

**Status Report of the Utilization of Research
Reactors in the New and Candidate
Member States of the EU**

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Overview

country	operational	shut-down
Bulgaria	1	-
Czech Republic	3	1
Hungary	2	-
Poland	1	1
Romania	1	1
Slovenia	1	-

Bulgaria

- INRE – IRT-2000 reactor
 - 1961 0.5 MW, 1 MW from 1965, 2 MW from 1970
 - upgrading to 5 MW – terminated project
 - 2001 decision to low power reactor 200 kW
- Use of the low power reactor
 - education and training
 - neutron activation analysis
 - radioactive isotopes, BNCT, nuclear electronic tests

Czech Republic

- LVR-15 at NRI in Řež near Prague
 - 10 MW
- LR-0 at NRI in Řež near Prague
 - 5 kW – VVER fuel – since 1983 (82)
- VR-1 (sparrow) at FNSPE at Prague Tech University
 - 1 kW – fuel as LVR-15 – since 1990

LVR-15

- In operation since 1957
 - 2 MW, 4 MW from 1964, present 10 MW (licensed 15)
- Enrichment
 - EK-10, then IRT 80%, IRT 36%
- Utilization
 - material testing, activation analysis, beam experiments
 - medical and pharmaceutical, silicon doping, BNCT
- Operation up to 2018

Hungary

- Budapest Research Reactor
 - 10 MW
- Training reactor at INT of Budapest Tech University
 - 100 kW
 - 10 kW 1971, 100 kW 1986 – EK-10 fuel
 - education and training
 - reactor physics, radio chemistry, noise diagnostics,
 - health physics, nuclear electronics

Budapest Research Reactor

- In operation since 1959
 - 2 MW, 5 MW from 1966, 10 MW from 1992
- Enrichment
 - EK-10, than 36% (VVRSM and VVR-M2)
- Utilization
 - beam experiments (cold neutron source, TOF)
 - isotope production, radiography, activation analysis
- Operation up to 2023

Budapest Research Reactor



Budapest Technical University Training Reactor



Poland

- **MARIA in Swierk at the Institute of Atomic Energy**
 - First in operation 1974, reconstructed 1985
 - temporarily shut-down since 2004
- **Enrichment**
 - originally 80%, from 1999-2001 36%
 - transition to 20% is considered
- **Utilization**
 - isotope production

Romania

- Dual core TRIGA ROMANIA
 - 14 MW - mixed HEU/LEU fuel
 - 500kW pulsed reactor – 20% enriched ¹²U-Zr-H fuel
- HEU - LEU transition started in 1992
 - Spent HEU back to US – in progress
- Utilization
 - CANDU tests, isotope production, activation analysis
 - radiography, training

Slovenia

- TRIGA MARK II at IJS in Ljubljana
 - in operation since 1966, GA, 250 kW – pulsed mode
 - 219 spent fuel elements back to US in 1999
- Utilization
 - education and training
 - activation analysis, isotope production
 - serving the NPP needs
- Long-term use foreseen

Former German Democratic Republic

- in Rossendorf near Dresden a research reactor, similar to the BRR (same fuel, power) was in operation from 1957 to 1990
- fresh fuel and other devices were purchased by AEKI for the symbolic price of 1 DM (~ 0.5 €)
- **the Rossendorf Reactor survives, at least partly in Budapest**

Summary

- the reactors differ quite significantly from each other
 - well known types among them (Triga in Romania and Slovenia)
 - the majority is of Russian origin with Russian fuel (EK, IRT, VVR).
- all the reactors are foreseen for further use, technical problems (supply etc.) may hinder the utilization
- there is need for research reactors in the entire region