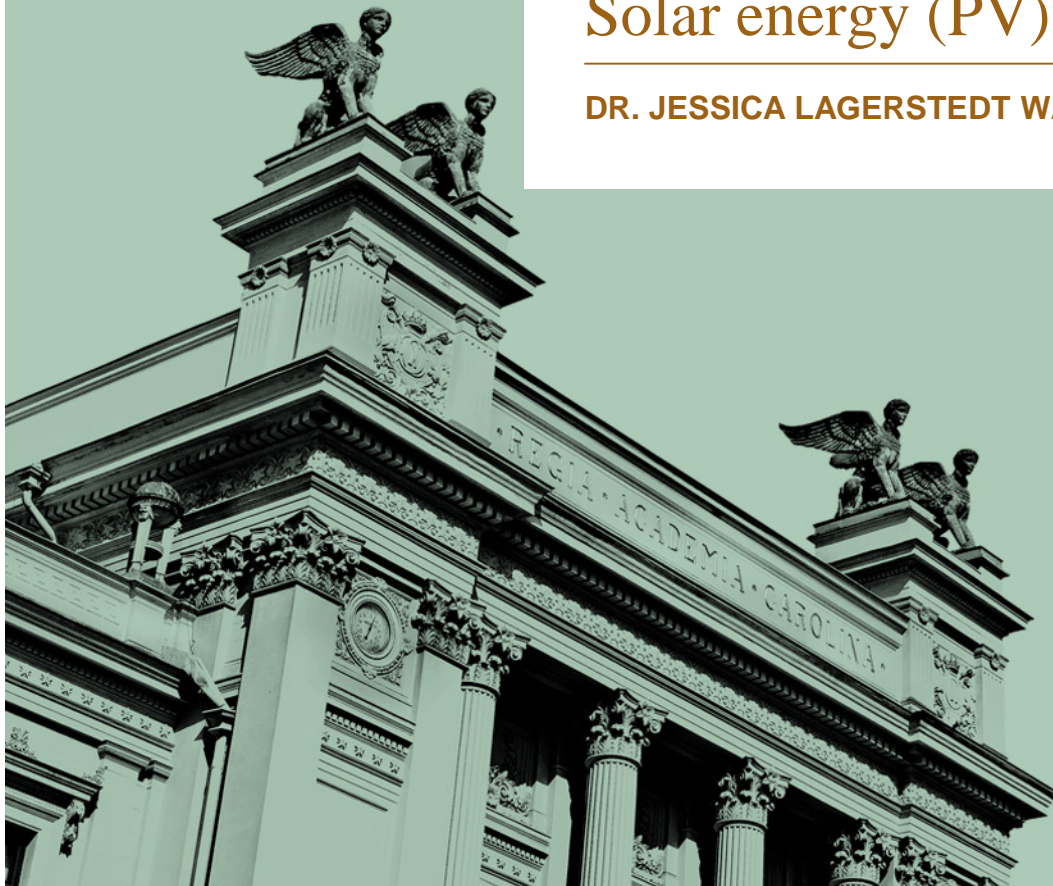




LUND
UNIVERSITY

Solar energy (PV) and business models

DR. JESSICA LAGERSTEDT WADIN, LUND UNIVERSITY



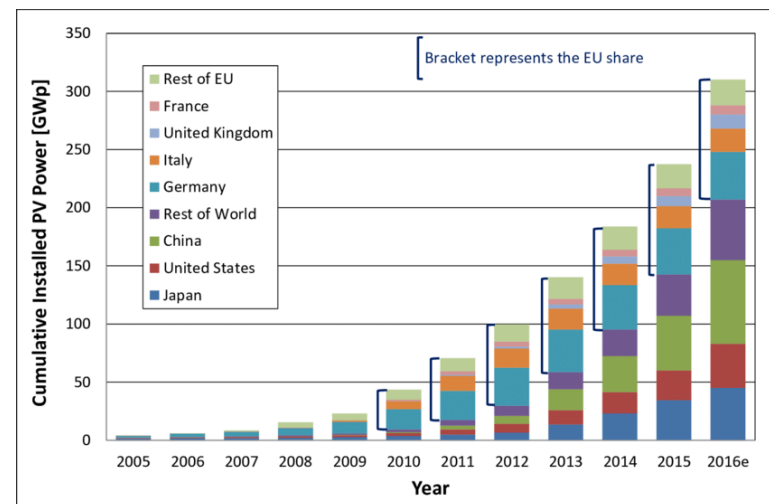
Outline

- The solar energy market
- What is a business model?
- Some examples
- A successful business model travelling from California to the Netherlands
- Swedish utilities offering solar energy

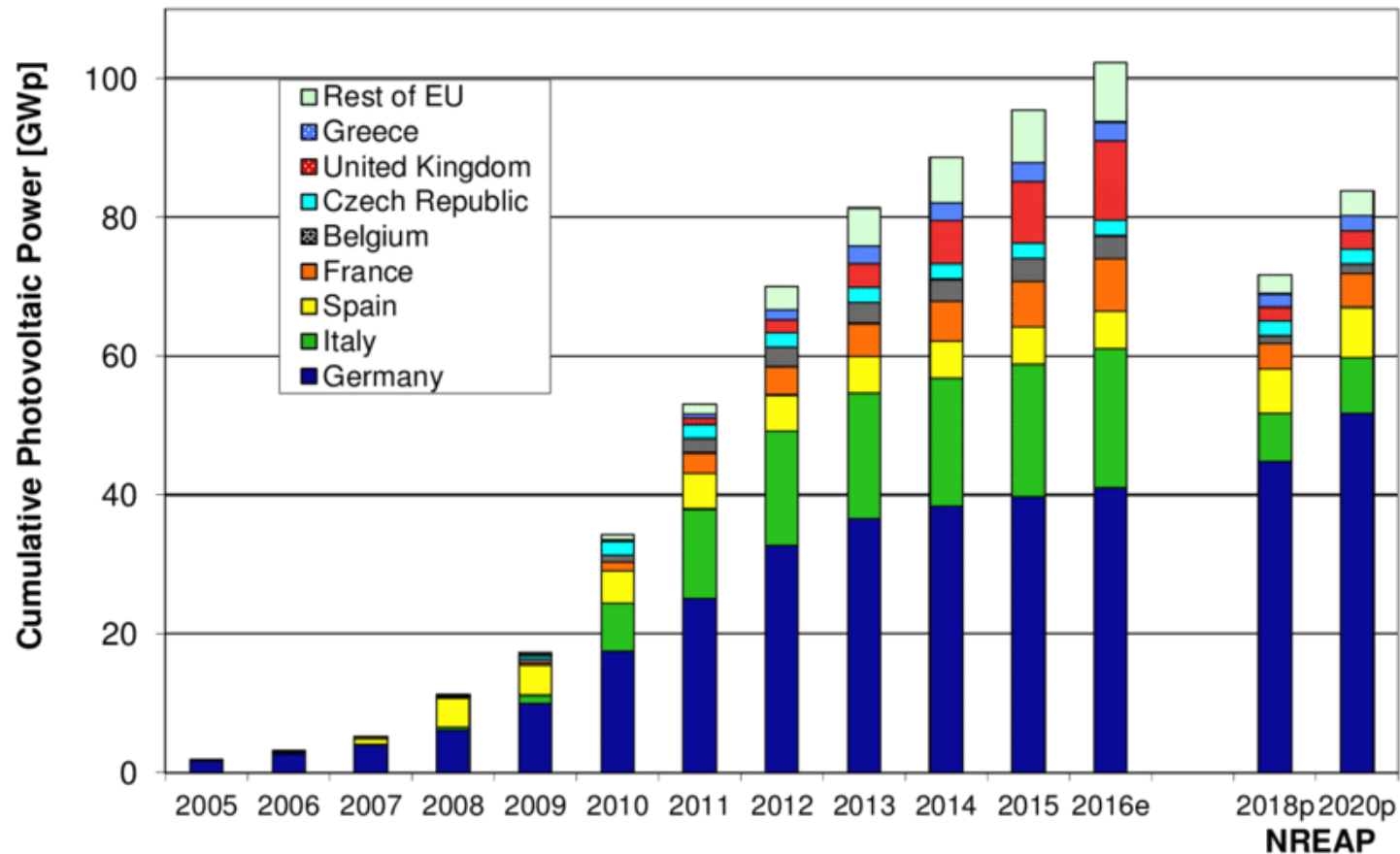


The global solar energy market

- Exponential increase in installed global capacity during the last decade, now exceeding 300 GW. (26% in 2016)
- Falling prices on photovoltaic technology enable solar energy to reach grid parity.
- Initial deployment dependent on financial supporting schemes (e.g. tax credits, FIT, net metering).
- Upfront costs, uncertain policies, and presumed hassle still deter market demand



Cumulative Photovoltaic Power (GWp) - Europe



(data source: ResearchGate report based on [IEA 2016a, Sol 2016, Sys 2016])



PV trends

Solar Parks



The 550 MW Riverside County, California

Empowering people



(Photo: UNDP Honduras)

PV + storage

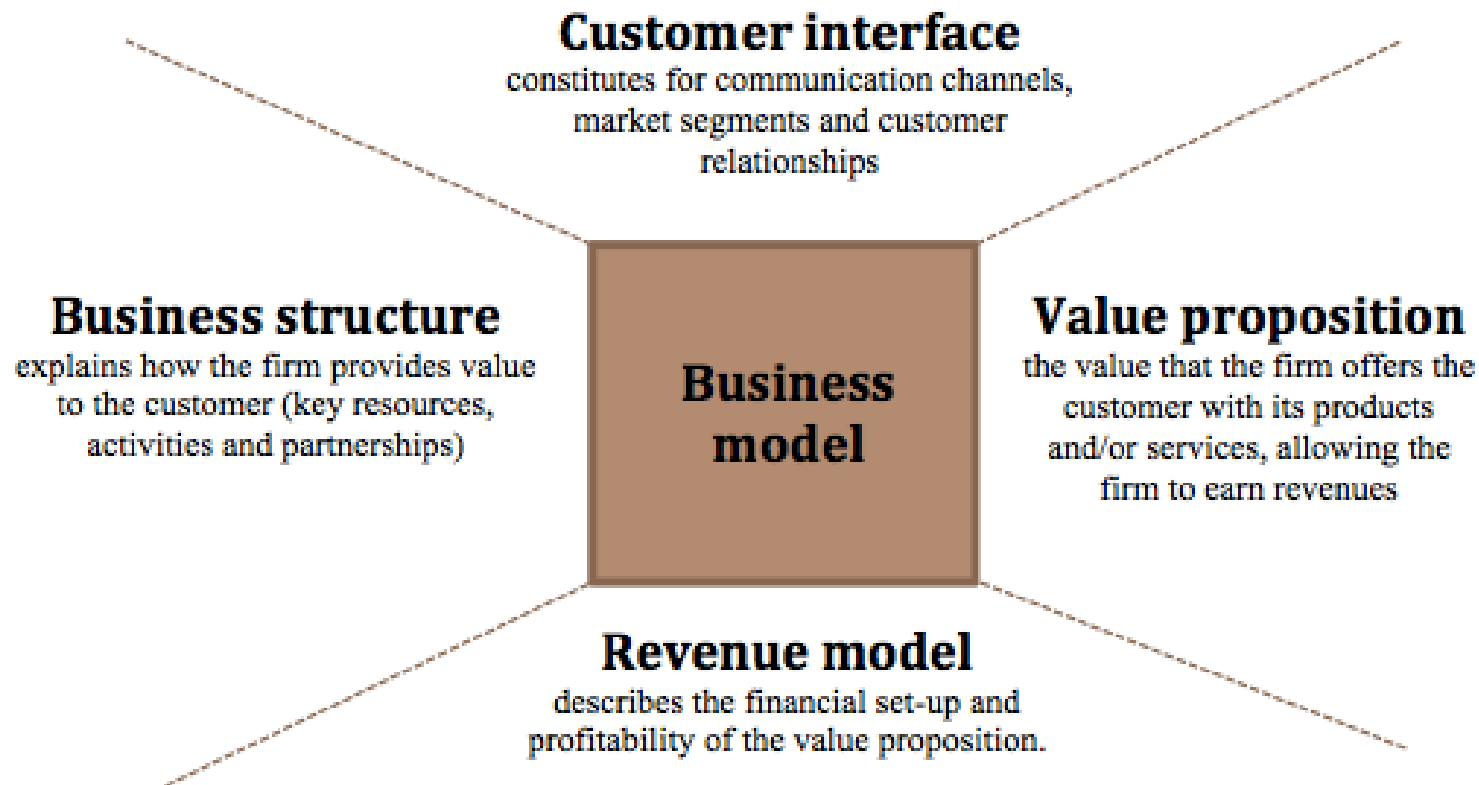


(Greensolarworld.co.uk)



LUND
UNIVERSITY

The business model framework



(Source: Definition based on e.g. Boons and Lüdeke-Freund, 2013 and Richter, 2012).



Value proposition



Customer interface



Business Structure



Revenue Model



Business models can rapidly change the game



Freemium



Pay as you go



LUND
UNIVERSITY



Business models for solar PV

Solar as a service

- Third Party Ownership
- Power Purchase Agreement
-

Host owned model /
plug and play

Storage as a service



Community based

Crowd funding

Cross sales

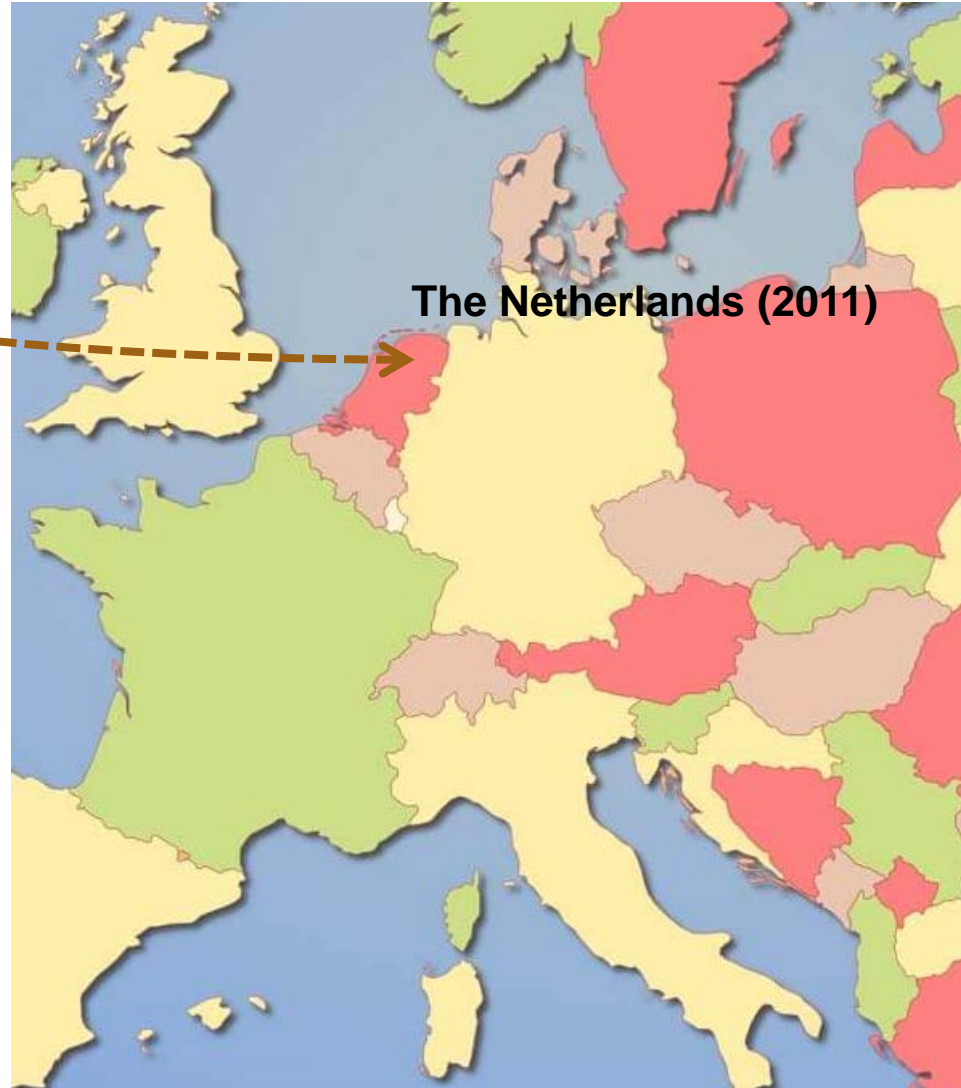


LUND
UNIVERSITY

Third Party Ownership (TPO) Business model migration

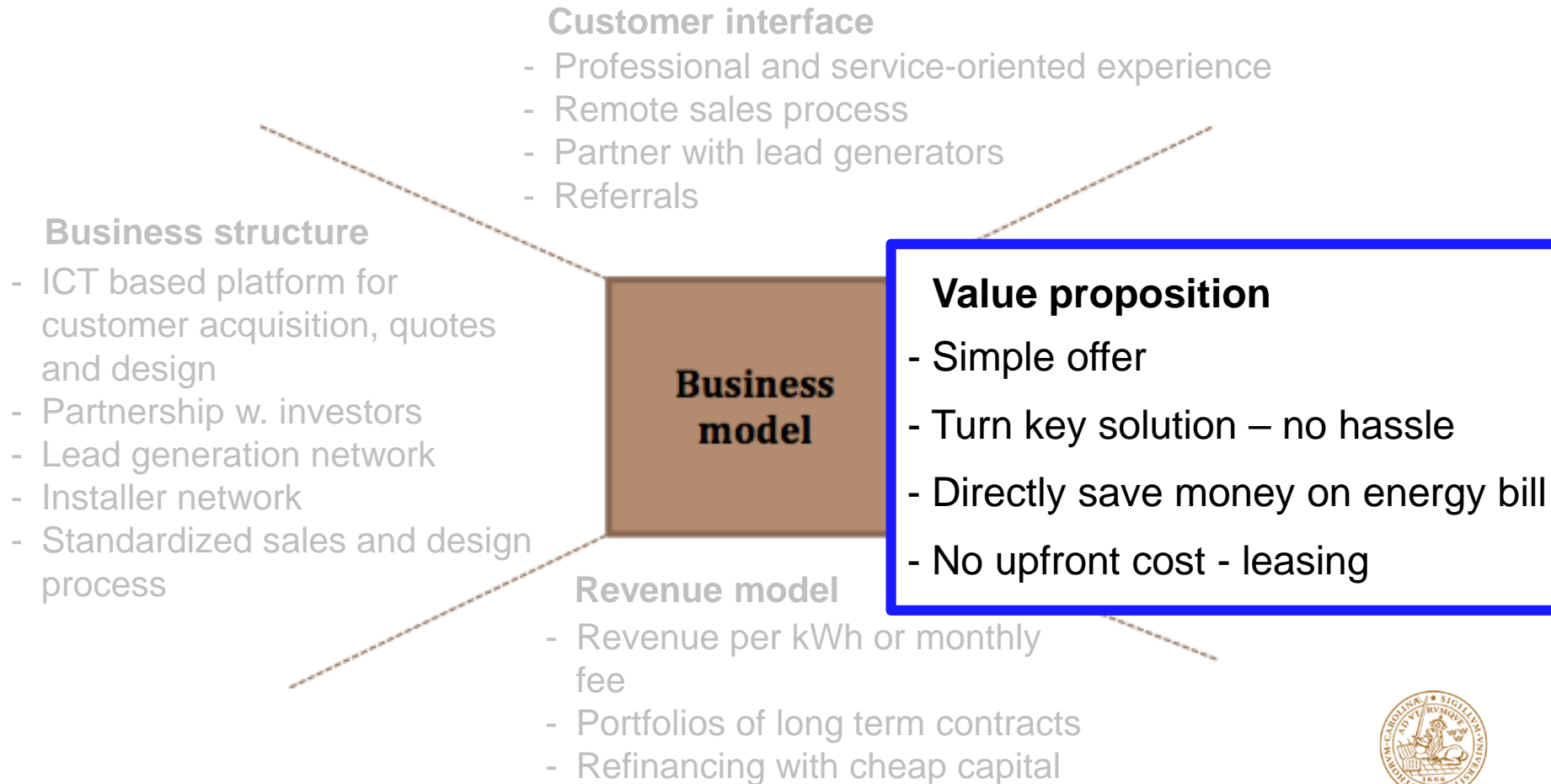


The Netherlands (2011)

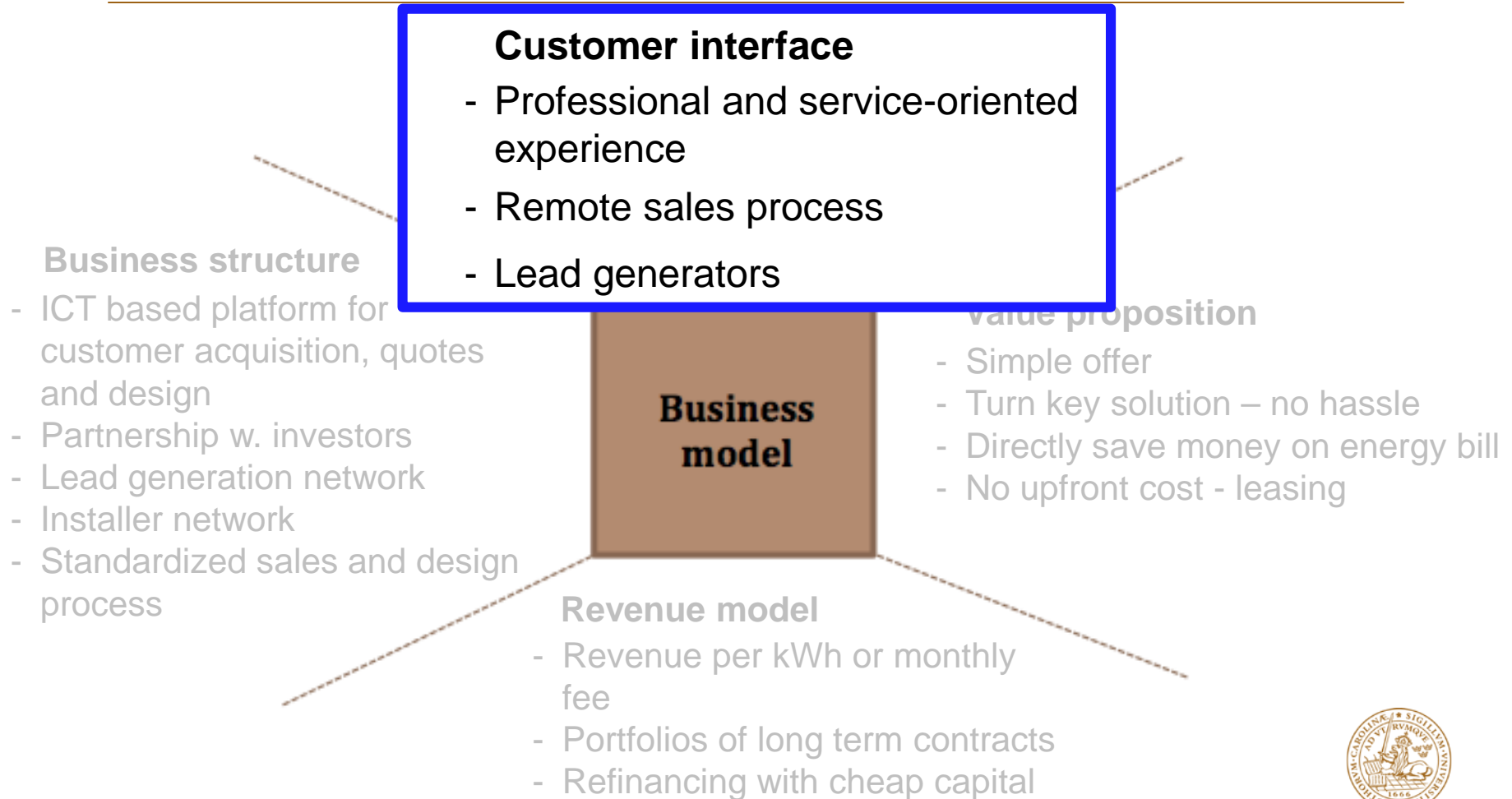




The Third Party Offering (TPO) model



The Third Party Offering (TPO) model





The Third Party Offering (TPO) model

Customer interface

- Professional and service-oriented experience
- Remote sales process
- Referrals

Business structure

- ICT based platform for customer acquisition, quotes and design
- Standardized sales and design process
- Partnership w. investors
- Lead generation network
- Installer network

Business model

Value proposition

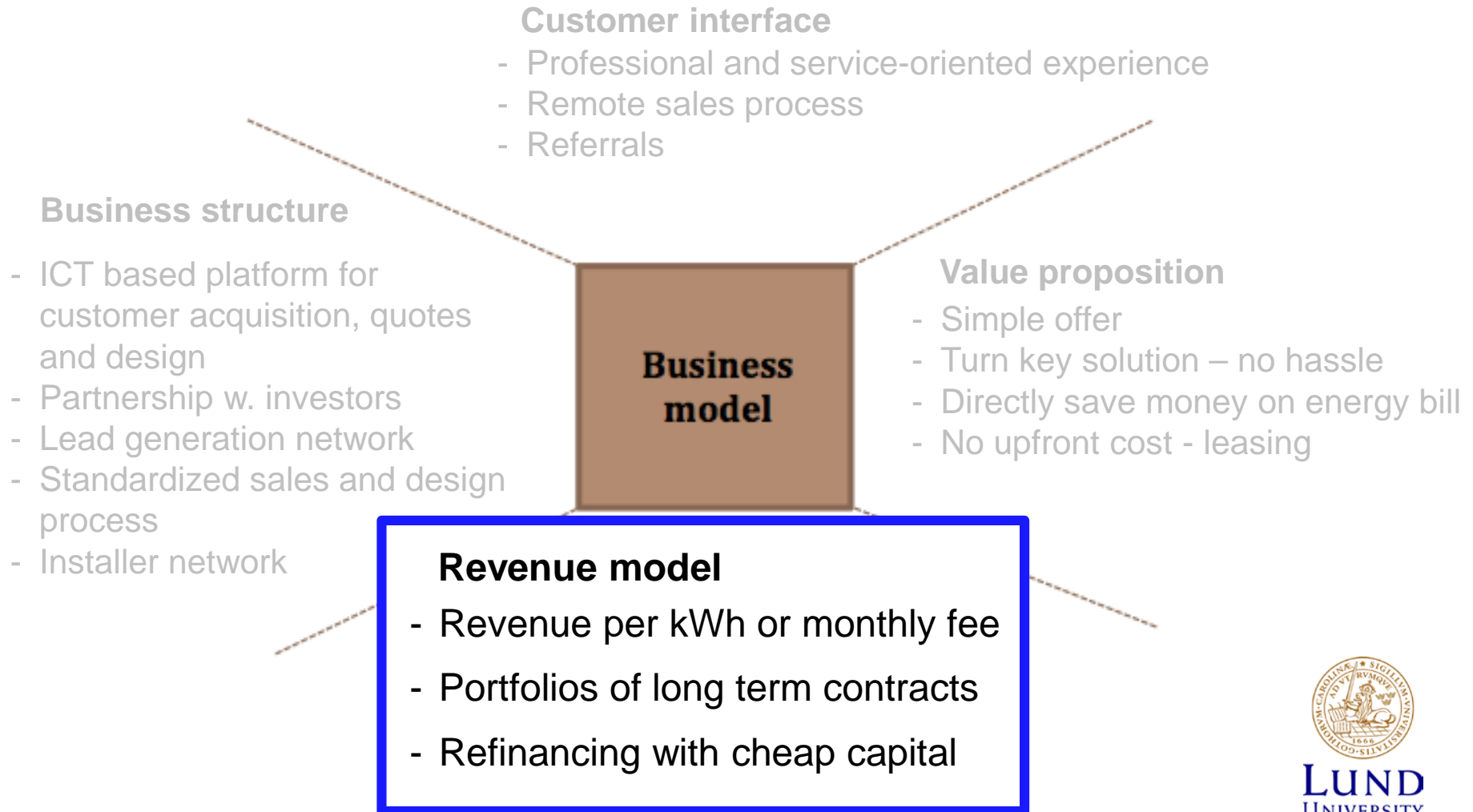
- Simple offer
- Turn key solution – no hassle
- Directly save money on energy bill
- No upfront cost - leasing

Revenue model

- Revenue per kWh or monthly fee
- Portfolios of long term contracts
- Refinancing with cheap capital

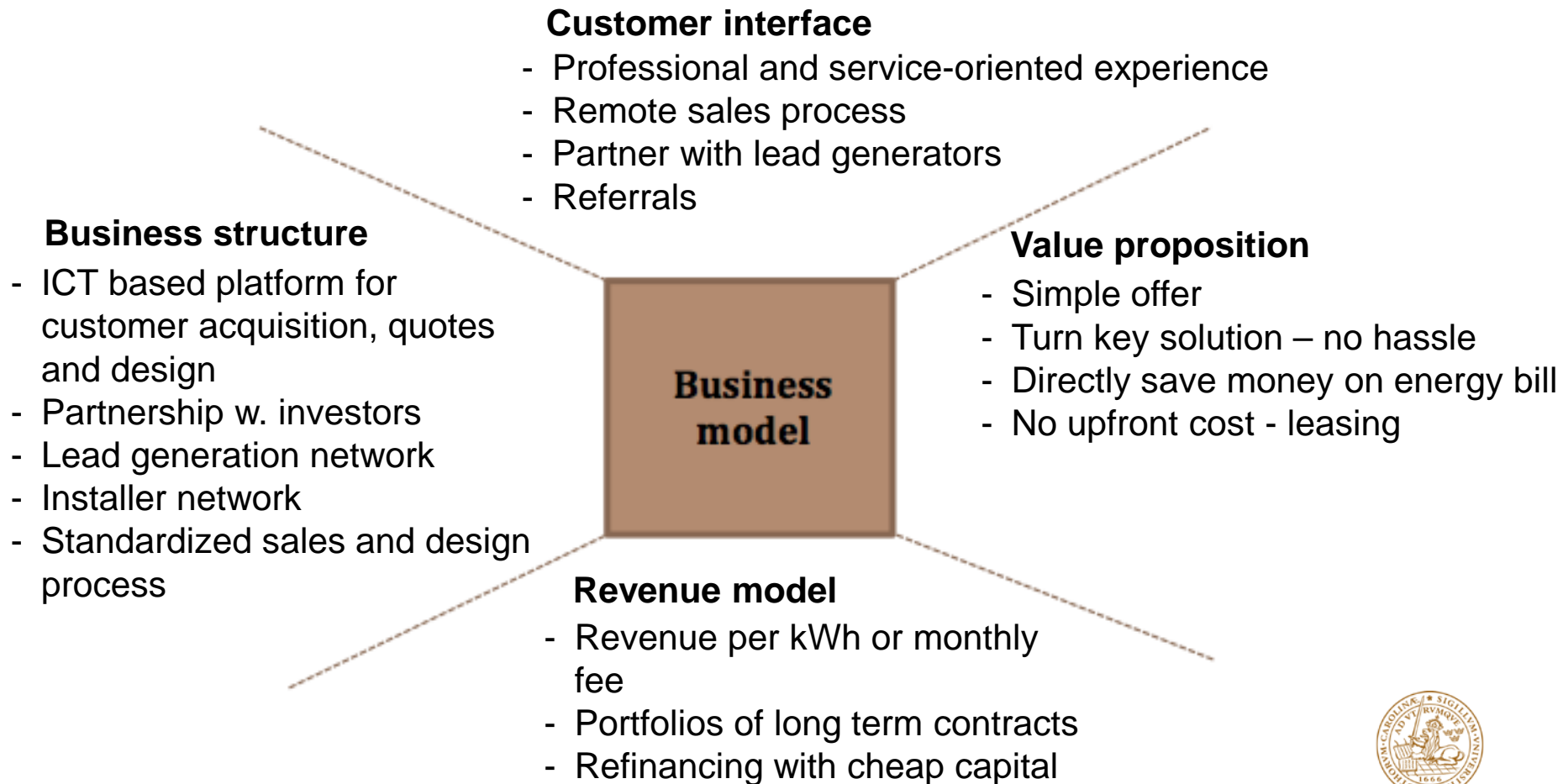


The Third Party Offering (TPO) model



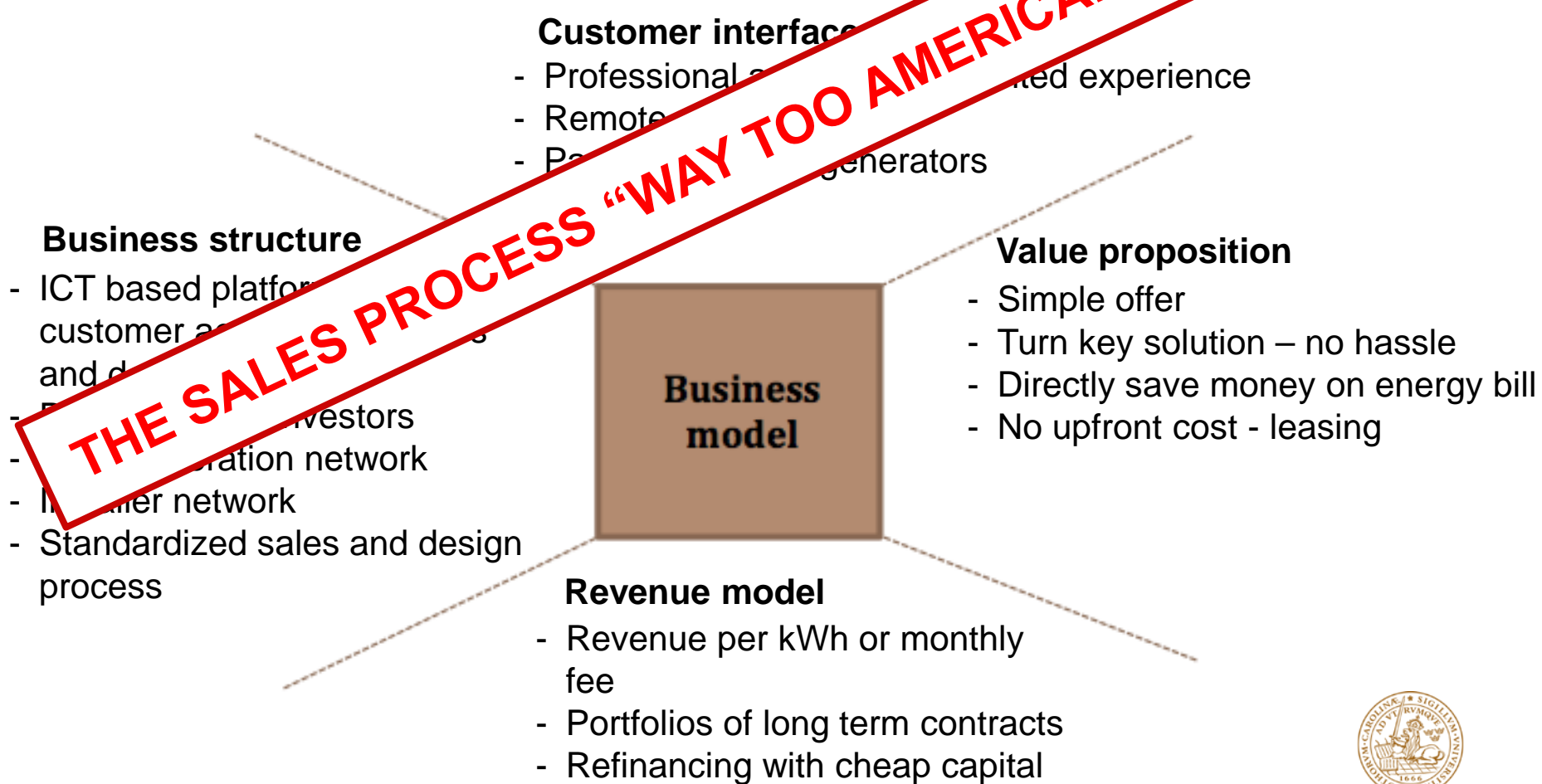


The Third Party Offering (TPO) model

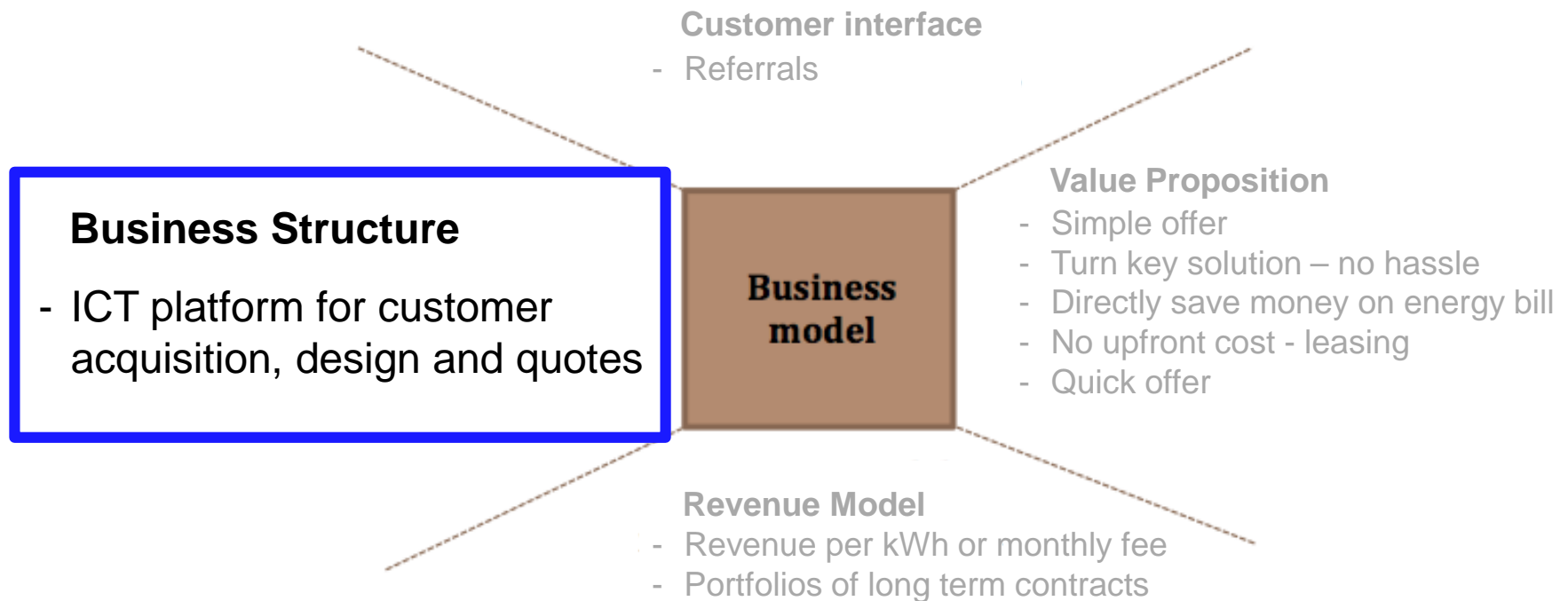




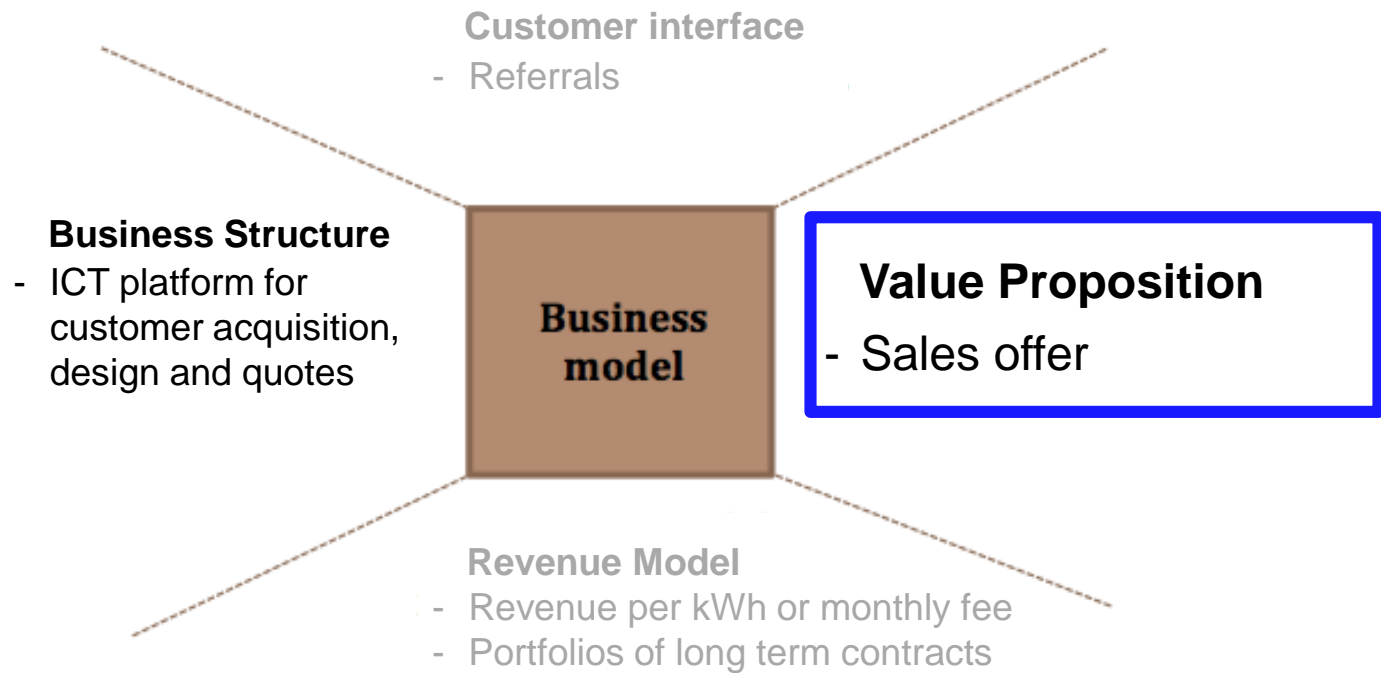
The Third Party Offering (TPO) model



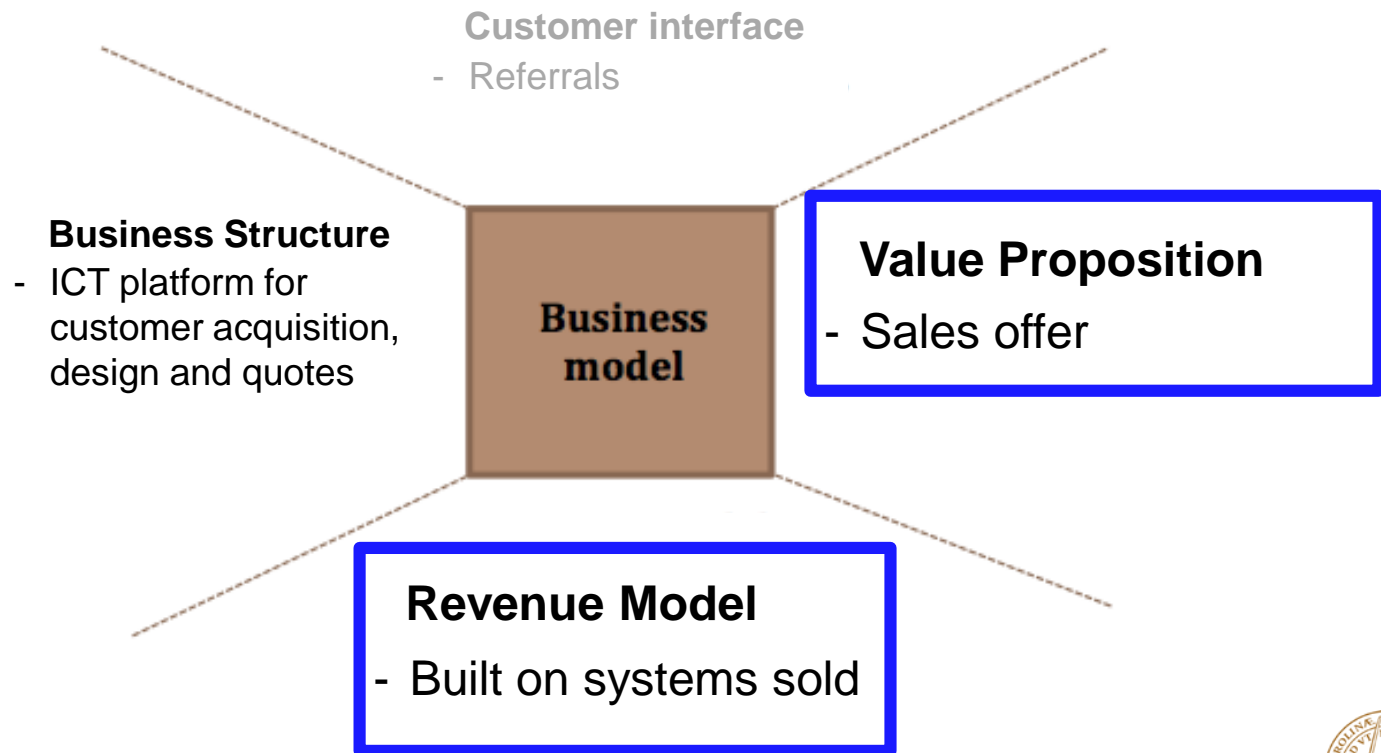
1) The TPO model - Dutch market



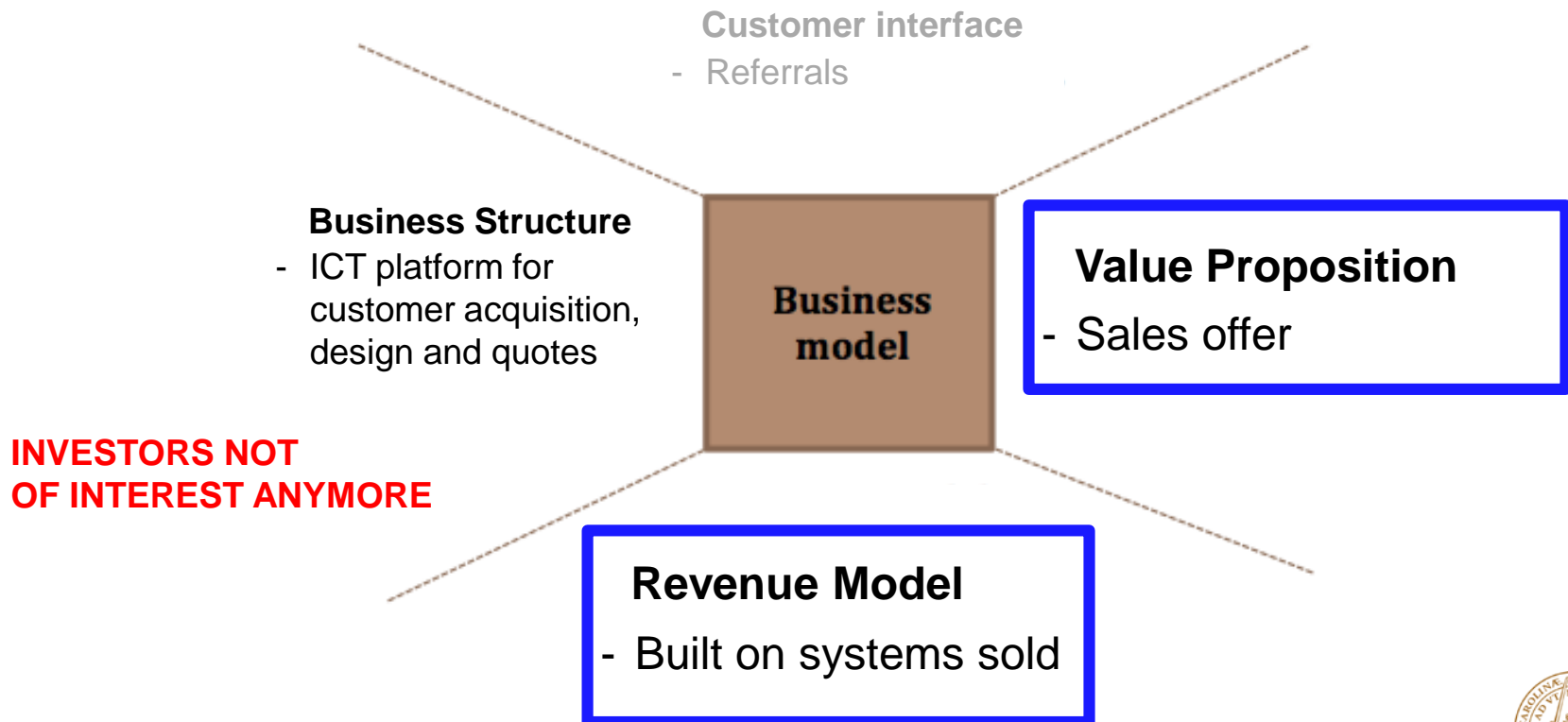
2) The TPO model - Dutch market



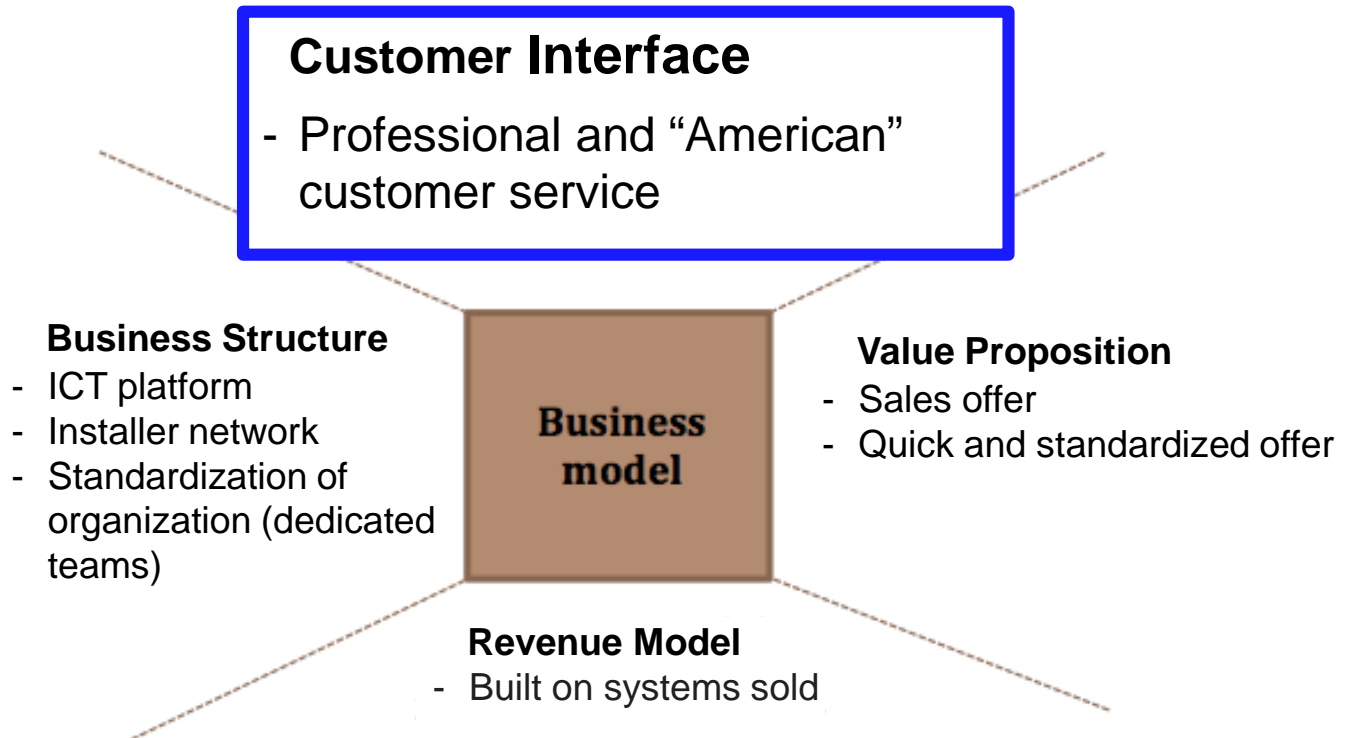
2) The TPO model - Dutch market



2) The TPO model - Dutch market



3) The TPO model - Dutch market



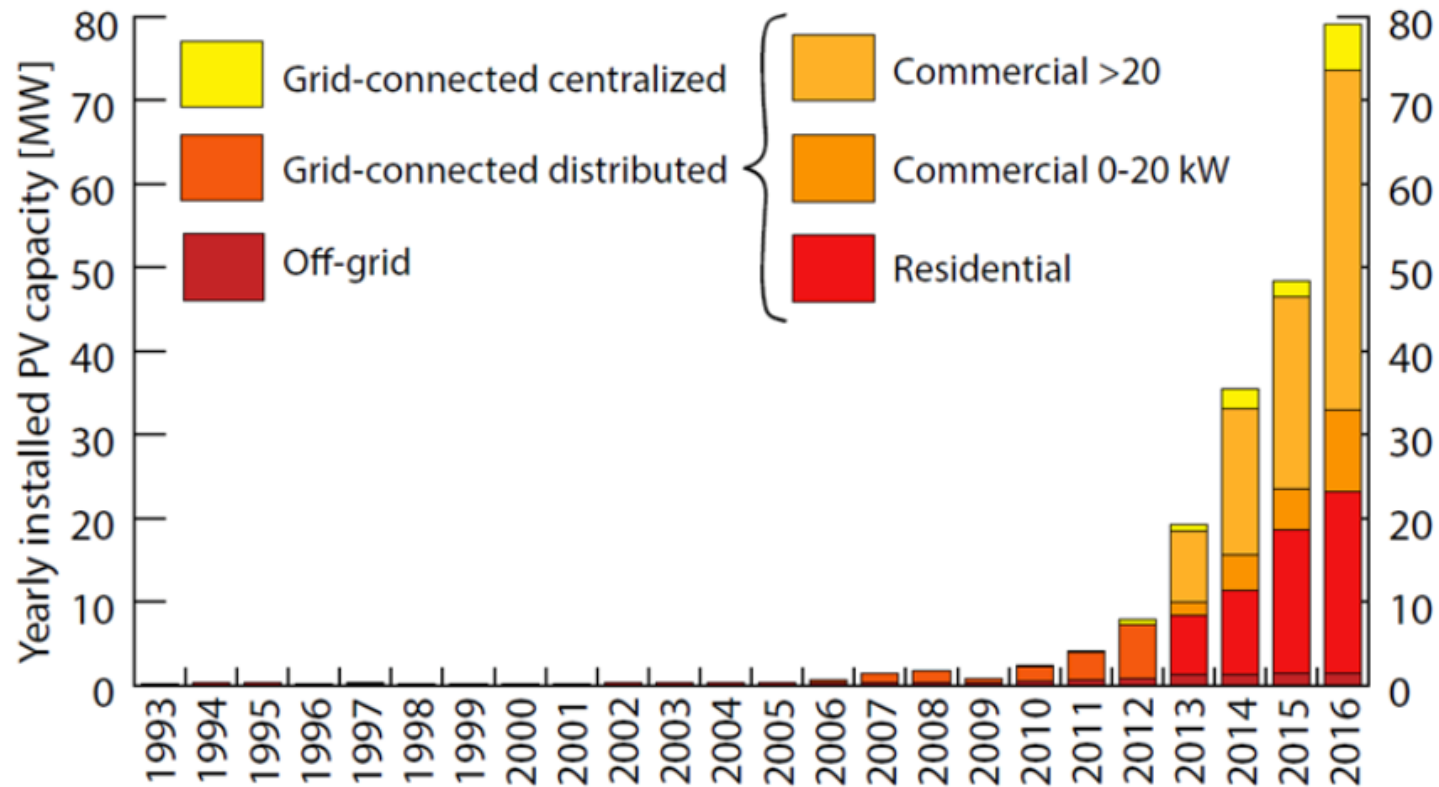
Conclusions

- A business model is dependent on the local context
- External stimuli affect – business model components need to fit the new business environment
- Perseverance that allows experimentation and mistakes
- Partnerships to learn and share costs
- Champions to create a culture and engagement for willingness to succeed
- Need to understand and see the business model as a whole, but the components can be analyzed separately
- Customer sensitivity important to build trust





Annual installed capacity Sweden



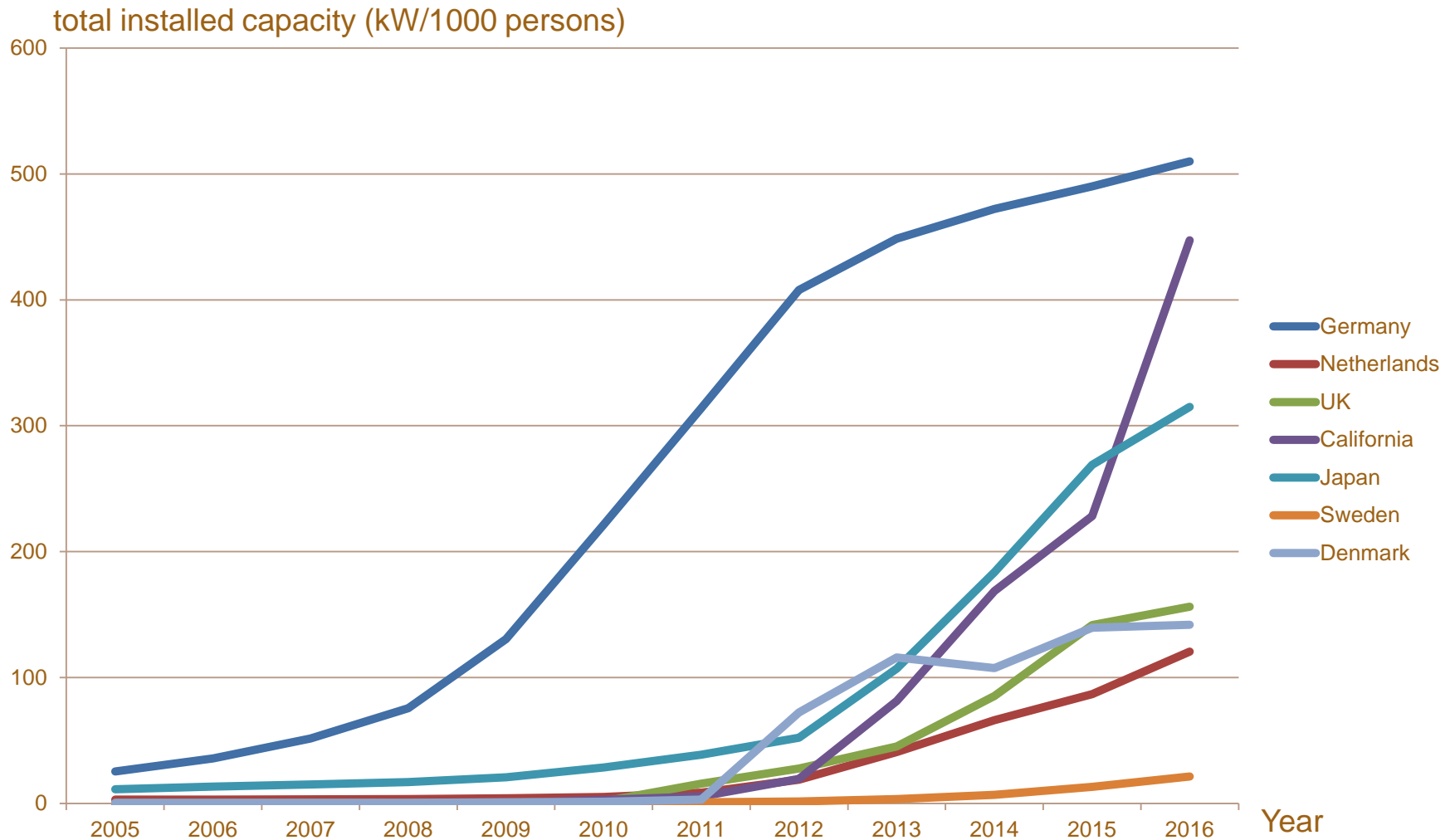
(IEA, PVPS, Lindahl, 2017)



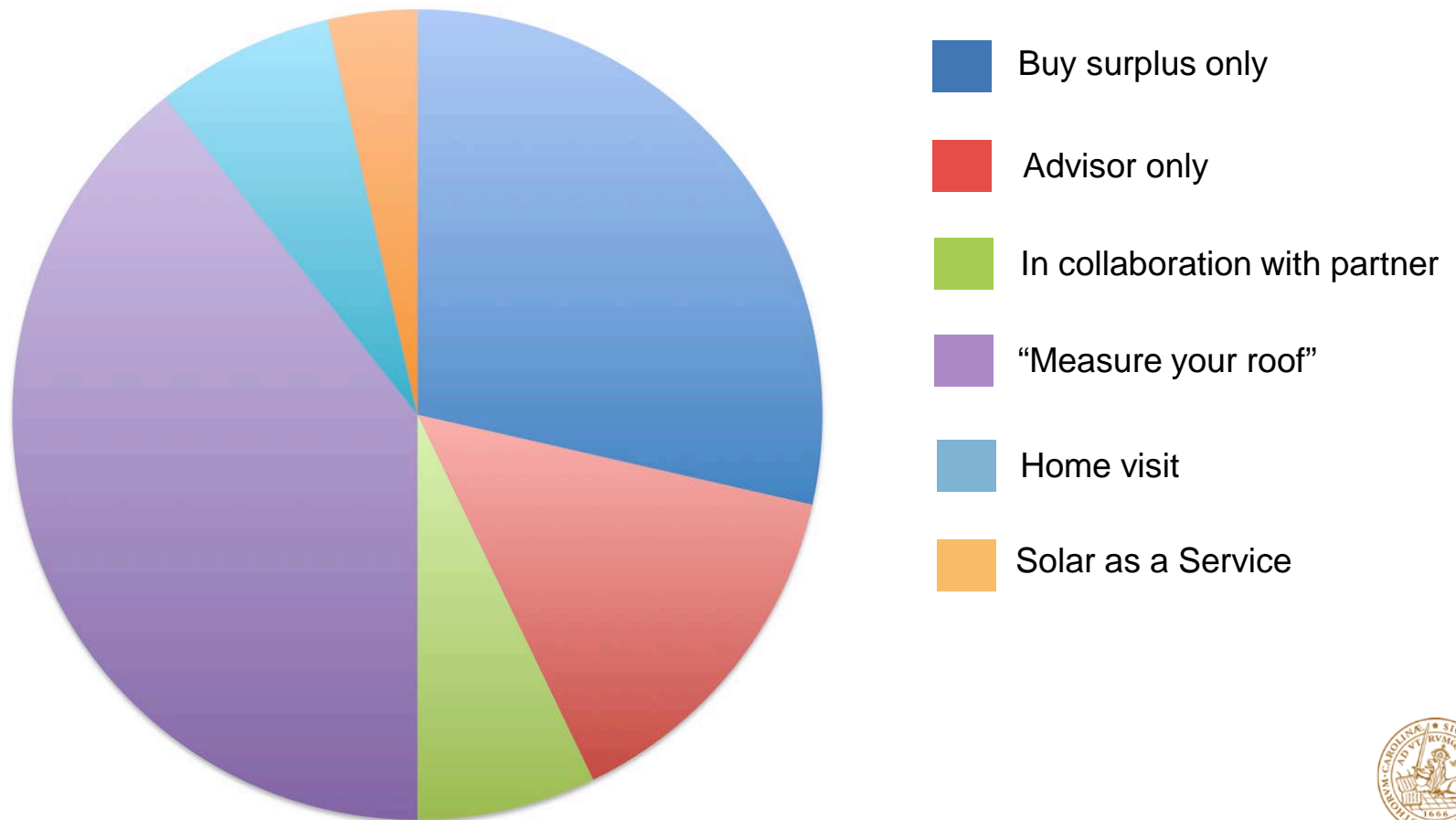
LUND
UNIVERSITY



Diffusion of solar energy (total)



30 biggest Swedish utilities offering PV







Thank you!



LUND
UNIVERSITY