



MEDREG

**MEDREG – ECRB Joint Workshop on
“Integrating RES in the Electricity Networks and Balancing
Mechanism in MEDREG and ECRB Regions” – 15 April 2021**

Discussion Panel: Balancing mechanism – The Portuguese case

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MEDREG is co-funded by the European Union



Agenda:

Energy sector challenges towards decarbonisation

The Solar PV auction 2020 in PT – main results



Energy sector challenges towards decarbonisation

Energy policies towards decarbonisation



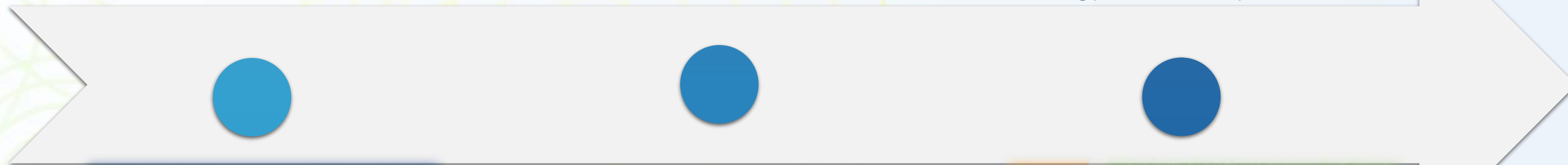
How we started:

- 1, 2, 3 Packages
- Liberalisation
- Unbundling
- Internal energy market
- New EU entities & NCs



Where we are going:

- New actors
- Energy system integration
- Carbon-neutral society
- Hydrogen
- Energy efficiency



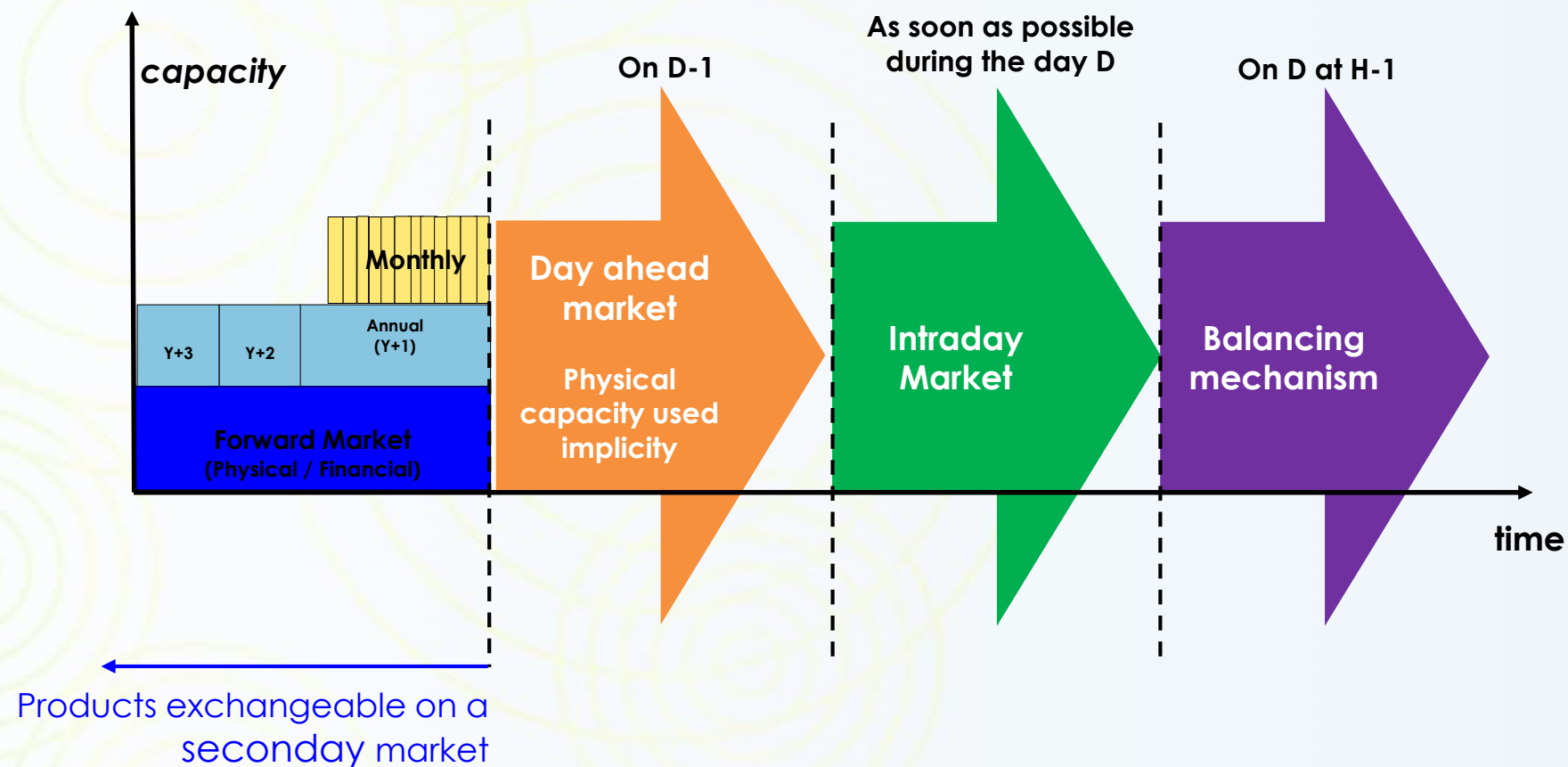
Where we stand:

- Clean Energy Package
- Decentralisation
- Prosumers
- Energy efficiency



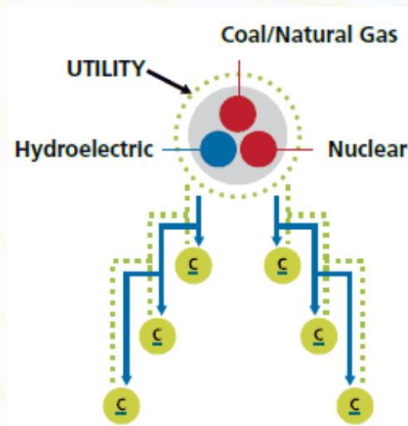
Internal Energy Market – electricity and gas

← **Bilateral contracts - OTC** →



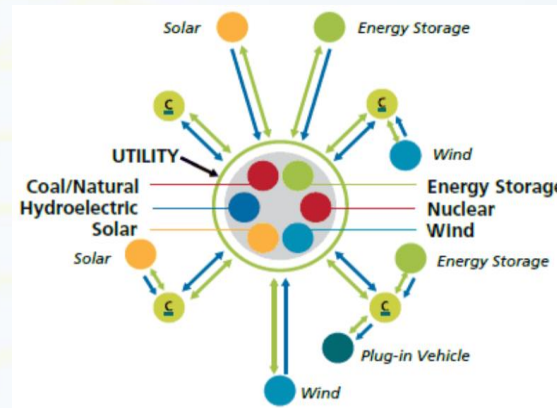
Clean Energy Market

Yesterday (Centralised)



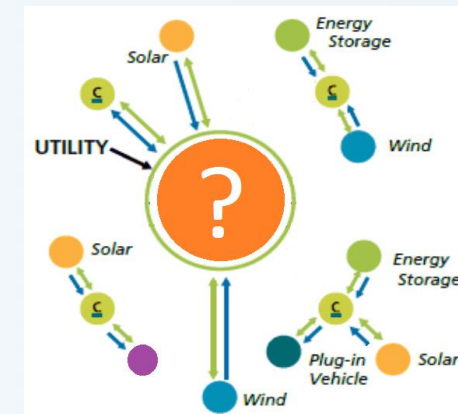
- Hierarchical
- Unidirectional flows

Today (Decentralised)



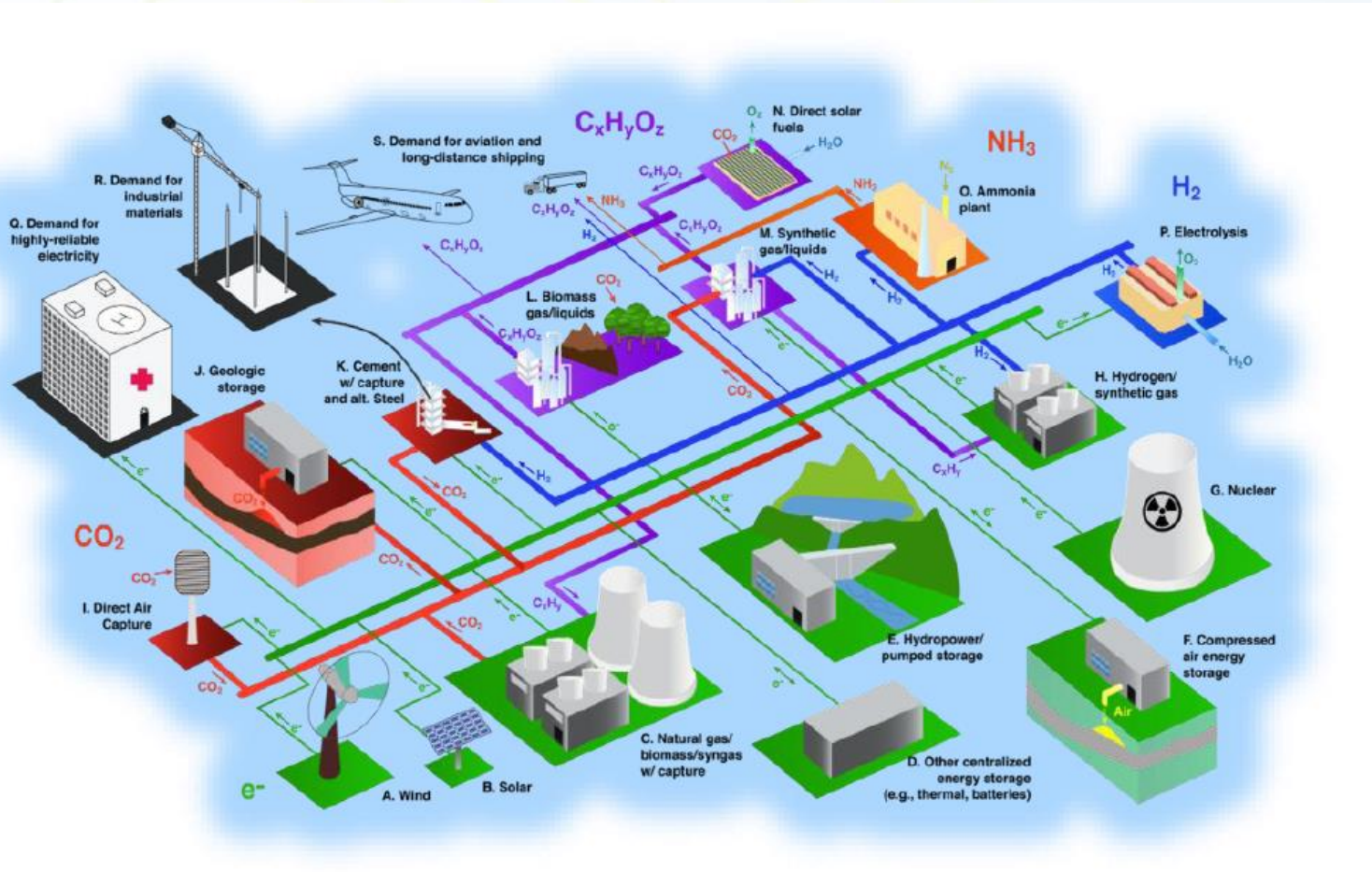
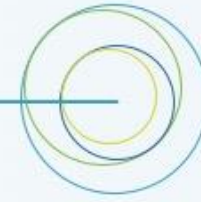
- Distributed resources
- Centralized control
- Bidirectional flows

Tomorrow (Hybrid)



- Transactive energy (P2P)
- Microgrids
- 'Multidirectional' flows

Energy system integration



- Consumer protection and empowerment
- Fit-for-purpose infrastructure
- Well-functioning markets
- Innovation and flexibility
- Integration of renewables and new gases
- Dynamic regulation

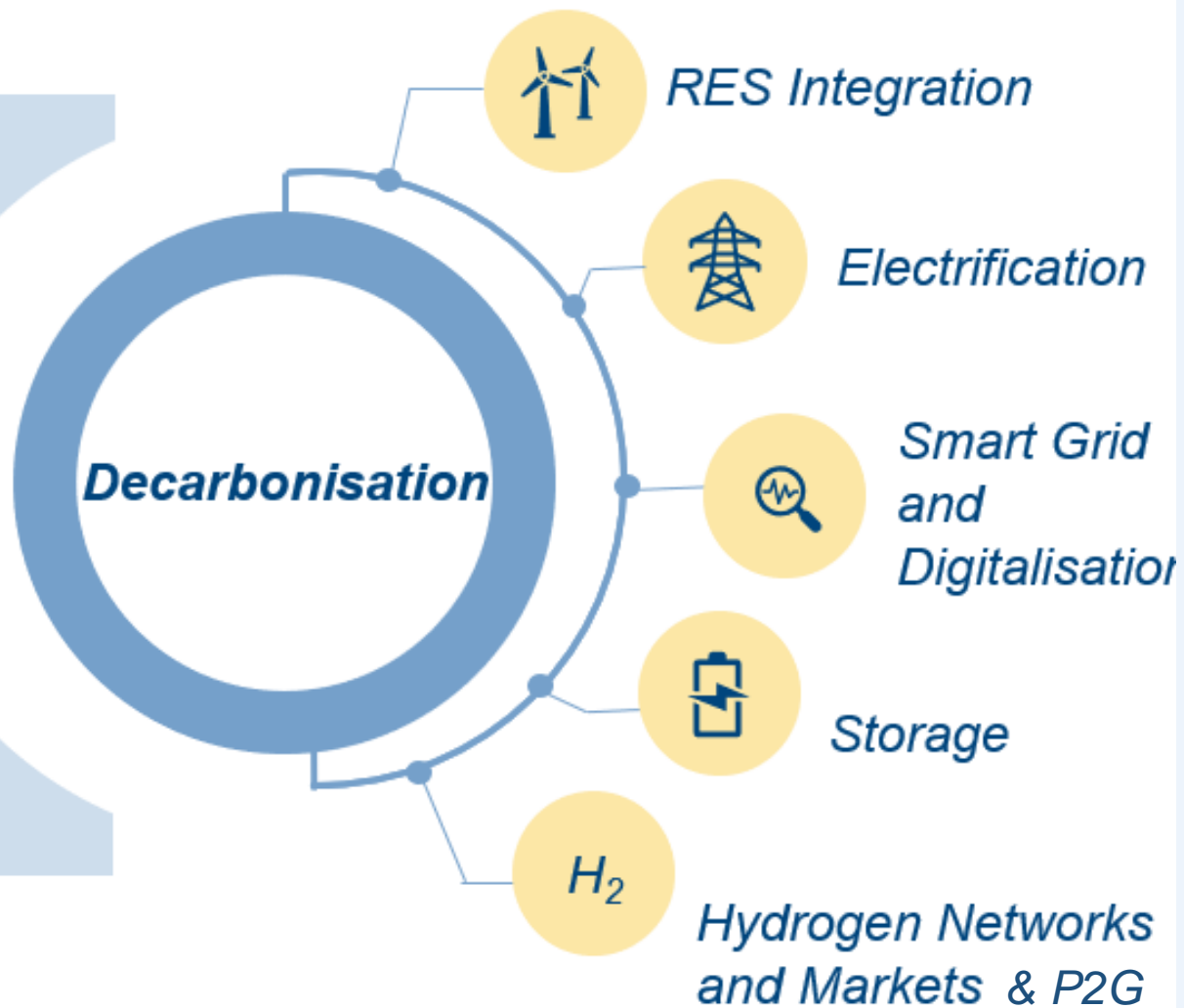
Source: <https://science.sciencemag.org/content/360/6396/eaas9793>



Energy system integration has several dimensions

In a future, with a volatile renewable energy source based power system, new solutions will be needed

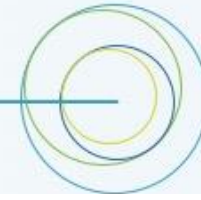
Interlinkages between energy vectors allows us to optimise the resources and costs



The Solar PV Auction 2020 in Portugal

Main results

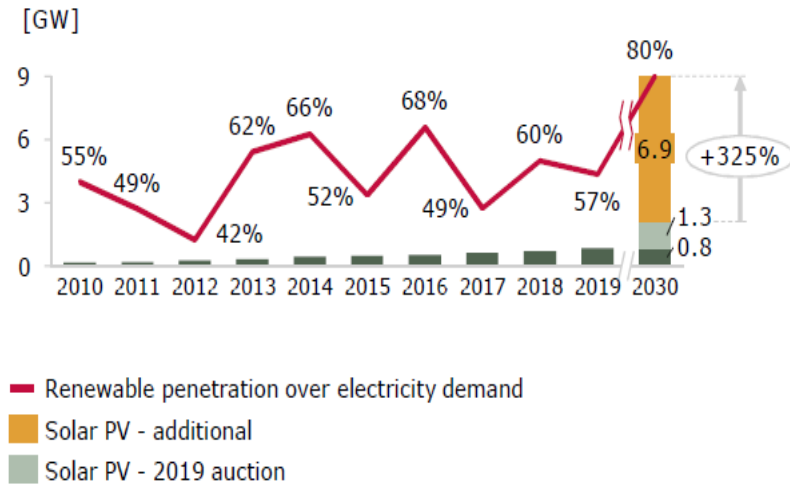
Pathway to the 80% renewables goal in 2030



AUCTIONS AS ENABLERS OF MATERIALIZATION OF MARKET TRENDS

2020 auction ensures regulatory stability of pathway started in 2019 and gives participants an additional option that values storage

THE PATH SO FAR AND THE ROAD AHEAD



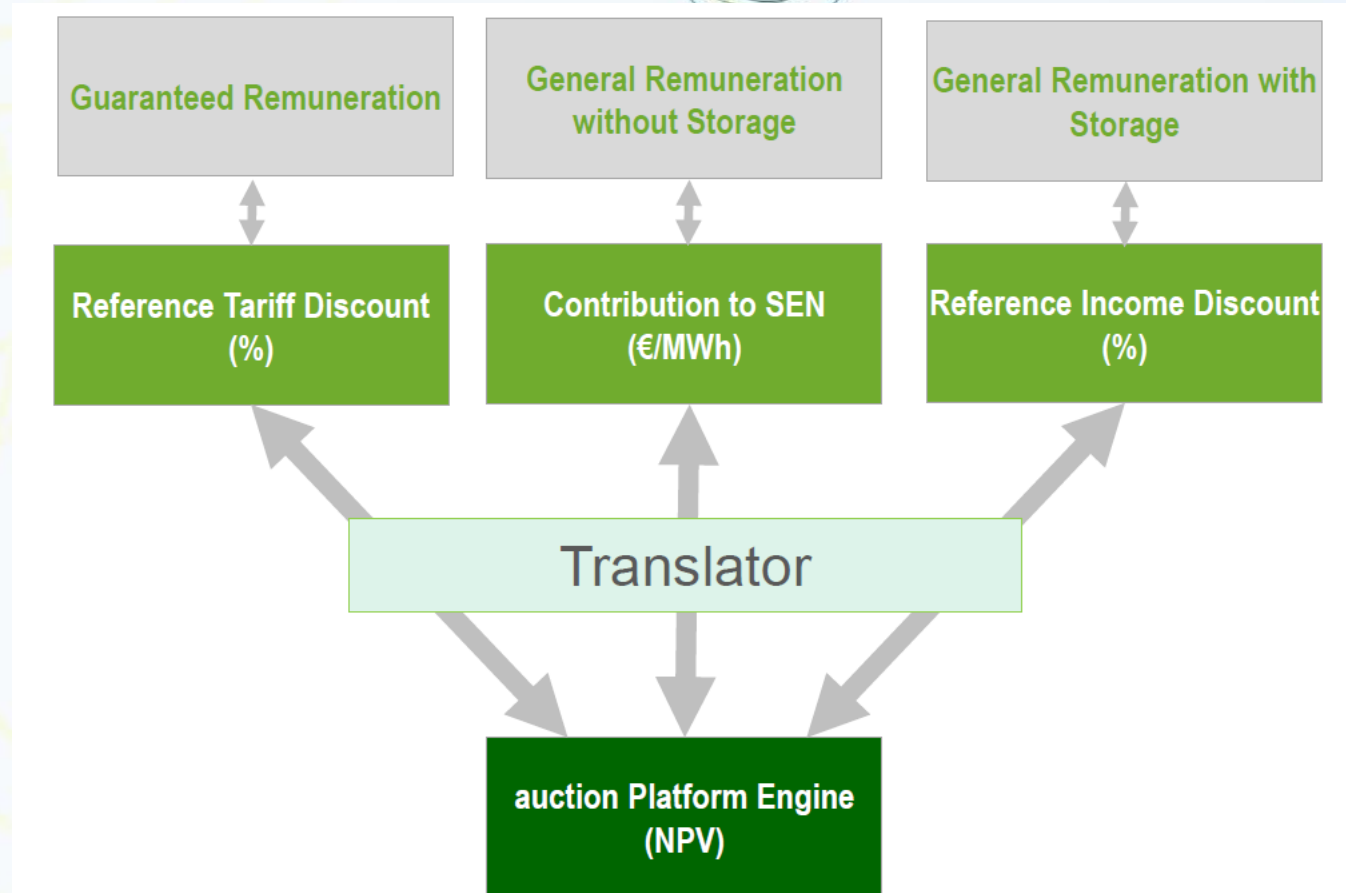
- | | |
|---------------------|--|
| 2019 auction | <ul style="list-style-type: none"> - High competition in the first auction resulted in world record low bids - 1GW awarded under the fixed tariff option, weighted average FiT of €20.4/MWh, nominal - 288MW awarded under the merchant option, weighted contribution to the system of €21.35/MWh |
| 2020 auction | <ul style="list-style-type: none"> - Two remuneration options of 2019 auction are maintained - Third option included for storage facilities associated with solar generation - Is storage a price competitive solution in today's market? |



2020 Solar PV Auction design

Bids from the 3 revenue schemes are converted into an one single **RATIO**:
Net Preset Value for the system (NPV) in €/MW, nominal money

An online tool available for participants to do the calculation of the NPV bids



$$NPV^L = \sum_{i=1}^t \frac{[PC_i^L - PR \times (1 - d)] \times H^L}{[1 + r \times (1 + \sigma)]^i}$$

$$NPV^L = \sum_{i=1}^t \frac{CS_i^L}{(1 + r)^i}$$

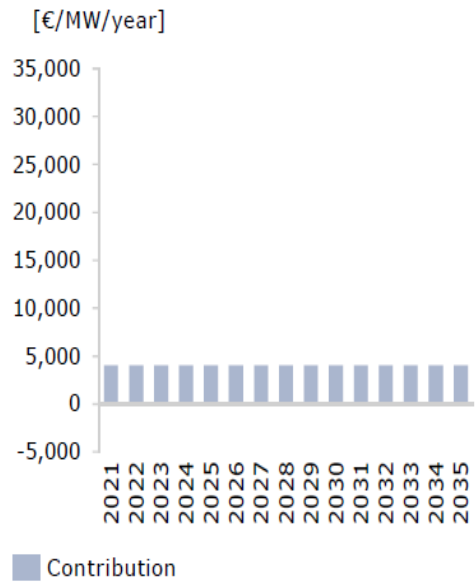
$$NPV^L = \sum_{i=1}^t \frac{[SD_i \times FC - RR \times (1 - dd)]}{[1 + r \times (1 + \sigma)]^i}$$

2020 Solar PV Auction design

2020 AUCTION DESIGN

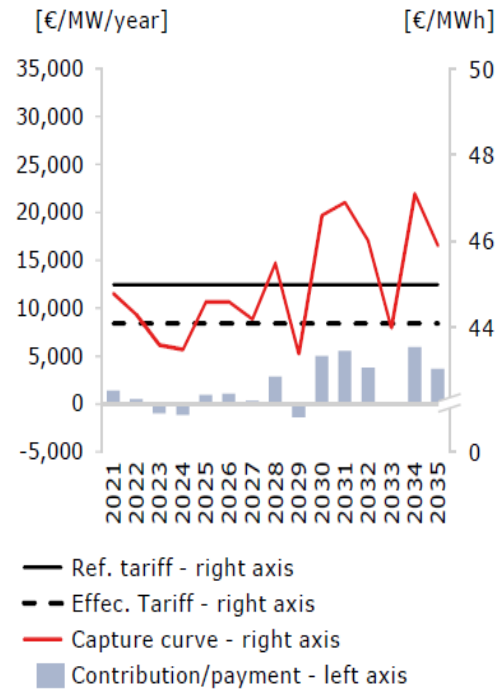
Change of system to €/MW (nominal) to enable comparison with storage option.
Decision variables for last auction's options remain the same

MERCHANT (NO STORAGE)

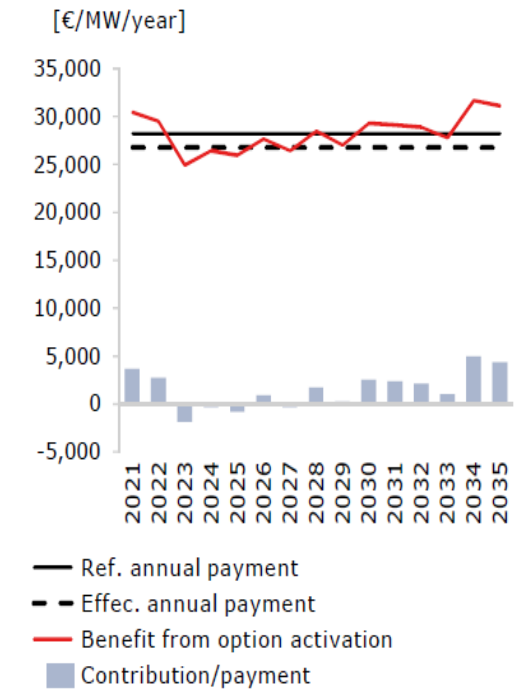


Note: all figures are nominal

FIXED TARIFF



MERCHANT (WITH STORAGE)



2020 Solar PV Auction results

Lote	Cap. Leiloadada	#Conc.	Procura Inicial	Rácio	Q. Adj.	#Rond.	Regime
	MVA		MVA		MVA		
1	99	12	1184	11,96	99	19	Comp. Fixa SEN
2	109	10	1081	9,92	109	8	Prém. Fixo Flex.
3	99	10	990	10,00	99	7	Prém. Fixo Flex.
4	108	13	1303	12,0648	108	21	Comp. Fixa SEN
							Comp. Fixa SEN
							Prém. Fixo Flex.
5	99	2	198	2,00	69	5	Prém. Fixo Flex.
6	99	9	891	9,00	99	20	Prém. Fixo Flex.
7	10	6	60	6,00	10	7	Prém. Var. Dif.
8	10	7	70	7,00	10	8	Comp. Fixa SEN
9	10	4	40	4,00	10	8	Comp. Fixa SEN
10	19	17	318	16,74	19	7	Prém. Fixo Flex.
11	19	7	133	7,00	19	19	Prém. Fixo Flex.
12	19	22	418	22,00	19	23	Prém. Fixo Flex.

	MW	%
Compensação Fixa ao SEN	177	26,42%
Prémio Variável por Diferenças	10	1,49%
Prémio Fixo por Flexibilidade	483	72,09%
Total	670	100,00%

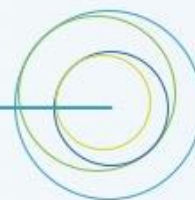


2020 Solar PV Auction results

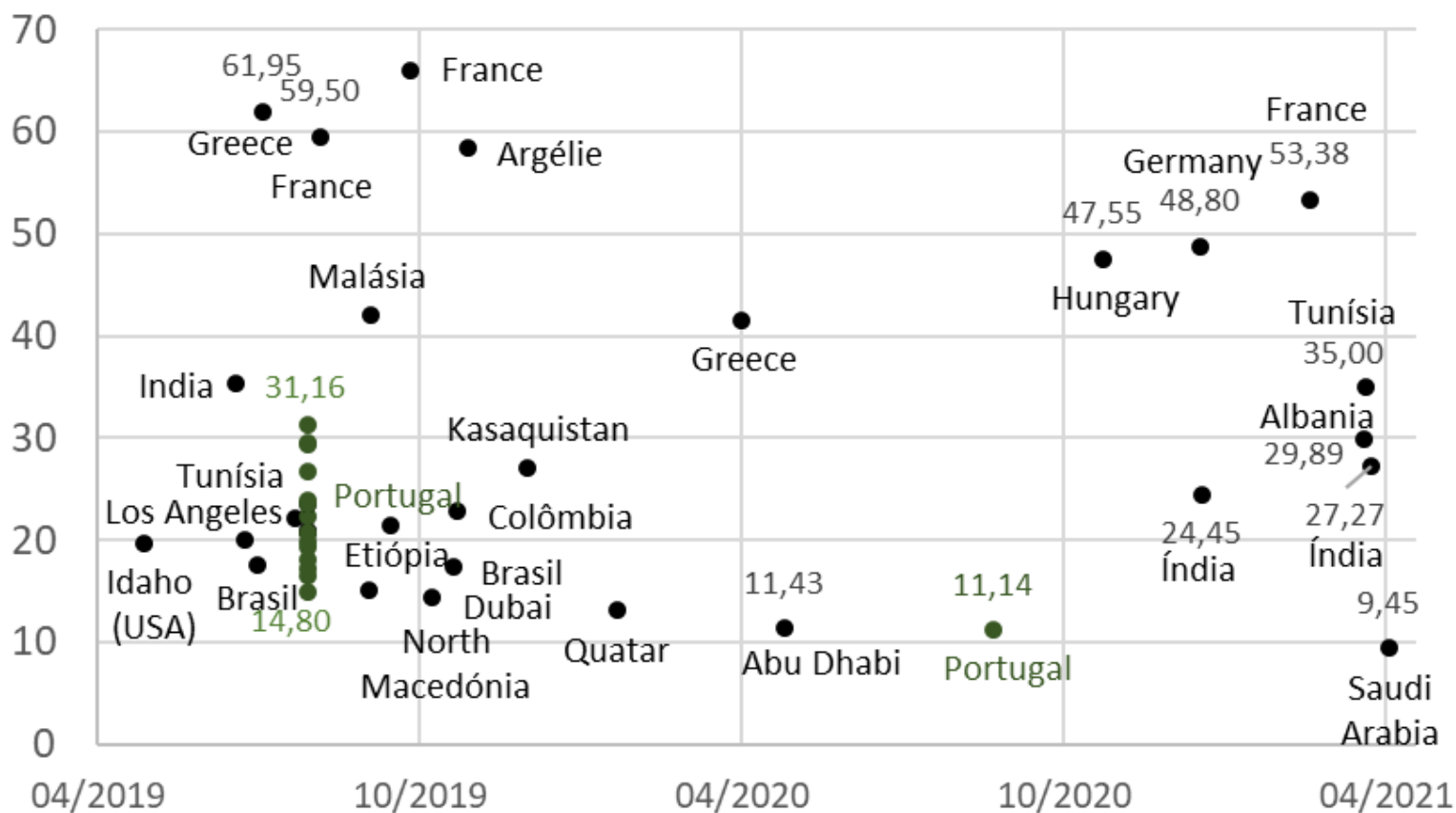
Lote	Regime	Adjudicatário	Quant.	Comp. Fixa SEN		Prém. Var. Dif		Prém. Fixo Flex		VAL	Prémio Fixo	Comp. Fixa SEN	Rem. Gar.	Prémio Fixo
				MVA	€/MVA/Ano	MVA	%	MVA	%					
1	Comp. Fixa SEN	Green Show - Lda	99	99	72 976,5	0		0		903 616		-37,27		
2	Prém. Fixo Flex.	Hanwha Q Cells GmbH	109	0		0		109	207,33%	795 306	-35 968			-18,38
3	Prém. Fixo Flex.	Endesa Generación Portugal, S.A.	99	0		0		99	187,93%	721 005	-29 467			-15,06
4	Comp. Fixa SEN	Green Show - Lda	54	54	79 019,1	0		0		978 437		-40,36		
	Comp. Fixa SEN	Green Show - Lda	4	4	75 873,9	0		0		939 493		-38,75		
	Prém. Fixo Flex.	Hanwha Q Cells GmbH	50	0		0		50	255,02%	978 437	-51 992			-26,55
5	Prém. Fixo Flex.	Iberdrola Renewables Portugal, S.A.	69	0		0		69	148,18%	568 763	-16 146			-8,25
6	Prém. Fixo Flex.	Hanwha Q Cells GmbH	99	0		0		99	244,86%	939 493	-48 585			-24,81
7	Prém. Var. Dif.	Solarengoradar - Unipessoal, Lda.	10	0		10	73,30%	0		685 441			11,14	
8	Comp. Fixa SEN	TAGENERGYSA	10	10	64 229,3	0		0		795 306		-32,82		
9	Comp. Fixa SEN	TAGENERGYSA	10	10	64 229,3	0		0		795 306		-32,82		
10	Prém. Fixo Flex.	Hanwha Q Cells GmbH	19	0		0		19	187,93%	721 005	-29 467			-15,06
11	Prém. Fixo Flex.	Hanwha Q Cells GmbH	19	0		0		19	235,50%	903 616	-45 445			-23,21
12	Prém. Fixo Flex.	Hanwha Q Cells GmbH	19	0		0		19	276,31%	1 060 043	-59 133			-30,20
			670	177	71 265,6	10	73,30%	483	217,88%	841 805	-39 525	-36,40	11,14	-20,19

	Total (MVA)	#Lotes	Modalidade
Endesa Generación Portugal, S.A.	99	1	Prémio Fixo por Flexibilidade
Green Show - Lda	157	2	Compensação Fixa ao SEN
Hanwha Q Cells GmbH	315	6	Prémio Fixo por Flexibilidade
Iberdrola Renewables Portugal, S.A.	69	1	Prémio Fixo por Flexibilidade
Solarengoradar - Unipessoal, Lda.	10	1	Prémio variável por Diferença
TAGENERGY SA	20	2	Compensação Fixa ao SEN

2019-2021 Solar PV Solar Auctions worldwilde



(€/MWh)





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