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Polish Nuclear Power Programme

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Polish Nuclear Power Program

Rationale to introduce nuclear power in Poland:

1. assuring long-term security of electricity supply
2. maintaining electricity prices at levels acceptable by the national economy and the society
3. reducing emissions of SO_2 , NO_x , PM and CO_2

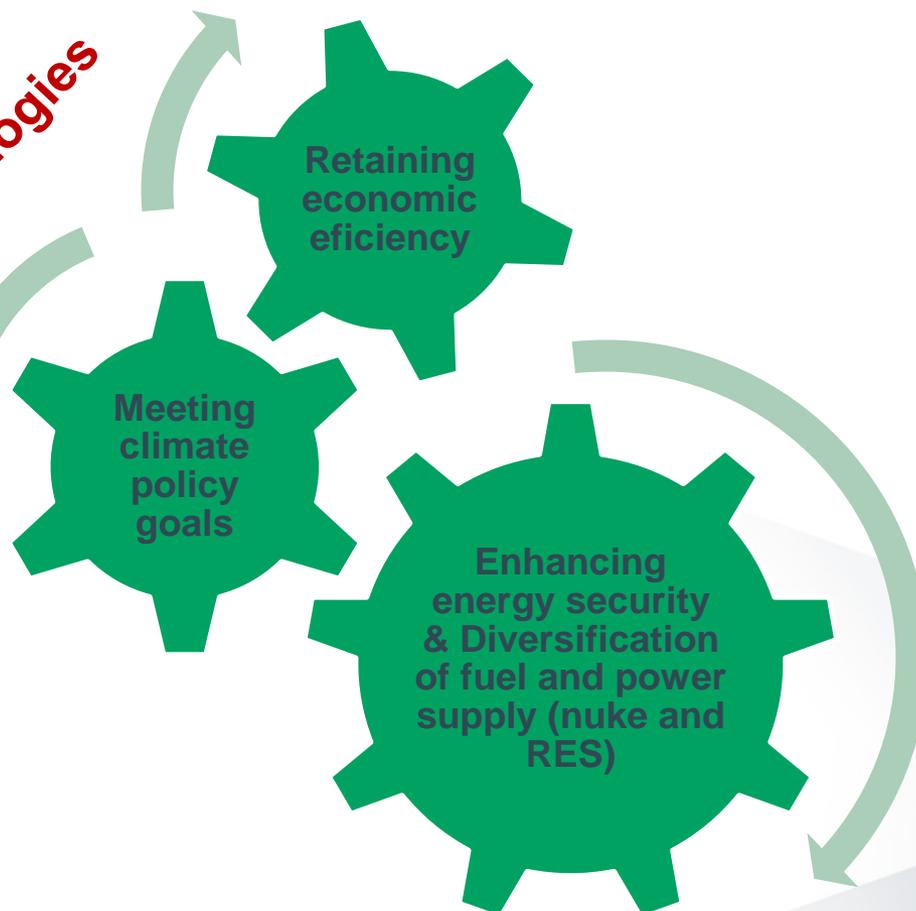


Polish Energy Policy 2030 objectives

- **To diversify the electricity generation structure by introducing nuclear power**
- To enhance security of fuel and energy supplies
- To reduce the environmental impact of the power industry
 - To improve energy efficiency
 - To develop the use of RES, including biofuels
 - To develop competitive fuel and energy market

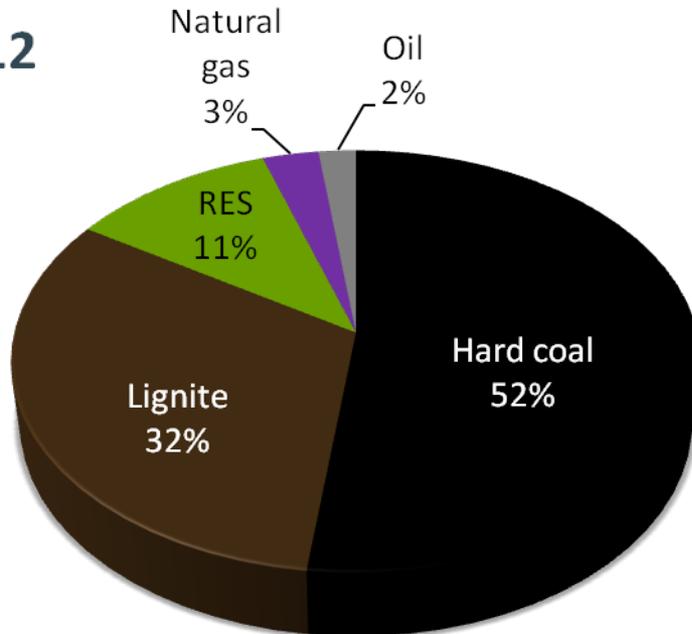
Why nuclear power?

**Using all available technologies
(also renewables, CCT)**

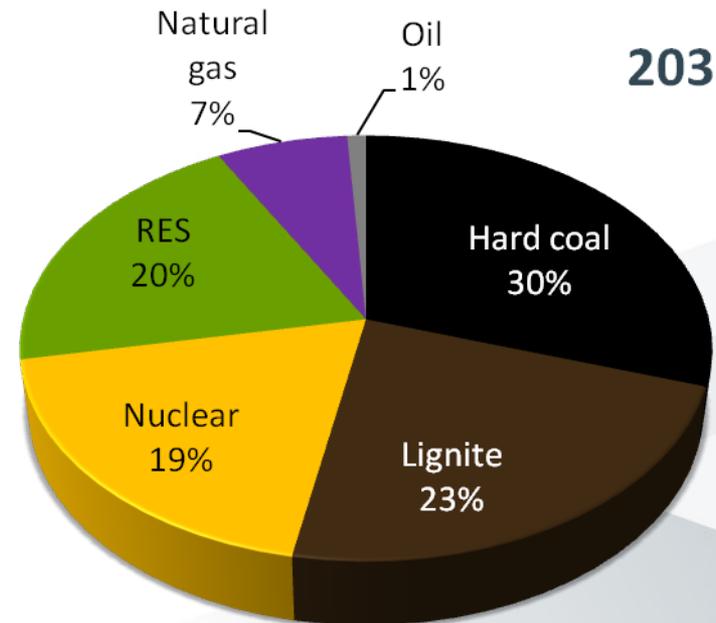


Electricity generation structure (*energy mix*)

2012



2030



No reasonable alternatives...

Coal:

- Cheap coal resources already mined out
- EU decarbonization policy
 - Increasing costs of coal power generation (CO₂, air pollutants)
 - New coal power units are not bankable
- CCS not existing and not accepted by Polish coal industry

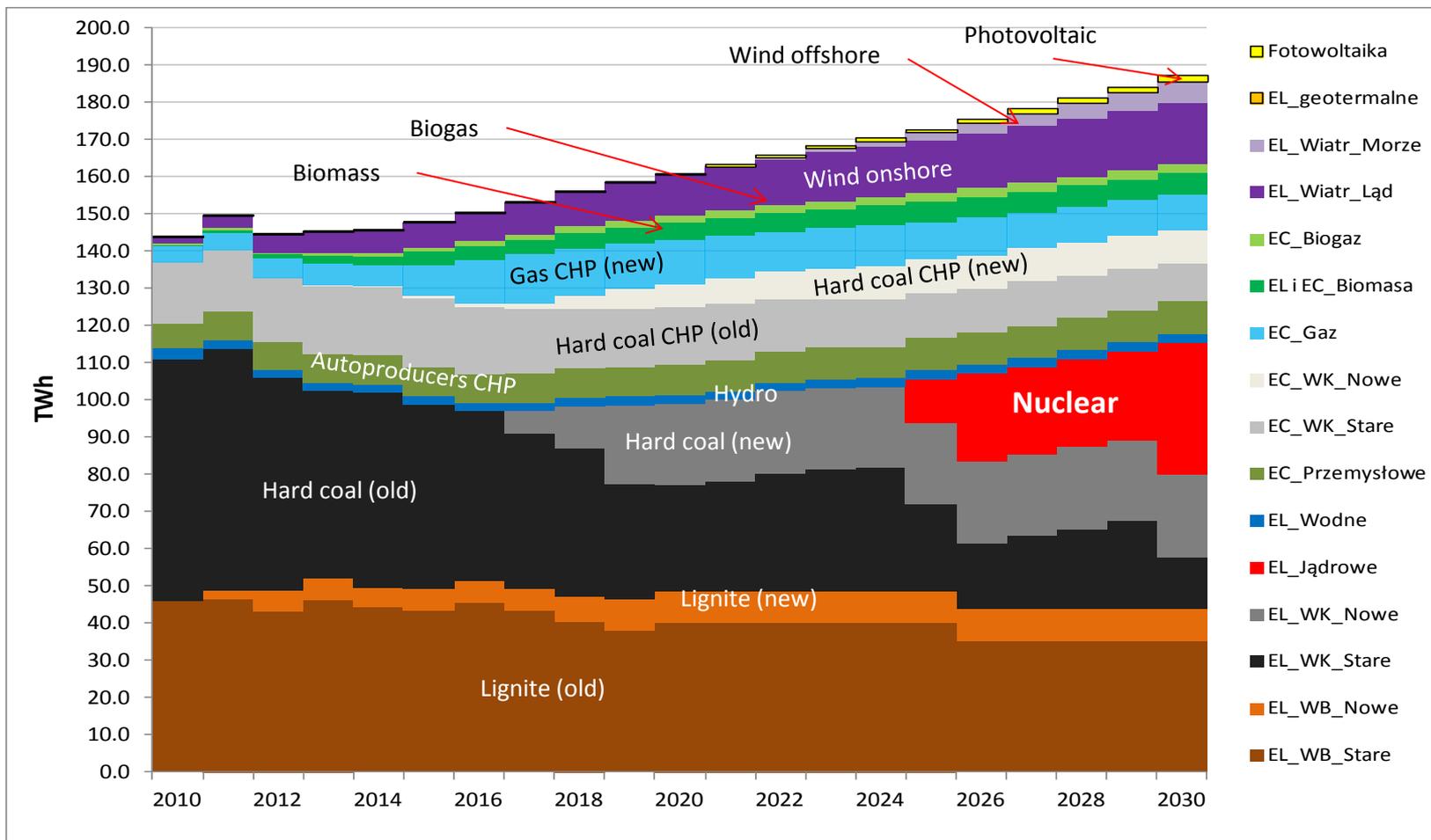
Natural gas:

- Domestic shale gas exploration ended with poor results
- Gas imported through LNG terminal will not be competitive
- Gas import from outside EU poses a threat to national security

Renewables:

- Not for baseload
- High costs (require subsidising)
- Unfavourable geographic/climate conditions (low wind, low sun)

Electricity generation structure in 2030

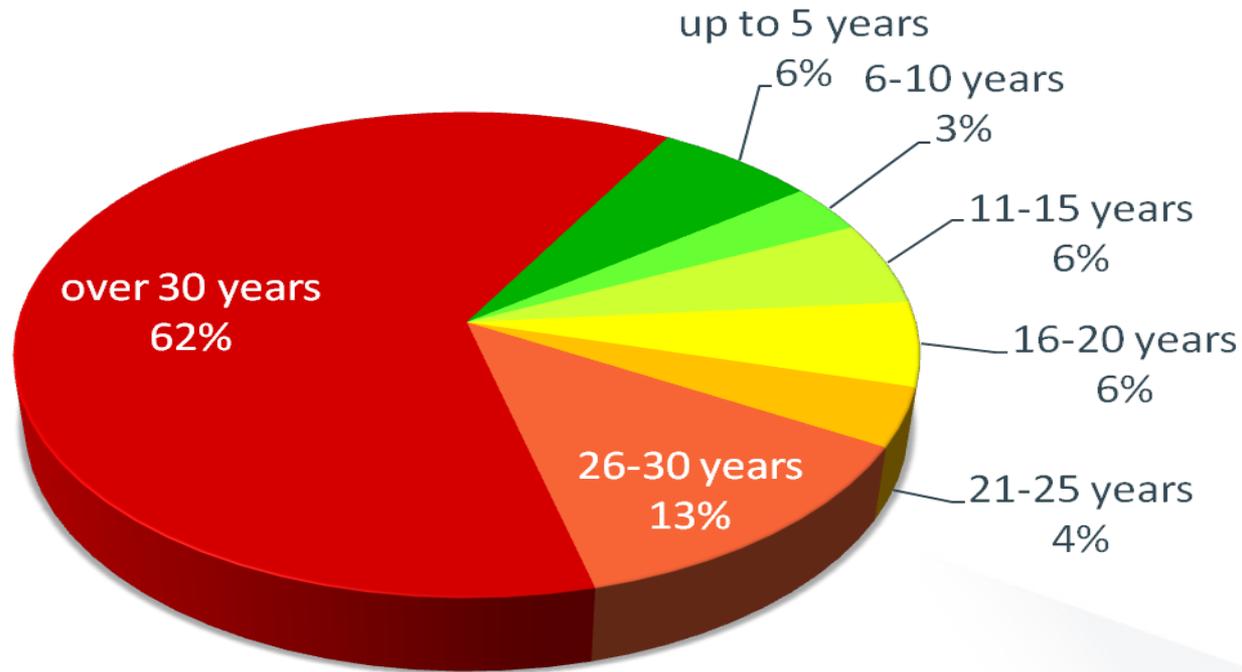


Source: Update of study of electricity generation costs with nuclear, coal, gas power plants and RES, EMA, April 2013



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Age Structure of the Existing Power Plants in Poland



Sorted by boiler's age

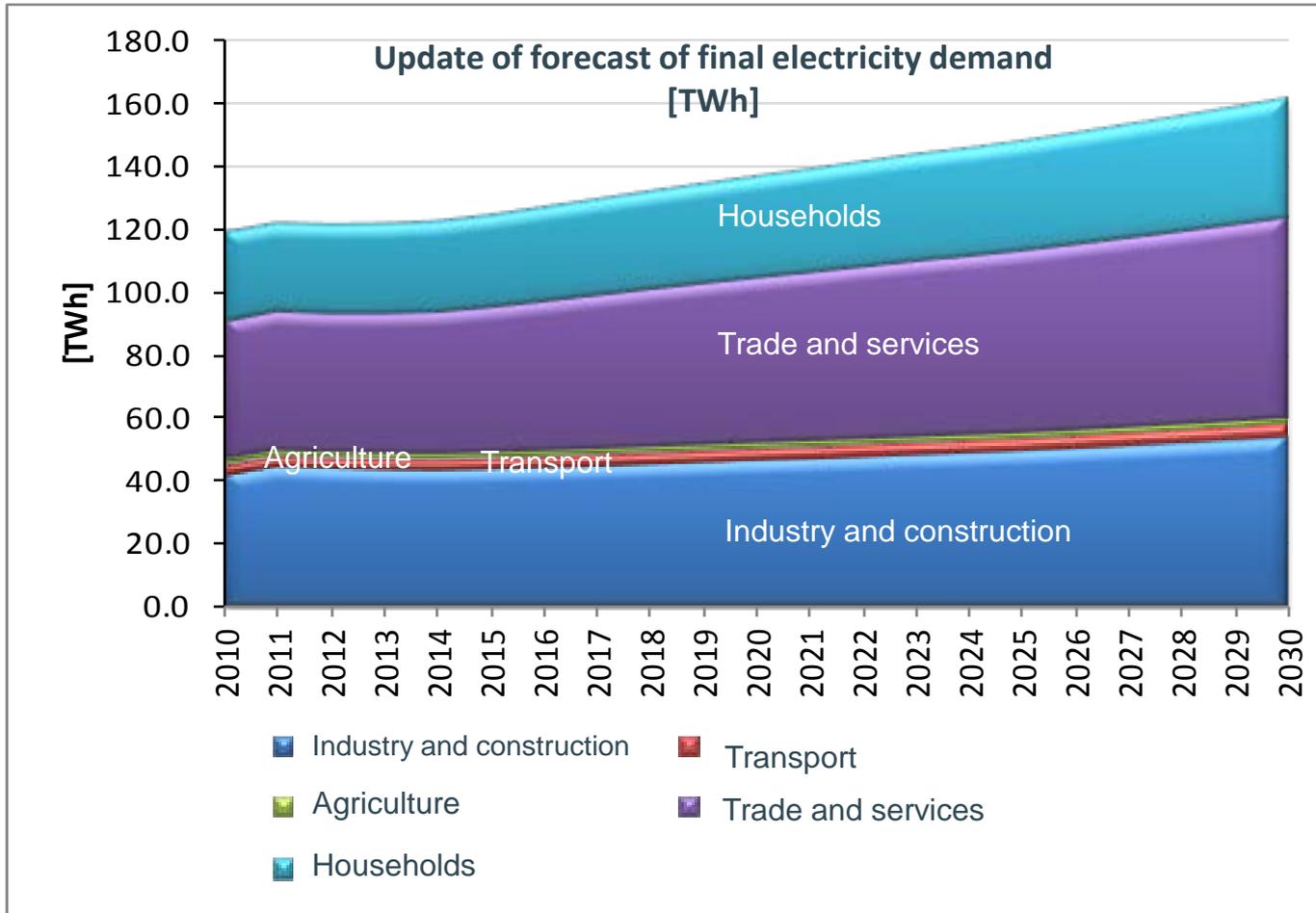
Data: Polish Energy Market
Agency 2013

Out of 33.5 GWe of current capacity ca. 6 GWe will be written off before 2020 and further 6 GWe will be shutdown before 2030. This is 36% of present capacity. Nuclear power plants can replace it to some extent.



Demand for electricity in Poland will grow

According to study made by EMA in June 2013 the final electricity consumption in Poland will increase by 36% in 2030 which is 1.5% on a year-by-year basis.

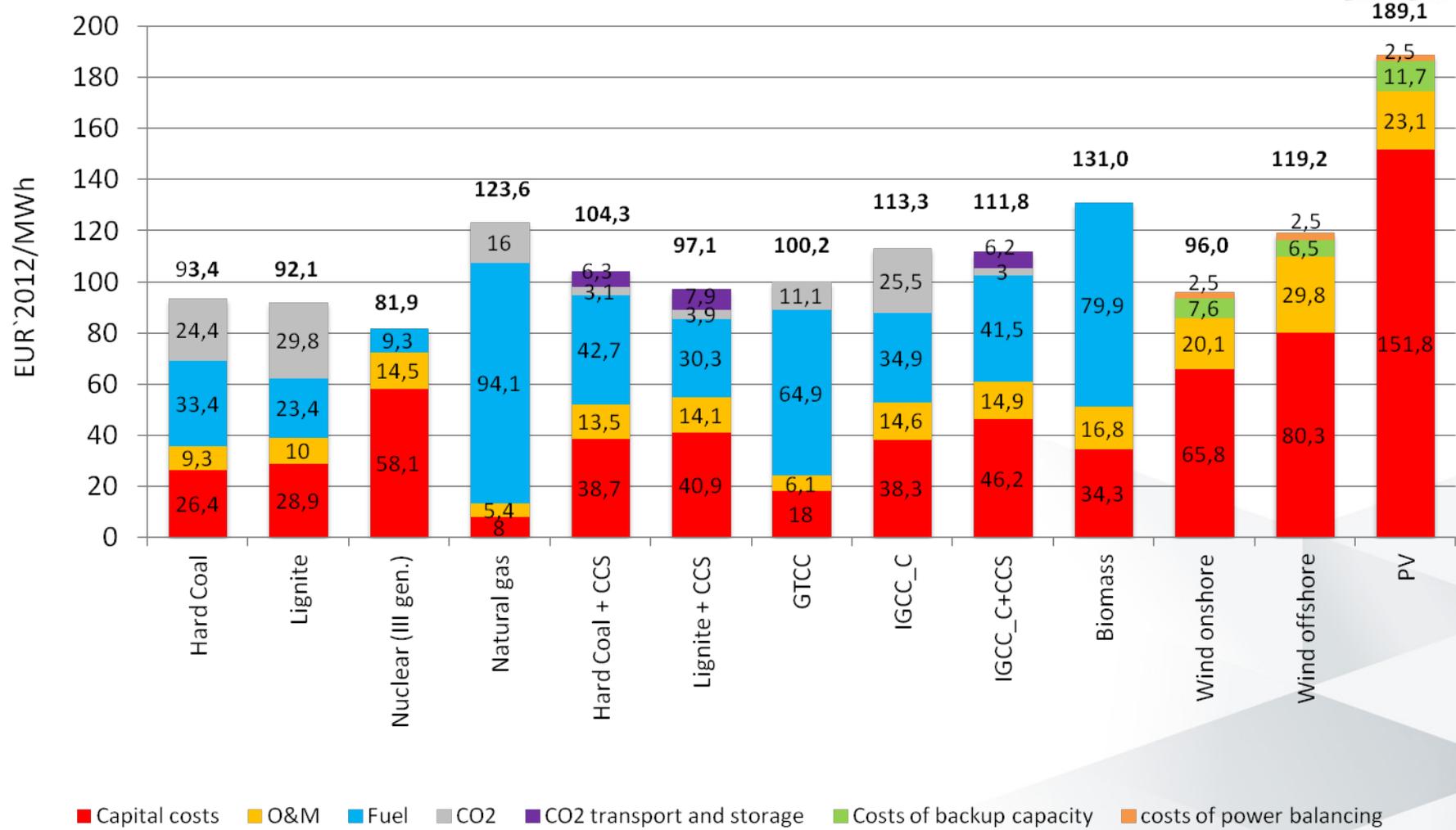


Source: Update of forecast of fuel and electricity demand until 2030, ARE S.A., June 2013

Total electricity production currently is ca. 160 TWh/y.



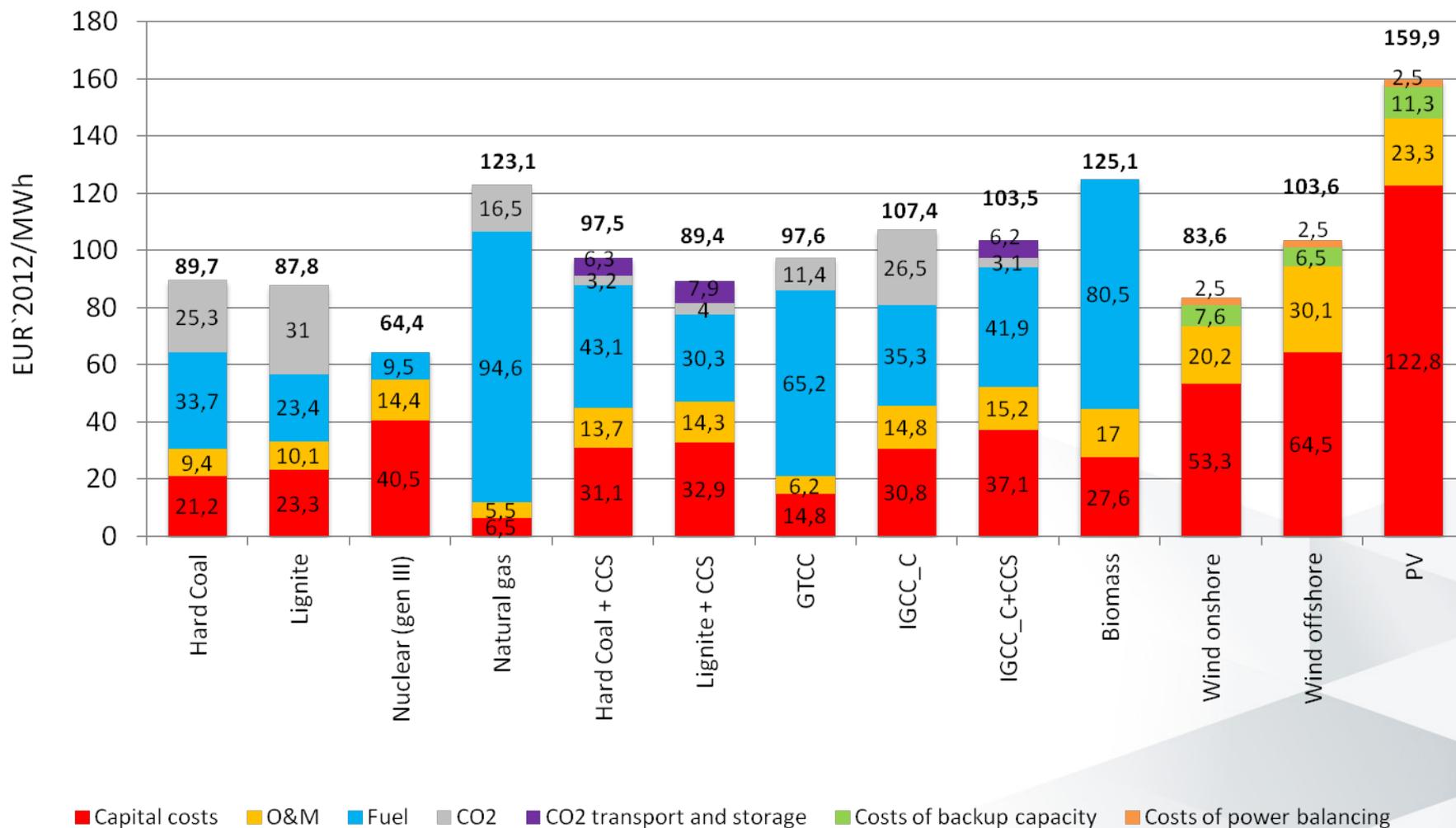
Comparison of averaged electricity generation costs for technologies foreseen to implement in Poland from 2025



Source: Update of study of electricity generation costs with nuclear, coal, gas power plants and RES, EMA, April 2013

Assumed discount rate: 8%
Nuclear overnight cost: €4,000,000/MWe

Comparison of averaged electricity generation costs for technologies foreseen to implement in Poland from 2025



EU ambitions regarding climate change: A challenge for Poland





Climate policy benefits from nuclear power in Poland

2 NPPs with combined capacity
of ca. 6 000 MWe

Electricity production of 50 TWh per year

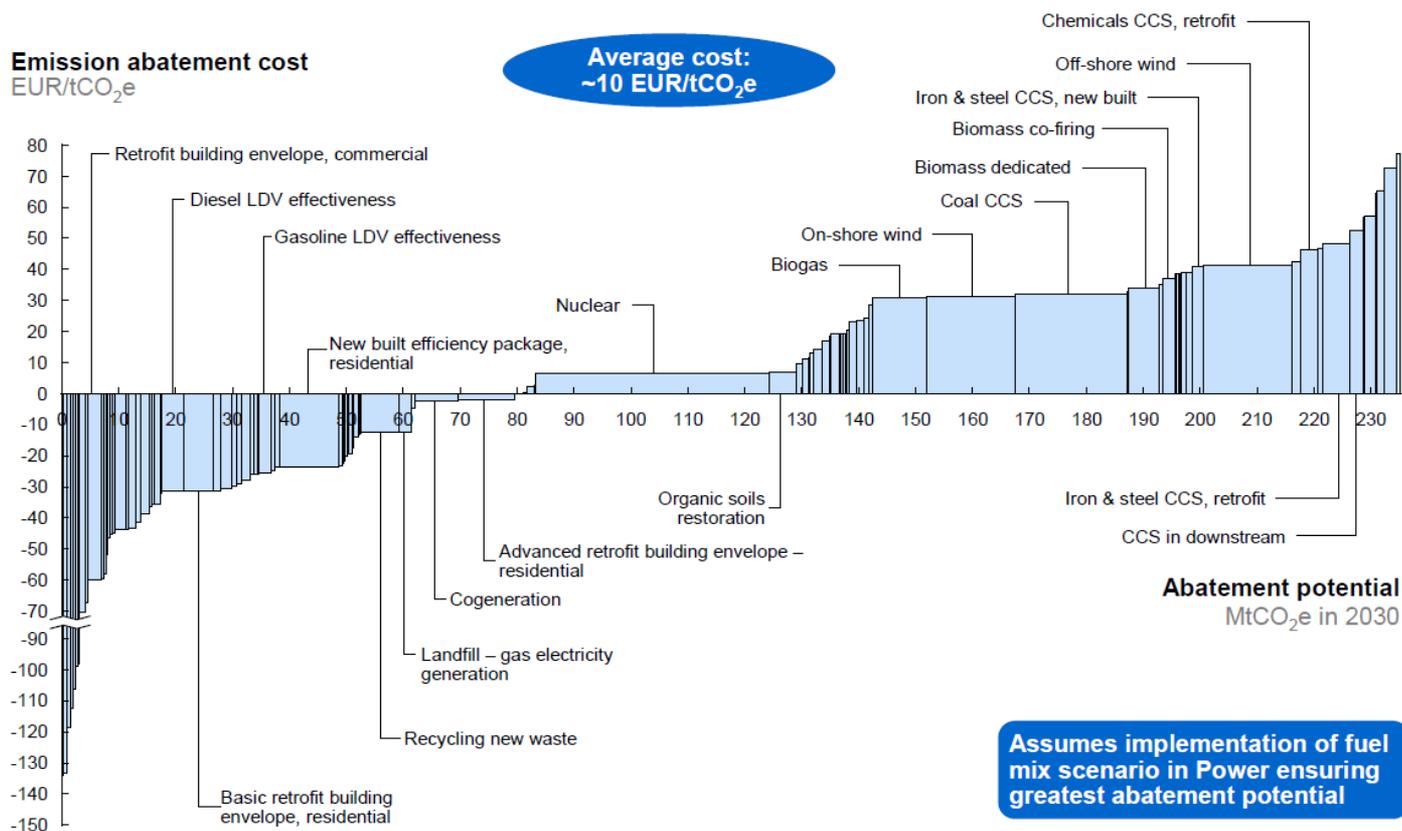
Saving of **35 million tons*** of CO₂ each
year or even more if cogeneration
(district heating) is considered

This is **23%** of current CO₂ emissions level
in Polish electricity generation sector

*in comparison to modern coal power plants, with emissions rate less than 700 kg/MWh

McKinsey's study – nuclear is the most effective tool for GHG emissions reduction

GHG abatement cost curve for Poland in 2030¹



¹ Only the most significant abatement opportunities are named

Time-frame for PNPP implementation

Phase I	2014 - 2016
site selection, call for integrated tender, technology selection	
Phase II	2017 - 2018
drafting blueprints, obtaining all required regulatory approvals	
Phase III	2019 – 2024
building permit, construction and connection of the 1st reactor of the 1st NPP starting construction of the 2nd reactor	
Phase IV	2025 - 2030
completion of the first NPP (2-3 units), construction of the 2nd NPP to be completed in 2035	

- In 2035: 2 NPPs with 4-6 GenIII/III+ reactors (≈6,000 MWe net)
- Nuclear electricity share in energy mix in 2035: 19%



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Stage I

site selection,
call for tender
for the reactor
technology,
technology
selection

**01.01.2014 -
31.12.2016**

Stage III

building permit and
construction of the first
reactor of the first
nuclear power plant

**01.01.2019 -
31.12.2024**

**01.01.2017
- 31.12.2018**

Stage II

NPP technical
specification and
design, obtain
regulatory
approvals

**01.01.2025 -
31.12.2030**

Stage IV

completion of the first
nuclear power plant
(2-3 units), beginning
of construction of a
second nuclear power
plant

PNPP – Who does what?



MoE

*Policymaking, strategies
(PNPP, Strategies for HR
development and waste
management)
Lawmaking
Coordination*

**Introduction of nuclear
power in Poland**

Safety regulations, licensing

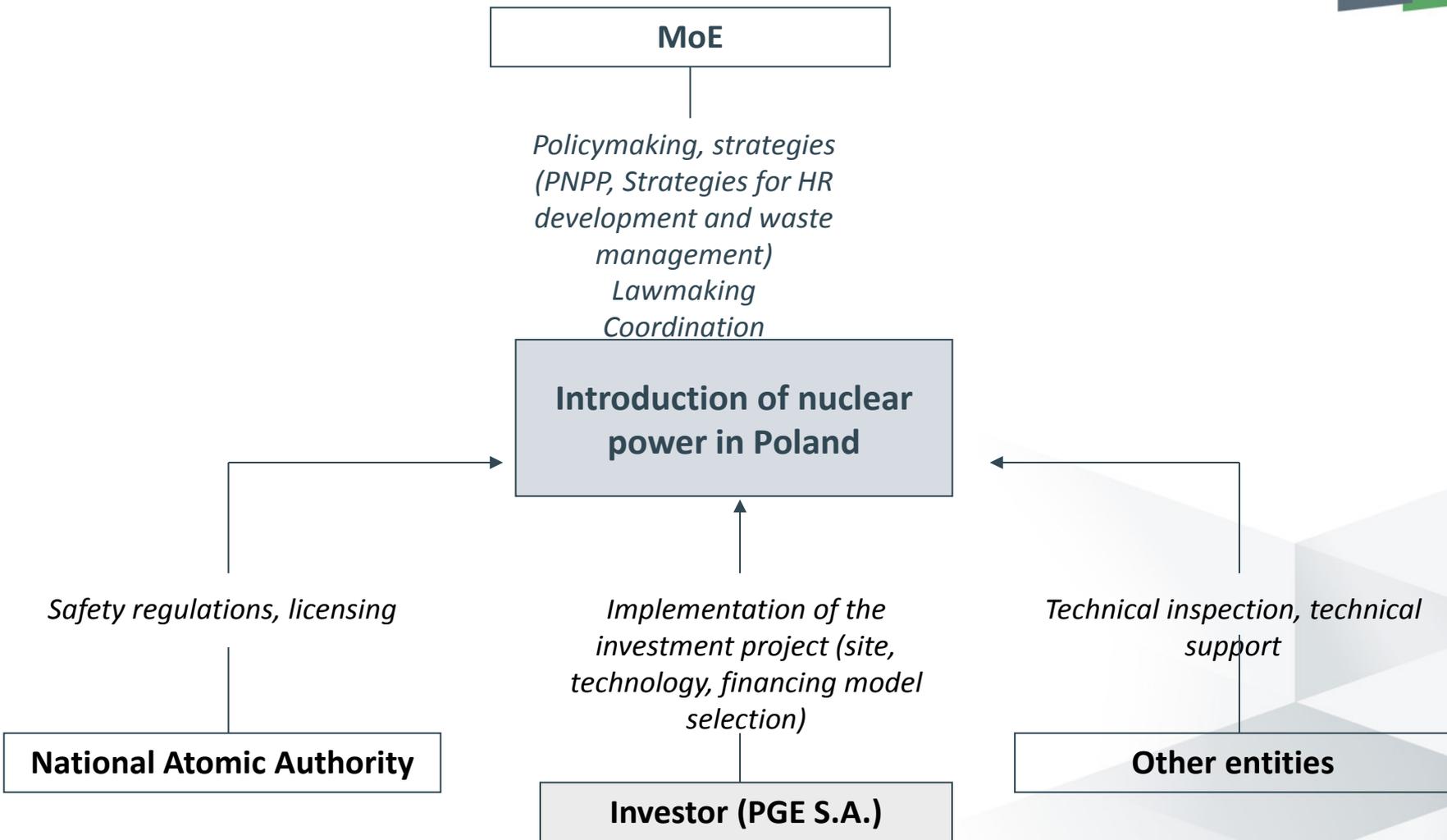
National Atomic Authority

*Implementation of the
investment project (site,
technology, financing model
selection)*

Investor (PGE S.A.)

*Technical inspection, technical
support*

Other entities





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PNPP: What has been achieved so far...

PNPP drafting,
public
consultation,
cross-border
consultations

06.2010 –
06.2013

PNPP adopted
by the
Minister of
Economy

09.2013

PNPP adopted
by the Council
of Ministers

28.01.2014

07 – 08.2013

PNPP updating
including
cross-border
consultations
comments

10 – 11.2013

Interministerial
consultations

Status of PNPP implementation – legal framework



Two laws/bills which allow investment process are in force :

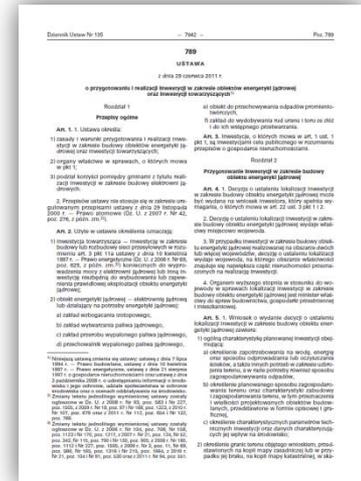
- amended Atomic Law
- Act on the preparation and implementation of investments in nuclear power facilities and investments for the supporting infrastructure (called "investment law").

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

On May 23rd, 2014 the amendment to the Atomic Law to implement the so-called EU radwaste directive (Council Directive 2011/70/Euratom) entered into force.

The strategy: Polish Nuclear Power Program – was adopted by the Council of Minister on January 28th, 2014.

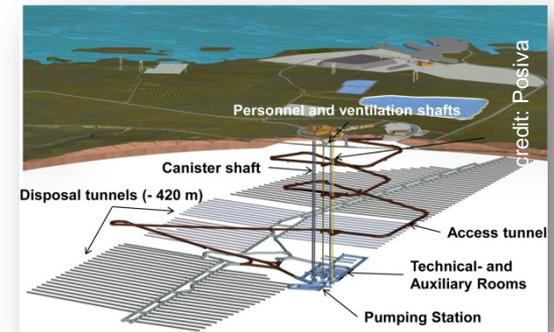
Finally, Ministry of Economy is preparing now a draft of Regulation on the requirements for equipment subject to technical inspection at the NPP





Status of PNPP implementation – radioactive waste management

- In 2014, following the adoption by the CoM of the PNPP, a draft of the National Plan of radioactive waste management and spent fuel management was prepared. The public consultation on its environmental impact assessment were finished. After the Plan will be approved by the CoM it will be send to the European Commission (obligation resulting from the Radwaste Directive),
- The process to choose the site of the new surface repository is going on,
- The Radwaste EU Directive was implemented to the Polish legal system,
- Preparations began to the construction in the future of the deep repository of the HL Radwaste and SNF,
- Preparations began to close the acting National Repository of the Radwaste in Rozan (stocktaking and safety report).



Status of PNPP implementation – national industry involvement

- MoE is working on a database of Polish companies with competence and capacity to participate in the program.
- In 2012, the first nuclear industrial cluster EuroPolbudatom was created
- The Polish companies are gaining experience in nuclear projects in Europe. Olkiluoto-3: 4500 workers at the peak (2011), 40% of them were Poles, 25 Polish companies. Polish site manager in 2009-11. Polish workers were recognized as competent and reliable professionals in many projects - Flamanville-3, Pierelatte enrichment plant, Philippsburg NPP, Forsmark NPP, Ignalina NPP.



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Human resources and Competences

Ministry of Economy is responsible for coordination and follow-up activities related to human resources development

Human resources development plan for nuclear is under final stage of preparation, expected in IV quarter 2014.

For 2015

Industry – inventory of competencies,

Human resources development for regulator – trainings,

Implementation of training strategy by utility,

Human resources development for Radioactive Waste Disposal

Enterprise (ZUOP) – trainings,

Human resources development for Technical Supervision Office – trainings,

Trainings for medical services – for nuclear protection's purposes,



Since Jan 2013	On-going site surveys in potential locations. January 2013 WorleyParsons was chosen for sites survey. Contract values – app. 80 mln EUR. In December 2014 PGE EJ1 terminated the contract and is doing the survey independently.
Jul 2014	Technical advisor & contract engineer selected: AMEC Nuclear UK Ltd / EUR 400 mln
Apr 2015	Tauron, Enea (power utilities) and KGHM (copper supplier) acquire 10% each of the project
End 2015	Expected launching of integrated tender for technology supply
On-going financing & investment analyses	



Polish Energy Policy 2050

POLICY SCENARIOS

Nuclear

- 45-60% nuke
- 15 % RES

Sustainable

- 15 % nuke
- Some increase in RES

Gas +RES

- ca. 50 % in total
- 10 % nuke

- Nuclear power and RES as priority intervention directions
- Support for RES to be phased out until 2030

PRELIMINARY DRAFT

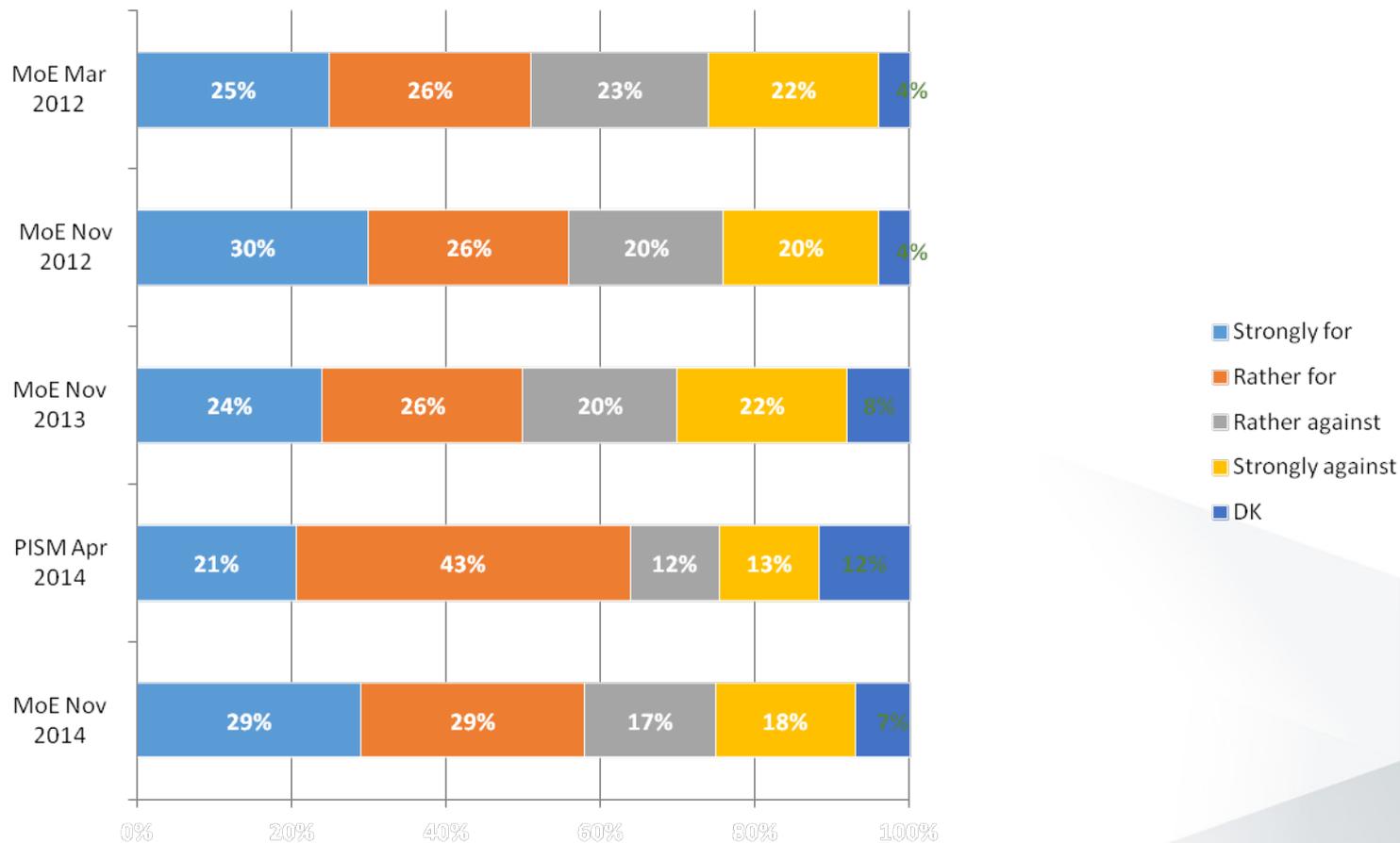
Questions/challenges we are facing currently

Draft New Energy Policy of Poland until 2050, cont.

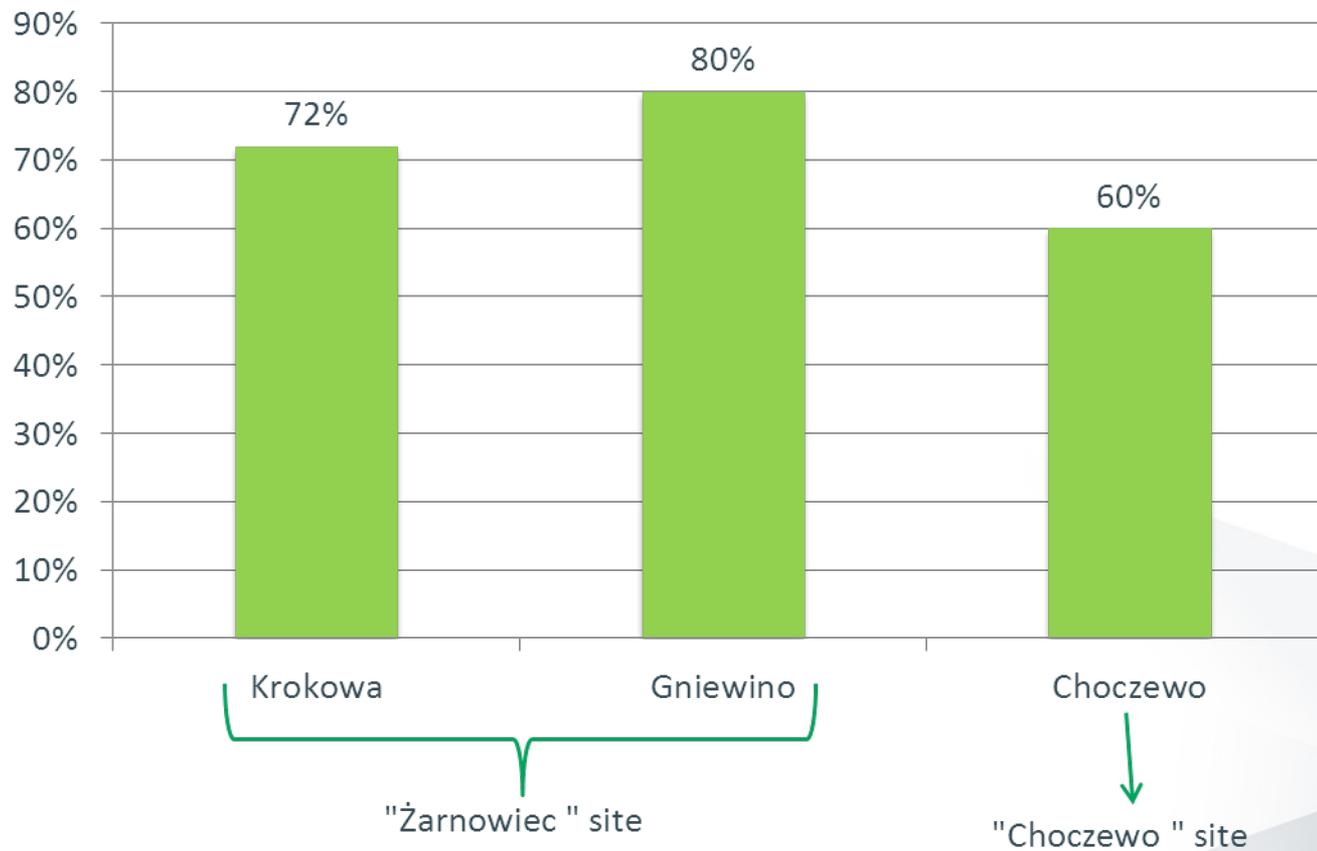
Nuclear Scenario – main assumptions

1. Extension of an ongoing nuclear power program, ensuring the share of electricity produced from nuclear power plants in the energy balance at the level of 45-60%, i.e. significantly higher than currently expected.
2. Nuclear scenario is characterized by a dominant share of nuclear energy in the energy balance of the country. The share of other energy carriers is balanced on a similar level. It is assumed that share of nuclear energy at the level of 45-60%, the share of coal and lignite at the level of 10-15%, oil at approx. 10-15%. natural gas at the level of 10-15% and renewable energy sources at approx. 15%
3. Under the nuclear scenario renewable energy sources will focus probably in the area of distributed prosumer (producer-consumer) energy and micro-generation. Their role in the base-load power system will be limited.
4. Decrease of the dependence on the fossil fuels import.
5. Increase of the competitiveness of the Polish economy.
6. Decrease of the GHG emissions (mainly CO₂).

Public support for nuclear power in Poland



Local acceptance for NPP





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Thank You for Your Attention

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