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# OPPORTUNITIES AND BARRIERS FOR ASSET MANAGERS INTEGRATING ENERGY FLEXIBILITY

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## 10 1 SUMMARY

It is expected that future buildings will be able to manage their demand and generation not only according to local climate conditions and user needs, but also related to changing grid requirements. This development will introduce new challenges regarding asset management, which so far have not been explored.

15 This innovation adoption research identifies key opportunities and barriers for asset managers from a case study that considers changing grid conditions on a university campus in the Netherlands. The case illustrates that implementing energy flexibility is certainly not only a problem of data communication and transfer. The paper sets the scene that asset management for energy flexibility also requires detailed consideration and planning of required technical changes in buildings and grids.

## 2 INTRODUCTION

20 With its “Clean Energy For All Europeans” package the European Commission (2016) proposed new ways to deal with energy efficiency and renewable energy, with an outlook towards new business development in the energy market. While energy efficiency is put first, smart grid development now also come in the picture, as well as market changes to accelerate competitive renewable energy production. Connected to smart grids, buildings can becoming micro energy hubs consuming, producing, storing and supplying energy more flexibly than before. From literature it is expected that in the near future, there will be a need for “Energy Flexible Buildings”; buildings that are able to manage their demand and generation not only according to local climate conditions and user needs, but also related to changing grid requirements (Jensen et al., 2017). Energy Flexible Buildings might aid demand side management/load control and thereby demand response based on the requirements of the surrounding grids.

30 Based on the agenda “Energy Flexible Buildings” of the EBC Annex 67 research group of the International Energy Agency, there appears to be a need to explore if users find the concept of energy flexibility suitable for their daily practice or business development. So far, current social studies are limited to understanding the perception of end-users, such as homeowners (Li et al., 2017) and office workers (ongoing IEA EBC Annex 67 activity). There is however also a need to better understand the implications for facility and asset managers, who can potentially play a pivotal role in the acceptance of energy flexible services. Therefore this paper looks into the barriers and opportunities that asset managers encounter that can either hinder or facilitate adoption of energy flexibility.

## 3 RESEARCH APPROACH

40 As energy flexibility is perceived as a new concept by asset managers, it can be investigated from the viewpoint of adoption of innovation. Innovation theories were already introduced during the 60’ies and have been applied on hundreds of adoption problems (Rogers, 2003), including the adoption of energy-saving and environmental technologies, concepts and demonstration buildings (Mlecnik, 2013), and provides relevant research models.

In-depth knowledge from demonstrations is needed for the future development of asset management strategies. The aim of this research is to better understand experiences from a real-world case study, assuming that this is

45 likely to unravel important contextual conditions for the adoption of energy flexibility. Methodologically, the research uses a case study approach (Yin, 2014), supported by literature search, stakeholder interviews and (procurement) action research to investigate adoption barriers and opportunities related to the adoption of the concept of “Energy Flexibility” and its effect on asset management strategy, using the experiences from asset managers from a university campus in the Netherlands.

#### 50 **4 CASE STUDY**

The Technical University of Delft has developed ambitious targets regarding the implementation of energy efficiency and renewable energy systems on its campus. Amongst other, its facility managers are looking for ways to lower the heat supply temperature in the local (heat) grid on the campus. The changing grid conditions imply needed changes in connected buildings. The transition from a high to a medium supply temperature on the TU Delft campus appears to have far-reaching consequences on the facility management of the buildings and the redevelopment of the heat grid. Simulations and tests show that a smart control system can lower the heat network supply temperature, which can support the implementation of renewable energy systems. However, such control strategies imply a time shift in the energy use of individual buildings and technical modifications of hardware, devices, buildings and systems. The lack of interoperability of building management, control and data transfer systems is an important practical barrier.

#### **5 CONCLUSION**

New challenges lie ahead to be able to manage building portfolios more effectively, taking into account the need of buildings being able to respond to changing grid requirements. This paper provides insights to better understand asset managers’ perceived opportunities and barriers for introducing ‘energy flexibility’ and lessons from the development of energy management practices on the TU Delft campus.

In theory older buildings can be made suitable for low supply temperature with fast and – compared to renovations - relatively small investments. When user-friendly, the implementation of control systems and optimization algorithms can allow to save energy and monitor comfort. However, the implementation in practice can result in high innovation risks due to testing in a working environment and additional transaction and hardware costs which might hinder adoption. Furthermore, the adoption of energy flexibility is challenged by data transfer and communication difficulties and conflicting views on the implementation of sustainable portfolios. The research identifies a need for future research regarding ‘energy flexible’ asset management strategies, which includes the development of suitable policy instruments, new business models and procurement and end-user guidelines.

#### 75 **6 REFERENCES**

- European Commission, (2016), Clean Energy For All Europeans, European Commission, Brussels, 30.11.2016 COM(2016) 860 final.
- Jensen, S.Ø., Marszal-Pomianowska, A.J., Lollini, R., Pasut, W., Knotzer, A., Engelmann, P., Stafford, A., Reynders, G., (2017), IEA EBC Annex 67 Energy Flexible Buildings, Energy and Buildings 155, 25–34.
- 80 Li, R., Dane, G., Finck, C., Zeiler, W., (2017), Are building users prepared for energy flexible buildings? A large-scale survey in the Netherlands, Applied Energy 203, 623–634.
- Mlecnik, E., (2013), Innovation development for highly energy-efficient housing. Opportunities and challenges related to the adoption of passive houses, PhD dissertation, TU Delft, Delft, The Netherlands.
- Rogers, E.M., (2003), Diffusion of Innovations, 5th ed., Free Press, New York, NY.
- 85 Yin, R.K., (2014), Case study research: design and methods, 5th edition, SAGE Publications, London.

#### **7 CONFERENCE TOPIC**

Future role of buildings and industry for the flexibility and stability of thermal and electric grids.