

The 'green tsunami' is causing shocks to the energy network, calling for an innovative approach

Global CO₂ levels are increasing, governments are intervening and promoting electrification, green energy generation and consumer generation of energy by means of incentives. This 'green tsunami' is causing 'shocks' to the network in the form of literal overload and metaphorical financial shocks. These shocks call for an innovative approach: the technical solution of Smart Grids, increased cooperation between market players and a directing role for government.

The Netherlands' electricity network is in the midst of change: from a traditional, centrally managed offering, powered by coal and gas in particular, to a widely diversified mix of energy suppliers and carriers such as solar panels, wind turbines, batteries, hydrogen and, of course, still coal and gas. Electrification is receiving an additional impetus in the Netherlands due to the reduction in the use of gas. Not only is the energy carrier different: demand, supply, production locations and predictability are changing accordingly.

Solar panels are being erected in fields beside roads and motorways and on the roofs of company premises and, of course, homes. The number of offshore wind turbines is growing fast, but locations for installing wind turbines are also being proposed under local and regional initiatives. The rapid increase in the number of initiatives and the number of parties involved presents regional grid operators with multiple challenges: additional demands on the companies building infrastructure to deliver connections, additional investment in order to increase the capacity of the existing network to cope with increased electrification and connect additional wind turbines and solar panels. But the peak loads of the natural sources (solar/wind) and higher consumption of electricity due to heat pumps and electric cars are causing additional strain on the electricity network.

Financial shock

The electricity network was originally designed to transport electricity from the power station to the connection point (factory/household). That means thick copper cables at the power station end and thin wires entering the household.



The increase in decentralised generation by means of solar panels and higher peak loads (due to the charging of electric vehicles and energy feed-in) requires that the network has sufficient capacity for the quantity of electricity to be transported. In today's world, energy networks widely distributed throughout the country need to be provided with higher capacity connections; moreover, they must not only be able to receive electricity but also feed it back into the grid. This makes the task of the grid operator significantly more difficult. More and thicker (higher capacity) copper cables are needed to be able to handle the demand and the supply. Regional grid operators have a statutory obligation to provide connections: if a company has received permission from a local authority to build a solar farm, the grid operator is required to connect it within a set period of time. On top of that, grid operators have no say in where in the network the solar or wind farms are built. They are hampered by the existing legislation and regulations. Grid operators literally have their backs against the wall, not least in financial terms. In peripheral areas, where many of these new solar and wind farms will be located, existing transport capacity is too low, which means the grid operator has to make relatively large investments in order to achieve the required increase in capacity and connection. This issue will only become more acute as the energy transition accelerates. In the period 2021-2050, annual investments in grid operation in the Netherlands will be nearly double what they were in the previous decade.

The regulatory framework around grid operation is geared towards a return on investment spread out over the long technical lifespan of the assets. This means that the investments required for the energy transition cannot be financed from the grid operator's current income. Plus, there are limits on the amount that may be financed with debt. In short, additional money is required, resulting in a demand for direct financing.



This is causing significant shocks to the shareholders of the grid operators – municipal and provincial authorities. For years, the grid operators generated a fixed and predictable dividend stream. Due to the huge financing requirement, the shareholders need to provide additional investments in order to keep the grid operators' equity at an adequate level.

This is of course a very traditional approach to the problem: the existing statutory division of roles in the market model forces the grid operator to make substantial investments to increase capacity at points in the network that are sub-optimal (in the grid operator's view).

This needs to change. We see two options: increased use of Smart Grids, but also a stronger directing role for the government in the energy transition: deciding where capacity does/does not need to be increased, but also encouraging collaboration between market players.

What are Smart Grids and why do they represent a solution?

'Smart Grids' is a catch-all term for different smart ways of matching energy supply and demand by means of technology. Technological applications help the demand for energy to move in tandem with supply and so prevent additional pressure on the network, meaning that in effect part of the expected increase in capacity of the network is not needed or can be delayed. Balancing energy supply and demand can be achieved at various points in the network. For example, at the level of a home, a street, a neighbourhood or an industrial estate, or between the various strands of a distribution network. For example: a car is automatically charged when the sun shines and charging is paused when there is less energy 'left over' due to cloud cover. Or a heat pump heats its buffer reservoir when the sun is shining and recovers energy via a heat exchanger when it stops. In this way, the same electric car can also act as a buffer in order to meet the additional energy demand. This is a complex software solution to a practical problem that may offer a solution for grid operators.

How far have the grid operators got with Smart Grids in practice?

A survey of experts reveals that grid operators are already quite advanced in digitising their existing energy networks. Grid operators are able to perform maintenance and resolve faults remotely. Digitisation is high on their agendas.

In terms of developing Smart Grids, we see a varied picture: at some grid operators, projects have been delayed or are at the pilot stage; others, by contrast, are actively investing.

We observe that a number of grid operators are concentrating on meeting the massively increased demand for connection of wind and solar farms. The focus among the companies is to comply with their statutory connection obligation, meaning there is simply no capacity available to further explore the new applications.

The question now is, when will we reach the tipping point where grid operators have to deliver so many new connections while at the same time supply and demand are fluctuating so heavily that smart technologies like Smart Grids are essential? Or to put it another way, are we still in the pilot phase, testing out the technology, or can we already clearly foresee where balancing is required and where we need to use Smart Grids? The risk of postponing Smart Grid applications is that we will be too late, and will be forced to increase capacity. A vicious circle: even more infrastructure projects in a market in which there is already a shortage of qualified staff, higher costs and higher financing requirements for shareholders and external investors.

We recommend that grid operators act now on Smart Grid pilots and applications – not just to test the new technological applications 'in the field', but in particular to explore their impact on operational management and the necessary changes to the market model (cooperation between suppliers, metering companies and grid operators).

There are various issues in terms of operational management that need to be worked out. For example:



Heat

How is heat anchored in the existing market model? In existing heat networks, the owner of the network and the supplier are closely linked, but there is also no option to choose a different supplier. Should we not consider a connection requirement in order to make the local heat networks economical and so achieve the lowest costs for society?



Charges

Is the existing model for transport charges (capacity charging) still appropriate in the KV segment? Should we not introduce a different charge or structures in order to facilitate the diversity in users?



Data sharing

Smart Grid applications require many different data sources: about generation (where and how much), about consumption (where and how much) and about the way in which the energy flows through the network. What is needed to achieve a data hub and who will facilitate this role? The grid operators or the suppliers, or both together?



Roles

Which new roles will be introduced to the existing market model? There is currently talk about local optimisation of generation and consumption via aggregators or 'semi-off grid' communities; the creation of trading platforms for the different forms of energy where producers and energy consumers can buy their energy and/or offer it for sale.



Privacy & security

Privacy & security of smart meters has always been a sensitive issue in the Netherlands. How do we ensure that privacy & security remain assured with the expected increase in data sharing and the offering of different applications?

Scope for grid operators to work together and a more directive role for government

The second solution, besides Smart Grids, for coping with the shocks caused by the 'green tsunami' lies within the government's sphere of influence: scope for collaboration and a more directive role for government.

The Dutch government privatised the energy sector in the mid-1990s, the most notable change for the consumer being the ability to switch energy suppliers. Later, a compulsory organisational division between energy suppliers and grid operators was also imposed.

In the words of the government, the free market is responsible for achieving the energy transition. The government is encouraging this energy transition, but is not directing it.

We have for years seen a kind of 'catch 22' among the energy suppliers and grid operators. The grid operators want to help consumers achieve energy savings. However, the statutory framework prohibits them from playing that role. The energy suppliers, on the other hand, are able to do so. We see the energy suppliers taking various initiatives aimed at energy savings:

- providing access to consumption information;
- promoting new applications: local action at street or neighbourhood level to make use of excess solar/wind energy;
- local storage of energy, etc.; however, these initiatives have yet to bear fruit.

In order to really make headway in terms of the energy transition, greater cooperation between the market players is needed. There is currently nothing stopping energy suppliers and grid operators from working together, but the existing legislation on the independence of grid operators has given rise to an idée-fixe among suppliers and grid operators that cooperation is not possible and that the grid operator must follow the free market. This means grid operators only take action when a customer has a particular energy requirement that needs to be met by suppliers and the grid operator can modify its network accordingly.





The huge **financing requirement** also needs to be put on the agenda more widely. Why not convert the shareholder structure (currently municipal and provincial shareholders) to state shareholdership as is the case with TenneT and Gasunie? This would prevent a situation where municipalities that are short of money are unable to meet the financing requirements of the grid operators, temporarily or otherwise.

And why not create an extra income stream for the grid operators in order to start actively directing the energy transition? They could choose at which points and in which neighbourhoods we switch to heat, hydrogen, 'all-electric', etc. in order to achieve speed (mandate and legal frameworks) and a low cost of the energy transition to society.

Another alternative would be to modify the regulatory framework for grid operators. This was historically developed under the assumption of a stable investment level that is virtually equal to depreciation. Changes are required that take account of the significantly increased investment agenda for the energy transition.

In the form of the energy transition, we face a huge task, perhaps far greater than the Delta Works of the period 1953-2010. Not being able to facilitate the energy transition could also have far-reaching consequences for the growth of the economy. The first noises are already being heard that particular hoped-for modifications to the energy infrastructure will not be achieved on time, meaning that some businesses cannot continue to grow at their current locations. If as a society we wish to achieve the energy transition, it is also necessary that the grid operators work with energy suppliers, residents, housing associations, industry and non-entrants to achieve new applications. No time must be wasted on debates about whether or not collaborating is possible. What matters is to invent the new world together in the field and establish the division of roles going forward.



In addition, we recommend that the government play a **greater directive role** as regards where in the Dutch landscape the sustainable energy is generated. A wide-ranging dialogue needs to be facilitated in order to identify the optimum locations. The current situation in which solar and wind farms are run by investors will saddle Dutch society with multiple problems: strong resistance in various communities, but also high costs of connection to the network. Those higher connection costs will ultimately be paid by citizens: via transport charges, or through government funding.

Contact



Mark Lof

Partner

Lof.Mark@kpmg.nl
+31306 582160



Rudolf Stegink

Partner

Stegink.Rudolf@kpmg.nl
+31206 568523



Stan de Ranitz

Associate Director

deRanitz.Stan@kpmg.nl
+31204 262645

