Tapping the Potential of Prosumers

Drivers and Policy options

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Prosumers

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iERC
International Energy Research Centre

Introducing the IERC

- An Irish Government supported, collaborative energy research centre that responds to industry-driven energy challenges within the commercial and residential sectors

- Translate industry needs into research objectives, delivering impact from research excellence

- Hosted in the Tyndall National Institute = 550 fulltime researchers

Agenda

- Introducing Prosumers and PV systems
- Role of Incentives and Enabling Policies
- Policy Makers and Key Drivers
- Potential Future Strategies

Research Context:

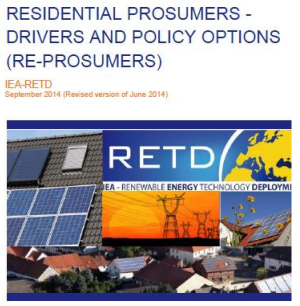
Four country case studies (FR, DE, UK and US)

- Case study objectives
  - Actions concerning onsite PV in the commercial sector
  - Primary drivers behind PV prosumers
  - Conditions and barriers are holding back widespread adoption of PV for self-consumption

- Building types selected based on which ones had strong potential to emerge as prosumers. Criteria included:
  - Good available roof space
  - Relatively steady and large daily load profiles
  - Common building type within the country

IEA-RETD
Renewable Energy Technology Deployment

iea Energy Technology Network



2014

2015

2016

A ‘commercial prosumer’

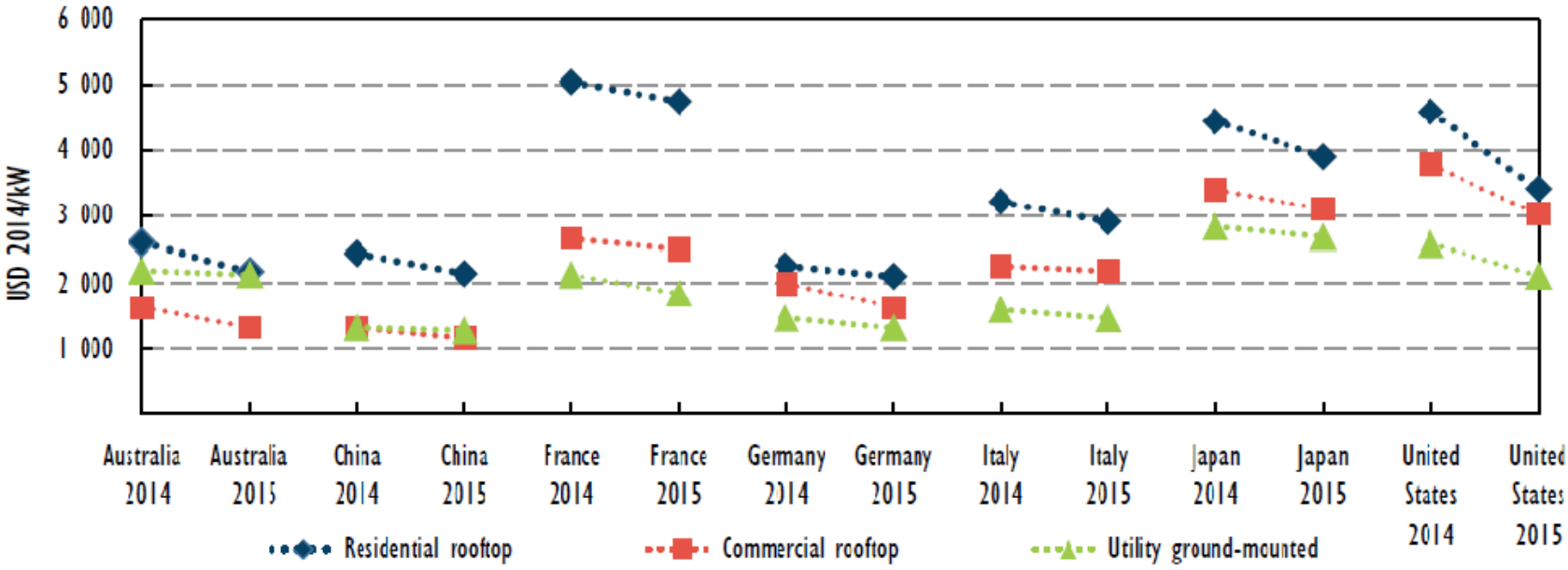
- Different countries track and classify PV data in different ways and there is no standard definition

- Some countries (e.g. US) track commercial systems specifically, where other countries (e.g. France and Germany) primarily track systems based on the feed-in tariff they receive.

- Commercial prosumers:
  - Are interconnected behind the meter
  - 10 kW – 250 kW

Is it a PV Prosumer Revolution?

The cost to install PV has fallen dramatically, and is likely to continue to do so

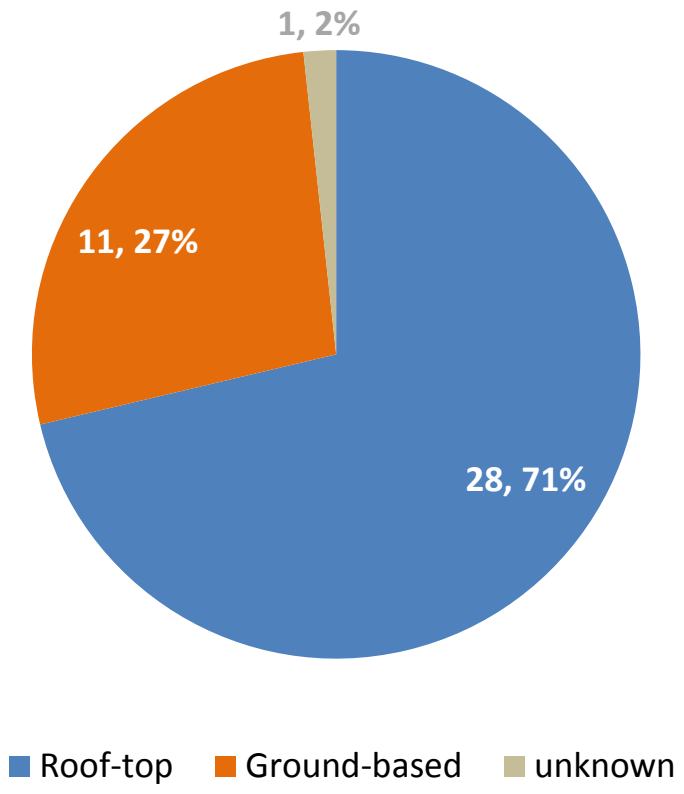


Source: IEA(2015)

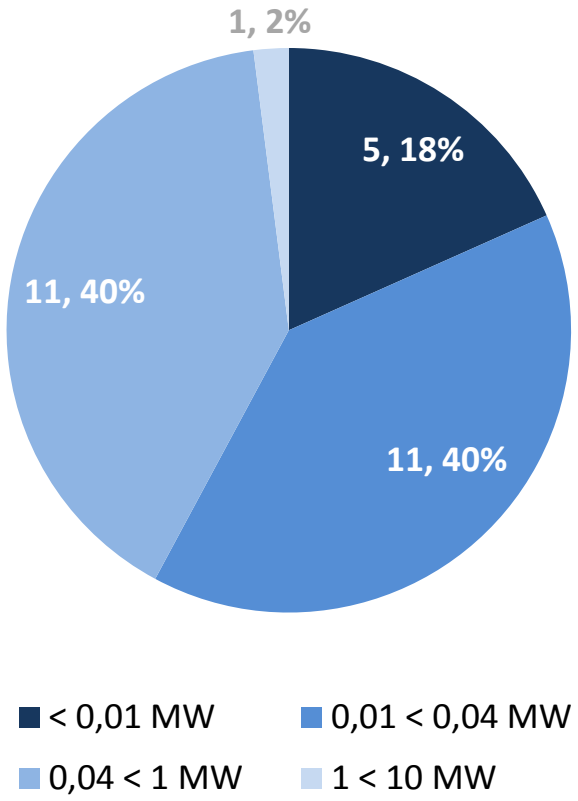
Market example: Germany

Roof-top PV can have an important share in some PV markets (71 % in Germany, thereof 58 % < 40 kW)

PV capacity installed (GW)
31.12.2015



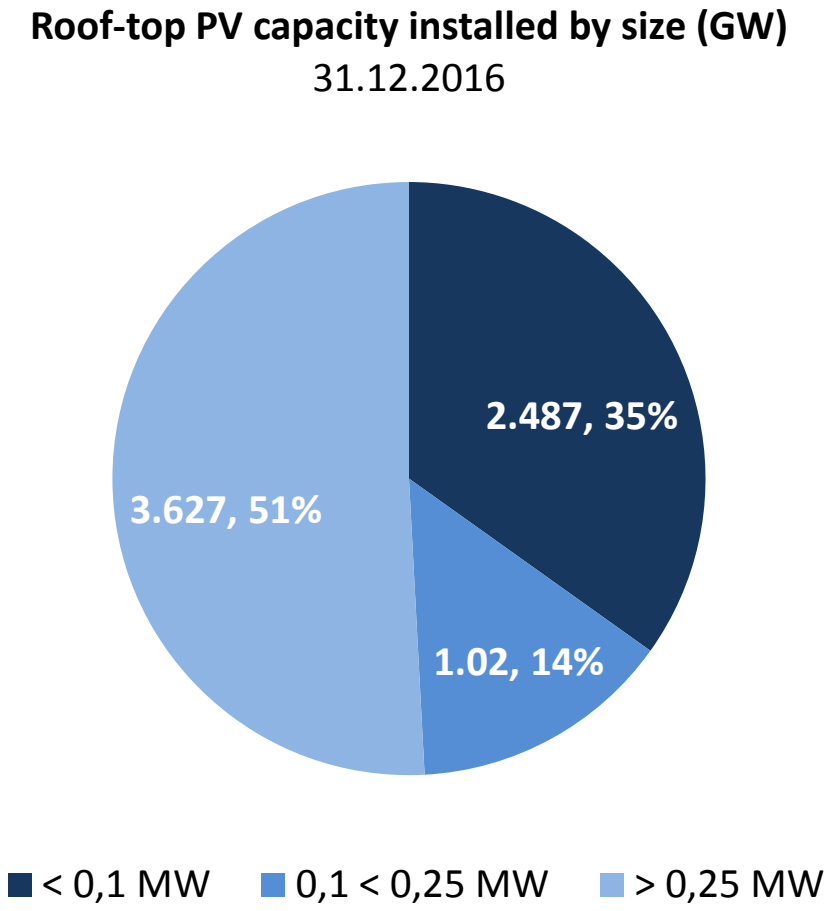
Roof-top PV capacity installed by size (GW)
31.12.2015



Source: Bundesnetzagentur 2016

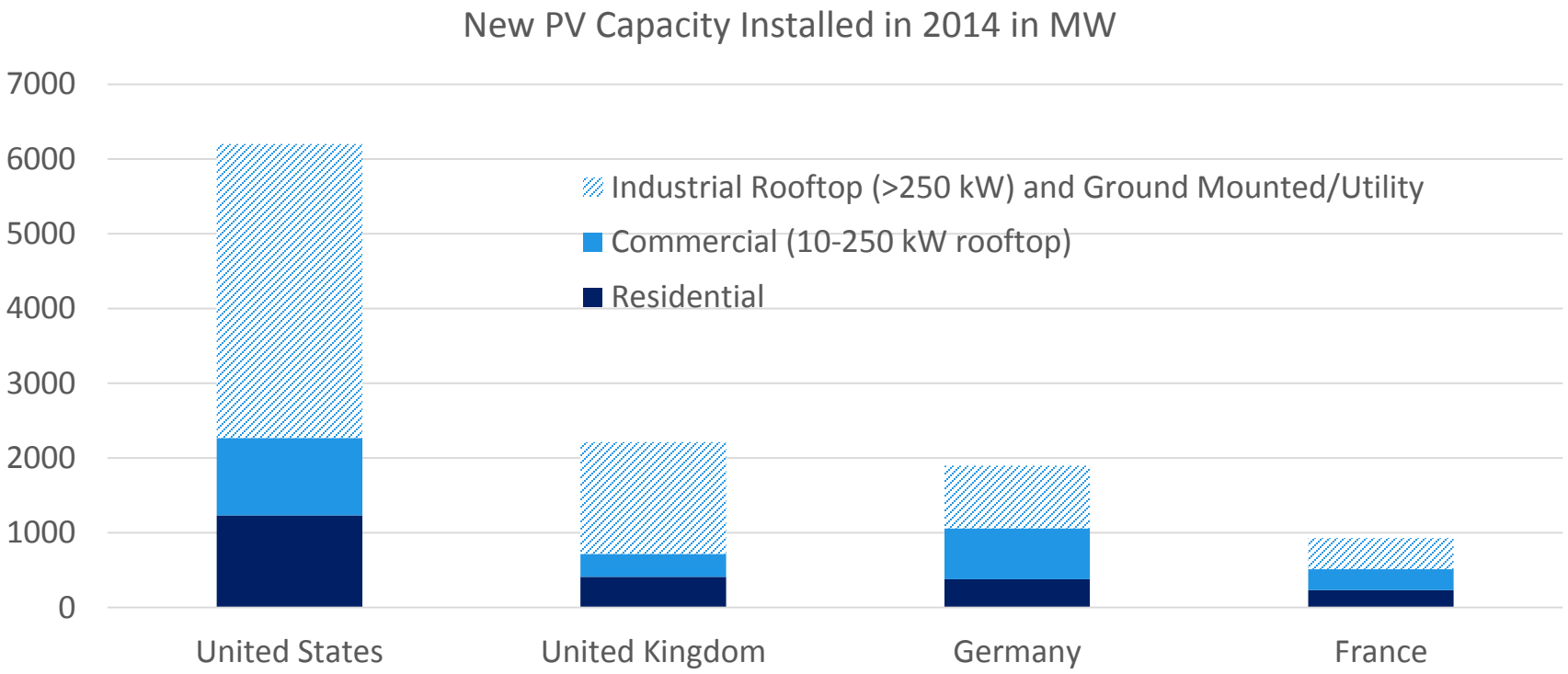
Market example: France

In France the share of projects below 100 kW is at 35 %



Source: https://www.pv-magazine.com/2017/03/01/frances-pv-capacity-tops-7-13-gw/

Roof-top PV Share



Share of roof-top PV market does not mean that those installations are “prosumers” that benefit from self-consumption- often built for FiT and electricity export

Sources: SEIA 2014 (US); DECC Solar PV Deployment 2015 (UK); Bundesnetzagentur 2015 (DE), Syndicat des Énergies Renouvelables

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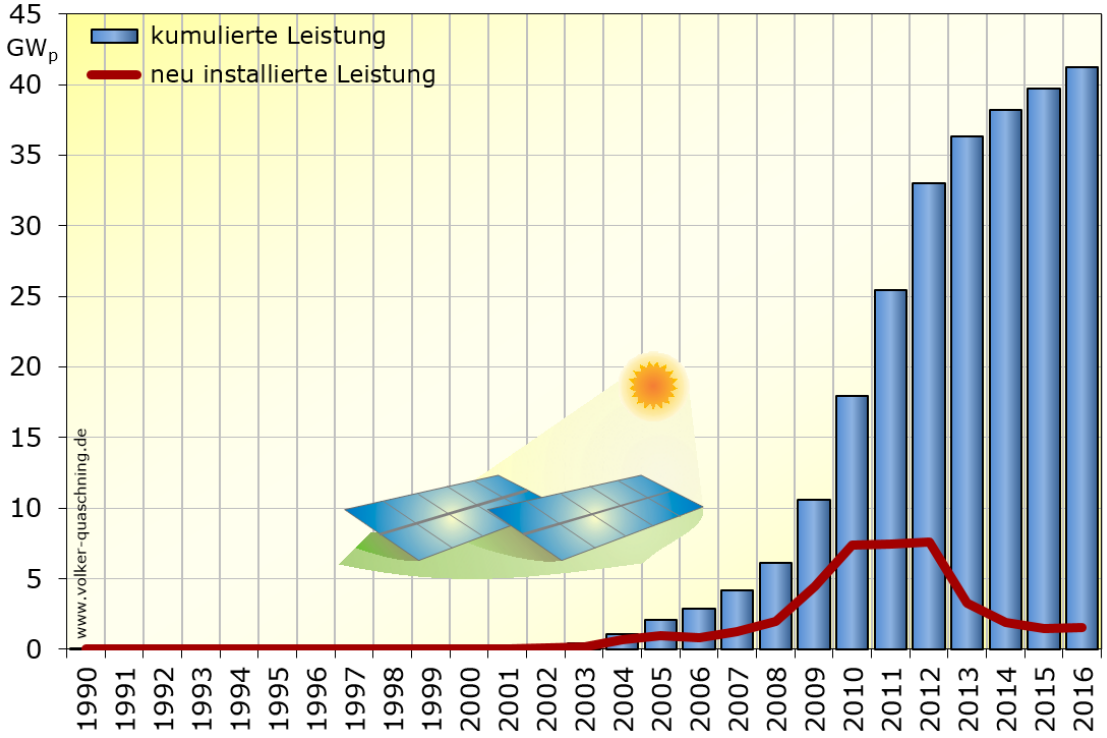
Prosumer Revolution ?

Neither German nor French market are booming

PV Installations in Germany



New installations in 2016:

Only 1.5 GW PV in Germany

Only 559 MW PV in France (lowest value since 2009)

Possibly linked to lack of policy

Source: https://volker-quaschning.de/datserv/pv-deu/index.php

Incentives and regulations

- Mass non-incentivized prosumers are unlikely to arrive in the near-term
- Incentives (e.g. FITs) above the retail electricity rate have driven the prosumer revolution to date
- Mass prosumer expansion will require policies that compensate most/all of PV output (net metering, below-retail FITs, etc.)
- Without support schemes, storage will be required – which adds cost
- Non-incentivized mass defection from grids not to be expected soon.

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Key Drivers

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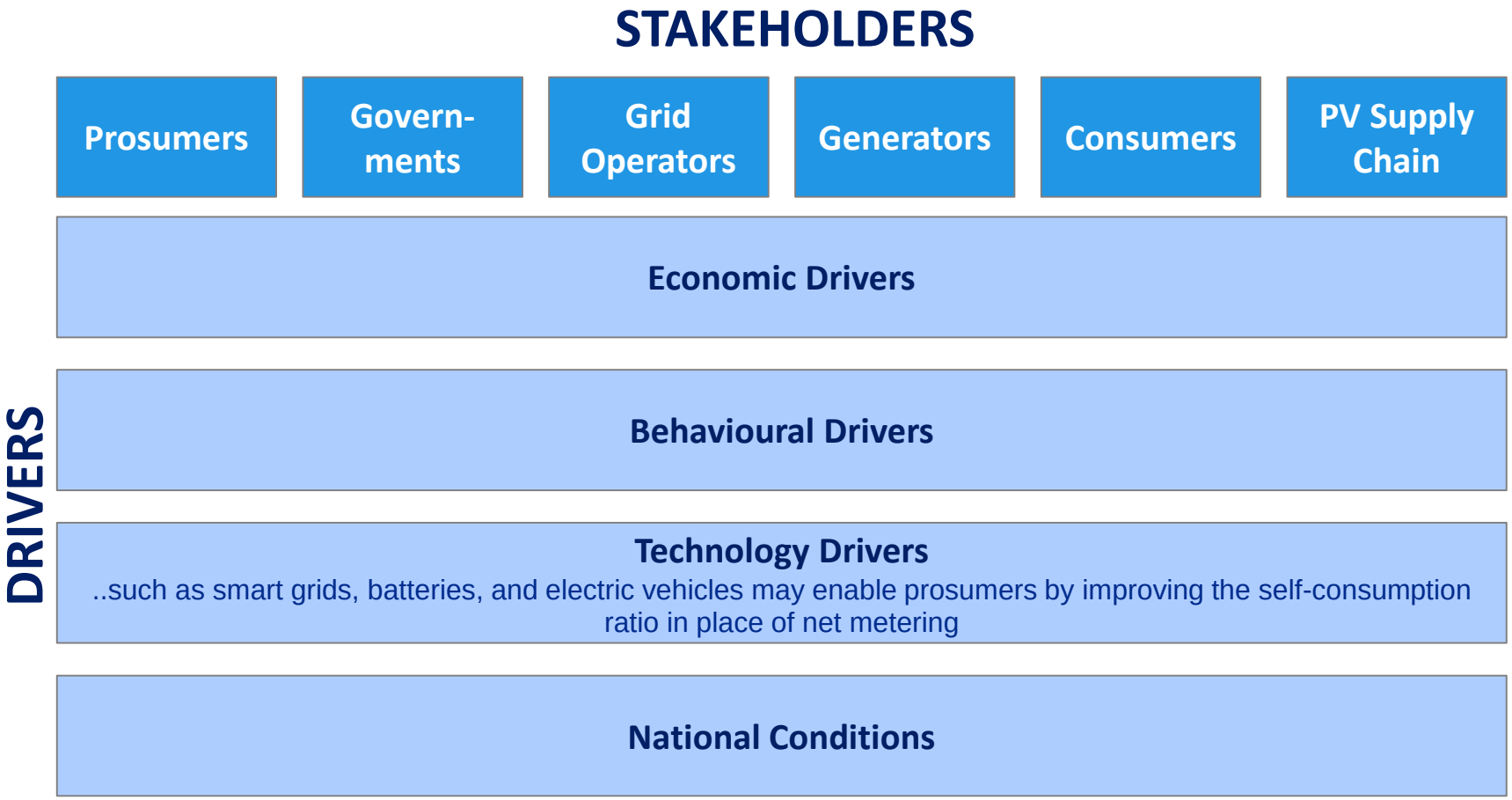

Key Drivers

Drivers can have enabling or constraining effects on prosumer uptake…

	Constrain prosumers		Enable prosumers
Economic drivers	High PV system costs		Low PV system costs
	Low electricity prices and fixed charges		High electricity prices and volumetric rates
	Low self-consumption ratio		High self-consumption ratio
	Low insolation		High insolation
Beha-vior	Hassle factor, lack of trust in technology, policy uncertainty		Environmental awareness, energy autonomy, “cool” factor
Techno-logy	n/a		PV technology breakthroughs
	Additional storage costs		Improved self-consumption ratio
	Additional EV costs		Improved self-consumption ratio
Nat. cond.	Decreasing energy demand		Available roof space, tenant ownership

Key Drivers

… Stakeholder interest = difficult to predict and poorly understood

Stakeholders	Constrain prosumers	Enable prosumers
	Decreased revenue for TSOs and DSOs, grid investments to accommodate prosumers	Prosumers can reduce T&D investments
	Reduced generator revenues	Prosumers create new business opportunities
	Increased retail electricity rates for other consumers	Economic, social, and environmental benefits created for all consumers
	Reduced tax income, potential for stranded assets	Increased resilience of energy supply; improved energy security

Key Drivers

Other national conditions also impact prosumer development

Topic	Examples
Available roof space	Rooftop space not a near-term limitation; rooftop PV could supply 20-40% of electricity demand in US and Europe
Share of rental property	Renters do not have an incentive to invest in PV; 30% rental property in EU vs. 35% in US
Electricity demand trends	Flat or declining demand increases competition between prosumers and other generators
Renewable energy development	Non-prosumer renewable energy development may “crowd out” prosumers
Existing grid infrastructure	Large, modern grids more able to absorb prosumers than small, old or remote grids

Key Drivers

Opportunities and risks need to be clearly articulated and balanced – and stakeholder interests aligned

Opportunities / Benefits

Political benefits

- PV popular with voters
- "Energy Democracy"

Grid benefits

- T&D deferral
- Avoided losses

Economic benefits

- Job creation
- Decrease fuel imports

Environmental benefits

- Emissions reductions
- Water conservation

Challenges / Costs / Risks

Decreased TSO/DSO revenue

- Reduced revenue
- Risk of "death spiral"

Grid expansion and upgrades

- Cost to expand grid
- Risk of stranded assets

Incumbent generator risks

- Generators lose revenue
- Risk of bankruptcy

Decreased tax revenues

- Lower tax payment from the retail rate

Technical Challenges

Solutions exist to increase the capability of grids to accommodate more prosumers

Categories	Examples
Utility- and System Owner-led Solutions	• Grid reinforcement: • Advanced voltage control for HV/MW transformers • On-load tap changer, static volt ampere reactive control, booster transformer • Adopting storage controlled by the distribution grid operator • Network reconfiguration • Advanced closed-loop operation • Improved Data and Forecasting
Prosumer-led solutions	• Incentivize prosumer storage • Encourage greater self-consumption via price incentives • Curtail solar PV power output • PV orientation • Adoption of advanced or “smart” PV inverters
Interactive Solutions	• Demand response via local or market price signals • SCADA-based techniques • Voltage and VAR control technologies

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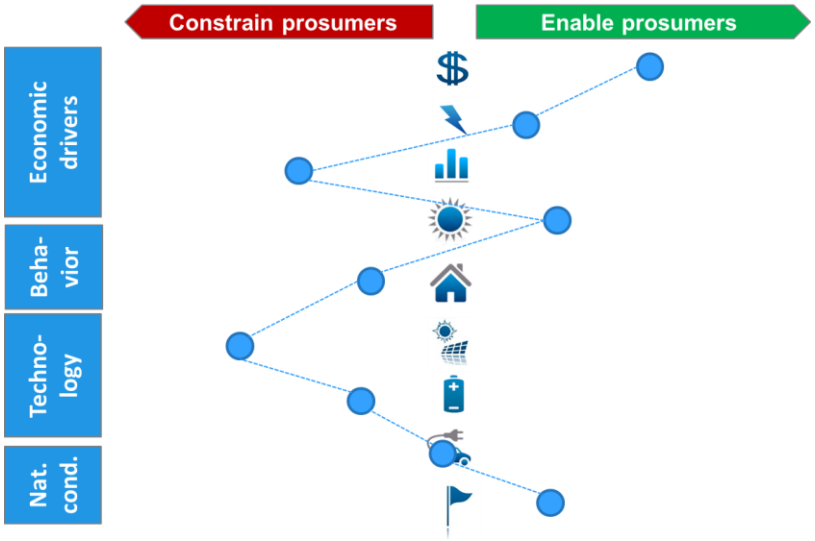
Potential Future Strategies

To define a policy strategy, governments need to evaluate all drivers and balance opportunities and risks

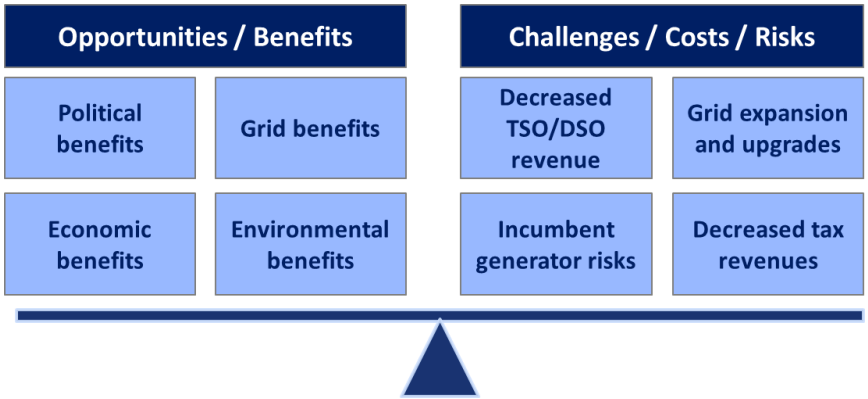
1. Evaluate drivers and conditions

Are the conditions in place to support non-incentivised consumer scale-up?



2. Balance opportunities and risks

Given the trade offs, is support for prosumers a national policy objective?



3. Define policy strategy

Potential Future Strategies

Prosumer strategies are required to sustain growth and to enable industry transition

Prosumer Strategy Choices

1. Constrain prosumers

Restrictive policies to avoid structural changes to utility business and regulatory paradigms

2. Enable prosumers

Enabling policies like compensation for surplus production and transparent interconnection rules

3. Transition to prosumers

A	Incremental
B	Structural

Prosumer compensation mechanisms, rate design, market reform and tax reform

New business models, new product and service offerings, emerging tech like smart grid

...a policy objective?

IERC International Energy Research Centre

Danish government unveils bill to introduce tax on self-consumed PV power

The government said the tax is expected to reduce budget expense from DKK 4.9 billion to DKK 3.7 billion, and to slow faster than expected development of solar.

MAY 22, 2017 EMILIANO BELLINI

Conclusions

Prosumer scale-up will require policies to enable market transition

- Potential is largely untapped
- Commercial prosumers have been slow to emerge on an "incentive free" basis (mainly due to economics)
- Support policies are currently the primary determinant of prosumer emergence.
- Economic drivers are accelerating prosumer case.
- Commercial prosumers can accelerate the transition to more decentralized, interactive, networked system.
- Policy makers, regulators, and affected utilities need to develop strategies to better anticipate, integrate, and plan for a growing number of commercial prosumers.
  - Designing new policies for net excess generation,
  - Facilitating improved data on national building stock,
  - Calculate (local) benefits of prosumers

Thank you. Questions?

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