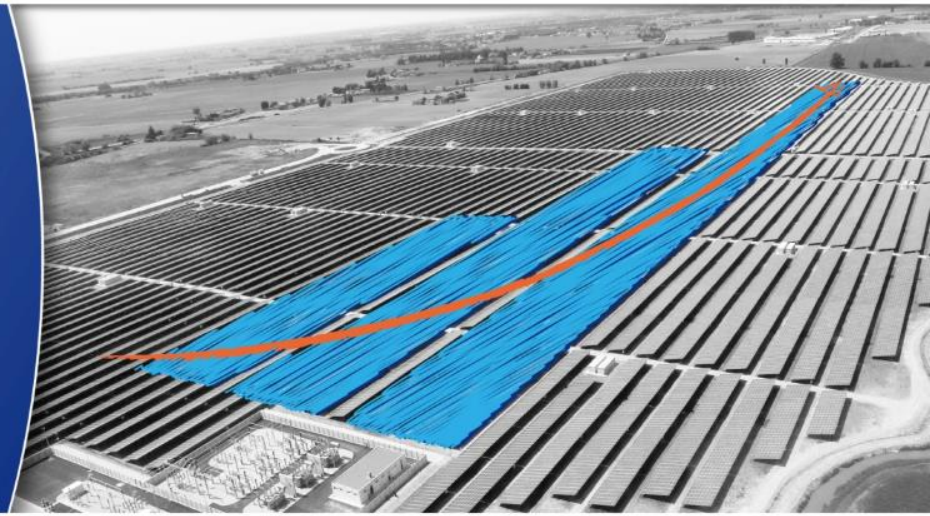
PV Financing webinar: Business models for the next generation of solar PV deployment in the EU



#PVbizmodels
@PVFinancing

PV Financing EU-wide webinar, Monday 6 February 2016
SolarPower Europe

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646554

Intro

Sonia Dunlop, Policy Adviser, SolarPower Europe

PHOTOVOLTAIC
AUSTRIA
FEDERAL ASSOCIATION

PVFINANCING

eclareon

Frankfurt School
of Finance & Management
German Excellence. Global Relevance.

HOUSING
EUROPE

Allianz

SOLAR TRADE
ASSOCIATION

GÜNDER

Observ'ER
Observatoire des énergies renouvelables

RESCOOP.EU

AMBIENTEITALIA

creara
ENERGY EXPERTS

Agenda

15:05 Power Purchase Agreements in the UK and elsewhere, Elizabeth Reid, Partner, Bird&Bird LLP

Q&A

15:20 The *Mieterstrom* neighbour solar supply model in Germany, Fabian Zuber,

L°energy

Q&A

15:35 The collective self-consumption model in France, Julien Courtel, Project Manager, Observ'ER

Q&A

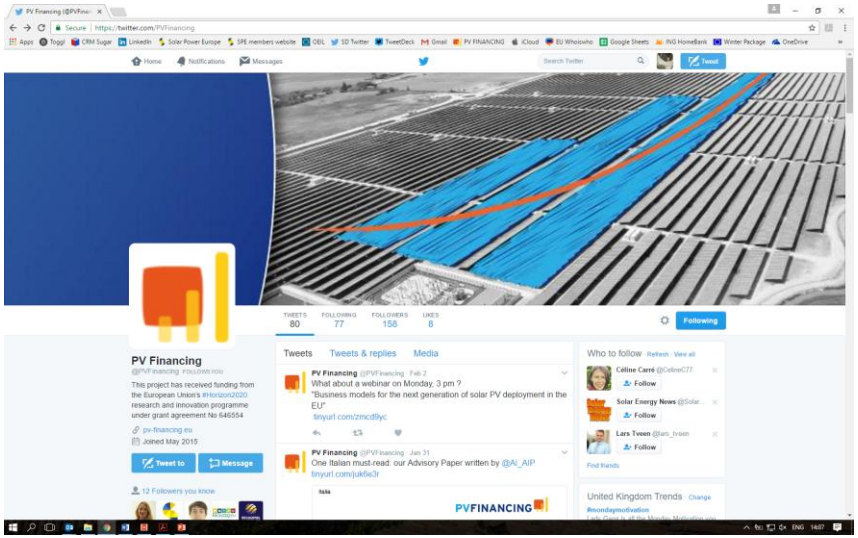
15:50 Next steps, Sonia Dunlop, Policy Adviser, SolarPower Europe

A recording of the webinar will be available after the broadcast.

Send us your questions!

PVFINANCING

GoToWebinar by CITRIX



With GoToWebinar (preferred):
Use questions box on right hand side of your screen

Get involved via Twitter:
#PVbizmodels
@PVFinancing
@SolarPowerEU
@twobirdsenergy
@soniakdunlop
@EURObserv_ER

Power Purchase Agreements in the UK and elsewhere

Elizabeth Reid, Partner, Bird&Bird LLP

Power Purchase Agreements in the UK and elsewhere

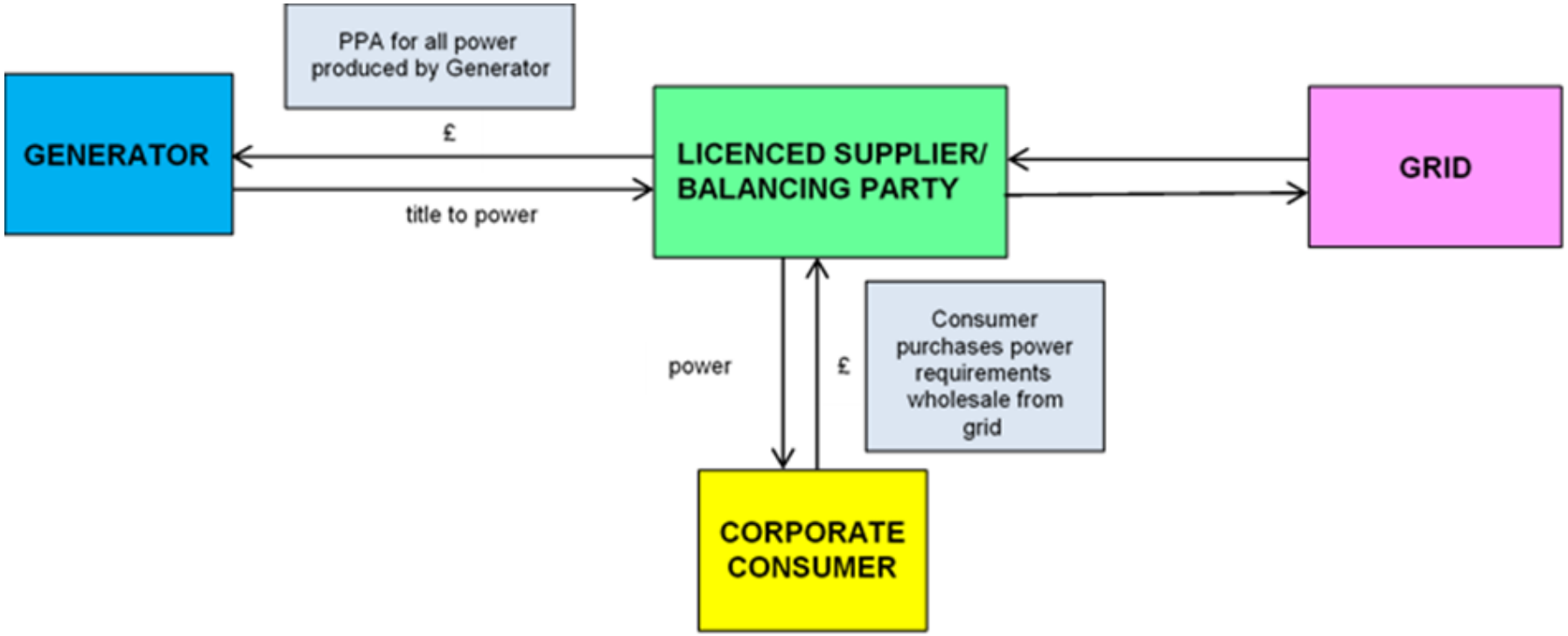
Elizabeth Reid

Partner, UK

6 February 2017

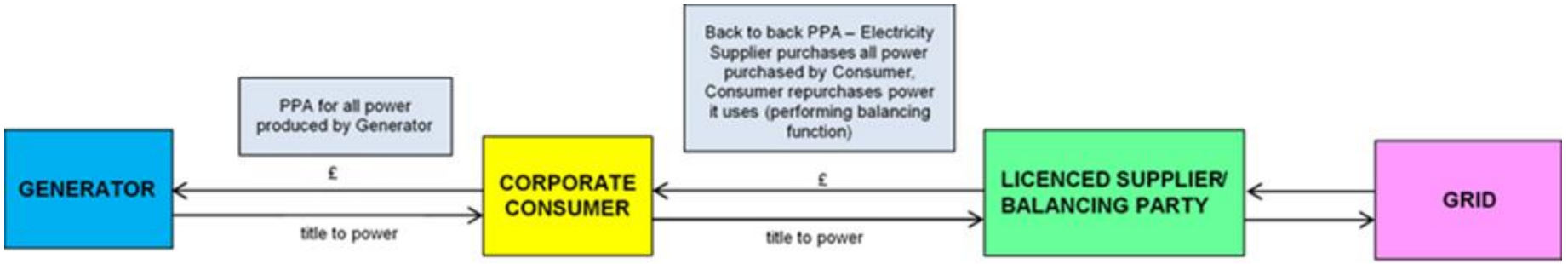
Traditional PPA Models

PPA structure (Wholesale PPA)



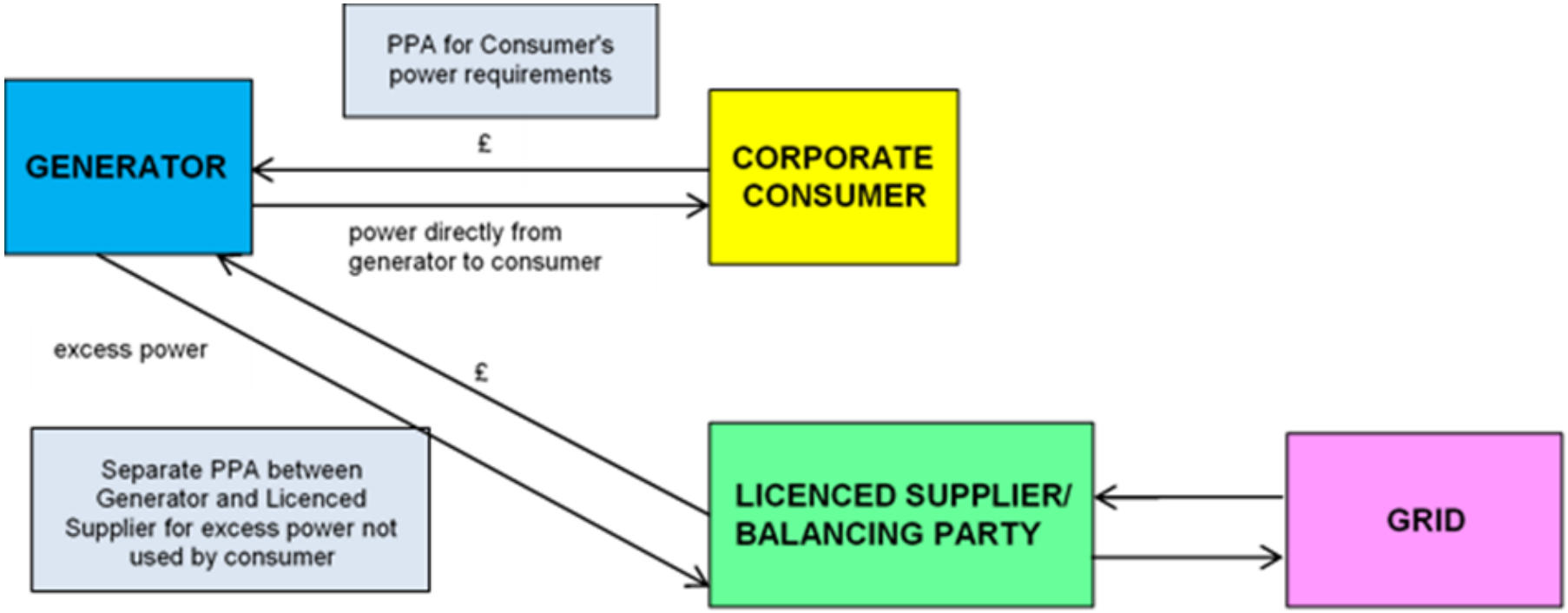
Bird & Bird

PPA Structure (Offsite sleeved PPA)



Bird & Bird

PPA Structure (Onsite private wire)



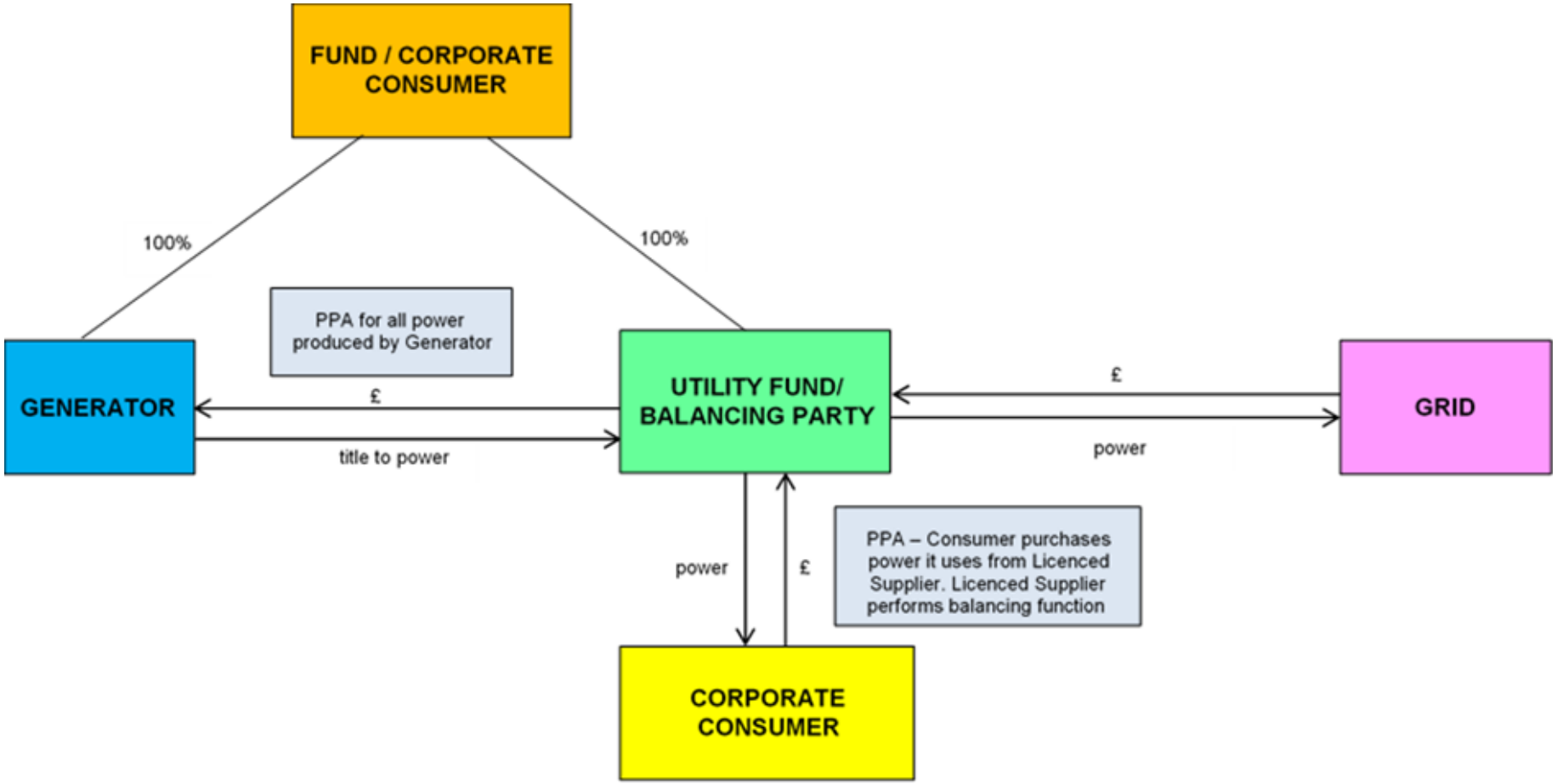
Bird & Bird

Comparison of traditional PPA structures

Business model	Revenues	Capex	Opex	Cost of capital	Scale	Profitability
Wholesale PPA	Low: Wholesale market price	Low due to lack of geographical constraints. Historically high due to policy-led "rushes"	Can be high due to access issues with landowner	Dependant on wholesale electricity projections and how volatile or accurate these are.	Plenty of scale possible as all that is need is land, grid and an off-taker.	Was profitable with ROCs and high price forecasts, now not profitable
Offsite sleeved PPA	Medium: competing with retail prices, but including grid costs	Same as above, although transactional costs high due to complicated legal structure	Same as above	Dependant on credit-worthiness of corporate consumer, which has proven challenging	Similar to above, but transactional costs quite high, so not suited to smaller projects.	Was profitable with ROCs, now may not be profitable
Onsite private wire	High: competing with commercial retail prices, avoiding grid costs	Potential reductions through e.g. grid efficiencies, but potential challenges from geographical constraints.	Same as above, although rental costs and access may differ on consumer-owned sites	Dependant on credit-worthiness of corporate consumer, which has proven challenging. Additional challenges from "stranded asset" risk	Limited market size, as challenging set of requirements.	In theory profitable, but challenges remain making projects viable.

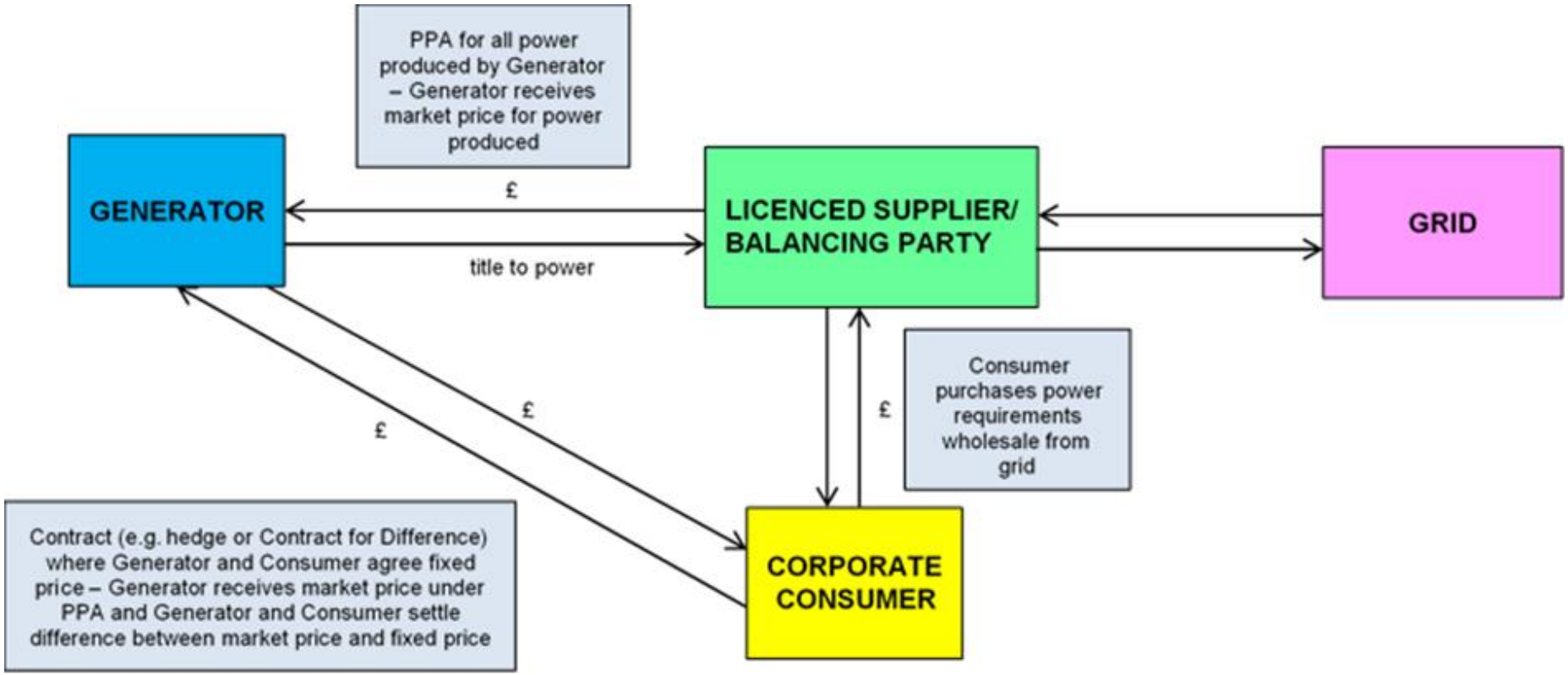
Innovative PPA Models

PPA Structure (Mini Utility)



Bird & Bird

PPA Structure (Synthetic PPA)



Bird & Bird

Thank you!

Elizabeth Reid
Partner, Bird & Bird
elizabeth.reid@twobirds.com
(00 44 20) 7905 6226

Bird & Bird

Q&A

Elizabeth Reid, Partner, Bird&Bird LLP

The *Mieterstrom* neighbour solar supply model in Germany

Fabian Zuber, L°energy

l°energy

“Mieterstrom”

Fabian Zuber | l°energy
6th Februar 2017

The neighbour solar supply model in Germany

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 646554

PVFINANCING

BSW GERMAN SOLAR ASSOCIATION

About l°energy | local energy markets

l°energy

- l°energy is a Berlin based consulting company.
- We offer Market Analysis and Business Development for local energy markets.
- Fabian Zuber is founder of l°energy and has over 12 years experience in the renewable energy market.

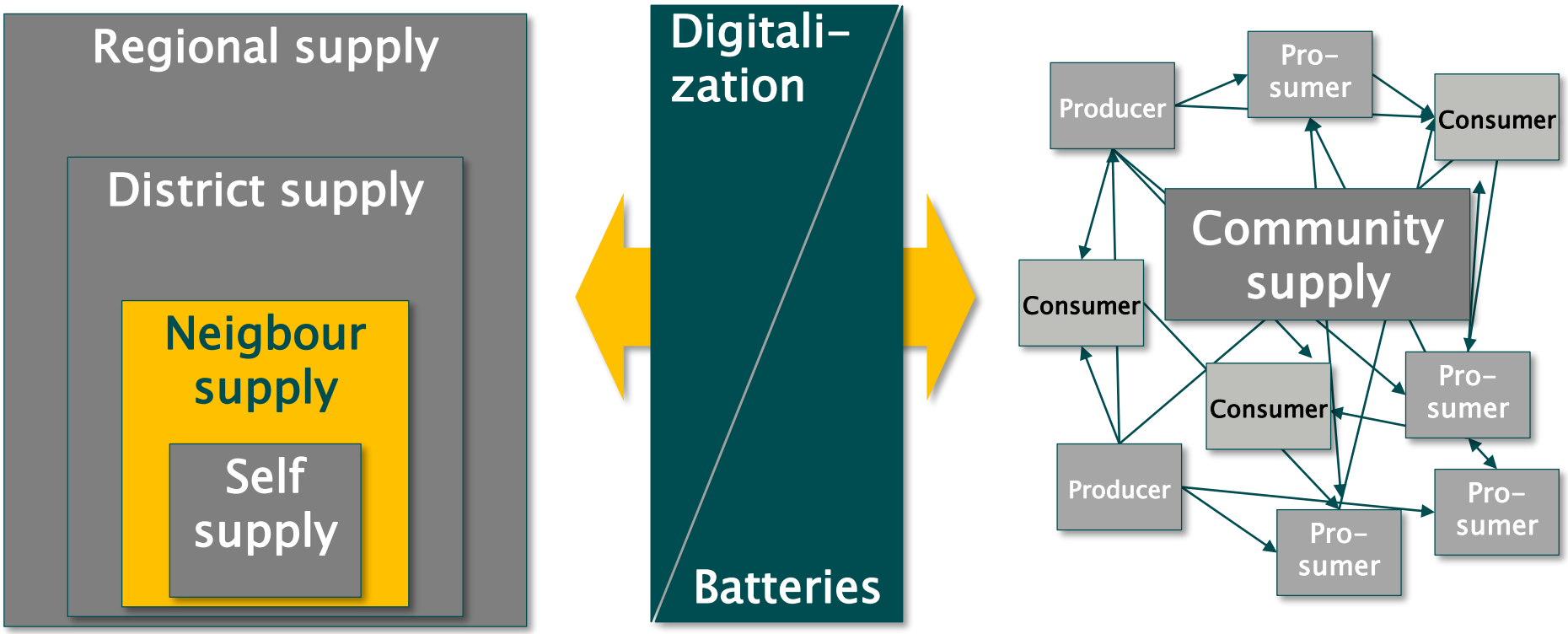
References

BSW Bundesverband Solarwirtschaft
Agora Energiewende
BBEn Bündnis Bürgerenergie e.V.
Green City Energy
HALEAKALA STIFTUNG

Project Partners

DENKZENTRALE ENERGIE Daten | Analyse | Beratung
BÜRO F
Urbane Energie
IET International Energy Transition

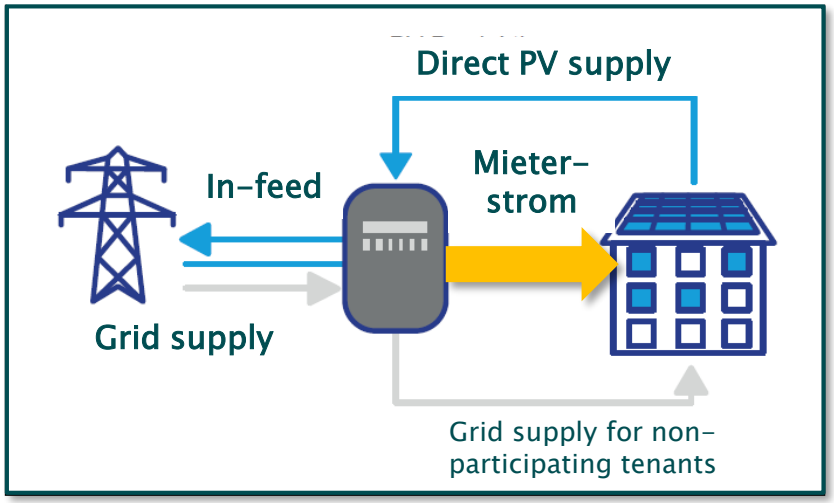
Local energy markets gain importance



Neighbour solar supply – Definition of „Mieterstrom“

1. Neighbour solar supply is based on **locally generated electricity** from PV plants and/or combined heat and power (CHP).
2. Electricity is **used directly by the tenants** in multi-family houses or commercial buildings.
3. Mieterstrom-products are usually a **mix of direct supply and grid supply.**
4. A building can have **participating and non-participating tenants.**

Mieterstrom: The neighbour solar supply model in Germany:



Source: Mieterstrom-Leitfaden 2016, BSW

Comparison of business models

BUSINESS MODELS	ON-SITE CONSUMPTION AND LEASE MODEL	NEIGHBOUR SOLAR SUPPLY	REGIONAL ELECTRICITY, BOROUGH ELECTRICITY AND NEIGHBOURHOOD ELECTRICITY
Supply relationship	The plant operator and final power consumer must be the same entity. Note: This is established through the lease contract or sale of the PV installation to the power consumer.	Supply to third parties	Supply to third parties
Grid use and grid charges	No use of the public grid. Consequently, no grid charges are due.	No use of the public grid. Consequently, no grid charges are due.	Use of the public grid. Grid charges are due.
EEG levy (tax)	Up to 40% of the EEG levy is due. For small installations the "small installation regulation" applies where electricity from installations with a maximum capacity of 10kWp up to an on site consumption of 10 MWh/year, is 100% exempt from the EEG levy.	100% of the EEG levy is due, although this is due to change shortly (with the EEG amendment 2017) and the installation will be power will be exempted from a percentage of the levy.	100% of the EEG levy is due.
EEG remuneration or feed-in tariff	For the self-consumed quantity of electricity, in accordance with EEG, no remuneration is paid.	For the directly-consumed quantity of electricity, in accordance with EEG feed-in tariff, no remuneration is paid.	The quantity of electricity fed into the grid will be remunerated at the valid EEG feed-in tariff rate for 20 years.

Source: EU-WIDE SOLAR PV BUSINESS MODELS 2016, PV FINANCING project | November 2016

Specifics of Mieterstrom:

- Delivery to a third party (no person identity)
- No use of the grid
- No grid charges
- 100 % EEG levy (6.35 €Ct/kWh)
- No EEG-feed-in-tariff is paid for directly used electricity

Political Framework: Support to come?

1. Providers of the neighbour solar supply model deliver electricity to final consumers and must therefore satisfy the **requirements of a licensed supplier** as stipulated in the Energy Industry Law (EnWG).
2. **Political framework is unclear** and inconsistent.
3. Specific **support programs at regional level** have been implemented in several states in 2016 / 2017.
4. Amendment of the **Renewable Energy Law (EEG 2017)**: The federal government is authorized, through legislative decree to reduce the EEG surcharge that operators of solar installations must currently pay (only for PV on residential buildings).
5. Newest proposal by the government is to skip decree and implement a **"Mieterstrom"-law** instead that would implement a tariff for directly used electricity.
6. Negotiations between the Ministry of Economics and Energy and the Parliament is going on: **Outcome unclear.**

Market potentials
Boost for urban energy transition?

1. New market: Business models are being developed only since 2013 – rapidly growing interest since 2016.
2. Several hundred projects have been realized or are being planned (PV based projects are less common than CPH).
3. About 3 million apartments /tenants are eligible for the supply model.
4. Maximum potential of "Mieterstrom" could lead to approx. 3-4 TWh of direct PV electricity use.

Sources: HEG, Mieterstrom-Leitfaden 2016, BSW, Prognos & BH&W, Mieterstrom, 2017

Broad variety of players in the market

About 30–40 first movers are active – many new players are entering the market segment

Real estate sector players:

1. The cooperative real estate
2. The municipal real estate
3. The commercial real estate
4. Homeowners' associations

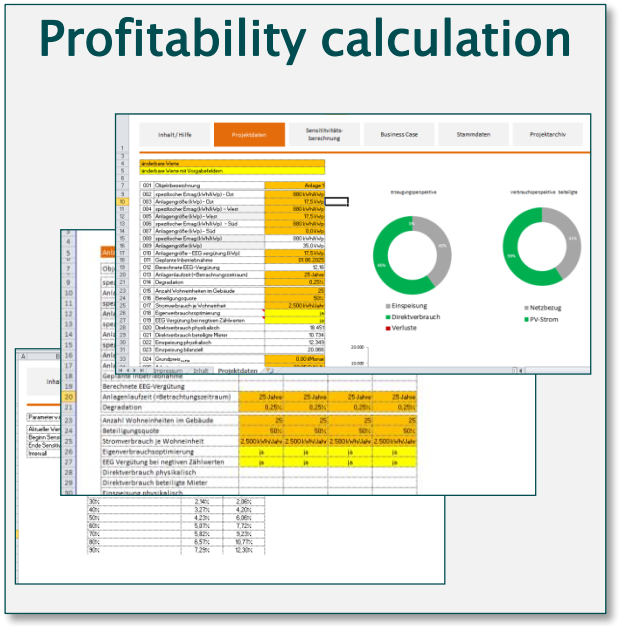
Energy sector players:

1. Public utilities
2. Energy supply companies
3. Green electricity providers
4. Energy cooperatives

Mieterstrom Business Case

1. **Economic profitability** under given circumstances is only given in best case scenarios.
2. Direct use of PV electricity usually covers about **50–75% of total production**. The rest is fed into the grid.
3. Participating households can usually cover **25 to 35 percent** of their own electricity requirements via the PV.
4. **Many factors** have to be taken into consideration (e.g. participating tenants, size of PV system, location).

Profitability calculation



Thank you | For more information

l°energy

Fabian Zuber
l°energy | local energy markets
Marienstr. 25 | 10117 Berlin
Germany
Tel: 00 49 30 236 178 90
fz@local-energy-markets.de
www.local-energy-markets.com

Profitability calculation tool:
fz@local-energy-markets.de

l°energy DENKZENTRALE ENERGIE Daten | Analyse | Beratung

Mieterstrom Guideline:
www.pv-mieterstrom.de/

BSW Bundesverband Solarwirtschaft l°energy Urbane Energie

Q&A

Fabian Zuber, L°energy

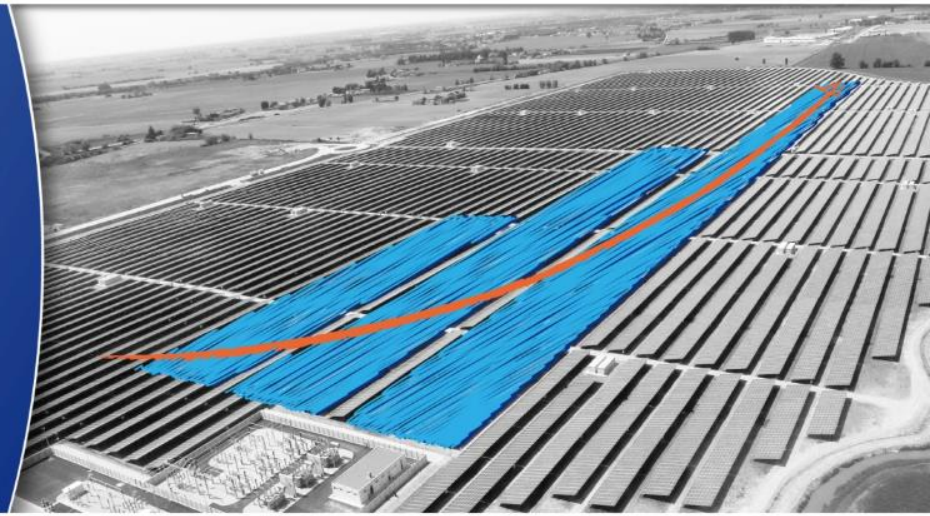
The collective self-consumption model in France

Julien Courtel, Project Manager, Observ'ER

PVFINANCING

Collective self-consumption in France

Julien Courtel, Observ'ER



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646554

Brief history of self-consumption in France

PVFINANCING

2010, Law NOME

2014, Governmental working group

2Q15, Energy Transition Law

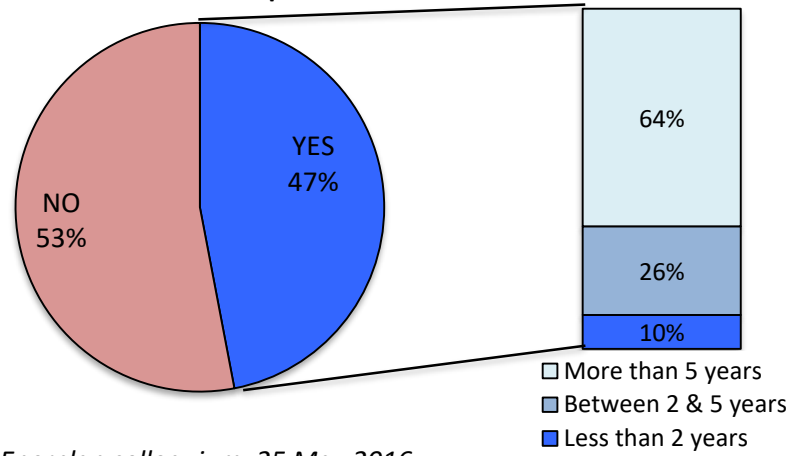
August 16, Ordinance on SC

National Assembly

Senate

February, the 3rd, the ordinance is ratified by a law

Would you consider investing in a PV installation with self consumption ?



Source: Enerplan colloquium, 25 May 2016

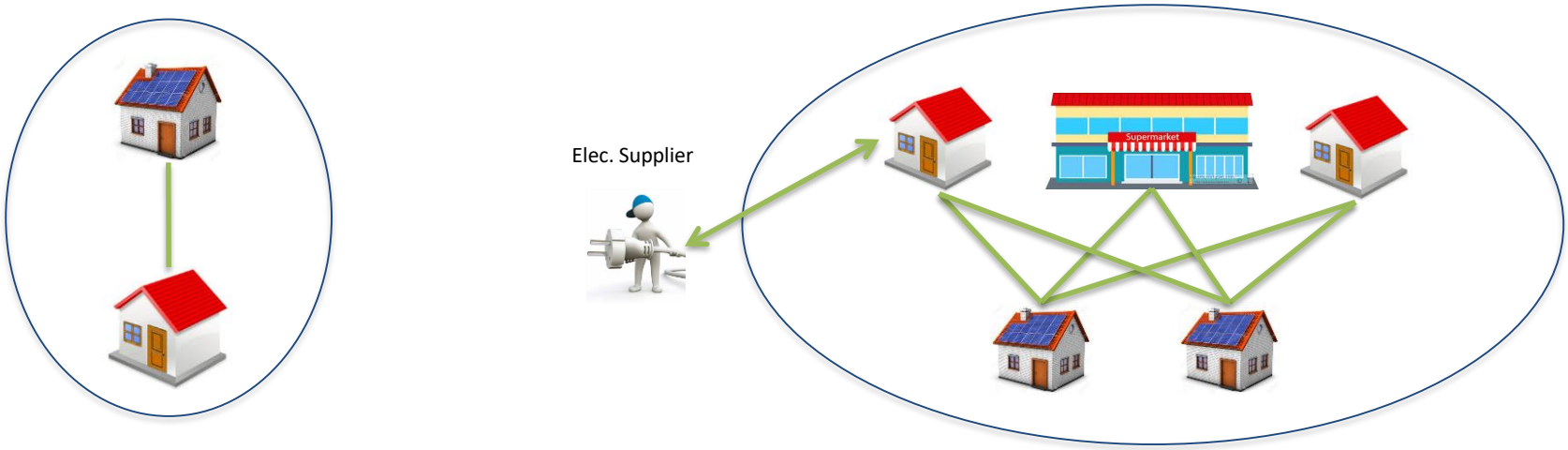
Public opinion : ✓

Regulatory framework : ✓

Start-ups, SMEs and companies: ✓

→ France is going to self-consume part of its PV electricity

Collective self-consumption schemes



« *Self-consumption is collective when the electricity supply is taking place between one or more electricity producers and one or more end consumers, linked together by a legal entity …*» (beginning of Art. L 315-2, Energy Code).

- Producers and consumers HAVE TO be part of a same legal entity.
- The choice of the type of entity is free (company, cooperative, association…)
- The entity in charge of the whole operation:
  - It manages the relationship between consumers and producers
  - It informs the grid operator about the breakdown of consumed electricity among consumers

REX will be key to overcome uncertainties

PVFINANCING

"The grid operators have to implement technical and contractual process in order to facilitate self-consumption operations"(end of Art. L 315-6, Energy Code).

This is a limitation to some reluctance that may have been observed locally on the part of grid operators

"…and from which the injection and exit points are on the same low-voltage loop of the public distribution grid. "(end of Art. L 315-2, Energy Code).

Geographic coherence and a preservation of suppliers' interests

~~*"…the electricity supply … "*(end of Art. L 315-2, Energy Code).~~

~~If the electricity producer is a "supplier" he will have to comply with many obligations~~

New ordinance: private grids (16 December 2016)

« A *private grid is a distribution network that brings electricity inside a closed site and which supplies one or more non-residential consumers…* » (Art 344-1, Energy Code)

➡ A good opportunity for project developers interested in collective self-consumption but were limited by the low-voltage loop

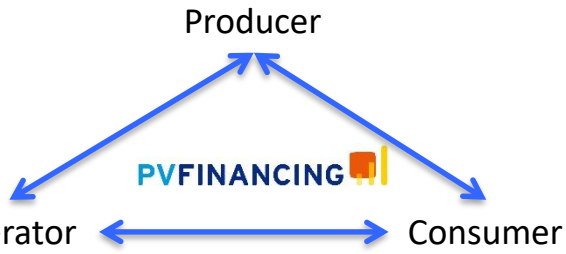
➡ «*The private grid operator has to facilitate the use of renewable energies on his grid*» (Art 344-5, Energy Code)

2 conditions to be allowed to create a private grid (alternative)

This grid is created for specific « technical or security reasons ».

Companies have to be linked (subsidiary companies).

These new rules create new relationships that need a contractual framework.



PVFINANCING

Thank you for your attention

Julien Courtel

julien.courtel@energies-renouvelables.org

Observ'ER

146, rue de l'Université,

75007 PARIS

France

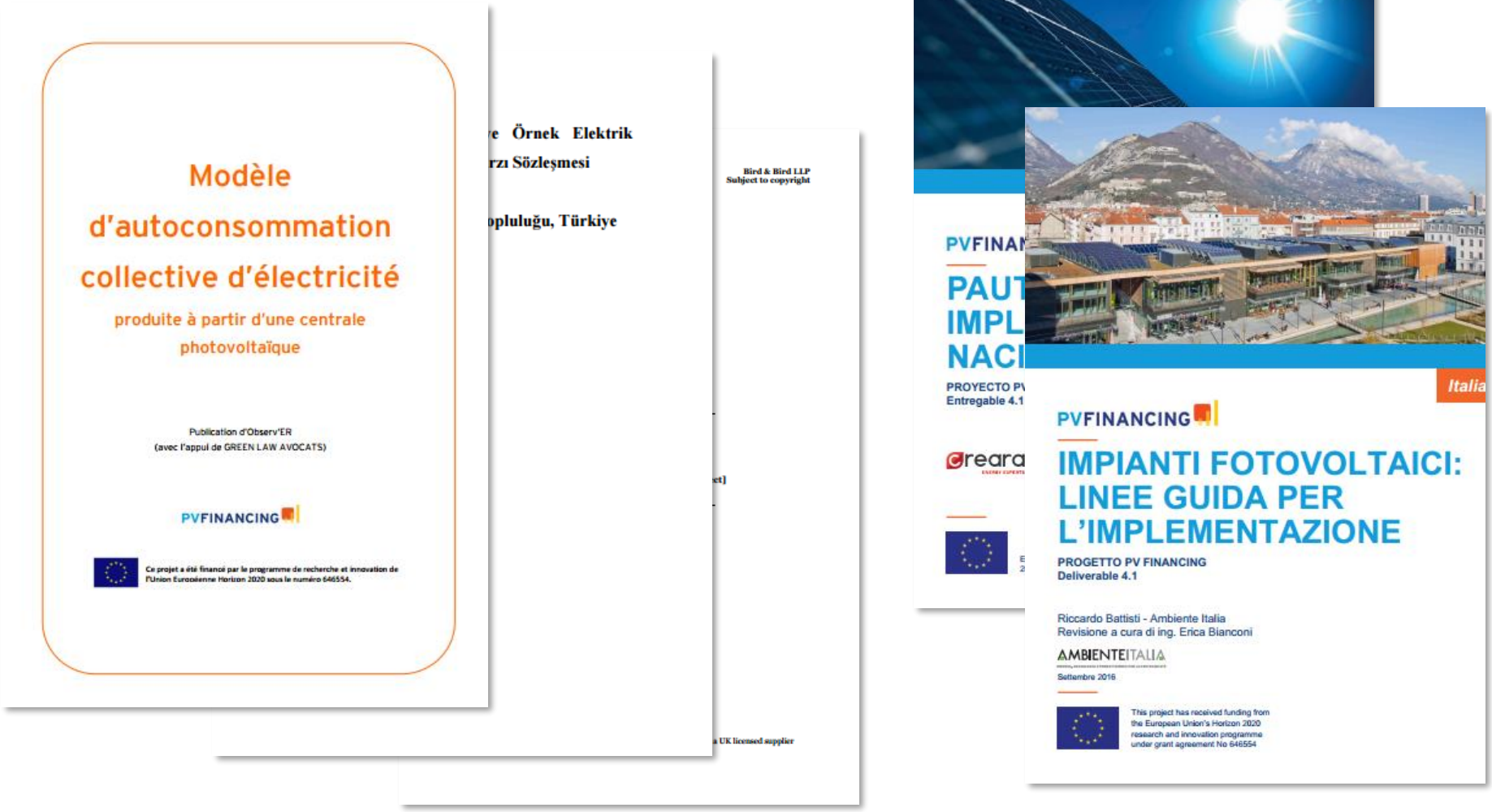
Q&A

Julien Courtel, Project Manager, Observ’ER

More information and next steps

Sonia Dunlop, Policy Adviser, SolarPower Europe

National contract templates and business model guidelines



Index: national documents

AUSTRIA

Roof rental contract Dachvermietung (Österreich)

Leasing contract Pachtvertrag (Österreich)

Solar cooperative association by-laws Vereinstatuten (Österreich)

Self-consumption model guidelines Leitfaden zu PV-Eigenverbrauchsmodellen

Policy advisory paper Austria Nationales Positionspapier

FRANCE

Collective self-consumption contract Modèle d'autoconsommation collective d'électricité (France)

Surplus electricity in collective self consumption electricity contract Modèle de contrat de vente du surplus d'électricité dans le cadre d'une autoconsommation collective (France)

Solar business model implementation guidelines Guide de Mise en Oeuvre de Projets PV en France

Policy advisory paper France Reccommendations pour un deployment accru du photvoltaique en France

GERMANY

Neighbour electricity model implementation guidelines "Geschäftsmodelle Mit Pv-Mieterstrom"

Policy advisory paper Germany Nationales Positionspapier

ITALY

Operational leasing contract for a PV plant Contratto di locazione operativa di impianto fotovoltaico (italia)

Power Purchase Agreement contract for electricity supply through a PV plant Accordo per la costruzione di impianto dedicato e somministrazione di energia elettrica secondo lo schema del sistema efficiente di utenza (italia)

Solar business model implementation guidelines Impianti fotovoltaici: linee guida per l'implementazione

Policy advisory paper Italy Fotovoltaico in Italia, quale politiche di supporto?

Index (contd)

SPAIN

Contract template for the participation in the crowdfunding of a PV installation Contrato de cuentas en participación para la explotación de una instalación fotovoltaica ubicada en (España)

Contract template for representation in the electricity trading market for a prosumer with self-consumption 2 Contrato de representación de mercado para la venta de excedentes de una instalación del autoconsumo (España)

Cooperative by-laws template Plantilla de estatutos corporativa (España)

Solar business model implementation guidelines Pautas de Implementación Nacional

National report on regulatory framework Spain Informe nacional de asesoramiento regulatorio

TURKEY

Contract for lease of PV system FV sistemlerin kiralanması için Örnek Kontrat

Electricity utility, investor and solar supplier contract Kontrat tipi 1: Kamu Hizmetleri(Elektrik), yatırımcı ve solar tedarikçi model I (Türkiye)

Electricity supply contract for solar PV electricity supply and example electricity bill Fotovoltaik Elektrik Arzı ve Örnek Elektrik faturası için Örnek Elektrik Arzı Sözleşmesi (Türkiye)

Solar business model implementation guidelines Ulusal uygulama rehberi

Policy advisory paper Turkey Ulusal Politika Tavsiye Belgesi

UNITED KINGDOM

Power Purchase Agreement (United Kingdom)

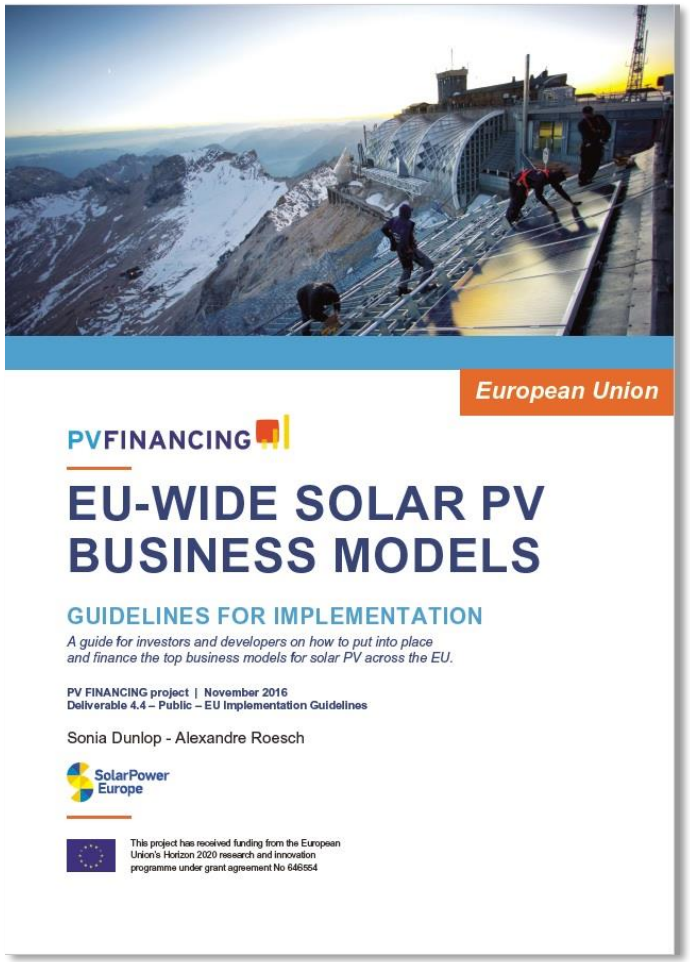
Making Solar Pay: the future of the solar PPA market in the UK

UK National Policy Advisory Paper

Click here for full list

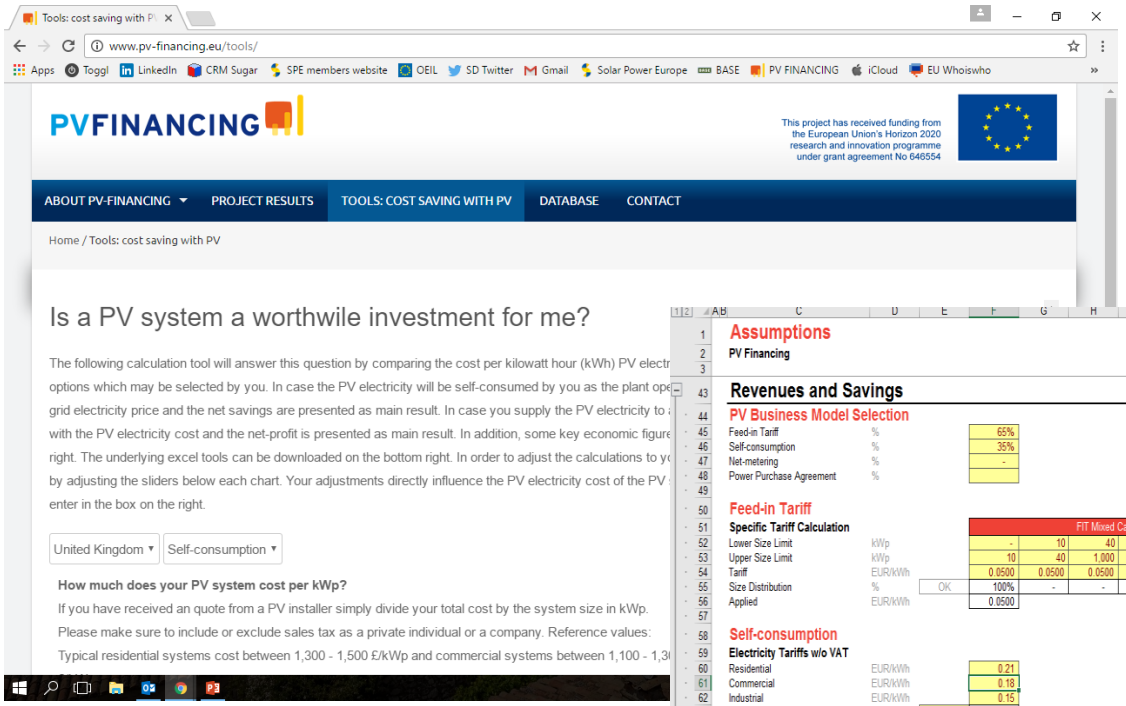
EU-level PV Financing reports

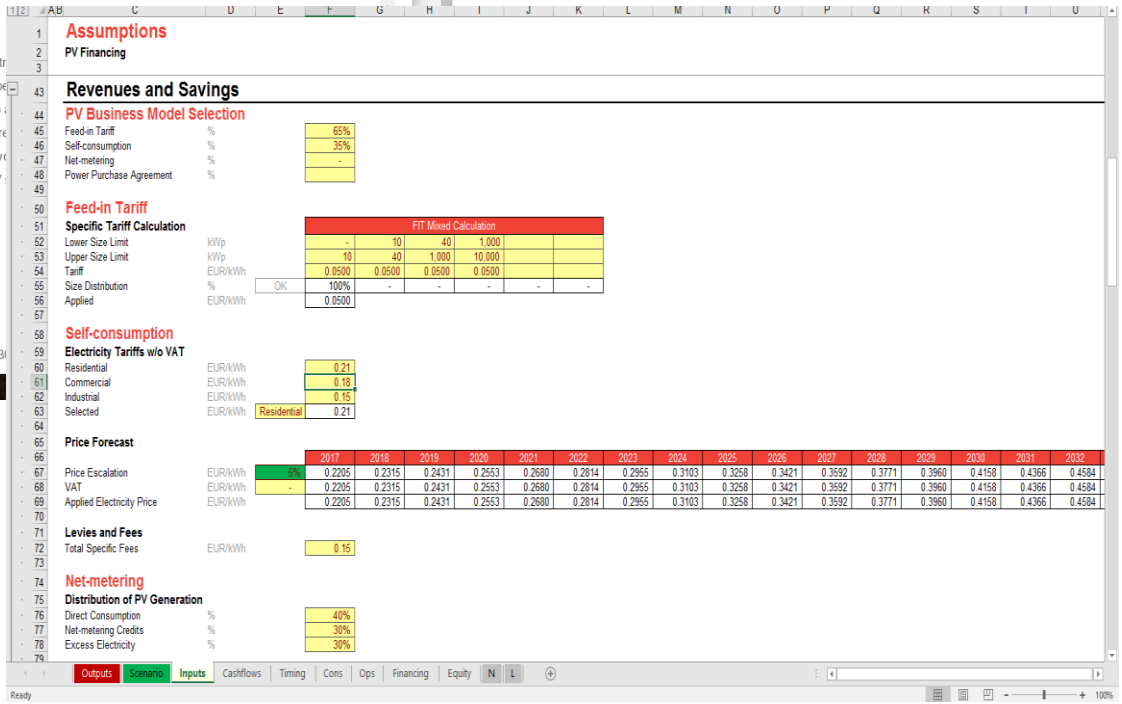
PVFINANCING



Cash flow models

PVFINANCING





Forthcoming events and webinars

PVFINANCING

- National webinars (in national languages) for seven countries: Austria, Germany, France, Italy, Spain, Turkey and United Kingdom
  - Contact the national partners for more information.
  - Italy webinar on Mon 20 February 15:00-16:30.
- Event in Brussels to present results to policymakers in April-May 2017
  - Contact SolarPower Europe for more information.
- Possible national webinars in other EU Member States to disseminate project results
  - Check @PVFinancing on Twitter for more information.

Thank you for joining our webinar

Sonia Dunlop

Policy Adviser, SolarPower Europe

Email: s.dunlop@solarpowereurope.org

Phone: +32 (0)2 709 55 28