Candidate PCI projects in the thematic area of smart grids

in view of preparing the 4th PCI list

This document includes information regarding all projects in the thematic area of smart grids submitted by projects promoters between 19 December 2018 and 7 March 2019 in view of assessment and preparation of the fourth Union list of Projects of Common Interest, to be adopted in October 2019.

1. SINCRO.GRID (Slovenia, Croatia)

Project website: www.sincrogrid.eu

The power systems of Croatia and Slovenia have a long history of cross-border cooperation which achieved technical perfection in the 1970's with the construction of the 400 kV TESLA loop and a strong interconnection to mainland Europe. Political changes in the 1990's and regulatory changes in the 2000's have left these countries with a system that has to operate in conditions which it was not designed or constructed for. Flexibility deficiency in terms of voltage and frequency regulation has recently been brought to the limit, which could potentially endanger future development in the direction of renewable and dispersed generation extension. Since the size of these countries is not larger than the size of an average Italian or Austrian regional province, flexibility problems are reported from all corners of national systems.

Bilateral technical discussions in 2014 have revealed a lot of similarity in the roots and symptoms of the underlying flexibility deficiency. At this time, TSOs and DSOs from Croatia and Slovenia have started to search for synergies in solving their problems, and the most promising view that washed up during these discussions was to establish an international smart grid cooperation that would increase the technical and economic efficiency of invested capital, human resources and technical know-how.

Various traditional and new approaches have been put together into a smart grid toolbox, including infrastructure investments, technologies and processes, which Slovenia and Croatia have finally decided to propose as a SG PCI project to the European Commission. The majority of proposals came from TSOs, because they are currently more exposed to the risks underlying their problems. Distribution companies have a need for reliable operation of the transmission grid and are contributing to the project with technical and process advancements, but compared to TSOs, their investment potential is relatively small.

The reader should also be aware that the division of responsibilities between TSOs and DSOs in Slovenia and Croatia is made in such a way that TSOs are strongly involved in the operation of their 110 kV grids, which, according to practices in larger European countries, are more commonly entrusted to distribution grid operators (e.g. neighbouring Austria and Hungary). The vast majority of actions designed at the Ultra High Voltage grid are designed in direct relation to the operation of the 110 kV grid.

Bringing the voltage profile to a safe and secure level that would allow more renewables, distributed generation, and other demanding users to be safely connected to the grid is the main subject of this proposal. Due to the extent of the voltage problem that is currently being reported from real time operations, cooperation between all 4 partners will be necessary to handle this challenge. A dedicated control centre infrastructure will be established in

order to support various voltage and frequency control processes. Together with the corresponding ICT infrastructure this will also be part of the quadrilateral development within the project.
Increasing the transfer capacities with overhead line dynamic thermal rating is another important smart grid technology that will be disseminated within this project. The frequency control problems in Slovenia, where it is impossible to obtain sufficient secondary reserve from "classical" generators, as the market prices of electric energy are very low due to the high penetration of renewables and some of the older units with higher costs have been closed, will also be addressed and largely suppressed by smart grid technologies within the scope of this project. Their use will be combined with power flow counter actions on 110 kV grid.

The main goals of the project are:
Relieving the growing network overvoltage issues, not only in Slovenia and Croatia, but also in adjacent countries, thus unlocking the renewable potential in these countries: thanks to technical control of dedicated and non-dedicated voltage and power sources with optimization based on national and international cooperation between TSOs and DSOs, overvoltage caused by high generation and low consumption at specific times will be completely removed, though low voltage problems, which could also occur in future will be prevented.

Relieving network congestions in Slovenia to allow for increasing the cross-border capacities and hosting increased transit flows from the Balkans (with high renewable potential) to Western Europe: the use of real-time control of operational limits of network elements (dynamic line rating) will allow increasing capacities available to market players without investing in new overhead lines.
Acquiring and centralizing the representation of RES production and system variables on the HV and MV networks of Slovenia and Croatia: this will enable efficient deployment of ancillary services in Slovenia and Croatia.

Reinforcing the security of operation of the electric system, by providing new sources for ancillary services (secondary regulation) in Slovenia to compensate the current operational deficiency caused by market price drop and closure of conventional generators: batteries will be installed for that purpose.

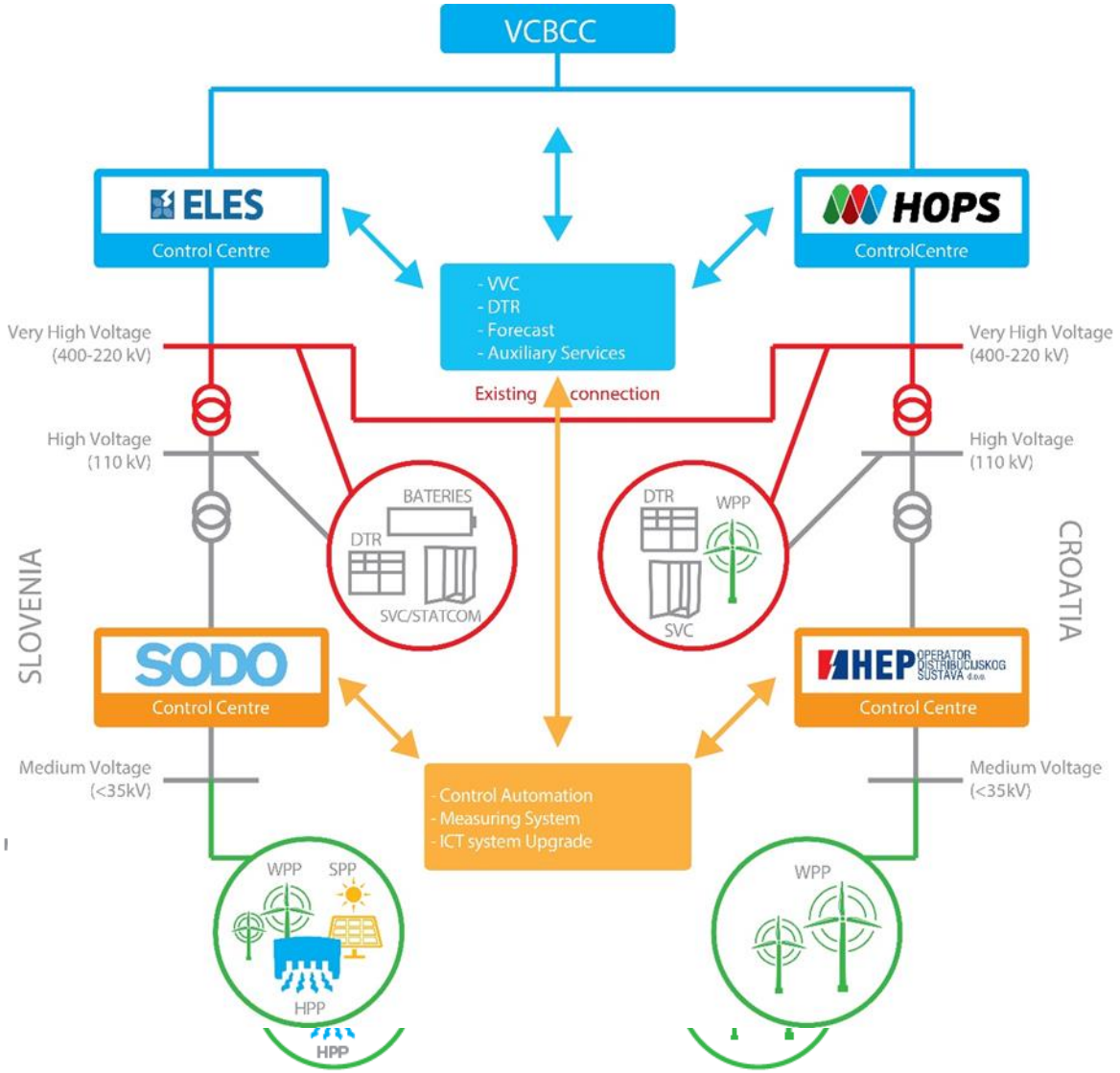
Improving the observability of the distribution network, to facilitate operation of the transmission network and to reduce needs for ancillary services.
Improving the observability of RES influence on the operation of transmission and 110 kV network operations at the international level.

Establishing communication platforms to support transparent integration of secondary and tertiary reserve from RES production and demand-side management (DSM).
Two TSOs (ELES from Slovenia and Hrvatski operator prijenosnog sustava (HOPS) from Croatia) and two DSOs from the neighbouring countries of Slovenia and Croatia are involved in the project. The project primarily addresses problems within the transmission grid, which is why the TSOs will be leading the project. Each operator is responsible for the implementation of the envisioned technologies in their respective grids. DSOs will enhance the observability of the distribution grid by providing forecasting tools for DG generation, which will help TSOs predict any necessity for ancillary services and operation regarding voltage profile.

The control centres of DSOs and TSOs will be connected using ICT infrastructure and systems integration (mainly using the semantic model – CIM).

The following technologies will be implemented within the scope of the project:

1. **Deployment of 6 compensation devices** to address at cross-border level overvoltage and voltage instability issues within the regional transmission grid.
2. **Deployment of advanced dynamic thermal rating (DTR) systems** in both the Slovenian and Croatian transmission grids, tailored to operation under alpine weather conditions and rough terrain, to deal with the highest possible power flows of the lines.
3. **Deployment of electricity storage systems**. Batteries with a capacity of 10 MW will be installed in Slovenia to provide secondary regulation, thus overcoming the market failure for the provision of secondary regulation in the region.
4. **Modernisation of telecommunication infrastructure, deployment of communication platforms and upgrade of operational tools**. In Slovenia integration of secondary and tertiary reserve from RES production and DSM will be supported. Advanced exchange of operational and planning data between TSO and DSO will enable improvement in short-term forecasting tool for RES production and DSM.
5. Deployment of a virtual cross-border control centre (VCBCC) consisting of dedicated IT infrastructure and software to be used by TSOs for the coordinated optimization of voltage profile. The equipment and operation of the VCBCC will be distributed between the existing control systems of both TSOs. Advanced algorithms for VVC optimization will be deployed.



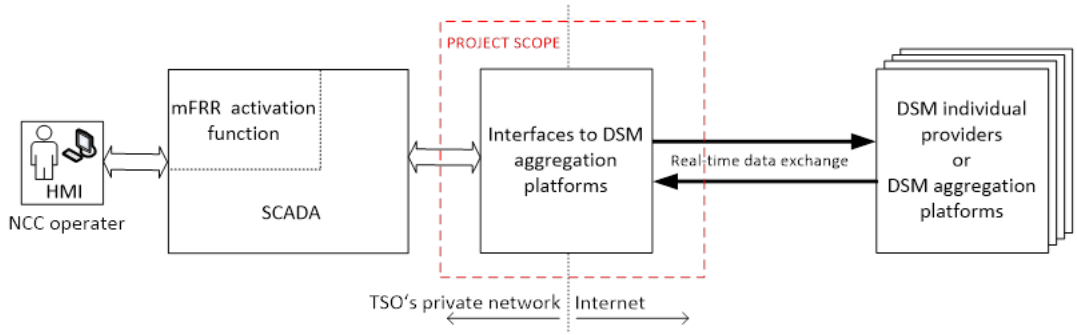
Expected impacts of the project:

Higher penetration of renewables into the distribution and transmission grids of both Slovenia and Croatia – permission for additional 330 MW of wind power can be granted in Croatia. In Slovenia additional DG installation cannot be safely installed in the system, as it would further affect the voltage issue. If the voltage issue is not solved in the next years, ELES will have to impose hard cap through the legislation solved issue of voltage profiles in both transmission systems of Slovenia and Croatia

Relieved shortage of ancillary services (secondary reserve) in the range of 12 MW from battery storage units and DG in Slovenia

Better utilization of existing transmission and 110 kV grid using the DTR system – the pilot shows a 15 % higher capacity, and we estimate 140 MW of additional NTC on the congested Slovenian borders
better observability of distribution and transmission grids using advanced forecasting tools, DTR and information coupling of distribution and transmission systems

Additional capacity of secondary and tertiary reserve will be provided from RES and DSM by establishing a communication platform that will loosen technical demands and increase confidence in the service by providing more accurate and accessible data to the TSO. Communication platform is a communication interface linking ELES control system with individual ancillary service provider or aggregation platforms as shown in picture below. The strict technical requirements of communication via ELES private TC network will be loosen so the ancillary service providers will be able to connect via public network using standardized and well specified interfaces. The ancillary service is intended to be provided both by large scale consumers as well as lower voltage level consumer via aggregators.



Status: Permitting

Date of commissioning: 2021

2. ACON Smart Grids (Czechia, Slovakia)

Project website: www.acon-smartgrids.eu (eng), www.acon-smartgrids.sk (Slovak), www.acon-smartgrids.cz (Czech)

The key intention of the ACON SG project (hereinafter referred to as the ACON SG project) stems already from its name – Again COnnected Networks. More precisely, main goal is to modernize and significantly improve the efficiency as well as cross-border cooperation of the distribution networks in Czechia and Slovakia. This modernization will in turn serve as a base for the implementation of Smart Grids (hereinafter referred to as SG) pilot projects. Consequently, the synergy between the Czechia and Slovakia at the Distribution system operator (hereinafter referred to as DSO) as well as Transmission system operator (hereinafter referred to as TSO) levels

will be deepened. In addition, the project realization is also expected to bring benefits for both Member States, as this cooperation will improve the already existing base of cross-border connection at DSO level.

This project is formed by two main segments. The first one can be characterized by massive implementation of innovative smart elements. The other part is rather devoted to the support of conventional networks, where smart components will be installed. This auxiliary part will serve not only for needs of Czechia and Slovakia, but also for other countries located in Central or Eastern Europe. Furthermore, the ACON SG project intends to deliver benefits to the broader territorial cohesion due to the fact that it will be used as a standard model for other countries demonstrating potential realization of SG concept.

The realization of ACON SG project is done for the sake of achieving the following goals:
• Efficiency and safety improvement of the Czech and Slovak distribution network
• Increase in the synergy between CZ and SK on both TSO and DSO levels
• Incorporation of SG elements into conventional parts of CZ and SK distribution systems
• Improvement in the monitoring of the grid

In order to successfully achieve previously defined goals, relevant information will be collected from various studies, analyses and operational experience. This will also serve as a foundation for further evaluation of the project itself.
As mentioned before, name ACON SG was not chosen randomly. To serve its label, the project will purposefully connect previously separated regions by using:

- Comprehensive smart technologies;
- Automated metering management (AMM) technology;
- Remote control devices;
- Looping of the MV power lines;
- Installation of the smart switchers (reclosers), locators on the MV power line;
- Installation of the voltage-regulated transformers;
- Implementation of the intelligent algorithms for automation of the grid steering, preparation of the compensation measures for local capacity of the power lines;
- Implementation of Broadband over power lines (BPL) technology to ensure rapid and reliable transmission of information.

With respect to the smart concepts introduced above, new communication elements will lead to overall advancement of the grid. This measure ensures better connection and future use of both distribution networks for easier deployment of Internet, including the availability of high-speed broadband internet and access to digital service infrastructure, i.e. so-called Internet of Things.
ACON SG project realization will also cause an increase in the cross-border capacity at DSO level. Moreover, it will strengthen the existing cross-border interconnection by construction of another 22 kV line and 110 kV line. These measures should lead to minimization of the need for possible non-standard operational activities during the management of the grid. The advancement of the cross-border interconnection also fulfils the technical requirement implied by the article 4 (1.) paragraph c) point i) of Regulation No 347/2013. The compliance with this criterion is guaranteed also for the update ACON SG project on the PCI (Projects of Common Interest) list.

ACON SG project brings together a total of 4 entities, who are interested in the development of SG activities in the Czech and Slovak area. Two of the 4 participants are DSOs in the selected location, E.ON Distribuce (CZ, hereinafter referred to as ECD) and Západoslovenská distribučná (SK, hereinafter referred to as ZSD). These two take the primary responsibility for prepared activities and act as project promoters. The other two are the related TSOs, ČEPS, a.s. (CZ, hereinafter referred to as ČEPS) and Slovenská elektrizačná prenosová sústava, a.s. (SK, hereinafter referred to as SEPS), who will play an important role in the matter of far-reaching use of the information flow.

This may enhance not only the operating of the transmission system but also the know-how sharing process in the particular area for further development in other regions of the impacted countries.

Border line area of the Czech Republic a Border line area of the Czech Republic and the Slovak Republic has been evaluated as a strategic locality, because this area has already existing connections of the voltage levels 400 kV and 220 kV between transmission operators, and further less often (nowadays mainly used for non-standard situations) used connection of the 22 kV and 110 kV voltage level between the distribution operators).
Southern and Eastern part of Czechia and Western part of Slovakia. Furthermore, activities within the project are expected to deliver an increase in potential energy input. Consequently, greater connection of all customers would rise, too. This measure should ultimately improve the quality of life in the regions. Impact of the project can be considered as beneficiary for the environment, due to the lower need for power which depends on balancing the load profile. Literally, everything will be ensured by better communication elements, which will create the possibility to use all new elements up to their full potential.
To be more precise, there are several measures that are necessary to be done for an increase in the electricity system stability and further innovation process with respect to smart technologies within the ACON SG project. Those are:

- installation of remote-control devices;
- looping of the MV power lines;
- implementation of AMM technology for innovative steering grid purposes;
- installation of the smart switchers (reclosers) on the MV power line;
- installation of the locators on the MV power lines;
- installation of the voltage regulated transformers MV / LV (VRDT);
- implementation of the intelligent algorithms for grid steering automation;
- preparation of the compensation measures for local capacity of the power lines;
- implementation of the BPL technology to ensure rapid and reliable transmission of information;
- modernization of TS 110/22 kV and construction of new TS 110/22 kV; o installation of new local advanced SCADA (Supervisory Control and Data Acquisition), voltage regulation, remote control, IT hub
- continues with the process of the implementation of smart technologies
- enables to connect more consumers / producers / prosumers
- lowers the peak of consumption – balance of the peak / diagram of consumption
- cabling of the problematic parts of the MV power lines and strengthening of the existing power lines;
- increase in capacities for connection of grid users
- improvement of SAIDI and SAIFI, decrease of malfunctions – better quality of supply
- preparation of the new type of the grid connection – cross grid
- modernization of current cross-border MV and HV power lines and construction of new cross-border MV power line; o increase in capacities for connection of grid users
- installation of optic wires for delivering, e.g. IoT
- security reasons – resolving critical security circumstances
- enhanced platform for demand side management
- AMM technology that will use smart meters, concentrators and additional communication devices
- ensuring the cyber and physical security of SG infrastructure; o construction of the technical monitoring centre with respect to technologies, e.g. both electronic as well as emergency systems, CCTV (Closed Circuit Television), chip cards.
- updating the energy dispatching centre according to SG elements;
- PIT / CIT (Process IT / Communication IT); o constructing or detaching the parts of existing data networks in order to separate critical systems
- separating the communication access points into network segments based on their categorization
- ensuring the voice services through the communication infrastructure
- implementation of the WDM (Wavelength Division Multiplexing) technology

Status: Planned, but not yet in permitting

Date of commissioning: 2024

3. Danube InGrid (Slovakia, Hungary)

The main goal of the Danube InGrid project (hereinafter referred to as Project) is to strengthen interaction and integration of the Slovak and the Hungarian electricity markets. The Project will adopt Smart Grid technologies both internally and on cross border level using Information and Communication technologies (hereinafter referred to as ICT) for the development of modern energy infrastructure. It will efficiently integrate the behaviour and actions of all market users connected to the electricity network, mainly consumers, prosumers, battery operators, generators with the aim to integrate large amounts of electricity from renewable or distributed energy sources.

The importance and priority of the Project within both countries could be best declared by the actual engagement of Project participants. On the Slovak side, the role of the leading organization is held by the largest distribution system operator (hereinafter referred to as DSO) - Západoslovenská distribučná, a.s. (hereinafter referred to as ZSD), and the Slovak transmission system operator (hereinafter referred to as TSO) - Slovenská elektrizačná prenosová sústava, a.s. (hereinafter referred to as SEPS) is also actively participating in the Project through implementation of its own investment. On the Hungarian side E.ON Észak-dunántúli Áramhálózati Zrt. (hereinafter referred to as EED) as DSO is the active participant of the Project and the Hungarian TSO – Magyar Villamosenergia-ipari Átviteli Rendszerirányító ZRt. (hereinafter referred to as MAVIR) is involved as supporting organization of the Project.

Participation of both DSOs and TSOs shall lead to a more intense cooperation between the Slovakia- and Hungary, primarily in the field of data exchange and accelerated know-how sharing process, which would also facilitate the management of emergency situations in the future. The Project would also deliver several benefits for all market participants in Slovakia and Hungary, not only for DSOs and TSOs. SEPS and MAVIR are key players of the Project, as they will also act as transmission channels which will enable the spread of new technologies used in the Project to other regions of Slovakia and Hungary. As a result, the process of modernization of the national transmission and distribution network will be accelerated.

The Project follows up the joint activity of TSOs and DSOs. CEDEC, EDSO, Eurelectric, GEODE and ENTSO-E signed an updated Memorandum of Understanding related to the cooperation for smarter electricity grids on 23rd October 2018.

The Project will improve the efficiency of the distribution network management while increasing the quality and security of supply for the electricity consumers. Furthermore, it will enable more renewable energy sources to be connected to the distribution network efficiently, and it will also contribute to the reduction of the negative environmental impacts of DSOs´ activities.
The Project contains several streams of Smart Grid applications: smart applications related to security of supply, smartening of substations (sensors, information devices, applications), data exchange, data flow and smart metering.

The concept of the Project is built on the implementation of new smart technologies and, as a result, will have a major positive impact on the region described further on. Consumers, producers and prosumers will benefit from the Project, as the Project increases the quality of electricity supply and this way increases consumers' comfort and quality of their lives. The Project ensures security of the distribution system as well.

Following smart technologies will be implemented within the Project: construction of new transformation stations with smart control, modernization of existing transformation stations by implementation of smart devices and sensors, better monitoring and remote control of the distribution system, implementation of IT based system for the smart management of the grid and smart metering systems at medium voltage (MV) level. Reaction time to eliminate potential system failures will be much faster, distribution system operators will be able to tackle network issues remotely which implies less field work and thus less CO2 emissions.

Besides, smart and prompt response further increases consumer well-being as a reason of reliability and quality of supply on the one hand, and accessibility of data to customers on the other, based on which they can optimize grid usage in terms of requested capacity and adjusted consumption diagram. In addition, this international cooperation will provide solutions for potential crisis scenarios. System Average Interruption Duration Index (hereinafter referred to as SAIDI) and System Average Interruption Frequency Index (hereinafter referred to as SAIFI) indicators will be positively influenced too, thus electricity service quality for end-users will be increased.

Taking into consideration the growing population, increase of GDP (Gross Domestic Product) and industry consumption, the increased usage of smart technologies, people's dependency on technology and deployment of electromobility, we assume that these trends will lead to increased energy consumption in the long-term. On the other hand, the Project enables more connections of renewable energy sources to the distribution networks and better balancing of the load profile. New smart applications in the grid will result in the decreasing network losses in distribution grid. The sum of the above should lead to lower electricity demand. The need for capacity will increase, however that does not imply that the environment deteriorates in the same pace. New smart elements are used up to their full potential. Therefore, the Project has a positive impact on the ecology and on the environment as well.

Specifically, there are several measures that need to be undertaken to increase the stability of the electricity system and support the innovation processes with respect to smart technologies within the Project, such as,

- modernization of the technology of 150 existing transformer stations at DSO level, which is expected to bring the following benefits:
    - improved monitoring of the grid
    - metering the voltage quality
    - better detection, localization and response to operating faults, and non-standard disturbances (SAIDI, SAIFI management)
    - communication and data transmission to the control centre systems
    - collection of data for system analysis of MV network (big data)

ıstruction of optical fibre network for MV grid management

enabling connection of smart concentrators

providing access to smart transformer stations
covering the majority of population in the region with optical fibre network

- enhancing communication infrastructure

improved communication and data exchange between meter data management system and installed smart meters

construction of new smart 400/110 kV substation in Slovakia, which will have important role regarding the stability of the electricity system in the concerned area, together with security and reliability of the electricity supply in the respective DSO area. The construction of the substation is a prerequisite for the connection of new energy generation, not only large system power plants, but also distributed generation of electricity based on RES and CHP

the substation will be equipped by state-of-the-art devices enabling remote control mode of its operation without need of permanent staff to be present; furthermore, it is expected, that the latest technology will decrease the failure rate of the equipment which leads to lower amounts of staff intervention on the site

construction of new 110/22 kV substation in Šamorín, which will:

- enable connection of more RES
- support of e-mobility
- lower GHG (Greenhouse gas) emissions and electricity losses
- improve of the business environment and employment in the region through connection of new customers and energy generation in the region
- enable better flexibility under both expected and unexpected interruptions of distribution
- enhance distribution capacity and stability of the grid

installation of smart metering devices

implementation of cybersecurity measures involving SCADA (Supervisory Control and Data Acquisition) analytical algorithms for improved renewable energy sources management, introduction of new asset management processes, optimization of grid operation, improved grid connection and communication, possible utilization of big data, blockchain technology, etc.

Increasing the number and transformation capacity of HV/MV supply by construction of micro substations with the following expected benefits:

- connection of renewable energy sources
- support for e-mobility
- enhanced distribution capacity and stability of the grid
- connection of new customers and new power plants in the region
- better SAIDI and SAIFI, thus less disturbance and better quality of supply for end-users
- improved flexibility under both expected and unexpected interruptions of distribution for the Project region

installation of a new modern SCADA system with smart functionalities o introducing a modern, forward-looking SCADA system with sensors allowing the implementation of optimum measures on the distribution network, thereby increasing security of supply

- maintaining monitoring and operational control functionality, and extending the use of advanced applications
- functional expansion: Introducing less used functions to meet new challenges and expectations, e.g. forecasting, network computing, real-time data services
- development and unification of SCADA-NET: Closer connection to INIS (which is a program of network topology based on GIS); extending remote monitoring to all SCADA-NET devices
- the intelligent system allows smaller classic network investments to provide greater regulatory flexibility, thus enabling renewable energy to capture capacity on the distribution network
- the system provides useful online information to customers that allows to manage injection and consumption of producers and consumers for energy management
- by installing a communication module, it is possible to continuously share and exchange system information between Project partners, providing useful predictions of system behaviour

installation of voltage and current metering devices with communication function into 5 000 MV/LV transformer stations

- measuring devices and sensors installed in MV/LV transformer stations have a central processing and communication unit; the device uses real-time communication so that in case of failure the reaction time will be reduced considerably
- measured data (current and voltage values) considerably help to maintain a careful, optimized schedule of operation and maintenance tasks

installation of automatic on load tap changer MV/LV transformers

the OLTC (on load tap changer) MV/LV transformer is able to continuously change its transmission even when it is loaded to achieve standard LV level, saving the cost of complete network expansion
Installation of metering and fault detection to RPMs (Remotely operated pole mounted switches)
Changing air insulated RPMs to new devices with metering and communication
Installation of fault detection systems on MV lines
Installation of fault detection and remote control to MV cable network switchgears
Construction of optical fibre network for HV and MV grid management and communication

optical cables will be hung on HV and MV overhead lines, or where necessary (urban areas), underground optical cables will be used
optical fibre network will be feasible for all communication between HV/MV substations in both control and protection
by building optical connections, we create the foundations of an intelligent grid of HV and partly of a MV network
installation of a new modern GIS (geographic information system) with large capacity and smart functionalities

the introduction of a modern, high-capacity, wide-functionality GIS system opens up the possibility of extensive data storage, which provides a good basis for introducing new services

Status: N/A

Date of commissioning: N/A

4. Data Bridge (Estonia, Latvia, Lithuania, Denmark, France)

Project website (N/a No website yet created)

The main goals of the Data Bridge:

- Integrating European energy markets closer together, by ensuring the interoperability of exchanging different types of data between a variety of stakeholders (like system operators, market operators, flexibility providers, suppliers, ESCOs, end-customers). Types of data may include smart meter data (both low voltage and high voltage meter data), sub-meter data, operational data, market data required for functioning flexible energy market and reliable system operation.

- Integrating retail energy markets in Europe by interoperability of smart meter data, reducing the cost of energy suppliers to operate in new regions.

- TSO-DSO cooperation on data interoperability by bringing companies together in a project of common interest, benefiting grid operators, energy companies and consumers.

- Achieving GDPR and Clean Energy Package compliance, by providing the necessary tools to grid companies to ensure that consumers can access and share their personal energy data and that energy companies can access the smart meter data of all European consumers.

- Ensuring that consumers benefit from increased choice and better energy services, arising out of increased competition in regions with data interoperability.

Participants and responsibilities:
The participants are TSOs and DSOs who process smart meter and other data (from commercial and/or industrial consumers). These organisations interface with the Data Bridge, ensuring data interoperability.

Cross border dimension:
The participants in the Data Bridge make their data accessible to all participants. This is in the spirit of the Clean Energy Package and enables the integration of retail energy markets in practice.
Technical characteristics:

The Data Bridge aims at interoperability of energy data systems. It connects data from smart meters (datahubs) and other information systems with parties requesting these data. The Data Bridge enables energy suppliers, aggregators and other service providers to access data from a single API. Importantly, the Data Bridge ensures that personal data is shared securely and only with the consent of the final consumers.

Expected impacts:
The impacts from market integration and increased competition are:

- More flexibility on the grid
- Better energy efficiency services for end consumers
- Lower price energy for end consumers
- Participation of prosumers on energy markets

Consumers want access to better and more personalised energy services and want control over who is using their data and for what purposes.

Energy suppliers want easier access to meter data in markets which they would like to enter. Note that incumbents may want to protect their markets by erecting barriers to data access. The Data Bridge removes these barriers and creates a level playing field.

Energy services companies (aggregators, monitoring services, financial services) need access to meter data for providing services to consumers. Aggregators need meter data for settlement, monitoring services need meter data for providing suggestions to customers, financial services need meter data for bookkeeping.

DSOs and TSOS need more flexibility on the grid.

Special sector companies responsible for data management according to the Clean Energy Package need IT infrastructure for fulfilling their legal obligation to provide data access to consumers in a secure way

Status: N/A

Date of commissioning: N/A

5. SMART BORDER INITIATIVE: A FRANCO-GERMAN CROSS-BORDER ENERGY OPTIMISATION PROJECT (France, Germany)

Project website: www.d-f-plattform.de/projekte/smart-border-initiative/ (De)

Integrated and optimised local energy systems will play a key role in **achieving the energy transition objectives** set by France and Germany, in line with the Energy Union's goals, and contribute to ensuring a secure, affordable and climate-friendly energy supply in the EU.

In order to **capitalise on the French and German expertise and experiences** in developing such systems and to continue strengthening the cross-border cooperation towards a fully integrated European energy market, both Governments have decided to launch a common initiative to identify and structure a cross-border energy optimisation project. Within the franco-german energy platform, in close cooperation with DSOs, TSOs and further partners from both countries, this initiative have led to the joint development of the Smart Border Initiative (SBI).

The SBI will, on the one hand, connect policies designed by France and Germany in order to support their cities and territories in their energy transition strategies and European market integration. It is currently a paradox that, though more balanced and resilient energy systems build up, bottom-up, at the local level, borders remain an obstacle to this local integration, in spite of the numerous complementarities observed in cross-border regions, and of their specific needs, in terms of smart mobility for example. The SBI project aims at enabling European neighbouring regions separated by a border to jointly build up optimised local energy systems, and jointly develop their local economies following an integrated, sustainable and low-carbon model.
On the other hand, this **showcase project** will initiate a **new stage in the EU electricity market integration**, by completing high voltage interconnections with local, low voltage integration at DSO level, opening new optimisation possibilities in managing the electricity balance, and enabling DSOs to jointly overcome some of the current challenges, notably the increased share of renewable energy (RE) and ensuring Europe's security of supply.

The SBI has been granted the status as Project of Common Interest under the3rd list in 2017. In the following, the project promoters successfully applied for a funding under the Connecting Europe Facility (CEF) for the study phase of the SBI. The study phase began in May 2018 and is envisaged to be completed by the end of 2019. It encompasses selected activities within all three modules with the aim to further develop the project concept and to prepare the implementation phase. The final result of the study phase will be a cost-benefit-analysis, that will take into account all quantitative and qualitative inputs collected during this phase. Depending on the outcome of the CBA, the project will be ready to proceed to the final investment decision phase (FID).

Highlighting the added value of a Franco-German approach and driven by practical needs, the main objective of the SBI is to design a **replicable European project** that paves the way for more cross-border cooperation in optimising energy systems. This project will offer a field of experimental **smart grid use cases for cross-border optimisation of the electricity distribution systems, smart mobility solutions and multi-energy sub-systems**, aiming at improving the integration of renewables, energy efficiency, security of supply and resilience of the covered areas.
It will provide an opportunity to assess the **socio-economic benefits** of these use cases following a cost-benefit analysis (CBA) approach. It will also enable stakeholders to identify regulatory hindrances to a better DSO integration and possible solutions to adapt the existing **regulatory patterns** to allow an enhanced and fully integrated EU energy market.

Tilia and dena have worked on the project design in close cooperation with key partners who have provided highly valuable inputs to this SBI project description and are committed to work on its implementation. This group of key partners includes French and German DSOs, regional and local authorities, technology providers, research centres and other relevant local actors working on the energy and mobility fields.
The geographical scope of the project concerns the **cross-border region of Saarland - Lorraine** (which is part of the Grand Est region).
The project will be developed in different modules.

Module 1: Joint optimisation of the cross-border electricity distribution systems

The energy transition has a significant impact on the electricity system´s operation, mainly due to the introduction of higher shares of decentralised generation, intermittent renewable electricity and new loads for electric vehicle (EV) charging.

The first project Module aims at **optimising the development and operation of the electricity distribution systems in the cross-border area** through an improved match of local electricity production and consumption at DSO level and the integration of flexibilities, following a bottom-up approach. It will build on lessons and experiences gathered from previous smart grid projects in both countries, and will focus on **delivering real value to end users, communities and system operators.**

Module 2: Smart mobility and integration into the smart grid (implementing a vehicle to grid interface)

Cross-border journeys in the Saarland-Lorraine region concerns around 20,000 people daily. This second Module aims at developing and implementing a **smart and low-carbon strategy to cross-border mobility** and at **optimising the development and operation of EV charging infrastructure**, taking into account the electricity grid constraints.

Module 3: Energy efficiency and sector coupling (Implementing an interface to add energy efficiency and sector coupling measures to the smart grid)

One of the key aspects of the SBI is its **multi-energy dimension**. While most of the existing smart grid pilot projects have focused on the electricity grid, new smart grids such as this project aim at developing **integrated and optimised local energy systems**, taking into account all kind of energy supply (notably heating, cooling and electricity).
The Project Promoters will provide an interface to Module 3 although as DSO they will not be directly involved in the design and implementation of Module 3. It is expected however that additional partners will address the issues of Module 3.
The project aims at developing real life business models for multi-energy smart grids. It foresees the performance of a **long-term CBA**, taking into account socio-economic externalities (CO2 emissions saved, balancing services provided to the electricity system, impact on local employment, etc.). The SBI will capitalise on existing methodological tools developed by some of the project partners, notably those that have been developed by TSOs and DSOs.

The overall **joint project design and management team** is working on the detailed design and implementation of the project and negotiates with stakeholders (local partners, industrial partners, technology providers, financing institutions...). It will secure the coherence between the cost-benefit evaluation and modelling output and the project features, and is also responsible for the overall project planning and monitoring, coordination of project partners, development of project management procedures and managing the budget and funding sources.

A Steering Committee was established within the project governance structure, integrating high-level representatives of the project promoters.

Status: under consideration

Date of commissioning: 2020

6. Crossborder flexibility project (Finland, Estonia)

Project website (not available. To be established during spring 2019)

Note: This application is not complete due to on-going establishment of consortium and full scope of the project. Therefore, possibility to amend the application is requested. The need for amendments is mainly due to complexity and extensiveness of the scope. The projected scope targets to combine outputs of various recent regional smart grid pilots and R&D projects. The outputs are combined in such manner that the flexibility services could be implemented in efficiently to address various range of power system operational needs from local, regional and crossborder perspective in Finland, Åland islands and Estonia.

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The project has been established with the overall target Support RES integration and increase security of supply of power systems of Finland, Åland islands and Estonia by sharing flexibility resources across borders. This project will specifically address how the co-ordination between flexibility resources and HVDC systems providing cross-border capacity could be applied to enhance the availability of flexibility services across the borders and thus facilitate the effective use of flexibility resources. In Nordic countries the need for flexibility services has been raised by concerns related to adequacy of inertia in long term, and novel sources for that will be of high value. For the Åland islands an ambitious long term target of being 100% renewable has been set and both receiving and providing flexibility services to the neighbouring countries will be improve the overall efficiency and feasibility of that target.
Main goals of the project can be separated in four

- To maximize the utilization of the flexibility resources for power system needs, and especially management of power balance and abnormal system states, both at distribution and transmission level
- To extend the possibilities to provide fast flexibility services across the borders using HVDC systems
- Identify technical requirements (incl. validation and information exchange) both for distributed resources and HVDC control systems
- support the development of the flexibility platform under H2020 project “INTERRFACE” and enhance its features to support better the cross-border flexibility features

There are two aspects which make this project unique:

- target to modify existing cross-border HVDC systems and existing distributed resources to better facilitate the provision of system services across the borders
- re-evaluate the different local and regional use cases for smart grid and flexibility features from earlier demonstration and pilot projects, and implement new flexibility resources according to refined comprehensives technical requirements

Establishment of the project consortium together with various partners is on-going. The target for consortium partners and their roles is as follow:

- Fingrid (TSO) is the owner of the project and other owner of EstLink 1 and 2 HVDC conenctions that are already applied for provision of frequency control service across the borders. The TSOs in the project shall be responsible to lead the study and implementation projects related HVDC features and aspects related to security of supply, system stability and reliability.
- Elering (TSO) is the Estonian TSO and the other owner of EstLink 1 and 2 HVDC connections together with Fingrid.
- Kraftnät Åland (TSO) is the TSO at Åland islands and owner of Ål-Link HVDC connection connecting Åland and mainland Finland. Krafnät Åland one of the main stakeholders in the Smart Åland initiative.
- DSOs shall participate and provide input related to the flexibility needs from the perspective of distribution network especially related to security and quality of supply. DSO's shall also address the technical requirements from the perspective of distribution network owner
- owners and/or investors of distributed resources shall be responsible for studies related to implementation of the distributed resource and the possible actual implementation of new resources and modification to existing resources.

Crossborder impacts

EstLinks have been among the first HVDC systems, which have been applied in day-to-day operation to provide of frequency regulation services between two different synchronous areas. The changes in the generation and in the consumption resulting into less inertia and short circuit power in distrb. Possibility to co-ordinate HVDC systems so that the impact on power system operation due to fast provision even large amount with flexibility resources, would allow or even increase the possibilities in future to continue provision of the services.

Technical characteristics:

In Finland certain smart grid features have been already taken into regular use. This project targets to take the next step by implementing flexibility resources providing extensive services to address both at transmission and distribution network. This project will cover portfolio of various services which have already been implemented in demonstration and pilot project, and establish implement those through new investments and modifications to existing installations to representative use-cases

The project will cover use cases, which are considered as representative considering the main regional challenges and power system characteristics. Most of the uses will be established around a technical setup consisting distributed resources, distribution network, transmission network, HVDC converter station and

More detailed conceptual description of technical characteristics is provided in the chapter 3 of the appendix 1 of this application.

Expected impacts:

- improved requirements facilitating provision of wide portfolio of flexibility services to strengthen the business cases related to flexibility resources investments
- measures to support integration of renewables into distribution and transmission network with new flexibility features
- increased utilization of HVDC systems – specifically ÅlLink and EstLink 1
- increased robustness against unintentional islanding of Åland
- increased availability of flexibility services essential to facilitate power balance management and management of power system under abnormal operation

  implementation of first flexibility services required to achieve 100% renewable energy island.

Status: N/A

Date of commissioning: N/A