Heavily Modified Water Bodies: the WFD's tool to consider specific uses

Eurelectric policy briefing note

July 2020

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We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

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The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

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embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

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Heavily Modified Water Bodies – the Water Framework Directive's tool to consider specific uses

A Eurelectric policy briefing note July 2020

For more than two years, Eurelectric has provided detailed input and examples within the process of developing the new Guidance Document no. 37 "Steps for defining and assessing ecological potential for improving comparability of Heavily Modified Water Bodies" of the Water Framework Directive's Common Implementation Strategy (CIS). We have welcomed the final guidance published in February 2020. However, as this legally non-binding document still raises questions that might lead to different interpretations, Eurelectric recommends considering the following when applying the new Guidance Document no. 37:

KEY MESSAGES

- **Environmental objectives of the EU Water Framework Directive (WFD) for all European surface waters are** the Good Chemical Status (GCS) as well as **the Good Ecological Status (GES) for natural water bodies, or the Good Ecological Potential (GEP) for Heavily Modified Water Bodies (HMWBs)** and for Artificial Water Bodies (AWBs).

- **HMWBs constitute a surface water category of their own.** Since human development has substantially changed the character of these water bodies across Europe over decades, different targets and reference conditions have to be set: **The reference conditions for HMWBs (the so-called Maximum Ecological Potential, MEP), shall be assessed on a case by case basis**, taking into account the physical changes caused by specific uses, including hydropower generation, inland navigation, irrigation, flood protection and the overall utilisation of near-water spaces, etc.

- **The new CIS Guidance Document no. 37**, "Steps for defining and assessing ecological potential for improving comparability of Heavily Modified Water Bodies" **supplements the CIS Document no. 4** "Identification and Designation of Heavily Modified and Artificial Water Bodies" published in 2003. The new Guidance Document introduces a detailed, step-wise approach for the assessment of HMWBs, including best practice examples.

- **The definition of the Good Ecological Potential (GEP) as "close to best approximation to ecological continuum" leaves room for interpretation**. Especially, this definition bears the risk to understand the GEP as a set of mitigation measures with a strong focus on continuity, without sufficiently considering ecological benefits. Instead, **Maximum Ecological Potential (MEP) and Good Ecological Potential (GEP) are not binding sets of mitigation measures but ranges of biological values that could be reached by implementing the considered measures.**

- In the new CIS Guidance Document no. 37, the assessment of the Maximum Ecological Potential (MEP) includes the term "best approximation to ecological continuum". Achieving

an ecological continuum ensures that the habitats for type-specific aquatic species are interconnected in space and time, with the aim that species can fulfil their lifecycles. **The best approximation to ecological continuum shall even be achievable under changed physical conditions without causing significant harm to specific uses**. This means that, for example, river continuity for fish should only be realised in case fish migration is a precondition for a sustainable natural reproduction of the specific fish population, as well as if the mitigation measures (enabling river continuity) will not have significant adverse effects on hydropower generation.

- **The Member States should have sufficient flexibility to assess adverse effects and thresholds, whereas there is a need for EU-wide transparency and coherence.** The Member States can **designate HMWB** and should keep this competence together with the possibility to assess adverse effects as well as thresholds for significant effects. At the same time, it has to be ensured that GEP classification methods are compliant with the WFD and that classification results are comparable between the Member States. This balancing shall be **guaranteed by a continuous exchange of information and an inter-comparison of the national approaches** (i.e. how the Member States have addressed the key steps of the Guidance).

- **Following the subsidiarity principle, significant adverse effects on specific uses should be assessed at the local level.** All effects can be determined locally, at the level of a water body, a group of water bodies, a region, at national scale, or at River Basin District (in case of the Rhine and the Danube, even involving several countries and the EU working towards a joint management of water). The starting point will and should usually be the assessment of local effects.

- Concerning hydropower, significant adverse effects on specific uses should be assessed at the most local level possible, **whereas a full range of criteria, such as generation and flexibility losses, as well as financial losses have to be taken into account.**

Heavily Modified Water Bodies – the Water Framework Directive's tool to consider specific uses

WFD and CIS Guidance Documents

Environmental objectives of the EU Water Framework Directive (WFD) for all European surface waters are the good chemical and good ecological status (for natural water bodies), or the good ecological potential (for Heavily Modified Water Bodies, HMWBs and Artificial Water Bodies, AWBs). Article 4(3) of the WFD allows Member States to identify and to designate surface water bodies which have been physically altered by human activity as "heavily modified" under specific circumstances, whereas Common Implementation Strategy (CIS) Guidance Documents no. 4 and no. 37 have been elaborated to assist stakeholders with the respective application.

The WFD defines HMWBs as a separate surface water category, beside other categories such as rivers, lakes, transitional waters and coastal waters. The reason for introducing the category of HMWBs to the WFD was that human development (the so-called "specific uses", including hydropower generation, inland navigation, irrigation, flood protection, the overall utilization of near-water spaces, etc.) has substantially changed the character of many water bodies throughout Europe over decades, even centuries. In these water bodies, it is not possible to aim for the same kind of biology as in natural water bodies, hence, a definition of separate objectives is necessary. The procedure to define objectives and reference conditions for HMWBs differs from that of natural waters (differentiation into types and trying to find undisturbed reference sites for those types). **Every HMWB is in this way its own type and reference conditions shall be assessed case by case.**

CIS Guidance Document no. 4 on "Artificial and Heavily Modified Water Bodies" was published in 2003. The document follows quite closely the classification procedure described in the WFD. Following this guidance for classification means that reference conditions for biological quality elements for every single HMWB have to be defined (reference approach).
As Member States faced difficulties in defining reference conditions for HMWBs and in collecting sufficient biological monitoring data, indirect methods for classifying HMWBs have been developed. The WFD CIS workshop in Prague 2005 introduced the so-called "mitigation measure approach" (Prague method), which is now applied in many Member States.

A proper use of both methods (following either the approach described in CIS Guidance Document no. 4 or the Prague method) results in the same values for Biological Quality Elements (BQEs) in GEP. However, when the "mitigation measure approach" is applied, the GEP could be misunderstood as a mere implementation of a set of mitigation measures linked to flow and river continuity instead of a range of values of biological quality elements.

Reference conditions (MEP) and environmental objective (GEP) for Heavily Modified Water Bodies (HMWB)

The new CIS Guidance Document no. 37, "Steps for defining and assessing ecological potential for improving comparability of Heavily Modified Water Bodies", was published in February 2020 to supplement Guidance Document no. 4. The new guidance aims to clarify both, the original Guidance Document no. 4 classification procedure and the "mitigation measure approach" (Prague method), by introducing a detailed, step-wise approach with concrete examples. The necessity to

monitor the current state of biology,[1] and to assess the effect of considered mitigation measures on the values of biological quality elements,[2;3] are both emphasized in the new guidance.

Maximum Ecological Potential (MEP) and Good Ecological Potential (GEP) are not sets of mitigation measures but they are defined as biological values, which could be reached by implementing considered mitigation measures.

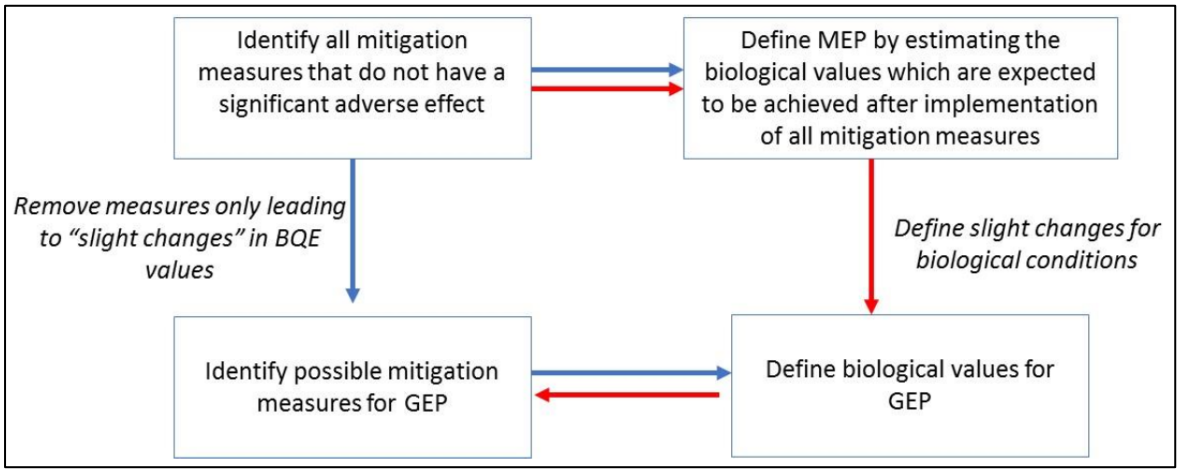

Figure 1: The reference approach (red arrows) as well as the mitigation measure approach (blue arrows; "Prague-method") aim to assess Biological Quality Elements (see figure 3 of the CIS Guidance Document no. 37)

The GEP is not a set of mitigation measures, but a range of values for biological quality elements. The new guidance aims to clarify the differences and links between natural water bodies and HMWBs. Generally, Member States may designate a water body as a HMWB (Art 4.3, WFD), in case the achievement of the good status requires changes to physical characteristics, having a significant adverse effect on specific uses, such as hydropower. Consequently, the values of the biological quality elements cannot be the same in natural water bodies and in HMWBs. Figure 2 below indicates that the reference condition (MEP) as well as the environmental objective (GEP) of HMWBs are lower than the good ecological status (GES) of natural water bodies. Following the definition for HMWB (Article 4.3 WFD), the values classifying the BQEs of HMWBs are lower than those of the Good Ecological Status (GES) of the nearest comparable natural waterbody. For example, this means that a water body might reach the GEP even if a moderate number of fish species is absent.[4]

[1] CIS Guidance Document no. 37, page 77: *"To assess the effects of any mitigation measures already in place and the need for further mitigation measures, the ecological condition of the HMWB should be monitored […]."*

[2] CIS Guidance Document no. 37, page 28: "*GEP is ultimately defined as the biological values that are expected from successfully implementing the selected mitigation measures."*

[3] CIS Guidance Document no. 37, page 31: "*It is noted that in the mitigation measures approach, mitigation measures by themselves are not the GEP objective, but a means to define GEP*."

[4] WFD, ANNEX V 1.2.1 Definitions for high, good and moderate ecological status in rivers. Moderate status for fish fauna: "*Age structure of the fish communities shows major signs of anthropogenic disturbance, to the extent that a moderate proportion of the type specific species are absent or of very low abundance*."

In defining the MEP, only mitigation measures with no significant adverse effect on use (i.e. on hydropower) can be included.[5] According to the new guidance, the range of values for biological quality elements to all status classes should be defined also for HMWBs (CIS Guidance Document no. 37, pages 29 and 70).

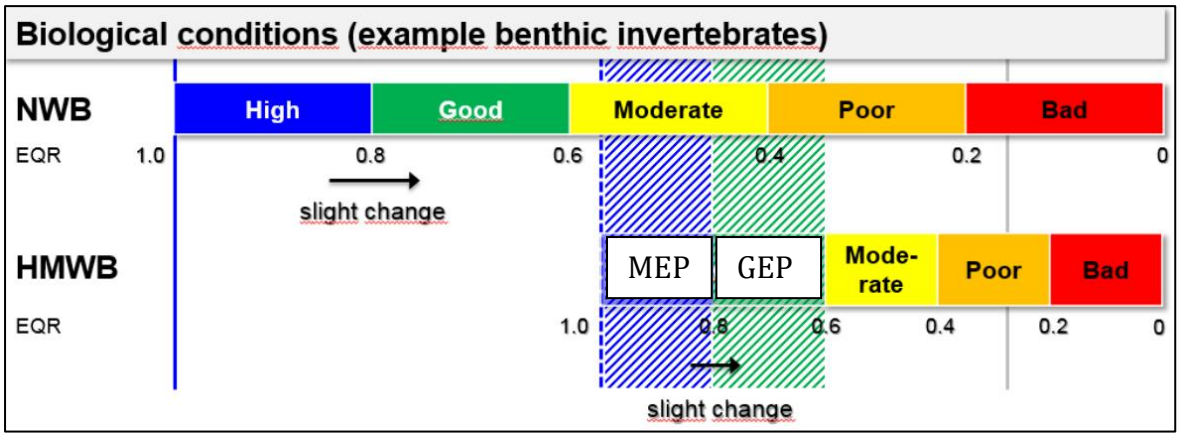

Figure 2: Example of five equidistant classes for ecological potential (based on figure 9, Guidance Document no. 37)[6]

According to Guidance Document no. 37, "best approximation to ecological continuum" shall be used in defining reference conditions (= MEP). Consequently, conditions at the environmental objective (= GEP) should be "close to best approximation to ecological continuum". Following the step-wise definition process described in CIS Guidance Document no. 37, hydromorphology used in Maximum Ecological Potential (MEP) assessment will often be far from natural river conditions. However, in defining "best approximation to ecological continuum" for MEP and GEP, relevant mitigation measures should be excluded in case they have significant adverse effect on use, e.g. hydropower or do not give sufficient ecological benefits (e.g. due to lack of spawning habitats upstream or other hydromorphological changes).[5]

Figure 3: It is not possible to return to natural or nearly natural physical conditions without significant adverse effect on hydropower

[5] CIS Guidance Document no. 37, page 43: The (potentially relevant) mitigation measures can be excluded from MEP (and GEP) due to three main reasons:

- The mitigation measure is not relevant for the type of water body
- The mitigation measure is not ecologically effective
- The mitigation measure has significant adverse effects on use(s) or the wider environment

[6] CIS Guidance Document no. 37, page 31: *"The two approaches [the reference approach as well as the mitigation measures approach] should lead to comparable outcomes in ecological terms. There are various ways to describe ecological targets whichever approach is applied. For example, semi-quantitative descriptions of ecosystem functioning or modified ecological quality ratio (EQR) values."*

Ecological continuum and river continuity

The WFD as well as several Guidance Documents (such as no. 4, no. 31, no. 37, etc.) provide definitions for “ecological continuum”, "best approximation to the ecological continuum" and “river continuity”, whereas it is advisable to scrutinize the specific differences:

- Achieving an **ecological continuum** ensures that the habitats for type-specific aquatic species are interconnected in space and time so that the species can fulfil their life cycles.
- The **best approximation to ecological continuum** is used to choose mitigation measures for assessing values for BQEs at MEP. The best approximation to ecological continuum shall be achievable under changed physical conditions without causing significant harm to specific uses (WFD Article 4.3, Annex V; normative definitions).
- **River continuity** means that migration of fauna and sediment transport are not hindered.

In practice, the ecological continuum has invariably been modified in HMWBs. According to Guidance Document no. 37, "the best approximation to ecological continuum" requires river continuity for fish (enabling the migration of fish) in situations where it can enable a sustainable natural reproduction of fish population. The need of river continuity is species-specific as, in many cases, some fish species can fulfil their lifecycles in a specific water body without the need to migrate. However, **mitigation measures enabling river continuity shall not have significant adverse effect on use.**

Significant adverse effects on use or the wider environment

According to WFD Article 4.3, Member States can designate a water body as a HMWB, if reaching good status requires changes to physical characteristics, which would have significant adverse effect on specific uses, including hydropower. Significant adverse effects on use have been discussed in CIS Guidance Document no. 4 and mainly repeated in Guidance Document no. 37. According to the papers, the significance of adverse effects has to be assessed twice:

- During the designation of HMWBs; for the measures considered to reach the Good Status (restoration measures for GES);
- After the designation process; for the measures considered in the assessment of reference conditions, MEP and environmental objective, GEP (mitigation measures).

Due to the nature of HMWBs, the CIS Guidance Documents no. 4 and no. 37 do not provide any specific threshold value for significant adverse effects on use.[7] Water bodies, hydropower plants and energy systems differ in their types, sizes and locations (member states, market areas). However, the new Guidance Document suggests that Member States need to establish criteria and thresholds for significant adverse effects to enhance transparency of implementation.[8] Some countries have established national upper limit levels for annual hydropower generation losses and these are also listed in the new Guidance Document (see table 1 below). However, following the subsidiarity principle, significant adverse effects on specific uses, including hydropower, should be assessed at the most local level possible.

[7] WFD CIS Guidance Document no. 4, page 40: *“It is not considered possible to derive a standard definition for ‘significant’ adverse effect. ‘Significance’ will vary between sectors and will be influenced by the socioeconomic priorities of Member States.”*

[8] WFD CIS Guidance Document no. 37, page 19*: “Member States need to establish criteria and thresholds for deciding if these measures would have a significant (or not significant) effect on use. […] not only one criterion may be considered but several criteria may need to be used*.”

Table 1: Examples of adverse effects of mitigation measures on water storage for hydropower and assessment of significance (taken from: CIS Guidance Document no. 37, Table 13)

Benefits of storage for hydropower	Effects of measures on storage for hydropower	Criteria for assessing adverse effect on use	Level/scale at which this assessment may take place	When is an adverse effect significant
Electricity production (base load) Compared to annual production (%)	Production loss (base load) Effect on climate change drivers and CO2 emissions (effect on wider environment)	Exact figure (production, MWh) Compared to renewable energy targets (%)	National, regional	Examples of national estimates of significance: Scotland: >2% of annual national production AT: >3% loss of annual national production at any rate (maybe already even less) SE: >2.3% loss of annual national production NO: estimates available but no specific threshold of significance
Flexibility (regulatory power, peak load production)	Loss of flexible capacity Loss in minimum safe capacity Effect on climate change drivers and CO2 emissions (effect on wider environment)	Range of flexibility	National, local level	Quite unlikely to set quantitative threshold for significance
Regional or national energy security	Significant risk to regional or national energy safety of electricity supply Significant risk to regional or national security of grid stability	Risk to security	National, local level	No significant risk to security can be accepted

As stated in WFD CIS Guidance Document no. 4, page 39, in assessing "significant adverse effects" economic effects play a crucial role, but social aspects, too, need to be considered.[9] Effects can be determined at the level of a water body, a group of water bodies, a region, a River Basin District or at national scale. In some cases, it may be appropriate to consider effects at more than one scale in order to ensure the most appropriate assessment.

[9] WFD CIS Guidance Document No. 4, page 39f: *"In assessing 'significant adverse effects' on the specified uses, economic effects will play an important role, but also social aspects may need to be considered […]."*

The starting point will usually be the assessment of local effects.[10] The new Guidance Document emphasizes both, the regional and national level for determining HMWB.[11] At the stage of MEP definition, the local scale is generally relevant for assessing significant adverse effects, but the assessment has to be linked to a general or national method on how to assess these effects. At this stage, no one should be discriminated against or categorised according to its financial strength and ability to pay.[12] However, the adverse effect would clearly be significant, if it compromised the long-term viability of the specific use by significantly reducing its performance.[13;14] In other words, also an individual project shall be able to keep its "business case".

Permitting of new projects under Article 4.7

WFD Article 4.7 allows permitting of hydropower plants even if they deteriorate water bodies from good to moderate or worse. These water bodies will be designated as HMWBs in the next cycle of River Basin Management Plans (RBMPs), if GES cannot be longer achieved. According to the EU Court of Justice (ECJ) decision on the Schwarze Sulm (C-346/14 European Commission v Republic of Austria), even a small hydropower plant could receive a permit, using Article 4.7. Given this plant's planned annual electricity generation of 17.8 GWh, equalling to only 0.2% of the Austrian annual electricity consumption, it is obvious that the project is not significant at national level. This clearly shows that also a water body characterised by a small hydropower plant can be designated as a HMWB and simultaneously highlights the relevance of considering the right level when assessing the significance of adverse effects on specific uses. Furthermore, the ECJ judgement considers the new hydropower plant a sustainable development project and compares benefits of new plants with possible lost benefits to society due to deterioration – an important aspect for the assessment of significant adverse effects on specific uses, especially for the designation of HMWBs.

Hydropower: renewable electricity and flexibility

In the CIS workshop on significant adverse effects in spring 2019, Eurelectric emphasized the need to keep the flexibility of hydropower in order to reach the overall EU goals of decarbonisation. Quite small limits to make full use of the flexibility provided by hydropower plants could be significant: Flexibility (regulatory power, peak load production), energy security and effects on climate change are now specifically mentioned in the new Guidance (see table 1 above).

[10] WFD CIS Guidance Document no. 4, page 40: *"Effects can be determined at the level of a water body, a group of water bodies, a region, a RBD or at national scale. […] In some cases it may be appropriate to consider effects at more than one scale in order to ensure the most appropriate assessment. The starting point will usually be the assessment of local effects."*

[11] WFD CIS Guidance Document no 37, page 20: *"If the main importance of the use lies at national level, then local effects should be accumulated at national level to assess significance."*

[12] WFD CIS Guidance Document no. 4, page 40: *"The ability of the user to pay is not relevant at this stage as this would potentially discriminate against efficient and profitable enterprises*."

[13] WFD CIS Guidance Document no. 4, page 40 as well as WFD CIS Guidance Document no. 37, page 60: *"[…] the effect would clearly be significant if it compromised the long-term viability of the specified use by significantly reducing its performance*."

[14] WFD CIS Guidance Document no. 4, page 49: […] *"This is particularly relevant when the necessary "measures" imply the cessation of specified uses, functions and related human activities."*

The new Guidance Document gives examples concerning significant losses[15]; regarding hydropower, **a full range of criteria such as generation losses, flexibility losses as well as financial losses have to be taken into account.** According to the new Guidance Document, the distance between "no effect" and "significant effect" can be comparably small, for example in provision of regulatory power.[16]
CIS guidance documents exclude capital costs and technical feasibility of possible mitigation measures from assessment of significant adverse effects on specific uses. However, other economic effects are included, whereas impractical measures, such as extremely costly measures, should be excluded from any detailed assessment.[17]

Needed: a level playing field for all affected stakeholders

The CIS guidance documents stress the need for equal treatment between different actors. For this reason, the measures already taken should be taken into account when considering the adverse effects on specific uses. For example, if a hydropower plant permit includes minimum flow as a mitigation measure, it should be added to the adverse effects caused by additional mitigation measures being considered. In this context, the economic situation of operators should not be taken into account in the assessment of adverse effects.

Abbreviations

AWD	Artificial Water Bodies
BQE	Biological Quality Element
CIS	Common Implementation Strategy
EQR	Ecological Quality Ratio
GCS	Good Chemical Status
GEP	Good Ecological Potential
GES	Good Ecological Status
HMWB	Heavily Modified Water Body
MEP	Maximum Ecological Potential
NWB	Natural Water Bodies
RBMP	River Basin Management Plan
WFD	Water Framework Directive

[15] WFD CIS Guidance Document no. 37, page 60: *"For instance, how does a level of significance of adverse effect of less than 5% of reduction in annual electricity base load production compare to natural variation in annual production of 5-10%? Natural variation implies that, in dry years, a country would have certain energy loss, therefore any reduction to energy (base load) production should not be considered automatically as significant adverse effect."*
[16] WFD CIS Guidance Document no. 37, page 60: *"However, in some cases, the distance between "no effect" and "significant effect" can be comparably small, for example in case of 100-year flood safety or regulatory power provision."*
[17] WFD CIS Guidance Document no. 4, page 57: *"Although all mitigation measures should be identified, it would not be useful to further consider measures that were impractical. Such impractical measures should be excluded from any detailed assessment"*

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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