Energy Transition
Where are we heading?

Landsnet Annual Day
14th March 2018
ENERGY TRANSITION
WHERE ARE WE HEADING?

Reykjavík, 14th March 2018
Agenda

1. Introduction: Iceland today
2. Energy Transition ET: drivers, barriers and facilitating framework
3. Electrification of Transport
4. Tesla: from EVs to batteries
5. DERs, aggregation & flexibility: value to Landsnet
6. Recommendations & Lessons learnt
Iceland Today

Energy Transition for Transport, 31st May 2017: action plan to increase the share of domestic renewable energy (40% by 2030)

Iceland is 99.99% transport fuel dependent. About 85% of energy supply is domestically produced & renewable EV-IncentivesCity employees who come to work at least 3 times a week by means other than a diesel car will get a 72,000 ISK annual stipend Goal of 30,000 electric cars by 2026 The limit of the carrying capacity of the grid has been reached. Iceland’s electricity production is primarily based on sustainable energy. This is why it makes perfect sense for the transport sector to be a part of the electrification process.
Energy Transition: Targets & Enablers?

The new realities

- Decentralisation
- Electrification
- Variability

4th Industrial Revolution

Empowerment

Flexibility

Digitalisation

Environmental commitment
2. ENERGY TRANSITION: Main Drivers

TARGETS

NEW ENERGY SYSTEM

“Clean, safe, secure and affordable energy is one of the greatest challenges facing Europe today”

Fuente: Dominique Ristori. Prologo European commision´s in house science service (JRC). 2013

Source: https://ec.europa.eu/energy/en/topics/energy-strategy/2020-energy-strategy
Huge penetration of renewable to fulfill the energy objectives

Arias Cañete: “Twenty years ago, renewables were still seen by many as an expensive gamble. Twenty years later, I am speaking to you in a building with solar panels on the roof providing us with clean electricity”

HOW TO ACHIEVE THOSE OBJECTIVES?

System integration through Network Codes and CEP

Clean Energy for All Europeans
3. Electrification of Transport

Iceland’s electricity production is primarily based on sustainable energy. This is why it makes perfect sense for the transport sector to be a part of the electrification process.

News

Sale of Electric Cars Nearly Doubled in 2017

BY LARISSA KYZER | BUSINESS | Updated: January 05, 2018 10:00

ABB to cover Iceland with 15 new fast-charging electric car stations
Opportunity:
• Vehicle to grid services

Challenge:
• Impact on the load curve

EV will be part of the new picture

What impact does this have on the EV market?

- EV's can have a significant impact in the energy transition (storage capacity and support of the grid frequency)
- EV's could potentially deliver FCR (income source)
- The European FCR market changes in a way that is favourable for EV's
### Drivers to promote EV deployment

#### EV-specific home charging tariffs in Europe

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<tr>
<th>Country</th>
<th>Utilities involved</th>
<th>Notes</th>
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| UK      | OVO Energy         | • Flat rate of £83 per month  
          |                    | • Access to UK Polar Network (50,000 EV chargepoints) |
| UK      | Good Energy        | • 15% per kWh cost reduction on variable EV tariff |
| UK      | Ecotricity         | • £40 a year discount for EV owners. |
| Spain   | Endesa             | • 1,200 kWh of free electricity per year between 1:00am and 7:00am.  
          |                    | • Free installation of a home charging point  
          |                    | • Access to a public charging network that will be built in 2018. |
| Portugal| EDP                | • 10% discount per kWh during night time charging.  
          |                    | • All electricity is sourced from renewables.  
          |                    | • The first 900 customers who sign up and have an EV from one of EDP’s partner brands* get the first 15,000km of electricity for free, which is applied as a 40 euro per month bill reduction over 10 months. |

**Economic incentives:**

“City employees who come to work at least three times a week by means other than a diesel car will get a 72,000 ISK annual stipend”

https://grapevine.is/mag/articles/2017/05/18/the-future-is-coming
What is smart charging?

The charging process is managed and controlled in response to an external stimulus so to optimise the use of the grid and available energy in such a way that there is little, if any, impact on the customer. Smartness is enabled by both price and control signals via an ICT infrastructure.

Actors involved:

- EV drivers who want to charge their cars every time
- Grid operators who want to avoid congestions
- Actors on the wholesale market that want predictability of demand
- Local RES owners that want to use locally produced energy
4. Tesla: from EVs to batteries to Flexiblity

EV are only as clean as the grids that charges them.

Using the same Battery technology, Tesla’s Energy Products address the increasing need for Flexibility of the electricity system, with intelligent stationary battery storage systems and renewable generation.

The suite of battery systems developed by Tesla can perform a variety of functions for Utilities, businesses, and residential customers.
“Customers will progressively move to the centre of the electricity system. A new service model is emerging, based around energy efficiency offerings, smart grids, decentralised generation and, most importantly, new types of customers: more aware and demanding, more active and engaged”.

“What is flexibility at household level? Flexibility at household level is the ability of an appliance connected to the power system to change its consumption profile (time or level of consumption) through automation or direct action by the customer.”

“Action is taken to evolve towards an electricity market where prosumers have the possibility to provide flexibility and ancillary services.”
Key items

- Customers need to be incentivised to benefit from reduced energy costs and a lower total cost of ownership.
- European electricity system can cope with 100% EVs with no additional Generation or Transmission capacity.
- Investments in distribution grids can be minimised with smart charging.
- Smart charging supports integration of renewables such as wind and solar.
- There is significant value of smart charging for CO2 emissions savings and related costs.
5. Recommendations/Lesson Learnt

- A lot is going on- We need to stay alter in Iceland and we shouldn’t lag behind, positioning as a front runner of Energy Transition. We already are the front runners in Renewable Energy
3.- Simulaciones

**Simulador de la factura de electricidad**

Simula el importe de tu factura actual suponiendo que se mantiene el consumo exactamente igual pero cambiaras el peaje de acceso o la potencia contratada:

**Contrato actual**

- Importe total: 23,61 €
- Pot. contrat.: 3,45 kW
- Tarifa: 2.0A GENERAL

¿Cuánto habria pagado en el periodo analizado con otro peaje de acceso?

- Importe total: 21,78 €
- Pot. contrat.: 3,45 kW
- Tarifa: 2.0DHA NOCTURNA

- Importe total: 21,93 €
- Pot. contrat.: 3,45 kW
- Tarifa: 2.0DNS SUPERVALLE

¿Cuánto cambia el importe en el período analizado si modifiqué la potencia contratada?

Fuente: CNMC https://facturaluz2.cnmc.es/
“Energy storage can supply more flexibility and balancing to the grid, providing a back-up to intermittent renewable energy”


Act on local flexibility markets or own local storage facilities

- The use of energy storage allows the faster deployment of renewable energy, which is beneficial to reaching the EU’s renewable energy target.

- Therefore DSOs must be able to use local storage capacity offered on local flexibility markets, when this is cost effective to manage short term unpredictable fluctuations to avoid congestion.

- When this short term capacity cannot be provided by market parties, DSOs must be able to use own energy storage facilities to provide the required flexibility to the system, in order to maintain security and quality of supply.

- The incremental capacity that energy storage provides to the DSOs can, in the long term, defer or reduce investments in additional grid capacity. These long term investments in storage capacity can be considered as a DSO responsibility similar to traditional grid investments such as cables.

Source: CEDEC Storage as a tool for smart distribution. Enero 2016
“The electricity system will require more flexibility if higher shares of renewable energy are integrated. **Energy storage is one of the available flexibility options**”

“It also assists the transition towards an energy system where end-users can provide flexibility to the system, either with stationary batteries coupled with their own self-production generation units, or using vehicle-to-grid as a second application of their vehicle batteries”


“A number of technologies can provide flexibility, including centralised or de-centralised generation, demand side participation and energy storage”

In the future, DSOs could additionally procure ancillary services from distributed generation and other **distributed energy resources** (including demand response and decentralized storage)

Demand Response is provided by electricity consumers which accept to adapt their electricity consumption when needed, to secure electricity grid security and balancing in a cost-effective way.
4. International Experiences

- Reforming Energy Vision-NY DSO: framework
- Sonnen IBM Blockchain Germany
- Eneco, Tennet Batteries and smart charging
- Denmark, Nissan V2G, Enel... (1000 euros per year)
- Clean Energy Package
Electro-mobility can make transport cleaner and cheaper

But to move more people and goods using electricity, we need EU policies, programmes and initiatives that support synergies between the transport and energy sectors.

This platform unites organisations from across civil society, industries, and transport modes. Its members are committed to promote electro-mobility and strive to collectively develop solutions to electrify European transport, and to promote those solutions to the EU institutions and Member States.
Monitor and control in real time the charging of electric vehicles: Centro de control de vehículos eléctricos (CECOVEL)
6. Recommendations

- EV could be the biggest provider of flexibility in particular through Smart charging
- Establish vehicle/battery standards, V2G communication protocol, TOU charging Price
- A better design of power Market is the fundamental driver
- Customers need to be incentivised to benefit from reduced energy prices
- Demand response will become key in the energy transition
- TSO-DSO cooperation is needed to increase the security of supply
“In order to keep the lights on, system operators will need to cooperate more in the future and explore areas where cooperation would increase security of supply”


Energy Regulation: A Bridge to 2025
Conclusions Paper

19 September 2014

4.4 More active control of distribution networks will result in a need for greater coordination between TSOs and DSOs

Objective

68 Cooperation between the DSOs and the TSO must be effective as the requirement for active network management by DSOs increases as a result of greater distributed generation and DSR.

Proposal

CEER will develop recommendations for clarifying the distinct roles and responsibilities of TSOs and DSOs in order to strengthen cooperation and technical data exchange between them, as well as among DSOs (both in the gas and electricity sectors). The management of data in relation to market players is addressed in Chapter 1, whilst the consumer protection aspects of this issue are addressed in Chapter 3.

Source:
Memorandum of Understanding

Between

the European Transmission System Operators Association:
ENTSO-E

And

European Associations representing Distribution System Operators (DSOs), notably:

CEDEC
EDSO for Smart Grids
EURELECTRIC
GEODE

Information Exchange  Operational cooperation  Areas of common interest
“the upcoming opportunities for the TSO and DSO cooperation can be grouped into three categories”:
(1) coordinated access to resources
(2) regulatory stability
(3) grid visibility and grid data

WHAT AREAS REQUIRE ENHANCED COOPERATION?

• Roles and responsibilities
• Flexibility in the market
• Technical requirements

Source: DSO associations y ENTSO-E 2015. General guidelines for reinforcing the cooperation between TSOs and DSOs