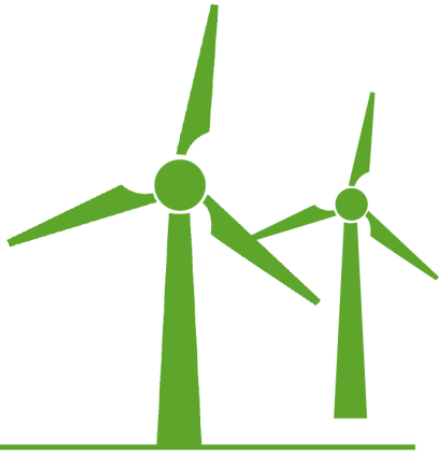

"Innovative Business Models for Market Uptake of Renewable Electricity unlocking the potential for flexibility in the Industrial Electricity Use"

# Minutes of the Workshop

## *"Innovative Business Models making use of Flexibility in Industrial Electricity Demand"*

**27th October 2015**
**Brussels**



IndustRE

# Acknowledgements

This report has been produced as part of the IndustRE project “Innovative business models for market uptake of renewable electricity unlocking the potential for flexibility in the industrial electricity use”. The logos of the partners cooperating in this project are shown below and information about them and the project is available under www.IndustRE.eu

This work has been carried out by the project teams in ECI and WIP

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# Acronyms

| | |
|---|---|
| BM | Business Model |
| BRP | Balancing Responsible Party |
| TOU | Time of Use |
| FID | Flexible Industrial Demand |
| VRE | Variable Renewable Energy |
| RTP | Real Time Pricing |

# 1. Introduction

The workshop on "Innovative Business Models making use of Flexibility in Industrial Electricity Demand" was organized as part of the IndustRE project consultation process on the 27 of October 2015 in Brussels in the Metals Conference Center (100 rue du Duc, 5th floor, 1150 Brussels, Belgium).

The aim of the workshop was to present a basic outline of the different possible business models for supplying variable renewable electricity to industrial users with a potential for flexibility in their demand and to get feedback on the applicability of these business models within the current regulatory and market framework.

The Annex I presents the list of participants and the Annex II the agenda of the workshop.

# 2. Summary of presentations

## *Introduction (WIP)*

The European electricity market is facing two major challenges. The first is the cost-effective integration of VRE into the power system. The second challenge is the rising electricity cost affecting the competitiveness of the European industry. Industrial electricity demand flexibility is an opportunity to deal with both challenges at the same time.

IndustRE brings together the large industry with the renewable energy community in order to find a common ground. We want to formulate Business Models, develop tools to facilitate their adoption, quantify the potential benefits and formulate policy recommendations.

All BMs come down to one basic model. The concept is to modify electricity consumption in response to external signals. The electricity consumer receives a financial benefit, while the grid operator or BRP enjoys a more balanced network. The financial benefit can be in terms of:

1. A reduced energy bill (in case the FID owner is reacting to market prices).

2. Extra revenue (in case the FID owner selling network services through a contract of a fixed duration with a grid operator or BRP, or via aggregators).

The grid operator or BRP enjoys a flatter load curve, or the opportunity to buy balancing services.

With the IndustRE project we have broken down this basic model into several a priori BMs in order to analyze them (but these components can be combined in many different ways).

We have:

A. Executed a stakeholder consultation to learn about their point of view on the BMs.

B. Analyzed the impact (barriers or incentives) of the regulatory and market framework on the BMs in each of the target countries (BE, FR, UK, DE, ES, IT).

## A. Stakeholder Consultation
*(ECI)*

The database for the stakeholder consultation contained more than 270 contacts covering all relevant groups: energy intensive industries, renewable energy stakeholders, system operators, regulators and policy makers, aggregators, NGOs and research institutes.

The first step was an online questionnaire disseminated to all contacts of the database. It was gauging to the applicability of the BMs in particular circumstances of the interviewee, and exploring ideas for possible future policy development. The second step is today's workshop, in which we hope to gather more input through an interactive discussion with approximately 40 invited experts. As a third step we will conduct a series of phone interviews for open-ended discussions with 10 to 15 selected stakeholders. These will enable deeper discussions on the barriers for applicability of the BMs, further explore potential changes in the market and regulatory framework, and clarify other open issues. We will take all this feedback into our synthesis which will be the input for the report on updated business models and identification of barriers.

## B1. The applicability of Business Models within the current Regulatory and Market Framework (1)
*(Universidad Pontificia Comillas)*

First we investigated the BMs in which owners of FID react to electricity market prices in order to reduce their energy bill. We have broken down this model into the following sub-models:

- TOU retail prices: a few different price levels depending on the time of the day.
- Dynamic retail prices in a contract between:
  - The energy supplier and the owner of FID.
  - The energy supplier owning VRE resources and the owner of FID.
  - The energy supplier and the owner of FID including on-site VRE resources.
- The owner of FID (with/without on-site VRE) is exposed to wholesale RTP (reacting to the actual situation of supply and demand on each moment in time -week ahead, day ahead, intraday market).
- The owner of FID (with/without on-site VRE) reducing peak load in response to network charges.

For each of these BMs we investigated which barriers or incentives the market and regulatory framework provides in each of the target countries (BE, FR, UK, DE, ES, IT).

More specifically we investigated the impact of:

- Retail electricity prices for industrial consumers.
- The relative relevance of all the (market based or regulated) price components (e.g. energy, network charges, etc):
  - The network tariffs (very relevant).
  - Incentives to self-consumption.
  - The direct access of FID to the market.
- VRE participation in the market:

- Competitiveness versus support schemes.
- Bilateral agreements with consumers.

## *B2. The applicability of Business Models within the current Regulatory and Market Framework (2)*

*(Universidad Pontificia Comillas)*

Secondly we investigated the BMs in which owners of FID offer flexibility system services through contracts of a fixed duration with grid operators or BRPs (sometimes via aggregators). We have broken down this model into the following sub-models:

- The FID owner offering reserve capacity to the System Operator for frequency control
- The FID owner responding to signals of the concerned BRP
- Other services to the system (e.g. capacity markets, interruptibility, DSO services, etc.)

Also for these BMs we investigated which barriers or incentives the market and regulatory framework provides in each of the target countries. More specifically we investigated the impact of:

- Balancing responsibilities assigned to market players (is the VRE operator responsible or not?).
- The definition and implementation of flexibility markets and services (secondary and tertiary reserve, balancing, capacity markets, DSO network services, etc.).
- Requirements and technical conditions for FID participation in flexibility markets.

## *Model Contracts*

*(Becker Büttner Held)*

We investigated how the bilateral contracts between FID owners and VRE owners could be drafted. Our main objectives are the following:

- Show what is possible or not, using the pre-defined Business Models as a basis.
- Create instruments to allow for easier implementation, such as check-lists of what needs to be considered.
- Provide a basis for discussion, e.g. model contracts.
- Clarify Member State particularities (different legal systems requiring for different contractual settings)-

Our main conclusions so far are the following:

- Different business models require different contractual settings. The particular interests of the concerned parties and particularities of each project make it impossible to create a "one size fits all" contract.
- BUT: examples and check-lists can form a basis for negotiations and for drafting the individual contracts. To do so, check-lists are more practical, while model contracts provide more insight.

- Differences in national legislation need to be addressed as well. Summaries of the differences and particularities would be welcome.

# 3. Essential ideas from the panel member speeches

## *Hans De Keulenaer (ECI)*

We should look at the issue of flexibility from a more conceptual level and with a longer time perspective. What will happen if we are evolving towards an electricity system with very large penetration of renewables? The planning cycle as we know it today, defining peak, shoulder and base-load power stations taking renewable generation into account as negative demand, will not function anymore. If we look at the classical monotone diagram of system net demand, and we increase the penetration of renewables, we see that not only the peak gets sharper, but also the tail of over-production gets longer. What we will need is a system of "flexibility mapping" rather than "capacity planning".

The good news is that there is a lot of potential flexibility in the system. However, the planning will have to become more local. Renewable Energy communities, managing and balancing their own renewables, are the future. Germany is already familiar with this concept. This will result in an increased decentralization of the system.

Finally the role electrothermal technologies could play in making the process industries more flexible was highlighted.

## *Peter Claes (International Federation of Industrial Energy Consumers)*

I can confirm that there is a business case for Demand Response in industry. This business case stems from the ability of demand response to cope with temporary electricity shortages at a significantly lower overall cost than new or even reserve generation capacity; the intermittency of VREs contributes to the existence of such power shortages. We developed a series of recommendations to remove the legal and technical barriers that are still hampering this market to take off.

However, I also would like to mention two critical points.

First, the potential of Industrial Demand Response is limited in terms of the percentage of the peak power and the number of hours per year. Industrial companies are there to produce industrial goods, which is their core business. This is in contrast to generating companies, whose main business it is to produce electricity. This means that industry can never become the one and only solution to the intermittency of VREs. Furthermore, industrial demand response can help cope with temporary shortages, but is not a good solution for structural generation shortages.

Second, we have to keep the system cost in mind. If Demand Response comes to the favor of subsidized renewable energy, it will result in driving up the system cost even more in the end. To avoid this, renewables should become competitive with other types of generation first, before developing a mature market for DR.

## *Ivan Pineda (European Wind Energy Association)*

Wind energy and other renewables have come a long way to reduce their cost. Moreover, it is in the aim of the EU to proceed with the transformation of our energy system and with the de-carbonization of our economy. Consequently, the need for flexibility services will continue to grow. There is enough flexibility around, so the question is not so much where to find it, but rather where to find the most cost-effective solutions.

- We should first optimize the existing generation assets.
- Secondly we should make maximum advantage of a large interconnected grid: trading and exchanging energy along this grid can flatten out variability.
- In the third place, the system can be changed fundamentally by creating a market for demand response (DR). This should start with the energy intensive industries, since they contain most of the low hanging fruit for DR. Only in a later phase, DR can also be developed for smaller consumers.

The Wind Industry would like to find the best ways to co-operate with energy intensive industry, because we believe that through such a partnership, supported by an appropriate regulation, we can find the most cost-effective way to decarbonize our economy. This is in the advantage of industry as well, because the system as it is now, with its high dependency on imported fossil fuels, has no control of the cost. This means that we will have to evolve towards an energy system consisting largely of local renewables. Industry as well as smaller consumers will need to get grip on such a system in order to use it to their own advantage.

EWEA pointed out at ancillary services and different processes in the industry in order to find flexibility.

## *Hendrik Dam (European Commission DG Energy)*

The discussions on the applicability of the BMs in the current regulatory framework could become obsolete soon. It is the clear intention of the Commission to propose a new legislative package on electricity market design by the end of 2016. It will take some time to take it through, but it is in the pipeline. The good news is that it is in the aim of the EC to include all possible means of flexibility, starting with the most cost-effective ones (the low hanging fruit). If we want to realize the 2020 and 2030 policy framework and its renewable targets, we will need flexibility resources. The flexibility resource can be situated at distribution and at transmission level. On the level of the energy intensive industry, the debate has already started and there is already an active market existing. The larger challenge will be to include also the residential level, as well as the SMEs (which are somewhat overlooked in this whole story at the moment). The new market design framework will be aligned with several other policy objectives, such as:

1. The Energy Union, placing consumers and their needs at the center of the system.
2. A review of the Energy Efficiency Directive to align them with the 2030 objectives.
3. The Heating and Cooling policy strategy. H & C represents 46% of the EU energy consumption and contains huge resources for (often cheap and easily available) flexibility.

At the same time the EC will continue its support to the R&D chapter of Horizon 2020, which is a key success factor for energy system transformation. We need large scale demonstration projects to attract investors towards the innovations. It is a main goal to build more relevant business cases of

systems that combine energy efficiency with renewables. If we manage to do so, we will be well on the way to the objectives of 2030.

# 4. Essential ideas from the discussion rounds

## *Questions asked to the participants*

On the BM reducing energy bills:

1. Assuming there are no incentives for self-consumption, would it be interesting for FID to install on-site VRE?
2. Does the current retail price structure make it attractive to install on-site VRE for FID?
3. Under which conditions do you foresight that long-term bilateral contracts between VRE and FID would happen?
4. Is current energy price volatility in the wholesale market attractive for real time response by FID?

On the BM with additional revenue from network services:

1. Is it technically feasible for FID to provide capacity reserve in the timeframe of seconds to minutes? Is there a real business opportunity in it?
2. Do increasing volumes of RES generation require more balancing energy? Can FID compete with current balancing providers?
3. Do current interruptibility mechanisms represent an important revenue for FID? Is there any business opportunity for FID to participate in capacity remuneration mechanisms?

## *Reactions of the participants*

### *On long-term contracts and projects*

- Some industrial stakeholders expressed their preference to get away from long term contracts. Others believe these can help increase visibility for industrial consumers on electricity pricing, thus positively influencing the investment climate for new industrial activities.
- The renewable energy sector, however, reminded that such long term contracts used to be very common, namely between industry and nuclear power operators. Today, similar agreements with renewable energy providers are not uncommon in many parts of the world, e.g. the Chilean mining industry with solar farms. They wondered what makes the circumstances different in Europe today. Indeed, such long-term contracts with locked-in energy prices could be interesting for industrial companies to build in more security towards the volatile energy prices on the market (hedging) provided they can be matched with the consumption profile of the industrial process.
- The industrial stakeholders pointed out that they have no principal objections against long-term agreements, but that historically such long-term contracts are considered to bring uncertainty, because regulation and markets change over the years. This shifts the financial positions of the

contractual parties and may finally result in a significant loss for one of them. However, they see no reason why this perception might not change in the future and agreements can be found between the energy providers and energy users.

- Some energy intensive companies do invest in flexibility and self-consumption on the longer term. The example of Google was brought up, who constructed three new data centres in Finland and wind farms in Sweden to provide them with electricity. Industrial stakeholders, however, expressed their reservation as to call Google an energy intensive industry, it is rather part of the service industry, for which redundancy is very important, but energy purchasing is not of strategic importance for their business model.

## *On potential conflicts of interest*

- If flexibility services are needed to make VREs produce an output that looks more like base load, industries that mainly consume base load will not be able to provide it to a large extent.
- If the installations consume mainly base load, and you make this load flexible, the energy efficiency of the industrial plant might go down. The overall energy efficiency of the installation is an important part of the equation, since there are penalties if the energy efficiency targets are not achieved.
- If both energy efficiency improvements and flexibility services would be entirely subjected to a market system, this conflict of interest would solve itself – companies would give preference to EE or flexibility depending on the market price (and thus the need) of each of them. But that is not the case, since energy efficiency regulation at the moment is all about industrial companies reaching the targets. In other words, it is a system of all (reaching the target) or nothing at all (penalties for failing to reach the target), and not a dynamic system of supply and demand such as the flexibility market. As a result, the comparison of the financial benefits of energy efficiency investments versus investments in flexibility services does not perfectly reflect the comparison of their overall benefits for the electricity system.
- Depending on the way grid fees are calculated for the end user it is possible that they will affect the decision of the industry to activate flexibility as a response to energy prices or other market signals, not necessarily in the most cost effective way from the perspective of the overall power system.

## *On the market potential of flexibility, and the various flexibility resources*

- The paper industry is mainly consuming base load. However, this does not mean that they cannot provide a limited amount of flexibility services, for instance through the local CHP units (including dispatchable biomass that covers 60% of the industry's total energy consumption). On-site electricity generation represents roughly 50% of the paper industry's electricity demand (52 TWh out of 105 TWh) with 96.4% of it coming from CHP.
- The chemical industry clearly expressed its interest to become part of the flexibility story, but at the same time drew the attention to the fact that they are not the silver bullet the wind

industry is looking for. They explained that the sector is very diverse. Some chemical industries also consume mainly base load, but others have much more potential for variation.

- Renewable energy stakeholders wanted to highlight the fact that flexibility comes in many different kinds of products, not only in straight power cuts. Consequently, providing flexibility services does not need to be equivalent to decreasing or shifting the production output. Very often, there are energy buffers in the service functions of the industrial plant (compressed air, cooling towers, steam production etc).
- Many stakeholders agree on the fact that for some types of continuous production, there will never be a significant potential for DR.

## *On energy storage*

- IndustRE does not specifically refer to energy storage. It is just one of the potential sources of flexibility. The project does not study the nature of those sources, since they are very much dependent on the type of industry. The aim of the IndustRE project is to assess the size of its total potential and to investigate how this flexibility can be used.
- Stakeholders from the renewable industry pointed out that for self-consumers, there is often still a barrier for using energy storage, since it might lead to a loss of the incentives for self-consumption.
- According to industrial consumers, large investments in energy storage at industrial sites do not pay off yet. This shows that it is all still in a research phase and the Business Models are not up and ready yet. However, they believe that energy storage will play a role in the DR and flexibility services of the future.

## *On real time response and ancillary grid balancing services*

- IndustRE is studying two flexibility products. First, reactions to market prices on a week ahead, day ahead, or intra-day basis. And second, the provision of services to the electricity system. For the first category, typical reaction times are quite long (several hours to days), while for the second it is shorter (hours to minutes, even to seconds depending on the product). The IndustRE project has not made an assessment yet of the various flexibility products and their reaction times that could be offered by the energy intensive industry, and would welcome any support in this perspective.
- IndustRE acknowledges that whether an industrial plant can participate in a system of real time response depends on many parameters and should therefore be assessed case by case. However, it is not a necessary condition to offer a reaction on a 15 minutes timeframe. In some countries there are many companies that do day-to-day planning according to the electricity prices (e.g. Norway).
- An aggregator had the experience that some industrial processes can react within seconds or minutes of time, and sees a high potential availability of such services. This opinion was based on a pilot project with several industrial partners for providing primary reserve (reaction time <30s).

- According to representatives of the renewable energy sector, the ability of VRE to provide grid balancing services should also be looked at, especially in the "on-site VRE" model. There's experience on this gained through an EU funded project (RE Services) that evaluated which ancillary services can be provided and how aggregation can improve this model. IndustRE and wind energy sector representatives expressed their willingness to collaborate on this topic.

## *On self-consumption*

- The paper industry pointed to the fact that the potential production of on-site VREs is still too small to cover a substantial part of the consumption (certainly with solar PV – with wind it might be a different story, but there other issues might arise such as land availability or public acceptance). Moreover, they will have to be connected to the LV or MV grid, while the usual connection of paper plants is to the HV grid.
- An IndustRE representative explained that to study the barriers and incentives for self-consumption, you have to look at the tariff structure, and that can vary a lot, even among categories of consumers in one country. Moreover, it is not always transparent. In general terms you can say that volumetric network charges are an incentive, but they are less and less applied. If self-consumption used to be a free ride, this is not the case anymore. In Spain now the grid cost is even totally independent from the amount of self-consumption.
- BBH reminded the workshop participants that some countries have a tradition with self-consumption, such as Germany. In Germany today 11% of final electricity use is from self-consumption, or 62 TWh/year, of which 2 TWh/year is from PV units. Trends to favor self-consumption come and go. At the beginning of the market liberalization in the 1990ties, industry in Germany wanted to get rid of their on-site CHP installations because they believed that it would become much cheaper to buy this energy from the market players. Since the renewable energy boom, the trend of self-consumption has come back. However, once you are connected to the public grid, it becomes a totally different story. But local "closed distribution grids" often provide a good solution for avoiding grid connection. The German Federal Grid Agency just issued a consultation report (in German), which is a first step towards a manual for self-consumption (and it already counts 80 pages). It has structured all possible mischievous usages and opportunities you can find concerning auto-production in the German context.

## *On aggregators*

- IndustRE representatives remarked that all BMs studied in the project can function with or without aggregation. Consequently, it doesn't make a fundamental difference for what the project wanted to investigate.
- An aggregator drew attention to the fact that aggregation can put more value on the table for the industrial companies. Even for big industry the aggregation of DR services can be interesting. It can create an additional layer of value. Many different BMs are possible for aggregation, and aggregators can also install VREs on industrial sites and manage the output.

## *On the electrification of process heating*

- A copper industry representative points out that the electrification of heating systems can create new opportunities for DR, since heating systems can often provide a substantial energy buffer. Electrical process heating systems (induction, infrared, microwave, electron beam etc.) are available today and are often highly efficient. They enable to heat up just as much as you need and precisely where you need. Combined with storage systems it can be an additional source of DR.
- The European Commission agrees with this, as long as it is done in a smart way. With heat pumps for example, not with classical resistance heating.
- Renewable Heating and Cooling sector agrees that electric process heating will be part of the mix, among other types of solutions.

## *On design for flexibility*

- With the renewable targets of the EU, the creation of a flexibility market will be unavoidable on the medium term. A representative from a research company was wondering whether this provokes a trend in industry to design their processes for increased flexibility? And whether the EC offers any kind of support to design for flexibility?
- Industrial consumers confirmed that there is a huge need for raising awareness in the industry about this topic. Even though we have been liberalizing the energy market already for more than 20 years now, before that we had 50 years of regulation in which demand response was not even discussed - it was up to the regulator to make sure that there was a reserve margin for capacity. So it might take some time for industry to adapt to the new paradigms. Secondly, for DR to develop there needs to be a shortage first. One of the issues is whether countries will still stick to the traditional balancing reserve margin. DR products need to be able to cover the costs, and this will require relatively high market prices. It needs a market environment in order to fly. Nevertheless, more and more industrial companies are indeed thinking about designing for flexibility. But it will never be the case that a company will build a plant at double capacity, in order to run at double capacity in summer and not at all in winter, for instance.
- A research company representative reminded us to the fact that generation has to build reserve capacity as well, which also has an investment cost. Consequently, the question is where this investment will be the cheapest.
- Industrial stakeholders, however, drew the attention to the fact that, in contrast to generation companies, industrial companies operate in a global market. If the costs for industry become too high, companies will go away to other parts of the world.
- All stakeholders agreed on the fact that we need demand flexibility without shooting down industrial plants. According to a representative of the copper industry, this means that we need to build-in incentives at the demand side, while at the moment, nearly all of the incentives are located at the generation side.

## *On the system cost*

- Industrial stakeholders stressed the concern that we have to keep the system cost in mind. If Demand Response results in an increase of subsidized renewable energy, it will in the end drive up the system cost. It is their opinion that renewables should become competitive with other types of generation first, before DR can develop in the market.
- The renewable energy sector is confident that the decarbonization of the EU economy will happen anyway, which will lead to a high penetration of renewables, which will automatically create a market for flexibility services. They expressed the aim to look at the low hanging fruit for the provision of flexibility, which is probably situated in the energy intensive industry.
- Industrial stakeholders are prudent in supporting the energy market changes, because they play in a global market and have to compete with countries that do not go that far in the energy transition.
- An IndustRE representative asked the workshop participants to look at the issue from another angle. Indeed, it is the job of industry to produce, like it is the job of generation to generate. But you could generalize even more and say: the job of both of them is to maintain a profitable business. That is why IndustRE focusses on Business Models. Even if flexibility is not a concern of the industry, if the demand is there and it has a value, there will be other parties willing to come and make it happen: aggregators, service providers, suppliers of energy services. That's why IndustRE wants to identify the opportunities and design the market tools to make it happen.
- A representative from the EC explained that an Energy Union Package cornerstone is to make the energy policies that support growth of industry and employment. It is by no means a goal to close down energy intensive industries by energy policies. DR has to be a voluntary action, so that industry can clearly judge and see its own interest to participate. What they gain from it should be considered as part of their revenue. We should take the total value into consideration.

# Annex I – List of Participants

| Advisory Board Members | |
|---|---|
| Arrowsmith, Greg | EUREC |
| Bhagwat, Mukund | Aurubis |
| Claes, Peter | IFIEC |
| de Moura Torres, Marcelo | SEDC |
| Parker, Guy | CEFIC |
| Pineda, Ivan | EWEA |
| Vernik, Jernej | Eurometaux |

| External Stakeholders | |
|---|---|
| Bornas Cayuela, Damian | INEA |
| Cantu, Matteo | Enel |
| Caroff, Pierre | ENGIE |
| Cesson, Christophe | ACER |
| Corbetta, Giorgio | EWEA |
| Dam, Henrik | European Commission |
| Dewachter, Bruno | ECI |
| Dossche, Luc | REstore |
| Dufour, Manon | E3G |
| Lanfranconi, Cristian | CEER |
| Mandatova, Pavla | EURELECTRIC |
| Miccinilli, Maximo | European Aluminium |
| Muruais, Rafael | ACER |
| Parker-Hedderman, Aoife | Commission for Energy Regulation |
| Rega, Nicola | CEPI |
| Roesch, Alexandre | SolarPower Europe |
| Schell, Peter | REstore |
| Tudoroiu-Lakavice, Alexandra | COGEN Europe |
| Van den Bosch, Sven | Eandis |
| Vandevenne, Alain | Energy Pool |
| Weiker, Christine | ECSLA |

| IndustRE consortium partners | |
|---|---|
| Caporuscio, Annarita | SER |
| De Keulenaer, Hans | ECI |
| Fouquet, Dörte | BBH |
| Gómez, Tomás | Comillas |
| Jezdinsky, Tomas | ECI |
| Maidonis, Thomas | WIP |
| Nuño, Fernando | ECI |
| Papapetrou, Michael | WIP |
| Vallés Rodríguez, Mercedes | Comillas |
| Van Deun, Steven | VITO |
| Vasilakos Konstantinidis, Christos | Imperial |
| Verbeeck, Jef | VITO |
| Virag, Ana | VITO |
| Weiss, Ingrid | WIP |

# Annex II – Agenda of the workshop

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## Workshop on Innovative Business Models making use of Flexibility in Industrial Electricity Demand

***27 October 2015, Brussels***

***Metals Conference Center***

*100 rue du Duc, 5th floor, 1150 Brussels, Belgium*

Variable renewable energy has some drawbacks for its integration in power systems and markets like variability, restricted predictability and firmness that impose extra requirements and costs. The flexibility of the industrial electricity demand has been identified as a potential that - through innovative business models - can facilitate the integration of variable renewable energy, while reducing electricity costs for the industry.

**This workshop will present a basic outline of the different possible business models for supplying variable renewable electricity to industrial users with a potential for flexibility in their demand. The discussion will focus on the applicability of these business models within the current regulatory and market framework.**

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| 12:30<br>13:30 | Arrival and networking lunch | |
| 13:30<br>13:45 | Introduction<br>*The IndustRE approach on making use of Flexible Industrial Demand* | Michael Papapetrou<br>(WIP Renewable Energies) |
| 13:45<br>14:00 | Stakeholder Consultation<br>*Creating win-win situations for Energy Intensive Industries and Variable Renewable Energy Plant Operators* | Fernando Nuño<br>(European Copper Institute) |
| 14:00<br>14:50 | Interactive Discussion on the Applicability of Business Models within the current Regulatory & Market Framework (Part I)<br>*Innovative Business Models making use of opportunities to reduce the Energy Bill of Energy Intensive Industries* | Tomas Gomez & Mercedes Vallés Rodríguez<br>(Institute for Research in Technology - Universidad Pontificia Comillas) |
| 14:50<br>15:10 | Model Contracts<br>*Possibilities for Bilateral Contracts between Energy Intensive Industries and Variable Renewable Energy Plant Operators* | Dörte Fouquet<br>(Becker Büttner Held) |
| 15:10<br>15:30 | Coffee break | |
| 15:30<br>16:20 | Interactive Discussion on the Applicability of Business Models within the current Regulatory & Market Framework (Part II)<br>*Innovative Business Models offering Services to the Power Market, creating Additional Revenue Streams for Energy Intensive Industries* | Tomas Gomez & Mercedes Vallés Rodríguez<br>(Institute for Research in Technology - Universidad Pontificia Comillas) |
| 16:20<br>17:00 | Panel Discussion:<br>• Henrik Dam, Policy Officer, European Commission, DG Energy,Unit C2<br>• Peter Claes, Vice-President, International Federation of Industrial Energy Consumers<br>• Ivan Pineda, Director for Public Affairs, European Wind Energy Association<br>• Hans de Keulenaer, Director, Energy & Electricity, European Copper Institute | Discussion moderated by Michael Papapetrou<br>(WIP Renewable Energies) |

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