PV VALUE BEYOND ELECTRONS

James Watson, CEO, SolarPower Europe

Repowering Europe conference, 18 May 2016

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SolarPower Europe: Who we represent

- *SolarPower Europe* – The new European Photovoltaic Industry Association (EPIA) – has been **promoting solar electricity in the European market** for 30 years. We represent our members, who are active along the whole **solar value chain** and in related business sectors.

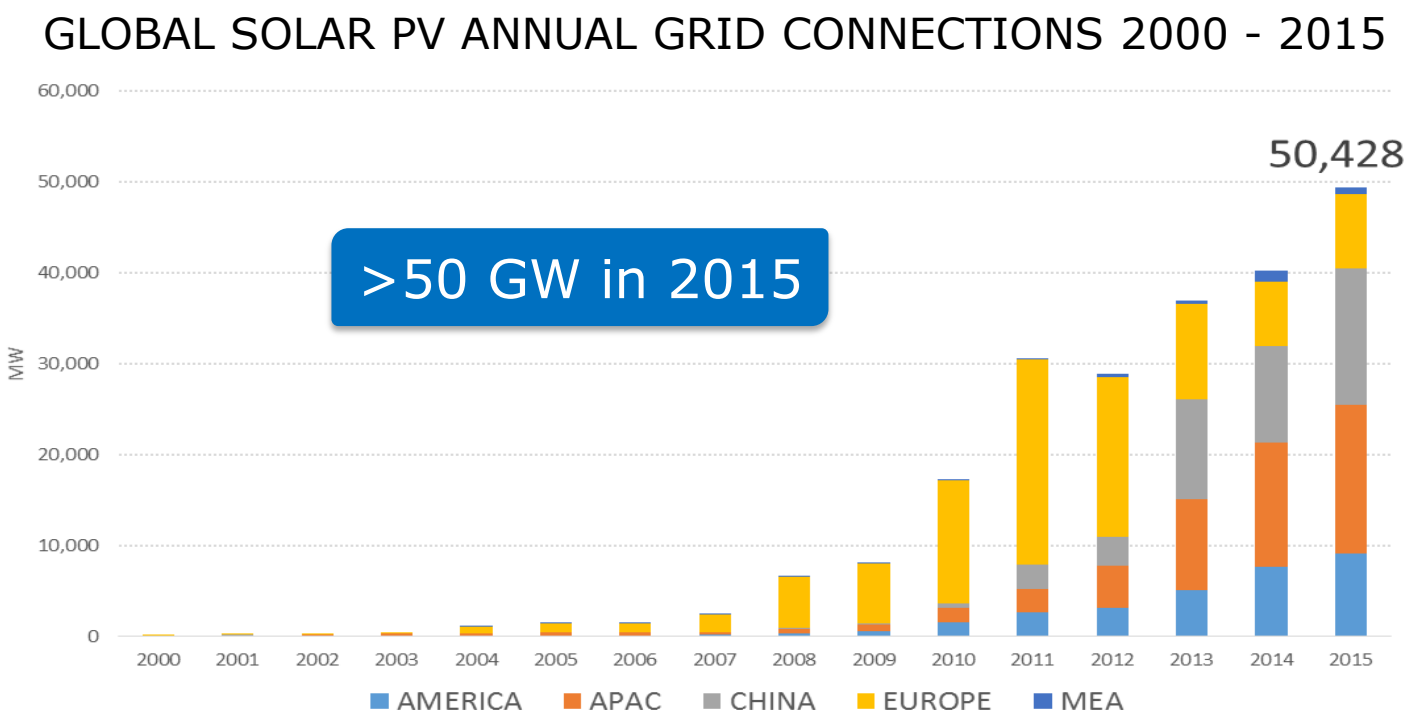
Our members include:

...and many more

Key messages today

1. Solar PV must be seen as a solution to our energy challenges

2. Solar PV value to the system must be maximised



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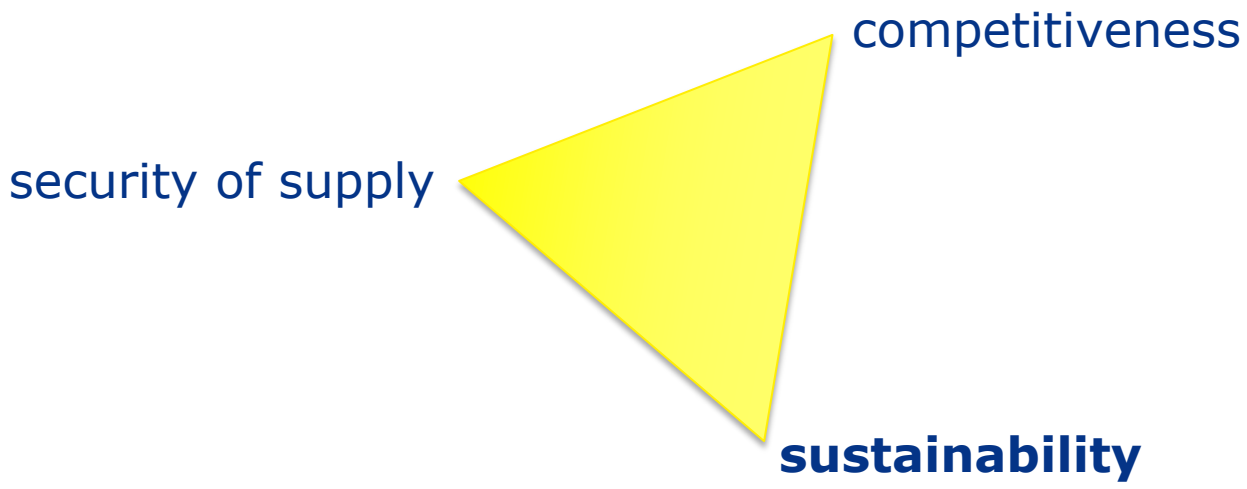
Solar PV: a solution to our energy (policy) challenges

The EU energy policy triumvirate



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Solar PV: A sustainable solution to our energy challenges

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Rapid switch to renewable energy can put Paris climate goals within reach

Increasing renewables to 36% of the global energy mix by 2030 would provide about half emissions reductions needed to hold warming to 2C, says International Renewable Energy Agency

The sixth International Renewable Energy Agency assembly takes place in Abu Dhabi from 15-22 January. Photograph: IRENA

Countries can deliver on the promises of the historic Paris climate change agreement by rapid scaling up wind and solar power to 36% of the global energy mix by 2030, an international energy gathering will be told on Saturday.

The International Renewable Energy Agency (Irena) meeting in Abu Dhabi - the first major global gathering since Paris - is seen as an important test of countries' readiness to put those plans into action.

Nearly 200 countries agreed to keep warming below 2C, and work towards a 1.5C limit, during the Paris climate negotiations last month. Some 187 put forward plans to cut greenhouse gas emissions.

United Nations Framework Convention on Climate Change

Clean Energy

Paris Agreement | Climate Action

India and France Launch International Solar Energy Alliance at COP21

ANNOUNCEMENT / 30. NOV, 2015

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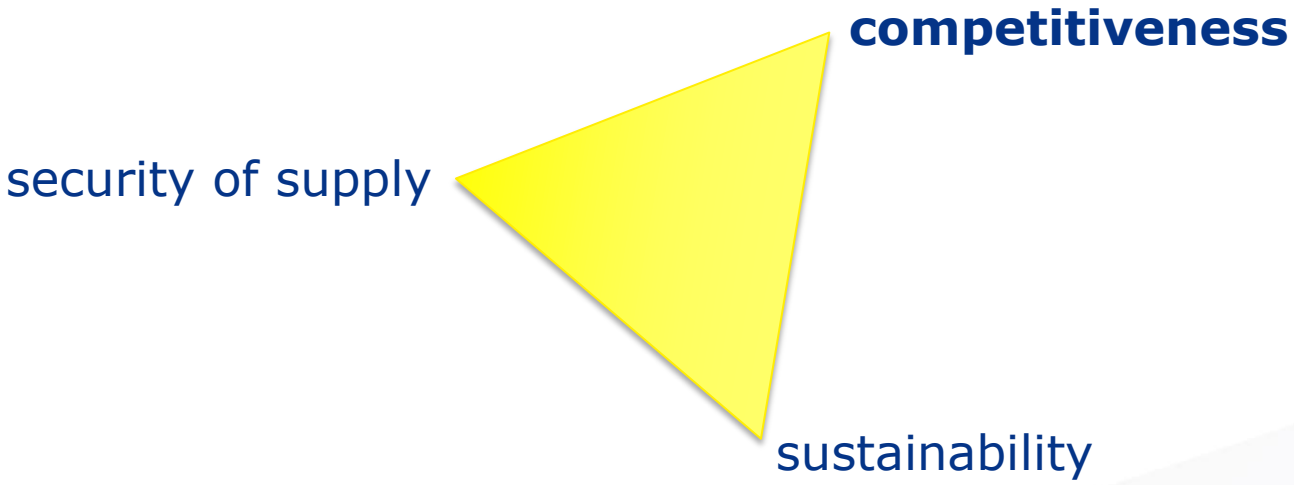
India and France have launched an International Solar Alliance to boost solar energy in developing countries.

The initiative was launched at the UN Climate Change Conference in Paris on 30 November by Indian Prime Minister Narendera Modi and French President Francois Hollande.

Solar PV: a solution to our energy (policy) challenges

The EU energy policy triumvirate



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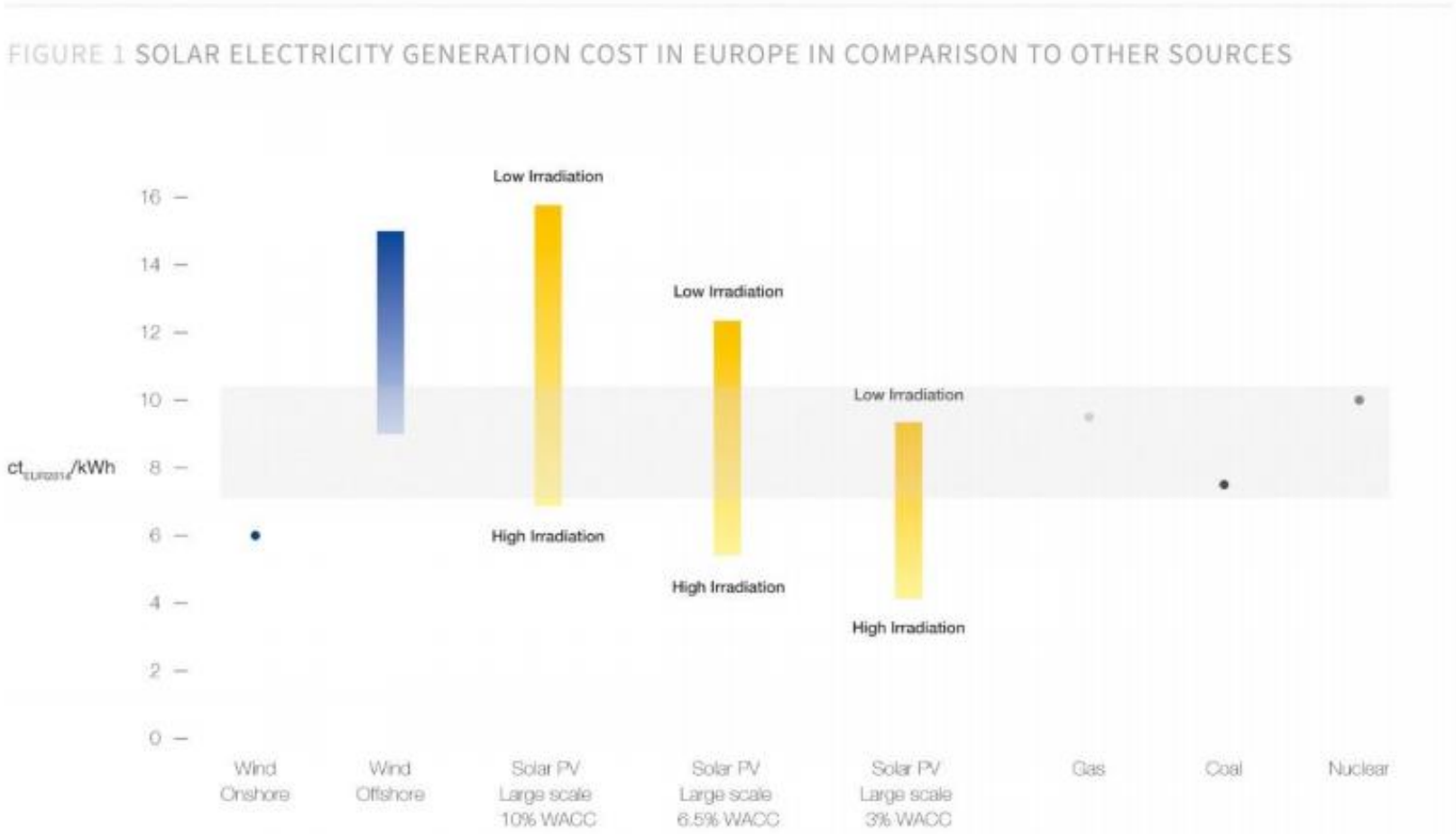
Solar PV: Competitive today

CEOs of Engie and Shell recognise that solar will be the bedrock of the energy system



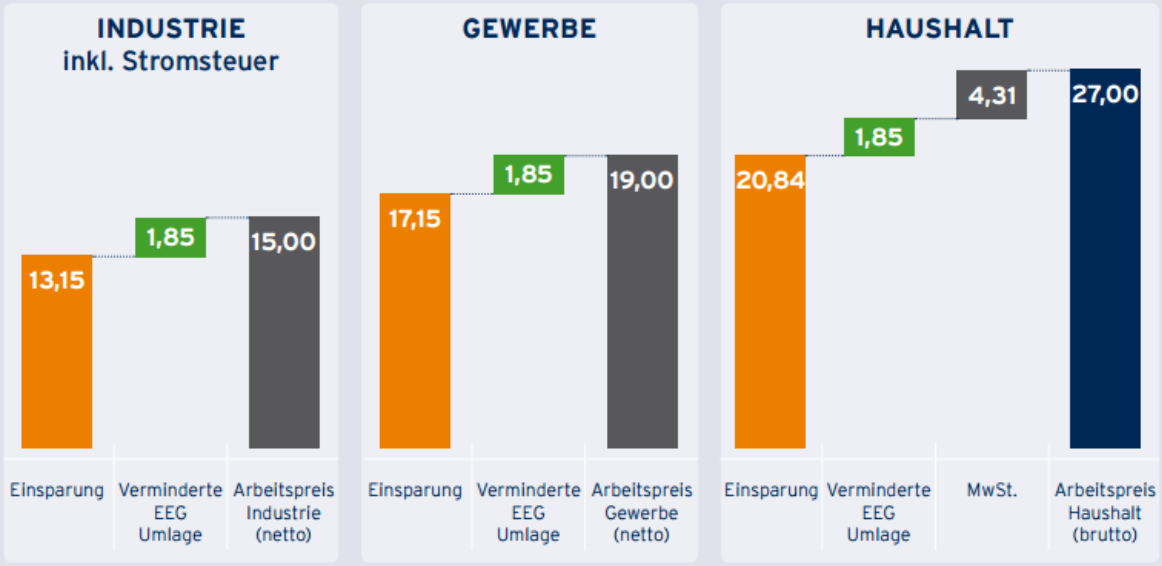
Source: SolarPower Europe on the basis of EU Commission data, 2014

Solar PV: Cost effective for all

Solar will bring lower energy bills for consumers and is accessible to all

Preisspielraum bei der Eigenversorgung für Industrie-, Gewerbe- oder Haushaltskunden

Einsparungen durch Eigenversorgung für neue Anlagen über 10 kWp nach EEG 2014 [ct/kWh]



Strompreis: Durchschnittliche Arbeitspreise Juni 2015
Anteil EEG-Umlage auf Eigenverbrauch: 30 % bis Ende 2015; 35 % bis Ende 2016; danach 40% für Inbetriebnahme ab 01.08.2014
Industrie: Jahresverbrauch 160 bis 20.000 MWh

Abbildung 3

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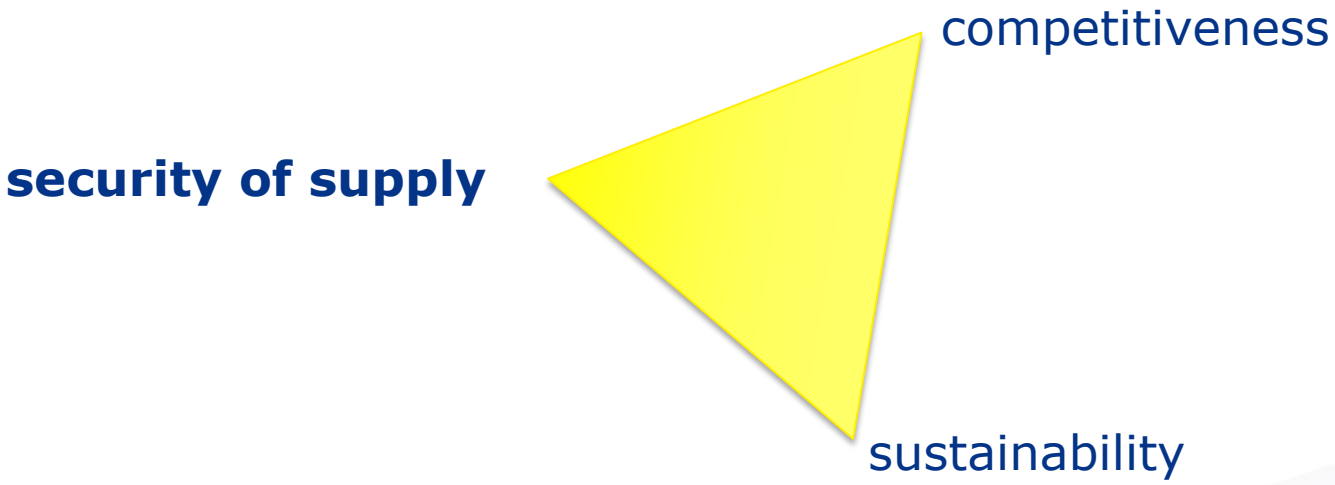
Sources: Sparen, Liefern, Pachten, BSW, June 2015. Solar for Social Housing, SolarCentury

Solar PV: a solution to our energy (policy) challenges

The EU energy policy triumvirate



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Solar PV: Providing support services to the grid

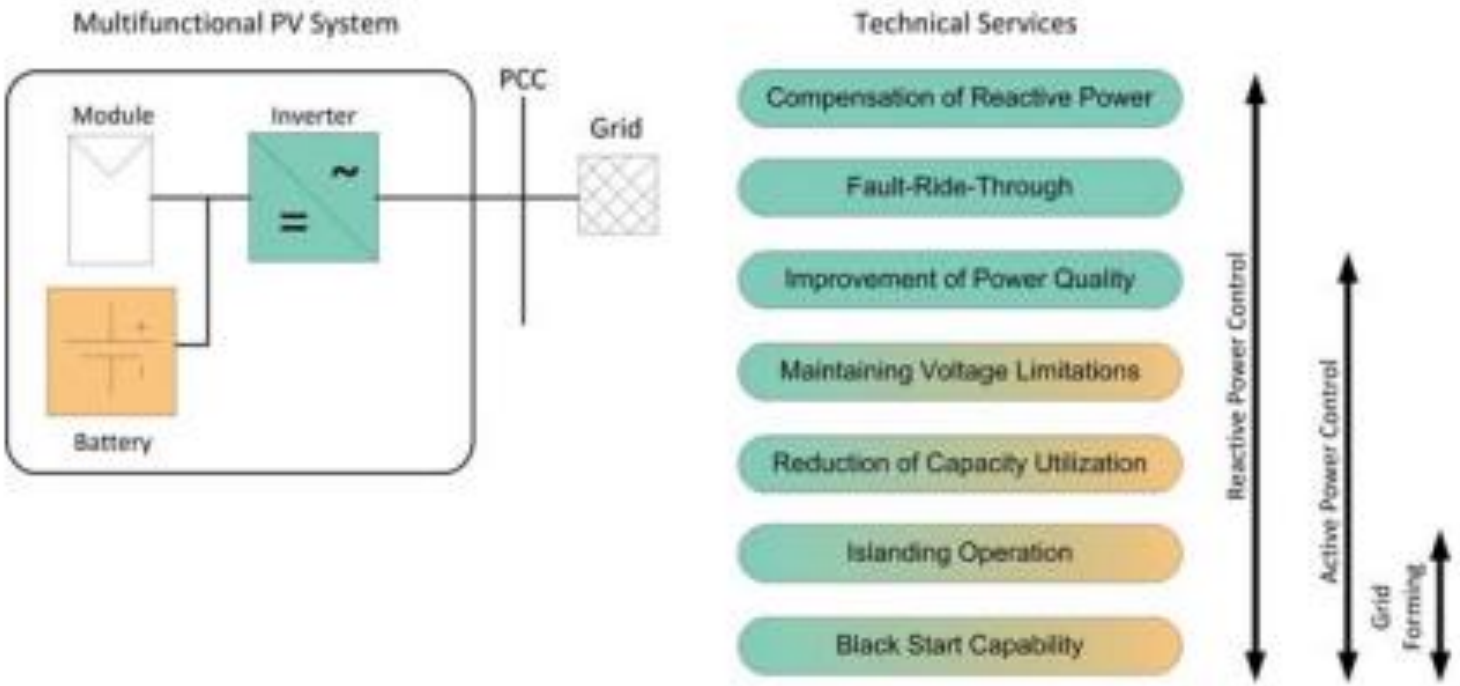

Figure 16: Technical services which can theoretically be offered by state-of-the-art PV and PV-battery systems [53]

Source: ETIP PV Grid Integration White Paper, taken from K. Büdenbender, M. Braun, T. Stetz, and P. Strauss, "Multifunctional PV Systems Offering Additional Functionalities and Improving Grid Integration," Int. J. Distrib. Energy Resour., vol. 7, no. 2

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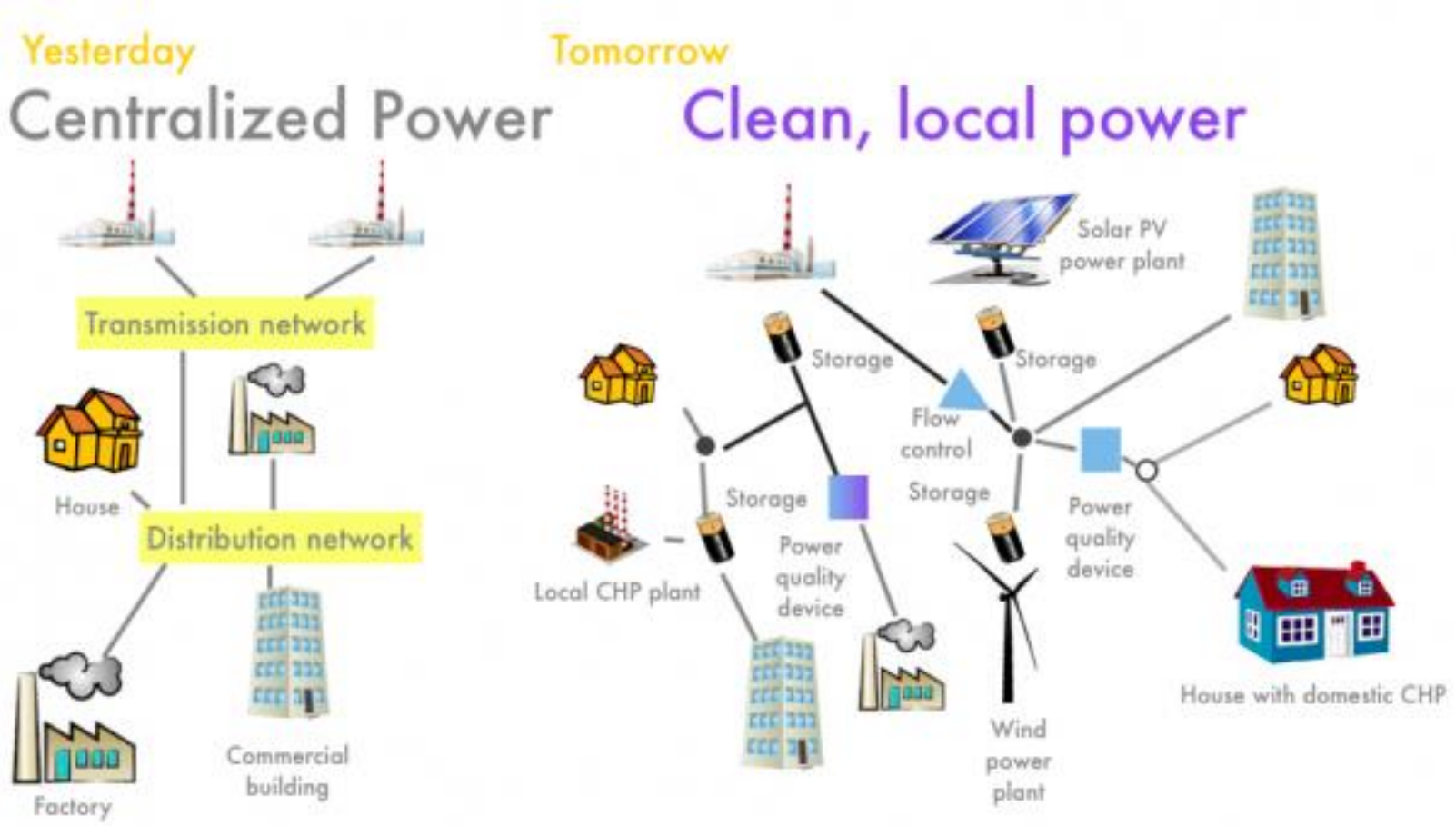
Solar PV: Decentralised systems are more resilient

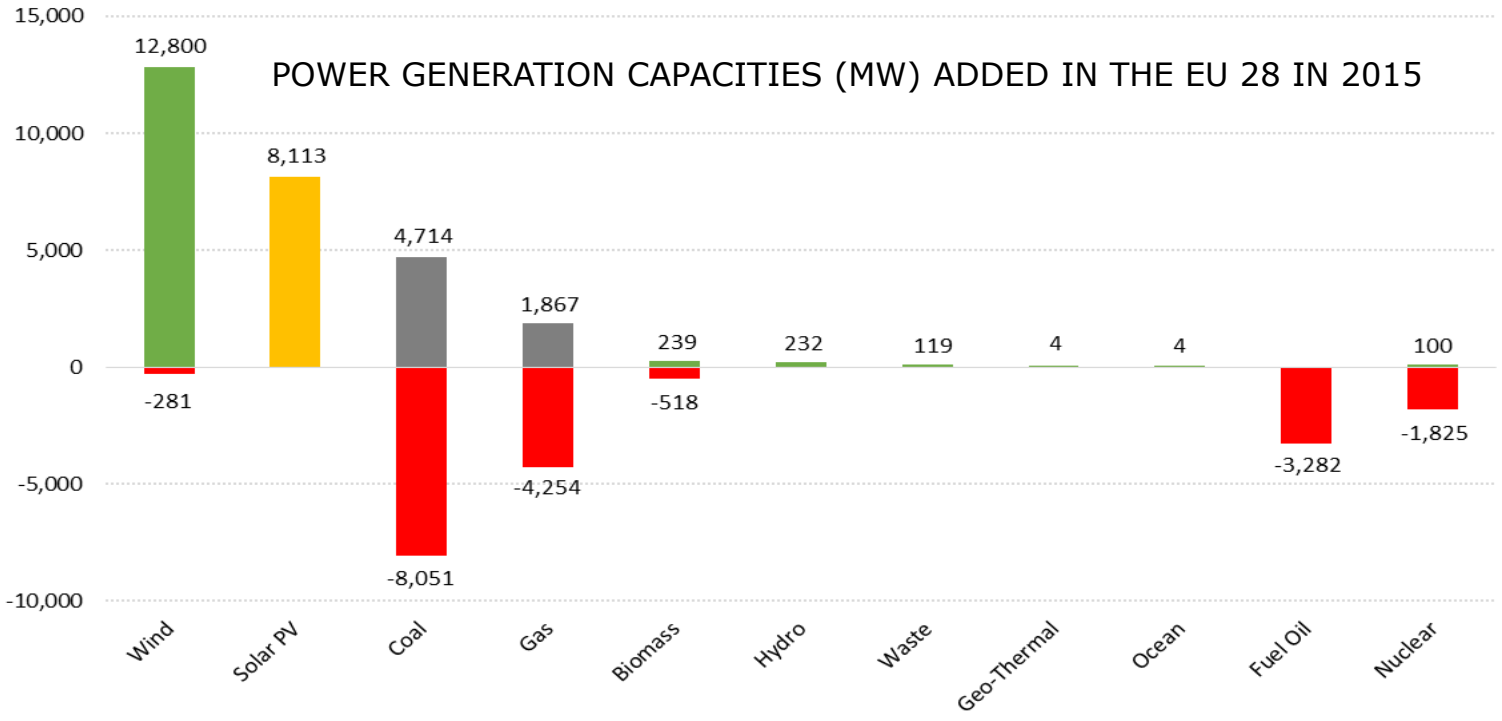


Source: European Commission

Key messages reminder

1. Solar PV must be seen as a solution to our energy (policy) challenges

2. Solar PV value to the system must be maximised



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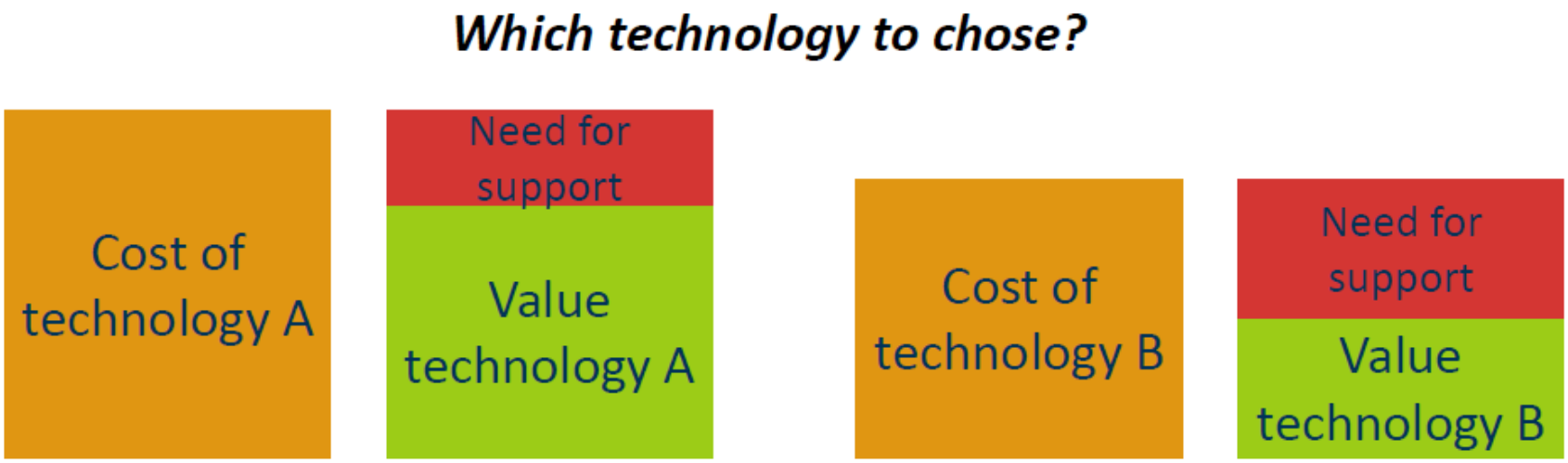
What is the true value of Solar PV in the system?



Source: IEA - CEM Multilateral Wind & Solar Working Group meeting, 15 March 2016, Beijing

The PV system value is the difference between its costs and benefits

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Solar PV system capabilities

Solar can provide grid services. We need the right regulatory framework to activate them in a market-based approach.

		Solar PV System Size					
		Small scale		Large scale		Aggregation	
		Tech.	Procedures	Tech.	Procedures	Tech.	Procedures
Frequency	FCR						
	FRR						
	RR						
	FFR						
	RM						
Voltage	SSVC						
	FRCI						

	PV	PV and battery
Reactive Power	√	√
Negative balancing	√	√
Positive balancing	X	√
Self-regulated consumption	X	√

PV can increase the value to the system

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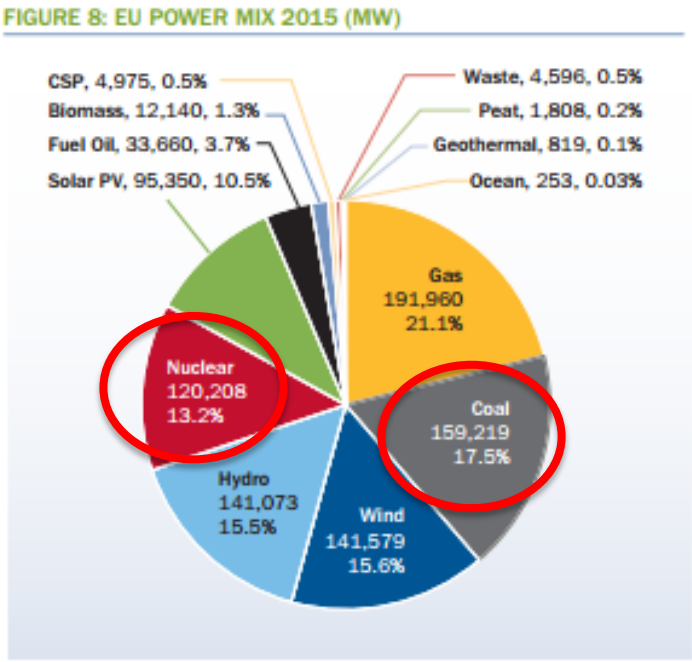
We can do a lot with solar PV – why aren't we?

Inflexibility



Source: Wind in Power, 2015 EU statistics, EWEA

Trading is low

Table 1: Intraday markets in selected European countries, including national consumption and intraday trading data from 2012

Country	Grid operator	Intraday exchange	Intraday gate closure ahead of delivery (min)	Intraday market design	National consumption (TWh)	Intraday trading Volume (TWh)	Share of national consumption (%)
Denmark	Energinet.dk	Elbas	60	Continuous	31.4	0.45	3.4
France	Réseau de Transport d'Electricité	Epex Spot	45	Continuous	434.1	2.2	0.5
Germany	50Hertz, Amprion, Tennet, TransnetBW	Epex Spot	45	Continuous	525.8	15.8	3.0
UK	National Grid	APX Power UK	60	Continuous	317.6	10.4	3.3
Italy	Terna	Gestore dei Mercati Energetici	255 – 690	Auction	296.7	25.1	8.5
Portugal	Redes Energéticas Nacionais	OMEL	135	Auction	46.2	5.2	11.3
Spain	Red Eléctrica de España	OMEL	135	Auction	240.2	46.8	19.5

Sources: Eurostat (2013), Websites of the grid operators and intraday exchanges.

Source:Working Paper Trading volumes in intraday markets: Theoretical reference model and empirical observations in selected European markets, April 2015, Simon Hagemann and Christoph Weber

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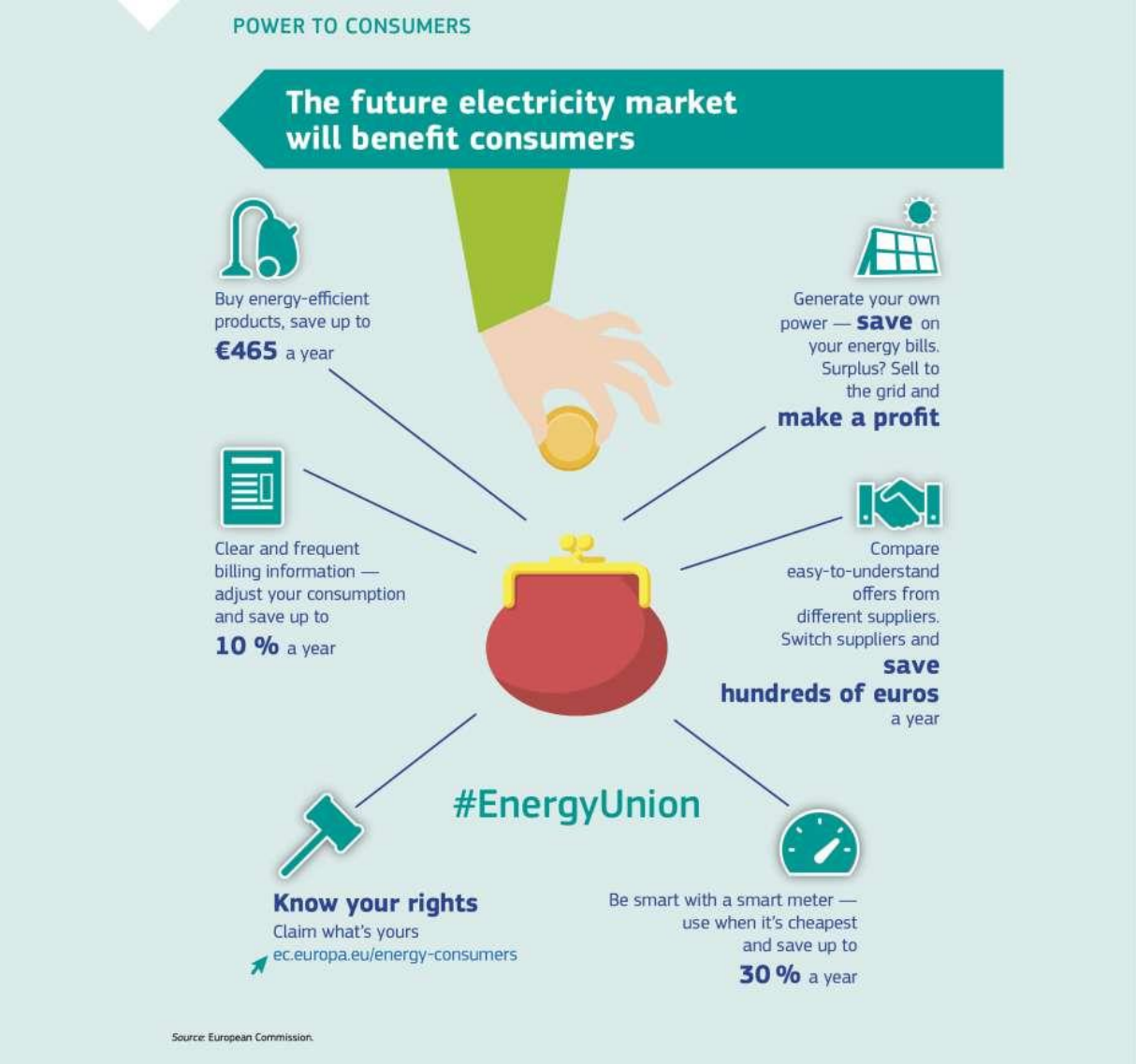
We need a new framework fit for PV



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A Vision of Future Power Systems

1 Photovoltaic Power Plant
2 Wind Farm
3 Hydro Electric Power Plant
4 Energy Self-sufficient Family Home
5 Communal Storage
6 Pumped Storage Hydro Power
7 Central Electrolysis/Methanation Station
8 Hydrogen Filling Station
9 Gas-fired Power Station
10 Energy Self-sufficient Telecom Station
11 Green Intralogistics

Source: Fronius 2014

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Delivering solar power for Europe

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