



IAEA

International Atomic Energy Agency



IAEA

Fusion Technology Data Collection for Energy Production

Lorenz Gaertner, Vladimir Kriventsev,
Luigi Di Pace, Nicole Virgili

FURIS = FUsion Reactor Information System



collection of data for fusion reactors designed for energy production

Objectives for FURIS

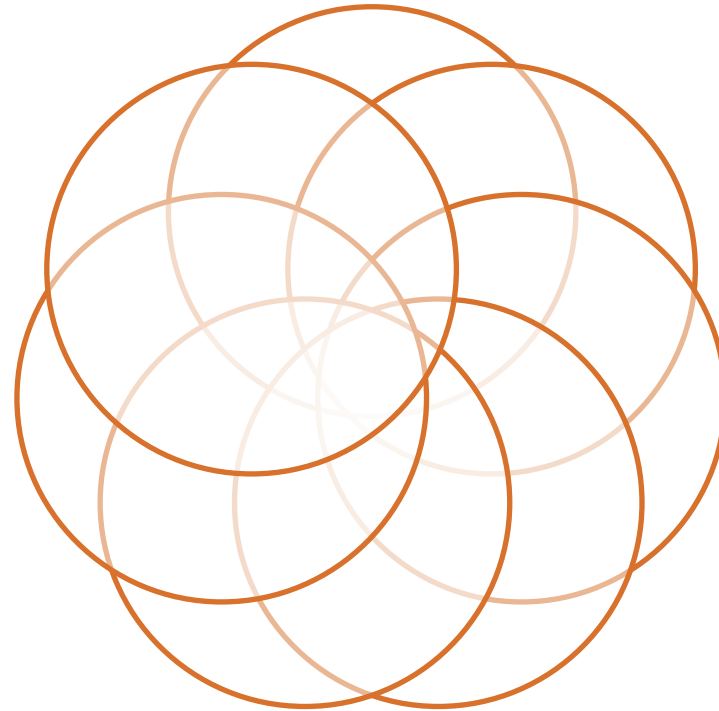
Collect data

Serve as a
technical
reference

Present the
collected data

Provide
possibility for
live update

Promote and
facilitate the
exchange of
information



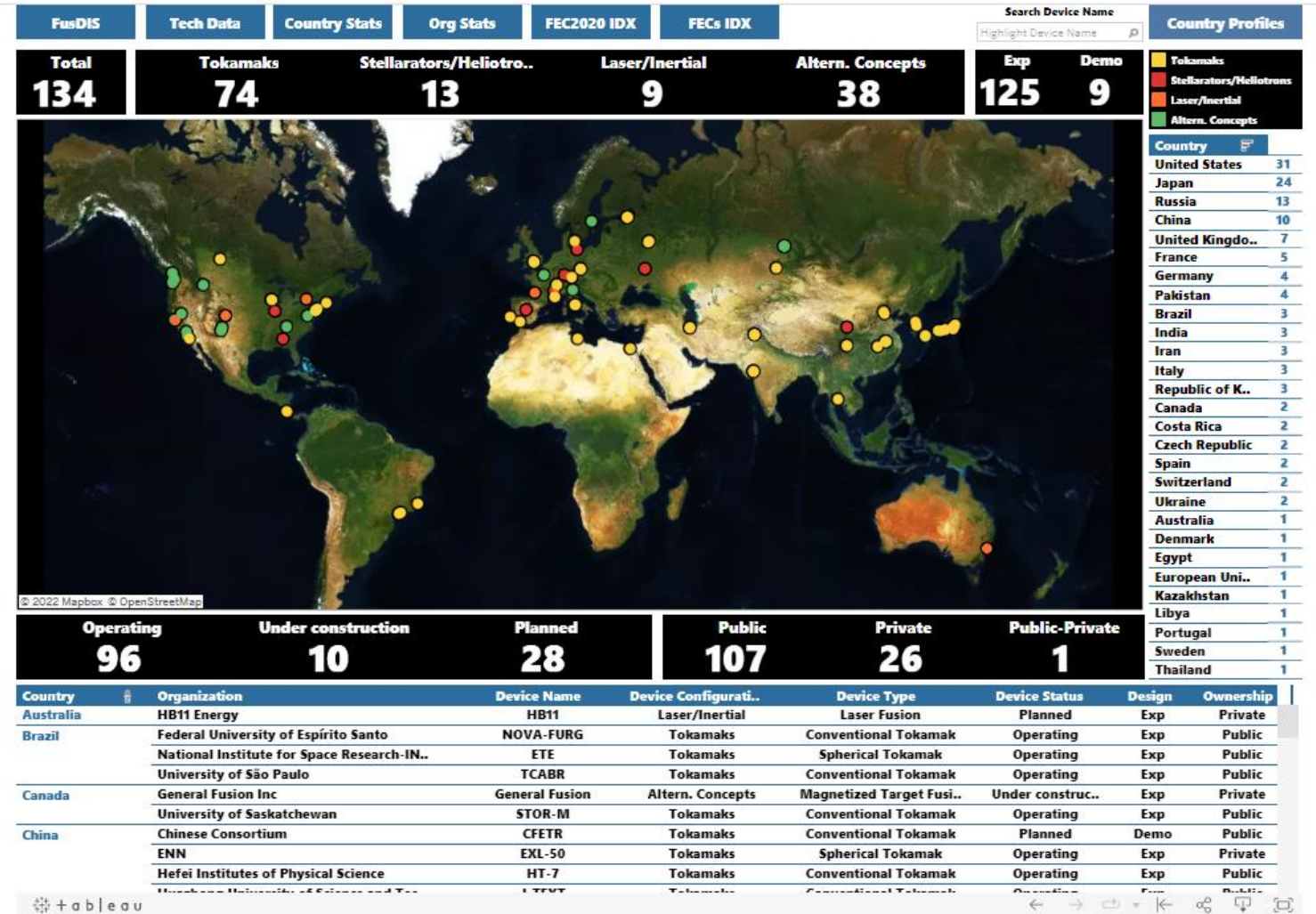
Document the
discussions and
major findings

Summarize the current
state-of-the-art of fusion
technology developments

IAEA Fusion Portal: Fusion Device Information System (FusDIS)

nucleus.iaea.org/sites/fusionportal/Pages/FusDIS.aspx

“FusDIS contains information on fusion devices public or private with **experimental and demonstration designs**, which are currently in operation, under construction or being planned, as well as **technical data** of these devices and country statistics, including research statistics from the Fusion Energy Conference series.”




Fusion Energy Base

fusionenergybase.com

“The mission of Fusion Energy Base is to **inform** investors about fusion energy in order to **optimize** the allocation of capital for the achievement of **commercially viable** fusion energy on the **shortest possible timeline**.”



 Fusion Energy Base Organizations Projects Articles About

JET (Joint European Torus)



Affiliated Organizations

[CCFE \(Culham Centre for Fusion Energy\)](#)

In Operation

1983 - present

Cost

\$438,000,000

Website

https://en.wikipedia.org/wiki/Joint_European_Torus

Fusion Approach

[Tokamak](#)

Key Technologies

[Divertor](#)

Tokamak Parameters

Major Radius (m)	Minor Radius (m)	Plasma Current (MA)	Toroidal Magnetic Field (T)	Duration (s)
3	1.25	7	3.5	1.8

ADVANCED REACTOR INFORMATION SYSTEM

The Advanced Information System (ARIS) database is designed and maintained by the IAEA and contains design descriptions of evolutionary and innovative advanced nuclear reactors

[Explore](#) →

Advanced Reactors

Small Modular Reactors

[Water Cooled Technology](#)

[Gas Cooled Technology](#)

[Liquid Metal Cooled Technology](#)

[Molten Salt Cooled Technology](#)



Thermal Capacity

Operating Temperature

Power Density

Plant Efficiency

Discharge Burnup

Capacity Factor

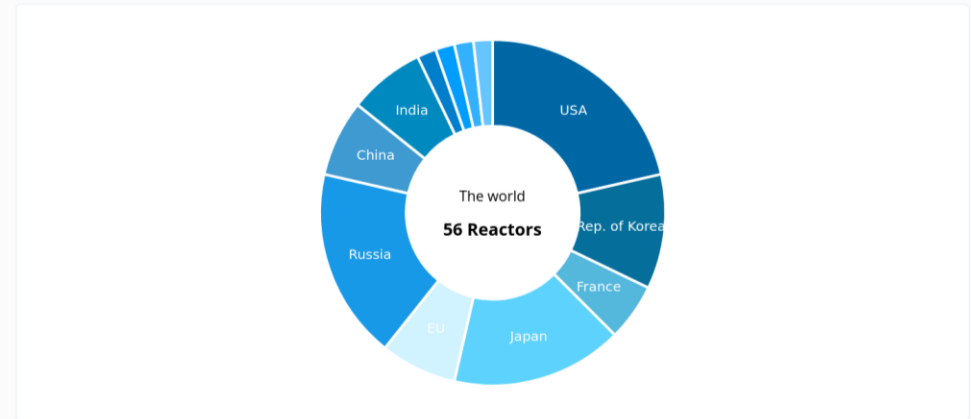
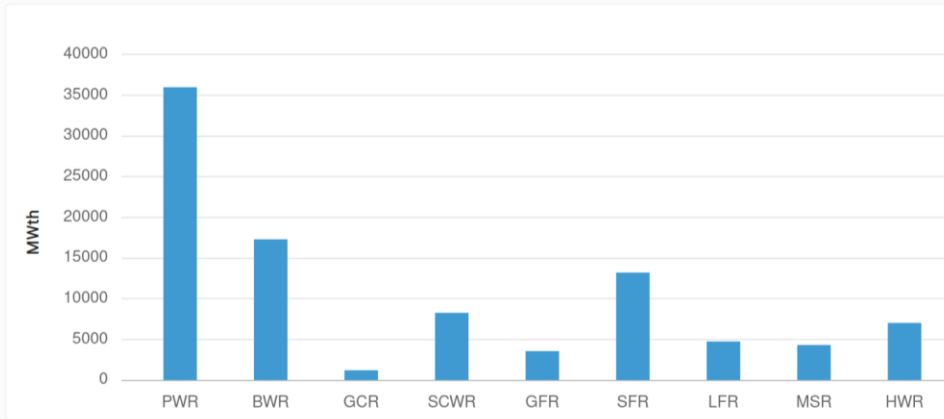
Plant/Site Footprint

NSSS Primary/Secondary

Operating Pressure

Containment Volume

Thermal Capacity



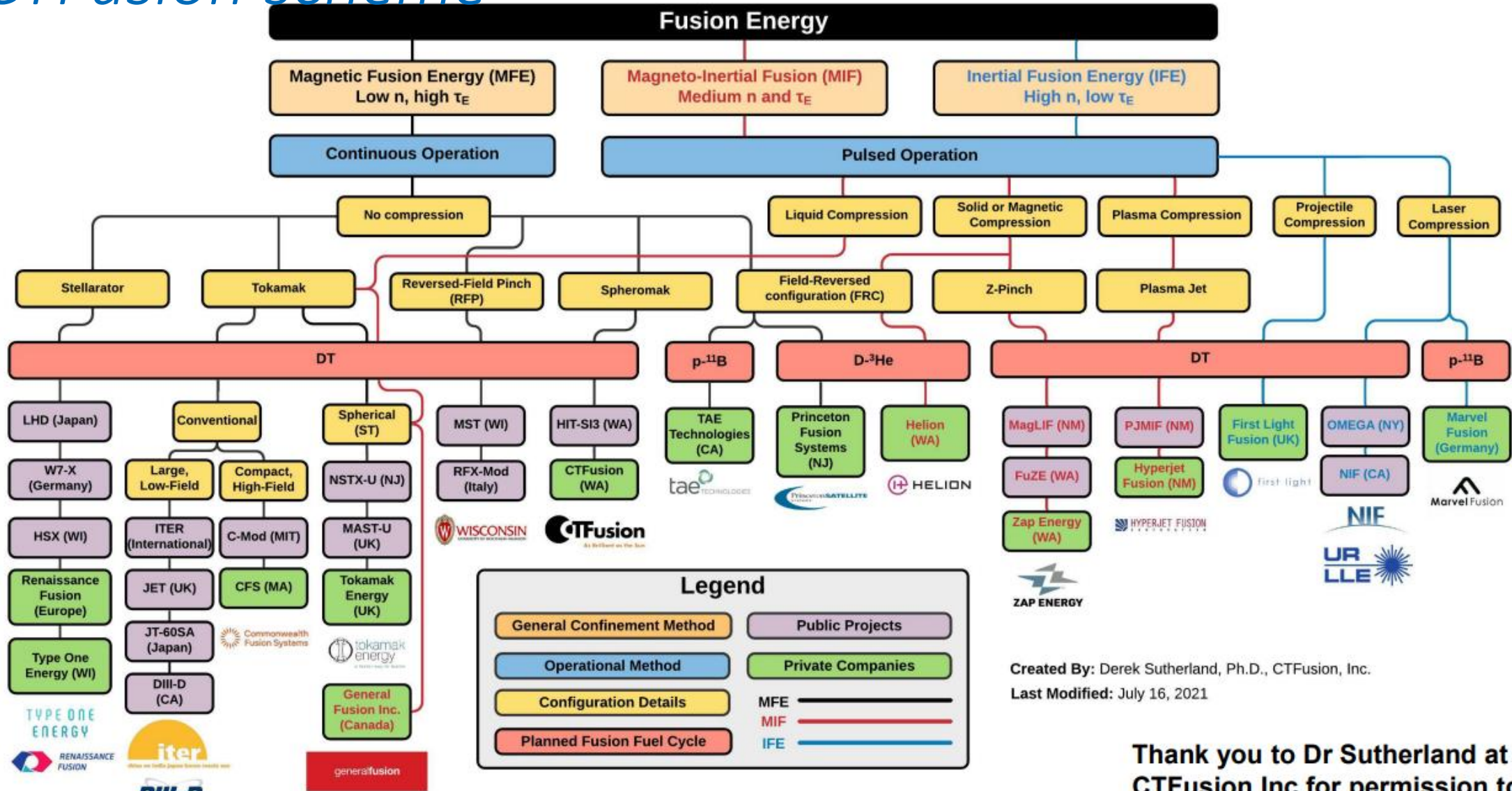
Type ▾
Country ▾
Status ▾
More Filters
Manage Columns
Group By ▾

56 Reactors

Acronym ▾	Thermal capacity(MWth) ↑	Coolant Inlet Temp (C) ↑	Coolant Outlet Temp (C) ↑	Average core power density (Kw/l) ↑	Plant efficiency net(%) ↑	Discharge burnup[M
<input type="checkbox"/> 4S	30	355	-	-	-	34
<input type="checkbox"/> ABWR	3926	278/288	-	-	-	50.0
<input type="checkbox"/> ABWR-II	4960	277	-	-	-	60.0
<input type="checkbox"/> ACR-1000	3200	275	-	-	-	20.0

Overview of fusion technologies

CTFusion scheme



Legend

General Confinement Method	Public Projects
Operational Method	Private Companies
Configuration Details	MFE
Planned Fusion Fuel Cycle	MIF
	IFE

Created By: Derek Sutherland, Ph.D., CTFusion, Inc.
 Last Modified: July 16, 2021

Thank you to Dr Sutherland at CTFusion Inc for permission to use this figure

Stakeholder data collection form



Fusion Technology Data Collection for Energy Production

Introduction

Milestones/Achievements

Representative picture of the device

Status of the project

- Operating
- In construction
- In design

Parameters

General

Experimental/DEMO	
Net Power Generation (MW)	
Fusion (Plasma) Power (MW)	
Auxiliary Power (MW)	
Scientific gain (Q)	
Engineering gain (Q)	
Private/public	
Participating countries	
Location	

Magnetic Fusion Energy (MFE)

Fusion triple product ($keV m^{-3} s$)	

Magneto-Inertial Fusion (MIF)

Compression parameter (Volume ratio, V_i/V_f)	
Initial and final density of plasma (n/cm^3)	
Temperature initial value (eV)	
Driver	Laser, Plasma, Heavy ion, Z-pinch
Target	Cryogenic, compact torus, open traps, pinch
Liner	Fluid, plasma-jets, gaseous, solid

Inertial Fusion Energy (IFE)

Reaction time	
Confinement time	

Target Gain	
Fuel Energy Gain	
Power Production	

Fuel

D-T

Fuel consumption D (g/h)	
Fuel consumption Li (g/h)	

D-D

Fuel consumption D (g/h)	

D-³He

Fuel consumption D (g/h)	
Fuel consumption ³ He (g/h)	

p-¹¹B

Fuel consumption p (g/h)	
Fuel consumption ¹¹ B (g/h)	

Technology

Tokamak

Major radius (m)	
Minor radius (m)	
Elongation	
Triangularity	
Average Plasma Temperature (Central ion temperature) (K)	

Stakeholder data collection form

Toroidal magnetic field B (T)	
Poloidal magnetic field (T)	
Plasma current (MA)	
Plasma Volume (m ³)	
Plasma Surface (m ²)	
Blanket materials	
Breeder material	
n multiplier	
Blanket Coolant	
Blanket average thermal load MW/m ²	
Divertor materials	
Coolant	
Divertor Max. heat flux (MW/m ²)	

Stellarator

Reversed Field Pinch

Spheromak

Field-Reversed Configuration

Z-Pinch

Plasma Jet

Economics

Estimated Cost	
Public funding	
Private funding	

Device description / Additional Information

ARIS Database

Example modifications



ADVANCED REACTOR INFORMATION SYSTEM

The Advanced Information System (ARIS) database is designed and maintained by the IAEA and contains design descriptions of evolutionary and innovative advanced nuclear reactors

Explore →

MFE

MIF

IFE

MFE = Magnetic Fusion Energy
MIF = Magneto-Inertial Fusion
IFE = Inertial Fusion Energy

Advanced Reactors

Small Modular Reactors

Water Cooled Technology

Gas Cooled Technology

Liquid Metal Cooled Technology

Molten Salt Cooled Technology

Stellarator

Tokamak

Reversed-Field Pinch (RFP)

Spheromak

Field-Reversed configuration (FRC)

Z-pinch

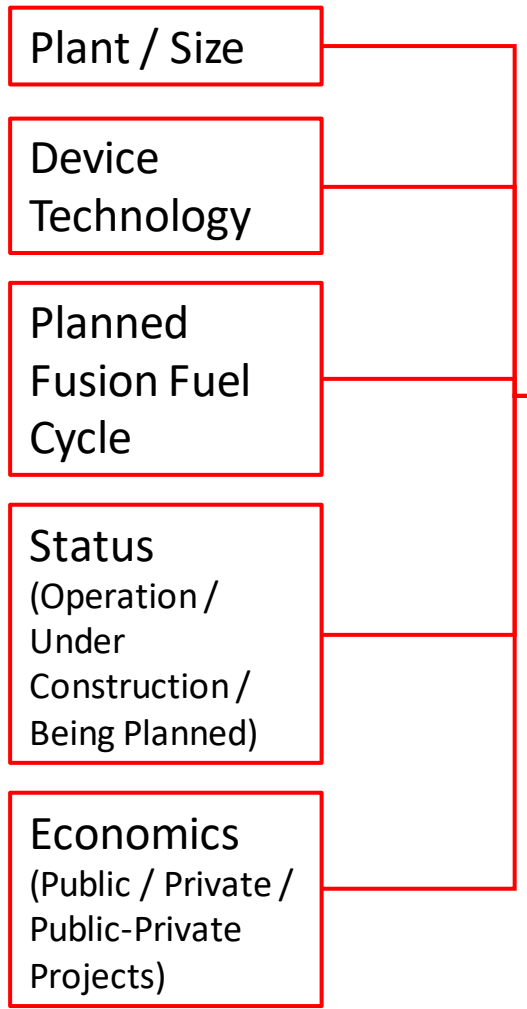
Plasma Jet

Laser or Projectile compression



ARIS Database

Example modifications



Reactor Unit 56 Reactors

Search [] Type [] Country [] Status [] More Filter []

Acronym ↓	Full name ↑	Design Org ↑
4S	super-safe, small and simple	Toshiba Energy Systems & Solutions Corp.
ABWR	Advanced Boiling Water Reactor	GE-Hitachi
ABWR-II	Advanced Boiling Water Reactor II	GE-Hitachi
ACR-1000	Advanced CANDU Reactor 1000	AECL
AHWR	Advanced Heavy Water Reactor	BARC
ALFRED	Advanced Lead Fast Reactor European Demonstrator	Ansaldo Nucleare
ALLEGRO	ALLEGRO	EURATOM
AP 1000	Advanced Passive PWR	Westinghouse

Home Technical Data Deployment Characteristics Publications Glossary About ARIS

How to get involved

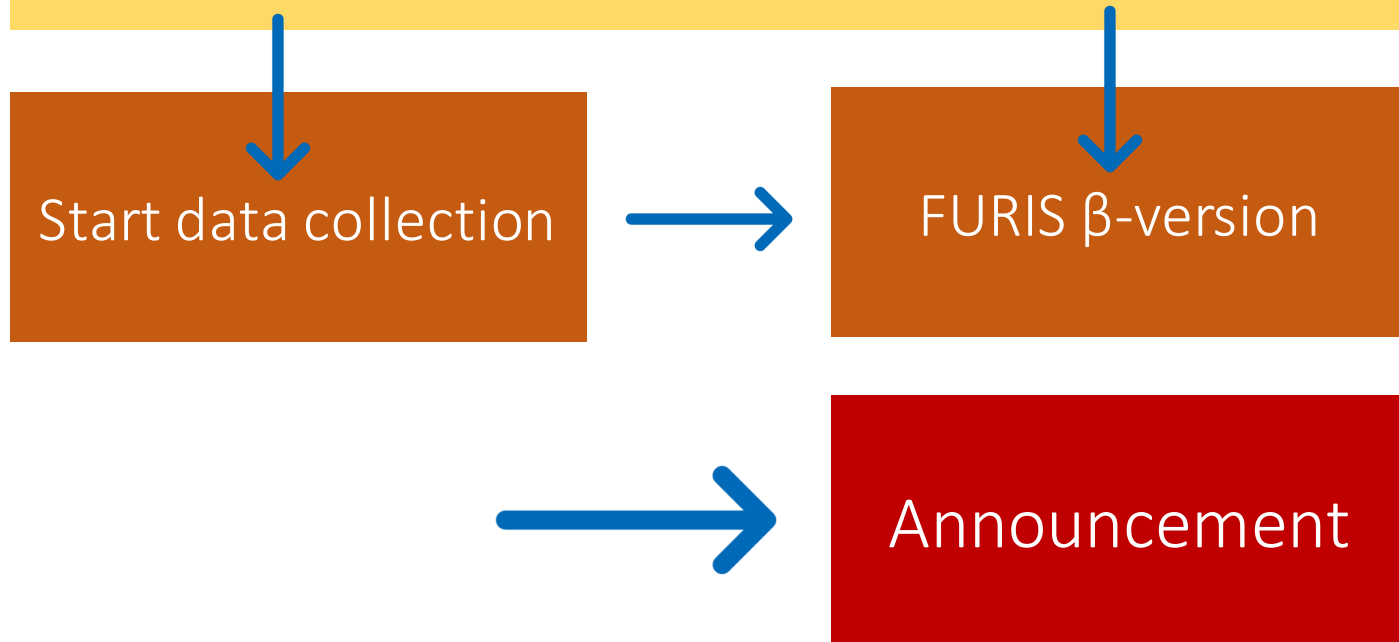
Consultancy Meeting in July

Review the structure of the FURIS template

Finalize the list of parameters to be included in the template

Discuss key technological aspects

Prepare the list of the organizations to be invited





IAEA

International Atomic Energy Agency



IAEA

Thank you

ffsynergies@iaea.org

