ACER
Agency for the Cooperation of Energy Regulators

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OF THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS

of 22 May 2019

ON THE NATIONAL ELECTRICITY NETWORK DEVELOPMENT PLANS AND THEIR CONSISTENCY WITH THE EU TEN-YEAR NETWORK DEVELOPLMENT PLAN

THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

Having regard to Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003[1], and, in particular, Article 8(11) thereof,

Whereas:

1. INTRODUCTION

(1) Article 8(11) of Regulation (EC) No 714/2009 tasks the Agency for the Cooperation of Energy Regulators ('the Agency') with providing an opinion on the national ten-year network development plans ('the NDPs'), to assess their consistency with the EU-wide ten-year network development plan ('the EU TYNDP').

(2) If the Agency identifies inconsistencies between a NDP and the EU TYNDP, it shall recommend amending the NDP or the EU TYNDP as appropriate. If such NDP is elaborated in accordance with Article 22 of Directive 2009/72/EC of the European Parliament and of the Council, the Agency shall recommend that the competent national regulatory authority ('NRA') amend the NDP in accordance with Article 22(7) of that Directive and inform the Commission thereof.

[1] OJ L211, l4.8.2009, p.15.

(3) NRAs have provided the Agency with essential information on the general regulatory framework, inputs, outputs and methodologies used for the development of the NDPs, as well as specific information on the latest draft or final NDP.

(4) Further, NRAs have provided the Agency with information on the draft EU TYNDP 2018 projects and corresponding investments which are located in their jurisdictions and on those investments which appear on their NDPs, have a cross-border relevance, but do not appear in the draft EU TYNDP 2018. The data collection from NRAs was completed on 29 April 2019.

2. DEFINITIONS AND SCOPE

(5) Similar to the Agency's previous practice, the Agency considers as 'national ten-year network development plans' pursuant to Article 8(11) of Regulation (EC) No 714/2009 all relevant network planning instruments, even if they are referred to with a different title (e.g. investment plan) and a different time span.

(6) Further, for the purpose of this Opinion the Agency considered the following definitions:

(a) Cost benefit analysis (CBA): Conceptual framework applied to any systematic, quantitative appraisal of a public or private project to determine whether, or to what extent, that project is worthwhile from a social perspective.

(b) Infrastructure / investment need: Investment gaps which indicate a need for further development of the transmission system, e.g. a need to develop capacity across a boundary.

(c) Market study: Market studies are used to calculate the optimal dispatch of generation units. Besides the dispatch of generation and demand (if modelled endogenously), market simulations compute the market exchanges between bidding areas and the corresponding marginal costs for every modelled time step. Market studies results allow the computation of some of the CBA indicators, such as socio-economic welfare (SEW), CO2 emissions, RES integration and the adequacy component of security of supply[2].

(d) Network study: Network studies are based on a detailed representation of the transmission network and are used to calculate the actual power flows that take place in the network under given generation/load/market exchange conditions. Network studies allow to identify bottlenecks in the grid, highlighted by the power

[2] Adapted from the relevant text of ENTSO-E's CBA methodology 2.0, p.15.

flows resulting from the market exchanges. Network studies results allow the computation of some of the CBA indicators such as: Net Transfer Capacity (NTC), grid losses and the stability component of the security of supply[3].

(e) Scenarios: A set of assumptions for modelling purposes related to a possible future situation in which certain conditions regarding demand and installed generation capacity, infrastructures, fuel prices and global context occur[4].

(f) Progress of a project: It indicates whether a project's implementation is on track compared to its plan. A project is 'on time' if the commissioning date is unchanged compared to the commissioning date in the plan. A project whose implementation is sped up and for which therefore the expected commissioning date is now earlier than previously considered is 'ahead of schedule'. A project, which falls behind its schedule is either 'delayed' or 'rescheduled', or both[5].

(g) Smart grid projects: 'Smart grid' means an electricity network that can integrate in a cost efficient manner the behaviour and actions of all users connected to it, including generators, consumers and those that both generate and consume, in order to ensure an economically efficient and sustainable power system with low losses and high levels of quality, security of supply and safety[6].

(7) The Opinion aims to review the NDPs of all the jurisdictions of EU Member States (Northern Ireland and Great Britain as separate jurisdictions) and of those countries, which participate in the Agency's working structures on a voluntary basis, i.e. Norway, Switzerland and Montenegro, and to assess their consistency with the EU TYNDP.

3. PROCEDURE

(8) On 14 January 2019, the Agency invited the NRAs from the 32 aforementioned jurisdictions within the targeted scope of the Opinion to review their relevant NDPs and assess their consistency vis-à-vis the draft EU TYNDP 2018.

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[3] Idem.
[4] In line with the definition of ENTSO-E's CBA methodology 2.0, p.3.
[5] The term "delayed" corresponds to a project which is still needed according to the validating body (NRA or, where applicable Ministry) at the expected date, but cannot be delivered on time due to various external factors like permitting, environmental, legislative reasons, etc.
The term "rescheduled" corresponds to a project which is voluntarily postponed by a promoter due to changes of its external driver (e.g. lower demand, less urgent need for an investment due to updated planning data or priority to other transmission solutions).
[6] In line with the definition of Article 2(7) of Regulation (EU) No 347/2013.

(9) By 29 April 2019, 29 NRAs provided input to the Agency via an online data collection tool (EU Survey) and/or by email on the relevant NDP (see Table 16) and/or national parts of projects[7]. The list of NDPs on which the Agency has received information from the NRAs and the number and rate of reviewed national parts per jurisdiction is presented in Table 1.

Table 1. List of assessed NDPs and number and rate of reviewed national parts of projects

Jurisdiction	Assessed NDPs in this Opinion	Number of relevant national parts of projects[8]	Number of reviewed national parts of projects	Rate of reviewed national parts of projects
Austria	Yes	13	13	100%
Belgium	Yes	18	18	100%
Bulgaria	Yes	4	4	100%
Croatia	Yes	4	4	100%
Cyprus	Yes	1	1	100%
Czech Republic	Yes	3	3	100%
Denmark	Yes	9	9	100%
Estonia	Yes	3	3	100%
Finland	Yes	4	4	100%
France	Yes	17	17	100%
Germany	Yes	47	47	100%
Greece	Yes	6	6	100%
Hungary	Yes	3	3	100%
Ireland	Yes	7	7	100%
Italy	Yes	20[9]	20	100%
Latvia	Yes	3	3	100%
Lithuania	Yes	4	4	100%
Luxembourg	Yes	2	2	100%
Malta	N/A (There is no TSO)	0[10]	N/A	N/A

[7] In this Opinion the part of an EU TYNDP 2018 project which belongs to a national jurisdiction is called "national part of a project". E.g. if a project consists of an interconnector between countries A and B, and an investment item located in country A, it is considered that there are two national parts, one consisting of the part of the interconnector and the investment item located in country A, and the other one consisting of the part of the interconnector located in country B.

[8] The number of relevant national parts of projects is higher than the number of the EU TYNDP 2018 projects as in case of interconnection more than one national part was reviewed.

[9] The amount does not include 2 additional cross-border relevant projects which are not included in draft EU TYNDP 2018, but included in the Italian NDP.

[10] None of the EU TYNDP 2018 projects is located in Malta and the NRA did not identify any cross-border relevant project.

Montenegro	No	2	0[11]	0%
Netherlands	Yes	13	13	100%
Norway	Yes	4	4	100%
Poland	Yes	6	6	100%
Portugal	Yes	3	3	100%
Romania	Yes	4	4	100%
Slovak Republic	Yes	2	2	100%
Slovenia	Yes	9	9	100%
Spain	Yes	18	18	100%
Sweden	Yes	6	6	100%
Switzerland	No	11	0[12]	0%
UK (Great Britain)	Yes	24	24	100%
UK (Northern Ireland)	Yes	2	2	100%
Total	29	272	259	95%

4. ASSESSMENT OF THE NDPS AND THE EU TYNDP 2018

4.1. General notes

(10) In the Agency's view, the assessment of consistency of the NDPs with the EU TYNDP may cover in principle three fundamental aspects:

(a) Consistency of inputs (including scenario building);

(b) Consistency of analytical methodology (including identification of needs, CBA);

(c) Consistency of outputs (including list of projects).

(11) Based on NRAs review of their NDPs and on the Agency's assessment of the draft EU TYNDP 2018[13], the Agency concludes on major patterns, substantial differences and inconsistencies between the NDPs and the EU TYNDP (and the corresponding investments). The Agency stresses that not all differences constitute inconsistencies, as some differences may enrich the infrastructure planning (e.g. use of additional scenarios, sensitivities, more detailed modelling) or may arise from the development of the projects

[11] No information was provided on the relevant national parts of projects 28 ('Italy-Montenegro') and 227 ('Transbalkan Corridor').

[12] No information was provided on the relevant national parts of projects 31, 174, 199, 231, 174, 199, 231, 250, 253, 263, 264, 265, 266 and 333.

[13] The Agency's assessment regarding the draft EU TYNDP 2018 has been already provided by the Agency in its Opinion No 11/2019.

over time (i.e. different timing of the plans). The Agency also identifies best practices for the development of the NDPs and the EU TYNDP and recommends that NRAs and/or other relevant national entities responsible for the elaboration and approval of the NDP follow them.

(12) The Agency positively notes that the vast majority of NRAs already (individually) assess the consistency of the NPDs in their jurisdictions with the EU TYNDP with respect to one or more of the three fundamental aspects referred to in recital (10) above [14]: 2 NRAs (BE and PT) assess the consistency on all three aspects, 12 NRAs assess the consistency of inputs and outputs, 1 NRA assesses the analytical methodology and the outputs, 7 NRAs assess the consistency of the inputs only and 2 NRAs the consistency of the outputs only. 5 NRAs (CY, DK, EE, NO and RO) do not carry out individual consistency check on any of the three aspects. For more details please refer to Table 2.

Table 2. NRAs consistency check with EU TYNDP for the development of NDPs

Jurisdiction	Consistency of inputs	Consistency of analytical methodology	Consistency of outputs	No consistency check is carried out by the NRA
Austria	X		X	
Belgium	X	X	X	
Bulgaria	X			
Croatia			X	
Cyprus				X
Czech Republic	X		X	
Denmark				X
Estonia				X
Finland	X		X	
France	X		X	
Germany[15]	X		X	
Greece	X		X	
Hungary	X			
Ireland	X			
Italy[16]		X	X	
Latvia	X			

[14] Pursuant to Article 22(5) of Directive 2009/72/EC, the consistency check is legally required regarding the NDPs of the Independent Transmission System Operators (ITOs).

[15] In Germany, there is no consistency check referring to CBA methodologies so far, but it is under consideration for future NDP.

[16] In Italy, the consistency between CBA methodologies is checked via regular updates of the national CBA methodology. Consistency of inputs (unless duly motivated) is a requirement on the TSO.

Lithuania[17]	X		X	
Luxembourg	X		X	
Netherlands	X			
Norway				X
Poland	X		X	
Portugal	X	X	X	
Romania				X
Slovak Republic	X		X	
Slovenia[18]	X		X	
Spain	X		X	
Sweden	X			
UK (Great Britain)[19]			X	
UK (Northern Ireland)	X			
Total	21	3	17	5

4.2. Assessment of the NDPs

4.2.1. Consistency of the general regulatory frameworks for the development of the EU TYNDP and the NDPs

(13) The Agency examined the NRAs' information on unbundling models chosen for the electricity TSOs, as the Independent Transmission System Operators ('ITOs') model, according to Chapter V of Directive 2009/72/EC requires stronger regulatory oversight, including review, consultation and monitoring of the NDPs compared to the Independent System Operator model ('ISO') according to Article 13 of the same Directive or the full ownership unbundling ('OU') model.

(14) Table 3 shows the different unbundling models for TSOs applied in the different jurisdictions, as well as the frequency with which NDPs are provided. The Agency notes that full ownership unbundling is applied in approximately half of the NRAs' jurisdictions (15 out of 29), while the ITO model is applied in 7 jurisdictions (24%). The remaining (non-derogated) jurisdictions apply multiple models or the ISO model.

[17] In Lithuania, according to the legal acts the NRA shall assess whether the plan submitted by the TSO is compatible with the actual EU TYNDP.

[18] In Slovenia, the NDP is drafted on the basis of the "Rules on the methodology for drafting the development plans of operators and other providers of energy sector activities", which requires compliance in visions/scenarios between the NDP and the EU TYNDP.

[19] In Great Britain, the NRA does not require that the methodology be identical to the ENTSO-E CBA methodology - as such small differences in inputs and outputs are expected. However, the NRA asks how the outputs of the NDP methodology compare to the EU TYNDP outputs.

Pursuant to Article 44 of Directive 2009/72/EC, 3 Member States (CY, LU, MT) are derogated from the application of the unbundling requirement. In addition, Ireland has a similar derogation[20].

Table 3. Unbundling models and frequency of plans

Jurisdiction	TSO	Unbundling model	Frequency of NDP
Austria	APG VÜN	ITO Ownership unbundling	1-year (one NDP per TSO)
Belgium	Elia	Ownership unbundling	4-year
Bulgaria	ESO	ITO	1-year
Croatia	HOPS	ITO	1-year
Cyprus	Cyprus TSO	Derogation	1-year
Czech Republic	ČEPS	ITO	2-year (but it happened that some approvals took place beyond the 2-year timeframe)
Demark	Energinet	Ownership unbundling	1-year
Estonia	Elering	Ownership unbundling	1-year
Finland	Fingrid	Ownership unbundling	2-year
France	RTE	ITO	1-year (but it happened once that it was delayed to the legal changes)
Germany	Amprion TransnetBW TenneT DE 50Hertz	ITO ITO OU OU	2-year[21] (joint NDP of the 4 TSOs)
Greece	IPTO	Ownership unbundling	1-year (but it happened that some approvals took place beyond the 1-year timeframe)
Hungary	MAVIR	ITO	1-year
Ireland	EirGrid	Derogation	1-year (but it happened that some approvals took place beyond the 1-year timeframe)
Italy	Terna	Ownership unbundling	1-year (but the process is systematically delayed)
Latvia	AST	ISO	1-year
Lithuania	Litgrid	Ownership unbundling	1-year
Luxembourg	Creos Luxembourg	Derogation	2-year
Netherlands	TenneT NL	Ownership unbundling	2-year
Norway	Statnett	Ownership unbundling	2-year

[20] Pursuant to Article 9(9) of the Directive, a Member State may decide not to apply any of the three models, where on 3 September 2009, the transmission system belonged to and there are arrangements in place which guarantee more effective independence of the transmission system operator than the provisions of the ITO model.

[21] The German national scenario report (SR) is prepared during even years, followed by the NDP during odd years.

Poland	PSE	Ownership unbundling	3-year (or more often if needed)
Portugal	REN	Ownership unbundling	2-year
Romania	Transelectrica	Ownership unbundling	2-year (but it happened that some approvals took place beyond the 2-year timeframe and the plans of different years have been combined)
Slovak Republic	SEPS	ITO	2-year
Slovenia	ELES	Ownership unbundling	2-year
Spain	REE	ITO	6-year
Sweden	Svenska kraftnät	Ownership unbundling	2-year
UK (Great Britain)	National Grid	Ownership unbundling	1-year
UK (Northern Ireland)	SONI	Derogation[22]	1-year

4.2.1.1. Frequency of development of the plans

(15) Article 8(10) of Regulation (EC) No 714/2009 requires the European Network of Transmission System Operators for Electricity ('ENTSO-E') to adopt and publish an EU TYNDP every two year.

(16) Pursuant to Article 22 of Directive 2009/72/EC, TSOs certified under the ITO unbundling model shall prepare a NDP every year. Article 37(3)(c) of the same Directive (indirectly) requires that ISOs also present a multi-annual NDP every year. TSOs under ownership unbundling models have no such legal obligations.

(17) The Agency finds that in approximately half of the jurisdictions (15 out of 29), the NDP is developed every year, in 11 jurisdictions every 2 years, and in the remaining 3 jurisdictions the NDP is developed less frequently (i.e. every 3, 4 or 6 years respectively).

(18) The Agency notes that NDPs which are elaborated every year appear to be slightly more exposed to complexities in fulfilling the legal deadline for the development of the NDP, which confirms previous findings of the Agency[23].

(19) While the Agency did not find a clear correlation between the date of the latest NDP and the number of identified differences, it is reasonable to assume that, as the projects develop over time, a lower frequency of development of NDPs increases the risk that

[22] European Commission's decision C(2013) 2169.
https://ec.europa.eu/energy/sites/ener/files/documents/2013_059_uk_en.pdf

[23] In 2014, the Agency found that about half of the jurisdictions with a yearly frequency encounter delays or difficulties in fulfilling the different steps of the process of preparation of the NDP (See Agency's Opinion No 08/2014).

information provided in the NDPs become obsolete and differences occur between the NDP and the EU TYNDP, which may also result in later inconsistencies.

(20) Therefore the Agency recalls the importance of keeping the NDPs up to date. However, in order to avoid delays in the timely approval of the NDPs, the Agency reiterates its previous recommendation (see Agency's Opinion No 08/2014, p.6) that NDPs are ideally prepared with a biennial frequency and be accompanied by a monitoring update in the years in between.

(21) The Agency notes that this recommendation is in line with the Commission's proposals within the 'Clean Energy Package' which also foresees an 'at least every two year' frequency, instead of every year[24], and that some NDPs' (CZ, DE, SK) frequency has already changed from annual to biennial, compared to the information provided in 2016[25].

4.2.1.2. Project inclusion

(22) Pursuant to Article 8(10)(a) of Regulation (EC) No 714/2009, ENTSO-E shall develop a ten-year plan which is built on the NDPs. ENTSO-E shall ensure that the EU TYNDP does not discriminate between TSOs and third party project promoters.

(23) Article 22(2) of Directive 2009/72/EC provides a ten-year scope for the NDPs of TSOs certified under the ITO unbundling model (i.e. the NDPs shall indicate to market participants the main transmission infrastructures that need to be built or upgraded over the next 10 years, contain all the investments already decided and identify new investments which have to be executed in the next three years). The Agency notes that projects of common interests ('PCIs'), including those which may be promoted by third parties shall also become an integral part of the relevant NDPs pursuant to Article 3(6) of Regulation (EU) No 347/2013.

(24) The Agency notes that the draft EU TYNDP 2018's time horizon is indeed more than 10 years and includes investments with an expected commissioning date beyond 2030 and/or those which are still in study phase or under consideration (see Agency's Opinion No 11/2019, p.5). The draft EU TYNDP 2018 includes and assesses third-party transmission projects and also storage projects.

[24] Article 51(1) of the proposed recast of the Electricity Directive.
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0864R%2801%29
[25] Agency's Opinion No 04/2016, p.6.

(25) The Agency notes that NDPs only slightly vary in terms of the time horizon up to which the projects included in them are planned. The vast majority of the NDPs include projects which are expected to be commissioned in the next 10 years[26]. Three NDPs (EE, DE, NO) have an even longer (i.e. 15-20 years) time horizon[27].

(26) In 23 jurisdictions out of 29 (79%), the NDPs include (in general) projects 'under consideration' (e.g. studies, projects conditional to specific circumstances). In 4 jurisdictions (CY, LU, GB, NL) they are provided separately from the NDP and in the remaining 2 jurisdictions (FR and BG) they are not provided either in the NDP or separately.

(27) As shown in Table 4, the Agency notes that, beyond the transmission projects, 12 NDPs include (or allow to include) SCADAs, ICT, cybersecurity and/or communication infrastructures, 7 NDPs include smart grid projects and 6 NDPs include storage projects. 1 NDP (HU) also includes distribution grid projects at 132 kV voltage level.

Table 4. Categories of projects included in the NDPs

Jurisdiction	Transmission (including PST)	Smart grid	Storage	SCADAs, ICT, cybersecurity and/or communication infrastructures
Austria	Yes			
Belgium	Yes (>70kV)			
Bulgaria	Yes	Yes		Yes
Croatia	Yes	Yes		Yes
Cyprus	Yes	Yes	Yes	Yes
Czech Republic	Yes	Yes		Yes
Denmark	Yes			
Estonia	Yes			
Finland	Yes			
France	Yes			
Germany	Yes			
Greece	Yes		Yes	Yes
Hungary[28]	Yes			
Ireland	Yes (>110 kV)	No, but allowed	No, but allowed	No, but allowed

[26] The Spanish NDP is split into two parts. One part is Annex I (binding and with a 6-year time horizon) and the other part is Annex II (not binding and with a longer time horizon).
[27] The Danish NDP also shows possible grid structure in 2040, but it focuses on a 10-year horizon.
[28] The Hungarian NDP also includes distribution (132 kV) projects.

Italy	Yes (>35 kV)	Yes (depending on technological solution)		
Latvia	Yes			
Lithuania	Yes			
Luxembourg	Yes			Yes
Netherlands	Yes			Yes
Norway	Yes			
Poland	Yes			Yes
Portugal	Yes			
Romania	Yes	Yes	No, but allowed	Yes
Slovak Republic	Yes			Yes
Slovenia	Yes (>=110 kV)	Yes	Yes	Yes
Spain	Yes			
Sweden	Yes			
UK (Great Britain)	Yes		No, but allowed	
UK (Northern Ireland)	Yes			

(28) As shown in Table 5, in 13 jurisdictions, the relevant third-party projects are included or referred to in the NDPs: In some instances they are assessed together with the national TSO's projects, in the others they are described or only listed, but not subject the same assessment (e.g. CBA). In 5 jurisdictions third-party projects are allowed to be included, but no application has been made yet. In the remaining 11 jurisdictions, third-party projects are not allowed to enter the NDP.

(29) The Agency positively notes the increase in the number of NDPs which include or refer to third-party projects, compared to 2016 (i.e. 5 NDPs[29]).

Table 5. Inclusion of third-party projects in the NDPs

Jurisdiction	Third party projects are included in the NDP?	Further description
Austria	Partially	Only measures from the grid access point within the transmission grid are considered
Belgium	Partially	Takes into account only the capacity that is needed by third-party projects that are included in the third Union list of PCIs, as well as in the EU TYNDP 2018
Bulgaria	Yes	
Croatia	No, but allowed	

[29] See Agency's Opinion No 04/2016, p.6.

Cyprus	Partially	The third-party projects are mentioned in the NDP without providing any analysis or further details
Czech Republic	No, but allowed	
Denmark	Partially	Some 3rd party projects are included
Estonia	Yes	
Finland	No	
France	No	The NDP includes only projects that are developed based on a grid assessment (i.e. in practice only TSOs' projects)
Germany	Yes	
Greece	Partially (only advanced projects)	2 third-party projects are included in the last draft NDP (2019-2028) due to their prior inclusion in the EU TYNDP and Union list of PCIs and their level of maturity according to the Greek TSO[30]
Hungary	No	
Ireland	Yes	All Irish projects (TSO and third-party projects) that are in the EU TYNDP are included in the NDP for information (i.e. without further assessment)
Italy	Yes	Info/data on third-party projects are collected by the TSO 2-3 months before the submission of the draft TYNDP. They are not subject to CBA
Latvia	No, but allowed	
Lithuania	No	
Luxembourg	No	
Netherlands	No	
Norway	Partially	Planned third-party projects are described, but the NDP does not include a CBA of the projects
Poland	No	
Portugal	No, but allowed	No third-party projects have been submitted so far
Romania	No, but allowed	Projects of common interest (PCIs) promoted by third parties
Slovak Republic	No	
Slovenia	No	The NDP is drafted on the basis of the 'Rules on the methodology for drafting the development plans of operators and other providers of energy sector activities'. Third-party projects are not foreseen by these rules
Spain	No	
Sweden	No	
UK (Great Britain)	Yes	
UK (Northern Ireland)	Partially	Potential Northern Ireland third-party large scale transmission projects are included in the NDP, including the projects of the NI DSO and the Irish TSO

[30] The EU TYNDP 2018 projects 219 ('EuroAsia Interconnector') and 1006 ('Hydro Pumped Storage AMFILOCHIA') are included in the last draft NDP (period 2019-2028). Other third-party projects that have not reached an adequate maturity status according to the Greek TSO, such as project 284 ('LEG1') and 293 ('Southern Aegean Interconnector'), are not currently included in the Greek NDP.

(30) In line with its considerations in its Opinion No 08/2017 (p.4-5), the Agency recommends that network planning documents include/inform on studies and projects 'under consideration', even if they may go beyond the time horizon of the NDP and clearly flag them as such[31]. The Agency is of the view that TSOs' projects, which are not included (or approved, where applicable) in the NDPs, should be considered as projects 'under consideration' by default.

(31) The EU TYNDP and ideally also the NDPs should have separate project Appendices: one listing the mid-term and long term (i.e. already 'planned' and expected within 10 years) projects and the other listing 'future' projects or studies (i.e. 'under consideration' or planned only beyond 10 years). Such a clear separation provides increased transparency with regard to the different levels of uncertainties associated with these two 'categories of projects'.

(32) The Agency is of the view that the NDPs cannot provide the proper basis for the EU TYNDP regarding the inclusion (and exclusion) of third-party projects, where such projects are not allowed to enter the NDP. The Agency therefore recommends to expand the scope of the NDPs to allow the inclusion of third-party projects.

4.2.1.3. Consultation

(33) In line with Article 10(1) of Regulation (EC) No 714/2009, while preparing the draft EU TYNDP, ENTSO-E shall conduct an extensive consultation process, at an early stage and in an open and transparent manner, involving all relevant market participants, and, in particular, the organisations representing all stakeholders. The consultation shall also involve NRAs and other national authorities, supply and generation undertakings, system users, including customers, distribution system operators (DSOs), relevant industry associations, technical bodies and stakeholder platforms. It shall aim at identifying the views and proposals of all relevant parties during the decision-making process.

(34) Article 6(3) of Regulation (EC) No 713/2009 also stipulates that the draft EU TYNDP shall be submitted to the Agency for an opinion. The Agency's opinion is not binding to ENTSO-E, but the Agency expects that it is duly taken into account by ENTSO-E before the finalisation of the EU TYNDP.

[31] I.e. to highlight that these projects are not yet included as 'planned' (or approved, where applicable) projects in the NDP.

(35) Regarding the elaboration of the draft EU TYNDP 2018, the Agency already reviewed the stakeholder involvement and concluded that ENTSO-E carried out an extensive consultation process[32].

(36) Pursuant to Article 22 of Directive 2009/72/EC, TSOs certified under the ITO model shall submit to the NRA their NDP after having consulted all the relevant stakeholders. The NRA shall also consult all actual or potential system users on the NDP in an open and transparent manner. The NRA shall publish the result of the consultation process, in particular possible needs for investments.

(37) As shown in Table 6, stakeholder consultations are part of the development process of most NDPs. However, the party responsible for the public consultation (i.e. the TSO or the NRA) and the level of involvement of stakeholders vary across jurisdictions. In 20 out of 29 jurisdictions (69%), the draft NDP is subject to public consultation (i.e. any stakeholder is invited to participate), some of them held additional separate consultation on the scenarios and/or the relevant analytical methodology. In 2 jurisdictions (LU, GB), only the scenario development part of the NDP is consulted, in 1 jurisdiction (DK) in addition to the scenarios also the large projects are consulted. In 4 jurisdictions, no public consultation is carried out, but the TSO has specific (bilateral) consultations at least with the NRA (CY, NL), or also with other stakeholders (HU, SI). In 2 jurisdictions (EE, SE), neither public consultation nor any specific or bilateral consultation is carried out.

Table 6. Consultations with regard to the development of the NDPs

Jurisdiction	Public consultation regarding the NDP	Other public consultation (scenarios/CBA/needs)	Specific consultation
Austria	Public consultation by TSO; Public consultation by NRA		Specific consultations of NRA, other national stakeholders and foreign stakeholders
Belgium	Public consultation by TSO		Specific consultations of Administration, Federal Planning Bureau
Bulgaria	Public consultation by TSO; Public consultation by NRA		No specific bilateral consultation of any stakeholder
Croatia	Public consultation by NRA	Public consultation of future grid users by the TSO regarding their intentions for connection to the grid (or increasing the power for existing users)	Specific consultations of Ministry and NRA
Cyprus	No public consultation		Specific consultation of NRA

[32] See Agency's Opinion No 11/2019, p.9.

Czech Republic	Public consultation by NRA		Specific consultations of Ministry and NRA
Denmark	No public consultation of the NDP itself	Public consultation regarding scenarios; Public consultations on large projects	Specific consultations of NRA and other national stakeholders (DSOs, project promoters, local authorities)
Estonia	No public consultation		No specific consultation
Finland	Public consultation by TSO		
France[33]	Public consultation by TSO; Public consultation by NRA	Public consultation regarding scenarios	Specific consultations of Ministry and NRA
Germany	Public consultation by TSO; Public consultation by NRA	Public consultation regarding scenarios	
Greece	Public consultation by TSO Public consultation by NRA		Specific consultations of NRA, DSOs, neighbouring TSOs and NRAs
Hungary	No public consultation		Specific consultations of NRA and other national stakeholders (DSOs)
Ireland	Public consultation by NRA	Public consultation regarding scenarios	Specific consultations of NRA, DSOs and System Operator for Northern Ireland
Italy	Public consultation by NRA	Public consultations regarding scenarios, CBA and infrastructure needs	Specific consultations of the Committee of stakeholders (mostly associations of network users) and environmental organisations
Latvia	Public consultation by NRA		Specific consultations of the Ministry, other national stakeholders and foreign stakeholders
Lithuania	Public consultation by NRA		No specific consultation
Luxembourg	No public consultation of the NDP itself	Public consultation regarding scenarios	
Netherlands	No public consultation		Specific consultation of NRA
Norway	Public consultation by TSO		Specific consultations of NRA and other national stakeholders (all relevant stakeholders, including national authorities, network users, DSOs)
Poland	Public consultation by TSO		
Portugal	Public consultation by NRA		Specific consultations of Ministry, NRA, DSOs, other national and foreign stakeholders

[33] In France, apart from the NDP consultation, there is an additional public consultation regarding specific projects.

Romania	Public consultation by TSO; Public consultation by NRA		Specific consultations of Ministry, NRA, DSOs, producers, professional associations, local public authorities and foreign stakeholders
Slovak Republic	Public consultation by TSO; Public consultation by NRA		Specific consultations of Ministry, NRA and other national stakeholders
Slovenia	No public consultation		Specific consultations of Ministry, other national stakeholders (DSO and large consumers) and foreign stakeholders (TSOs of neighbouring Member States and other countries)
Spain	Public consultation by NRA		Specific consultations of Ministry, NRA, other national stakeholders (DSO, Autonomous Communities), and foreign stakeholders (international generation promoters)
Sweden	No public consultation		No specific consultation
UK (Great Britain)	No public consultation of the NDP itself	Public consultation regarding scenarios and CBA	Specific consultations of Ministry, NRA and regarding analysis methodology: committee of other national stakeholders
UK (Northern Ireland)	Public consultation by TSO; Public consultation by NRA	Public consultation regarding scenarios	Specific consultations of NRA, DSOs, TSO of Ireland

(38) The Agency considers it of utmost importance that stakeholders are appropriately involved in the EU TYNDP and the NDP building process in order to increase its quality and public acceptance. In this regard, in its Opinion No 11/2019, the Agency already called on ENTSO-E better and more transparently to explain how the public consultation results are taken into account.

(39) Further, the Agency recommends that a public consultation be carried out in each jurisdiction on the draft NDP irrespective of the chosen unbundling model. In more advanced national frameworks, separate consultations on the major building blocks of the NDPs (e.g. scenario development, CBA methodology) should also be considered in order to ensure that stakeholder inputs are timely taken into account (i.e. before the assessment of the projects). The results of the public consultations should be published and information on the treatment of the stakeholder comments provided.

4.2.1.4. Approval of the NDPs and the NRA's respective role

(40) The regulatory oversight of the EU TYNDP is mainly carried out through non-binding opinions of the Agency, while, in most jurisdictions, NRAs are formally empowered to approve, reject and/or validate the NDP proposals of the TSOs. As shown in Table 7, in 20 out of 29 jurisdictions, there is a public entity (i.e. the NRA in 14 jurisdictions, the Ministry in 5 jurisdictions and a 2-round procedure by the Ministry and the NRA in 1 jurisdiction) approving the draft NDP prepared by the TSO. Out of the remaining 9 jurisdictions, in 3 there is a binding opinion of the NRA, in 3 there is at least some scrutiny of the NRA (via a non-binding opinion or request to amend the NDP), while in 3 of them (EE, LU, SE) the NDP is not approved by any public entity and the NRA plays only a limited consultative role in the NDP elaboration process without any effective power.

Table 7. Approval of the NDP and NRAs' respective roles

Jurisdiction	Who approves the NDP?	Does the NRA provide an opinion and/or can require amendment of the draft NDP?	Is the NRA's opinion binding?	Link to relevant NRA's opinion or decision (where applicable)
Austria	The NRA	Yes	Binding	NRA opinion: https://www.e-control.at/recht/entscheidungen/vorstand-strom#p_p_id_56_INSTANCE_a0kxb5WT6wMv_
Belgium	The Ministry	Yes	Non-binding	NRA opinion: https://www.creg.be/nl/publicaties/advies-a1802
Bulgaria	The NRA	Yes	Binding	NRA opinion: http://www.dker.bg/uploads/reshenia/2018/res_dprm-2_18.pdf
Croatia	The NRA	Yes	Binding	The decision on the approval of the NDP (which may require also amendments): https://www.hera.hr/hr/docs/2017/Odluka_2017-12-22_01.pdf
Cyprus	The NRA	Yes	Binding	The NRA opinion is non-public
Czech Republic	The NDP approval is a two-round process by the	The NRA cannot amend the draft NDP and does not provide an opinion on it. However,	N/A	N/A

	Ministry and the NRA[34]	there is specific consultation between the TSO and the NRA		
Denmark	No approval of the NDP (i.e. TSO adopts it). However, there is a some interaction between the NRA and the TSO before adoption	The NRA cannot amend the draft NDP and does not provide an opinion on it.	N/A	N/A
Estonia	No approval of the NDP (i.e. TSO adopts it without any interactions with other parties)	The NRA cannot amend the draft NDP and does not provide an opinion on it.	N/A	N/A
Finland	No formal approval of the NDP, but there is some scrutiny by the NRA	Yes	Non-binding (However, in practice the NRA has jurisdiction to demand changes to the NDP if it does not meet the requirements set in national law)	The NRA opinion is non-public
France	No formal approval of the NDP, but there is a binding opinion by the NRA	Yes	Binding	NRA opinion: https://www.cre.fr/Documents/Deliberations/Decision/sddr-rte-2016
Germany	The NRA	Yes	Binding	The reports that are finally approved (SR, NDP) essentially represent the opinion of the NRA. The approved NDP 2017-2030: https://data.netzausbau.de/2030/NEP/NEP_2017-2030_Bestaetigung.pdf The approved SR 2019-2030:

[34] An approval of the NDP is a two-round process. In the first round, the Ministry issues a binding opinion on the NDP. In the second round, the NRA approves the NDP; the NRA's approval is conditioned upon the Ministry's opinion.

				https://www.netzausbau.de/SharedDocs/Downloads/DE/2030_V19/SR/Szenariorahmen_2019-2030_Genehmigung.pdf?__blob=publicationFile
Greece[35]	The NRA	Yes	Binding	Public, but the opinion on the draft NDP is not yet approved
Hungary	The NRA	Yes	Binding[36]	The NRA opinion is non-public. The NRA decision on the approval of the NDP: http://www.mekh.hu/download/c/07/50000/1097_2018.pdf
Ireland	The NRA	Yes	Binding	The NRA opinion is non-public
Italy	The Ministry	Yes	Non-binding	NRA opinion: https://www.arera.it/it/docs/18/674-18.htm
Latvia	The NRA	Yes	Binding	The NRA opinion is non-public
Lithuania	The NRA	Yes		NRA opinion: https://www.regula.lt/SiteAssets/vkekk-2018-08-16.pdf
Luxembourg	No approval of the NDP (i.e. TSO adopts it without any interactions with other parties)	The NRA cannot amend the draft NDP and does not provide an opinion on it	N/A	N/A
Netherlands	No formal approval of the NDP, but there is a binding opinion by the NRA	Yes	Binding	The NRA opinion is non-public
Norway	The NRA	Yes	Binding	The NRA opinion is public
Poland	The NRA	Yes	Binding	The NRA opinion is non-public
Portugal	The Ministry	Yes	Non-binding	The NRA opinion is public

[35] The NRA considering, inter alia, the public consultation results, communicates its remarks on the draft NDP to the TSO. Then, the TSO submits the final NDP to the NRA for approval. Finally, the NRA assesses the final NDP adopting a decision (publicly available).

[36] The NDP is subject to NRA's approval, thus the NRA's opinion should be duly taken into account by the TSO.

Romania	The NRA	Yes	Binding	The NRA decision on the approval of the NDP: https://portal.anre.ro/PublicLists/Decizie/GetDecizieFisier?IdDecizie=1813
Slovak Republic	No formal approval of the NDP, but there is a binding opinion by the NRA	Yes	Binding	NRA opinion: http://www.urso.gov.sk/sites/default/files/ORE_Vysledky_konzultacie_10rPRPS_22-03-2017.pdf http://www.urso.gov.sk/sites/default/files/dokumenty/Sprava-o-plneni-DPRPS-za-rok-2017.pdf
Slovenia	The Ministry	The NRA cannot amend the draft NDP and does not provide an opinion on it	N/A	N/A
Spain	The Spanish Council of Ministers	Yes	Non-binding	NRA opinion: https://www.cnmc.es/expedientes/infde04415
Sweden	No approval by the NDP (i.e. TSO adopts it without any interactions with other parties)	The NRA cannot amend the draft NDP and does not provide an opinion on it	N/A	N/A
UK (Great Britain)	No formal approval of the NDP, but there is some scrutiny by the NRA. The NRA must formally approve the analysis methodology	Yes	Non-binding	
UK (Northern Ireland)	The NRA	Yes	Binding	Public, but the opinion on the draft NDP is not yet approved

(41) The Agency notes that the legal requirements for the regulatory oversight is generally higher for NDPs than that for the EU TYNDP as in 79% of the jurisdictions, the TSO is bound by the approval or the opinion of an entity acting in the public interest (i.e. NRA or Ministry/ies, or both).

(42) In this regard, the Agency is of the view that the regulatory oversight over the elaboration of the EU TYNDP should be strengthened, e.g. by giving a binding nature to the Agency's opinion.

(43) Similarly, irrespective of the unbundling model chosen for the TSO(s), in each jurisdiction the NDP should be subject to appropriate regulatory oversight. Therefore, the Agency recommends to strengthen NRAs' or other public entities' role regarding the development of the NDPs in those jurisdictions where the TSO currently adopts the NDP without any regulatory approval or binding scrutiny.

(44) Further, the Agency recommends that all formal acts on the NDPs, where applicable, (i.e. decisions, opinion, consistency analysis, monitoring) be published.

4.2.2. Consistency of inputs and methodologies

(45) Pursuant to Article 8(10) of Regulation (EC) No 714/2009, the EU TYNDP shall include, among other features, scenario development, and it shall identify investment gaps, notably with respect to cross-border capacities.

(46) Pursuant to Article 11(1) of Regulation (EU) No 347/2013, ENTSO-E shall apply a harmonised energy system-wide cost-benefit analysis (CBA) at Union level, including on network and market modelling, for the preparation of each EU TYNDP.

(47) Regarding the study horizon of scenario development, the CBA methodology provides that the common input data set shall cover years n+5, n+10, n+15 and n+20, where n is the year in which the analysis is performed.

(48) Pursuant to Article 22(3) of Directive 2009/72/EC, TSOs certified under the ITO unbundling model should make reasonable assumptions about the evolution of generation, supply, consumption and exchanges with other countries, taking into account investment plans for regional and EU-wide networks for the purpose of the NDP.

4.2.2.1. Scenarios

(49) The EU TYNDP 2018 scenarios are described in the ENTSOs' scenario development report[37]. ENTSO-E studies one (short term) best estimate scenario for year 2025 and three (long term) scenarios for year 2030. Two out of the three long term scenarios feature 'high economic growth', while one considers a 'moderate [i.e. average] growth'.

(50) The EU TYNDP 2018 assesses and provides the projects' benefits for each of the aforementioned scenarios. The Agency's views on these scenarios were provided in its Opinion No 10/2018 on the ENTSOs' draft TYNDP 2018 scenario report. In that Opinion the Agency observed that, in particular for the 'short-term' study year (i.e. 2025), a sensitivity analysis (except with respect to climate years) was missing and, for the

[37] https://tyndp.entsoe.eu/tyndp2018/scenario-report/

'mid/long-term' study year (i.e. 2030), ENTSOs failed to consider a wide spectrum of possible futures, which would have increased the robustness of the assessment.

(51) The reviewed NDPs display a large variety of approaches in defining the future energy landscape. The Agency notes that all but three of the 26 NDPs (88%), for which this information is available, use multiple scenarios approach (or at least consider different combination of values for certain parameters) and, in most cases, assess the projects against several or all of these scenarios to decide on their necessity, which is a very significant change compared to the findings in 2016[38]. More than one third of the NDPs appear to also use a scenario which considers lower economic growth or demand. About two thirds of the NDPs include multiple study years for which the assessment is carried out. Most of the NDPs include a study horizons up to the year n+15, but 8 NDPs also assess the projects in a study horizon beyond 15 years. The details on the use of scenarios in each jurisdiction are presented in Table 8.

Table 8. Scenarios used in the latest NDPs

Jurisdiction	Scenarios used	Number of scenarios per study years	Is there any 'low economic growth' or 'slow progress' scenario?	Description on how the scenarios are taken into account for the assessment of individual projects
Austria	Only EU TYNDP	Multiple scenarios for multiple study years, i.e. 1 (2020) and 4 (2030)	No	Projects are assessed against all scenarios[39]
Belgium	Both EU TYNDP and national	Multiple scenarios for multiple study years, i.e. 1 (2025), 4 (2030), 3 (2035), 3 (2040)	Not specified	Projects are assessed against all scenarios
Bulgaria	Both EU TYNDP and national	Multiple scenarios, i.e. 2 (study year(s) are not specified)	Not specified	Not specified
Croatia	Only national	Multiple scenarios for multiple study years (not specified)	Yes ('Low demand')	Not specified

[38] In 2016, about half of them used a single scenario.
[39] The NDP assessment summarises and refers to the CBA results from the EU TYNDP 2016.

Cyprus	Only national (may take into account EU TYNDP scenarios)	Single scenario for multiple study years, i.e. 1 (2019), 1 (2024), 1 (2028)	N/A	Projects are assessed against all scenarios
Czech Republic	Both EU TYNDP and national	Multiple scenarios for multiple study years, i.e. 4 (2030), 4 (2040)	None of the scenarios primarily focused on the GDP growth or EU policy targets.	Projects are assessed against all scenarios. Positive CBA results are necessary at least for one scenario
Denmark	Only national	Single scenario providing year-to-year changes for the period 2019-2040[40]	N/A	N/A
Estonia	Only national (but taking into account EU TYNDP)	Multiple study year i.e. 2022, 2025	No	Projects are assessed against all scenarios
Finland	Only national (but taking into account EU TYNDP)	Not specified	Not specified	Not specified
France	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years, i.e. 3 (2021), 4 (2030)	Yes	Interconnection projects are assessed against all scenarios, whereas national grid development projects are assessed against national forecasts, taking into account the TYNDP scenarios.
Germany	Only national (but taking into account EU TYNDP	Multiple scenarios for multiple study years, i.e. 1 (2025), 3 (2030), 1 (2035)	No	The assessment of projects in the NDP is based on (n-1) security investigations so far[41]. There is no combination of scenario results, but investment projects can only receive approval if they perform in all relevant scenarios. This can be regarded as indirect consideration of probabilities

[40] The NDP is based on the "best guess" scenario provided by the Danish Energy Agency. The scenario provides year-to-year changes for the period 2019-2040.

[41] A CBA for cross-border projects will be introduced in the NDP 2019-2030.

Greece	Only national[42]	Multiple scenarios for multiple study years, i.e. 6 (2019-2028)	Yes ('Low demand')	Projects are assessed against all scenarios[43]
Hungary	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years, i.e. 2 (2022), 2 (2027), 2 (2032)	None of the scenarios primarily focused on the GDP growth or EU policy targets.	The assessment of projects in the NDP is based on (n-1)-security investigations so far. There is no combination of scenario results, but investment projects can only receive approval if they perform in all relevant scenarios. This can be regarded as indirect consideration of probabilities.
Ireland	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years, i.e. 4 (2017), 4 (2020), 4 (2025), 4 (2030), 4 (2040)	Yes ('Carbon Living Slow Change Consumer')	Projects are assessed against all scenarios[44]
Italy	Both EU TYNDP and national	Multiple scenarios for multiple study years, i.e. 1 (2020), 2 (2025), 2 (2030)	Not mandatory (albeit contrasting scenarios are requested)	Results for at least two study years are to be used Cross-border projects and internal-congestion projects have to be assessed against all scenarios[45]

[42] For the evaluation of cross-border projects, RAE uses the TYNDP scenarios and respectively the TYNDP CBA (EU-level) results in an indirect manner, given the fact that the investment requests submitted by the project promoters are based on these scenarios.

[43] For the assessment of internal projects, for the time being, RAE asks from the Greek TSO an adequate justification of the project's necessity based on the national scenarios, because the adoption of a national CBA methodology in the context of the NDP, consistent with that of ENTSO-E, is still pending. However, especially for the case of islands' interconnection projects, RAE has established a committee (by virtue of its decision 469/2015) with the purpose of examining if the interconnection of a non-interconnected island with the mainland is beneficial or not. The above committee uses a CBA methodology issued by RAE by virtue of its decision 651/2018. This CBA methodology is based on that of ENTSO-E (using a base case scenario and similar indicators). Then, the Greek TSO can assess the findings of this committee and submit its proposal in the context of the NDP.

[44] All four scenarios are used for the determination of needs. A reference scenario is used to assess comparative performance of competing alternatives/options. All four scenarios are used to compare economic performance, and Least Worst Regrets Analysis is used at a minimum.

[45] The same requirement is not present for other projects (e.g. reliability, quality of supply, resilience to extreme events).

Latvia	Both EU TYNDP and national	Not specified	Not specified	No CBA is carried out
Lithuania	Only national	Multiple scenarios for multiple study years, i.e. 3 (2020), (2027)	Yes ('Pessimistic')	Not specified
Luxembourg	Only national	Multiple scenarios i.e. projection of low/medium/high LU needs (study years are not specified)	Yes ('Low LU needs')	Projects are assessed against all scenarios
Netherlands	Both EU TYNDP and national	Multiple scenarios for multiple study years, i.e. 4 (2018), 4 (2020), 4 (2025), 4 (2030) and 4 (2035)	No	Two scenarios are used to identify potential infrastructure gaps in the national grid[46]
Norway	Only national	Multiple scenarios for multiple study years, i.e. 3 (2016-2040)	No	Projects are assessed against one scenario and sensitivity analysis
Poland[47]	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years, i.e. 16 (2020), 16 (2025), 16 (2030)	Yes ('Low demand')	In each scenarios, potential network candidates are analysed along with an indication of the optimal timing moment of their introduction into the NPS identified by the PLEXOS model. If an investment is not needed for NPS, it will not be selected during the analysis period
Portugal	Both EU TYNDP and national	Multiple scenarios for single study year, i.e. 6 (2030)	Yes ('Low consumption')	Information is not available to the NRA
Romania	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years, i.e. 1 (2022) and 2 (2027)	No	For internal projects TSO used both scenarios (best estimate and green). For interconnection projects

[46] These scenarios contain the calculation of the development of the expected capacity. In four different exercises per scenario are the effects on marginal cost optimisation and also the effects of the variation of available solar- and wind power assessed.

[47] Scenarios were created in which four basic elements influencing the functioning of the power system were diversified: forecast of demand for electricity and power (2 forecasts), fuel prices (2 forecasts), volume and type of cross-border exchange (2 forecasts), volume and location of new wind sources (2 forecasts). The individual scenarios were created by a combination of the above elements.

				TSO used ENTSO-E TYNDP.
Slovak Republic	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years, i.e. 3 (2023) and 3 (2028)	Yes ('Crisis scenario')	Not specified
Slovenia	Both EU TYNDP and national	Multiple scenarios for single study year, i.e. 4 (2026)	Yes ('Slowest progress')	Information is not available to the NRA. The NDP is approved by the Ministry
Spain	Only national (but taking into account EU TYNDP)	Multiple scenarios for multiple study years	Yes ('Lower GDP growth')[48]	Projects are assessed against multiple planning cases (i.e. scenarios)[49]
Sweden	Only national (but taking into account EU TYNDP)	Single scenario for single study year, i.e. 1 (2040)	N/A	N/A
UK (Great Britain)	Only national (but taking into account EU TYNDP)	Multiple scenarios for single study year, i.e. 4 (2050)	Other[50]	The GB NDP for interconnectors (NOA IC) assesses the NPV of potential (none specific) future interconnection options under each scenario. This provides the optimal level of interconnection for each future scenario.
UK (Northern Ireland)	Only national (but taking into	Not yet defined[51]	N/A	The TSO assess several options against multi-criteria

[48] The NDP was developed to be consistent with the most probable economic scenario and the European energy targets for 2020 regarding energy efficiency, renewable energy and environment. The electrical system analysis performed during the planning process includes three scenarios regarding the GDP growth (upper, central and lower scenario) to cover the potential uncertainties that a forecast may implies.

[49] The electrical system analysis is carried out taking into account different scenarios that represent a possible evolution of the main variables that allows to define a specific situation (for example: demand growth, evolution of the power generation mix, fuel prices, etc.). Several planning cases are studied for every scenario. These cases represent the different situations: season (summer/winter); demand hours (peak/flat/valley); year; climatic conditions (wind/sun/water/temperature); dispatch generation; volume of cross-border exchange. The system´s behaviour is studied in a future "N" year taking into account the transmission network state as of 31st December of the year N and modelling the nodal demand from the global demand forecast.

[50] The GB scenarios are assessed in the framework of the UK's 2050 carbon reduction targets set out in the Climate Change Act 2008, which is the UKs contribution to the contribution to the Paris Agreement. Whilst all scenarios show progress towards decarbonisation, only two of the GB scenarios meet the UK's 2050 target (the "Community renewables" and the "Two degrees" scenarios). The drivers for speed of decarbonisation are policy, economics and consumer attitudes – as such these scenarios are not specifically low, moderate or high GDP growth scenarios.

[51] SONI will be shortly consulting on the future scenarios. Following this consultation the final scenarios will be published and reviewed every two years.

	account EU TYNDP)			analysis including at a high level, environmental and cost benefit assessments to identify shortlisted potential options.

(52) Further, the Agency notes that the vast majority (i.e. 79%) of the NDPs reflect on the EU TYNDP scenarios: out of 29 jurisdictions, 8 (27%) use both EU and national scenarios, 14 (48%) use only national scenarios, but take EU TYNDP scenarios into account and 1 (4%) use only EU scenarios. However, the Agency also notes that in 6 NDPs the EU TYNDP scenarios are not (or only potentially) taken into account.

(53) The Agency notes that scenarios developed for the NDPs take into account demand, generation and cross-border capacities basically in all jurisdictions, while other elements, including forecasts for demand response, use of heat pumps, electric vehicles and new storage facilities are remarkably less frequently, but still considered in about half of the jurisdictions, as shown in Table 9.

Table 9. Elements taken in account for the construction of scenarios in the NDPs:

NDP	Demand	Generation mix	Cross-border capacities [52]	Demand response	Heat pumps	Electric vehicles	New storage facilities
Austria[53]	X	X	X	X	X	X	X
Belgium	X	X	X	X	X	X	X
Bulgaria	X	X	X				
Croatia	X	X	X				
Cyprus	X	X		X		X	X
Czech Republic	X	X	X	X	X	X	X
Denmark	X	X	X		X	X	
Estonia	X	X	X	X			
Finland[54]	X	X	X	(X)	(X)	(X)	(X)
France	X	X	X	X	X	X	X

[52] Existing and/or planned cross-border capacities with the neighbouring countries.

[53] The EU TYNDP 2016 scenarios were used for the Austrian NDP 2018.

[54] Demand response, heat pumps, electric vehicles, new storage facilities are mentioned as changes in operational environment and claimed to have been taken into consideration in the NDP. However the estimates of the effects are unclear.

Germany	X	X	X	X	X	X	X
Greece	X	X	X				X
Hungary	X	X	X				
Ireland	X	X	X	X	X	X	X
Italy	X	X	X	X	X	X	X
Latvia	X	X	X	X			X
Lithuania	X	X	X				
Luxembourg	X	X	X			X	
Netherlands[55]	X	X	X	X			
Norway	X	X	X	X	X	X	X
Poland	X	X	X		X	X	
Portugal	X	X	X				
Romania	X	X	X				X
Slovak Republic	X	X	X		X	X	
Slovenia	X	X	X	X			X
Spain	X	X	X	X			
Sweden	X	X	X	X		X	
UK (Great Britain)[56]	X	X	X	X	X	X	X
UK (Northern Ireland)	X	X	X	X	X	X	X
Total	29	29	28	18	14	17	16

(54) The way in which scenarios are developed and used is critical in terms of the assessment of a project, as the need for the project and the accompanying costs and benefits strongly depends on the chosen parameters. As pointed out in the Agency's Opinion No 11/2019 (p.25), the project-specific CBA results in the EU TYNDP 2018 show important differences compared to those in the EU TYNDP 2016, which (as explained by ENTSO-E) were partially due to the new scenarios considered for the analysis.

(55) The Agency considers the 'best estimate' approach for the short term and the multi-scenario approach for the long term as appropriate, so as better to consider the growing uncertainties over time and better to assess the resilience of the investment projects against them.

[55] Including a scenario in which all coal fired plants are phasing out.

[56] Other new technologies such as CCUS.

(56) The Agency also recommends to complement the near-term best-estimate scenario with appropriate sensitivity analyses. Such sensitivity analysis would be particularly useful in detecting the main factors on which a project outputs (benefits) depends.

(57) As regards the long term, the Agency deems that the fundamental objective of the scenarios is to depict an appropriate range of plausible futures. In this regard, the Agency reaffirms its view that considering a 'low economic growth'/'slow progress' scenario could help to build trust in the scenario development, by not just building on policy goals, but also highlighting possible risks of not achieving these goals. Therefore, a 'slow progress' scenario should be investigated by the CBA, for all years where multiple scenarios are developed in the EU TYNDP.

(58) As regards the scenario-building method, the Agency recommends to develop at least one robust scenario with a top-down approach (i.e. consistent and coherent assumptions across Europe), which takes into account country specifics. This(ese) scenario(s) should be evaluated in the EU TYNDP and taken into account to construct the NDPs' scenarios.

(59) When study years are used (instead of continuous description assessing each future year), the Agency considers it as a good practice that NDP scenarios and CBA assessments primarily refer to the rounded years (i.e. years ending with 0 and 5).

4.2.2.2. Infrastructure needs

(60) For the purpose of the EU TYNDP 2018, ENTSO-E released a report which aimed to depict infrastructure needs in 2040[57]. The Agency's main considerations regarding the assessment of the infrastructure needs were provided in its Opinion No 11/2019 (p.14).

(61) Based on the NRA responses, as shown in Table 10, the Agency identified that for most NDPs (62%), the TSO does not conduct a formal (i.e. based on an approved methodology) infrastructure gap (needs) identification process, before projects are proposed; instead projects are defined based on the TSO's experience and knowledge of the transmission system and their assessed benefits.

[57] ENTSO-E: "European Power System 2040 - Completing the map: The Ten-Year Network Development Plan 2018 System Needs Analysis".

Table 10. Methodology used for the identification of infrastructure gaps (needs)

Jurisdiction	Infrastructure gap (needs) identification	Description of the methodology / needs identification exercise
Austria	No formal exercise	
Belgium	No formal exercise	Market studies and network simulations are carried out by the TSO to identify infrastructure gaps
Bulgaria	No formal exercise	
Croatia	No formal exercise	Based on national and regional ENTSO-E network studies and regional ENTSO-E market studies
Cyprus	No formal exercise	Infrastructure gaps are identified during the NDP process. Network simulations are carried out to identify infrastructure gaps, measures that might be able to resolve those gaps are then proposed by the TSO in order to ensure security of supply
Czech Republic	No formal exercise	Infrastructure gaps are identified by the TSO as part of the NDP. Gaps are identified with market model, according to the congestion of the reference grid for each scenario
Denmark	No formal exercise	
Estonia	No formal exercise	Infrastructure needs are identified by the TSO, based on a national methodology
Finland	No formal excercise	
France	Formal infrastructure gap identification	Infrastructure needs are identified upstream from the NDP process through the analysis of current network constraints
Germany	Formal infrastructure gap identification	Infrastructure gaps are identified during the NDP process. Market and network simulations are carried out to identify infrastructure gaps, measures that might be able to resolve those gaps are than proposed by the relevant TSO
Greece	No formal excercise	The projects proposed by the TSO derive from the needs identified by the national scenarios (different demand forecasting levels, islands' interconnections), the investment requests for RES penetration and the TSO's experience and knowledge of the operation and the needs of the national transmission system and its interconnections to neighbouring countries
Hungary	Formal infrastructure gap identification	Infrastructure gaps are identified during the NDP process. Network simulations are carried out to identify infrastructure gaps, measures that might be able to resolve those gaps are then proposed by the TSO in order to ensure security of supply
Ireland	Formal infrastructure gap identification	Infrastructure needs are identified by the TSO, based on a national methodology
Italy	Formal infrastructure gap identification	Target capacity identification exercise is conducted by the TSO, based on a national methodology. But it does not directly affect the NDP projects
Latvia	Formal infrastructure gap identification	Based on national and regional ENTSO-E network studies and regional ENTSO-E market studies

Lithuania	No formal excercise	TSO is obliged to forecast the long-term power balance of the power system and to provide market participants with information on the projected lack or limitations of power generation or transmission power, to ensure the reliability of the work of the transmission network equipment and the long-term ability of the system to meet reasonable electricity transmission needs and to guarantee the safety, reliability and efficiency of the transmission network operation, to provide system services to all market participants. The TSO by its internal methodology periodically performs related assessment[58]
Luxembourg	No formal excercise	The 20 year ahead scenario helps the TSO to define the infrastructure gap according to the forecasted needs
Netherlands	No formal excercise	Infrastructure gaps are identified by the TSO, based on the outcome of sensitivity analysis of two scenarios in four different runs per scenario
Norway	Formal infrastructure gap identification	Infrastructure needs are identified by the TSO, based on simulated power flows, capacity limits and price differences in the power system model
Poland	Formal infrastructure gap identification	The developed scenarios are subjected to market analyses in the area model, i.e. on a simplified model of the system, in which groups of nodes have been focused in areas, and connections between areas represent links, mapping network connections. The task of the calculations performed in this step is to assign generation candidates to the areas and to assess and identify investment (network) needs in the area of inter-territorial connections
Portugal	No formal excercise	
Romania	Formal infrastructure gap identification	Needs for network development and corresponding projects are proposed and assessed based on the market, network and dynamic studies
Slovak Republic	No formal excercise	
Slovenia	No formal excercise	Infrastructure gaps are identified by the TSO as a part of the NDP. Based on national and regional ENTSO-E network studies and regional ENTSO-E market studies.
Spain	No formal excercise	Network (load flows, short-circuit, stability) and market (generation, demand, RES integration, etc.) studies are carried out during the planning process to identify infrastructure needs. In addition, the different actions will contribute to reinforce the areas where have been detected technical constraints
Sweden	No formal excercise	
UK (Great Britain)	Formal infrastructure gap identification	The SO identifies future transmission capability requirements, and the TOs identify future transmission options. In response to

[58] The TSO assesses the status of transformer substations and power transmission lines, develops strategies for the transformation of transformer substations and power transmission lines and methodologies for the assessment of individual electrical equipment, analyses the actual load on the electricity transmission network, thereby determining the least loaded substations and lines.

		the data on boundary capabilities and requirements produced by the SO, TOs identify and develop multiple credible options that deliver the potentially required boundary capabilities. The SO has the opportunity to suggest concepts to the TOs for options to achieve the boundary requirements. The options that the TOs provide are listed and described in the NOA report along with SO alternative options such as operational options. The SO alternative options might include liaison with TOs, distribution licensees or third parties. The NOA and the NOA Methodology describe how the SO assesses the required levels of network transfer requirement, the options available to meet this requirement and the SO's recommended options for further development. It is important to note that whilst the SO recommends progressing options in order to meet system needs, any investment decisions remain with the Transmission Owners (TOs) or other relevant parties as appropriate
Northern Ireland	Formal infrastructure gap identification	Projects with cross border impacts on the network, market and ancillary/balancing services across the island of Ireland are assessed at an pan-European network model level

4.2.2.3. Methodologies used for the assessment of the projects

(62) In the draft EU TYNDP 2018, the projects are assessed using the ENTSO-E CBA methodology 2.0 approved by the European Commission on 27 September 2018[59]. The Agency's view on the CBA methodology was already provided in its Opinion No 05/2017.

(63) The CBA methodology identifies two cost categories: investment costs (CAPEX) and operating expenditure (OPEX). According to their definitions, the CAPEX of the investments in the EU TYNDP 2018 should include the following cost elements (p.42):

(a) Expected costs for permits, feasibility studies, design and land acquisition;

(b) Expected cost for equipment, materials and execution costs (such as towers, foundations, conductors, substations, protection and control systems);

(c) Expected costs for temporary solutions which are necessary to realise a project (e.g. a new overhead line has to be built in an existing route, and a temporary circuit has to be installed during the construction period);

[59] https://docstore.entsoe.eu/Documents/TYNDP%20documents/Cost%20Benefit%20Analysis/2018-10-11-tyndp-cba-20.pdf

(d) Expected environmental and consenting costs (such as environmental costs avoided, mitigated or compensated under existing legal provisions, cost of planning procedures);

(e) Expected costs for devices that have to be replaced within the given period (consideration of project life-cycle); and

(f) Dismantling costs at the end of the equipment life-cycle.

(64) The OPEX figures in the EU TYNDP 2018 consists of the expected annual maintenance costs and the expected annual operation costs, reported as an annual average figure.

(65) The ENTSO-E CBA methodology includes eight (partially overlapping) benefit categories (i.e. SEW, CO2 variation, RES integration, societal well-being, grid losses, adequacy, flexibility and stability) and three residual impact categories (environmental, social, other). Beyond these, the EU TYNDP 2018 includes a so called 'missing benefit' or 'declared values' category, which allows the project promoters to report on benefits, which are either not captured by the CBA methodology or captured, but not adequately calculated in the EU TYNDP 2018.

(66) The projects, which were part of the reference (or 'baseline') network (for a certain study year), were assessed with the Take Out One at the Time (TOOT) methodology, the other (non-reference grid) projects were assessed with the Put IN one at the Time (PINT) methodology. For competing projects, ENTSO-E also used the multiple TOOT approach.

(67) Regarding the NDPs, as shown in Table 11, the way with which projects are assessed greatly varies across jurisdictions, but the use of the CBA has increased compared to the practice in 2016[60]. In 17 out of 29 jurisdictions (58%), a formal (e.g. based on a methodology approved by law or a public entity) CBA is carried out, in most of them only for some of the proposed projects (e.g. cross-border or high CAPEX projects). In the remaining jurisdictions the projects are selected according to the planning criteria set by the TSOs and in one instance the way how the projects are assessed was not specified. The Agency notes that the share of NDPs building on a formal CBA analysis is expected further to increase in the future (e.g. in GR).

[60] In its Opinion No 04/2016, the Agency identified only 8 out of 28 jurisdictions (i.e. 28%) where some monetisation of the benefits were carried out.

Table 11. Methodology used for the assessment of the projects in the NDPs

Jurisdiction	Application of a formal CBA methodology in the NDP for the assessment of the projects	TOOT	PINT	Sensitivity analysis[61]
Austria	The EU TYNDP 2016 CBA results are used.	X[62]	X[63]	
Belgium	A CBA based on ENTSO-E CBA methodology is performed for the most important projects	X[64]	X[65]	X
Bulgaria	ENTSO-E CBA methodology is applied for cross-border relevant projects. For other projects there is no formal CBA methodology applied	X	X	
Croatia	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Cyprus	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Czech Republic	ENTSO-E CBA methodology is applied for cross-border relevant projects. For other projects the same CBA is performed as well, but simplified to the necessary extent (e.g. the NTC increase is not calculated).	X		
Denmark	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Estonia	A CBA is performed for cross-border projects			X
Finland	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
France	A formal CBA methodology is approved and the CBA is performed for some cross-border projects[66]		X	
Germany	A formal CBA methodology is approved and the CBA is performed for cross-border projects[67]		X	X
Greece	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO[68]		X	

[61] Additional assessments by changing single input parameters.
[62] For reference grid projects.
[63] For non-reference grid projects.
[64] For reference grid projects.
[65] For non-reference grid projects.
[66] National grid development projects and interconnection projects, which don't request EU funding, are assessed through the incentive regulation framework of the NRA. A formal CBA methodology is approved and performed for interconnection projects requesting EU funding.
[67] A CBA for cross-border projects will be introduced in the NDP 2019-2030.
[68] For the time being, the NDP does not include a CBA methodology, but the adoption of such a methodology for the most important projects is on its way. The projects are proposed by the TSO based on the needs identified by the national scenarios, the investment requests for RES penetration and the TSO's experience and knowledge of the transmission system.

Hungary	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO	X		
Ireland	A CBA is performed for all projects		X	X
Italy	A formal CBA methodology is approved, but the CBA is performed only for projects above a CAPEX threshold (i.e. 15 million Euros)	X[69]	X optionally	X[70] (only for short term study year)
Latvia	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Lithuania[71]	No formal CBA methodology			
Luxembourg	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Netherlands	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Norway	A formal CBA methodology is approved, but the CBA is performed only for the most important projects		X	
Poland	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO		X	X
Portugal	A formal CBA methodology is approved, but the CBA is performed only for the most important projects	X		
Romania	A CBA is performed for some projects[72]	X		X
Slovak Republic	No CBA is conducted, but the projects are selected according to the planning criteria set by the TSO			
Slovenia	A formal CBA methodology is approved, but the CBA is performed only for the most important projects		X	X
Spain	A CBA analysis is performed for the most important projects (according to the ENTSO-E CBA methodology)	X[73]	X[74]	X
Sweden	A CBA is performed for all projects			

[69] Primarily, sequential TOOT may be used in case of multiple capacity increases on the same boundary.
[70] Sensitivities are requested for the short term study year (which was 2020 in recent NDPs). However, in practice, 2025 and 2030 study year results were mostly used for CBAs. These are multi-scenario, without sensitivities.
[71] The Lithuanian NRA informed that in the NDP (2018-2027) it was indicated that all projects were currently under review by CBA criteria.
[72] A CBA is performed for internal projects (according to ENTSO-E methodology). For PCIs, the CBA is performed at ENTSO-E level. For refurbishment of existing equipment, there is no CBA in the NDP, only in the feasibility studies.
[73] For reference grid projects.
[74] For non-reference grid projects.

UK (Great Britain)	A formal CBA methodology is approved and the CBA is performed to assess the optimal level of interconnection[75].		X	X[76]
UK (Northern Ireland)	A CBA analysis is performed for all projects		X	

(68) Regarding the costs, the Agency notes that the expected cost for materials and assembly and the expected costs for temporary solutions, which are necessary to realise a project, are included in the costs figures used for most of the NDPs, as shown in Table 12. However, not all cost elements identified by the CBA methodology are considered in many of the jurisdictions.

Table 12. Cost elements included in the total project expenditures available in the NDP or to the NRA

Jurisdiction	**Expected cost for materials and assembly costs[77]**	**Expected costs for temporary solutions which are necessary to realise a project[78]**	**Expected environmental and consenting costs[79]**	**Expected costs for devices that have to be replaced within the given period (regard of life-cycles)**	**Dismantling costs at the end of life of the equipment**	**Maintenance costs and costs of the technical life cycle**
Austria	X	X	X			
Belgium	X	X		X		X
Bulgaria	X	X				
Croatia	X		X			

[75] The NOA for interconnectors assesses the optimal level of interconnection for GB consumers. The methodology for delivering this is approved by Ofgem and involves setting a baseline of projects with a threshold of regulatory certainty, and then assessing the NPV of potential (none specific) future interconnection options above that baseline in an iterative optimisation process. This is not, however, a formal CBA for the purpose of assessing the viability of specific projects.

[76] Sensitivities are used to enrich the analysis for particular boundaries to ensure that issues, such as the sensitivity of boundary capability to the connection of particular generation projects, are adequately addressed. The SO and TOs use a Joint Planning Committee subgroup as appropriate to coordinate sensitivities. This allows regional variations in generation connections and anticipated demand levels that still meet the scenario objectives to be appropriately considered.

[77] Such as masts/basement/wires/cables/substations/protection and control systems.

[78] E.g. a new overhead line has to be built in an existing route, and a temporary circuit has to be installed during the construction period.

[79] Such as environmental costs avoided, mitigated or compensated under existing legal provisions, cost of planning procedures, and dismantling costs at the end of the life time.

Cyprus	X	X		X	X	
Czech Republic	X	X	X			
Denmark	X					
Estonia	X	X		X	X	X
Finland[80]						
France	X	X	X	X		X
Germany	X	X				
Greece	X	X	X			
Hungary	X					
Ireland	X	X	X	X		X
Italy	X	X	X			X
Latvia	X	X				
Lithuania	X					
Luxembourg	X	X		X		
Netherlands	X	X				
Norway	X			X		X
Poland	X	X	X			
Portugal[81]						
Romania	X	X	X		X	
Slovak Republic	X	X	X			
Slovenia	X	X	X			
Spain	X	X	X	X	X	X
Sweden	X	X	X	X		X
UK (Great Britain)[82]	X					
Northern Ireland	X	X	X	X		X

(69) Noting the different cost elements included in the total expenditure of the projects in the different jurisdictions, the Agency considers it important to clarify in the relevant NDPs, which cost elements the provided cost figures correspond to.

[80] No information was provided by the NRA regarding the cost elements.

[81] Not specified by the NRA (i.e. The NRA informed that total costs include direct and indirect costs and financial costs. No disaggregation of costs).

[82] The forecast cost is a central best view. The TOs and SO agree each year the cost basis to be used for NOA analysis. The information that will have to be agreed includes but is not limited to: price base, that is the financial year of the prices and should be current year prices; annual expenditure profile reflecting the options' earliest in service dates; any major risks for options costed appropriately; delay costs; the TO's Weighted Average Cost of Capital (WACC). The TOs provide the individual elements of the investments that provide incremental capability. For consistency of assessment across all options, the TOs provide all relevant cost information in the current price base. The SO reviews the costs that the TOs submit with their options and checks that they are reasonable. This is to help ensure the highest quality data goes into the NOA report process.

(70) The Agency notes that in those jurisdictions where a CBA is carried out, multiple benefits are considered, as shown in Table 13. The Agency notes that even in those jurisdictions where no CBA is carried out for the NDP, some aspects (e.g. contribution of the project to security of supply or adequacy) are quantitatively assessed.

Table 13. Benefit categories and their monetisation in the NDPs

Jurisdiction	Socio-economic welfare	Variation of congestion rent	Variation of re-dispatch costs	RES integration	Variation in CO2 emissions	Variation of losses	Societal well-being	Adequacy to meet demand	System flexibility	System stability	Social impact	Other benefit
Jurisdictions in which a formal CBA methodology is applied												
Austria[83]	X (M)			X	X	X		X	X	X	X	
Belgium	X (M)	X (M)	X	X	X	X		X	X	X	X	
Bulgaria[84]												
Czech Republic				X (M)	X (M)	X			X	X		
Estonia	X			X	X	X			X		X	
France				X	X	X						
Germany	X (M)		X (M)	X (M)	X	X (M)		X		X		
Ireland	X	X	X	X				X		X		X[85]
Italy	X (M)		X (M)	X (M)	X	X (M)	X (M)	X (M)			X	X (M)[86]
Norway	X (M)	X (M)	X (M)	X (M)		X (M)		X (M)	X	X		
Portugal	X (M)			X	X	X (M)		X				X[87]
Romania	X (M)			X	X (M)	X (M)	X (M)	X	X	X	X	X (M)[88]

[83] The Austrian NDP refers to the EU TYNDP 2016 benefits.
[84] No specific benefit indicator was indicated by the NRA.
[85] E.g. competition, reduction of costs for ancillary services, reduction of emissions (non-CO2), avoidance of the renewal/replacement costs of infrastructure.
[86] Reduction of costs for ancillary services, avoided emissions (different than CO2), deferred investments.
[87] Not specified.
[88] Reduction of emissions (non-CO2) - only for internal projects.

Slovenia[89]	X			X	X	X		X	X	X		
Spain[90]		X	X	X		X		X	X	X	X	X[91]
Sweden	X (M)	X (M)		X (M)	X (M)			X (M)	X (M)	X (M)	X (M)	
UK (Great Britain)	X (M)		X (M)	X	X				X	X		
UK (Northern Ireland)	X	X	X	X		X (M)		X	X	X	X	X[92]
Jurisdictions in which no formal CBA methodology is applied												
Cyprus								X	X	X		
Croatia				X		X		X		X		
Denmark				X		X		X				
Finland	X			X				X	X	X		
Greece	X			X		X		X	X	X	X	
Hungary												
Latvia	X			X	X	X	X			X		X[93]
Lithuania[94]												
Luxembourg												X[95]
Netherlands												
Poland				X				X				
Slovak Republic								X				

(71) The CBA or other project assessments are carried out via different market, network and/or dynamic studies. As shown in Table 14, in about two third of the jurisdictions both market and network studies are used, in 1 jurisdiction (CY) only a specific market is used, in 8 jurisdictions only network studies are carried out. Most of the indicated studies use models covering the relevant region or beyond (i.e. EU level). Only few studies are carried out using only national assumptions.

[89] Transmission projects are evaluated by criteria marked, however results of evaluation are not presented nor monetised in NDP.

[90] The final NDP 2015-2020 includes a CBA analysis carried out by the TSO according to the TYNDP 2014 methodology and the "Guideline for Cost Benefit Analyis of Grid Development Projects. October 2014", for the new investments of the network transmission, mainly for the international interconnections, e.g. Biscay Gulf project.

[91] Cross-border exchanges.

[92] Including avoidance of the renewal/replacement costs of infrastructure.

[93] Not specified.

[94] Benefit categories were not specified.

[95] Security of Supply.

Table 14. Studies carried out in the NDPs

Jurisdiction	A combined network and market study[96]	Market study			Network study	Dynamic studies
		with a multi-zone optimisation model[97]	Specific to evaluate the impacts of projects on ancillary/ balancing services	Other market study		
Austria[98]	X					
Belgium		X		X[99]	X	X
Bulgaria[100]						
Croatia					X	X
Cyprus			X		N/A (isolated system)	
Czech Republic					X	
Denmark					X	
Estonia					X	
Finland	X					
France	X	X (for interconnections)			X	X
Germany	X					
Greece[101]					X	X
Hungary					X	
Ireland[102]	X					X

[96] I.e. including the full network description and costs/bids, to assess e.g. redispatching effects.
[97] To simulate the European market behaviour (as used in the EU TYNDP).
[98] The Austrian NDP 2018 refers to the EU TYNDP 2016 CBA results.
[99] Market study for Belgium only.
[100] ENTSO-E CBA methodology is applied for cross-border relevant projects. For other projects there is no formal CBA methodology applied.
[101] For the assessment of projects with cross-border impact, the results of the latest EU-TYNDP are used, including imports and exports data. Particularly, the reports of Regional Investment Plan (Continental South-East) are used, which are based on the Pan-European market study results combined with European and/or regional network studies. Furthermore, the TYNDP 2018 Regional Insight Report for the North-South Interconnections East is considered.
[102] Additional studies include: harmonic, insulation co-ordination, transient and small signal stability. The range of studies depends on the technology and case being studied.

Italy	X (for some benefits)	X (for some benefits)	X (for some benefits)		X[103]	X (only for specific projects)
Latvia	X				X	X
Lithuania					X[104]	X
Luxembourg					X	
Netherlands	X					
Norway	X					
Poland	X[105]	X			X	
Portugal[106]		X			X	
Romania		X		X[107]	X	X
Slovak Republic	X				X	
Slovenia			X		X	
Spain	X					X
Sweden	X					
UK (Great Britain)				X[108]	X	
UK (Northern Ireland)	X		X	X[109]	X	X

(72) The Agency recalls its recommendation in its Opinion No 04/2016 (p.3) that the NDPs should include market studies for projects of cross-border relevance and use the multi-

[103] Multiple models, as needed (e.g. national model to study local developments, multi-national model for transfer capacity calculations).
[104] Synchronisation studies, adequacy studies, studies on integration of offshore wind power plants.
[105] Cross-border flows have been determined on the basis of analyses of the EU market model. In the next step, a market model is used with the full national transmission network model and designated cross-border flows. The analysis carried out with such a model allows to identify bottlenecks and propose investments eliminating them, taking into account the greatest effects for the power system.
[106] For cross-border relevant projects the EU TYNDP results are used.
[107] For the time horizons not covered in TYNDP and the related PEMMDB, specific (detailed, unit-by-unit based) market studies are carried-out at national level, with the appropriate assumptions on the exchanges.
[108] The SO uses the scenarios and the criteria stated in the NETS SQSS to produce the future transmission capability requirements by using an in-house tool called 'Peak Y'. The SO then passes these capability requirements to the TOs to identify future transmission options. In response to the data on boundary capabilities and requirements, TOs identify and develop multiple credible options that deliver the potentially required boundary capabilities. The SO then undertakes the cost-benefit analysis studies on these options.
[109] Not specified.

national network models fully to assess the project's influence on the interconnected network.

(73) The Agency is of the view that the CBA, which allows the comparison of the costs and benefits of a project, is a good practice and carrying out a CBA should be considered in each jurisdiction at least for the larger projects, as it promotes transparency and objectivity in the decision on the projects. In this regard, the Agency recalls the importance of avoiding double-counting of the benefits.

4.2.2.4. Discounting parameters used

(74) As described in ENTSO-E CBA methodology (p.24), in order to calculate the Net Present Value (NPV) of a project, its monetised costs and benefits must first be estimated using the same assumptions and then discounted such that those costs and benefits are all actualised to the year in which the study is performed). Discounted costs (negatives) and benefits (positives) can then be added in order to calculate the NPV of the project.

(75) In line with the Agency's Opinion[110], the following discounting parameters should be applied in the EU TYNDP:

(a) 25 years of operation;

(b) residual value equal to 0;

(c) 4% (real) discount rate.

(76) Further, the ENTSO-E CBA 2.0 (p.14) provides that the mid-term horizon scenarios have to be representative of at least two study years and that (p.24) the benefits should be aggregated across years as follows:

- for years from the year of commissioning (i.e. the start of benefits) to the first mid-term time horizon: the first mid-term year's benefits are extended backwards;
- for years between different mid-term, long-term and very long-term time horizons (if any): benefits between the time horizons are linearly interpolated;
- for years beyond the farthest time horizon: benefits are maintained at the same level of this farthest time horizon.

[110] Agency's Opinions No 01/2014, p.7 and No 05/2017, p.7.

(77) The Agency notes that these discounting rules are broadly applied for the NDPs as well. As shown in Table 15, out of the 17 NDPs for which a CBA assessment is carried out:

- in 14 NDPs (82%), all costs and benefits are discounted to the same year in 10;
- in 8 NDPs (47%), 25 years of operation are assumed;
- in 8 NDPs (47%), a 4% (real) discount rate is applied; and
- in 7 NDPs (41%), a 0 residual value is assumed.

Table 15. Application of the EU TYNDP 2018 discounting parameters in the jurisdictions with a formal CBA methodology

Jurisdiction	All costs and benefits are discounted to the same year	25 years of operation	0 residual value	4% (real) discount rate	The benefits are calculated with the ENTSO-E CBA interpolation rules
Austria[111]	X	X	X	X	X
Belgium	X	X			
Bulgaria					
Czech Republic		X	X	X	
Estonia	X	X		X	
France	X	X	X	X	X
Germany	X				
Ireland	X	Useful lifetime of asset	X	WACC	
Italy	X	X	X	X	X
Norway	X			X	
Portugal[112]	X				
Romania	X	X	X	X	X
Slovenia	X				X
Spain		X	X	X	
Sweden	X				

[111] The Austrian NDP 2018 refers to the EU TYNDP 2016 CBA results.
[112] No details are disclosed to the NRA on the discounting rules, but the TSO refers to follow the EU TYNDP principles.

UK (Great Britain)	X	40 years		Other[113]	
UK (Northern Ireland)	X				
Total	14	8	7	8	5

4.2.3. Publication

(78) Pursuant to Article 8(10) of Regulation (EC) No 714/2009, ENTSO-E shall adopt and publish the final EU TYNDP. Since the EU TYNDP is subject to public consultation, the draft plan is also publicly available.

(79) Regarding the NDPs, the Agency notes that in all, but 2 jurisdictions (CY, LU), the NDP is published. (In 16 jurisdictions both the draft and the final NDP are published, while in 11 jurisdictions only the final NDP is published). Table 16 presents the list of the latest NDPs and the links to them.

Table 16. Latest NDPs and links to them

Jurisdiction	Date of the latest NDP	Status of the latest NDP	Which version of the NDP (i.e. draft or final) is public?	Link to the latest (draft or final) NDP
Austria	2018 (Dec)	Final	Both	http://www.vuen.at/de/html/uebertragungsnetz_netzentwicklung_2018.html
Belgium	2019 (Apr)	Final	Both	https://eliafederaalontwikkelingsplan.be/ https://planfederaldedeveloppementelia.be/
Bulgaria	2018 (Nov)	Final	Both	http://eso.bg/fileObj.php?oid=1799
Croatia	2017 (Dec)	Final	Only the final	http://www.hops.hr/wps/portal/hr/web/hees/razvoj
Cyprus	2018 (Nov)	Final	None	N/A
Czech Republic	2018 (May)	Draft	Both	https://ceps.cz/cs/rozvoj-ps
Denmark	2019 (Apr)	Final	Only the final	https://energinet.dk/Om-nyheder/Nyheder/2019/04/15/RUS-plan-2018
Estonia	2018 (June)	Final	Only the final	https://elering.ee/en/publications
Finland	2017 (Oct)	Final	Both	https://www.fingrid.fi/globalassets/dokumentit/fi/kantaverkko/kantaverkon-

[113] Benefits are discounted with HM Treasury's Social Time Preferential Rate and costs are discounted with WACC.

				kehittaminen/kantaverkon-kehittamissuunnitelma-2017-2027.pdf
France	2017	Final	Both	https://www.rte-france.com/fr/article/transition-energetique-et-revolution-numerique-plus-de-10-milliards-d-euros-d
Germany	2017 (Dec)	Final	Both	Final NDP 2017-2030: https://www.netzausbau.de/bedarfsermittlung/2030_2017/nep-ub/de.html Draft NDP 2019-2030: https://www.netzentwicklungsplan.de/de/netzentwicklungsplaene/netzentwicklungsplan-2030-2019
Greece	2018 (Nov)	Draft	Both	http://www.rae.gr/site/categories_new/about_rae/activity/global_consultation/current/231118.csp
Hungary	2018	Draft	Only the final	http://mavir.hu/documents/10258/15454/HFT_2017.pdf/8826edb7-d17a-463e-8983-29b616337f76
Ireland	2017	Final	Both	http://www.eirgridgroup.com/site-files/library/EirGrid/TDP_2017_Final_for_Publication.pdf
Italy	2018	Draft	Both	https://www.arera.it/it/comunicati/18/170529pds.htm
Latvia	2018 (Sept)	Final	Both	https://www.sprk.gov.lv/uploads/doc/LemumsN111D28092018pielikums.pdf
Lithuania	2018	Final	Only the final	http://www.litgrid.eu/index.php/tinklo-pletra/lietuvos-elektros-perdavimo-tinklu-10-metu-pletros-planas-/3850
Luxembourg	2018 (Nov)	Draft	None	N/A
Netherlands	2017 (Dec)	Final	Only the final	https://www.tennet.eu/fileadmin/user_upload/Company/Publications/Technical_Publications/Dutch/TenneT_KCD2017_Deel_II.pdf
Norway	2017 (Oct)	Final	Only the final (redacted version)[114]	https://www.statnett.no/for-aktorer-i-kraftbransjen/planer-og-analyser/nettutviklingsplan-og-kraftsystemutredning/
Poland	2018	Draft	Both	https://www.pse.pl/dokumenty
Portugal	2017[115]	Final	Only the final	www.ren.pt
Romania	2018	Final	Both	http://www.transelectrica.ro/web/tel/plan-perspectiva
Slovak Republic	2017 (Nov)	Final	Both	https://www.sepsas.sk/Dokumenty/ProgRozvoj/2018/07/DPR_PS_2018_2027.pdf

[114] There is one detailed version, which is not public because it includes confidential information about the power system. One shorter version without confidential information is public.

[115] Approved by competent authority in February 2019.

Slovenia	2019	Draft	Only the final	https://www.eles.si/Portals/0/Novice/aktualne-teme/Dokumenti/Razvojni%20nacrt%202017-2026.pdf
Spain	2015 (Oct)	Final	Both	https://www.boe.es/boe/dias/2015/10/23/pdfs/BOE-A-2015-11398.pdf
Sweden	2017 (Nov)	Final	Only the final	https://www.svk.se/siteassets/om-oss/rapporter/2017/svenska-kraftnats-systemutvecklingsplan-2018-2027.pdf?
UK (Great Britain)	2019 (Jan)	Final	Only the final	Future Energy Scenarios: http://fes.nationalgrid.com Electricity Ten Year Statement: https://www.nationalgrideso.com/insights/electricity-ten-year-statement-etys Network Options Assessment: https://www.nationalgrideso.com/insights/network-options-assessment-noa
UK (Northern Ireland)	2019	Draft	Both	https://www.uregni.gov.uk/sites/uregni/files/consultations/2019-04-18%20TDPNI%20Consultation.pdf http://www.soni.ltd.uk/media/documents/TDPNI2018-for-consultation.pdf

(80) The Agency considers that the public availability of the draft and final NDPs contributes to transparency and thus consistency of the NDPs vis-à-vis each other and vis-à-vis the EU TYNDP, as well as to the efficient infrastructure planning and implementation in Europe. Therefore the Agency recommends that the draft and final NDPs are published in all jurisdictions.

4.2.4. Transparency of the information

(81) The draft EU TYNDP 2018 mostly includes the following project specific information[116]:

(a) The expected commissioning date for each investment;

(b) The status for each investment;

(c) Transfer capacity increase;

(d) Investment costs (CAPEX) for each investment;

(e) The annual average OPEX for each investment;

[116] The Agency also noted in its Opinion No 11/2019 (p.12-13) that in some instances such information is not provided, nor a justification for the absence of the required information is offered.

(f) Benefits.

(82) In addition, the draft EU TYNDP 2018 provides information about the evolution of the investment since the previous EU TYNDP.

(83) Information about the availability of project data in the NDPs was provided for 28 NDPs[117]. The Agency notes that the status and the commissioning date are the most frequently publicly available information items: The commissioning date is available in 19 NDPs; the project status is available in 18 NDPs. In the remaining instances, the status information is available to the NRA only.

(84) The availability of other project or investment specific information (including costs, benefit and transfer capacity increase) is more limited.

(a) Investment cost information is publicly available in 13 jurisdictions (in two jurisdictions, in a separate document not in the NDP and in another one only for the most important projects) and in 14 jurisdictions available only to the NRA. In one jurisdiction (FI), the investment costs are not available to the NRA.

(b) Life cycle cost (or OPEX) information is publicly available in only 4 jurisdictions (in one jurisdiction in a separate document not in the NDP and in another one only for the most important projects) and in 15 jurisdictions available only to the NRA or the relevant competent authority. In 6 jurisdictions, the life cycle costs are not available to the NRA or the relevant competent authority. In the 3 remaining instances, the NRA did not provide information on the availability of this specific project data.

(c) Monetised benefits are provided in 7 NDPs and non-monetised benefits in additional 6 NDPs. In 8 jurisdiction the benefits are available to the NRA but not published, in 6 jurisdictions, no benefit data is provided to the NRA (or the competent authority), either in monetised or non-monetised form and in one instance, the NRA did not provide information on the availability of this specific project data.

(d) Expected increase of transfer capacity for each project is included in the public NDP in 13 jurisdictions, in additional 10 jurisdictions this information is provided only to the NRA or the competent authority, while in 4 jurisdictions it

[117] Although in Cyprus and Luxembourg the NDP is not published, they are still taken into account in this assessment. The information regarding the availability of any project data was not provided for Bulgaria.

is not available to them at all. In one instance, the NRA did not provide information on the availability of this specific project data.

(85) The Agency notes that only in one jurisdiction information on the progress of the projects and reason for their delay or rescheduling is not provided either publicly or to the NRA. In about half of the jurisdictions, the monitoring results are provided either in the NDP or in a separate publicly available document and in about half of them it is available only to the NRA. In one instance, the NRA did not provide information on the availability of this specific project data.

(86) The information published in the NDPs and/or available to the NRAs is shown in Table 17.

Table 17. Project specific elements included in the NDPs

Jurisdiction	Monitoring of projects	Reason for delay /rescheduling	Status	Commissioning date	CAPEX	OPEX	Benefits	Transfer capacity increase
Austria	available to the NRA	public	public	public	public	not available to NRA	public (only non-monetised)	not available to NRA
Belgium	public	public	public	public	public for the most important projects for others available to the NRA	public for the most important projects for others available to the NRA	public	public
Bulgaria [118]								
Croatia	available to the NRA	available to the NRA	available to the NRA	public	available to the NRA	not available to the NRA	not available to the NRA	not available to NRA[119]
Cyprus	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA
Czech Republic	available to the NRA	public	public	public	public		public (only non-monetised)	public

[118] No information was provided by the NRA regarding the availability of the project data in the Bulgarian NDP.
[119] Only the total transfer capacity increase of all planned projects is publicly available.

Denmark	public	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA
Estonia	available to the NRA	public	public	public	available to the NRA	available to the NRA	available to the NRA	public
Finland	not available to the NRA	not available to the NRA	public	public	not available to the NRA	not available to the NRA	not available to the NRA	not available to the NRA
France	public	available to the NRA upon request only[120]	public	public	available to the NRA	available to the NRA upon request only[121]	public (only non-monetised)	available to the NRA upon request only[122]
Germany	public (separate from NDP)	public (separate from NDP)	public	public	available to the NRA (total cost is publicly available)	available to the NRA	public	available to the NRA
Greece	public	public	public	public	public	not available to the NRA	not available to the NRA[123]	public
Hungary	public	public	public	public	available to the NRA	available to the NRA	available to the NRA	available to the NRA
Ireland	public	available to the NRA	public	public	available to the NRA	available to the NRA	public (only non-monetised, monetised available to NRA)	available to the NRA
Italy	public	public	public	public	public	public	public	public
Latvia	available to the NRA	public	public	public	public	available to the NRA	available to the NRA	public
Lithuania	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA

[120] I.e. no systematic disclosure.
[121] I.e. no systematic disclosure.
[122] I.e. no systematic disclosure.
[123] Only qualitative information is available.

Luxembourg	available to NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	not available to the NRA	not available to the NRA	available to the NRA
Netherlands	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	not available to the NRA	not available to the NRA	available to the NRA
Norway	public	public	public	public	public	public	public	public
Poland	available to the NRA	available to the NRA	available to the NRA	public	available to the NRA (total cost is publicly available)	available to the NRA	available to the NRA (the total benefit is publicly available)	public
Portugal	available to the NRA	public	available to the NRA	public	public	available to the NRA	public	public
Romania	public	public	public	public	public (separate)	public (separate)	public	public
Slovak Republic	available to the NRA	available to the NRA	public	public	public	available to the NRA		public
Slovenia	public	public	public	public	public	available to the competent authority	public (only non-monetised)	public
Spain	available to the NRA (separate from NDP)	available to the NRA (separate from NDP)	available to the NRA (separate from NDP)		partially included in the NDP[124]	not available to the NRA	public	not available to the NRA
Sweden			public	public	public		public	
UK (Great Britain) [125]	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA	available to the NRA

[124] A total CAPEX value for all the infrastructures is included in the NDP. In addition, there are some projects (requested by agents) that also have an individual CAPEX value. For the rest of projects, the individual CAPEX value is not available to the NRA.

[125] The purpose of the GB NDP for interconnectors (NOA IC) is to act as a market signal on the potential benefits of interconnection from baseline of projects that have been assessed by Ofgem. The purpose is not therefore not assess the viability of current and future projects, and as such the NOA IC does not provide project specific information.

UK (Northern Ireland)	available to NRA	public	public	public	public	available to the NRA	public (only non-monetised, monetised available to NRA)	public

(87) In its Opinion No 04/2016 (p.7), on the consistency of the NDPs with the EU TYNDP, the Agency already pointed out that the NDPs do not always provide the same set of information and insisted on the need for NDPs to contain the fundamental project information (full information on commissioning dates, project status, increase of transfer capacity and project cost). The Agency reiterates its recommendation that such fundamental information should be published in the NDPs.

(88) In order to enhance transparency and allow a better interaction between the EU TYNDP and NDPs, the Agency recommends that not only the EU TYNDP include a mapping of cross-references between the investment codes in different plans[126], but also NDPs use, beyond the national coding systems, cross-referencing with EU TYNDP coding.

4.3. Assessment of the projects in the NDPs and EU TYNDP

4.3.1. Inclusion in NDPs

(89) The NRAs reviewed 239 national parts of transmission projects and 20 storage projects, when carrying out the consistency check of the projects included in the draft EU TYNDP 2018.

(90) Out of 239 national parts of transmission projects, the NRAs identified 185 national parts (77%) which are fully included in the NDPs (i.e. all those investments, of the project which are located in the territory of a jurisdiction are included in the relevant NDP). 6 national parts (3%) which are only partially included (i.e. not all of the investments located in the territory of a jurisdiction is included) and 47 national parts (20%) which are not included in the relevant NDPs. Out of the 20 storage projects, 5 are included in the relevant NDPs. The list of projects not included or partially included in one or more of the relevant NDPs is provided in Tables 19-21 in Annex I.

(91) The number of national parts (47, 20%) of transmission projects which are not included in the NDPs remarkably decreased compared to the finding of the Agency's analysis carried out in 2016 (when the number of national parts not included in the NDPs

[126] Agency's Opinions No 01/2015, p. 11 and No 04/2016, p. 4.

represented 33% of the total), but is still significantly higher than in 2014 (when the share was slightly below 10%)[127].

(92) Most transmission projects which are not included in the NPDs, were not included as they were not advanced enough to enter the NDP or because the commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned). These findings confirm the ones in 2016 (Agency's Opinion 08/2016 p.5), when the most frequent reason for the absence of a national part in a NDP reported by the NRAs was also related to a commissioning date too far in the future or no sufficient progress.

(93) In 8 instances (17%), the national part of a project is not included in the NDP as it is a third-party project and third-party are normally not included in the NDPs.

(94) Most of the storage projects were not included in the NDP, due to general non-inclusion of the storage projects in the concerned jurisdictions. Out of the 5 storage projects, which were included, one was only referred to, without any further assessment.

(95) 2 investments (corresponding to 3 national parts) have been mentioned by the NRAs as having cross-border relevance, but do not appear in the draft EU TYNDP 2018[128]. One is an Italian internal investment, another one is an Italian - Austrian interconnection. The Agency notes that, based on the information received by ENTSO-E, these investments were not proposed by the project promoters as candidates for the EU TYNDP 2018.

Table 18. Investments which have a cross-border relevance, but do not appear in the draft TYNDP 2018

Jurisdiction	Investment number in the NDP	Substation 1	Substation 2	Investment item description	Status	Commissioning date	CAPEX
Italy	252-N	Dobbiaco (IT)	Lienz (AT)	Dobbiaco - Austria	Planned, but not yet in permitting	after 2025	55
Italy	206-P	Volpago (IT)	-	Volpago substation	Planned, but not yet in permitting	2025	165

[127] Agency's Opinion No 08/2017, p.4.

[128] Based on ARERA order 674/2018, the Italian draft NDP 2018 also includes 3 interconnection projects by third parties with status 'under consideration' (beyond the 6 TPPs which are present in the TYNDP 2018), and 3 projects by Terna with status 'under consideration' (codes 5-S, 205-S and 605-S), as already indicated in the Agency's Opinion No 08/2017, p.29.

(96) The Agency reiterates its view that, although the NDP is not legally binding in most jurisdictions within the EU, the implementation of the EU TYNDP projects strongly relies on the NDPs. Non-inclusion of a project in the NDP due to other reasons than the time difference in the elaboration of the plans or the limited scope of the NDP (e.g. when it does not include third-party projects) raises doubts on the credibility and feasibility of the implementation of the concerned projects, which feature should be clearly flagged in future EU TYNDPs.

(97) The Agency also reaffirms its recommendation[129] that the (approved/scrutinised) NDPs should explicitly flag the cross-border relevant projects and ENTSO-E should include them in the EU TYNDP.

4.3.2. Analysis of project differences in the EU TYNDP 2018 and in the NDPs

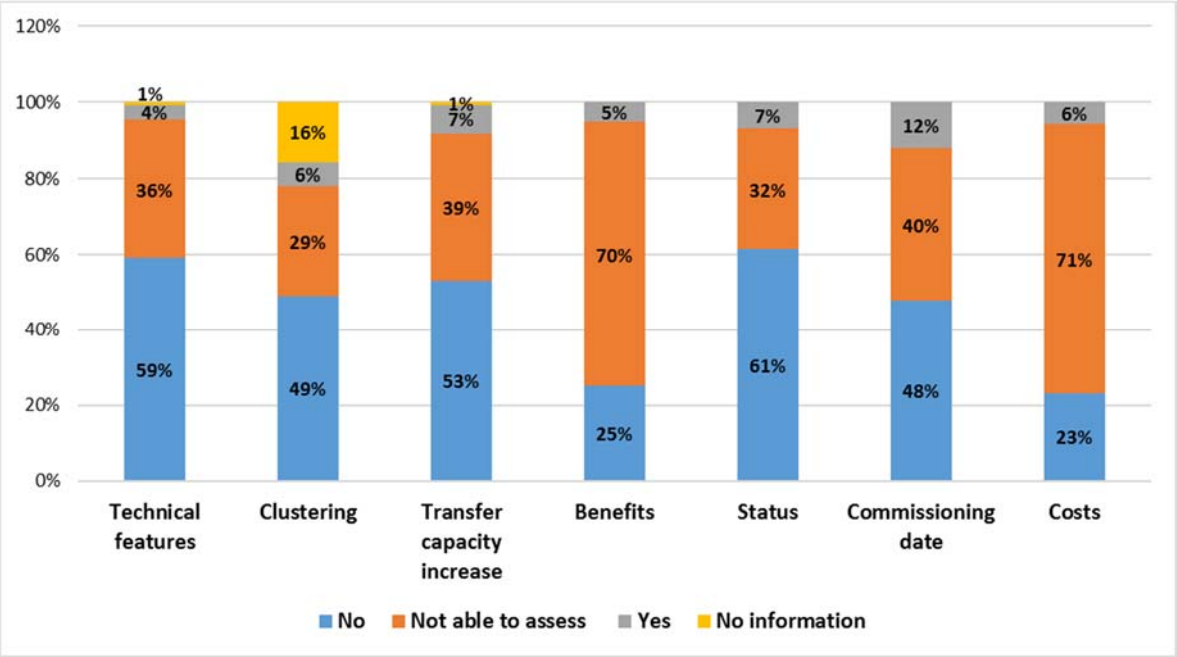
(98) An assessment of the projects consistency between the NDPs and the EU TYNDP was carried out by the Agency and NRAs, by evaluating differences regarding 7 project features (i.e. technical features, clustering, transfer capacity increase, benefits, status, commissioning date and costs of the projects).

(99) As shown in Figure 1, most of the differences emerging from this assessment are related to the commissioning date, followed by the status and transfer capacity increase. These results are similar to previous findings[130] and also appear to be in correlation with the Agency's finding about the availability of the data in the NDPs and to the NRAs (i.e. that costs and benefits are the most common sources of missing information preventing an assessment of the consistency by the NRAs).

[129] Agency's Opinions No 01/2017, p.5 and 08/2017, p.6.

[130] In the Agency's Opinion No 08/2017, p. 6, the most frequently reported difference is the commissioning date of the investments which emerged for 24 national parts and constitutes 33% of all reported substantial differences. Further, NRAs reported differences regarding the transfer capacity, the clustering of the investments, the technical description, the costs, the status and the classification of the projects.

Figure 1. Project/investment differences in the NDP and draft EU TYNDP 2018 identified by NRAs



(100) The Agency notes that the non-reporting of a difference does not always mean a NRA validation of the data. For 45% of the data assessed in this Opinion (7 characteristics for 259 national parts of projects), the NRAs are not able to assess the consistency (e.g. the project is not mature enough, information is not available to the NRA). In total for 7% of the data the NRAs reported differences and for 45% they confirmed the data in the EU TYNDP 2018. The remaining 3% of the data was not available.

(101) Even if difference has been identified in only 7% of data, approximately half of the national parts of the projects listed in the draft EU TYNDP 2018 exhibit at least one substantial differences compared to the NDPs or the NRAs' most recent information. Although for the vast majority of the (different) national parts one or two differences were identified (67% and 19% respectively), there were national parts (10%) featuring between 4 and 6 differences out of the 7 features.

(102) The Agency notes that the draft EU TYNDP 2018 (similar to the EU TYNDP 2016) seems more optimistic in terms of the commissioning date and the advancement status than the relevant NDPs. In this regard, the Agency reiterates it recommendation that in order to avoid excessively optimistic projections on commissioning dates, ENTSO-E should define reference project timelines (e.g. number of years from start of permitting to commissioning). For projects with status 'under consideration' or 'planned, but not yet in permitting', the future EU TYNDPs should provide the project promoters' estimate

together with the 'reference timeline' estimate. In case of differences, the project promoters should explain them.

(103) The Agency notes that misalignments exist between different NDPs regarding some projects, in terms of timing of their implementation, status or cross-border capacities[131]. The Agency is of the view that such misalignments for interconnections could be largely avoided with enhanced consultations and exchange of information between the concerned TSOs on specific projects. Project promoters should inform NRAs of the outcomes of such consultations.

(104) The Agency also acknowledges that due to different schedules for the elaboration of plans and other reasons (for example, changes in market fundamentals), the NDPs and the EU TYNDP may temporarily be out of alignment, even if excellent coordination and regular exchanges of information took place.

5. CONCLUSION

5.1. For the purpose of this Opinion, the Agency has reviewed the NDPs of all EU Member States, with regard to the general regulatory framework and the inputs, outputs and methodologies used of their development.

(105) The Agency concludes that these NDPs are broadly consistent with the EU TYNDP 2018 and observes that their consistency with the EU TYNDP improved compared to the previous Agency's Opinion on the NDPs. This improvement can be explained by:

(a) A more widespread practice to move the frequency of the NDP from 1 year to 2 years;
(b) The more systematic use of a multi-scenario approach (while previously, about half of the NDPs were developed against a single scenario);
(c) A more widespread practice to introduce a CBA for projects and more benefit categories in the NDPs;
(d) A more widespread practice to include third-party projects in the NDPs.

(106) However, the Agency also notes that different practices are still used for the overall development, review and adoption of the NDPs, and some of them might negatively impact the robustness, credibility and transparency of the NDPs or could result in inconsistencies with the EU TYNDP.

[131] See also Agency's Opinion No 06/2019 p.13-16.

(107) Therefore, the Agency identified in this Opinion several areas for improvement.

HAS ADOPTED THIS OPINION:

1. The Agency considers that the NDPs reviewed in this Opinion are broadly consistent with the EU TYNDP 2018.

2. The Agency recommends ENTSO-E further to enhance the consistency between the NDPs and the EU TYNDP by implementing the following measures:

    a. The EU TYNDP should have two separate project Appendices: one listing the mid-term and long term projects (i.e. projects already 'planned' and expected to be commissioned within a ten-year period) and the other one listing the 'future' projects or studies (i.e. projects 'under consideration' or planned to be commissioned beyond 10 years).

    b. While the 'best estimate' approach is appropriate for the short term, the near-term best-estimate scenario for the EU TYNDP should be completed with appropriate sensitivity analysis. Such sensitivity analysis would be particularly useful in detecting the main factors on which a project outcome (benefits) depends.

    c. While the multi-scenario approach is appropriate for the long term, so as better to consider the growing uncertainties over time and better to assess the resilience of the investment projects against them, a 'slow progress' scenario should be also investigated by the CBA, for all years where multiple scenarios are developed in the EU TYNDPs.

    d. As regards the scenario-building method, at least one robust scenario with a top-down approach (i.e. consistent and coherent assumptions across Europe) should be developed, which takes into account country specificities. This(ese) scenario(s) should be evaluated in the EU TYNDP and taken into account to construct the NDPs' scenarios.

    e. Non-inclusion of a project in the NDP due to reasons other than the time difference in the elaboration of the plans raises doubts on the credibility and feasibility of the implementation of the concerned project and this concern should be clearly flagged in the future EU TYNDPs.

    f. ENTSO-E should define reference project timelines (e.g. number of years from start of permitting to commissioning). For projects with status 'under consideration' or 'planned, but not yet in permitting', the future EU TYNDPs should provide the project promoters' estimate together with the 'reference

timeline' estimate. In case of differences, the project promoters should explain them.

3. In order to increase the robustness, credibility and transparency of the NDPs, the Agency recommends that the parties responsible for their development, review and adoption take into account the following measures and pursue their implementation to the extent it is in their powers:

   a. The NDPs should be prepared with a biennial frequency. The NDP should be accompanied by a monitoring update in the years in between.

   b. The NDPs should include / inform on studies and 'under consideration' projects, even if they may go beyond the time horizon of the NDP and clearly flag them as such.

   c. Ideally, the NDPs should have two separate Appendices: one listing the mid-term and long-term projects (i.e. projects already 'planned' and expected to be commissioned within a ten-year period) and the other one listing the 'future' projects or studies (i.e. projects 'under consideration' or planned to be commissioned beyond 10 years).

   d. NDPs' scope should be expanded to allow the inclusion of third-party projects, where it is not yet the case.

   e. A public consultation should be carried out on the draft NDP in each jurisdiction and the results should be published. Information about the treatment of stakeholder comments should also be provided.

   f. NRAs' or other public entities' role regarding the development of the NDPs should be strengthened in those jurisdictions where the TSO adopts the NDP without any regulatory approval or binding scrutiny.

   g. The NDP and all formal acts on the NDPs, as applicable in each jurisdiction (e.g. decisions, opinion, consistency analysis, monitoring) should be published.

   h. NDPs should include market studies for projects of cross-border relevance and use the multi-national network models fully to assess the project's influence on the interconnected network.

   i. Carrying out a CBA, which allows the comparison of the costs and the benefits of a project, should be considered in each jurisdiction, at least for the larger projects.

j. Fundamental project information (i.e. commissioning date, project status, increase of transfer capacity and project cost) should be systematically published.

k. NDPs should use a national coding system and cross-referencing with EU TYNDP coding.

l. NDPs should explicitly flag the cross-border relevant projects.

Done at Ljubljana on 22 May 2019.

- SIGNED -

For the Agency
Director ad interim
Alberto POTOTSCHNIG

Annexes:

Annex I

Table 19. Interconnection projects which are not included in any of the respective NDPs

EU TYNDP 2018 project number	Project name	Jurisdictions	Reason for the absence	NRAs objection to inclusion in the EU TYNDP 2018
247	AQUIND Interconnector	UK (Great Britain), France	In France: The cluster is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP In UK (Great Britain): Not included within the NDP because its exemption request pursuant to Regulation (EC) No 714/2009 was rejected. Aquind is expected by the NRA to be included within future NDP if it submits a CBCA request and/or the project moves forward via another feasible route	No
260	New Great Britain – Netherlands interconnection	The Netherlands, UK (Great Britain)	In the Netherlands: The commissioning date of the cluster is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned) In UK (Great Britain): The project is not advanced enough to be included in the NDP	No
296	Britib	UK (Great Britain), France, Spain	In France: The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP In Spain: Until the date, the Spanish NRA has not received updated information about this project In UK (Great Britain): The project is not advanced enough to be included in the NDP	ES NRA objects the inclusion in the EU TYNDP 2018
330	4th 400 kV CZ-SK interconnector	Czech Republic, Slovak Republic	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No

335	North Sea Wind Power Hub	Denmark, Germany, the Netherlands	In the Netherlands: The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
349	MAREX Organic Power Interconnector	Ireland, UK (Great Britain)	The project is not advanced enough to be included in the NDP baseline.[132]	No

[132] It will be included in the TDP 2018 in Ireland.

Table 20. Internal projects and national parts of interconnection projects which are not included in the respective NDP

Jurisdiction	EU TYNDP 2018 project number	Project name	Internal / interconnection	Reason for the absence	NRAs objection to include the project or some of the investments in the EU TYNDP 2018
Transmission					
Austria	336	Prati (IT) – Steinach (AT)	Interconnection	The project itself is a DSO project and thus not assessed in the NDP. There is only one side effect of the project included in the NDP which is the connection of this line to the TSO grid	No
Austria	375	Lienz (AT) - Veneto region (IT) 220 kV	Internal	The project was downgraded to a reconstruction of the existing line. Thus, the project does no longer need permission via the NDP	No
Bulgaria	342	Central Balkan Corridor	Interconnection	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
Croatia	241	Upgrading of existing 220 kV lines between HR and BA to 400 kV lines	Interconnection	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
Croatia	243	New 400 kV interconnection line between Serbia and Croatia	Interconnection	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
Cyprus	219	EuroAsia Interconnector	Interconnection	The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP	No
Denmark	175	Great belt II (DKW-DKE)	Internal	The project is very preliminary / under consideration and not part of the analysis premises for the NDP	No

Denmark	179	DKE – DE (Kontek2)	Interconnection	The project is very preliminary / under consideration and not part of the analysis premises for the NDP	No
Denmark	234	DKE-PL-1	Interconnection	The project is very preliminary / under consideration and not part of the analysis premises for the NDP	No
France	270	FR-ES project -Aragón-Atlantic Pyrenees	Interconnection	The project is not advanced enough to be included in the NDP	No
France	276	FR-ES project -Navarra-Landes	Interconnection	The project is not advanced enough to be included in the NDP	No
France	280	FR-BE: study Lonny-Achene-Gramme	Interconnection	The project is not advanced enough to be included in the NDP	No
France	285	GridLink	Interconnection	The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP	No
France	299	SACOI3	Interconnection	The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP	No
Germany	245	Upgrade Meeden - Diele	Interconnection	The project is under construction	No
Germany	256	Study to upgrade interconnection DE-NL	Interconnection	The project is not advanced enough to be included in the NDP	No
Germany	263	Lake Constance East	Interconnection	The project is not advanced enough to be included in the NDP	No
Germany	113	Doetinchem - Niederrhein	Interconnection	The project has been commissioned	No
Germany	179	DKE - DE (Kontek2)	Interconnection	The TSOs have not applied for the project within the NDP	No
Greece	293	Southern Aegean Interconnector	Interconnection	The project has not reached an adequate maturity status according to the Greek TSO, so it is not currently included in the Greek NDP. Furthermore, the design of the project in the EU TYNDP is different from that the Greek TSO and NRA are aware of. Considering that this project is included in the TYNDP 2018, the Greek	No

				TSO should incorporate it in its NDP, according to the Article 22 (5) of Directive 2009/72/EC and also RAE' s (Greek NRA) view, subject to its benefits and cross border impact	
Greece	284	LEG1	Interconnection	The project has not reached an adequate maturity status according to the Greek TSO, so it is not currently included in the Greek NDP. Considering that this project is included in the TYNDP 2018, the Greek TSO should incorporate it in its NDP, according to the Article 22 (5) of Directive 2009/72/EC and also RAE' s (Greek NRA) view, subject to its benefits and cross border impact	No
Netherlands	344	Reinforcements Ring NL phase II	Internal	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
Netherlands	347	Maasvlakte – Noord Brabant connection NL	Internal	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
Netherlands	377	Upgrade BE-NL interconnector VanEyck-Maasbracht	Internal	The project was not included because the latest NDP was prepared earlier than the draft EU TYNDP 2018	No
Norway	294	Maali	Interconnection	The project is not advanced enough to be included in the NDP	No
Romania	259	HU-RO	Interconnection	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
Romania	341	North CSE Corridor	Interconnection	The commissioning date of the project is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No

Slovenia	323	Dekani (SI) - Zaule (IT) interconnection	Interconnection	The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP	No
Slovenia	324	Redipuglia (IT) - Vrtojba (SI) interconnection	Interconnection	The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP	No
Spain	233	Connection of Aragon Pumping hydro	Internal	It is only a conceptual project and the required network is not still defined in the TYNDP 2018. It will depend on the future pumping hydro to be planned.	No
Sweden	267	Hansa PowerBridge II	Interconnection	The commissioning date of the cluster is beyond the time span of the NDP (i.e. time horizon up to which year a project can be planned)	No
UK (Great Britain)	214	Interco Iceland-UK	Interconnection	This project was considered as a generator in the NDP rather than as a transmission project.	No
UK (Great Britain)[133]	121	Nautilus: 2nd interconnector Belgium - UK	Interconnection	The necessity of the project is not confirmed by the NRA or still under discussion	No
Storage					
Austria	1000	Hydro Pump Storage Power Plant Pfaffenboden in Molln	Internal	Storage projects are not included in the NDP and not assessed by the NRA	No
Austria	1001	Kaunertal Extension Project	Internal	Storage projects are not included in the NDP and not assessed by the NRA	No

[133] The GB NDP includes commissioned interconnectors, projects included within Cap and Floor (C&F) window 1, projects included within C&F window 2 and projects with an approved exemption.

Estonia	1004	Estonian PHES (pumped-hydro energy storage)	Internal	The project is a third party or non-TSO project and third party or non-TSO projects are normally not included in the NDP	No
Germany	1026	Hydro pumped storage Riedl	Internal	Storage projects are only indirectly included in the NDP (i.e. by considering generation facilities for scenarios).	No
Ireland	1025	Silvermines Hydroelectric Power Station	Internal	The project will be included in the TDP 2018	No
Ireland	1030	Marex Organic Power Energy Storage	Internal	The project will be included in the TDP 2018	No
Netherlands	1013	CAES Zuidwending, NL	Internal	Storage projects are not included in the NDP	No
Spain	1011	Reversible pumped-storage hydroelectric exploitation 'Mont-Negre' power 3,300 MW Zaragoza, Spain	Internal	Storage projects are not included in the NDP	No
Spain	1012	Purifying -Pumped Hydroelectric Energy Storage (P-PHES Navaleo)	Internal	Storage projects are not included in the NDP	No
Spain	1019	Two Reversible Hidroelectric Plants: Girones & Raimats in Spain	Internal	Storage projects are not included in the NDP	No
Spain	1027	P-PHES CUA	Internal	Storage projects are not included in the NDP	No
UK (Great Britain)	1014	Coire Glas	Internal	Storage projects are not included in the NDP	No
UK (Great Britain)	1015	Cruachan II	Internal	Storage projects are not included in the NDP	No
UK (Great Britain)	1022	CARES (Compressed Air Renewable Energy Storage)	Internal	Storage projects are not included in the NDP	No
UK (Great Britain)	1023	Cheshire Gas CAES	Internal	Storage projects are not included in the NDP	No

Table 21. National parts of projects which are only partially included in one or more of the relevant NDPs

Jurisdiction	EU TYNDP 2018 project number	Project name	EU TYNDP 2018 investment number	Status of the investment	Commissioning date	Reason for the absence	Proposal on how to amend the NDP / EU TYNDP
Austria	210	Wurmlach (AT) - Somplago (IT) interconnection	1380	In permitting	2021	The project is a third party project and third party projects are normally not included in the NDP	No
Germany	206	Reinforcement Southern Germany	682	Planned, but not yet in permitting	2025	The necessity of the investment is not confirmed by the NRA or still under discussion	Yes. The investment should be removed from the EU TYNDP 2018
Germany	231	Concept project Germany - Switzerland	1457	Under consideration	2034	Only investment 1282 is part of the German NDP. The investment 1457 is probably not advanced enough	No
Italy	325	AT, SI, IT – South-East Alps Project	1631	Under consideration	2035	The only investment item concerning Italy has been cancelled	Yes. The investment should be removed from the EU TYNDP 2018
Poland	170	Baltics synchro with CE	1034	Planned, but not yet in permitting	2025	The project was not included because the latest NDP was prepared earlier than	No

						the draft EU TYNDP 2018[134]	
Slovenia	325	AT, SI, IT – South-East Alps Project	1483	Under consideration	2035	The project is not advanced enough to be included in the NDP[135]	Yes. The investment should be removed from the EU TYNDP 2018

[134] In the NDP, investment 1034 a new HVDC connection was not included with a submarine cable between Lithuania and Poland. The new HVDC connection has only been shown schematically in the directions of the transmission grid development.

[135] The investment is implicitly present only as a long-term concept of upgrade 220 kV grid to 400 kV. However this concept is far beyond time horizon of the current NDP.

Table 22. Substantial differences between the draft EU TYNDP 2018 and NDPs

Project number	Project name	Investment item[136]	Jurisdiction	Reported difference by the NRA	Most recent data available to the NRA / proposed amendment of the NDP / EU TYNDP 2018 by the NRA
13	Baza project	570	Spain	Status	The project status should be changed from 'under consideration' for 'in permitting' in the EU TYNDP
13	Baza project	569	Spain	Status	The project status should be changed from 'under consideration' for 'in permitting' in the EU TYNDP
13	Baza project	31	Spain	Status	The project status should be changed from 'under consideration' for 'in permitting' in the EU TYNDP
13	Baza project	570	Spain	Commissioning date	The commissioning date should be changed from 2025 for 2020 in the EU TYNDP
13	Baza project	569	Spain	Commissioning date	The commissioning date should be changed from 2025 for 2020 in the EU TYNDP
13	Baza project	31	Spain	Commissioning date	The commissioning date should be changed from 2025 for 2020 in the EU TYNDP
16	Biscay Gulf		France	Transfer capacity increase	The EU TYNDP states that the capacity in the Spain to France direction is 2200 MW, while the French NDP states 2600 MW
21	Italy-France		France	Transfer capacity increase	The EU TYNDP states 1000 MW in the IT-FR direction, while the NDP states 1200 MW in both directions
21	Italy-France	55	France	Commissioning date	The commissioning date should be changed for 2020 in the EU TYNDP
21	Italy-France		Italy	Benefits	There is no benefit analysis provided in the EU TYNDP 2018.

[136] If the investment items are not specified in the table, the difference refers to the all investment items within the project.

23	FR-BE: Avelin/Mastaing-Avelgem-Horta HTLS	60	France	Commissioning date	The commissioning date should be changed for 2020 in the EU TYNDP
25	IFA2		UK (Great Britain)	Transfer capacity increase	Small difference between the NG Interconnector register and the TYNDP. The register states 1150 MW export compared to 1100 MW in the EU TYNDP. It is unclear however whether this exact value was used in the baseline for the NDP and it is not deemed to require amending
26	Reschenpass Interconnector Project		Italy	Benefits	Disagree with the quantification of the benefit B4-RES
28	Italy-Montenegro		Italy	Clustering of the investment items	The project is composed by two investment items (70 and 624) under construction to be commissioned in 2019 and by one item (1503) which is under consideration according to ARERA Opinion 674/2018, with commissioning in 2026. The project should be accordingly declustered into two new projects, with their own CBAs
28	Italy-Montenegro		Italy	Transfer capacity increase	It should be 600 MW (1st phase) + 600 MW (2nd phase) and not 1200 MW altogether
28	Italy-Montenegro		Italy	Benefits	As the clustering is wrong, the benefit calculation is wrong and should be performed separately for the two amended projects. SEW: Inappropriate clustering (in addition to mistakes in the ENTSO-E TYNDP reference grid and obscure/wrong definition of some scenario assumptions, see ACER Opinion 10/2018) B4: No benefits provided SOS: Inappropriate clustering + different baselines for the calculation of experimental SoS and for the calculation of B1 Losses: As declared by ENTSO-E, the losses calculation is not reliable
28	Italy-Montenegro	1503 - 2nd phase	Italy	Status	The project status should be changed for ‘under consideration’ in the EU TYNDP
28	Italy-Montenegro		Italy	Costs	It should be clarified why the OPEX for the first phase (above 0.6% of CAPEX per year) is significantly higher than the OPEX for the second phase (about 0.2% of CAPEX per year)

29	Italy-Tunisia		Italy	Benefits	The project should not be in the reference grid (as it is under consideration), thus the benefits may not be consistent. SEW: mistakes in the ENTSO-E TYNDP reference grid and obscure/wrong definition of some scenario assumptions, see ACER Opinion 10/2018 B4: No benefits indicated SOS: different baselines for the calculation of experimental SoS and for the calculation of B1 Losses: As declared by ENTSO-E, the losses calculation is not reliable. Furthermore, for this project, the variation of losses across scenarios is very large
29	Italy-Tunisia	635	Italy	Status	The project status should be changed for 'under consideration' in the EU TYNDP
29	Italy-Tunisia		Italy	Costs	The TYNDP project sheet describe CAPEX uncertainties, however no uncertainty range is provided. OPEX: consistent. yearly 0.5 % of CAPEX is a figure in line with available benchmarking data regarding HVDC submarine links
31	Italy-Switzerland	642	Italy	Technical features	Given the technical features (AC line + HVDC), there should be at least two investment items i) All'Acqua (CH) - Pallanzeno (IT) 380 kV upgrade and ii) Pallanzeno (IT) - Baggio (IT). Furthermore, the TYNDP project sheet indicates that the project is under review and currently being remastered. ('the technical solution will be updated')
31	Italy-Switzerland	642	Italy	Commissioning date	The commissioning date should be changed in the EU TYNDP according to the ongoing project review
31	Italy-Switzerland		Italy	Clustering of the investment items	There is a problem with the definition of investment items
31	Italy-Switzerland		Italy	Transfer capacity increase	The Italian draft NDP 2018 indicates a transfer capacity (TTC) of 1000-1100 MW
31	Italy-Switzerland		Italy	Benefits	The B4-RES indicator provides a single figure for year 2030, which was calculated for a 2030 scenario of the TYNDP 2016. This figure may be outdated and should be better removed (or recalculated).

					SEW: The analysis carried out for the other CH-IT project identify serious deficiencies in the calculation of SEW. Furthermore, there are mistakes in the ENTSO-E TYNDP reference grid and obscure/wrong definition of some scenario assumptions, see ACER Opinion 10/2018 B4: B4-RES is related to old scenarios. While some benefits are possible, the quantification provided cannot be accepted. SOS: different baselines for the calculation of experimental SoS and for the calculation of B1 Losses: As declared by ENTSO-E, the losses calculation is not reliable
33	Central Northern Italy	1041	Italy	Technical features	The length of the project 432-P is 443 km in the Italian draft NDP 2018, vs. 350 km in the TYNDP
33	Central Northern Italy	90	Italy	Commissioning date	The commissioning date is 2023
33	Central Northern Italy	1041	Italy	Commissioning date	The investment is labelled as 'long term'. Future NDPs should provide more clarity about the date.
33	Central Northern Italy		Italy	Costs	National CAPEX: 181 + 66 million Euro (vs. 220 + 140 million Euro in the TYNDP 2018)
37	Norway - Germany, NordLink	406	Norway	Commissioning date	The commissioning date for Voltage uprating of existing 300 kV line Sauda/Saurdal - Lyse - Ertsmyra - Feda - 1&2, Feda – Kristiansand is 2021/2022 in the NDP and not 2020 as indicated in the EU TYNDP 2018. The commissioning date for the part related to Upgrade Samnanger - Mauranger is 2022 in the NDP and not 2020 as indicated in the EU TYNDP 2018 Long term/uncertain need of Blåfalli-Samnanger. Commissioning date is not indicated in the NDP
39	DKW-DE, step 3		Germany	Clustering of the investment items	Project 39 is clustered together with Project 251 in the NDP (TTG-005)
47	Westtirol - Vöhringen	689	Germany	Commissioning date	In the draft NDP 2019-2030 the commissioning is planned for 2023. The necessity and effectiveness will be checked during the NDP 2019-2030. The investment was not approved in the final NDP 2017-2030

62	Estonia-Latvia 3rd IC		Latvia	Transfer capacity increase	In the EU TYNDP is 600 MW which is maximum capacity. In NDP the transfer capacity in direction LV>EE is 500 MW
62	Estonia-Latvia 3rd IC	386	Latvia	Costs	In the EU TYNDP investment item 386 CAPEX is 120 million Euro, in NDP 83,70 million Euro
74	Thames Estuary Cluster (NEMO-Link)		UK (Great Britain)	Transfer capacity increase	Very small difference between the NG Interconnector register and the TYNDP. The register states 1020 MW import and 1046 MW export. It is unclear however whether this exact value was used in the baseline for the NDP and it is not deemed a significant enough difference to require amending
94	GerPol Improvements		Germany	Clustering of the investment items	The investments are clustered separately within two projects 50HzT-P128, 50HzT-003 in the NDP
94	GerPol Improvements	796	Poland	Costs	CAPEX in the NDP is 43.5 million Euro compared to the value in draft EU TYNDP 2018 (i.e. 36.5 million Euro)
107	Celtic Interconnector		Ireland	Benefits	The methodology applied to compute the SoS benefit consists in adapting the scenarios in order to attain a given adequacy standard, thus creating a discrepancy between the SEW and the B6 indicators. Instead of modifying the scenarios to compute some of the benefits, the TYNDP should be based on scenarios representing a realistic view of the electricity system (in terms of economic and adequacy viability)
113	Doetinchem - Niederrhein	145	Germany	Status	The project status should be changed for 'commissioned' in the EU TYNDP
121	Nautilus: 2nd interconnector Belgium - UK		UK (Great Britain)	Transfer capacity increase	The NG interconnector register states 1500 MW import and 1500 MW export, compared to the TYNDP which states 1400 MW for both
123	LitPol Link Stage 2		Poland	Technical features	In new NDP draft the technical data on line length was updated
123	LitPol Link Stage 2		Poland	Clustering of the investment items	
123	LitPol Link Stage 2	373	Poland	Status	Status of investment in EU TYNDP was based on previous NDP. In new NDP draft the status was updated to 'under construction'

123	LitPol Link Stage 2	373	Poland	Costs	The CAPEX for the investment is 79.7 million Euro in the NDP. The indicated CAPEX in the draft EU TYNDP 2018 (i.e. 335 million Euro) appears to include other already implemented investments
124	NordBalt phase 2	385	Latvia	Costs	In the EU TYNDP- the investment item 385 CAPEX is 190,8 million Euro. In NDP the CAPEX is 128,52 million Euro. NDP indicate only stage 3. CAPEX which is the last stage of the project
127	Central Southern Italy	86	Italy	Technical features	The investment item should read Foggia - Gissi, because the part Gissi - Villanova was commissioned in early 2016
127	Central Southern Italy		Italy	Clustering of the investment items	Unclear why the Laino - Altomonte investment item is clustered together, given that only the other two investment items are reported in the Italian NDP (2017 version) to increase transfer capacity from Italy South to Italy Center South (Bisaccia - Deliceto +400 MW and Foggia - Gissi + 600 MW). Another project affecting the capacity from Italy South to Italy Center South (Montecorvino - Avellino - Benevento + 200 MW) is not reported in the TYNDP project
127	Central Southern Italy		Italy	Transfer capacity increase	The transfer capacity from Italy South to Italy Center South is identified as 0 MW. This is wrong, because the capacity increase is around 1000 MW
127	Central Southern Italy	96	Italy	Status	The project got full permitting in 2017
127	Central Southern Italy	96	Italy	Commissioning date	The commissioning date should be changed for 2021 in the EU TYNDP
127	Central Southern Italy	86	Italy	Commissioning date	The commissioning date should be changed for 2024 in the EU TYNDP
127	Central Southern Italy	86	Italy	Costs	The CAPEX of the investment is overestimated because the 400 million Euros relate to the entire Foggia - Villanova line (including the already constructed part). The Foggia - Gissi CAPEX should be around 170 million Euro

134	North-South Corridor in Western Germany (section South)	176	Germany	Commissioning date	The commissioning is planned for 2023
135	N-S Western DE_parallel lines		Germany	Clustering of the investment items	In the NDP the Investments are separated into two projects.
142	CSE4		Bulgaria	Costs	The CBCA decision on investment item 256 allows a deviation of CAPEX ±5%, in relation to the submitted value in the context of Investment Request
142	CSE4		Greece	Costs	The CBCA decision on investment item 256 allows a deviation of CAPEX ±5%, in relation to the submitted value in the context of Investment Request. There is a significant difference on OPEX of investment no. 256 between the CBCA decision (0.15 million Euro) and the data submitted by the Project Promoters in the ENTSO-E draft TYNDP 2018 project sheet (1.1 million Euro). This deviation has to be clarified
150	Italy-Slovenia	616	Italy	Technical features	Uncertainty on project phase 1 (see TYNDP 2018)
150	Italy-Slovenia		Italy	Benefits	The TYNDP project sheet states that the commissioning date may be after 2025 due to the status of the project in Slovenia. In such a case, benefits will not be delivered in 2025
150	Italy-Slovenia	616	Italy	Status	The project status should be changed for ‘under consideration’ in the EU TYNDP
150	Italy-Slovenia	616	Italy	Commissioning date	The commissioning date may be a later date
150	Italy-Slovenia	616	Slovenia	Status	The project status should be changed from ‘in permitting’ for ‘under consideration’ in the EU TYNDP
150	Italy-Slovenia	616	Slovenia	Commissioning date	The commissioning date is expected to be beyond 2030, (instead of 2025)
153	France-Alderney-Britain		UK (Great Britain)	Transfer capacity increase	Very small difference between the NG Interconnector register and the TYNDP. The register states 1460 MW export capacity compared to 1400 MW in the TYNDP. It is unclear however whether this exact value

					was used in the baseline for the NDP and it is not deemed to require amending
164	N-S Eastern DE_central section		Germany	Clustering of the investment items	Project 164 consists of three separate NDP projects (P24, P43, TTG-006).
167	Viking DKW-GB		UK (Great Britain)	Transfer capacity increase	The NG interconnector register states 1500 MW import and 1500 MW export, compared to the TYNDP value of 1400 MW for both. It is unclear however whether this exact value was used in the baseline for the NDP.
170	Baltics synchro with CE	1010	Latvia	Commissioning date	The commissioning date is 2023.
170	Baltics synchro with CE	1011	Latvia	Commissioning date	The commissioning date is 2024
170	Baltics synchro with CE	1010	Latvia	Costs	Investment item 1010 is 53.66 million Euro in the EU TYNDP , while 23 million Euro in the NDP
170	Baltics synchro with CE	1011	Latvia	Costs	Investment item 1011 is 27.2 million Euro in the EU TYNDP, while 22 million Euro in the NDP
170	Baltics synchro with CE		Poland	Technical features	The differences in line lengths were identified, which result from updating the data for TYNDP and NDP
170	Baltics synchro with CE		Poland	Clustering of the investment items	In NDP, there is no investment related to the new HVDC connection from Lithuania to Poland
172	ElecLink	1487	France	Commissioning date	The commissioning date should be changed for 2020 in the EU TYNDP
172	ElecLink		UK (Great Britain)	Transfer capacity increase	Very small difference between the NG Interconnector register and the TYNDP. The register states 1050 MW export, compared to 1000 MW in the TYNDP. It is unclear however whether this exact value was used in the baseline for the NDP so does not require amending
174	Greenconnector		Italy	Benefits	SEW should be amended by adding extra-SEW, as communicated by the promoter, to take into account the impact of some ancillary-service-related constraints in the day ahead market simulations. Furthermore, in case of higher NTC, the benefits would be higher. There are mistakes in the ENTSO-E TYNDP reference grid and

					obscure/wrong definition of some scenario assumptions, see ACER Opinion 10/2018 B4: No data were provided, albeit the promoter seems interested in calculating it (as long as ENTSO-E data would be available) SOS: different baselines for the calculation of experimental SoS and for the calculation of B1. ARERA supports the promoter request to use the Italian VOLL for the Italian ENS. Losses: As declared by ENTSO-E, the losses calculation is not reliable
183	DKW-DE, Westcoast	1018	Germany	Commissioning date	The commissioning for the German part of the connection between Klixbüll and the border (DE/DK) is planned for 2021 in the draft NDP 2019-2030
187	St. Peter (AT) - Pleinting (DE)	997	Germany	Commissioning date	The commissioning is planned for 2025 in the draft NDP 2019-2030
191	OWP TenneT Northsea Part 2	1513	Germany	Status	The project status should be changed for 'commissioned' in the EU TYNDP
192	OWP Northsea TenneT Part 3	659	Germany	Commissioning date	Ongoing evaluation of environmental aspects for the area that would be connected by the system. Therefore, the commissioning date is currently not available
193	Godelleta-Morella/La Plana		Spain	Technical features	There is a typographical error in the length of the line in the EU TYNDP. The right value is 227,5 km per circuit. However, this is a preliminary data and could change in future plans
194	Cartuja	561	Spain	Status	The project status should be changed for 'in permitting' in the EU TYNDP
194	Cartuja	929	Spain	Status	The project status should be changed for 'in permitting' in the EU TYNDP
194	Cartuja	561	Spain	Commissioning date	The commissioning date should be changed for 2023 in the EU TYNDP
194	Cartuja	929	Spain	Commissioning date	The commissioning date should be changed for 2023 in the EU TYNDP
197	N-S Finland P1 stage 2		Finland	Transfer capacity increase	According to 2017 NDP transfer capacity increase is 700 MW and according to EU TYNDP it is 1000 MW

207	Reinforcement Northwestern DE	940	Germany	Commissioning date	The commissioning is planned for 2029 in the draft NDP 2019-2030
207	Reinforcement Northwestern DE	676	Germany	Commissioning date	The commissioning is planned for 2029 in the draft NDP 2019-2030
219	EuroAsia Interconnector		Greece	Commissioning date	
230	GerPol Power Bridge I	355	Poland	Status	Status of investment in the EU TYNDP 2018 was based on previous NDP. In new NDP draft the status was updated to 'under construction'
230	GerPol Power Bridge I	353	Poland	Status	Status of investment in the EU TYNDP 2018 was based on previous NDP. In new NDP draft the status was updated for 'under construction'
230	GerPol Power Bridge I	1035	Poland	Status	Status of investment in the EU TYNDP 2018 was based on previous NDP. In new NDP draft the status was updated for 'under construction'
230	GerPol Power Bridge I	1232	Poland	Status	Status of investment in the EU TYNDP 2018 was based on previous NDP. In new NDP draft the status was updated for 'under construction'
230	GerPol Power Bridge I	1035	Poland	Commissioning date	Commissioning date in the EU TYNDP 2018 was based on previous NDP. In new NDP draft the commissioning date was updated to 2022
230	GerPol Power Bridge I		Poland	Costs	In NDP CAPEX was updated according to the maturity (change of status) of the project
240	380-kV-grid enhancement between Area Güstrow and Wolmirstedt	1460	Germany	Commissioning date	The commissioning is planned for 2022 in the draft NDP 2019-2030
242	Offshore Wind Baltic Sea (I)	194	Germany	Clustering of the investment items	Investment 194 consists of three Offshore-Connection Systems
244	Vigy - Uchtelfangen area	1514	France	Commissioning date	The commissioning date should be changed for 2028 in the EU TYNDP
247	AQUIND Interconnector		France	Benefits	The NRA observes discrepancies between the scenarios used to compute the SEW and the SoS indicator
247	AQUIND Interconnector		France	Commissioning date	Commissioning date seems to be underestimated in the EU TYNDP (i.e. 2022) and has been updated by the project promoter during the ongoing PCI selection process (i.e. 2023)

248	Offshore Wind Baltic Sea (II)	1248	Germany	Clustering of the investment items	Investment item 1248 consists of three Offshore-Connection Systems
248	Offshore Wind Baltic Sea (II)	1613	Germany	Commissioning date	Ongoing process to evaluate the exact commissioning date and technical configuration. The commissioning date will be available with the final NDP 2019-2030
248	Offshore Wind Baltic Sea (II)	1627	Germany	Commissioning date	Ongoing process to evaluate the exact commissioning date. Due to legal circumstances, the area that is supposed to be connected by the system is currently not available. Therefore, no commissioning date available yet
250	Merchant line Castasegna (CH) - Mese (IT)		Italy	Clustering of the investment items	As indicated in the TYNDP project sheet, the Castasegna - Mese line is complementary and connected to grid reinforcements. These grid reinforcements in Italy should be displayed as separate item(s)
251	Audorf-Dollern		Germany	Clustering of the investment items	TYNDP Projects 251 and 39 are clustered together in the NDP (TTG-005)
267	Hansa PowerBridge II	1262	Germany	Commissioning date	The commissioning is planned for 2035 in the draft NDP 2019-2030
269	Uprate the western 220kV Sevilla Ring	1228	Spain	Status	The investment was commissioned in June 2018, the investment status should be changed for 'commissioned' in the EU TYNDP
270	FR-ES project - Aragón-Atlantic Pyrenees	1211	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
270	FR-ES project - Aragón-Atlantic Pyrenees	1212	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
270	FR-ES project - Aragón-Atlantic Pyrenees	1214	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
270	FR-ES project - Aragón-Atlantic Pyrenees	1215	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP

270	FR-ES project - Aragón-Atlantic Pyrenees		France	Commissioning date	The commissioning date in the EU TYNDP 2018 (i.e. 2027) seems to be underestimated and has been updated by the project promoter during the ongoing PCI selection process (i.e. 2030)
270	FR-ES project - Aragón-Atlantic Pyrenees		France	Benefits	The NRA observes discrepancies between the scenarios used to compute the SEW and the SoS indicator and raised methodological concerns in the assessment of societal return of the investment and 'accelerated project implementation' benefits (already mentioned in the Agency's Opinion on the draft EU TYNDP 2018)
276	FR-ES project - Navarra-Landes	1206	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
276	FR-ES project - Navarra-Landes	1207	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
276	FR-ES project - Navarra-Landes	1208	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
276	FR-ES project - Navarra-Landes	1210	France	Status	The investment status should be changed for 'under consideration' in the EU TYNDP
276	FR-ES project - Navarra-Landes		France	Commissioning date	The commissioning date in the EU TYNDP (i.e. 2027) seems to be underestimated and has been updated by the project promoter during the ongoing PCI selection process (i.e. 2029)
276	FR-ES project - Navarra-Landes		France		The NRA observes discrepancies between the scenarios used to compute the SEW and the SoS indicator and raised methodological concerns in the assessment of societal return of the investment and 'accelerated project implementation' benefits (already mentioned in the Agency's Opinion on the draft EU TYNDP 2018)
283	TuNur		Italy	Benefits	Missing benefits are not acceptable (no monetisation, no studies). Furthermore, the non-CO2 benefit seems to relate to CO2 emissions
283	TuNur	1378	Italy	Status	The project status should be changed for 'under consideration' in the EU TYNDP
283	TuNur	1430	Italy	Status	The project status should be changed for 'under consideration' in the EU TYNDP

285	GridLink		France	Costs	Potential inconsistency is observed regarding the CAPEX indicated in the EU TYNDP: The project is composed of only one investment, which CAPEX is 906 million Euro, but the total project CAPEX is 860 million Euro
285	GridLink		France	Benefits	The B4 monetisation in the EU TYNDP shows methodological weaknesses.
285	GridLink		France	Commissioning date	The commissioning date in the EU TYNDP (i.e. 2022) seems to be underestimated and has been updated by the project promoter during the ongoing PCI selection process (i.e. 2024)
285	GridLink		UK (Great Britain)	Transfer capacity increase	The national grid interconnector register indicates an increase of 1500 MW import and 1500 MW export, compared to 1400 MW for both in the TYNDP. It is unclear however whether this exact value was used in the baseline
296	Britib	1437	France	Commissioning	The commissioning date in the EU TYNDP (i.e. 2024) appear to be unrealistic
296	Britib	1437	France	Costs	The project is composed of only one investment, which CAPEX is 2040 million Euro, but the total project CAPEX is 2200 million Euro. The project is composed of only one investment, which OPEX is 20 million Euro/year, but the total project OPEX is 22 million Euro/year.
299	SACOI3		Italy	Benefits	Doubts (at least lack of clarity) on the consistency of scenarios for calculating B6. experimental SoS
316	Upgrade of 220 kV line Bericevo-Divaca to 400 kV		Slovenia	Costs	In approved NDP 2017 total cost estimated is 130 million Euro. In draft NDP 2019 no cost data - project in study phase.
321	Herbertingen - Tiengen	1475	Germany	Commissioning date	The commissioning is planned for 2030 in the NDP 2019-2030.
322	Wullenstetten - Border Area (DE-AT)		Germany	Clustering of the investment items, Technical description	The project covers two NDP investments. Start and ending points of the TYNDP project should be clarified/better aligned with NDP

323	Dekani (SI) - Zaule (IT) interconnection		Italy	Transfer capacity increase	The promoter provided a TC increase of 150 MW for the Italian NDP 2018. Such value is significantly higher than the 10 MW TC increase (Slovenia to Italy), which is displayed in the TYNDP 2018
324	Redipuglia (IT) - Vrtojba (SI) interconnection		Italy	Transfer capacity increase	The promoter communicated a NTC increase of 150 MW for the Italian NDP 2018 (vs. 20 MW in the TYNDP 2018 - ENTSO-E estimate)
325	AT, SI, IT - South-East Alps Project		Italy	Clustering of the investment items	Presence of a cancelled investment
325	AT, SI, IT - South-East Alps Project		Italy	Transfer capacity increase	Inconsistency due to the presence of a cancelled investment
325	AT, SI, IT - South-East Alps Project		Italy	Benefits	Inconsistency due to the presence of a cancelled investment
325	AT, SI, IT - South-East Alps Project	1631	Italy	Status	The project status should be changed for 'cancelled' in the EU TYNDP
328	Interconnector DE-LUX	1620	Luxembourg	Technical features	Not clear from the TYNDP description which country is concerned
328	Interconnector DE-LUX	1629	Luxembourg	Commissioning date	The commissioning date is 2026 in the NDP
328	Interconnector DE-LUX	1620	Luxembourg	Commissioning date	No information in LU NDP
336	Prati (IT) – Steinach (AT)		Italy	Transfer capacity increase	The TC increase in the Italian draft NDP 2018 is 100 MW (vs. 90 MW in the TYNDP 2018)
336	Prati (IT) – Steinach (AT)		Italy	Benefits	No benefit analysis is carried out
338	Adriatic HVDC link		Italy	Costs	Italian draft NDP 2018: 1115 million Euro while TYNDP: 1150 million Euro (no information whether the small difference is due to normal project progress and updated estimates)
343	CSE1 New	1534	Croatia	Costs	In NDP it costs 52 million Euro, while in TYNDP it costs 65.5 million Euro

375	Lienz (AT) - Veneto region (IT) 220 kV		Italy	Technical features	The Italian draft NDP 2018 was vague regarding the features (and possible alternative options) for this project
375	Lienz (AT) - Veneto region (IT) 220 kV		Italy	Benefits	The benefit B4-RES is not acceptable
375	Lienz (AT) - Veneto region (IT) 220 kV	1555	Italy	Status	The project status should be changed for 'under consideration' in the EU TYNDP
375	Lienz (AT) - Veneto region (IT) 220 kV	1555	Italy	Commissioning date	The investment start construction in 2024/2025
381	OWP Northsea Part 4	211	Germany	Commissioning date	Ongoing process to evaluate the exact commissioning date. Therefore, no commissioning date available yet. The commissioning date will be available with the final NDP 2019-2030
381	OWP Northsea Part 4	1485	Germany	Commissioning date	Ongoing process to evaluate the exact commissioning date. Therefore, no commissioning date available yet. The commissioning date will be available with the final NDP 2019-2030
1029	PSPP Kozjak		Slovenia	Commissioning date	Commissioning date is uncertain due to environmental problems in construction of 400 kV OHL connection to transmission system