

# Secure Reference Architecture for Smart Grids in Austria

## An Initiative of the Technology platform Smart Grids Austria

### Starting position

The advancing digitization has brought about an unprecedented degree of integration with regard to information technology. Two main challenges for system design arise within the energy sector. On the one hand, interoperability between different (sub) systems and components must be ensured. On the other hand, effective security and data protection measures are necessary to protect this critical infrastructure against cyber attacks and to increase consumer acceptance. Only if both challenges are accounted for already in the design phase of future smart grids, a high level of security of supply can be guaranteed in the long term.

Recent Austrian and European smart grid applications, pilot projects and safety investigations provided only partial solutions. In order to tackle the global challenges of interoperability and system security over the next five to ten years, the development of a uniform smart grid reference architecture for Austria is essential. Or else isolated solutions may be established, further preventing the implementation of a widely accepted holistic solution. The Austrian smart grid reference architecture will thus be developed in a European context, already taking into account future applications.

### Objective of the Reference Architecture

#### Tasks for the reference architecture

- Development of new solutions for the integration of higher shares of renewable energy resources and electric vehicles as well as for the use of flexibility.
- Support for planning future systems and migrating existing legacy architectures into a new smart grid architecture.
- Digitization of the energy system will require high investments in the coming years.
- New requirements for safety and security lead to additional system complexity.
- New regulation, e.g. on information security or data protection, requires companies to adjust their policies and processes, e.g. for the documentation of implemented measures.

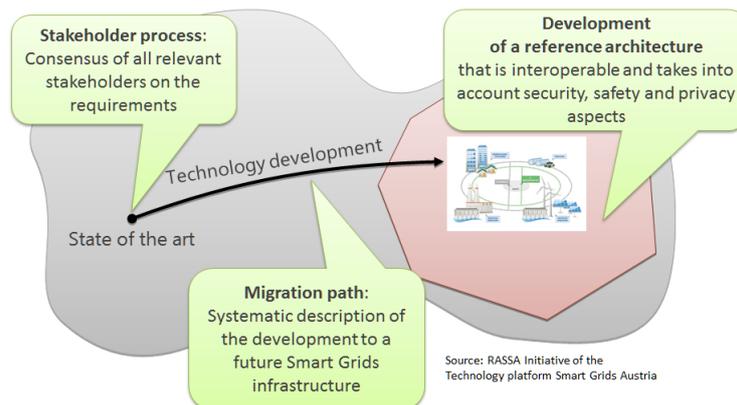


Figure 1: RASSA initiative led by the Technology Platform Smart Grids Austria

#### Proposed solutions

- The reference architecture represents the basis of a model-based view of the overall system consisting of energy components and IT infrastructure.
- The development of suitable tools, helps to systematically model, validate and document the complex systems. Tools also support the reusability of solutions.
- The definition of reusable design patterns and their security requirements enables the standard-compliant development of secure systems.

A reference architecture provides manufacturer-neutral technical specifications for minimum requirements and interfaces of modular 'blocks' for concrete system solutions. The reference architecture is based on preselected applications, actors and their functional relationships, predefined processes, data exchanges, security and standard requirements as well as components.

### Modeling of Smart Grid Systems

The development of smart grid system architectures is a complex challenge that involves different stakeholders from different domains. In order to enable cross-disciplinary development across a range of stakeholders, a model-based approach is an important goal. It serves as an instrument for communicating through system context on the basis of a common viewpoint and language and allows for a structured development process based on accorded requirements. The Smart Grid Architecture Model (SGAM, M / 490 Mandate) represents a reference system, which supports systematic modeling processes of complex systems.

### Starting points for the development of the reference architecture:

Different reference architectures already exist, which have been created based on extensive collections of use cases. Figure 2 shows the relationships between existing international and national solutions representing the basis for the development of the Austrian reference architecture.

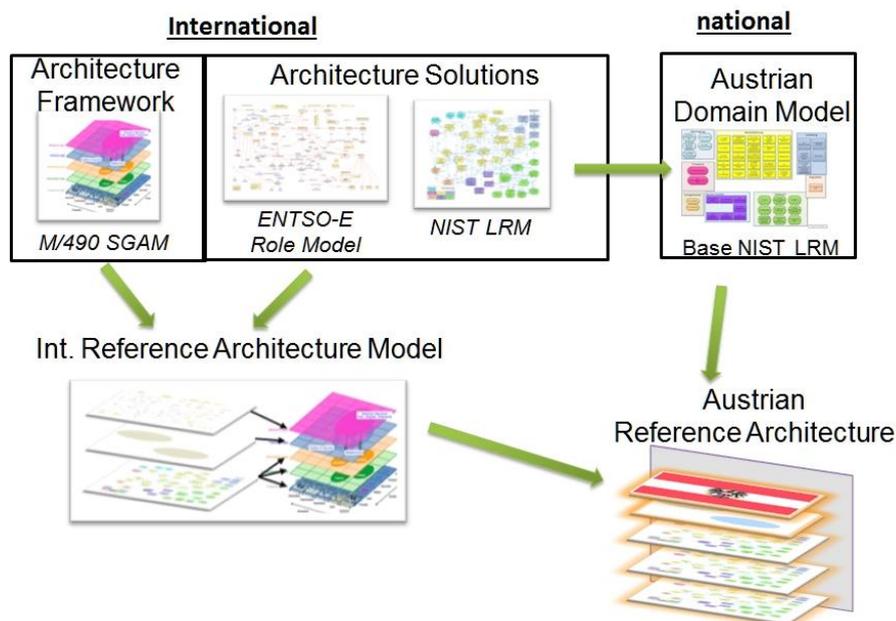


Figure 2: Starting points for the reference architecture for Austria <sup>1</sup>

### Benefits of the reference architecture

- The different perspectives of the model-based approach allow for the integration of the various stakeholders. Institutional requirements can also be mapped.
- The standard-based derivation of requirements (e.g. security from NIST LRM) forms the basis for the creation of comprehensive state-of-the-art requirements profiles.
- A digital model of the architecture allows for the design of secure, complex systems and ensures the reusability of the existing components.
- The development of suitable tools helps to systematically model, validate and document the complex systems.
- Digital models support the data export to other tools (e.g. risk management tools) and provide documentation of interfaces, protocols and data models.

<sup>1</sup> Own representation according to (CEN/CELELEC/ETSI SGAM), (ENTSO-E AISBL 2014), (NIST - National Institute of Standards and Technology 2010), (E- Control, Oesterreichs Energie, APG, BKA, BMWFW, BMI, BMLVS, KSÖ, REPUCO, 2014), (Neureiter, Das SGAM Modell und seine praktische Anwendung 2015) in A. Berger, M. Meisel, L. Langer, M. Litzlbauer, M. Uslar; RASSA-Stakeholderprozess, 12/2015, Endbericht, FFG, Wien, S. 37, to appear, Download: <http://www.nachhaltigwirtschaften.at>