

The European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC) and European Chemical Industry Council Long-Range Research Initiative (Cefic LRI) Environmental Sciences Scoping Meeting 2020

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The *European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC)* and the *European Chemical Industry Council Long-range Research Initiative (Cefic LRI)* convened the *Environmental Sciences Scoping Meeting 2020* that took place on 28 and 29 January 2020 in Brussels, Belgium. Approximately 60 invited participants from Europe and North America representing ECETOC and Cefic member companies, academia, regulators, and consultancies attended the meeting; see meeting programme [here](#) for a list of participants.

Olivier de Matos (Secretary General, ECETOC, Belgium) and **Bruno Hubesch** (Cefic LRI, Belgium) opened the meeting, outlined its agenda and provided an overview of activities that were initiated and conducted since the 2019 Environmental Sciences Scoping Meeting.

During 2019, seven ECETOC Task Forces (TFs) on environmental sciences were active as well as nine TFs and a new Transformational Programme (TP) relating to human health and exposure sciences, and a number of workshops (WSs) and expert group meetings (ExpGs) were held. Overall, more than one hundred experts were involved, which is a sign of the trust and relevance of the ECETOC work. In 2020, planned outputs include nine Technical Reports (TRs), a range of publications and workshop reports, and at least two contributions to the Society of Environmental Toxicology and Chemistry (SETAC) Europe 30th Annual Meeting in May 2020 (<https://dublin.setac.org>).

Cefic LRI initiated three new environmental sciences projects that shall begin shortly (Table 1).

Table 1: Cefic LRI – environmental sciences projects initiated in 2019 and planned to begin in 2020

Project	Budget	Lead researcher
<u>ECO51</u> : Strengthening weight-of-evidence for FET data to replace acute fish toxicity (SWiFT) [a]	250k € over 2 years	Adam Lillicrap, Norwegian Institute for Water Research (NO)
<u>ECO52</u> : Bioavailability, complex substances and overall persistence (BCOP): three themes to deliver a step-change in persistence assessments [b]	231k € over 2 years	Christopher Hughes, Ricardo Energy and Environment (UK)
<u>ECO53</u> : A chemical categorisation approach for long-range transport assessment (CC-ALT) [c]	280k € over 2 years	Knut Breivik, Norwegian Institute for Air Research (NO)

Footnote to Table 1 – corresponding Requests for Proposal (RfPs):

[a] Integrating the fish embryo test into the weight-of-evidence to inform on acute fish toxicity.

[b] Expanding the conceptual principles and applicability domain of persistence screening and prioritisation frameworks, including single constituents, polymers and UVCBs.

[c] Breakthrough developments in the characterisation of long-range transport of chemicals.

For the remainder of Day 1, the meeting moderator **Dennis Landsbert-Noon** (Panda Communications, Belgium) lead through a series of elevator pitch presentations of proposals for new ECETOC and Cefic LRI activity. The elevator pitch presentations were 5-minute presentations by the respective idea submitter or a designated colleague, each followed by a brief questions & answers (Q&A) session.

All proposed activities were further discussed on Day 2 in World Café sessions; see meeting programme [here](#) for process of the World Café sessions.

Below, **important points of discussion from the respective elevator pitch Q&A (Day 1) and World Café sessions (Day 2) are summarised together**. To complement this report, please refer to the slides from the elevator pitch presentations and the plenary slides summarising the outcomes of the World Café sessions available [here](#).

Session I: Risk assessment, risk management and communication

The environmental risk and remediation of persistent, mobile, toxic (PMT) and very persistent and very mobile (vPvM) substances in the aquatic environment [LRI] Code ENV 3

Sarah Hale, Norwegian Geotechnical Institute (Norway)

Since it is neither possible, nor always desirable, to substitute all persistent substances, ‘remediation’ in this context implies that the risks potentially caused by the respective substances need to be known so that risks can be weighed against benefit and prospective and retrospective remediation can take place. Better risk assessment tools are needed for this purpose, ensuring that both hazard and exposure are considered.

Findings from the planned project shall also serve to provide sound scientific evidence for ongoing regulatory PMT and vPvM initiatives or to support requests for their adaptation. This is particularly important since substances identified as ‘PMT’ will most likely be assessed as being of high concern.

During the World Café discussions, it was proposed to vote on ENV 3 and ENV 14 (see below) together, and this was agreed in the subsequent plenary. Overall, the work should help to understand the potential risks posed by persistent and mobile substances and contribute to the ongoing regulatory discussions (further considering findings from the ECETOC TF [‘Persistent chemicals and water resources protection’](#) and potentially Cefic LRI project ECO53; see Table 1).

Green-house gas emission tracking for chemical companies: Simplified, harmonised and globally applicable [ECETOC WS / ExpG] Code ENV 5

Johannes Tolls, Henkel AG & Co. KGaA (Germany)

Considering the broad spectrum of industry portfolios, it is often not easy or straightforward to determine how much CO₂ is delivered into the environment. The topic as such is increasingly gaining importance. Even though the proposed activity does not fully match ECETOC’s mission, an ECETOC ExpG is suggested because it is an established means to bring together all relevant stakeholders and agree a path forward.

From bioavailability science to prospective regulation of organic chemicals [LRI] Code ENV 7

Jose Julio Ortega Calvo, Instituto de Recursos Naturales y Agrobiología de Sevilla - IRNASE (Spain)

Even though this proposed activity has some similar themes to the ‘PMT proposal’ ENV 3 (see above), it shall focus on bioavailability, whereas ENV 3 focusses on risk assessment in general, of which bioavailability is only one aspect.

The proposed activity aims at developing *in silico* tools. It should be ensured that such tools are also useful for read-across, especially since ECHA has expressed the concern that bioavailability is not addressed appropriately during read-across. Further, it should be considered if knowledge on bioavailability might be incorporated into available *in silico* tools, e.g. those in the VEGA hub (<https://www.vegahub.eu>).

It was noted in the World Café sessions that this topic could perhaps be relevant to an ECETOC TP.

Uncertainty of risk assessments: what is it, how do we tackle it? [ECETOC TP] Code ENV 8

Thomas Preuss, Bayer Crop Science (Germany)

This proposed activity is targeted at environmental risk assessment. It does not focus on methodologies for uncertainty assessments, but on appropriate means of communication, ultimately, aiming at the development of a 'toolbox for communication'. As such, the proposed activity does not only address scientific issues, but also sociological and psychological ones. Therefore, non-governmental stakeholders and regulators should be involved in the planned activities, as relevant.

The uncertainties of risk assessments and of new approach methodologies (NAMs) have huge societal implications. If it cannot be shown how NAMs serve to reduce uncertainties during hazard and risk assessment, they will not receive regulatory (or societal) acceptance. At the same time, there are huge misconceptions on what 'uncertainty' truly means. Uncertainty may relate to the hazard and/or exposure component of risk assessment; depending on the type of substance under investigation (and the related legislation), uncertainty may be more related to exposure than to hazard.

Uncertainty should be transformed into understood variability. It will be important to establish links between different types of legislation, further considering that the assumptions underlying risk assessment differ from those underlying life-cycle assessments.

It was noted in the World Café sessions that this topic could perhaps be progressed initially by a TF, and that alignment with the ECETOC webinar series on communication should also be checked.

This proposed activity was also referred to during the parallel 2020 Human Health and Exposure Sciences Scoping Meeting in the context of proposal HH 11 (*Building a common template for reporting the uncertainty in tiered exposure assessment*). There, it was recommended that collaboration between human health and environmental toxicologists be enhanced.

Temporal trends in exposure of non-rapidly degrading substances [LRI] Code ENV 14

Nathalie Vallotton, Dow Europe GmbH (Switzerland)

During the World Café discussions, it was proposed to vote on ENV 3 (see above) and ENV 14 together, and this was agreed in the subsequent plenary. Nevertheless, it is important to note that there are two definitions for 'mobility', i.e. (1) the presence of a substance in drinking water; and (2) a substance's presence at a (certain) distance from its original source. While ENV 3 rather addresses mobility in the sense of the first definition, proposal ENV 14 relates to mobility in the sense of the second definition.

The role of field monitoring to assess exposures to non-rapidly degrading substances should be considered, although there can be multiple routes of exposure, which adds complexity to the assessment.

In accordance with the regulatory provisions for risk assessment, the geographical scale that shall be addressed is the local / regional environment.

It was noted in the World Café sessions that this topic could perhaps be progressed initially by a TF or ExpG, also looking to the outcome of the existing ECETOC TF on 'Persistent chemicals and water resources protection'.

Evolutionary scale of chemical risk assessment [ECETOC WS] Code ENV 18

Delina Lyon, Shell (USA); presented by Carolina di Paolo, Shell (Belgium)

Why this? Why now? – This proposed activity aims at enhancing the applicability of epigenetics for environmental risk assessment. For example, the EFSA and ECHA (2018) ED Guidance requires consideration of epigenetics effects in the overall evaluation. Notwithstanding, there are currently no standardised approaches for such an assessment, and it is unclear when epigenetic alterations should be considered adaptive or adverse.

If the proposed activity shall be taken forward, it should consider previous and ongoing work (also unrelated to LRI) addressing the epigenetics of different environmentally relevant species. Other aspects, i.e. multiple stressors including temperature that may affect (the effect of) chemicals, should also be addressed.

It was proposed during the World Café session on Risk assessment, management, communication to vote on an additional new proposal for an ECETOC WS / ExpG ‘Operationalisation of the European Green Deal regarding chemicals – what does this mean?’ and this was agreed in the subsequent plenary. However, this proposal received no votes and is not further addressed below.

Session II: Effects assessment

Metabolomics: metabolite profiling for the environment [LRI] Code ENV 9

Nina Hallmark and Maxie Kohler, Bayer Crop Science (Germany)

‘Omics, including metabolomics, are increasingly gaining importance in the context of (regulatory) hazard and risk assessment. The proposed activity shall serve to substantiate the usefulness of metabolomics for regulatory evaluations. The added value of conducting ‘omics assessments in daphnids, together with the traditional *Daphnia* test, is to gain supplementary mechanistic information in a common species and then extrapolate to species that cannot be submitted to ecotoxicity testing.

It was noted in the World Café sessions that this topic could perhaps be progressed initially by a WS or TF to further scope.

Towards a formal incorporation of predictive models in chemical hazard evaluation [ECETOC TF] Code ENV 20

Adriana Bejarano, Shell; presented by James Wheeler, Shell (Netherlands)

The TF is intended as multisector, multi-stakeholder group.

The scope of the TF shall include tools that are not quantitative structure-activity relationship (QSAR) models, i.e. tools for which there are no formal approaches to gain regulatory acceptance. Therefore, the outcomes shall also serve to inform on the basic principles for the development of such tools. Further, the scope of the TF shall not be restricted to any specific type of chemical.

Understanding physiological modes of action across species and chemicals [LRI] Code ENV 22

Roman Ashauer, Syngenta Crop Protection AG (Switzerland); presented by Thomas Preuss, Bayer Crop Science (Germany)

In the proposed activity, it is described that 3 species and 12 chemicals shall be covered. The precise set of species (e.g. species at different trophic levels) has not yet been determined and will also depend on the selected case studies. For practicality, the species need to develop and grow very quickly, so fish, or mussels, are generally excluded.

Implementation of the Endocrine Disruptor (ED) Guidance: Fish as alternative models to amphibians to evaluate thyroid disruption [ECETOC ExpG] Code ENV 10

Laurent Lagadic, Bayer Crop Science (France)

This proposed activity addresses the identification of endocrine disruptors (EDs) and, specifically thyroid disruptors, in the context of environmental hazard and risk assessment. While the EFSA and ECHA (2018) ED Guidance describes a hazard-based assessment, due to the sensitivity of most environmental species, it is pivotal to conduct ecotoxicological tests at concentration ranges that reflect real-life exposures. Therefore, exposure considerations must be included in such studies, and hence also in environmental hazard and risk assessment.

The proposed activity starts from the premise that amphibians cannot be used to evaluate thyroid disruption because the current test guidelines (TGs) do not include population-based assessments. It aims at further developing existing OECD TGs, for which an abundance of experience is available. These existing TGs shall be advanced to include more parameters, making use of innovative technologies for their measurement. The proposed activity does not aim at developing new test methods since these would be higher-tier methods, and the expenditure and time to develop and validate higher-tier methods as well as the numbers of animals involved speaks against such an approach (further considering difficulties in breeding amphibians in a laboratory setting).

Regulators should be involved in the ExpG to ensure regulatory acceptance of all new approaches.

It was remarked in the World Café sessions that there are a number of groups already active in this area, including an OECD working group. It was clarified that the ExpG would encourage consensus and perhaps make input at the stage of validating the incorporation into TG 234 (Fish Sexual Development Test).

Implementation of the ED Guidance: Is there enough available knowledge on the endocrine system of invertebrates to include them in regulatory ED evaluation? [ECETOC WS] Code ENV 11

Laurent Lagadic, Bayer Crop Science (France)

EFSA and ECHA (2018) ED Guidance indicates that, if available, information on invertebrate non-target organisms should be considered in ED assessment. However, it is currently not possible to determine if a substance meets the formal ED criteria in invertebrates, because endocrine modes-of-action cannot be identified in invertebrates.

The main groups of invertebrates to be covered in the intended project are likely to include crustaceans, daphnids, and bivalve (or mono-valve) molluscs. The proposed activity can build on recent research work related to crustaceans, including the development of a number of AOPs, e.g. on the disruption of the steroid hormone system.

Integrated effects assessment of new and existing pollutants in the marine environment [LRI] Code ENV 15

Adam Lillicrap, Norwegian Institute for Water Research (Norway)

Integrated tools for environmental effects assessment are especially lacking for the marine sediment compartment and for transitional waters. Furthermore, there are currently very limited internationally accepted methods for chronic marine sediment ecotoxicity tests. For development of the tools and methods, their standardisation is very important. Since OECD TGs are generally chemical-focused, the integrated approaches for testing and assessment (IATAs) might also make use of ISO standards and specifications since these are often developed for specific types of products (e.g. plastics) and as such might also be relevant for the assessment of pollutants.

At the Q&A session it was highlighted that the integrated tools for environmental effects assessment should consider bioaccumulation as key endpoint.

It remains to be decided which specific organisms the IATA should focus on. While corals are considered very sensitive species, some available evidence indicates that the sensitivities of marine species and freshwater species are not that different. Findings for the marine sediment will need to be compared to those from the freshwater sediment.

The findings of the ongoing ECETOC TF 'Sufficiency of aquatic hazard information for environmental risk assessment' that are expected to be published in the first half of 2020 are relevant in terms of prediction of effects cross-compartment.

It was noted in the World Café sessions that this topic could perhaps be further progressed via a pre-discussion in a WS format.

Automated analyses, image analysis and artificial intelligence in ecotoxicology [LRI] Code ENV 16

Jonny Beyer, Norwegian Institute for Water Research; presented by Adam Lillicrap, Norwegian Institute for Water Research (Norway)

The marker specified in the proposed activity is just one of many potential markers, and identifying which are most relevant was seen as a challenge. Further, considering that the proposed activity also aims at enhancing the applicability of established biomarkers in a routine setting, it was asked if this goal merited high priority follow-up.

It was however acknowledged that it would be beneficial to incorporate the proposed analysis to maximise the data extracted from studies.

It was noted in the World Café sessions that this topic could perhaps be further progressed via a pre-discussion in a WS format.

Knowledge discovery through data mining [ECETOC ExpG] Code ENV 17

David Saunders and Adriana Bejarano, Shell (Netherlands); presented by David Saunders

Regarding the use of next-generation digitalisation tools to retrieve relevant information, a 2018 Joint Research Centre (JRC) activity includes an extensive ecotoxicity data mining effort (see also: JRC Technical Report *Environmental Footprint: Update of Life Cycle Impact Assessment Methods – Ecotoxicity freshwater, human toxicity cancer, and non-cancer*¹). Involvement of Erwan Souter, the first author of this JRC Report, in such an ExpG may merit consideration. There are some overlaps between the proposed activity and this JRC activity. However, the proposed activity focusses on the

¹ https://publications.jrc.ec.europa.eu/repository/bitstream/JRC114227/jrc114227_final_online.pdf

operational side of data mining. Some of the input data for the planned tool could come from the JRC activity.

It was identified during the World Café session on Effect Assessment that a number of the proposals (ENV 9, ENV 16, ENV 17, ENV 20, ENV 22) appear conceptually related, i.e. they address different angles of the same topic. Therefore, consideration under a new ECETOC TP relating to mechanistic understanding could be merited. Such a TP could be combined with the proposed TP above (Session I: Risk assessment, risk management and communication): ENV 8 (*Uncertainty of risk assessments: what is it, how do we tackle it?*).

Session III: Persistence and degradation

Laboratory-based investigation of the applicability of the current screening and simulation biodegradation tests for evaluation of polymers including test limitations and modifications to improve predictability [LRI] Code ENV 2

Jennifer Menzies and Kathleen McDonough, Procter and Gamble (USA); Aaron Redman, ExxonMobil (Belgium); Len Sweet, Lubrizol (USA); Delina Lyon, Shell (USA); presented by Diederik Schowanek, Procter and Gamble (Netherlands)

This proposed activity is a follow-up of the ECETOC TR 133-2 *Applicability of Analytical Tools, Test Methods and Models for Polymer Risk Assessment*, whose publication is pending. As well as looking at applicability of the current methods, it aims at addressing more generally if ready biodegradability is a good predictor of biodegradation. Therefore, it is planned to perform a set of screening tests and selected simulation tests, also in view of the identification of necessary adaptations to the current testing protocols.

The work shall focus on polymers exhibiting at least some degree of solubility. Therefore, processes that are more relevant to solid polymers, such as microbial attachment to their surfaces, is considered out-of-scope. By contrast, the impact of light on degradation may merit consideration. Also, the usefulness of different inocula might be addressed, while considering the outcomes of relevant recent and ongoing research activities, such as Cefic LRI ECO 29 (*Application of chemostat systems to include adaption of microbial communities in persistency testing (CHEMADAPT)*) and ECO 11 (*Ring-test to revise the OECD 306 biodegradation in seawater test*).

It was noted in the World Café sessions that this topic could perhaps benefit from a tripartite workshop, including ECHA, to build consensus prior to initiating an LRI project.

Adapt aqueous biodegradation simulation testing to changing regulatory requirements [LRI] Code ENV 6

Björn Hidding, BASF SE (Germany); Louise Camenzuli, ExxonMobil (Belgium); Michael Essers, Lanxess Deutschland GmbH (Germany); Hans Allmendinger, Currenta (Germany); presented by Björn Hidding

It was asked what would be the implications if the proposed project showed that OECD TG 309 (*Simulation biodegradation test: aerobic mineralisation in surface water*; last updated in 2004) does not yield reproducible results? – In that case, this will have to be communicated to all those responsible for hazard and risk assessment.

Important scientific knowledge gaps within OECD TG 309 that shall be addressed include the selection of the most appropriate temperature (12 °C versus 20 °C) when assessing reference substances (i.e. positive controls). However, from a regulatory standpoint, if it can be shown that a study is valid, unexplainable variations in the biodegradation of the positive control do not *per se* lead to the rejection of the study. The planned research work might also aim at establishing approaches for study verification that do away with classical reference substances.

Development and validation of a silylation method for soil to elucidate the nature of non-extractable residues (NERs) [LRI] Code ENV 12

Markus Telscher, Bayer Crop Science (Germany)

This proposed activity is motivated by the circumstance that the silylation method is included in an ECHA discussion paper *Consultancy services to support ECHA in improving the interpretation of Non-Extractable Residues (NER) in degradation assessment* published in June 2018² even though it has not been standardised or validated.

The planned project aims at developing a robust silylation study. With regard to the specific assessments, it remains to be determined if the parent compounds or only specific components should be analysed in the silylated solution. It was asked if the further development and validation of the silylation method should be funded by LRI or rather by ECHA.

With respect to the question if the silylation method would also aim at informing on bioavailability, it was emphasised that silylation is a 'really harsh reaction' that does not inform on bioavailability.

NERs and persistence assessment of ionic and ionisable organic chemicals [LRI] Code ENV 1

Andreas Schäffer, RWTH Aachen University (Germany)

This proposed activity aims at investigating the formation of NERs from ionic compounds. Preliminary investigations indicate that the proportion of Type 1 NERs evolving from positively charged compounds is much higher than from other compounds, even if the compounds are structurally very similar. Further evidence shall be gained to substantiate this assumption, possibly beginning with a literature review to better understand the underlying mechanisms.

While NERs are generally considered to be persistent, the effects of components of ionics are matrix-dependent and hence potentially related to mobility. Even though NERs are by definition not mobile, they might be released and become mobile, if only at a very low rate.

The proposed project might also address if the evolution of NERs is pH dependent.

Persistence Assessment Tool [LRI] Code ENV 13

Aaron Redman, ExxonMobil (Belgium); Louise Camenzuli and Sam Arey, ExxonMobil; Kathleen McDonough, Procter and Gamble; Len Sweet, Lubrizol; Delina Lyon, Shell); presented by Aaron Redman

The suggested project is proposed to build on e.g. Cefic LRI ECO52 (see above Table 1) and therefore not intended for the 2020 LRI project selection process. It is presented at the 2020 Scoping Meeting to initiate a multi-stakeholder dialogue, including regulators, on its underlying principles and overall scope. The Persistence Assessment Tool shall enable the integration of persistence information obtained in different environmental compartments in an overall weight-of-evidence approach.

² https://www.echa.europa.eu/documents/10162/13630/echa_discussion_paper_en.pdf/4185cf64-8333-fad2-8ddb-85c09a560f7c.

Environmental degradation and fragmentation of microplastic to nanoplastic – mechanistic and experimental framework for prioritizing risk assessment needs [LRI] Code ENV 23

Todd Gouin, TG Environmental Research (United Kingdom); Sami Belkhiria, Dow Silicones (Belgium); presented by Todd Gouin

While the available evidence indicates that microplastics have no impact on organisms at their current concentrations in the environment, this does not *per se* imply that nanoplastics also do not. The proposed project includes the development and use of modelling tools, e.g. to screen and prioritise which specific types of polymers (e.g. depending on their molecular weight distribution) could actually exist as nano-sized particles in the environment and what the size range of the nano-sized particles is likely to be. For example, thermoplastics may exist as nano-sized particles. A comparison of such polymers with, e.g., biodegradable polymers that fragment into potentially robust microplastics may merit consideration.

It was noted in the World Café sessions that this topic should perhaps await the completion of Cefic LRI ECO 48 (*Nano2Plast – Extending nanoparticle models to open source models of the fate and transport of microplastic in aquatic systems*).

Voting session

After the plenary session in which the outcomes of the World Café sessions were summarised, all meeting participants were invited to take part in an indicative vote to prioritise the proposed activities for recommendation as potential ECETOC actions and/or Cefic LRI research projects. Apart from the hosts of the meeting, all represented affiliations were granted six votes each.

Participants interested to be involved in the development of any of the proposed activities were asked to please write their name on the corresponding A3 sheet of proposal title.

Figure 1 presents the outcome of the indicative vote, distinguishing between representatives from industry, academia, regulators / authorities, and consultancies, further indicating the suggested form of LRI or ECETOC activity.

Close of the meeting

In closing the ECETOC and Cefic LRI 2020 Environmental Sciences Scoping Meeting, Olivier de Matos (ECETOC Secretary General) thanked all participants for their valuable contributions. The outcome of the meeting will enable ECETOC and Cefic LRI to define areas where specific action would be most important. The proposed activities that were prioritised during the meeting will be presented to the ECETOC Scientific Committee and the Cefic LRI Issue Team for evaluation and decisions on further progression as ECETOC action and/or Cefic LRI research projects.

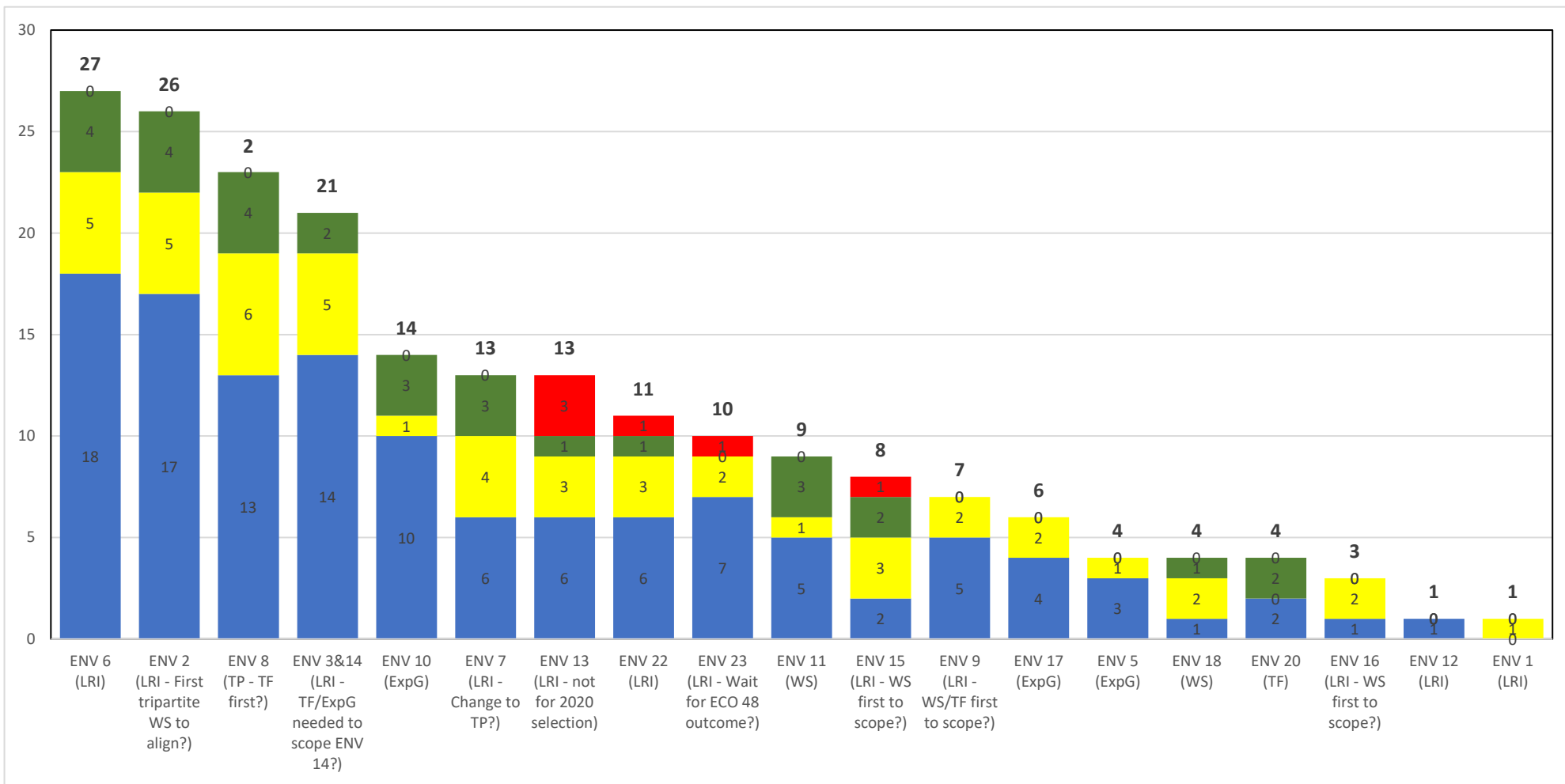


Figure 1: 2020 ECETOC and Cefic LRI Environmental Sciences Scoping Meeting: Outcome of the indicative vote (see next page for list of ENV codes of proposed activities). Blue = Industry; Yellow = Academia; Green = Regulator; Red = Consultant

List of ENV Codes of 2020 Environmental Sciences proposed activities in numerical order

ENV 1: Non-extractable residues and persistence assessment of ionic and ionisable organic chemicals [LRI]

ENV 2: Laboratory-based investigation of the applicability of the current screening and simulation biodegradation tests for evaluation of polymers including test limitations and modifications to improve predictability [LRI - First tripartite WS to align?]

ENV 3: The environmental risk and remediation of persistent, mobile, toxic (PMT) and very persistent and very mobile (vPvM) substances in the aquatic environment [LRI]

ENV 5: Green-house gas (GHG) emission tracking for chemical companies: Simplified, harmonised and globally applicable [ExpG]

ENV 6: Adapt aqueous biodegradation simulation testing to changing regulatory requirements [LRI]

ENV 7: From bioavailability science to prospective regulation of organic chemicals [LRI – Change to TP?]

ENV 8: Uncertainty of risk assessments: what is it, how do we tackle it? [TP – TF first?]

ENV 9: Metabolomics: metabolite profiling for the environment [LRI - WS/TF first to scope?]

ENV 10: Implementation of the Endocrine Disruptor (ED) Guidance: Fish as alternative models to amphibians to evaluate thyroid disruption [ExpG]

ENV 11: Implementation of the ED Guidance: Is there enough available knowledge on the endocrine system of invertebrates to include them in regulatory ED evaluation? [WS]

ENV 12: Development and validation of a silylation method for soil to elucidate the nature of non-extractable residues (NER) [LRI]

ENV 13: Persistence Assessment Tool [LRI -- not for 2020 selection]

ENV 14: Temporal trend in exposure of non-rapidly degrading substance [LRI - TF/ExpG needed to scope?]

ENV 15: Integrated effects assessment of new and existing pollutants in the marine environment [LRI - WS first to scope?]

ENV 16: Automated analyses, image analysis and artificial intelligence in ecotoxicology [LRI - WS first to scope?]

ENV 17: Knowledge discovery through data mining [ExpG]

ENV 18: Evolutionary scale of chemical risk assessment [WS]

ENV 20: Towards a formal incorporation of predictive models in chemical hazard evaluation [TF]

ENV 22: Understanding physiological modes of action across species and chemicals [LRI]

ENV 23: Environmental degradation and fragmentation of microplastic to nanoplastic – mechanistic and experimental framework for prioritizing risk assessment needs [LRI - Wait for ECO 48 outcome?]