TU/e

iNNOVATION SPACE

Challenge name	Energy transition
Challenge owner	Neways
	X Company □ Research □ Student team
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Email challenge owner	
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Preferred way to contact	X email □ Phone call □ SMS / what's app □ Other; …
Brief summary	The demand and supply of electricity and heat do not match in time with overload in the network as a result while storage capacity is not used. This leads to consumers buying electricity when it is expensive and supplying it when no one needs it at low or maybe even negative prices. The challenge is to better balance demand and supply and estimate the optimum business case for a solution. In this project, we focus on the energy system in a house or a street, and try to find solutions that enable a more sustainable way of matching supply and demand.

About the challenge owner

Neways is an international innovator in electronics for smart mobility, connectivity and semicon solutions. With more than 50 years' experience and strong engineering power, we are proud to act as technology innovation partner for the most demanding customers in the industry. Neways develops and produces electronics that facilitate major trends around global ESG themes. Our team of more than 2,500 specialists across the Netherlands, Germany, USA, China, Czech Republic and Slovakia enables future solutions for EV charging, electric power trains, digitizing health solutions, sustainable agriculture, producing microchips and more.

Challenge description

With the increased attention to energy consumption, carbon dioxide emissions and global warming, the existing system of electricity supply and demand is requiring a significant shift. Energy is used when it is hardly generated, making it expensive, and it is produced when the demand is much lower. One reason for this is that the availability of affordable solutions for local energy generation (solar cells, windmills,...) has turned consumers into prosumers, who often produce a lot of energy at times when they don't need it themselves.

Because of this, the central grid concept is under pressure, since it is not designed to deal with this massive difference in supply and demand at different times of the day. Furthermore, the huge increase in electricity demand due to the increasing popularity of electrical vehicles (EVs) introduces additional worries for energy companies.

All of these issues have led to the rise of smart, new concepts, which aim to decrease costs and pollution, while safeguarding energy availability through clever sharing of resources. Climate-friendly energy sources like solar panels have the disadvantage that power generation is maximal during mid-day, while households often need most power in the evening hours. The most important issue with self-sufficient or autonomous houses is therefore energy storage. Another, very efficient way to store energy is to use the batteries of electrical vehicles. Charging a vehicle during daytime, when a lot of power is generated can be an effective way to release the pressure on the grid and prevent meltdown (V1G). We want to challenge students to come up with sustainable and viable solutions for the supply-demand gap.

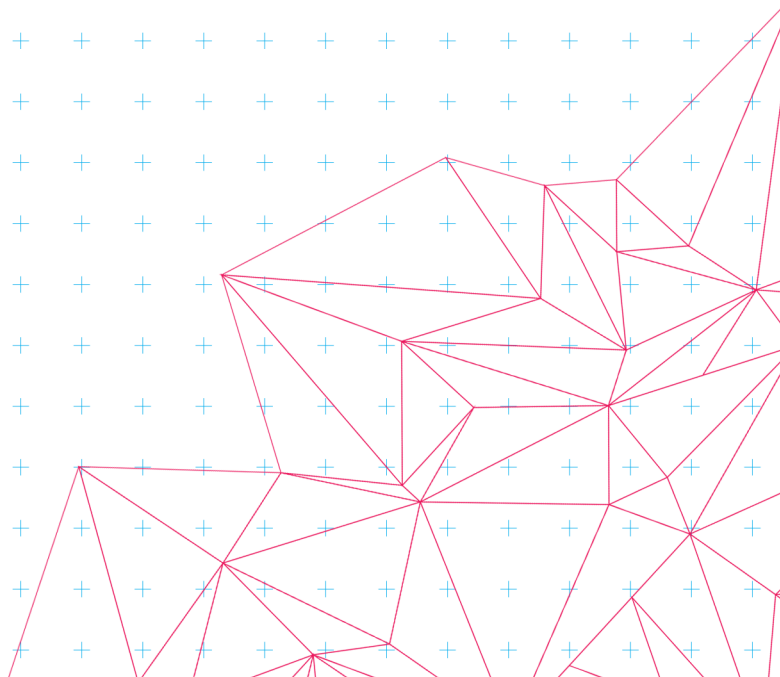
Input and involvement of challenge owner

We will challenge the project team on their solutions from a technical perspective as well as a business perspective by upfront discussions and reviewing afterwards.
As an outcome we hope for a concept that we can present to possible OEM's as a way forward to solve the challenge. This then could lead to an industry consortium that provides a solution to some of the questions raised by the Energy Transition.

Resources

We offer to the students

- Expertise regarding electronic control systems
- Workplace (if and when needed)
- Support in market access (if and when needed)



Roles of different disciplines (only for ISBEP)

Automotive Technology	As vehicle-to-grid (V2G) solutions are part of potential new smart grid solutions, obviously EV technology is one of the key aspects of these challenges!
Biomedical Engineering	
Architecture, Urbanism and Building Sciences	The energy solution mostly is the backbone of the house, so architecture students can think along in the planning of urban environments that are able to cope with changes in supply and demand of energy.
Computer Science and Engineering	Current smart energy solutions are very much integrated with their control systems, both on a local- as well as on a global scale. Intelligent software has to be created to control availability of power and is also used to calculate and settle energy use , purchasing or sale.
Data Science	
Electrical Engineering	Design the controllers and interface system parts, design (smart)grid systems, realisation and use, on a local- as well as global scale.
Industrial Design	
Medical Sciences and Technology	
Psychology and Technology	Incorporate views of the user regarding energy consumption to increase acceptance of the solution
Chemical Engineering and Chemistry	Especially useful in the field of (temporary) storage and conversion of various energy vectors (battery, hydrogen, ...).
Sustainable Innovation	To make this a future proof solution including end-of-life aspect as e.g. batteries may be involved
Industrial Engineering	Business model finetuning (local usage as well as inter-grid sales) and concepting.
Applied Physics	Working on the energy flows inside and outside the house, including maximum capacity of (local) grids and smart battery usage.
Applied Mathematics	
Mechanical Engineering	To model for example heat pump and storage and to design a solution to optime the usage of both. Design of systems, modelling of project parts.