



**IAEA**

International Atomic Energy Agency

Technical Meeting on Synergies Between  
Nuclear Fusion Technology Developments and  
Advanced Nuclear Fission Technologies  
6-10 June 2022, IAEA, Vienna

# Meeting Objectives and Expected Outputs

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<https://nucleus-new.iaea.org/sites/fr/Pages/fusion.aspx>

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# Can Fission help Fusion?

## Fission

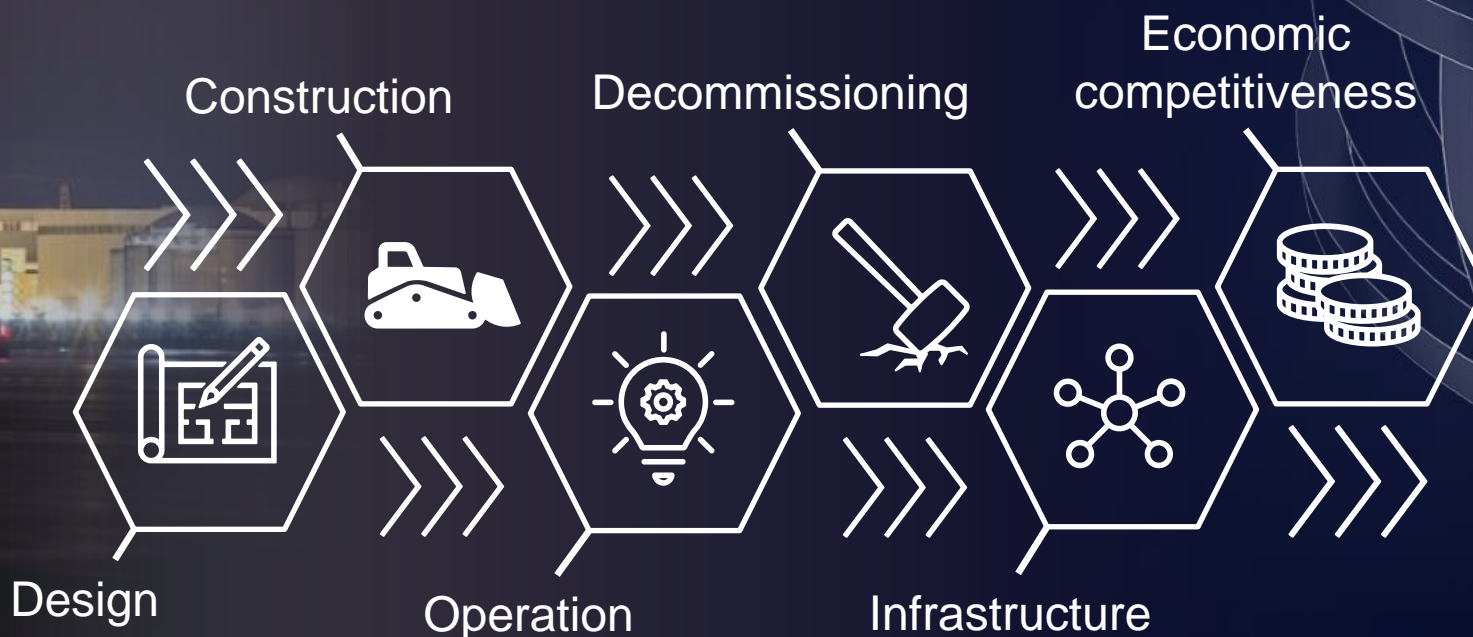
70  
years of  
experience

443  
reactors in  
operation

51  
nuclear power  
reactors under  
construction

10%  
of world's electricity  
production

Many novel, innovative fission reactor designs under development, several expected for near term deployment.



## Fusion

# IAEA Activity on Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production

**SAGNE**

The **Standing Advisory Group for Nuclear Energy (SAGNE)** supports the initiative of the Agency to implement new activities, including **cross-cutting** ones, focused on engineering, technology and science, including addressing **synergies in technology development between nuclear fission and nuclear fusion as well as fission-fusion hybrid systems** for power production and radwaste transmutation.

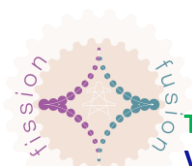
**GC64**

Recommends that the Secretariat continue to explore, in consultation with Member States, **Innovative nuclear technologies:**

1. Alternative fuel cycles (e.g. thorium, recycled uranium and plutonium)
2. Associated back-end management capabilities
3. Innovative nuclear energy systems including fast neutron systems, supercritical water-cooled, high-temperature gas cooled, molten salt nuclear reactors and
4. **Thermonuclear fusion experimental reactors**

- ✓ *strengthen and foster infrastructure, safety, security, science, technology, and capacity building*
- ✓ *via the use of experimental facilities and material testing reactors*
- ✓ *facilitate licensing, construction, and operation of these technologies*

***Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production***



# Fission-Fusion Synergies: Role of the IAEA

## Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production

### Context

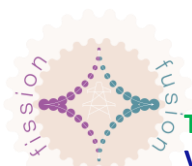
- Worldwide acceleration towards the early deployment of nuclear fusion for energy production
- Several fusion DEMO plants are being developed [six DEMOs “public” projects, three DEMOs with private fundings, and several start-ups]

### Role of the IAEA

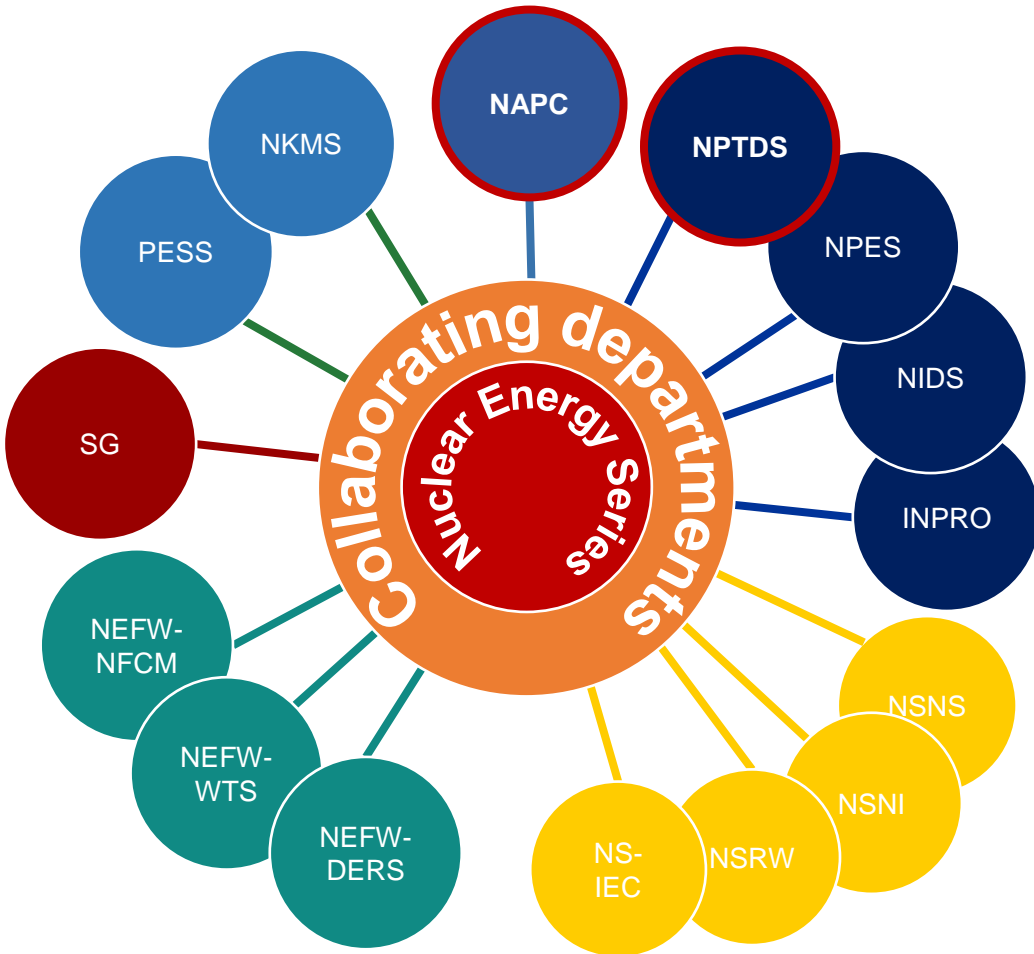
- New initiative aimed at addressing the great engineering challenge of fusion, by promoting:
  - Technology development
  - Transfer of knowledge
  - Common infrastructure
 } Fission → Fusion
- Identifying and analysing **all the possible synergies** on technology development and deployment between nuclear fission and nuclear fusion, **with an international perspective beyond ITER and towards DEMO and industrial deployment of nuclear fusion.**

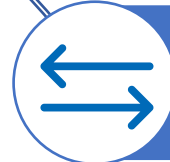
### Member States and Stakeholders


- Informed on the *synergies in technology development between nuclear fission and fusion for energy production*, status of cooperation between the fission and fusion communities.
- Receive recommendations on how to enhance relevant technology and knowledge transfers from fission to fusion technologies





# IAEA Internal Cooperation on Fission-Fusion Synergies for Energy Production




- 

Promote and facilitate the exchange of information on synergies between advanced nuclear fission and fusion technologies
- 

Summarize the **current status of cooperation** between fission and fusion technology development
- 

Discuss and identify **areas of development to bridge the gap** to deployment and to assess requirements in the field, leading to more focused efforts in specific areas
- 

Document the **discussions and major findings** among subject matter experts to support Member States to better understand and benefit from such synergies
- 

Serve as a **technical reference** for key technological aspects and related economic and human resource factors

**The NES publication will provide**

- **insight on all these areas**
- **examples of good practices and lessons learned**
- **suggestions to accelerate the transfer of technology, knowledge and know-how from fission to fusion**

**INTENDED AUDIENCE**

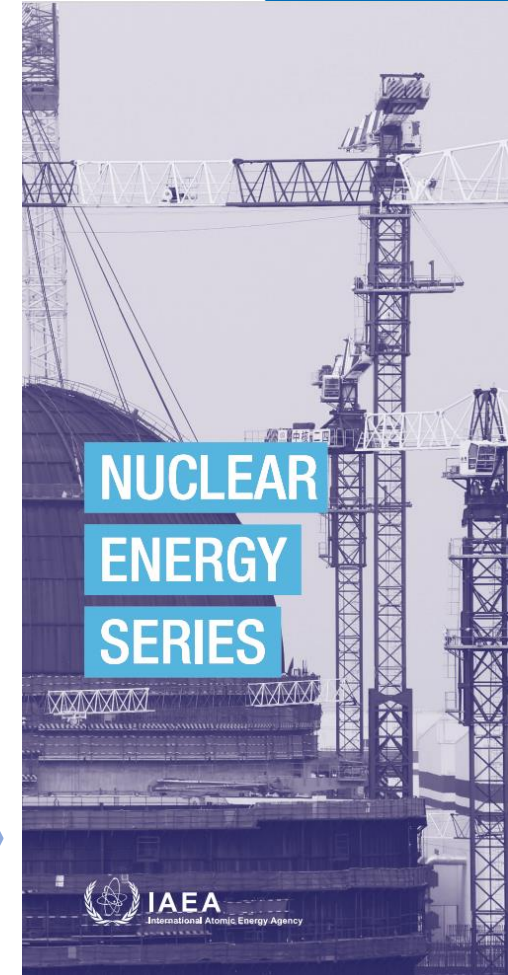
NES document will be open to all **Member States** involved or interested in the research and development of fission and/or fusion technology and their synergies, including

- **government organizations** (policymakers, analysts, regulators and R&D agencies)
- **industry stakeholders** (vendors, engineering companies, plant operators and technology developers)

# Nuclear Energy Series on Fission-Fusion Synergies:

Main output; to be published in 2022

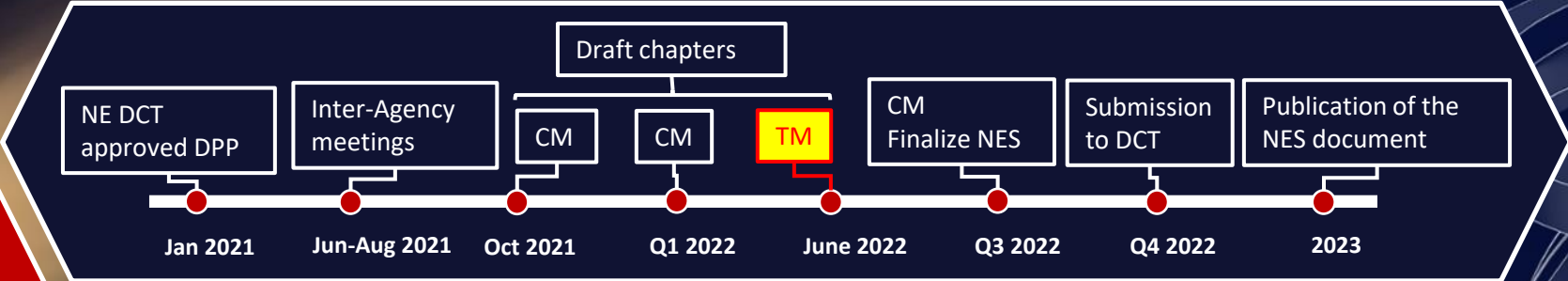
- 1 Status of fusion technology: needs and challenges
- 2 Scenario studies: nuclear fusion reactors as an element of future energy systems
- 3 Technology and 3S areas for synergies and technology and know-how transfer  
Energy conversion systems, Structural materials, Coolants, Waste management, Decommissioning, Fuel cycle, Diagnostics, Nuclear Data, Modelling and Simulations, Safety, Regulations, Manufacturing, Commissioning, Operations, Safeguards
- 4 Economic and market considerations
- 5 Human resources and knowledge management
- 6 Fission-fusion hybrid systems
- 7 General considerations on needed infrastructure
- 8 Stakeholder involvement, Start-ups, Public support
- 9 Considerations and suggestions for future work in the field



# Fission-Fusion Synergies



**2022**



2<sup>nd</sup> Consultancy Meeting on *Preparing the Technical Meeting on Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production*

1<sup>st</sup> Technical Meeting on *Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production*

Identification and development of the basic framework to support the pre-feasibility study of a Fusion Demonstration Plant



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Overview	Scientific Programme
Scientific Programme	Technical Session 1: Status of fusion technology: needs and challenges
Call for Abstracts	Technical Session 2: Scenario studies: nuclear fusion reactors as an
Contact	Technical Session 3: Technology, safety, security and safeguardability and know-how transfer
FFSynergies@iaea.org	3.1 Energy conversion systems
	3.2 Structural materials and circulating fluids
	3.3 Waste technology
	3.4 Decommissioning by design
	3.5 Fuel cycle
	3.6 Detritiation technologies
	3.7 Remote handling
	3.8 Diagnostics, instrumentation and other experimental techniques
	3.9 Nuclear data
	3.10 Modelling and simulations
	3.11 Design Safety, Safety Analysis and Regulation

**Technical Meeting on Synergies Between Nuclear Fusion Technology Developments and Advanced Nuclear Fission Technologies**

IAEA Headquarters, Vienna, Austria  
and virtual participation via Cisco Webex

6–10 June 2022

Ref. No.: EVT2103079

**Information Sheet**

**Introduction**

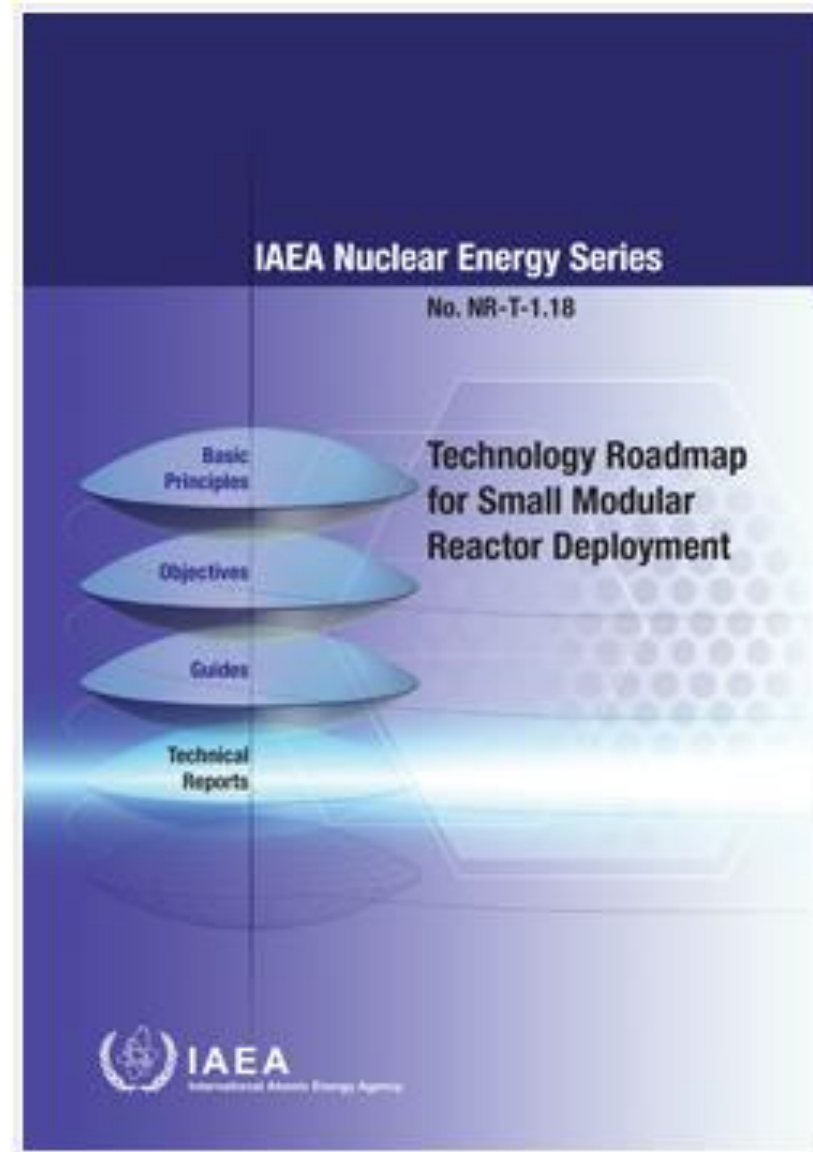
The International Atomic Energy Agency aims to support and strengthen its Member States' capabilities in the field of technology development of nuclear fission and fusion for energy production.

With the aim to address the resolution of the IAEA General Conference GC64 and the SAGNE recommendation and taking into account the worldwide acceleration towards the early deployment of nuclear fusion for energy production, it is the appropriate time for the IAEA to launch a new initiative aimed at addressing the great engineering challenge of fusion, by promoting transfer of technology and know-how from fission to fusion. In other words, the IAEA is in the best position to identify and analyse, with an international perspective, all the possible synergies on technology development and deployment between nuclear fission and nuclear fusion.

The fission based nuclear power plants have a long history of development and operational experience; the advanced nuclear fission reactors are at an early stage of deployment and several lessons are being learned in the process of their development. It is expected that the development of future fusion based nuclear power plants for energy production will face many challenges already well-known and

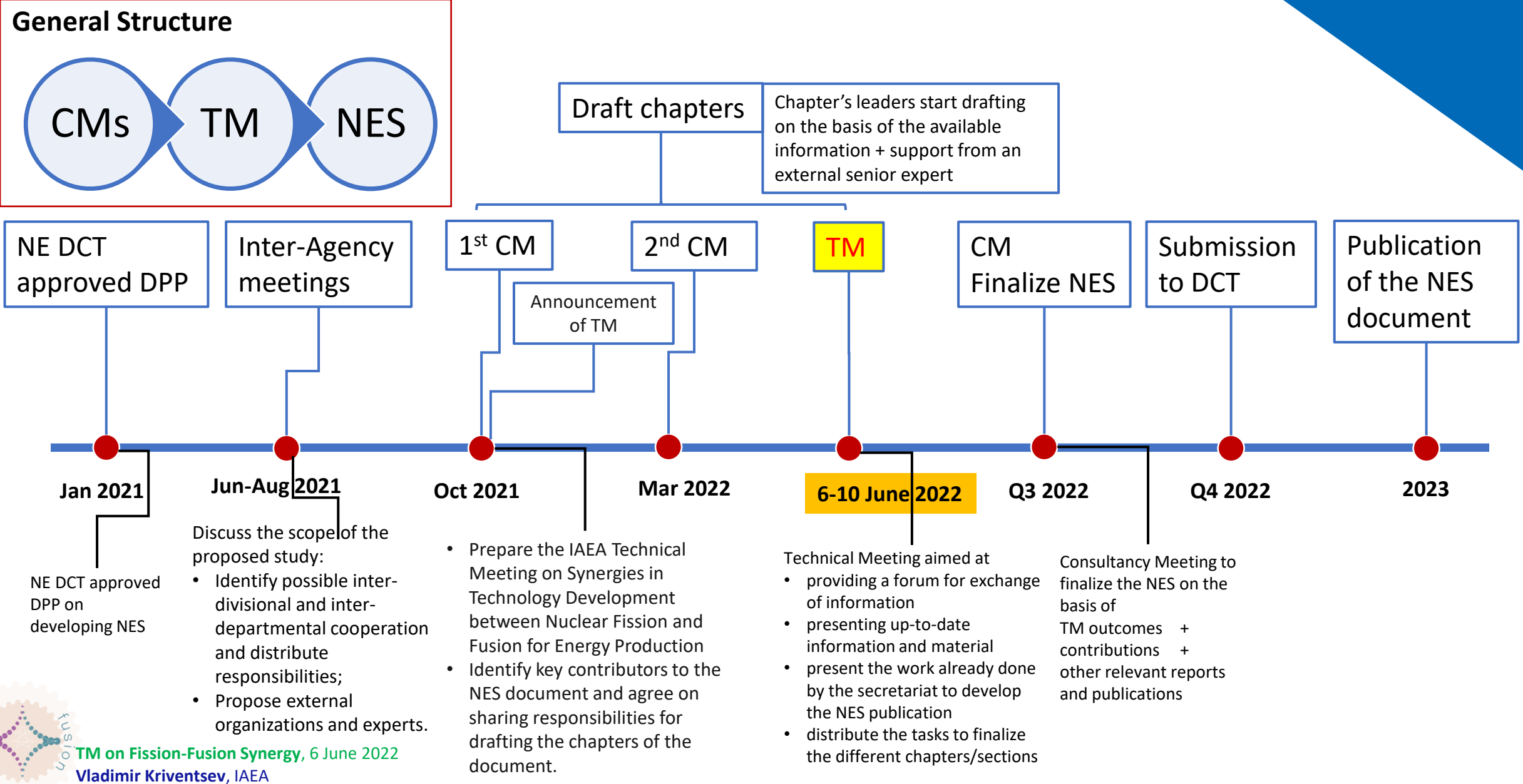


# Example of Nuclear Energy Series (NES) Publication





# Tentative Timeline of the Activity



# Technical Meeting: Purpose, Objectives and Outputs

TM

## Purpose

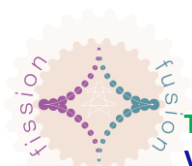
Provide a forum for the exchange of information on, present an up-to-date review of activities related to synergies in technology development between nuclear fission and fusion for energy production at the national and international levels, present the work already done by the Secretariat.

## Objectives

- Promote and facilitate the exchange of information on synergies between advanced nuclear fission and fusion technologies;
- Present, discuss and summarize the current status of cooperation between fission and fusion technology development, presenting up-to-date information and material;
- Present the work already done by the chapter leaders to develop the NES publication;
- Review of submitted contributions by session Chairs;
- Document the discussions and major findings among subject matter experts to support Member States in identification of possible synergies between fission and fusion and benefits from sharing knowledge between both technologies.

## Expected Outputs

- Recommendations to the IAEA on possibly synergies and sharing knowledge between fission and fusion;
- A first draft of the IAEA NES publication “Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production”





**IAEA**

International Atomic Energy Agency

Fission-Fusion Synergies for Energy Production

# Thank you

Website: <https://nucleus-new.iaea.org/sites/fr/Pages/fusion.aspx>

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