Implementing a European solar supply chain

Roundtables Europe 2022

European Solar Manufacturing Council

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SUPPLY CHALLENGE: small actual PV manufacturing capacities will negatively impact further developments in the EU

Despite our high Green Deal ambitions, drastically increasing PV installations, geopolitical challenges and EU fight for energy independence we are demonstrating very low capacities on PV manufacturing. In Europe we produced (in 2020):

- **11 %** of the PV silicon — **22.1 GW** production capacity (REC Solar Norway, Wacker)
- **1 %** of solar wafers — **1.25 GW** production capacity (Norsun, Norwegian Crystals, EDF Photowatt)
- **0.4 %** of cells — **0.65 GW** production capacity (Solitek/Valoe, Enel, Ecosolifer)
- **3 %** of modules — **6.75 GW** production capacity (at 29 different companies)

	2016 [kUS$]	2017 [kUS$]	2018 [kUS$]	2019 [kUS$]	2020 [kUS$]
Extraeuropean import	6 330 809	6 435 484	8 105 619	10 487 288	10 516 755
Extraeuropean export	1 701 633	1 641 939	1 725 089	1 565 484	1 775 708
Trade deficit	4 629 176	4 793 545	6 380 530	8 921 804	8 741 047

Table 1. The total value of traded Photosensitive semi-conductor devices, including photovoltaic cells whether assembled in modules or made up into panels; Light emitting diodes with European countries from 2016 to 2020. *Source: ESMC.*

Current PV trade deficit could increase from € 7.9 billion to € 15-20 billion annually in case the appropriate measures will not be implemented to re-establish PV manufacturing industry in the EU.

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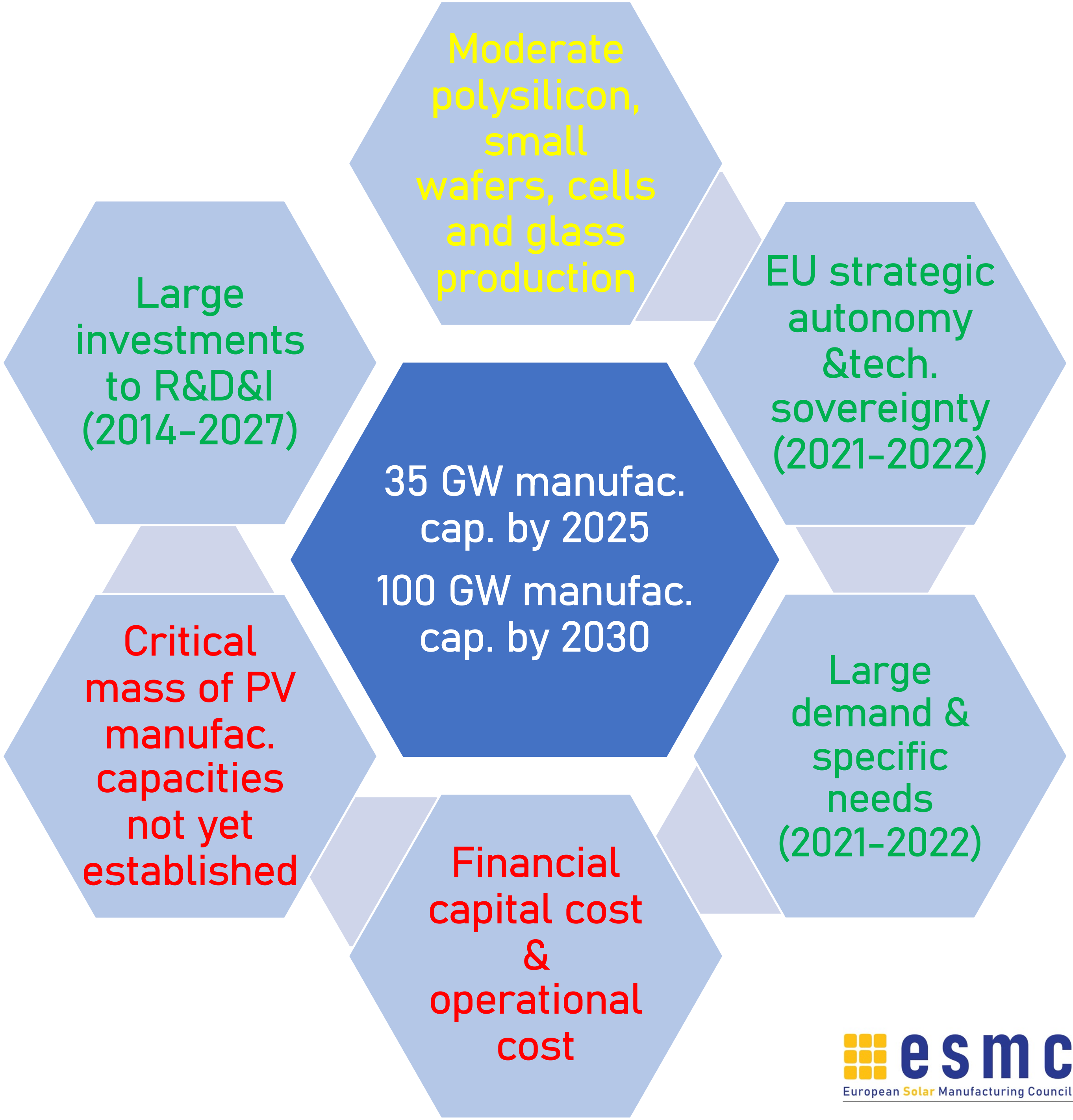
How to turn the growing actual European PV manufacturing capacities into socioeconomic benefits of large-scale PV manufacturing along the entire value chain?



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FINANCING OPTIONS AND FUTURE POTENTIAL TO EMPOWER PV MANUFACTURING IN EUROPE

Innovation Fund	• **Doubling the financial package after RePowerEU** • **€ 3 billion call in autumn**
Recovery and Resilience Facility	• **€ 26 billion under RePowerEU *for PV deployment*** • **€ 500 million already foreseen *for PV manufacturing*** • **Member States decisions after RePowerEU**
PV-IPCEI	• **€ 1 billion financing gap already identified** • **€ 1-2 billion financing gap for the future projects**
Solar PV Industry Alliance	• ***"The alliance will map the availability of financial support, attract private investment and facilitate the dialogue and match-making between producers and offtakers"***

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6 Projects – 50 companies – 14 EU countries

No.	Project Title	Project Targets
1.	**MCPV: Industrializing heterojunction cell and module technology to the Gigawatt scale**	Establish within the next 7 years, 15 Gigawatt (GW) of PV cell and module manufacturing in Europe, on the basis of the highly efficient Heterojunction Technology (HJT). The first stage of the project will be the implementation of innovative HJT PV cell and module manufacturing pilot lines during 2022, ramping up cell manufacturing to 15 GW in NRW under the MCPV project by 2027.
2.	**GIGA PV: Manufacturing of TOPCon PV cells and silver paste**	Extend the European PV value chain by local manufacturing of silver paste and novel PV cells. The innovation will focus on reduction of cost of silver contacts on silicon TOPCon cells, without compromising the advantages of the technology.
3.	**OXFORD PV: Industrializing Tandem PV technology to the Gigawatt scale**	To bring Tandem Silicon-Perovskite PV technology at industrial maturity and Gigawatt scale production establishing a production of 3 GW of PV cells and modules in Europe. Tandem technology will allow to overcome Silicon cell power efficiency conversion exceeding 30% and to lower Levelized Cost of Energy.
4.	**SOLITEK: PV integrated solutions**	Develop and establish large-scale Europe based production of innovative integrated PV solutions. For applications in buildings (BIPV), infrastructure (IIPV), vehicles (VIPV) and agriculture (Agro-PV).
5.	**REC SOLAR: Circular PV production**	To ensure that PV would be the best-in-class of environmental technologies on sustainability by minimizing the environmental impact from PV manufacturing and end-of-life.
6.	**ISC KONSTANZ: Industrializing IBC technology to GW scale**	To create European R&D experience for n-type bifacial PV ingot, wafer, cell and module technology and to develop it to the industrial GW scale.

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1. Industrializing heterojunction cell and module technology to the Gigawatt scale (33 Members)

MIC, SINGULUS, IPVF, NorSun, OXFORD PV, tecnalia, TNO, teamtechnik, MONDRAGON ASSEMBLY, cea, ZS-Handling, VON ARDENNE, RISE Technology, solarge, Photowatt, VOLTEC solar, APPLIED MATERIALS, halm., ENEA, Ulbrich Solar Technologies, eurac research, NEXWAFE, DCH2GEMINI technology consulting GmbH, CENER, Fraunhofer ISE, SIEMENS, VITRONIC, Soltec, RENA, enel Green Power, ines, MO Solar Equipment, IGNIS

2. Manufacturing of TOPCon PV cells and silver paste (17 Members)

GIGA PV, KGHM, IEO ec brec, RISE Technology, ISC research for a sunny future, ines, APPLIED MATERIALS, VITRONIC, cea, IPVF, SINGULUS, TNO, RENA, halm., Fraunhofer ISE, RCT solutions, solaris

3. Industrializing Tandem PV technology to the Gigawatt scale (31 Members)

enel Green Power, VON ARDENNE, NorSun, APPLIED MATERIALS, ENEA, eurac research, Soltec, MO Solar Equipment, teamtechnik, MONDRAGON ASSEMBLY, solaris, IGNIS, SINGULUS, SIEMENS, halm., MIC, ISC research for a sunny future, ines, cea, TNO, Photowatt, VITRONIC, VOLTEC solar, SOLARWATT, RISE Technology, imec, EVOLAR, CENER, OXFORD PV, RENA, IPVF

4. PV integrated solutions (22 Members)

SOLITEK, SIEMENS, cea, PROTECH, TNO, SmartEnergy DIH, ines, RCT solutions, VITRONIC, CENER, ZS-Handling, SOLEAN, VALOE, IPVF, MO Solar Equipment, ISC research for a sunny future, MONDRAGON ASSEMBLY, SOLARWATT, metsolar, eurac research, tecnalia, IGNIS

5. Circular PV production (30 Members)

REC Solar, SOLITEK, FuturaSun, solaris, cea, TNO, LuxChemtech, IFE, COVEME, VITRONIC, SOLARWATT, NorSun, APPLIED MATERIALS, solarge, enel Green Power, ISC research for a sunny future, SmartEnergy DIH, ines, VOLTEC solar, MO Solar Equipment, AGC, ENEA, IPVF, MIC, SINTEF, Standex, eurac research, CENER, Fraunhofer ISE, 3S Solar Plus

6. Industrializing of IBC solar cell and module technology to Gigawatt scale (27 Members)

ISC research for a sunny future, VALOE, FuturaSun, SOLITEK, MONDRAGON ASSEMBLY, APPLIED MATERIALS, IPVF, eurac research, teamtechnik, NorSun, PROTECH, imec, SINGULUS, VON ARDENNE, halm., GIGA PV, RCT solutions, SOLARWATT, TNO, ines, cea, LuxChemtech, tecnalia, RENA, RISE Technology, Fraunhofer ISE, IEO ec brec

THANK YOU FOR YOUR ATTENTION!

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