

## Minutes of the PV Financing Workshop:

# “Suitable Business Models & Financial Schemes for PV development in Europe”

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**Date:** 19. February 2016

**Venue:** ibis Brussels Centre Sainte Catherine  
Rue Joseph Plateau Straat 2 | B-1000 Brussels



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## Minutes of the workshop

19. February 2016, from 9 am to 15.30 pm

Session	Topic & Outcomes
<p><b>1</b></p>	<p><b>Welcome and Introducing PV Financing – project outcomes</b> Luz Aguilar – BSW Solar (project coordinator)</p> <p>Luz Aguilar welcomed the audience and gave a brief introduction of the project structure. She presented the latest result of the project until month 13.</p>
<p><b>2</b></p>	<p><b>Opportunities and challenges of self-consumption in PV in the distributed segments</b> Gaëtan Masson – Director, Becquerel Institute</p> <p>Europe represents 16% of the global PV market. PV is going to grow, but maybe differently in Europe than in other places. There are 2 different PV worlds, the Prosumer one, the Producer one (Pure players, grid injection, PPAs, competition with utilities).</p> <p>PV was designed for distributed applications in the beginning and very quickly moved to the size of utility scale fast development outside Europe. Slower development of rooftop PV than utility scale PV, this is because legislation is more complex for the first one. Also a question of setting up the right applications.</p> <p>Why has the market declined so fast in Europe? Because of complexity of regulation on self-consumption.</p> <p>Large part of the market will be driven by self-consumption. How much does it represent? 4% of electricity of Europe comes from PV, 1,5% are self-consumed. So most of it is injected into the grid.</p> <p>Prosumers: repay the PV system thanks to savings on the electricity bill and to selling of excess electricity on the market. Net metering = self-consumption + market price + FIT/ FIP. Capex of PV system + Opex of PV system should be below reduction of elec bill and sales to the grid.</p> <p>Energy part / grid cost part / taxes should be reduced in the same way as consumption of electricity coming from the grid is reduced also. In almost all countries there is a discussion on what part of the bill can be reduced.</p> <p>In Austria, there is a tax on kwh of self-consumed electricity 1,5c/kWh.</p> <p>Sales of PV electricity: how much can we reasonably expect for the electricity we are injecting into the grid.</p> <p>A certain number of countries are transforming the rem from Fit to FIP. Premium on top of the whole sale market product. A variable premium. In the end same effect in the end for the prosumer than the Fit. The cost for the community is reduced in a visible way because we pay only the premium. But difficult to negotiate on self if small producer. Cost of intermediation (margin taken from the intermediate). Much more complex system. Americans are defining a value for solar electricity (how to define a FIT, paradoxical!)</p>

Self-consumption ratio should be increased. For ex in France, you are not competitive with 50% ratio, but you are with a 75% ratio.

What are the solutions?

- Demand Side Management, I could shift my demand to when PV is producing, not easy but it's a possibility, shift a part of consumption to when PV is producing.
- Electricity Storage: Tesla Batteries, idea seems very simple, increase your self-consumption ratio to 70%. Experienced a very dramatic decline in PV systems, now are we going to add the cost of batteries when we have difficulties to finance PV? One of the systems in the future, won't change the market now.
- Other Uses (Out of load): increasing the load with new uses, H&C, Transport.

A need for regulations, self-consumption will be very hard to set up in some countries.

- SC is legally permitted?
- Savings on the variable price of electricity from the grid
- Additional costs associated to self-consumption such as fees or taxes may exist
- How to value excess electricity?
- Maximum timeframe for consumption?

Electricity is netted in real time, not 15 mn later or every hour, or every month (case of net metering). Question which are not solved now and are very important for the future of self-consumption. (cf IEA PVPS report to be published in the next month).

Compare between countries, 5 different categories of self-consumption.

1. FiT, exporting everything im producing and getting revenue
2. Self-Consumption with constraints – self-consume and save but how much do I get for excess? Zero – worst possible case e.g Spain
3. Self-Consumption + FiT or GC – save money on my energy bill, below retail price electricity (9/10 cents) Most common system.
4. Net-Billing – Italy, Portugal but not as interesting as net metering
5. Net-Metering – the retail price for excess electricity, very simple system.
6. Self- Consumption + Premium – UK example, before Grid Parity premium above the slf consumption revenue and retail price for excess use to be higher than the retail price.

We should stop talking about grid parity as an important milestone: it does not mean I am going to be competitive; I still need to have a premium. Net metering system has been installed in many countries when grid parity is reached. Then switch to a valorisation of excess electricity below retail price and over market price.

Innovative business models – ownership and location – see slide

5 proposals

1. Guarantee the right to SC without additional taxes
2. Compensation without limits of taxes and levies for prosumers
3. Variable grid costs shouldn't be paid until PV reaches a critical penetration
4. Grandfathering clauses for existing systems
5. Electricity markets are unstable, favour a stable value for solar electricity injected.

**Q&A:**

Every building should be self-sustained in terms of energy. PV should be put anyway, not a question of having a profit or not but of having a self-sustained building. Elec is better stored, then transformed into heat and then stored.

*Why should building be independent, question is to better integrate the PV production and decrease in some way the evening peak. Look for the system optimum and not the local optimum. Should not push to the local storage but to push the optimisation of the system. There are ways to produce heat more efficiently than to store in electricity.*

For which application segment (please describe the application segment) self-consumption would be best suited.

*Services and industry's*

How to handle the risk of future taxes on self-consumed PV electricity.

*How can you deal with politicians that don't have any interest? Compensation in grid taxes, non-taxation. Not so complex should be done at the European level. I don't think much will change in the next few years.*

Is the future outlook negative, for instance due to a strong lobbying action by the large utilities to limit the application of distributed systems and self-consumption.

*Conventional utilities will delay as much as possible. All the opinion polls, renewables are very popular. A lot of people are in favour of the transition but who's going to start first?*

*Add to the utilities the politicians. Germany, solar has taken away the revenue of taxing fossil fuels etc. Politicians are trying to keep the old system.*

What do we need as prosumers to help PV develop?

*It's acceptable not to pay balancing grid costs at the moment as it's so small. Wait 15 years and have a clear roadmap and then we will pay.*

**Evolution of the UK market for ground mounted solar**

Giles Clark - CEO Primrose Solar

Summary of Primrose solar, founded in 2013.

Evolution of UK subsidy regimes, rooftop was easier, ground mounted slower to start in Cornwall. (see slide )

FIT cut in 2011 – caused a pause in domestic. Government have underestimated subsidy appetite in the UK.

UK is currently at 10GW might get to 12GW end of Q1. Estimated total capex to date £12-15bn – 2/3rds ground mounted.

Who invests in UK solar?

- Tax advantages
- Yieldco
- Private Equity
- Community projects with crowdfunding
- EPCs
- Developers

Markets more mature, people more likely to take the risk of construction – 6GW installed in 2014-2015.

Pension funds are under-represented, Canadian Pension Fund.

Evolution – Falling Wholesale Power.

Lost 30% of revenue in 3 years. In 2014 H1 long term PPA available at £50+/MWhr compared to £35/MWhr 2016. Spoked investors as we use to think it was predictable. More conscious of the unpredictability.

Grid is very congested in the UK.

New models post subsidy

At a capital cost of £900k/MWp, a project needs revenue of about £80+/MWhr to be viable.

Solar investors in the UK are looking at new ways to survive (see slide)

Additional revenue from grid balancing and storage. Storage isn't economically viable.

What's next?

- India? Find new markets outside of the UK
- Very little manufacturing or export capacity
- Smart developers moving into real estate – eco homes
- Not obvious that the skills needed to succeed in the UK translate overseas
- Few large markets Ireland – won't be enough
- Industry will shift away from construction into asset management

	<ul style="list-style-type: none"> <li>• Restart in 2-5 years</li> <li>• Investor confidence which depends on no retroactive adjustments to grandfathering subsidies</li> </ul> <ol style="list-style-type: none"> <li>1. Lessons learnt from UK for other EU countries  <i>Double dipping, tax reliefs. Only other country was Greece – not a good precedent. If you want to trigger a boom at a non-sunny country give lots of taxes. Set of incentives that deliver solar in a way the country needs. We don't need solar in Cornwall; make sure it is in the right location. Would prevent grid issues. Locating solar closer to demand and population. Brownfield land e.g airspaces – perfect for solar.</i>  <i>We use to do business in Israel – learnt from Spain. Germany – include well-published mechanisms, to manage the subsidies downwards.</i> </li> <li>2. Do you believe companies will go abroad?  <i>Think they will lose money. Solarcentury is well established and has been very successful. People will try and do the same and won't have the same success. Lots of people will fail.</i> </li> <li>3. How will the UK meet its EU target? Will it cause pressure?  <i>Short term, government might like to be criticised by the EU. They don't want to miss the targets but they are thinking in the short term. Hinckley won't be ready by 2020 and coal will start shutting down. The UK needs more wind as it generates more power in the winter when demand is high. New build area has a future potential, UK need more housing.</i> </li> </ol>
	Lunch
4	<p><b>Selling electricity from PV directly to third parties: opportunities and obstacles in Germany</b>          Dr. Steffen Herz (SH), Lawyer and Partner at von Bredow Valentin Herz (vBVH), Berlin</p> <p><u>Facts and figures of new PV installations in Germany:</u> SH presented first an overview of the PV market in Germany:</p> <p>The market driver in new PV installations is still the FIT. Its level was still quite interesting in 2012 and 2013 but it fell in 2014 and 2015. Reasons for low installation levels in 2014 and 2015 were related to legal changes. In August 2014, the new RES law came into effect; there was a run in July 2014 to get the former conditions. The same happened in August 2015 and in December 2015. After September, FIT was granted through Call For Tenders (CFT). And since the 1<sup>st</sup> January 2016, installations between 100 and 500 kWp have been obliged to sell their electricity through the power market. The installation targets were missed 2 years in a row (2014 and 2015). The whole industry is looking for new business models.</p> <p><u>New models, legal framework:</u></p> <p>According to the German law, the RESA (renewable energy source act), if you supply a consumer (two person relation) you become an energy supplier, which brings a lot of constraints: the energy suppliers need to report their accounts to the fiscal authorities, they need to register for certificates, in order to be able to label it as green electricity, otherwise this electricity is disclosed as the German mix.</p> <p>The three principles of RESA are priority access, priority purchase and transmission and guaranteed fixed minimum feed in fees. Costs incurred because of the FIT are surcharged to the consumers (6,3 €c per kWh). RESA 2014 brought several changes: new funding scheme, direct marketing as a rule (to a trader, otherwise only 80% of the guaranteed fee you are entitled to by law). From 2017 on, all funding will be granted</p>

through tenders, except if under 100kwp (the number that is discussed for the moment, but it is not a fact that this is the size that will be kept for the exception). The RESA 2014 also brought about the deletion of the Solar green power privilege: no further reduction of 2ct/kWh will be applied on the RESA surcharge for the local direct selling of solar power.

This model, also called the tenant power, is understood (if not precisely defined) as decentralised produced power from PV plants being used on site by commercial or private users of a facility. It implies that there is no feeding into the grid. Plants cannot benefit from FiT or from other direct subsidies for the electricity produced.

This model supposes numerous types of legal relations: 1 contract with the consumers, 1 to use the roof, 1 to feed in extra electricity to the grid, 1 to sell the electricity on the market through the trader, 1 with a measuring operator, 1 to sell to the energy supplier. So the model is quite complicated.

The components of the cost of electricity in Germany are the following: 28,8 % energy and supply / 22,2 % Network costs / taxes and levies 50%. One can be exempted from the energy tax (2,05ct/kWh) if one sells from plants smaller than 2MW (which is the case for PV installations on buildings) and from other taxes and grid costs if one doesn't use the grid. In the case of the direct selling scheme, this means all in all that one can save 10,33 ct per kWh. This makes it possible to have this model in private apartments; one can offer an electricity price that is better than what one can get from the network. There are 1-1,5 million private or commercial apartment buildings in Germany. The potential for direct selling is evaluated 3,4 mln apartments (=20% of the flats in apartment buildings). And according to a recent pole, the interest in the real estate industry is quite important: 60% of the interviewed people declare some interest. The major barrier for the spreading of the model would be information, not the economic model, even if one won't earn a fortune (it should be understood as a 0 cost operation, rather than as a source of revenue).

*Comment from the audience: many parties have to be involved to make the model happen, plus the tax situation is very complex, and the Business Model (BM) does not seem very convincing, so this makes the model not easy to implement. It looks like it is not a mainstream business model.*

*SH: Now that the FIT is not sufficient either, so you have to find new BMs.*

There are other barriers to the tenant power model:

- Full RESA surcharge is for sure a pb. A reduced surcharge could not be applicable if there are different participants. Applies fully : 6,354 ct. No political will to look for a reduced RESA surcharge for direct sales.
- Also reduced business tax for real estate companies is lost if they add an activity in energy, so this has to be changed
- Too complex system of measurement solutions: this should be easier for small consumers and producers

**Q&A:**

*Q: How does it work with the one to many relationship? One panel per house?*

*A: There is a grid in the building. PV plant flows into the apartment. You need a good measuring to know how much comes from the grid and how much from the panel.*

*Q: Is there only 1 bill?*

*A: it depends, but this would be a suggestion, since tenants do not want too many different contractual relationships.*

	<p><i>Q: The ideal world for the tenant power model is to avoid the grid costs and electricity tax, which means that it is interesting only in big amounts.</i></p> <p><i>A: if the consumer of the electricity does not really operate the PV plant (lease agreement) the relationship is considered as one between seller and consumer. Grid operators are starting to write to people asking whether they are self-supplied or selling the electricity. Now the government says it is important that everyone pays the surcharge and the grid operators are starting to implement it. People just did not know. If you have a local direct selling, the logic was not that it was from an energy supplier.</i></p> <p><i>Q from RESCOOP: We have numerous PV investments on the roofs of our member: would this be considered self-consumption?</i></p> <p><i>A: not in Germany, a cooperative is a legal person, so it is a two person relation.</i></p> <p><i>Q: is there anything to learn from the cogeneration installations in Germany or in the industry?</i></p> <p><i>A: In Germany, the interests in industry and green energy are not matching. But regarding self-supply yes. Industrials do self-supply from coal plants. The case of Vatenfall: the coal plant supplied an industry seemingly as self-supply, but Vatenfall lost and had to pay the surcharge costs for 6 years back. But they did not pay the grid costs. But this could change in the next year: to be based on the capacity you use in peak times rather than per kwh you use. In Germany you have to be the operator and consumer, not necessarily own the plant, and also be in the same place (not defined, direct line, not allowed to use the grid); there is no net metering. You can store it, but not net meter it.</i></p> <p><i>Q : How do you handle the risk of partial or total consumer default?</i></p> <p><i>A : This is treated as a business risk. If there are 400 consumers, you can calculate a percentage. If you had only 1 or 2 consumers, you would have to have a security.</i></p> <p><i>Q: are you allowed not to participate if you are a tenant?</i></p> <p><i>A: You are not allowed to force the consumer into the scheme. So this is the difficulty. Everyone has the right to choose their energy supplier. Not allowed to have more than 2 years contract, even if you can prolong it automatically. But most of the consumers are too lazy to change suppliers every 2 years.</i></p> <p><i>Q Is it a fixed price for 2 year and then there is a renegotiation or you follow on the same price?</i></p> <p><i>A: Both are possible.</i></p>
<p>5</p>	<p><b>Innovative PV-Solutions in urban energy supply: experiences of the crowdfunding model in Austria</b></p> <p>Klemens Neubauer (KN) - Wien Energie GmbH</p> <p><u>PV in Austria and Vienna</u></p> <p>There is no space to build large PV plants since most of Austria is mountains. 60% of electricity demand comes from hydro. Wien energy is the local power supplier in Vienna. Currently 20,5% come from renewable energy out of the supplied 9.400GWh. The target is to achieve 30% green in 2030 for Wien energie.1% of the electricity demand in Austria is provided by PV. The PV potential is evaluated at 71 TWh/year.</p>



Wien Energie (WE) started in 2011 to develop new Business Models because PV price was interesting. Different Business Models are experienced:

- Rent/hire purchase model: WE rents the PV plant to a customer. Does the construction and investment. Customer only uses electricity, pays for the whole PV plant feed.
- PV combi products: PV is combined to a heat pump to optimise the energy use in the building.
- PV crowdfunding  
This can take two forms: WE sell the panels from a plant to a consumer and leases back the panels. Or the citizen can buy vouchers to support the development of PV. They annually get vouchers and an additional interest on top.

WE also provides services related to PV. They offer tools that help the planning of PV plants. They can also deliver certification in view of PV suitability.

Explanation of the crowdfunding model

There is a green oriented population in Vienna and WE is committed to the development of PV. But there are many hurdles to build PV in cities: most tenants cannot build their project because they do not own the roof and / or have no technical experience.

The crowdfunding model makes it possible to overcome these hurdles. The consumer gets a yearly rent and after 25 years he gets his investment back, fulfils his ecological awareness and helps create local value for installers. Local energy production prevents imports.

WE builds the plant before they sell the panels. The citizen has to commit the first 5 years, after that, he can drop out. This is riskless for the customer. Only risk is failure of Wien energy but it is a public company.

NB: all plants sold in a few minutes! 6.5MW for 22 plants. Supply of 3000 Vienna households. The model is replicated for wind power but with shares and a participation of 50% of Wien Energie. Further projects are under preparation.

**Q&A:**

*Q How much do you pay to the investors?*

*A: 3,1% interest, (950€ per panel, maximum 10 panels, you have to be a natural person, not a company). Lifetime is 25 years but you can quit whenever you want after 5 years.*

*Q when people quit, do you resell?*

*A: we have to decide, for the moment they don't quit, unless they die!*

*Q: What is the incentive?*

*A: people participate in a local project with a better life quality.*

*Q: Does the electricity goes into the electricity mix of the company?*

*A: it depends; some energy can be used by the consumer.*

*Q: only ground mounted plants?*

*A: it is easier to build bigger solar power plants. Large roof tops are not numerous.*

*Q: how can you guaranty a certain amount of interest? Is there an insurance company that guarantees a regular income?*

*A: you operate a plant, you take some risks: you do not know how long the panels will be functioning. Financing model and operating model are different. Financing model has a reason to include the citizen.*

*Q: Is it opened to everyone or just to Wien citizens?*

*A: not only Wien*

*Q: Mix with bank debt or only with participation of the people?*

*A: At one point we were also thinking of a bank since did not know about the success. But we try to keep them out since it is possible.*

**Thanks and end**