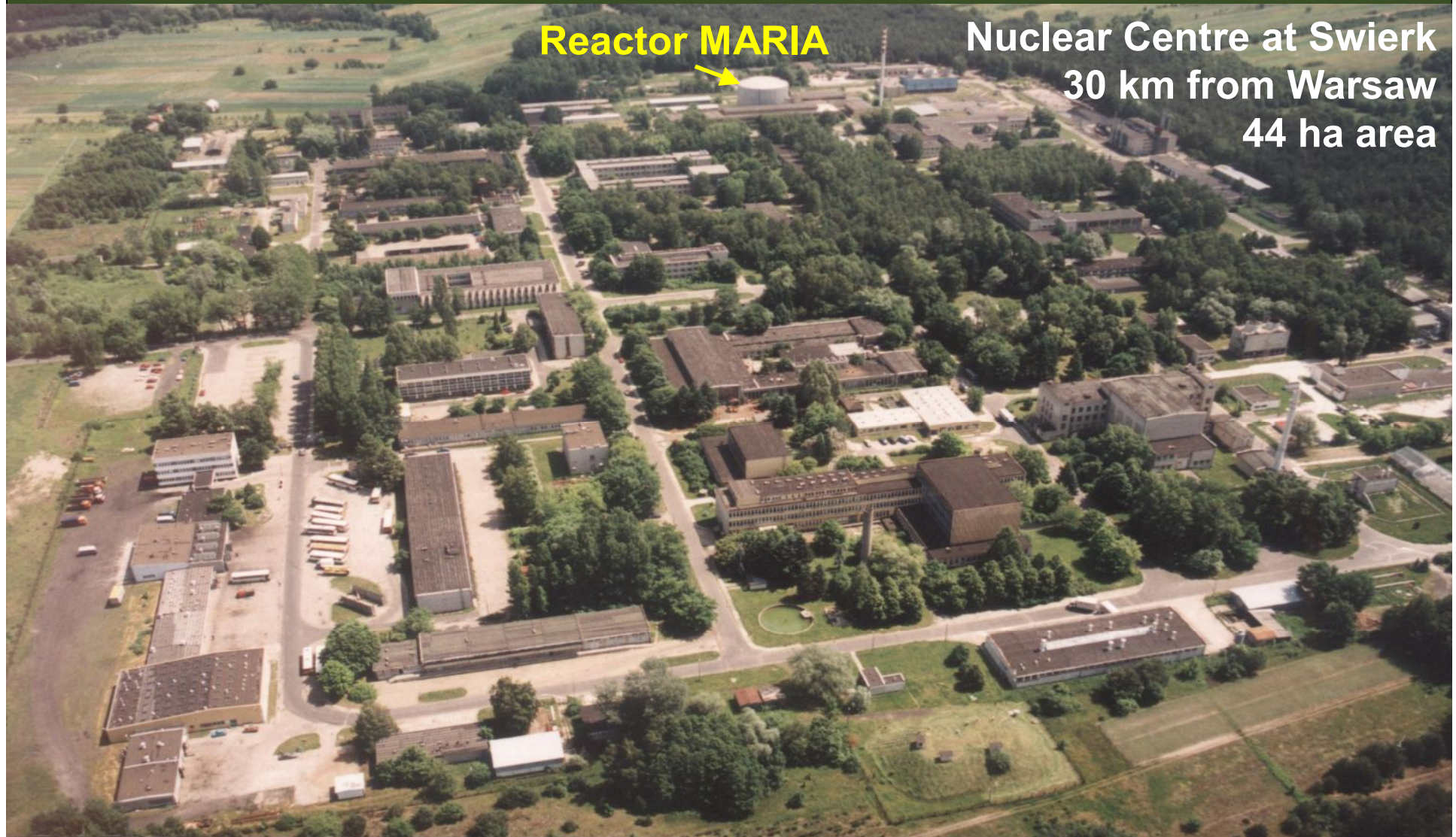


Nuclear power prospects for Poland



Reactor MARIA



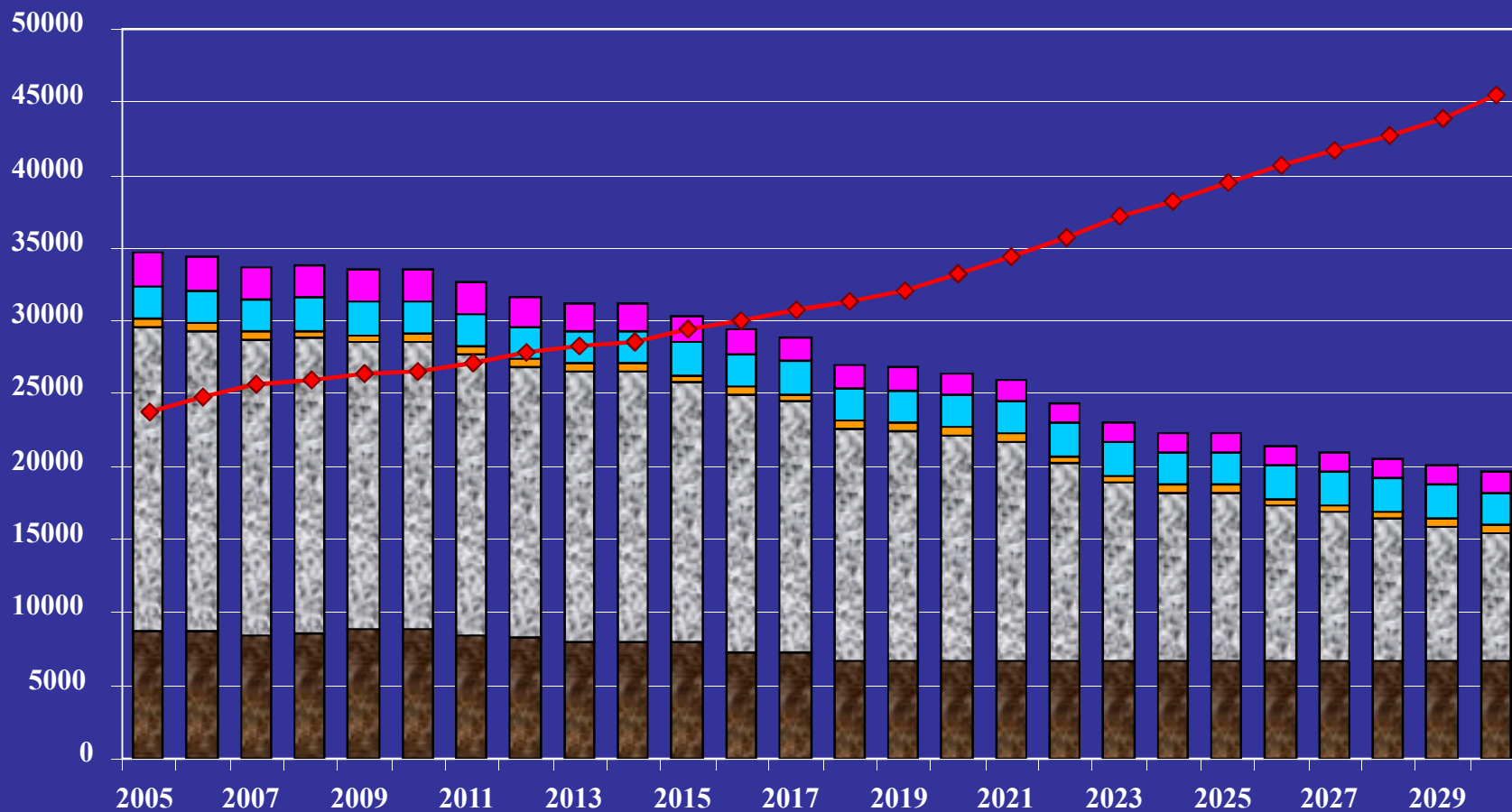
**Nuclear Centre at Swierk
30 km from Warsaw
44 ha area**

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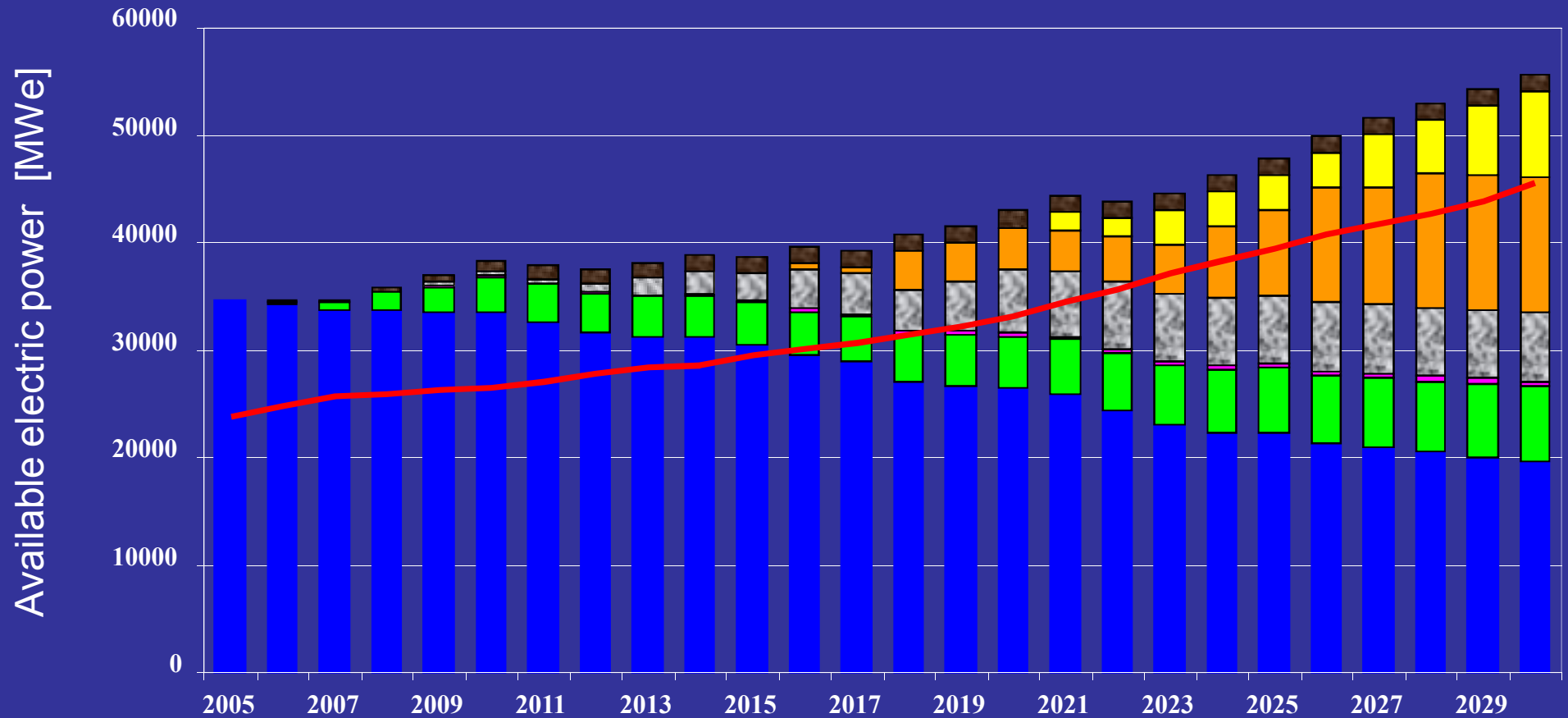
Production of electric power in Poland with existing power plants

Available & needed electric power [MWe]



Lignite
 Hard Coal
 Gas
 Water
 EC
 Needed

Plans to cover electric energy needs in Poland



Existing

Renewables

EC

Hard coal

Gas

Nuclear

Lignite

Needed

Nuclear power in Poland by 2030

	2006	2030		
		min	mid	max
Final electric energy (all sources) TWh	111	172	197	209
reactors	0	6	8	10
Nuclear power MW(e)	0	4800	9600	12000
Net electric energy (nuclear) TWh	0	16	32	47
Nuclear energy fraction	0%	15%	25%	30%

min – „Polish Energy policy till 2030”
mid – more investors , larger reactors
max – higher demand

Polish Nuclear Power Program

- **13.01.2009 – governmental decision to prepare the nuclear power programme**
 - Ministry of Economy created Department of Nuclear Energy, Governmental Commissioner appointed
- **Today:**
 - Drafts of legislations submitted to parliament
 - **PGE group opened bids for „owner’s engineer” and site licensing**
 - National Center of Nuclear Research under creation
- **2020 – first power plant in operation**
 - second reactor soon after the first one

Prospects for small reactors in Poland

Poland is a great potential market for SMR:

- **The grid is not well developed.**
 - **Large reactors need heavy investment in the grid.**
- **Many companies are ready to invest in their own sources of electricity and heat**
 - **fertiliser, cement & paper factories, refineries, mines, heavy industry etc.**
- **Pollution (PM10, etc) from heating of houses is a serious problem in many towns.**
 - **Many cities (inc. Warsaw) have heat networks connected to coal fired power plants**

Strategy for small reactors in Poland

- **Two markets:**
 - Industry – own sources of electricity and heat
 - Towns – local sources of electricity and heat
 - **Remote areas is not a big market in Poland**
- **How to reduce the cost per MW?**
 - Count on mass production
 - **Target: 100 SMRs in Poland (1000 in Europe)**
 - 6% of 50 TWe = 3000 MWe = 100 x 30 MWe
 - **Do not advertise the simplicity**
 - People afraid that you compromise on safety
- **Cogeneration is the magic keyword**

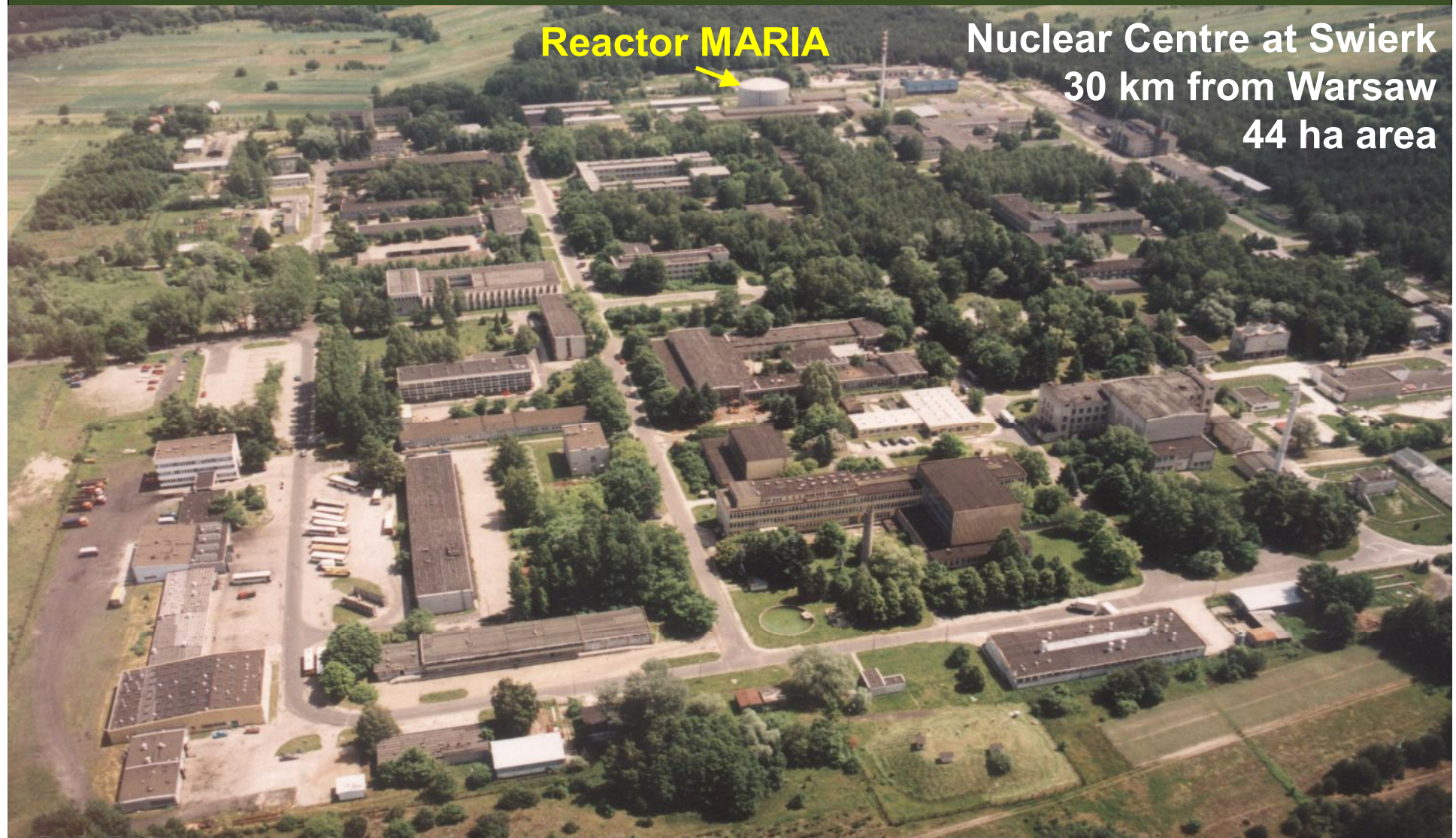
SMR as EU priority?

- „Strategic Energy Technology Plan” (SET-Plan) of Europe will be realised by „European Industrial Initiatives” (EII)
- „Sustainable Nuclear Energy Technology Platform” (SNE-TP) proposes:
 - **Eu Sustainable Nuclear II (ESNII)**
 - fast reactors to save uranium & reduce waste
 - **Nuclear Cogeneration EII**
 - mid power reactors for electricity & heat
 - so far only gas cooled high T reactors considered
- **SET-Plan conference & SNE-TP Gen. Assembly @ Polish EU presidency 28-29.11.2011**
 - **key place to discuss the Nuclear Cogeneration EII**

Strategy for small reactors

- **Chicken and egg problem of SMR:**
 - Needs investment to build a prototype
 - No one willing to invest not seeing working prototype
- **Licensing problem:**
 - Regulatory rules for large reactors not suitable for SME
 - Long and expensive licensing required to build the prototype
- **Proposed solution:**
 - Build a pre-prototype as a research reactor
 - <50 MWt licensing much easier
 - could use existing research lab site
 - could get some funds from research budget?

National Center for Nuclear Research (NCBJ)



Reactor MARIA

**Nuclear Centre at Swierk
30 km from Warsaw
44 ha area**

NCBJ is being created by merging the Institute of Atomic Energy (IEA) & the Soltan Institute for Nuclear Studies (IPJ)

Polish nuclear R&D institutes

Institute	site	staff	prof.	phd	papers
Institute of Atomic Energy (IEA) POLATOM	Swierk	458	18	44	130
Institute for Nuclear Studies (IPJ)	Swierk, Warsaw	460	48	52	308
Inst. of Nuclear Chemistry & Technology (ICHTJ)	Warsaw	241	24	44	236
Inst. of Plasma Physics & Laser Microsynth. (IFPiLM)	Warsaw	82	9	14	70
Central Lab. for Radiological Protection (CLOR)	Warsaw	52	3	7	
Institute of Nuclear Physics (IFJ) PAS	Cracow	486	71	115	~335
TOTAL		1779	173	276	1080

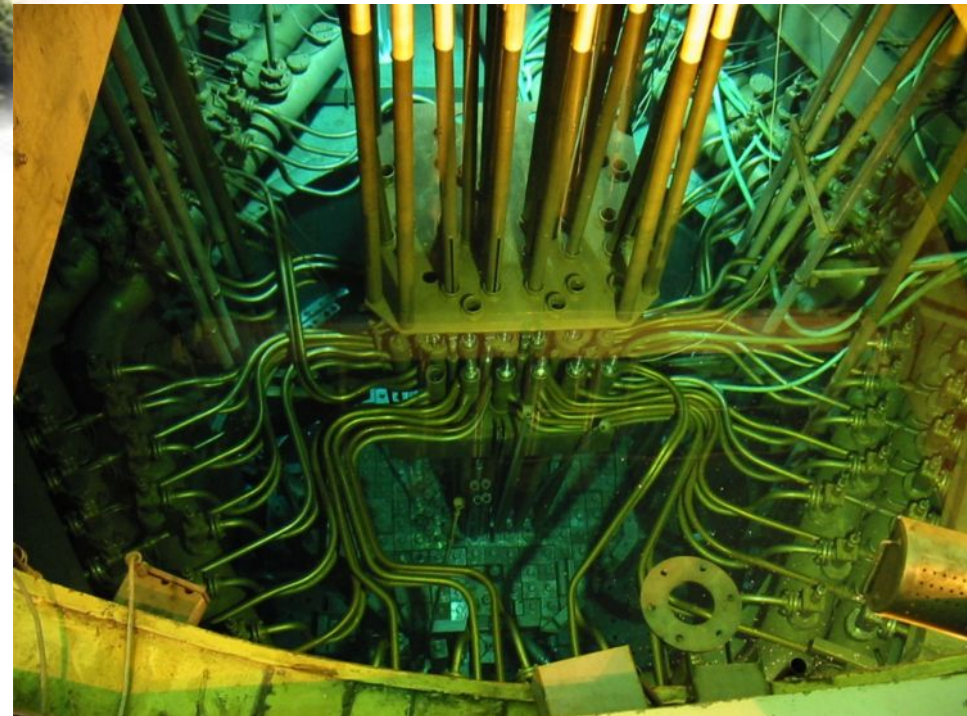
+ several universities & technical universities

Research reactor *MARIA* at Swierk



- built 1974, upgrade 1992
- neutron beam research, activation analysis, isotope production:
 ^{99}Mo for medical use

- pool type
- H_2O , Be moderated
- 30 MW thermal power
- neutron flux:
 - thermal $4 \cdot 10^{14}$ n/cm²s
 - fast $2 \cdot 10^{14}$ n/cm²s



Research programme

Nuclear power:

- Safety analysis
- Reactor materials
- Nuclear fuel
- Radiological monitoring
- Analysis of nuclear accidents
- Spent fuel
- Radioactive waste

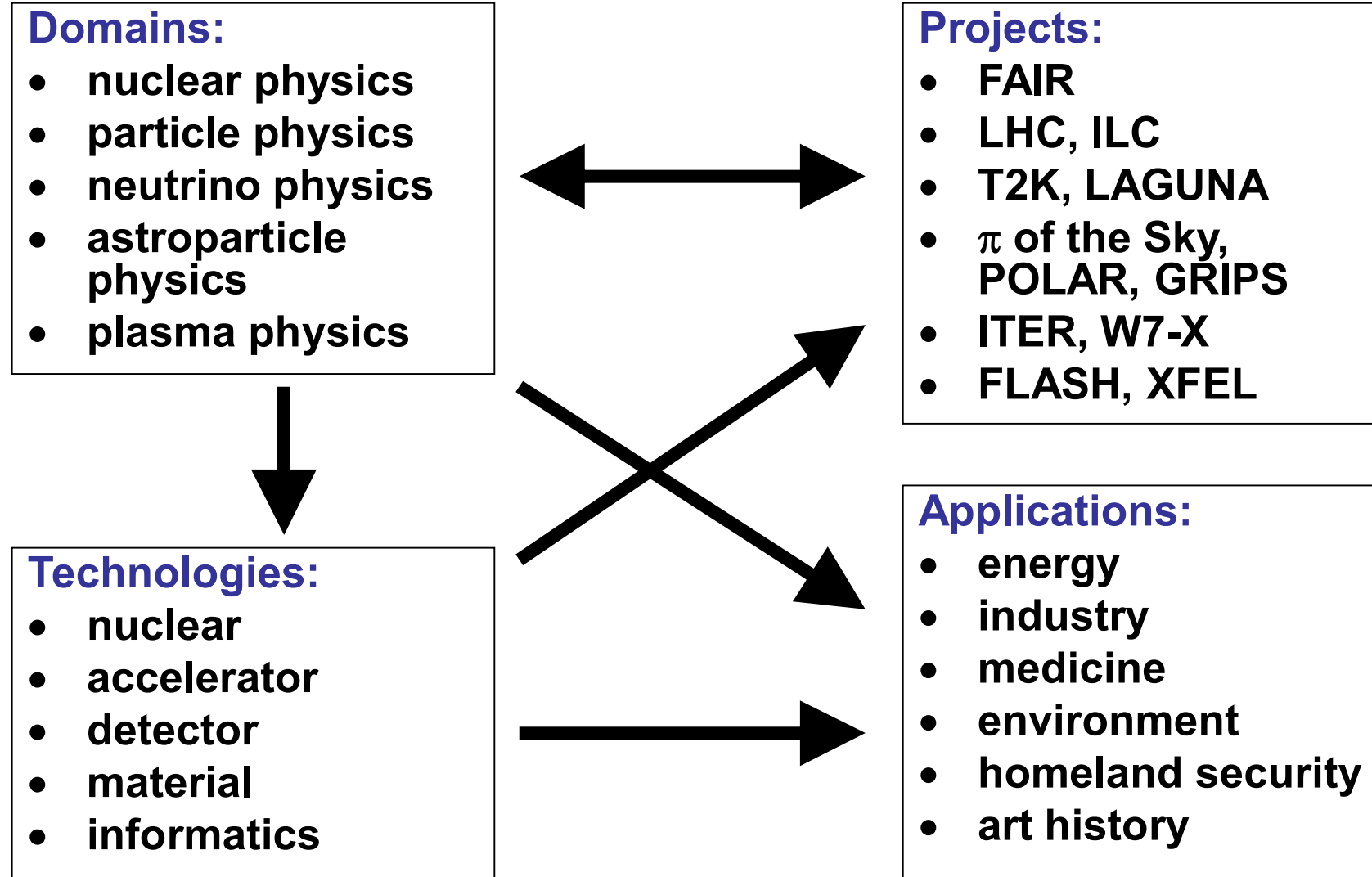
Research and applications:

- Material modification
- Neutron radiography
- Neutron-boron therapy
- Production of isotopes
- Si transmutation for microelectronics

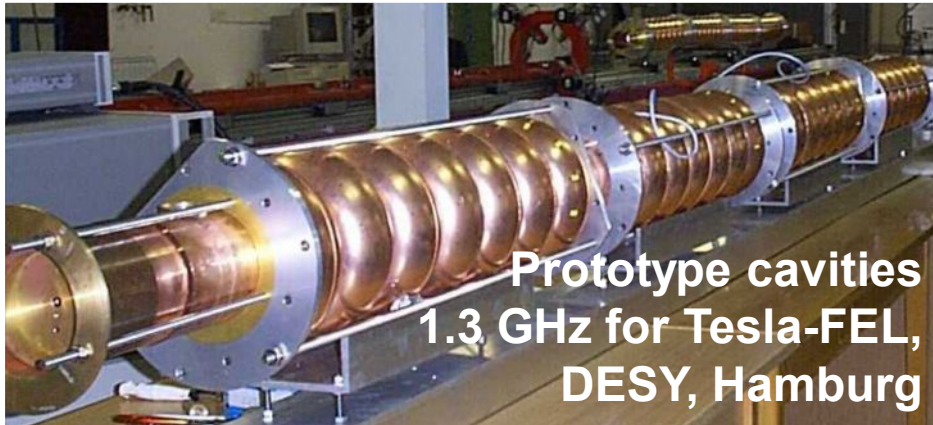


Soltan Institute for Nuclear Studies

research program



Particle accelerators and detectors



From research instruments
to commercial applications



www.HiTecPoland.eu

Conclusions

- **Lithuania and Poland share the interest in small nuclear reactors**
- **Collaboration in research is the best way to begin the common effort in this field**

