PLASMA POWER FRAMEWORK: HOW TO PREPARE YOUR COUNTRY FOR FUSION ENERGY

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1. INTRODUCTION

The Helixos Plasma Power Framework is a comprehensive framework designed to prepare nations for the commercialization of fusion energy. With recent significant scientific milestones achieved, and private fusion companies targeting commercial power delivery in the 2030s, the urgency for countries to ready themselves for fusion deployment has intensified.

The Plasma Power Framework emphasizes the necessity of establishing robust policy, regulatory, financial, workforce, and scientific infrastructures to support fusion energy's commercialization and deployment. While technological innovation is primarily driven by extensive research and development (R&D) from technology developers, the framework acknowledges that countries may also engage in targeted research to support domestic adaptation in areas like industrial capability, economic integration, regulatory compliance, and stakeholder engagement.

2. ELEMENTS OF THE PLASMA POWER FRAMEWORK

A robust framework for a fusion power program - the Plasma Power Framework - is vital for ensuring that the efforts required for fusion energy deployment are systematically coordinated and efficiently managed. This framework considers the necessary policy, regulatory, financial, workforce, and scientific structures to support the commercialization and eventual deployment of fusion energy. While extensive R&D by technology developers will primarily drive technological innovation, countries may still choose to engage in targeted research to support domestic adaptation in areas like industrial capability, economic integration, regulatory compliance, and stakeholder engagement. This framework aims to facilitate collaboration between government, industry, academia, and communities, streamline resource allocation, and ensure compliance with safety and environmental standards. By establishing a comprehensive framework, the country and other stakeholders can prepare for a fusion energy future, thus maximizing its potential benefits, driving domestic innovation, and maintaining a competitive edge in the global energy landscape.

The aim of the Plasma Power Framework is not to impose a rigid set of requirements, but rather to enable countries to capitalize on their unique strengths and opportunities within the fusion energy landscape. Fusion energy presents a transformative opportunity, not only for countries with established scientific or financial capacity but also for emerging economies looking to explore future energy solutions. This framework provides a flexible guide that highlights a range of elements to consider without assuming a one-size-fits-all approach. The degree to which each element applies will depend on the specific context of the country, and many of these can be facilitated through international support, regional agreements, and partnerships. Whether you are starting from scratch or building on an existing foundation, the framework is designed to help you navigate the path to fusion energy adoption and position for success in a future energy landscape.

Helixos' Plasma Power Framework empowers government, industry, and other stakeholders to progress towards the deployment of fusion energy in their country or region. It provides a holistic view of the key elements, nestled under overarching pillars, as shown in Fig. 1, which should be considered prior to embarking on a fusion power program. Consideration should also be given to how the country or organization can participate in fusion research and the supply chain.

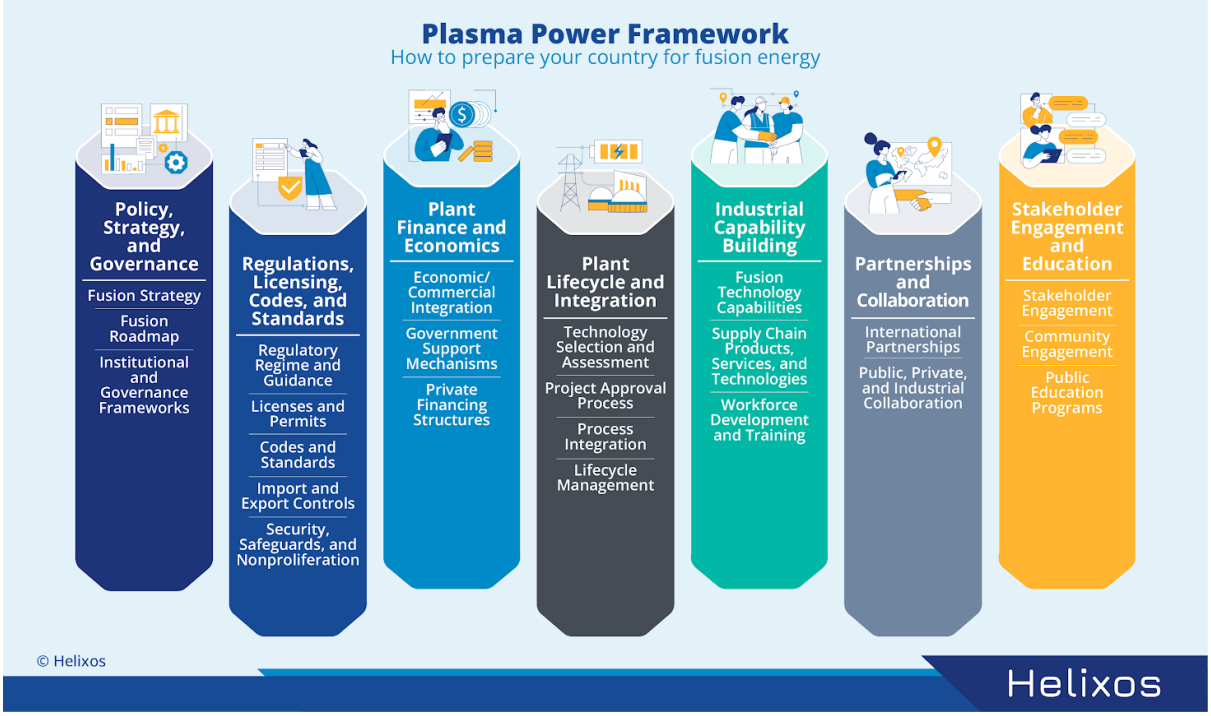

Fig. 1 Helixos Plasma Power Framework

3. CASE STUDIES

Thus far, Helixos has supported two countries in developing elements of the framework. Helixos supported the development of a strategic national roadmap for fusion energy in Canada [1]. Canada has a significant opportunity to capitalize on existing fusion research and development (R&D) and its expertise in tritium to become a leader in the fusion energy sector. This proposed roadmap has served as a critical piece for the federal government and other stakeholders to plan for a future in fusion research, development, and eventual deployment.

Helixos is also currently supporting the development of a fusion science and technology roadmap in another country with a robust fusion R&D portfolio to align these capabilities and outcomes with progress in the private fusion sector. This is essential for fostering public, private, and industrial collaboration.

4. CONCLUSION

This Plasma Power Framework can be used by countries and other stakeholders to reflect on the current state of their fusion ecosystem, identify any gaps, and work towards addressing these gaps through the key elements outlined above. The successful deployment of fusion energy will depend on both technological progress and the readiness of nations to implement it.

REFERENCES

[1] CANADIAN NUCLEAR LABORATORIES, “It’s Time for a Canadian Fusion Strategy”, (2024). https://www.cnl.ca/clean-energy/hydrogen-research/fusion-day-2024/