

## Making it happen

### Placing Analytical Research Infrastructures at the heart of the Green Deal

Decoupling economic growth from (non-renewable) resource use and negative environmental impact, in order to guarantee the long-term viability of a fair and prosperous society, is a goal that should be universally welcomed. For this reason, the scientific community enthusiastically supports the *European Green Deal for the European Union and its citizens*<sup>1</sup>, which puts Europe in a leading position in the design of tomorrow's society.

European scientists have been successfully working for decades on technologies that lead to higher resource efficiency and lower environmental impact. It is technological breakthroughs such as efficient renewable energy production and mobile storage that make the policy actions underlying the Green Deal possible in the first place. European scientists are keen to continue and strengthen these contributions towards tomorrow's society as an integral part of the Green Deal.

The development of new or improved green materials and processes is a central challenge for the Green Deal. The network of large-scale analytical facilities which allows European scientists to conduct sophisticated and innovative investigations into new materials and processes is undoubtedly one of Europe's outstanding assets in meeting this challenge. Within this network, neutron facilities serve a broad scientific community working on a vast range of societal topics from the quantum world for tomorrow's computing to the concrete and steel of tomorrow's buildings. These facilities provide scientists with access to state-of-the-art instruments as well as all the services they need - from sample preparation to data interpretation - to gain an in-depth understanding of the properties of new materials. These facilities have now formed an alliance, LENS, the League of advanced European Neutron Sources. One of the principal goals of this alliance is the coordination of impact strategies. Active involvement in the Green Deal has been identified as central to this strategy.

The Green Deal is not a one-off effort but a clear indication of Europe's determination to become a frontrunner in the ecological transition of the coming decades. One of the main targets is to achieve a carbon neutral economy by 2050. This means that European research will have to act at every level of the technology readiness scale, from the fundamental research of today that will determine the technology of 2050 to the highly targeted investigations needed to overcome the final barriers separating us from the innovative products of tomorrow.

European governments currently spend about half a billion euros every year on the operation of existing neutron facilities and on the construction of future facilities. The business model employed ensures that access is granted to study the most relevant questions. Under the impetus of national and European research policies these questions have, in recent decades, become more focussed on the topics of societal relevance that make up the Green Deal. Consequently, European neutron facilities, already have well-established links to appropriate research teams. These collaborations are a strong foundation on which to build. Dedicated funding would make it possible to strengthen and extend these links.

The LENS facilities and their user communities have greatly benefitted from the funding tools of past and present framework programmes. As outlined in the Green Deal, "All EU actions and policies will have to contribute to the European Green Deal objectives. The challenges are complex and interlinked. The policy response must be bold and comprehensive and seek to maximise benefits for

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<sup>1</sup> COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS of 11 December 2019

health, quality of life, resilience and competitiveness.” LENS proposes to actively respond to these obligations by steering part of future funding into a direction that further enhances the significant contribution neutron science already makes to innovation in relevant areas. This will also favourably contribute to the proposed 25% EU budget target for climate mainstreaming across all EU programmes.

There is a broad overlap between the innovation areas referred to in the Green Deal and the portfolio of science using neutrons. Among others, areas of connection include:

- Energy storage
- Photo-energy conversion
- Alternative transport fuels e.g. hydrogen
- Circular economy
- Energy reduction for intensive industries, such as steel, chemicals and cement

Access to neutron facilities is governed by scientific excellence. This strict selection criterion has, over many decades, guaranteed the quality and impact of the science produced and must also be maintained for the future. Nevertheless, this does not prevent us from taking active steps to further strengthen research activities in relevant areas. The above-mentioned fields certainly belong to this category. This further strengthening of such research activities must be tackled from both sides: (i) the large-scale analytical facilities will have to offer even more sophisticated, specifically tailored services and (ii) the users will have to deploy dedicated resources within their research programmes in order to fully benefit from the results obtained at the large-scale analytical facilities.

LENS proposes to achieve this targeted programme through concerted action. For this purpose, consortia of facilities will be formed to support fields relevant to the Green Deal. These consortia will undertake to:

- collectively and coherently develop infrastructure, such as instrumentation and sample environment, to specifically support fields relevant to the Green Deal in close interaction with expert researchers
- collectively provide software facilitating the exploitation of the corpus of data, including in particular the possibilities offered by the most recent developments in computer science, such as pattern recognition and artificial intelligence
- align as far as possible their operation to guarantee continuous reliable access
- collectively develop programmes for training a new generation of scientists capable of bridging the gap between the analytical techniques in use and the respective research fields in which they are used. These scientists would ideally work with the research teams.

The European Commission could make a significant contribution to boosting the development of these concerted activities by supporting this initiative. LENS would be more than happy to discuss with the Commission the practical aspects of how this might be implemented and funded.