

Technical Cooperation activities on Research Reactors (RR)

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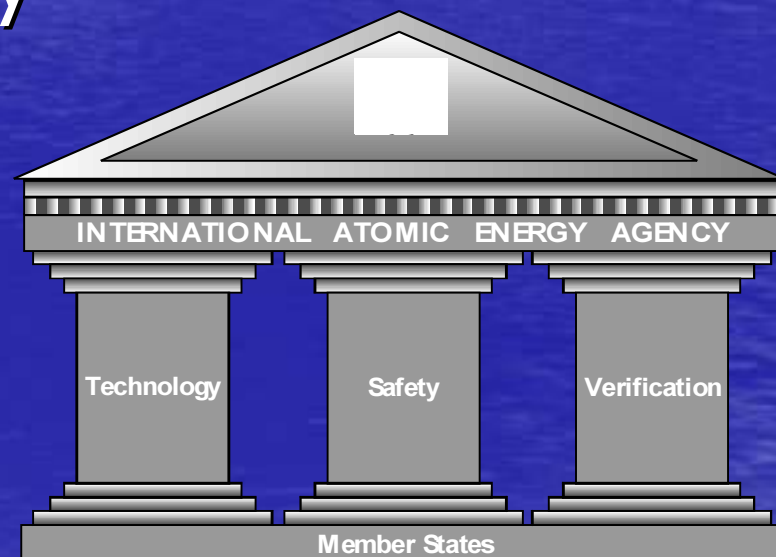
Mandate

- The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world. It shall ensure, so far as it is able, that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose

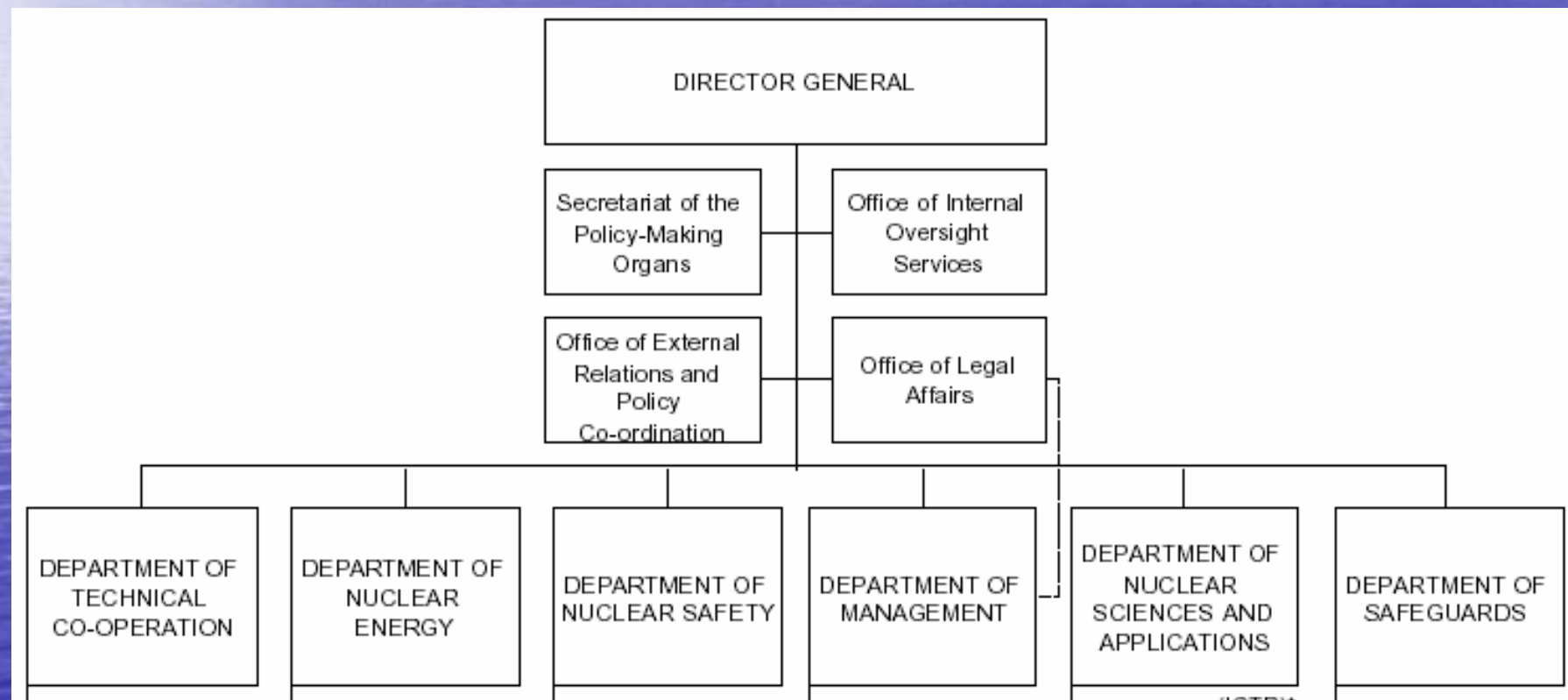
IAEA pillars

The IAEA bases its activities on three pillars

- Technology
- Safety and Security
- Verification



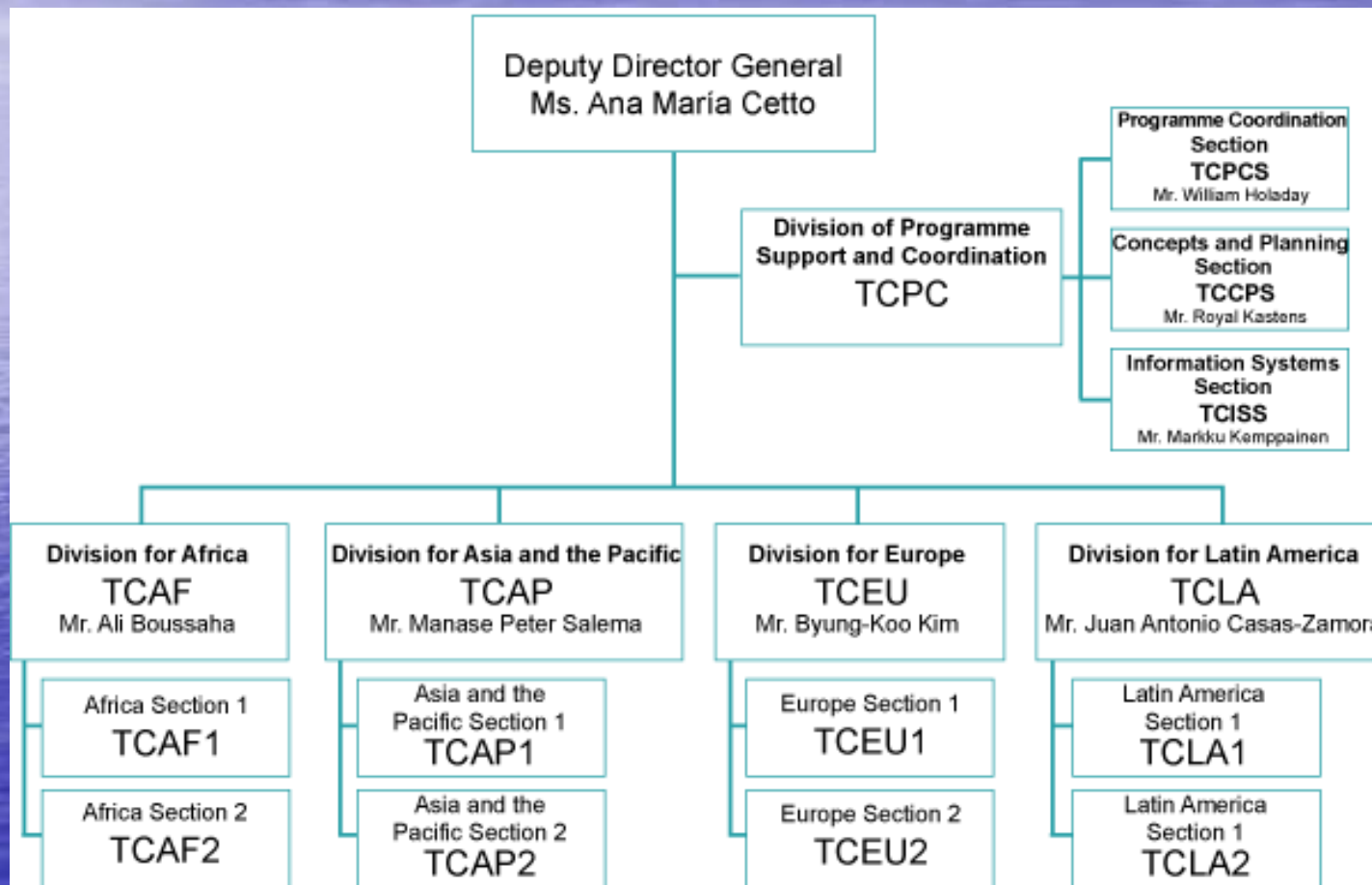
IAEA structure



Six Departments

- **Nuclear Energy:** nuclear energy, fuel cycle and waste management
- **Safety and Security:** Nuclear, waste and radiological Safety and nuclear security
- **Nuclear application:** Peaceful use of nuclear technology
- **Safeguards:** To independently verifies the correctness and the completeness of the declarations made by MS about their nuclear material and activities
- **Technical cooperation:** Technology transfer and sustainable development
- **Administration:** Administrative support (finance, budget, staff, Information Technology, public relation..)

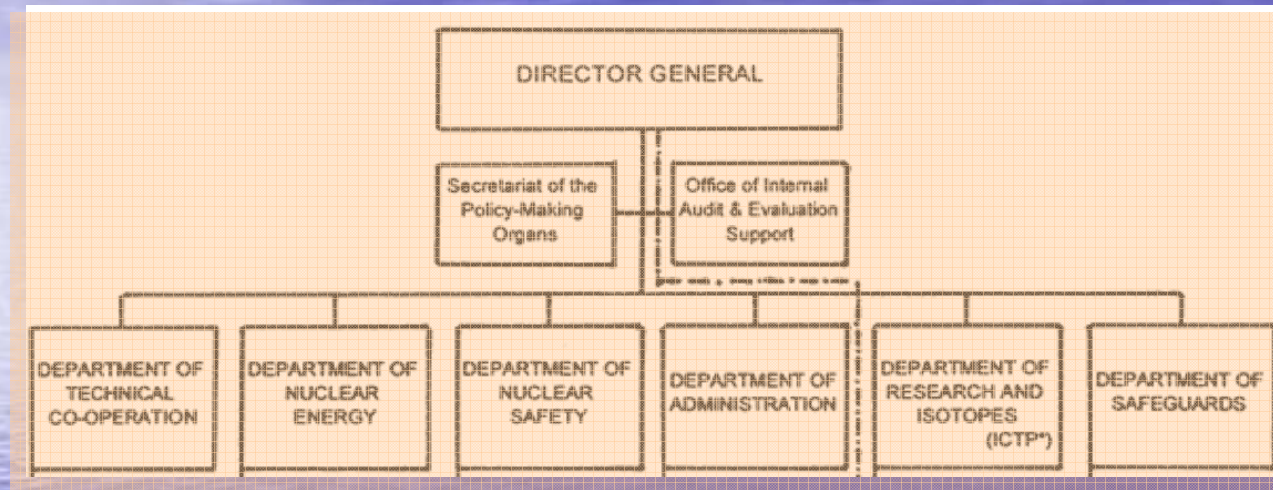
TC Department structure



Financial resources

- IAEA resources are of two types:
 - Regular budget
 - Technical Cooperation Funds (TCF)

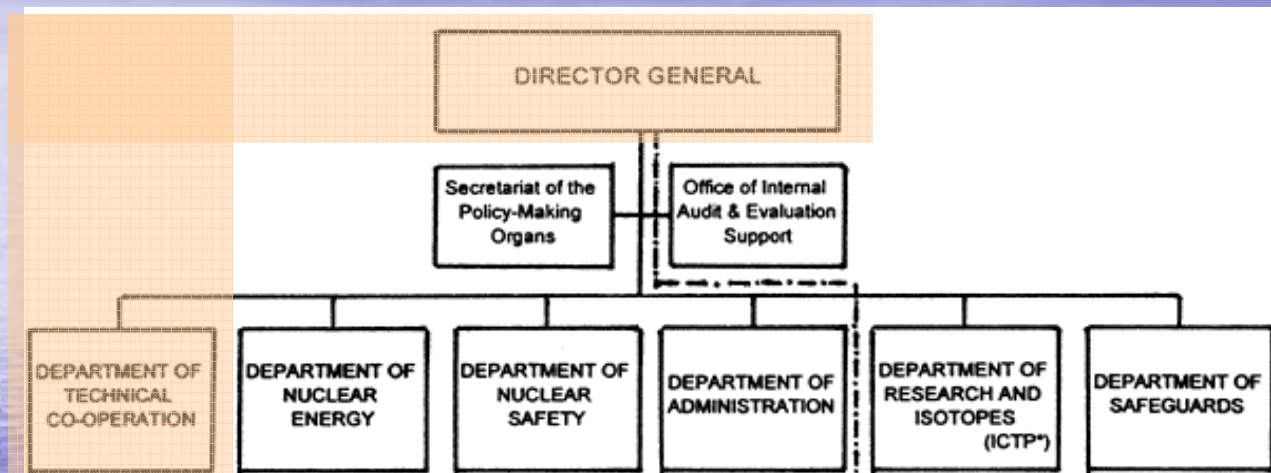
Funds and IAEA resources



Regular budget

- Staff salaries
- Departmental activities
- Coordinated Research Programme (CRP)
- Seminars, Conferences
- Operating costs of IAEA headquarter

Funds and IAEA resources

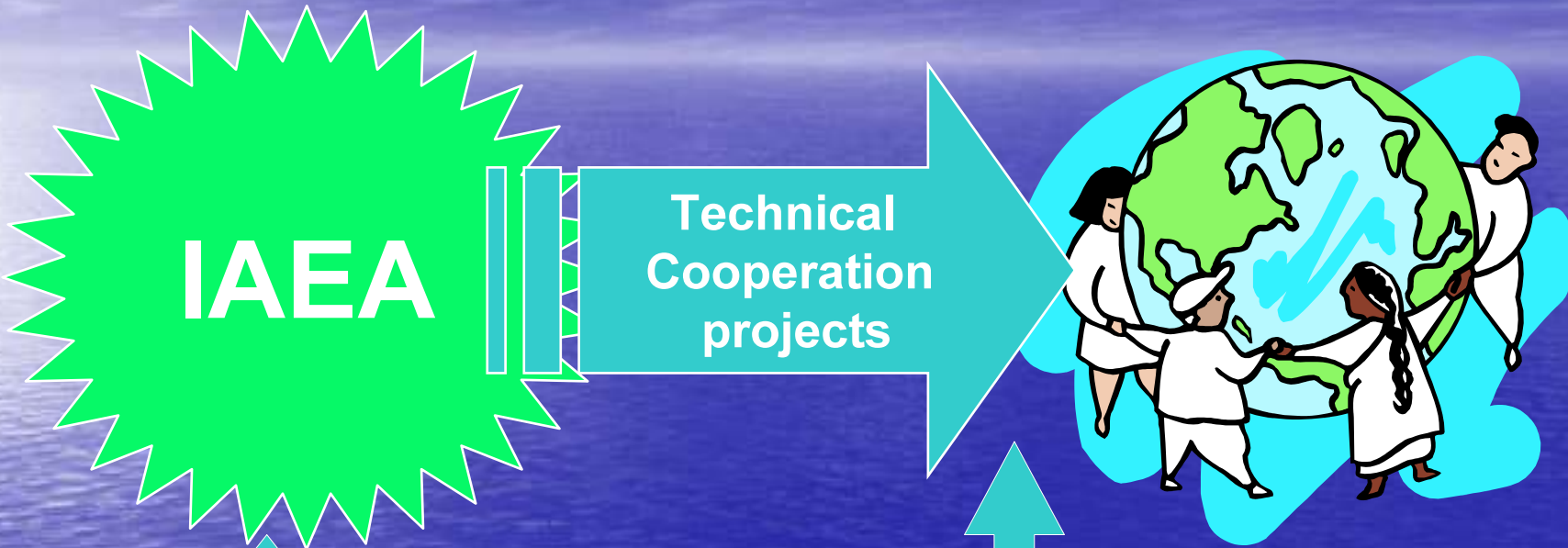


TCF (Technical Cooperation Funds)

- Technical Cooperation projects
- TC specific activities

Policy and strategy for technical cooperation.
Mandate of annual GC (Member States)

TC – Strategic Objective: How...?



- IAEA supports with:
- Fellowships (FE)
 - Scientific Visits (SV)
 - Expert Missions (EM)
 - Equipment (EQ)



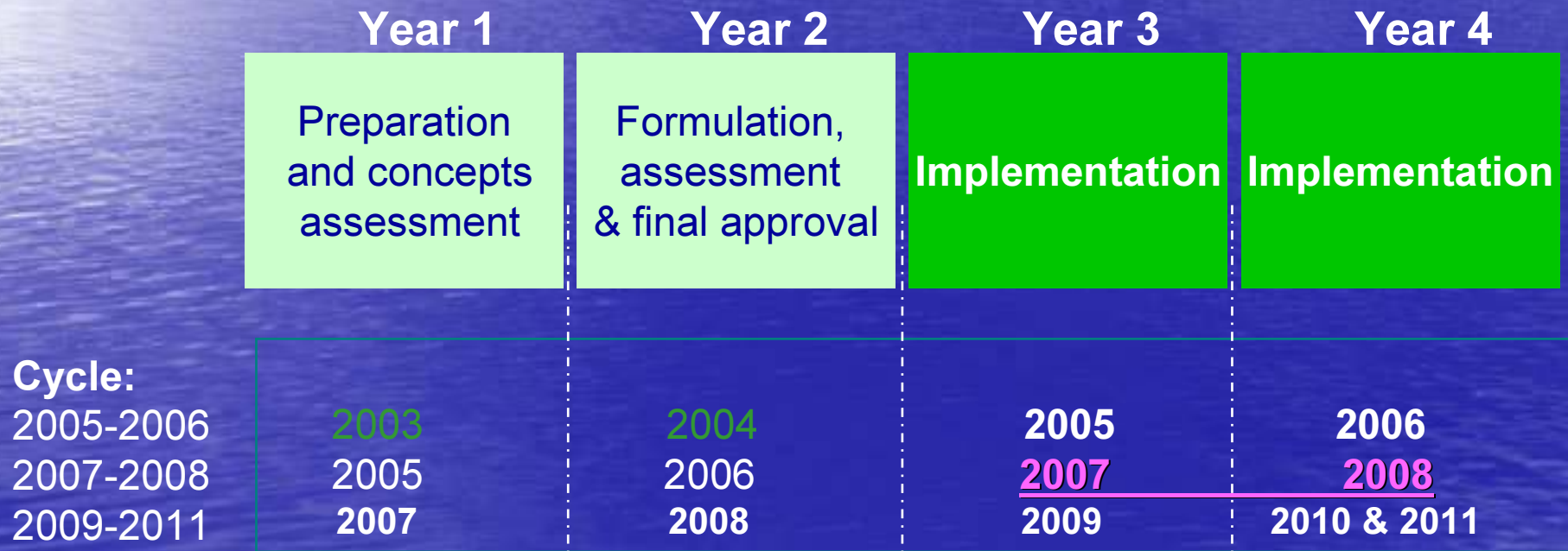
- MS contributes with:
- National Program
 - Local operating costs
 - Infrastructure (buildings..)
 - Human resources and a commitment with outcomes sustainability



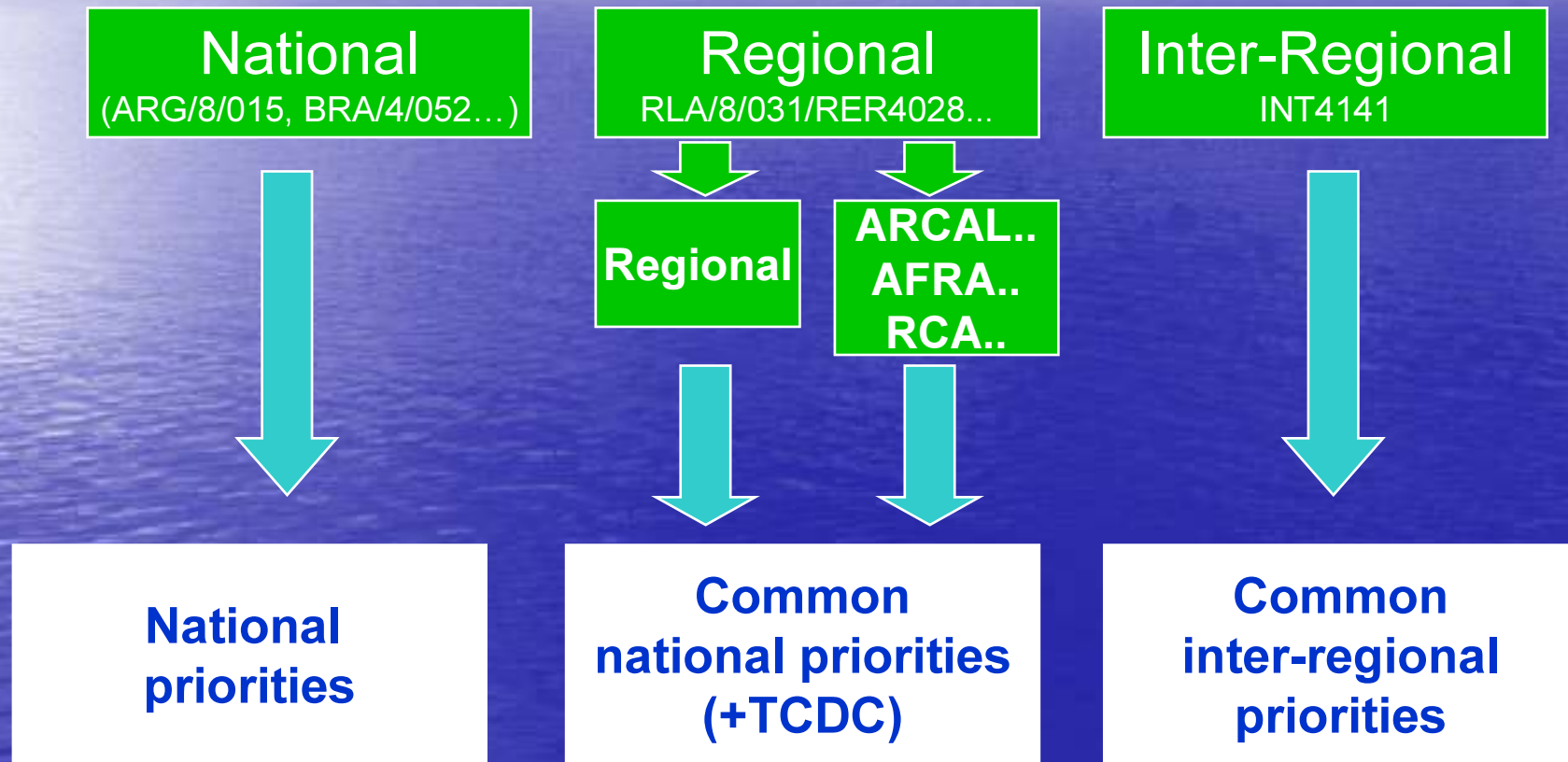
TC project

TC Programme cycle

- Biennium programme (Projects for 2 years or more..)
- + 2 years for preparation and project formulation



Types of TC Projects



Regular budget

- Based on compulsory contributions from Members States
- In 2007: **US \$386 millions**

Technical cooperation Funds (TCF)

In 2007

- Target for MS voluntary contribution to TCF: **US \$80 millions**
- Additionally an amount of **US \$58,8 millions** as extra-budgetary from MS, UNO's and other international organizations was donated

<http://www.iaea.org>

<http://tc.iaea.org>



IAEA

Atoms for Peace: The First Half Century

1957–2007

TC activities on Research Reactors

1. Use and applications
2. Modernization
3. Fuel cycle
4. Future TC projects on RR

1.1 Use and applications

1. **ALG4010**: Development and Improvement of Experimental and Analysis Techniques for the Es Salem Reactor
2. **COL1010**: Integral Use and Safety of the Nuclear Research Reactor IAN-R1
3. **CPR1007**: Residual Stress Measurement using Neutron Diffraction for Industrial Application
4. **EGY4048**: Development of Neutron Irradiation and Beam Line Facilities for Effective Use of the Research Reactor
5. **GHA4012**: Enhancing the operation and utilization of the miniature neutron source reactor (GHARR-1) for socio-economic Development
6. **GRE1040**: Development of a Regional Neutron Scattering Centre
7. **GRE4011**: Development of a Regional Neutron Scattering Centre
INS9022: Inspection Procedures and Methods for Assessing Reactor Tank Liners
8. **MOR4016**: Use of the Lateral Channels of the TRIGA MARK II Research Reactor

1.2 Use and applications

- **MOR4018**: Use of the Lateral Channels of the Triga Mark II Research Reactor
- **NIR4007**: Utilization of Research Reactor for Neutron Activation Analysis
- **RAS4026** Adding Value to Materials through Irradiation with Neutrons (RCA)
- **RER4029**: Enhancement of the Sustainability of Research Reactors and Their Safe Operation Through Regional Cooperation, Networking and Coalitions
- **SAF1002**: Establishing a Small-angle Neutron Scattering Centre
- **SAF4003**: Upgrading of the Neutron Beam Line Facilities of the SAFARI-1 Research Reactor
- **THI2012**: Strengthening of the Instrumental Neutron Activation Analysis Laboratory for Analysis of Food and Environmental Samples
- **VIE4014**: Modification of the Dalat Reactor Control System

2.1 Modernization

- **LIB/4/009** Enhancement of the Safety System of Tajoura Research Reactor and Critical Facility
- **BUL/4/014** Refurbishment of Research Reactor
- **UKR/9/024** Modernization and Safety Improvement of Research Reactor
- **UZB/9/004** Improving Operational Safety of the Research Reactor at the Institute of Nuclear Physics
- **BRA/4/056** Modernization of the IEA-R1 Reactor for Radioisotope Production

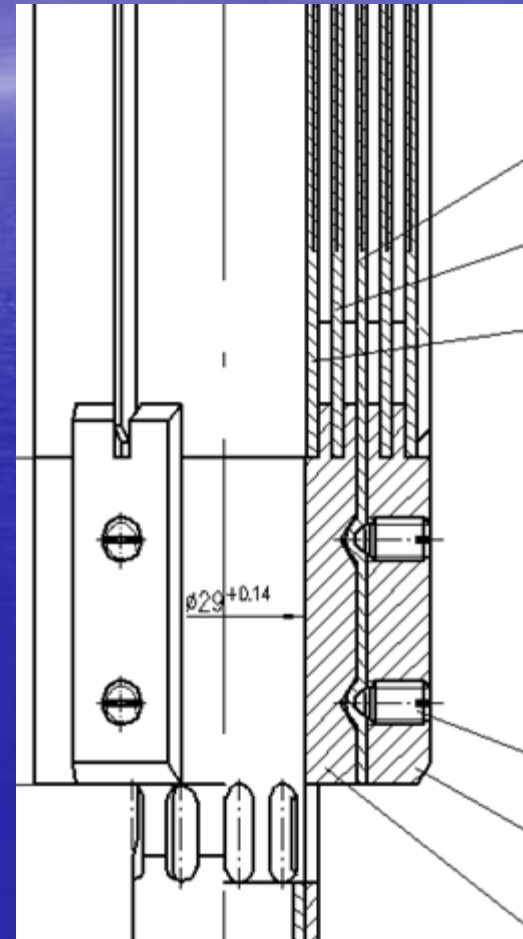
3.1 Fuel conversion (active projects)



- **KAZ/9/00** Support to Convert WWR-K Reactor to LEU
- **POL/4/017** Full Conversion of Maria RR to LEU (Poland)
 - Initially operated with 80% enriched HEU changed to 36% HEU in 1999
 - IAEA organized an independent expert mission to assist Poland in developing necessary design specifications and drawings
 - IAEA initiated a tender process to procure LEU silicide fuel
- **POR/4/016** Conversion of the Portuguese RR
 - Convert and return the HEU to US
 - IAEA initiated a tender process to procure LEU silicide fuel

3.2 Fuel conversion (active projects)

- Poland – Support of conversion of the Maria reactor.
- Use of silicide fuel, qualified to high burnups
- Unique, reverse flow, mechanical design requires irradiation of 2 LTAs and a somewhat customized



3.3 Fuel conversion (completed projects)

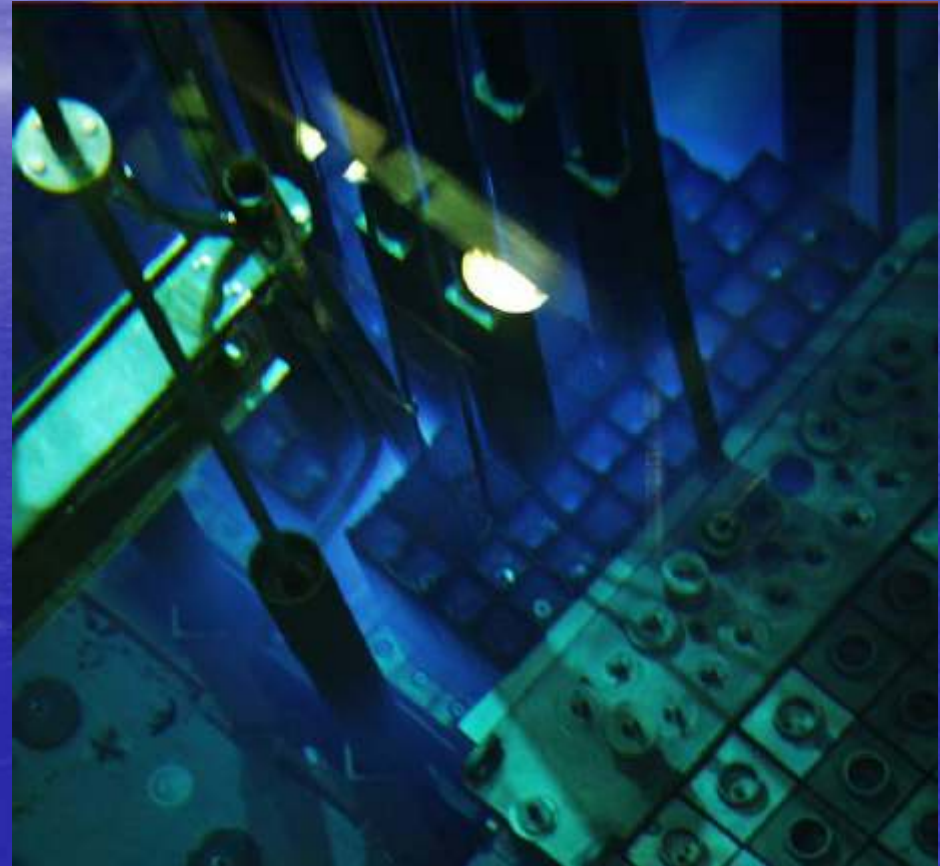


- **ROM/4/024** Full Conversion of TRIGA 14-MW (Romania)
 - 4 million \$ from US-DOE to procure LEU fuel, coupled with a Romanian 0.5 million \$ and IAEA TC Fund 100,000 \$
 - Final lot of LEU delivered to Pitesti on March 30, 2006
 - Mid-May 2006 full-core conversion completed
 - All irradiated HEU removed prior to May 12, 2006 shipped to the US
- **CHI/4/021** Production and Irradiation Qualification of Fuel Elements for RRs (Chile)
 - Conversion of the RECH-1 in La Reyna fully converted in May 11 2006,
 - CCHEN has been qualified as a supplier of silicide fuel elements through an irradiation and post irradiation qualification programme, conducted under the IAEA TC project CHI/4/021

3.4 Fuel conversion (completed projects)

Romania –14 MW TRIGA-reactor in Pitesti, Romania, fully converted in May 2006.

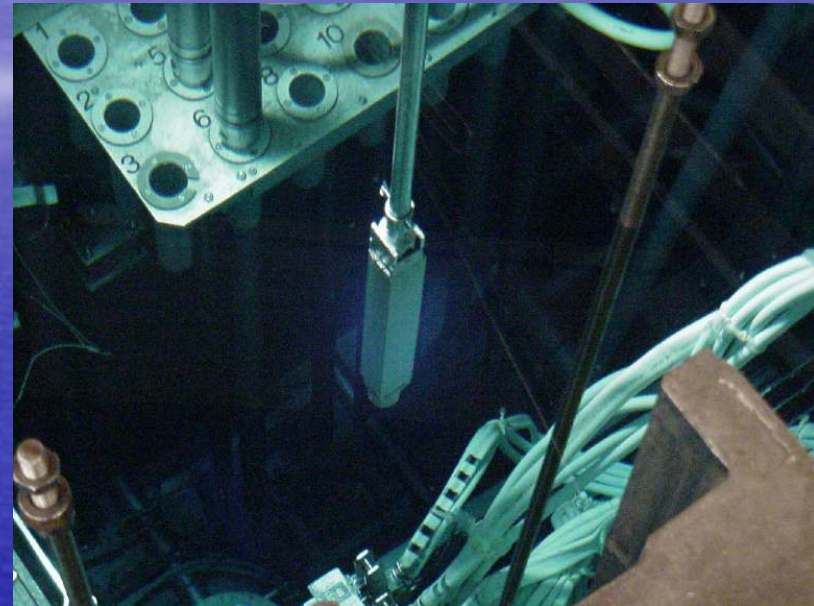
- Managed through a tripartite contract.
- Challenged as the fuel fabrication operations were transitioning from USA to France.
- Well managed with no adverse impact on the project.



3.5 Fuel conversion (completed projects)

Chile – Conversion of RECH-1, fully converted in May 2006

- Development of domestic LEU fuel fabrication capability
- IAEA support via TC commenced in 2001
- Objective: qualify the irradiation performance of fuel fabricated in Chile; to ensure quality control and assurance of silicide fuel, and to improve fuel fabrication technology



4.1 Future TC projects on RR

- AZB** Planning and implementation of research reactor in the Republic of Azerbaijan
- BRA** Modernization and Refurbishment of Iea-R1 Research Reactor to Secure Safe and Sustainable Operation to Produce Radioisotopes for Medical Applications
- BUL** Refurbishment Of The Irt-sofia Reactor. Improving Safety And Utilization
- GRE** Modernization of the Greek Reactor Control Room
- EGY** Build up capabilities and Installation of SANS Facility at ETRR-2 Reactor
- JOR** Establishment of a Research Reactor

4.2 Future TC projects on RR

- MAL** Developments of Advance Applications of Multipurpose Research Reactor (MRR) in Malaysia
- PAK** Ageing Management of Pakistan Research Reactor-1 (PARR-1)
- RCA** Production of Radiopharmaceuticals and Radioisotopes using Research Reactors / Accelerators and their Innovative Applications in Human Health, Industries and Mining (RCA)
- RLA** Aumento Sustentable de la Utilización de Reactores de Investigación en la Región de ALC, Intercambio de Experiencias, Preservación del conocimiento y formación de recursos humanos, y análisis de necesidad de modernización de algunos
- UKR** Design And Siting Of New Research Reactor In Ukraine
- RAF** Enhancing research reactor utilization and safety

Strengthening the research reactors activities..



...atoms for peace.