficiency potential could cut EU energy demand in half by 2050, compared with projections. In some sector such as commercial buildings, energy efficiency investments are profitable with paybacks within few years (investment on improving efficiency of electricity consumption in buildings have in average a return on investment of two years according to the International Energy Agency, IEA).

The good news is that today technologies are making sustainable building management much easier and cheaper. The combination of measurement, control and automation solutions can be a significant source of savings with low upfront investment and pay back times of only 2 to 5 years while facilitating grid connection and renewable energy integration. From 20% to 50% energy savings are typically being achieved by implementing such energy efficiency solutions in existing buildings, including schools, hotels, office buildings, and even homes.


According to the International Energy Agency (IEA), energy efficiency should deliver 50 percent of the GHG savings to be achieved by 2030. This makes energy efficiency the largest technological contributor to reducing global GHG emissions. Expanding energy efficiency globally simply makes good sense, it is cost-effective, and it pays back. Yet energy efficiency is not just a question of technology. We need an enabling policy framework that effectively tackles well-known market barriers, to accelerate investments in energy efficiency and maintain our competitive advantage. To obtain all the benefits of energy efficiency there needs to be focus on actions on both the demand side and the supply side.

On the supply side, district energy offers great solutions. District energy grids can integrate multiple sources of heat supply, from the industrial waste heat from a nearby CHP plant, a data center or a steel factory, to renewable heat supply. To give an example of the energy efficiency potential: Middlesbrough in the UK throws away 5 times more heat than the city. The Aalborg university estimates that the total waste heat potential in the EU is equivalent to the entire heating needs of residential and tertiary buildings. In addition, district energy grids can be useful to integrate volatile renewables, for example by storing excess electricity via large scale heat pumps. Yet district energy only accounts for 12-14% of the European heat demand.

On the demand side, there are very cost-effective ways to implement efficient solutions in buildings. There is a huge untapped savings potential in the upgrade of heating, cooling, ventilation and hot-water systems, the so called “technical building systems”. E.g. exchanging the current stock of manual radiator valves with thermostatic radiator valves would save €10 to 15 billion each year, and reduce gas and oil consumption by about 14 Mtoe. With a payback time of less than two years. Yet there are still over five hundred million manual valves installed in European buildings. We believe that new energy efficiency legislation should ensure that all citizens benefit from appropriately controlled and balanced buildings. This is a pre-requisite for putting consumers at the centre of the Energy Union.