Households installing solar panels – motives and barriers in a 10-year perspective

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Aim

- Analyse the reasons households have stated for installing or not installing photovoltaic panels (PV) in Sweden
- compare the results from interviews done in 2008–2009 and in 2014–2016 with homeowners in Sweden

Earlier research

Motivation

Testing new technology; technical interests

Earning money

Cost efficiency

Protecting against future high cost

Environmental benefit

Increase convenience

Security of supply

Symbolic reasons

Self-sufficiency

Social networks, peer effects

Barriers

Finance; Investment cost, Long pay-off time

Lack of subsidies

Uncertainty and mistrust that the system will perform as desired

Aesthetic and impact on residence

Hard to find objective experts

Satifisfied with existing system

Do not want to change routines

Perceived increase in maintenance

Presence of different opinion within a household

Uncertainty around regulations and subsidies

Technical flaws

Poor compatibility with existing infrastructure

Take place on a small scale

Lack of organizational and institutional support

Decision-making phase the interviewed households were in when interviewed	2008–2009	2014–2016, interviewed in first round	2014–2016, interviewed in the first and the second round
Under consideration to buy	8	5	
Bought but not installed (PV installation not included)	7		
Bought and will be installed (turn-key product with installation included)		17	
PV installed the same week as the interview		7	
PV installed for one year or more	2	14	17
Decided not to buy	3		2
TOTAL	20	43	19

Торіс	2008-09 study	2014-16 study
Average income of our households	68 000 EUR/year	85 000 EUR/year
Education	16 of 20 university degree	26 of 43 university degree
Installed capacity in Sweden	8 MW	50 MW (connected to the grid)
Number of companies targeting households	2	Over 100
	Started in July 2009 and was 60 % until Nov 2011.	1 Feb 2013- 31 Dec 2014, 35 % 1 January 2015, 20 %
Investment Subsidies households	None of our households had received subsidies	
	(1 nov 2011-31 jan 2013 45 %)	
Tax reduction micro production	No	Yes, since 2015
Need to pay VAT	No	Jan 2015-31 Dec 2016
Installation	The households did the installation	Turnkey concepts

Motives 2008-09

• Environmental reasons. In combination with family's lifestyle

"In our family we discuss what we eat, who produces the food we eat, and all these things. We have had this environmental concern all our lives. We are members of Greenpeace and the Swedish Society for Nature Conservation and so on".

- Symbolic show for other that it is possible
- protest against big multinational energy companies
- Interest in technology, the delight of actually producing one's own electricity

Motives 2014-16

- All share the motivation to earn money sell to the grid
- Environment was mentioned by 40 of 43. Environment now connected to societal change than family's life style

I am interested for both reasons, my own consumption and production, but also, how to say this, in relation to a societal perspective. It makes you interested in... I also became interested in how electricity in society is produced. (household 55)

- Had been inspiried by others, such as neighbours or at an exhibition, or other event where PVs were shown
- Be economic independent and go off-grid

Motives 2014-16

• Electrical vehicles. 1 household owned an EV and 7 planned for it These families wanted to be able to charge their EV with electricity they had produced.

The idea is to buy an EV that I can charge during the summer. (household 23)

• Technological interest mentioned but not as dominant

Barriers 2008-09

• Cost

"I probably have the most expensive electricity bill in this neighbourhood" (household 2)

- Lack of regulations, unknown concept, both authorities and energy companies didn't know how to deal with microgeneration
- Technology, didn't trust the technology, could break down
- Installation, need to install the product by your own

Barriers 2014-16

- Cost, less expensive than the first period, but still a heavy investment. Pay-off time had entered the decision-making process
- Administration, most common barrier. Apply for subsidies, check building permit, change meter, find a power company to sell the electricity to, apply for green certificate, pay VAT (disappeared Jan 2017)

"I filled in three or four different forms and they were general forms that were not suited for micro producers. It was really awkward. Me and my wife had to start a company and become partners and then she had to sign a letter that said that I would be responsible for the company. It was so stupid. And there were no easy information to get, that applied for us. I had to call several times and eventually I reached someone at the taxation authority that could provide support". (household 22)

- Information, hard to find information from neutral actor, no "best-in-test"
- Installation process, help with installation from companies, but it was delays, problem with languages, companies that went bankrupt, the installers lack proper education or lacked safety equipement

- In the first wave, the households were pioneers, resembling early adopters, who invested in PV panels for environmental reasons
- In the second wave, the households gave mainly economic reasons. Related to new policies that allowed households to sell the electricity to the grid, subsidies, lower prices on PV panels
- Pay-back time and profit new concepts in the second wave.
- In both studies, symbolic value important In the second wave, several commented that they
 had been inspired by seeing PV in their surroundings. This was not the case in the first wave,
 simply because not many had been installed at that time.
- Another change was the introduction of EV and the dream of having an EV charged by owned produced electricity.
- Cost was still a barrier even if less 2014
- Administration and information were new barriers in the second waves of interviews
- Trust in Technology was a barrier that had disappear
- Installation had changed form. Now the PVs were installed but other problems occur related to finding a "good" installer
- The design of PV panels was not a major issue in either rounds of interview, but mentioned. In the first round PVs were seen as ugly in the second study, households had more designs to choose from, but several expressed surprise that most PVs were so similar in their design

Conclusions

- Increasing trend more and more Swedes are interested in becoming prosumers
- Introduction of subsidies, easier and more profitable to sell micro generated electricity to the grid
- PVs are more visible in the Swedish landscape
- But many rules exist for becoming a prosumer in Sweden today and there is a lack of "facilitators" who can help perspective prosumers to navigate the market
- An increasing number of prosumer can also give other "side-effects", such as energy goes from being an abstract concept into something concrete and a natural part of peoples everyday life
- can re-delegate competence back to residents which in a long run can contribute to a transformation of the energy system

Thank you!