



Polish nuclear power program – current status and prospects Zbigniew Kubacki

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Agenda

- Nuclear power in the world and in the EU
- Status of implementation of the Polish Nuclear Power Program :
 - > PNPP framework
 - benefits for the economy
 - share of the Polish industry
 - > schedule
 - choice of location (actions of the investor)
 - legal framework
 - radioactive waste management
 - human resources development
 - ➢ R&D support
 - information and education campaign



Nuclear power in the world





	Units operating		Units under construction		Units planned	
	Capacity [GWe]	Number	Capacity [GWe]	Number	Capacity [GWe]	Number
Total	373,156	437	65,486	68	181,190	164

Source: IAEA PRIS, World Nuclear Association update**11.04.2013 r.** 4

Nuclear power in the world- countries with nuclear sorted by GDP



1	US	15	Indonesia	29	Malaysia	43	Czech Rep.	57	Morocco
2	China	16	Turkey	30	Nigeria	44	Greece	58	Kuwait
3	India	17	Iran	31	Belgium	45	Norway	59	Iraq
4	Japan	18	Australia	32	Philippines	46	Algeria	60	Belarus
5	Germany	19	Taiwan (China)	33	Venezuela	47	Romania	61	Ecuador
6	Russia	20	Poland	34	Sweden	48	UAE	62	Slovak Rep.
7	Brazil	21	Argentina	35	Switzerland	49	Israel		
8	UK	22	Saudi Arabia	36	Austria	50	Portugal	67	Tunisia
9	France	23	Netherlands	37	Ukraine	51	Kazakhstan	69	Bulgaria
10	Italy*	24	Thailand	38	Singapore	52	Denmark	83	Lithuania**///
11	Mexico	25	South Africa	39	Peru	53	Finland	86	Slovenia
12	S. Korea	26	Egypt	40	Vietnam	54	Hungary	99	Jordan
13	Canada	27	Pakistan	41	Chile	55	Ireland	128	Armenia
14	Spain	28	Columbia	42	Bangladesh	56	Qatar		others 125

Country with nuclear

Country with no nuclear but building/planning

Nuclear power in Europie



Country	Reactors in operat	tion	Reactors under construction/planned		
Country	Capacity [GWe]	Number	Capacity [GWe]	Number	
Belgium	5,9	7	-	-	
Bulgaria	1,9	2	-/1	-/1	
Czech Rep.	3,7	б	-/3,6	-/3	
Finland	2,7	4	1,6/3,0	1/2	
France	63,1	58	1,6/1,6	1/1	
Spain	7	7	-	-	
Netherlands	0,5	1	-/1,6	-/1	
Germany	12,0	9	-	-	
Romania	1,3	2	1,3/2,0	2/3	
Slovak Rep.	1,8	4	0,8/1,2	2/1	
Slovenia	0,7	1	-/b.d.	-/1	
Sweden	9,4	10	-/b.d.	-/2	
Hungary	1,9	4	-/2,2	-/2	
UK	10	16	-/18,4	-/13	
Countries without nuclear: 13	Austria, Cyprus, Denmark, Greece, Ireland, Luxemburg, Malta, Portugal, Italy				
Countries planning: 4	Poland, Lithuania	, Latvia, Estonia	-/7,4	-/5-7	
Total	121,9	131	5,3/34,6	6/35-37	



sources: IAEA PRIS, World Nuclear Association update **11.04.2013 r.** 6

NPPs around Poland (up to 300 km)





23 units in operation6 units in construction9 units planned

In 2020 all neighbours will have nuclear

From 2024 Germany without nuclear (?)

Demand for electricity in Poland will grow





Demand for electricity in Poland will grow



Update of forecast of final electricity demand [TWh]



Age Structure of the Existing Power Plants in Poland





A low electricity generation costs maintain a low costs of the national economy



Source: Update of prognosis of fuels and energy demand, EMA, July 2011

Energy mix of electricity generation





Scale Pyramid of Polish Nuclear Power





Political benefits

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Source: "Identification of profits from realization of nuclear power development program in Poland", Ernst & Young 2011.



- Energy security improvement.
- **Creation of Poland's image** internationally as modern, dynamically developing country
- **Building Poland's position** on the international arena through utilization of the strategic partnership in the nuclear power area with countries delivering the nuclear technology.
 - Making more flexible Poland's position on the international arena regarding climate protection and CO2 emission reduction.

Economic benefits

Poland", Ernst & Young 2011.





 Complex creation of whole new branch of national economy as development stimulator of the whole economic system on the national as well as local level.

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Broad and manifold impact
spectrum of the nuclear
program on the economy will
include various areas of
economic life even without the
proper State's organs support.

State's support will have the key importance for optimization of long term as well as short term benefits from implementation of nuclear power in Poland.

Chance for Polish enterprises

A development of Polish companies through participation in:

- planning, design, construction and operation of NPPs
- drafting and implementation of the national plan of waste management and spent nuclear fuel (ZUOP)
- development and implementation of guidelines for decommissioning

A development of cooperation between business sector and R & D to develop new, innovative products and to provide finances for research

The increase of quality of services; possibilities of international expansion

Polish companies present in the nuclear power sector:

- ELEKTROBUDOWA Katowice JSC
- ZT-B POLBAU Ltd.
- ENERGOMONTAŻ-Północ Gdynia
- ERBUD International Ltd.
- Rafamet JSC



Polish companies and Polish workers in the nuclear sector - currently

- Olkiluoto-3: 4500 workers at the peak (2011), 40% of them were Poles, 25 Polish companies (including the five listed on the previous slide). Polish nationality site manager in 2009-11. Polish workers were recognized as competent and reliable proffessionals
- Flamanville-3
- Pierelatte enrichment plant
- Philippsburg NPP
- Forsmark NPP
- Ignalina NPP





Benefits for the national and local economy Number of additional jobs during a construction of one nuclear unit



Jobs in the supply chain for NPP - 500

Jobs in facilities producing for suppliers working at construction site of NPP - 700

Jobs in sectors indirectly linked to nuclear - 1 250

Jobs at the construction site of NPP - 1 500

- Stable and relatively low cost of electricity generation
- > Reducing the environmental costs associated with electricity generation
- > Increase of general level of technical culture in the society
- > Increase of the quality of services provided by the Polish companies
- > Extending the range of provided services for the nuclear industry during construction and operation stages
- Increasing exports of goods and services for the nuclear industry
- Employment growth
- Increase in tax revenues for municipalities: PLN 170 million per year for the host municipalities and 170 million per year for neighboring municipalities (based on Ernst & Young, 2011), also revenues from personal income tax and corporate income tax for municipalities, counties and the whole province

Source: "Identification of the benefits resulting from the development of nuclear energy in Poland," Ernst & Young in 2011.



Status of implementation of the PNPP

PNPP phases:

Phase I – up to 30.06.2013: development and adoption of Program by the Council of Ministers, legislation passing (Atomic Law and so called Nuclear Investment Law, along with the regulations)

Phase II - 07.01.2013 - 31.12.2014: selection of Site Survey Contractor, call for tender for the reactor technology for the first nuclear power plant

Phase III - 01.01.2015 - 31.12.2017: drafting of blueprints and obtaining all required regulatory approvals

Phase IV - 01/01/2018 - 12/31/2022: building permit and construction of the first nuclear power plant

Phase V - 01.01.2023 - 31.12.2025: completion of the first nuclear power plant (2-3 units), launching the construction of a second nuclear power plant to be operational in 2029

Status of PNPP implementation - transboundary consultations

Transbounadry Environment Impact Assessment is based on:

- Directive 2001/42 EC on the assessment of the effects of certain plans and programmes on the environment
- Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a transboundary Context (Kiev Protocol)

From July to December 2012 meetings were held at the expert level with the countries concerned, i.e.:

- Slovakia (July 23)
- Austria (November 22)
- Germany (November 27)
- Denmark (December 4).

Those countries have submitted their formal final position. The last transboundary consultation's protocol is still discussed with Austria, signing of which will formally close the transboundary consultation process.









Status of PNPP implementation-investor's activities

PGE wants to commission the first unit at the end of 2023 or at the beginning 2024.

In early January 2013, the utility concluded a tender for Site Survey Contractor - the winning bidder was WorleyParsons. The Value of the contract is 252 million PLN (\$80 million)

The study will take more than two years and will include: geological, hydrological, seismic, environmental and natural conditions, the current land use, availability of infrastructure (including power grid)

In 2013 launch of tender for reactor technology and the financing scheme of investment is expected









Status of PNPP implementation – legal framework

Two laws which allow investment process are in force :

- amended Atomic Law

- Act on the preparation and implementation of investments in nuclear power facilities and investments for the supporting infrastructure (called "investment law").

The Atomic Law is complemented by about 45 regulations, including 3 regulations of the Minister of Economy.

Ministry of Economy is preparing drafts of (current phase: inter-ministerial consultations):

- amendment to the Atomic Law to implement the so-called EU radwaste directive (Council Directive 2011/70/Euratom)

- Regulation on the types of technical equipment subject to technical inspection at the NPP

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z dena 29 cze	rwca 2011 r.	
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² Zesiany tekatu jadrolitago wymianionaj ustawy zostały opioazona w Dz. U. z 2006 r. Nr 104, poz. 708, Nr 158, poz. 11221 Nr 170, poz. 1217, z 2007 r. Nr 21, poz. 124, Nr 159, poz. 343, Nr 110, poz. 720 i Nr 150, poz. 607, z 2008 r. Nr 160	c) określenie charakterystycznych parametrów tech nicznych inwestycji orsz dowych charakteryzują cych jej septyw na środowtako;	
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Status of PNPP implementation – radioactive waste management

In 2013, following the adoption by the Council of Ministers of the PNPP, a preliminary draft National Plan of radioactive waste management and spent fuel management will be prepared

The plan will be subject to public consultation and the process of transboundary environmental impact assessment.

On 9 of April 2013 a tender for the "Development of methodology to evaluate the safety and identify the optimal location of near-surface LILW disposal" for new LILW disposal was settled, the winning bidder was a consortium of Polish Geological Institute.

In January 2013 a special exploratory unit was set up at the Polish Geological Institute for geological repository for spent fuel







Status of PNPP implementation – national industry involvement

MoE is working on a database of Polish companies with competence and capacity to participate in the nuclear power program.

The next step will be to draft a plan of the Polish industry involvement in the Program.

In 2012, the nuclear industrial cluster Europolbudatom was created

In the framework of the research commissioned by NCBiR a research task "Analysis of possibilities and criteria for the participation of Polish industry in the development of nuclear power " is conducted - Warsaw University of Technology is a leader of a scientific network (consortium) conducting the task







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Status of PNPP implementation – human resources development

MoE is preparing the human resources development plan for nuclear power.

In 2009-2012, educators training program was implemented in collaboration with the French CEA.

Identification of the human resources and staff needs for stakeholders involved in the implementation of PNPP is conducted.

MoE disseminates educational materials for school teachers and students.









regulacyjnych i ewaryjnych

PODSTAWY ENERGETIKI JADROVEJ Maturaly szlodosáve da najiszycieli pradmeder pryrodskzych szlod ponidostkiawavch

Status of PNPP implementation- R&D support

In mid-2011 two institutes were merged in Swierk: IEA POLATOM and IPJ, creating a National Centre for Nuclear Research (NCBJ) which intends to be a part of national TSO for nuclear industry

In April 2012 INCT and CLRP signed agreements with the NAEA (nuclear regulator) on expert cooperation in carrying out research and analysis for the nuclear regulator. Those agreements allow the INCT and CLRP to be recognized as part of the Polish TSO.







Status of PNPP implementation – information and education campaign

On 29 March 2012 MoE inaugurated a campaign "Poznaj atom. Porozmawiajmy o Polsce z energią" ("Learn about the atom. Let`s talk about Poland with energy").

So far a number of workshops, meetings with local governments, debates on nuclear power, educational booth were organised

A campaign website www.poznajatom.pl and Facebook profile were launched

Public acceptance for the construction of NPP increased from 51% to 56% in the period from February to November 2012

Starting from 1 January 2013 the Department of Nuclear Energy of the MoE is directly responsible for the implementation of the campaign











INIR mission to Poland



On 18-22 March 2013, INIR mission of the International Atomic Energy Agency was held. INIR mission is a review of the activities of the IAEA Member State in the development of nuclear power.

- The main objective is to help IAEA Member States in the planning and development of infrastructure for nuclear power.
- Many Polish institutions, offices, companies etc. took part in the INIR meetings: the Ministry of Economy, NAEA (nuclear regulator), OTC (industrial regulator), RWMP (radwaste), PSE (national power grid operator), PGE (utility).

The scope of the review included:

- Nuclear safety and radiation protection
- Safeguards, security and physical protection
- Human resources development
- Legislative framework
- Industrial involvement and procurement
- Electrical grid
- Location of facilities and environmental protection

Within two months the IAEA will issue a report with findings and recommendations for Poland





Preliminary findings from INIR mission

- Poland has made significant progress in the necessary infrastructure for its nuclear power programme
- The INIR team identified strengths in several nuclear infrastructure areas
- Poland still has some work in Phase 1, but is simultaneously working in Phase 2
- The IAEA stands ready to assist Poland in further developing its infrastructure





Thank you for your attention

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