



COMMERCIAL PROSUMERS AS A CATALYST FOR RENEWABLES IN THE SEE REGION

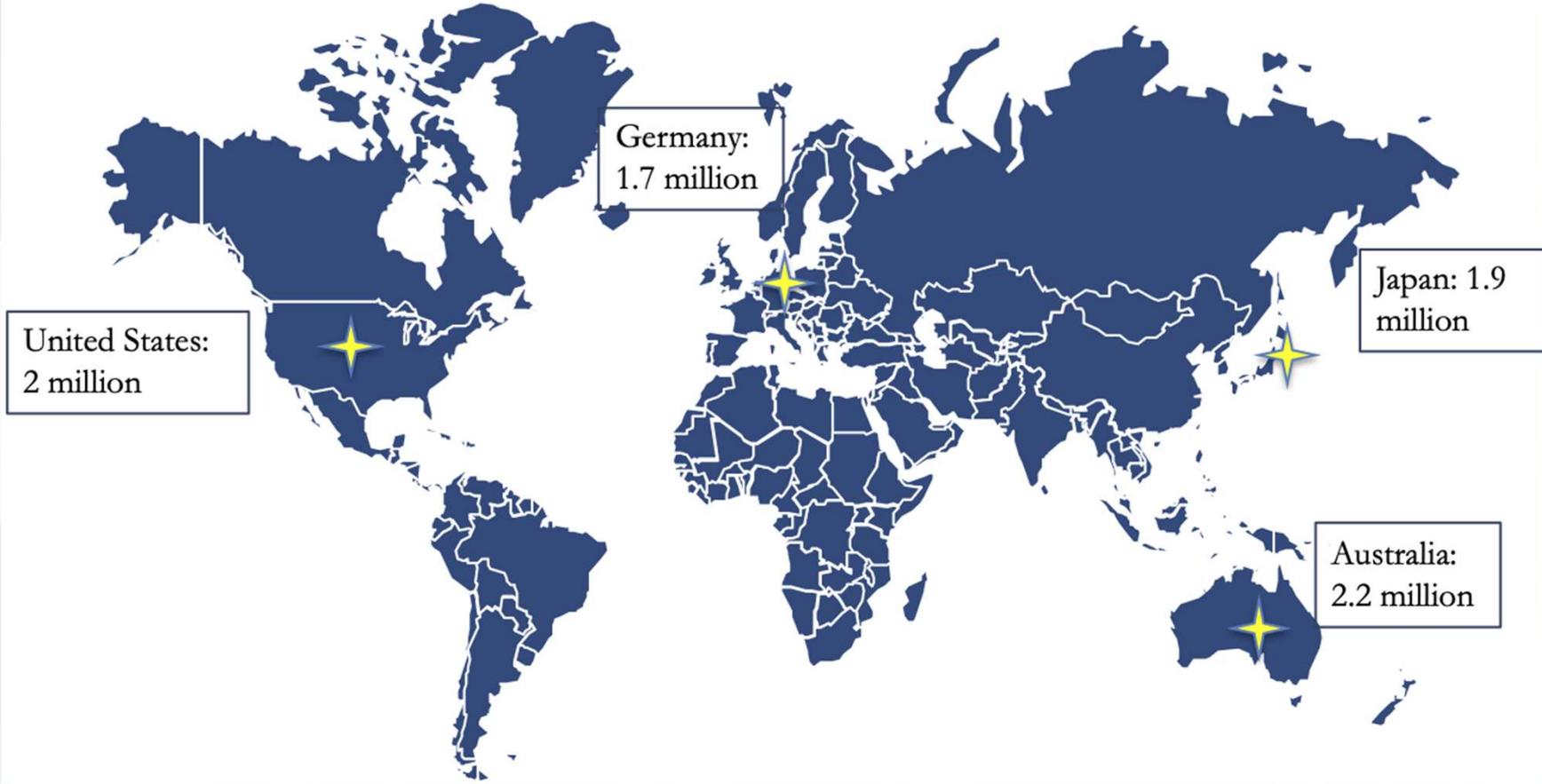
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Distributed Solar is growing rapidly worldwide

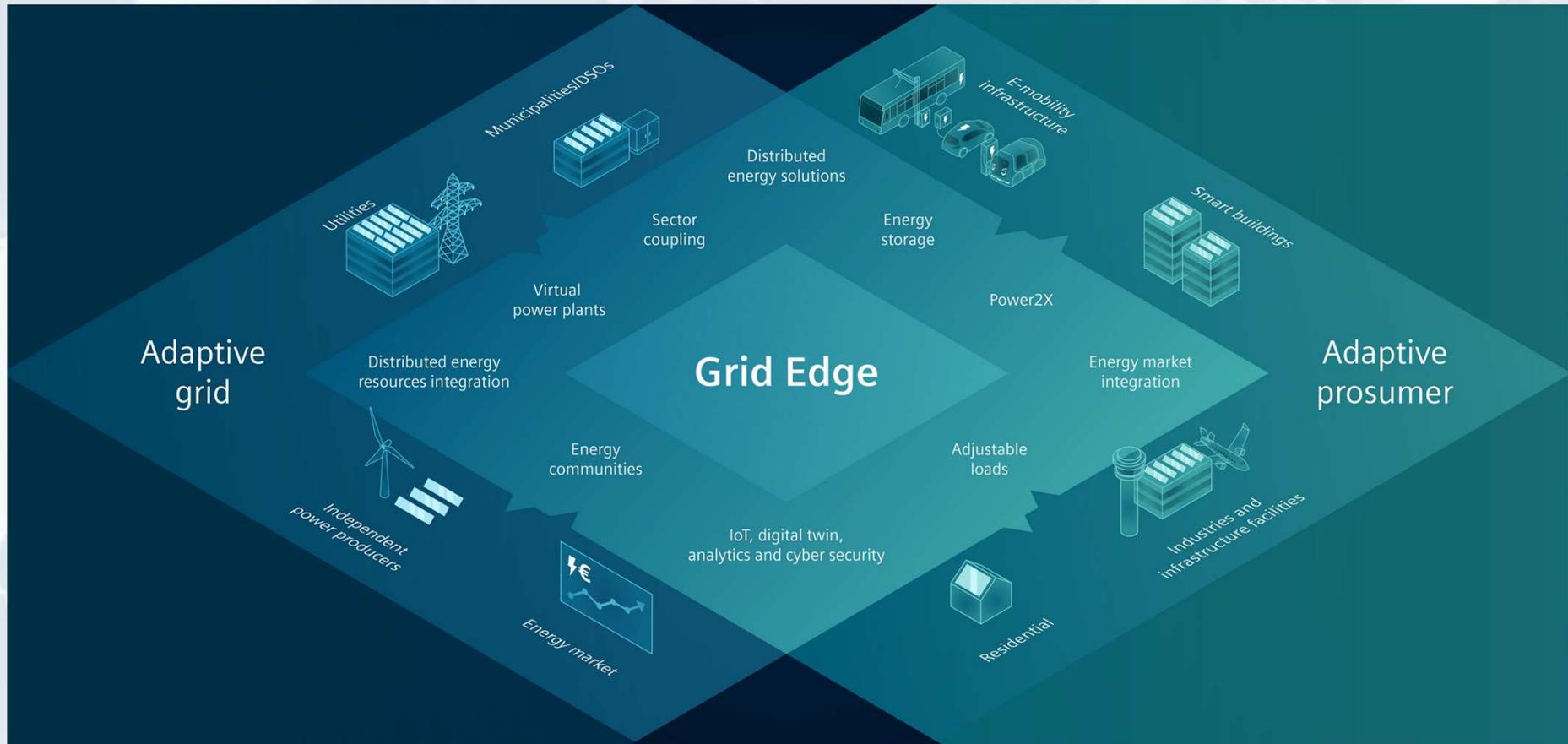
Number of Individual Solar PV Systems by Country (2021)



Distributed solar is growing rapidly worldwide

- Economic and financial fundamentals are making a wave of growth in the commercial prosumer market increasingly likely in the coming years
- Most jurisdictions in SEE remain unprepared for this wave, as most continue to underestimate the role of prosumers
- Without smart policy, governments are passing up a major opportunity to evolve the power system toward a cleaner, lower cost, more networked, and more interactive paradigm

Commercial prosumers have the potential to become far more active players in supporting grid resilience and decarbonization



Main Policy Pathways

Net Metering

- Allows customers to carry-over surplus generation to erase future consumption
- Net excess generation compensated **at the retail rate: 1kWh = 1kWh**
- No cash payment for net excess generation
- DPV understood primarily (if not exclusively) as demand reduction

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Net Billing

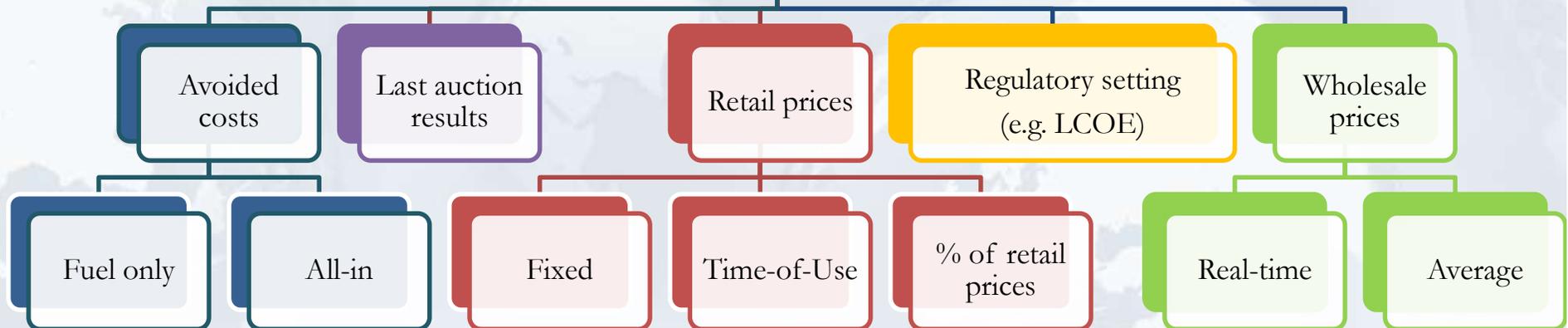
- Allows carry-over: But, **de-coupling** of the compensation rate from the retail rate paid: Net excess generation is compensated **at a rate below the retail rate**
- Creates an incentive to increase self-consumption (own-use)
- DPV still understood primarily as **demand reduction**

Net-FIT

- **No carry-over:** Net excess generation is compensated **at a rate below retail**
- **Surplus is sold** (i.e. \$/kWh payment): no longer used simply to reduce future electricity bills
- Surplus can be sold to brokers, to the utility, peer-to-peer, or to the wholesale market directly
- DPV begins to be recognized as a new source of distributed power supply

How to compensate surplus generation?

Options for setting the price awarded for surplus generation



Three main phases of prosumer market development

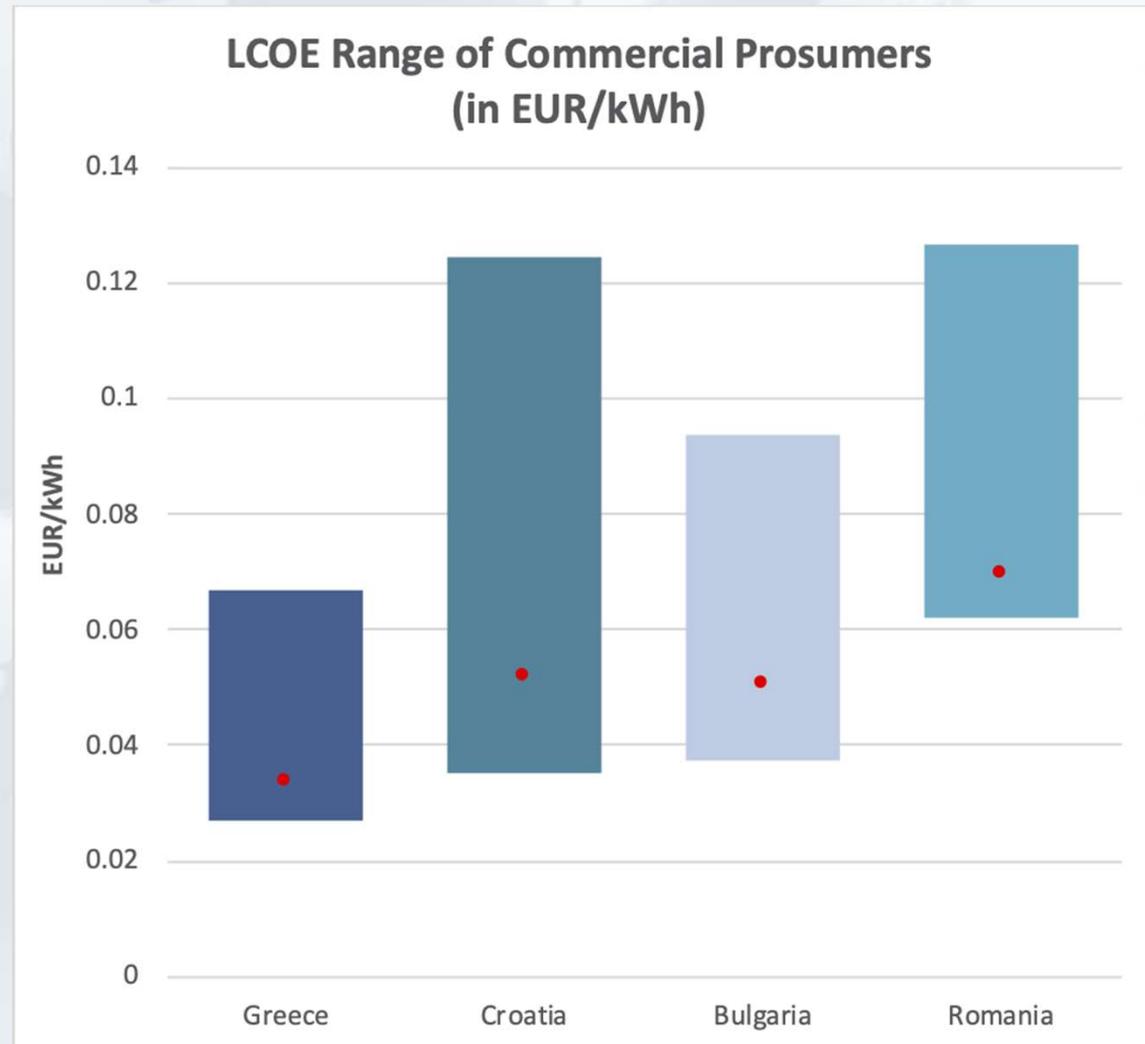


- Only Greece has entered the “Market Growth Phase”; the other countries covered are still in the Early Market Adoption Phase

How do jurisdictions in SEE compare?

The realistically achievable LCOE (red dots) for commercial rooftop projects in the SEE region currently ranges from roughly EUR 3,4 to 7.0 cents/kWh

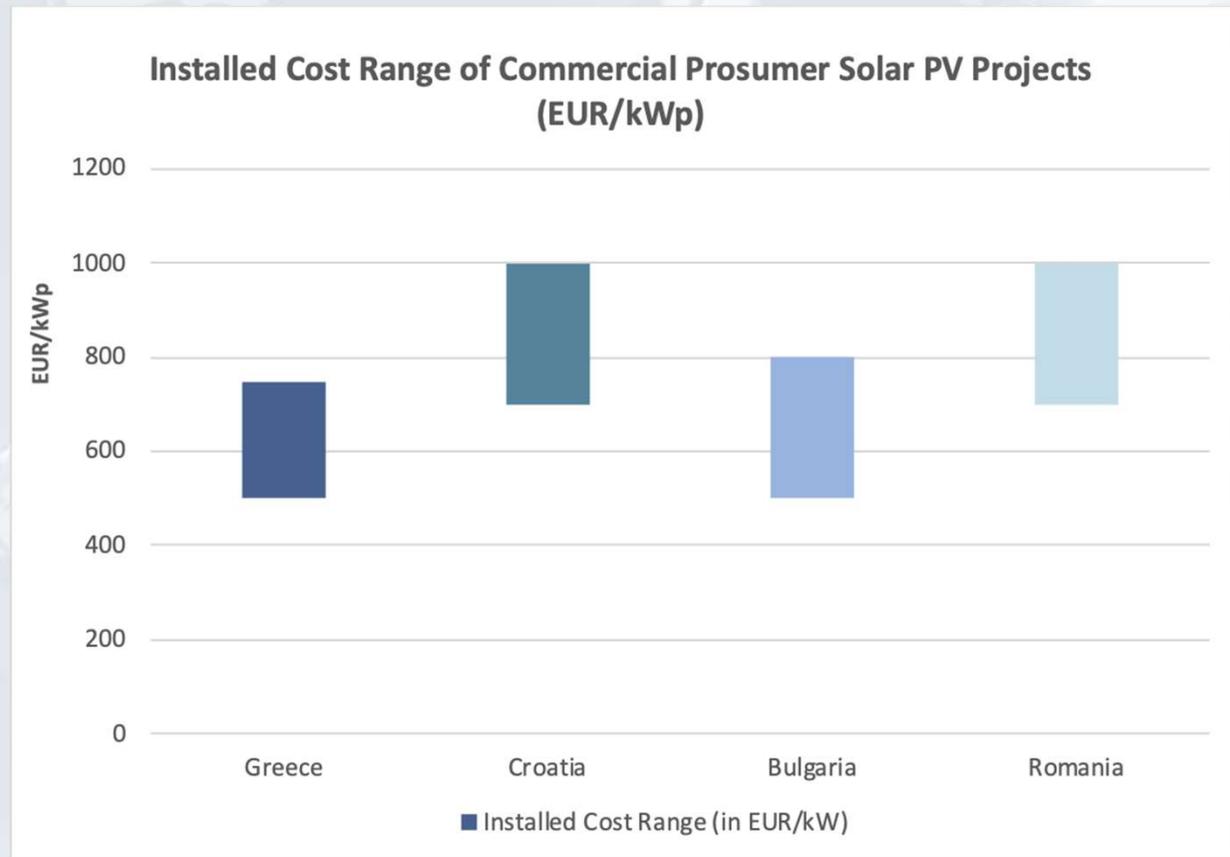
- Resource quality matters
- Cost of capital plays a decisive role
- Installed costs still differ widely by market
- Tracker? Bifacial?



Source: E3 Analytics Research 2021
For an overview of key assumptions, see Annex B.

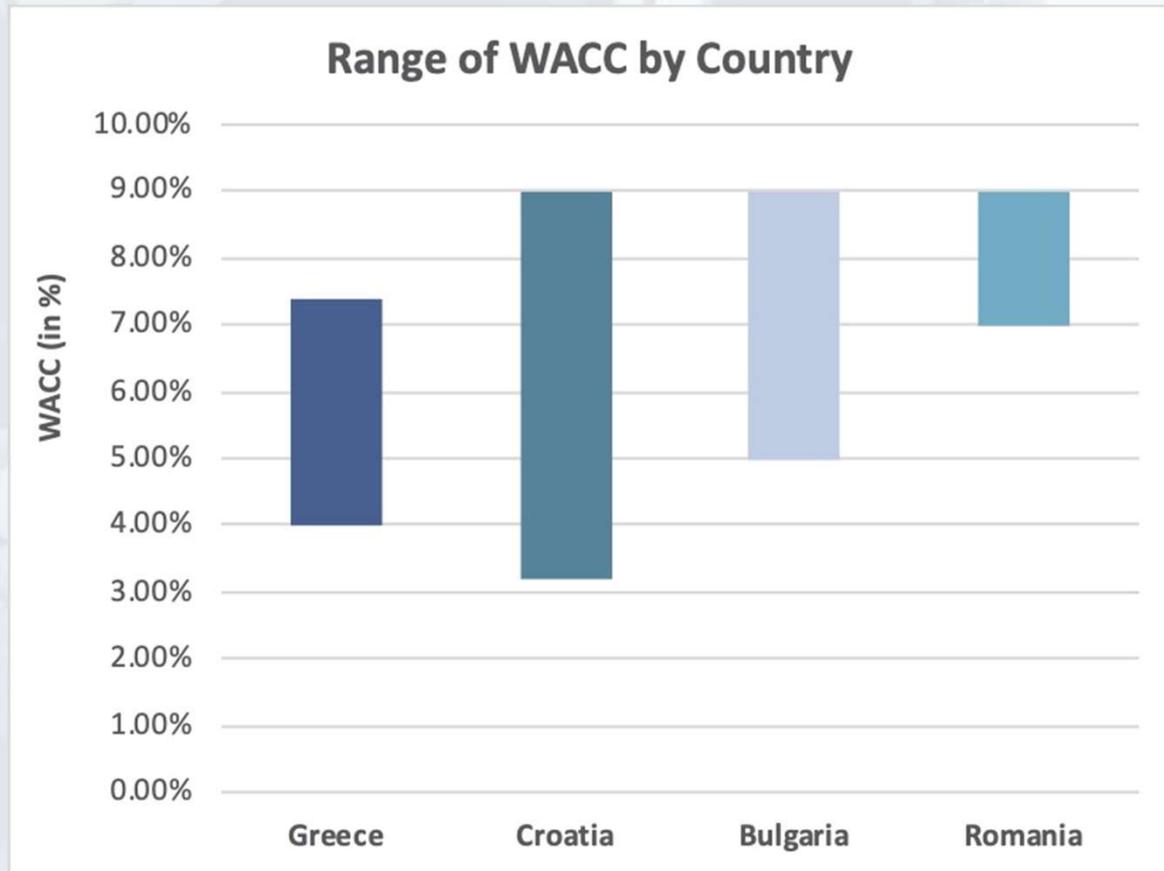
How do installed costs compare?

Installed costs range quite widely for commercial prosumer projects, reflecting different market maturities, but also different regulatory and support frameworks



How does the WACC compare?

The WACC differs widely across the region, but also within individual countries depending on the type of commercial prosumer investing, and the ability (or not) of bank lending



Policy Pathways

Over the next decade, most markets worldwide are likely to evolve toward the “**full system integration**” phase

In practice, this means (among others):

- National targets for prosumers
- Simplified administrative procedures
- Clear regulations and pricing conditions governing surplus generation, esp. market-linked pricing
- Clear tax rules and fees (grid connection, permits, etc.)
- Smart inverter standards to enable greater two-way interactivity

THANK YOU!

QUESTIONS?

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Annex A: Country Overviews

Market Snapshots: Greece (1)

- **Target of covering 61%-64% of its electricity needs with renewables** by 2030, up from 41% today + coal phase-out by 2023
- **50MW of installed prosumer PV** (out of 3.6GW nation-wide)
- Commercial, public and agriculture sector represent **40 % of national demand**
- **Commercial electricity rates** between EUR 0,10 - 0,15/kWh depending on the user type
- For some commercial prosumers, **payback times are reported to be in the 3-4 year range**

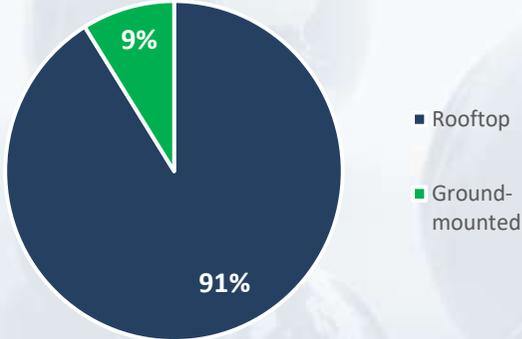
Market Snapshots: Greece (2)

1. Net Metering policy

- 3MW project size cap
- Surplus can be carried over to subsequent months; surplus netted after 3 years
- Used mainly to reduce consumers' power bill
- Primarily solar PV projects
- Currently represents the majority of the market

2. Self-production scheme (Net-FIT)

- No project size limit
- Max. 20% of total output can be compensated as surplus*
- Real-time offsetting of onsite demand (no carry-over)
- Surplus purchased at a regulated rate
- Primarily solar PV projects
- Currently a small, but growing, part of the market



Most of the current market is Net Metering, but uptake under the Self-Production Scheme is growing

Market Snapshots: Croatia (1)

- **Target of covering 63,8% of its electricity needs with renewables** by 2030, up from 49% today
- **17MW of installed prosumer PV** (out of 69MW nation-wide)
- Commercial, public and agriculture sector represent **59,5 % of national demand**
- **Commercial electricity rates** between EUR 0,093 - 0,125/kWh depending on the user type
- Existence of solar PV subsidies having counter-productive effects
(can cover 40 to 80% of total installed costs)

Market Snapshots: Croatia (2)

- Croatia has regulations governing surplus power sales:
Purchase rate for surplus generation set at 90% of the pre-tax retail price: but, this rate is lower than the current CROPEX wholesale market price
- Aim is to encourage “right-sizing” (or to discourage persistent electricity surpluses)
- Market growth remains slow, and SMEs largely wait for the funding windows to take advantage of subsidies.

Market Snapshots: Bulgaria

- **Target of covering 30% of its electricity needs with renewables** by 2030, up from 23% today
- **50MW of installed prosumer PV** (out of 3.6GW nation-wide)
- Commercial, public and agriculture sector represent **65 % of national demand**
- **Commercial electricity rates** between EUR 0,095 - 0,12/kWh depending on the user type
- No clear regulations governing surplus generation, grid connection
- Majority of the market is based on **pure self-consumption**

Market Snapshots: Romania (1)

- **Target of covering 50% of its electricity needs with renewables** by 2030, up from 42% today
- **Only a few MW of installed prosumer PV** (out of 1,378GW nation-wide): 59 non-household prosumers thus far
- Commercial, public and agriculture sector represent **75 % of national demand**
- **Commercial electricity rates** between EUR 0,010 - 0,13/kWh depending on the user type (up 30% since 2017)

Market Snapshots: Romania (2)

- Under new rules (Dec 2020), **surplus will be purchased at average wholesale market price in previous year** (around EUR 50/MWh)
- **Project sizes capped at 100kW**, hindering market deployment
- However, given significant increases in electricity prices in recent years, and the new regulatory framework for surplus power sales, the Romanian market is likely to grow

Annex B: Key Input Parameters

Key Input Parameters: Greece

	Low LCOE Case (More optimistic scenario: "best case", with tracker and bifacial panels)	Mid-Case (without tracker, and without bifacial panels)	High LCOE Case (Less optimistic scenario)
Installed Cost	600	500	750
Inverter Cost	40/kW	45/kW	50/kW
Inverter Lifetime	20 years	15 years	10 years
OPEX per year	10	7.5	12
PV system lifetime	25	25	20
WACC	4%	5%	7.4%
Degradation	0.25%	0.4%	0.5%
Full load hours	1850 (ground mount, single axis tracker, bifacial)	1650	1350

Key Input Parameters: Croatia

	Low LCOE Case	High LCOE Case
Installed Cost	700	1000
Inverter Cost	50/kW	100/kW
Inverter Lifetime	15 years	10 years
OPEX per year	10	15
PV system lifetime	25	20
WACC	3.20%	9.0%
Degradation	0.4%	0.9%
Full load hours	1550	1100

Key Input Parameters: Bulgaria

	Low LCOE Case	High LCOE Case
Installed Cost	500	800
Inverter Cost	50/kW	60/kW
Inverter Lifetime	15 years	10 years
OPEX per year	10	14
PV system lifetime	25	20
WACC	5.0%	9.0%
Degradation	0.4%	0.6%
Full load hours	1300	1100

Key Input Parameters: Romania

	Low LCOE Case	High LCOE Case
Installed Cost	700	1000
Inverter Cost	50/kW	60/kW
Inverter Lifetime	15 years	10 years
OPEX per year	11	14
PV system lifetime	25	20
WACC	7.5%	10.0%
Degradation	0.4%	0.6%
Full load hours	1250 (ground mount)	1100