Advisory Note on the draft Framework Guidelines on Electricity Grid Connections[1]

(May 3, 2011)

On March 3, 2011, the Agency for the Cooperation of Energy Regulators (ACER) issued draft Framework Guidelines on Electricity Grid Connections ("Framework Guidelines") for consultation, with comments due by May 2, 2011.[2]

Development of Framework Guidelines and associated network codes are part of a larger effort underway to achieve an integrated European electricity market under the Third Package Electricity Direction and Regulations ("Third Package.")[3] When finalised, these particular Framework Guidelines will frame the development of detailed technical requirements for resources connecting to the grid, including those resources that Member States and Europe as a whole will need to deploy at an accelerated rate to meet renewables and carbon reduction targets in the coming years. The detailed grid connection requirements, referred to as "network codes," will ultimately become European law and therefore binding on Member States.

The Regulatory Assistance Project has recently reviewed some of the key issues that will be addressed to implement market integration over the next three years, including the development of these specific grid connection network codes. Additional guidelines and associated network codes are under development to address a wide range of market integration issues, including the allocation of interconnector capacity and congestion management, transmission pricing, balancing and settlement arrangements, among others.

Our review highlights ways in which decisions on these issues could either advance, or interfere with, Europe's power sector decarbonisation agenda—including policy and other market reform initiatives to advance that agenda being considered by Member States.[4] This Advisory Note reviews the development of grid connection Framework

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[2] ACER Framework Guidelines on Electricity Grid Connection, draft for consultation, see;.http://www.energy-regulators.eu/portal/page/portal/ACER_HOME/Stakeholder_involvement/Public_consultatations/Open_Public_Consultations/PC-01_FG_El_Grid_Connection/Consultation_document/DFGC_2011E001_FG_Elec_GrConn.doc

[3] Directive 2009/72/EC concerning the common rules for the internal market in electricity and repealing Directive 2003/54/EC; see
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0055:0093:EN:PDF
Regulation No 714/2009 of the European Parliament and of the Council on Conditions for Access to the Network for Cross-Border Exchanges and repealing Regulation No 1228/2003; see
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0015:0035:EN:PDF

[4] Our review also presents an overview of the market integration process and associated timelines, describes the "target model" of market coupling, and discusses related EU regulations and directives. It serves as a useful companion to our advisory notes on specific consultations. See: *Advancing Both European Market Integration and Power Sector Decarbonisation: Key Issues to Consider*, Briefing Paper by the Regulatory Assistance Project. Our April

Guidelines (and subsequent network codes) from a similar perspective, but focuses in particular on the consultation document issued for comment. Below, we highlight some general observations together with “key messages” from our review, followed by a more detailed discussion of each. We also append a set of proposed modifications to the Framework Guidelines that reflect our observations and recommendations.

General Observations

Ensuring that generation (and demand) resources have the appropriate characteristics and can provide the services necessary to ensure the continued integrity of the electricity grid is crucial. The introduction of new, low carbon, technologies such as wind and solar will increase the scale and volatility of power transfers within and between national systems, a trend that will continue as we progress toward a decarbonised European electricity system.

It will be important, therefore, that the connection requirements for these technologies, and indeed conventional generation, are appropriately specified to assist in mitigating potential system instability issues that can result from such transfers. However, in considering the requirements and associated costs that the European minimum standards will impose, it is also important to recognise that appropriate technical standards for grid connection are only one component that can contribute to a secure and resilient electricity system. In fact, the causes of most recent system failures and blackouts worldwide relate to system operator error, lack of awareness or equipment failure, rather than inadequate generation connection standards[5]. The development of a secure and resilient European electricity grid will, therefore, also require the definition of robust operational standards and practices, as well as equipment specifications, in addition to appropriate grid connection requirements.

We also note that the Framework Guidelines are silent on other connection issues, in particular user access to the transmission system. Creating greater consistency of grid access issues (e.g., timely connection, timescales for connection offers, securitization requirements) is arguably as important to market integration objectives as the harmonisation of technical parameters.

Finally, a general theme of our comments reflects the general observation that leaning too far in the direction of “harmonisation for harmonisation’s sake” with respect to the minimum technical standards for grid connection has major costs and adverse impacts, relative to its potential contribution to the creation of a secure, well-functioning integrated European market.

2011 pre-publication draft is available by contacting Meg Gottstein at mgottstein@raponline.org or Stephen Benians at sbenians@raponline.org

[5] See; www.fglongatt.org.ve/Archivos/Archivos/SP.../pwrs_05_**blackout**.pdf

Key Messages

- Connection requirements covered by the network codes should be limited to those that have a significant impact on cross border trade and related market integration issues, consistent with the intent of Articles 1 and 8(7) of Regulation 714/2009
- Connection requirements should be proportionate and recognise capabilities of different generation technologies.
- Requirements placed on distribution-connected generators that have no significant impact at the transmission level should be addressed via national distribution codes. Ideally, distribution-connected generators should not be subject to requirements enforced via transmission codes or be required to enter into bilateral arrangements with owners of systems to which they are not connected.
- Whenever possible, required services should be procured though market arrangements
- Where possible, compliance with retrospective application of network code requirements should be via incentives, in order to avoid regulatory uncertainty and negative consequences for investment
- The network codes should allow for technical requirements to be met at a system level, where this is more economically efficient.
- Users of the system and Member States should have a formal and influential role in the development of the Connection Code in order to ensure that requirements are proportionate. Failure to involve stakeholders at an early stage is likely to lead to problems later in the adoption process.
- A process is needed by which at least some network codes can "evolve" without requiring that detailed amendments to be formally adopted by Member States via the comitology process. Taking a less prescriptive approach to network codes where possible can leave greater room for voluntary agreement via appropriate stakeholder governance processes or interpretation by Member States.

Discussion

As drafted, the Framework Guidelines apply to the connection of all types of user to the transmission or distribution system – conventional, distributed or intermittent generation, demand response or distribution system operators. Each type of user will be required to meet a minimum set of requirements established by network codes. In addition, the Guidelines allow for "additional requirements", beyond those set out in the minimum standards, to be defined where justified.

Minimum requirements for generation would include capability to operate within a particular voltage and frequency range, the provision of reactive power, load-frequency control, and various balancing and other ancillary services. For demand, the requirements would include issues such as automatic low frequency and emergency demand reduction in response to system incidents.

Scope of Connection Code and Interface with National Codes

Article 8(7) of Regulation 714/2009 states that the Connection Code shall be developed to deal with cross-border and market integration issues[6]. While this requirement was reiterated in the Pilot Framework Guidelines developed by ERGEG[7], no such reference exists in the current ACER consultation document.

Article 1 ("subject-matter and scope") is also relevant to the issue of scope for all the network codes being developed to implement market integration. Article 1 describes the "aim" of the regulation as: "setting fair rules for cross-border exchanges in electricity, thus enhancing competition within the internal market in electricity, taking into account the particular characteristics of national and regional markets." Article 1 also states that the regulation "provides for mechanisms to harmonise the rules for cross-border exchanges in electricity," and notably there is no reference to the provision of mechanisms for any other purpose.

It may be argued that all technical requirements have some impact on cross border trade or market integration. However, in reality, many of the technical parameters listed in 2.1 of the document will have no *significant* impact on cross border trade and market integration could proceed satisfactorily with limited harmonisation. In fact, excessive harmonisation may prove counter-productive in many instances, due to the differing characteristics and technical requirements of individual national electricity systems.[8] The network codes should therefore be contained to those issues that *significantly* impact cross border trade or related market integration issues, and allow sufficient flexibility to allow Member States to specify technical parameters that reflect national requirements via national grid codes.

Along these lines, the Framework Guidelines should clarify the intended relationship between the network codes and national grid codes, along with what issues are to be

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[6] Article 8(7) of Regulation 714/2009 states that "The network codes shall be developed for cross-border network issues and market integration issues and shall be without prejudice to Member States' rights to establish network codes which do not affect cross border trade."

[7] See ERGEG document E10-PC-52 at; http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/ELECTRICITY/Pilot_Framework_Guideline_Electricity_Grid_Connection/CD

[8] For example, UK/Ireland are connected to the rest of Europe via a dc connection and have quite different requirements in terms of frequency control and voltage requirements. In terms of frequency, the UK/Ireland systems have very coarse control and "harmonizing" these requirements across Europe would impact a range of operating and technical parameters, including reserve requirements and grid connection requirements such as low frequency relay settings and fault ride through. The range of frequency over which generation has to operate would also be quite different, as could be the power factor range required of generators (voltage capability). Black start requirements could also be quite different

considered “cross border network and market integration” related, in the context of Article 1 and Article 8(7) of Regulation 714/2009.

Requirements for Intermittent Generation, Demand and Distributed Generation

As indicated above, the Framework Guidelines provide for the development of minimum standards to be met by all users of the system, defined for each type of user, together with additional requirements where justified. While potentially helpful in moving away from the one-size-fits-all approach of many national grid codes, there is a risk that unduly onerous, restrictive and expensive requirements could be placed on particular categories of resource. The challenge will be to develop these technical requirements “sensibly” and in a manner that is proportionate and appropriately recognises the different capabilities[9] of different resources. The inclusive approach taken by other jurisdictions in developing standards and connection codes for intermittent generation, demand-response and distributed generation could provide useful models for this purpose. [10] This also speaks to the need for adequate system user involvement in the network code development process, discussed below.

More generally, the Framework Guidelines should take official notice of Article 16 of Directive 2009/28/EC on the promotion of the use of energy from renewable sources. [11] Article 16 (“access to and operation of the grids”) directly speaks to EU policy and law with respect to grid connection by renewables, and the Third Package requires Member States and their system operators to act in accordance with its provisions.[12]

Protecting the interests of smaller parties.

Smaller parties, such as generation or demand connected to the distribution networks, will be less able to engage with the network code development process or deal with the complexities of code compliance. The Framework Guidelines should therefore require that the interests of smaller parties be protected and compliance with Code requirements made as simple as possible. For example, Section 2.2 of the Framework Guidelines could specify that the network codes require all transmission-related requirements imposed on distribution-connected users, whose operations do not

[9] For example the different capabilities of intermittent sources such as wind and solar in terms of providing system inertia.

[10] For example, the North American Reliability Council (NERC) has developed a standards development process that it is inclusive in that it is open to all impacted parties and is designed to promote balance. Voting arrangements give industry sectors equal weight in the development of standards and no particular sector or interest group can dominate the process or veto proposals. Similar arrangements are adopted by the North American Energy standards Board (NAESB) for the development of business practices.

[11] For further discussion of this Directive in the context of the development of the guidelines and network codes, see the Briefing Paper referenced in footnote 4.

[12] Directive 2009/72/EC concerning the common rules for the internal market in electricity (July 13, 2009), Article 14 (Section 3).

impact significantly on the transmission system, be applied by national distribution codes, in order avoid the possibility that such users have to comply with both transmission and distribution codes. In addition, it would be useful if Section 2.2 highlighted the desirability of distribution-connected users not having to enter into any bilateral agreements with Transmission System Operators (TSOs), unless they significantly impact on the transmission system or specifically wish to utilise transmission capacity.

Mandates versus a Market Approaches to Service Delivery

Adopting a market-based approach for procuring services to meet Connection Code standards (wherever possible) has clear advantages as an alternative to mandating compliance. A market based approach is most likely to minimise the overall costs of service provision through competition, encouraging new sources of provision (including the demand side) and generally promoting innovation.

Rather than mandating that a generator provides a particular level of, for example, load-frequency control, an alternative would be to allow a generator to purchase those services from other generators. Another market-based approach would be to make the provision of some services voluntary, with the TSOs required to establish markets to procure the required level of service. A good example of a service that could be market-based is that of "system inertia". System inertia describes the "stiffness" of the power system in responding to changes in frequency and is a valuable commodity in that it can leverage the value of other services such as primary reserves, but is a commodity that has not traditionally been dealt with by national grid codes. The system inertia provided by wind generation can potentially be improved significantly by installing state of the art control systems. A market approach would allow other providers to participate, such as frequency-sensitive demand. [13]

It would be helpful if the Framework Guidelines clearly stated that a market approach to providing ancillary and other services should be adopted wherever appropriate. Doing so would be consistent with the manner in which TSOs are directed to procure ancillary services such as reserve capacity via market-based procedures under Article 15(6) of Directive 2009/72/EC.

Retrospective Compliance

Section 2.1 of the Framework Guidelines requires that the minimum requirements defined by network codes should apply retrospectively, subject to the outcome of cost-benefit analysis. In addition, Section 2.4 requires System Operators to amend all

[13] Frequency-sensitive demand can be provided when a device that consumes energy on a cyclic basis, like a refrigerator, is fitted with a controller that monitors supply frequency and adjusts energy consumption accordingly).

relevant bilateral agreements to reflect the terms of the Network Codes including, presumably, any “additional” requirements, as allowed by section 2.6 of the Guidelines.

The retrospective imposition of requirements through network codes could impose considerable costs on existing generation (or other users), raising issues of regulatory uncertainty and possibly undermining future investment, in addition to possibly forcing the early closure of some plant. It would be preferable to encourage retrospective compliance through financial incentives rather than compulsion as, for example, is the case in Spain and Germany. However, if system operators are to be required to unilaterally amend bilateral agreements, regardless of whether or not the agreements provide for such amendment, it will be important to ensure that the cost-benefit analysis referred to in Section 2.1 is independent and objective. The issue of retrospective compliance also underlines the importance of ensuring that stakeholders are formally involved in the development of network codes.

Provision of Services at a System Level

There are examples in national grid codes where requirements are imposed on generation that could be more cost-effectively delivered at a “system” level through economies of scale. Before imposing technical requirements on technologies such as wind, consideration should be given as to whether these could be provided more economically through system investment. An allied issue is the need to define requirements to be met by the system at the user connection point, as well as by system users and connected parties. It would be helpful if the Framework Guidelines provided guidance to ENTSO-E on these issues in framing the development of network codes.

System User and Member State Involvement

The role of ENTSO-E and individual national TSOs in developing Network Codes is crucial, given their unique technical expertise and system operator experience. However, an ENTSO-E/TSO-dominated process, without adequate system user and Member State involvement at an early stage, has the potential to create unnecessary problems later in the process, and produce less than an optimal outcome. The “pilot” network code development process overseen by ERGEG highlighted this outcome, with the publication of the first draft network code for generation raising a number of significant concerns.

Ensuring that stakeholders have a formal role in the network code development process and are involved from the outset should serve to avoid these issues in future. Developing network codes at a European level may, of necessity, require a rather different governance process than the more inclusive arrangements adopted by individual Member States, due the increased number of interested parties. However, the formal and early involvement of users in the code development process, properly represented by strong European Trade Associations capable of delivering a consensus view amongst their members, should result in the production of more balanced proposals, avoiding unnecessary problems at the comitology stage. Member States should also be actively involved well in advance of the comitology process.

Network Code Evolution

Network Codes, once submitted to the Commission and accepted by Member States via the comitology process, will be annexed to the relevant EU Regulation (i.e.(EC 714/2009) and therefore become part of European legislation. The process to be adopted for modifying network codes is not entirely clear[14], however modifications will presumably need to be adopted via comitology and the modification process could therefore be lengthy. It is estimated that the timescales involved in ENTSO-E drafting code modifications, the Commission proposing legislation and Member States accepting those modifications through the comitology process, could extend to between 12 and 36 months[15].

Network codes will need to evolve over time and, in the interests of minimising the need for legislative amendments, some thought should be given to the level of detail to be submitted to the legislative process. The development of network codes that deal with technical requirements at a high, rather than a detailed, level would be more robust and in need of less frequent amendment. Some codes, such as those associated with the allocation of interconnector capacity and the introduction of the market coupling process at the day-ahead, intra-day and balancing timeframes, may need to be more detailed in nature. Others could be less prescriptive leaving greater room for voluntary agreement via appropriate stakeholder governance processes or interpretation by Member States.

Taking a less prescriptive approach to network codes would not only ease the code modification process, but would also address concerns expressed by stakeholders in relation to the draft network code for the connection of generation developed by ENTSO-E, that requirements are unnecessarily onerous, potentially expensive and likely to cause a considerable amount of plant being rendered non-compliant.

Next Steps

[14] See CEER document “Implementing the 3rd Package – The Next steps”. http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_ERGEG_PAPERS/Cross-Sectoral/2009/C09-GA-52-06a_Imlementing_3rdpackage_18-Jun-09.pdf

[15] Estimates based on an assessment of the timescales implied by the EC/ACER/ENTSO-E 3-Year draft Work Plan, February 2011

Stakeholders and interested parties are required to respond to the ACER consultation on the draft Framework Guidelines on Electricity Grid Connections by 2 May 2011. The draft Requirements for Grid Connection Applicable to all Generators being developed by ENTSO-E in parallel with the Framework Guidelines is expected to be finalised by the end of 2011. ACER evaluation will take place in Q1 2012, followed by comitology in Q2 2012 through Q1 2013.

Draft Framework Guidelines on Electricity Grid Connection

Proposed Modifications to Text

Scope of Network Code and Interface with National Codes

Insert as second paragraph in section 2.1

Recognising the importance of the appropriate relation and interaction between the EU-wide grid connection codes and the national codes, it is important to bear in mind that, in line with the requirements in Art. 8(7) the Regulation, the network codes shall be developed for cross-border network issues and market integration issues and shall be without prejudice to the Member States' right to establish national network codes which do not affect cross-border trade. We further clarify that the minimum standards applicable to all users shall be developed for technical requirements that are significant with respect to these issues.

Requirements for Intermittent Generation, Demand and Distributed Generation

Replace the first paragraph of section 2.6 with;

Minimum requirements specified for each type of grid user, together with any additional requirements for a particular class, technology, size or location of grid user mandated beyond those minimum standards, shall recognise the particular capabilities of each type of grid user. The network code(s) shall set out and justify both minimum and any additional requirements. For those network code(s) applicable to generation from renewables, they shall be developed in a manner consistent with the provisions of Article 16 of Directive 2009/28/EC.

Protecting the interests of smaller parties.

Insert as the penultimate paragraph of section 2.6;

Transmission-related requirements defined for distributed-connected users should be applied via distribution codes developed by Member States. Where distributed-connected users have no significant impact on the transmission system, those users should not be required to comply with European or national network (transmission) codes, or be required to enter into any contractual agreement with the transmission system operator.

Mandates versus a Market Approach to Service Delivery

A first sentence to be added to the final paragraph of section 6.2;

A market-based approach to procuring services should be adopted wherever possible, consistent with the manner in which TSOs are directed to procure ancillary services (e.g., reserve capacity) via market-based procedures under Article 15.6 of Directive 2009/72/EC.

Retrospective Compliance

Insert as the first paragraph of section 2.4;

Where the minimum standards applying to all users or any additional standards exceed the capabilities of users already connected to the system, compliance with those standards should be incentivised or compensation offered. Where existing users are mandated to comply, standards should be fully justified by cost benefit analysis.