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## French “Cycle Impact” approach: Integrated approaches to the back end of the fuel cycle

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The fabrication of EDF’s nuclear fuels and their management once used, as well as associated waste, require many industrial operations, qualified as “fuel cycle”.

As requested by the French nuclear safety authority (ASN) since 2000, EDF in collaboration with its industrial French partners (Orano Cycle, Framatome, Andra) elaborates periodically a so-called “Impact Cycle” file. This document provides elements to demonstrate for the next ten years the compatibility, in terms of safety and radioprotection, between changes in fuel characteristics and fuel management in NPP and developments in fuel cycle facilities and the corresponding transports.

In June 2016, EDF submitted the file called “Impact cycle 2016” covering the 2016-2030 period.

The IRSN examination focused on:

- the adaptation to needs and evolutions, that may occur in the short or medium term (change of fuel, evolution of facilities, etc.), of the means involved in the fuel cycle (production or storage facilities, logistical means, etc.);
- the study of different scenarios of nuclear-sourced electricity production, including scenarios considering its reduction to 50 % of electricity production by 2025, in accordance with the Energy Transition Law for Green Growth (TECV Law);
- the study of postulated dysfunctions for every stage of the cycle, with identification of associated paradises;
- the analysis of major inflections and “cliff effects” that may appear by 2040.

IRSN transmitted to ASN the conclusions of its assessment in May 2018, which were presented to permanent group of experts for laboratories and plants (GPU), including experts from waste, nuclear reactors and transports committees at its meeting on 25 May 2018.

In conclusion, IRSN considers that assessment of the impact on the facilities and the transport activities participating to the French fuel cycle, of the current managements of EDF nuclear fuels and those envisaged until 2030, does not reveal major technical difficulty for this period. The study of prospective scenarios considering a reduction of nuclear-sourced electricity in application of the TECV Law shows that the shutdown of reactors loaded with MOX fuels can induce a short-term saturation of spent nuclear fuel storage facilities. However, a scenario including only the shutdown of reactors loaded with only UOX fuels could delay or even prevent the saturation of these storage facilities. IRSN also underlines the importance of examining the impact on the overall fuel cycle, of reactors shutdown, which will be carried out in application of the TECV Law.

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**Country or International Organization**

France

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