

## Energy on the Move: Logistics, Storage and Distribution

Our world is constantly on the move: technological innovation, physical transportation, scientific advancements or societal changes – there never is a standstill. It is similarly so in the world of energy. Nearly all of us in the Western world are used to electricity always being available: the electrons are always ready to start flowing, always there and waiting for us to plug in our phones, laptops or electric cars. We have all become increasingly dependent on electricity and are accustomed to the critical infrastructure always being up and running. But, the way in which the energy ecosystem operates is constantly in motion as well.

We are in the midst of a major energy transition, in which we are transitioning from large, centralized and often fossil fuel powered energy supply to decentralized and more sustainable energy sources. Besides the changes in the ways in which we generate energy, we also see changes in our energy consumption, e.g. electric vehicles, heat pumps and home batteries.

At current, the electricity grid is interconnected across Europe, and energy consumption and generation constantly need to be in nearly perfect balance in order to ensure availability of electricity whenever we need it. This delicate balance is constantly maintained by a whole range of roles within the energy market. The energy transition has also sparked a whole range of innovations in this field, like *microgrids* and *smart grids*, which in turn change the way the market and market parties have to operate to ensure the constant availability of electricity we're all so accustomed to.

### **A Complicating Factor...**

Traditionally, certain parties are responsible for maintaining the balance between electricity generating and electricity consuming clients within their portfolio. If these parties fail to achieve a balance within their own portfolio, they can trade excess energy on a market place. If an imbalance remains, there are system operators that retain flexible assets which can be temporarily switched on or off to restore the balance on the grid.

Renewable energy like solar and wind is often unpredictable. If you combine this fact with the fact that an increasing number of electric vehicles starts or stops charging at will, one sees that this leads to increased volatility on the energy grid. Microgrids like e.g. the ones in a neighborhood, aim to optimize energy consumption and generation in their own micro-environment, but should they fail to achieve a balance, they are currently still dependent on the trading markets and system operators to 'keep the lights on'. This means that it is very challenging for a microgrid to go entirely off-grid, i.e. to remove their connection to the transmission and distribution energy grid.

We therefore challenge you to solve the following issues...

Are there any synergies between to be found in our constantly moving world that will enable microgrids or individuals to become entirely self-sufficient? For example: can our constant increase in



parcel deliveries also deliver fully charged battery packs? Or will your electric car that is fully charged at work provide you with the necessary energy at home? Otherwise, are there synergies to be found between different modalities in transportation of discrete goods (like parcels, cars, people, etc.) and continuous goods (like fresh and sewer water, gas, electricity)? Do you see synergies between 'energy' and 'non-energy' activities? Do you see particular benefits for individuals, NGOs, SMEs, corporates, governments? Please consider that all solutions might include an element of minimizing consumption or increasing energy efficiency as well. Be sure to examine your deliverable!