

# **PV installation: The role of property owners of non-residential buildings for the energy transition**

JENNY PALM AND KATHARINA REINDL, IIIEE, LUND UNIVERSITY

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# Project Aim

Analyse perceived **barriers and enablers** of PV installations in Sweden by **property owners of non-residential buildings**

1 article on mapping **barriers and enablers in Sweden + literature review**

- *Reindl, K. ; Palm, Jenny (2021): Installing PV: Barriers and enablers experienced by non-residential property owners. Renewable and Sustainable Energy Reviews, 141*

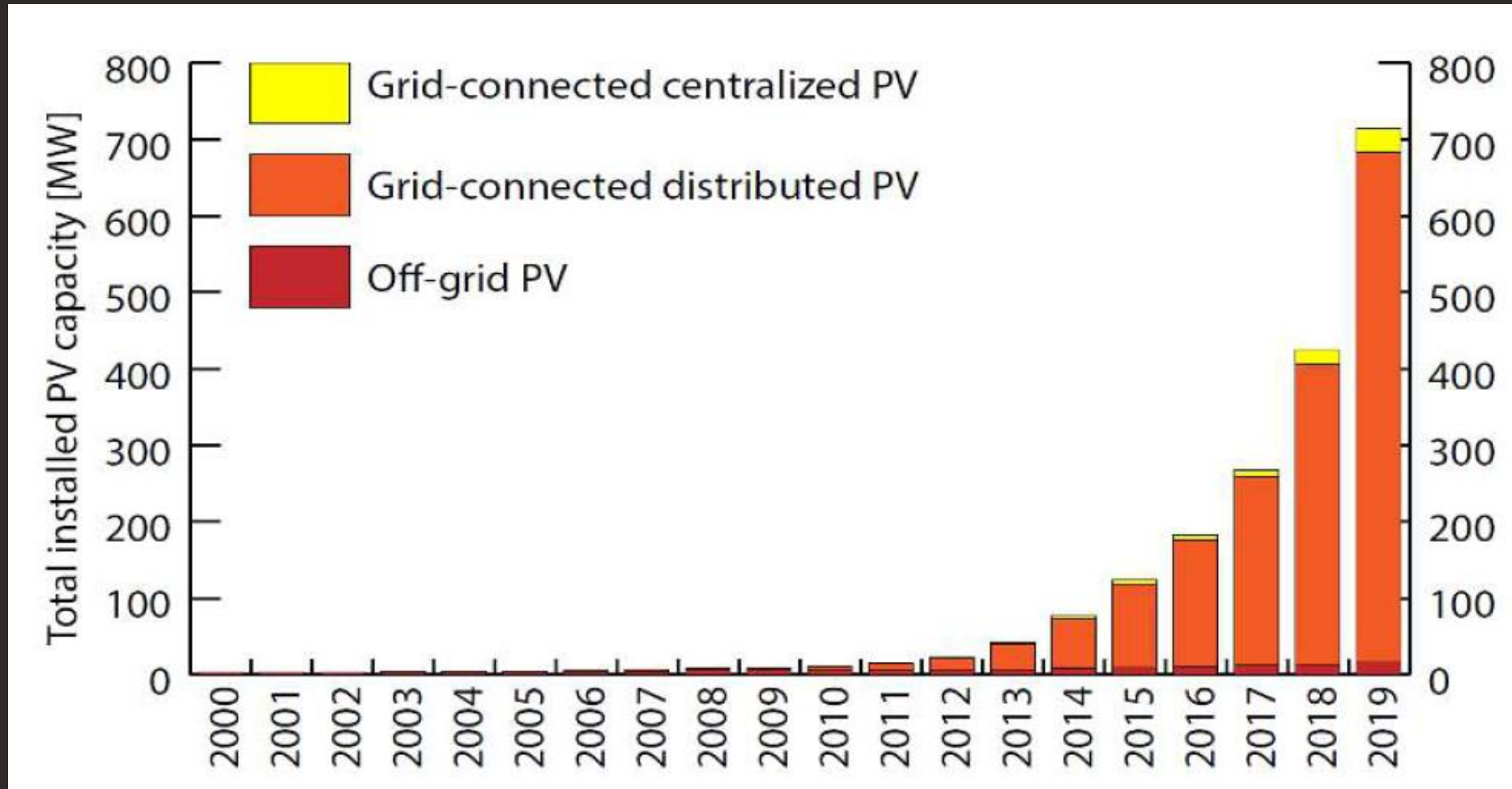
**The aim of this presentation – to discuss a potential paper 2**

# Background I: Role of PV

- Transition of the **electricity system** and **decarbonising and greening the housing sector**
- Potential in the roof space of non-residential buildings



# Background II: PV capacity in Sweden



Lindahl, J. et al. (2019). *National Survey Report of PV Power Applications in Sweden*.  
Task 1. Strategic PV Analysis and Outreach, 78. Technology Collaboration Programme by IEA.  
International Energy Agency Photovoltaic System Programme.

# Background III: Sweden's PV market

- Self-consumption business model
- Capital subsidies
- Feed-in-tariff never existed
- Installed grid-connected PV power\*:
  - 46% residential systems
  - 46% commercial facilities
  - 5% relatively small ground-mounted centralized PV parks

\*IEA-PVPS National report for 2019



# Focus of an additional analysis?

- Barriers and enablers good overview/ mapping
- Reductionism and isolation of factors
  - Missing the context an investment decision is embedded in



# Methodological Approach

- **25 Semi-structured interviews: non-residential property owners**
  - **Different Buildings**, e.g. hospital, schools, offices
  - **Respondents**, e.g. company CEOs, environmental or energy managers, and electrical consultants.
- **Buildings varying size and ownership structure**
  - Public and private
  - 2600m<sup>2</sup> to 2.1 million m<sup>2</sup>

# How to best understand/analyse the companies?

- Interview: a variety representatives of different companies



## Ideal types of companies?

- (e.g. see Max Weber, Högberg et al., 2009)

## Adopters?

- (e.g. see Rogers, 2003, Palm, A., 2020, Palm, J. – motives for adoption – early and late adopters)

## Practice theory approach of installing

- (e.g. see Bartiaux et al., 2014)

# Differences in adoption



## Adopted more than 10 years ago:

PV installed: 15+6, more than 30, more than 70

*optimistic champions*

## HOPE

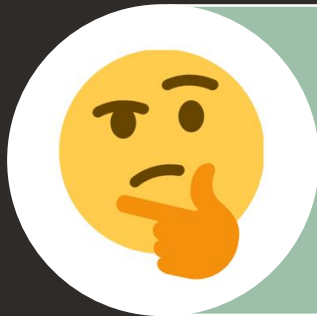


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## Adopted less than 10 years ago:

PV installed: Testing 1, 3-11

*cautious optimism*

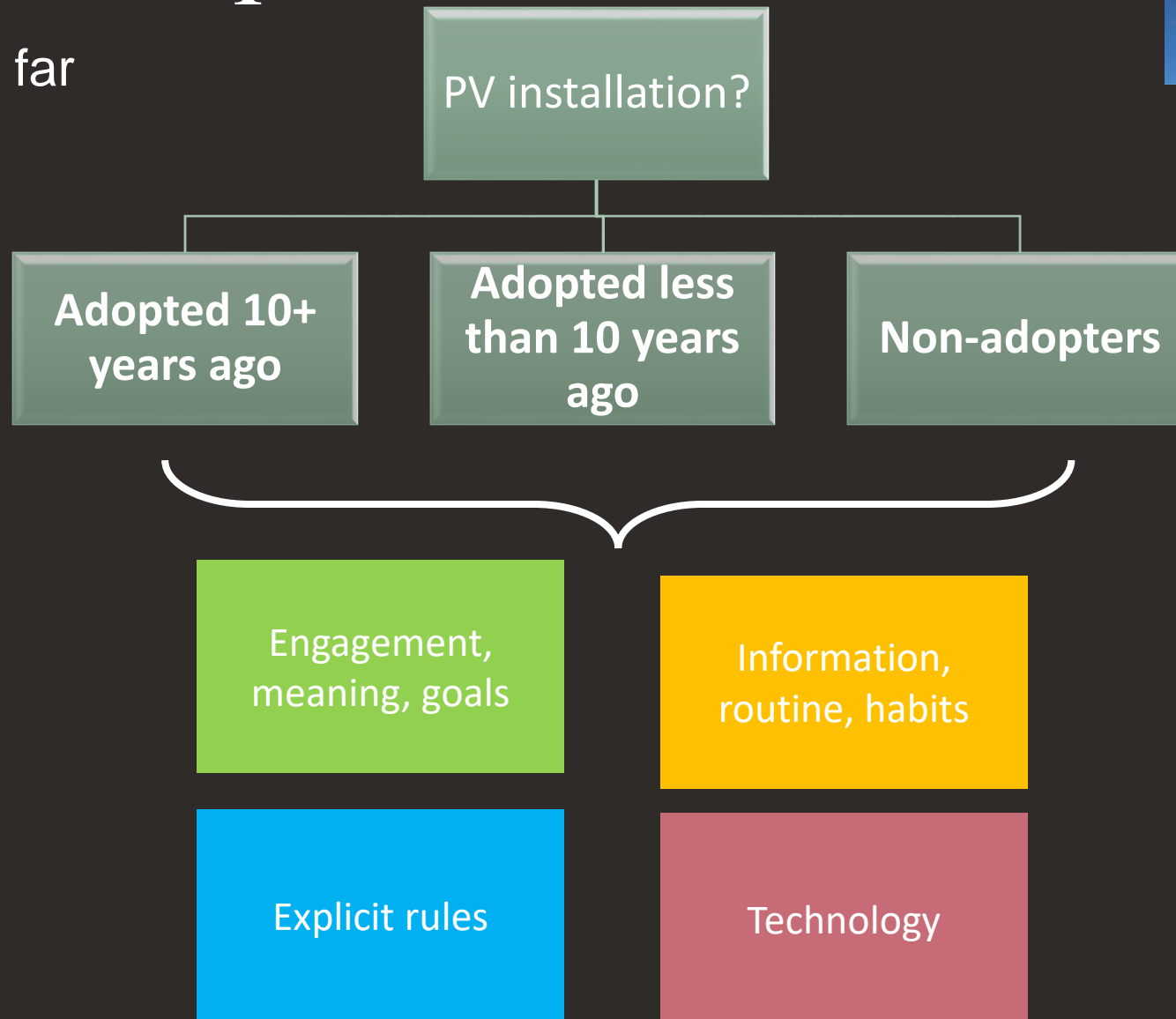


## Non-adopters:

Knowledgeable and *not profitable* vs. not knowledgeable and *sceptical*

# ...in development

- Analysis so far



# Discussion and policy recommendations

## Engagement, meaning, goals

### Adopted 10+ years ago

- Environment and energy important; concrete goals formulated
- Seen as profitable. Pay-off time of 12-13 years regarded as good

### Adopted less than 10 years ago

- Environment and energy important; not all concrete goals formulated
- Profitability on the edge

### Non-adopters

- Environmental and energy goals and no environmental and energy goals
- PV not seen as profitable. Pay-off should be under 10 years

- Varying views on profitability
- PV: as an important part of their sustainability strategy and corporate image, and building on such an interconnection seems fruitful

# Discussion and policy recommendations

## Information, habits, routines

### Adopted 10+ years ago

- No issues regarding information
- Good contact with suppliers and consultants and Good knowledge base within the company

### Adopted less than 10 years ago

- Varied views on information, missing information on legislation, subsidies, rules
- Good relationship with suppliers and consultants

### Non-adopters

- Enough information (environmental focused company)
- Others: not much discussed – PV installation to far away

- Varying views on information

## Habits, routines

- Experiences, routines, and habits established and negotiated in organization: determine PV installations
- 1 PV system installed: increased possibility to invest in more
  - Institutionalised decision-making process? (no need to invent a new procedure for decision)
- In-house aggregated knowledge base and good relationship with suppliers highlighted by early and later adopters as important

an



# Discussion and policy recommendations

## Explicit rules, financial support

### Adopted 10+ years ago

- Rules, legislations, subsidies: Easy to navigate

### Adopted less than 10 years ago

- Rules, legislation, subsidies not seen as easy to navigate by all
- Administration as hinder

### Non-adopters

- Seen as not good or no concrete knowledge on concrete rules, subsidies, regulations

- Problematic: rules, support and taxes have varied over the years - difficult to keep up
- **Assess and streamline administrative procedures/processes**
- **Removing building permits** or making it easier to install PVs – later adopters
- **Changing tax and VAT rules?**
  - 255kW tax rule seen as counterproductive for increased PV installation by all (now at 500kW)
  - Selling electricity is too expensive too – slowing down PV installation



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# Technology

## Technology

### Adopted 10+ years ago

- All content
- Mature Technology
- Issues: roof constructions existing buildings

### Adopted less than 10 years ago

- Many content; some still evaluating/testing
- Issues: roof constructions existing buildings

### Non-adopters

- Sceptical; immature Technology
- “Don’t want to be the guinea pig for a new technology”

- Catch the property owners before a renovation (or new construction)
- Encourage different business models where the property owners do not own the solar cells themselves
- To support solutions, virtual or physical, that help property owners store solar

# Discussion and policy recommendations

- To increase the driving forces of the various actors for installing PVs



No fits all policy recommendation: different views  
and needs

several factors: both barrier and driving force

**Thank you for your attention!**  
**Please stay in touch!**

jenny.palm@iiee.lu.se.  
katharina.reindl@iiee.lu.se

**Questions and comments?**



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