CONSULTATION Q&A

Final | 18 August 2021

TYNDP 2022 PROJECT PROMOTERS' GUIDANCE – COMMENTS RECEIVED DURING THE PUBLIC CONSULTATION & ENTSO-E'S ANSWERS

1. General Comments

Anonymous:

Page 8, Section 2.1 Eligibility criteria for all projects: The last section "Project promoters of storage projects ..." is in bold, we think there is an error, this should be option c) for the eligibility criteria and would like to ask for correction.

Could you define PHES in your document?

ENTSO-E's Answer:

In the Section 2.1. the last section is corrected by being indicated as Option C, thank you very much for your remarks.

For the definition of PHES (Pumped Heat Electrical Storage), please see following quote from Energy Storage Association (ESA)[1]. Please note that PHES is removed from the document to avoid any confusion, as the technologies are not limited with PHES.

> *"In Pumped Heat Electrical Storage (PHES), electricity is used to drive a storage engine connected to two large thermal stores. To store electricity, the electrical energy drives a heat pump, which pumps heat from the "cold store" to the "hot store" (similar to the operation of a refrigerator). To recover the energy, the heat pump is reversed to become a heat engine. The engine takes heat from the hot store, delivers waste heat to the cold store, and produces mechanical work. When recovering electricity the heat engine drives a generator.*
>
> *PHES requires the following elements: two low cost (usually steel) tanks filled with mineral particulate (gravel-sized particles of crushed rock) and a means of efficiently compressing and expanding gas. A closed circuit filled with the working gas connects the two stores, the compressor and the expander. A monatomic gas such as argon is ideal as the working gas as it heat/cools much more than air for the same pressure increase/drop – this in turn significantly reduces the storage cost.*
>
> *The process proceeds as follows: the argon, at ambient pressure and temperature (top left limb of the circuit on the diagram), enters the compressor (diagram shows a rotating compressor symbol – all equipment is in fact reciprocating). The compressor is driven by a motor/ generator (top) using the electricity that needs*

[1] *ESA, Retrieved on 2nd August 2021, https://energystorage.org/why-energy-storage/technologies/pumped-heat-electrical-storage-phes/*

to be stored (yellow arrows at top). The argon is compressed to 12 bar, +500°C. It enters the top of the hot storage vessel and flows slowly (typically less than 0.3m/s) through the particulate, heating the particulate and cooling the gas. As the particulate heats up, a hot front moves down the tank (at approximately 1m/hour). At the bottom of the tank, the argon exits, still at nearly 12 bar but now at ambient temperature. It then enters the expander (bottom) and is expanded back to ambient pressure, cooling to minus -160°C. The argon then enters the bottom of the cold vessel and flows slowly up, cooling the particulate and itself being warmed. It leaves the top of the tank back at ambient pressure and temperature.

To recover the power (i.e. discharge), the gas flow (and all arrows on the diagram) is simply reversed. Argon at ambient temperature and pressure enters the cold tank and flows slowly down through it, warming the particulate and itself becoming cold. It leaves the bottom of the tank at -160°C and enters the compressor. It is compressed to 12 bar, heating back up to ambient temperature. It then enters the bottom of the hot tank. It flows up, cooling the particulate and itself being warmed to +500°C. The hot pressurized gas then enters the expander where it gives up its energy producing work, which drives the motor/generator. The expected AC to AC round trip efficiency is 75-80%.

PHES can address markets that require response times in the region of minutes upwards. The system uses gravel as the storage medium, so it offers a very low cost storage solution. There are no potential supply constraints on any of the materials used in this system. Plant size is expected to be in the range of 2-5 MW per unit. Grouping of units can provide GW-sized installations. This covers all markets currently addressed by pumped hydro and a number of others that are suitable for local distribution, for example, voltage support. Technology is in development stage and commercial systems are due in 2014".

2. Please share here any comment or question on the Guidance - Specific comments on technical criteria (and related documentation)

Anonymous:

Page 17 shows the requirement that the project shall provide at least 225 MW installed capacity. We ask you to consider a reduction to 100MW. There are storage systems that could still provide the net annual electricity generation of 250 GWh/year with 100 MW installed capacity.

page 19 says "the promoter indicates whether the project presents a natural inflow (for PHES)". We do not know what that means? We like to ask for clarification. Natural inflow is the storage inflow that comes separately from the main source (river in case of pump storage). Example for the pump storage could be melting snow.

ENTSO-E's Answer:

As the required installed capacity is linked to the current TEN-E regulation, we cannot change this requirement. TEN-E Regulation Annex IV (1) (b) reads[2]:

[2] Regulation (EU) No 347/2013, guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009, Annex IV (1) (b)., https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0347&from=en

"b) for electricity storage, the project provides at least 225 MW installed capacity and has a storage capacity that allows a net annual electricity generation of 250 Gigawatt-hours/year"

For the second part of question (PHES) please see our answer to the previous question.

CurrENT Europe:

We suggest to add "Digitalisation projects" as a third category of projects, recognising that new transmission capacity, more storage and enhanced utilisation through digitalisation, are the three elements of the infrastructure transition.

In section 2.2.2 on estimation of increase in NTC, we suggest to add the requirement that the effects of grid enhancing technologies has to be considered as a supplement or alternative to building new grids. This change aims to ensure compliance with the efficiency first principle.

Many grid enhancing technologies and innovative solutions have medium to high TRLs and are ready for wide-scale implementation, but have not been included in TYNDP projects in past years. The TYNDP 2022 process should support inclusion of such technologies and solutions, in addition to conventional infrastructure. The ENTSO-E Technopedia is a useful reference on the wide range of technologies available.

ENTSO-E's Answer:

In the current TYNDP, there are several technologies that apply to digitalisation that can be part and are already part of the project & process (For example: HighT[a] conductors, DLR, FACTs, SSSC).

Regarding smart grid projects, as the current TEN-E Regulation does not require their inclusion; we have not included them in the TYNDP so far. We do recognize the importance of smart grid projects and their role in the infrastructure transition, however with the current TYNDP design (methodology and calculation method etc.) and timeframe, inclusion of these projects is not possible for this TYNDP 2022.

3. Please share here any comment or question on the Guidance - Specific comments on project assessment, review procedure and data handling

3d-Hydro Engineering GmbH

With regard to CBA:

1. The experience from past CBA shows that the methodology for calculation of the various indicators is available very (or too) late in the process. We propose to communicate the methodologies as early as possible in order to give promoters enough time to calculate the required figures.

2. Please try to monetize as much indicators as possible. In particular, avoided cost of non greenhouse gas emissions, based on EEA data, shows beneficial effects to the projects.

ENTSO-E's Answer:

The indicators for the CBA assessment and the approach behind them are included in the CBA guideline. The CBA guideline is not part of the consultation but is a separate guideline that is referenced in the Project Promoters Guideline. The 3rd ENTSO-E guideline for the CBA has been submitted to the European Commission for approval. Please find following clarification for your information regarding to the CBA;

1. The Implementation guidance for TYNDP 2022 will be completed and published before the initiation of the CBA process.

2. A monetisation of the non-CO2 indicator is currently not proposed in this methodology. This is because it is unlikely that future improvements in emission reductions, due to filters or increases in efficiency, will have a comparable effect at lower costs. When monetising the non-CO2 indicator, a project might become beneficial, or even non-beneficial, simply because of this impact. Therefore, it can be strongly impacted by future technologies. However, at the moment no such future technologies are in place, the non-CO2 indicator has to be shown on a quantified basis in order to complement the CBA assessment.

CurrENT Europe

Project Assessment:

Project Promoters must have the flexibility to adapt, change or propose new solutions if a better solution becomes available or is identified.

Given that innovation can be commercialised or proven at scale in a very short amount of time, innovative or new technologies will continue to become viable solutions for Europe during the time between projects being proposed to the TYNDP and their implementation on the grid (often 3yrs+). To ensure that the best solutions for society are ultimately delivered, the TYNDP process must provide flexibility to promoters to easily adapt, change or propose new solutions at any point if new solutions become available or they identify a superior solution that meets the same system need more efficiently.

The 'cost of delay' must be reflected in the assessment of TYNDP projects, and flexible solutions must be fairly valued.

currENT advocates for the optimisation and reinforcement of grids as a first step in grid development. While new grids are essential to meet certain long-term system needs, there is often scope to also utilise available capacity on the existing grid using flexible grid enhancing solutions. This can deliver earlier benefits to consumers while new infrastructure is 'in permitting' or under construction (e.g. by reducing constraint costs), and in some cases even defer or eliminate the need for the new infrastructure. The value of reducing carbon emissions in the near-term and making progress towards a high-RES grid now is far greater than reducing the same carbon emissions in 10 years' time. This 'cost of delay' associated with large infrastructure projects must be taken into account when considering which project should be taken forward to meet an identified system need.

Review Procedure/Assessment of existing projects:

Project Promoters must have the flexibility to adapt, change or propose new solutions if a better solution becomes available or is identified.

Given that innovation can be commercialised or proven at scale in a very short amount of time, innovative or new technologies will continue to become viable solutions for Europe during the time between projects being proposed to the TYNDP and their implementation on the grid (often 3yrs+). To ensure that the best solutions for society are ultimately delivered, the TYNDP process must provide flexibility to promoters to easily adapt, change or propose new solutions at any point if new solutions become available or they identify a superior solution that meets the same system need more efficiently.

We propose that there should be greater recognition of the full range of cost-effective solutions that can provide additional capacity, and support optimizing the use of the existing grid.

ENTSO-E's Answer:

The TYNDP project has a defined timeline and scope which are defined by the regulation. Considering its stringent requirements within the given timeline, it is not possible to provide flexible approach for project adaptation. Such an approach would cause inconsistencies in the following process of the TYNDP project (CBA calculation etc.) and would not allow timely delivery of the results. Any further modifications that might occur on the projects after the project data collection time frame can always be submitted to the TYNDP for the next cycle.

For the second part of your question, the indicators for the CBA assessment and the approach behind them are included in the CBA guideline. The CBA guideline is not part of the consultation but a separate guideline that is referenced in the Project Promoters Guideline. The 3rd ENTSO-E guideline for the CBA has been submitted to the European Commission for approval.

However, since the efficient use of the system is a pillar of ENTSO-E's approach to the energy transition, our CBA team will be informed about your comments to be evaluated for the next CBA guideline.