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LOW-EMISSION STRATEGY - POLAND 2050

Brno, 04.09.2013

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Scope

Context

About the project

Key findings

Key messages

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Context

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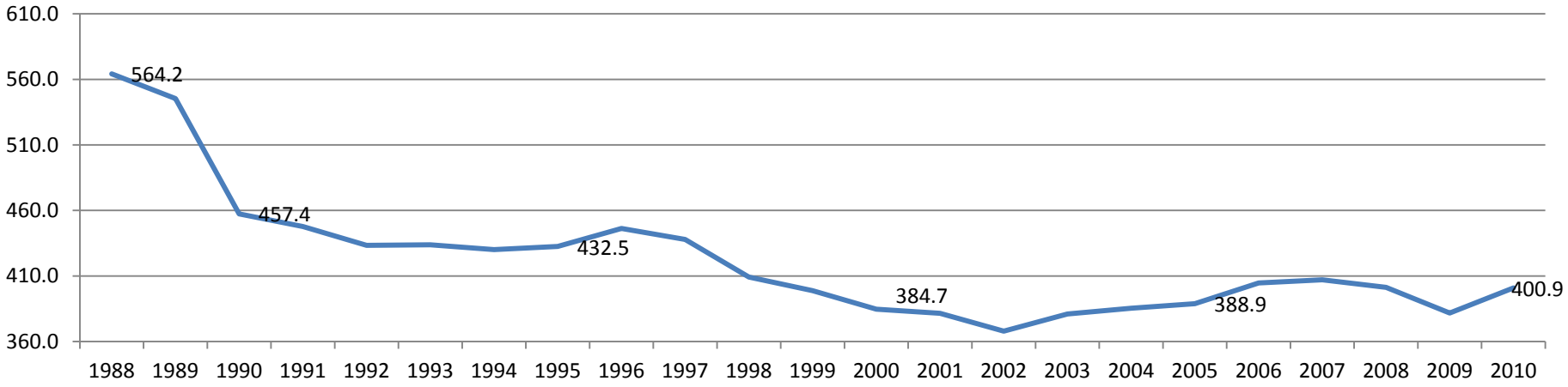
POLAND – Climate protection facts



- **Between 1988 and 2011 GHG emissions fell down by 29% – Kyoto goal for Poland is 6% emission reduction**
- **GDP between 1991 – 2012 has more than doubled**
- **Polish society not only profited but also paid for the changes**

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What is the state of the climate policy debate in Poland?

Open questioning of our civilization's responsibility for climate change

Three vetoes of Poland to EU climate targets, a resolution of the Polish Parliament (October 2012),

Strong energy sector and mining lobby are **slowing down** the development of RES and energy efficiency technologies (they are orphans) but **shortages** of electricity are coming.

The role of the **coal is under discussion.** Difficult times for lignite (strong social opposition and a necessity to open new lignite deposits) and the Polish hard coal is increasingly too expansive.

Two new opportunities ??? - Shale gas –the hype is down in recent months and **nuclear power stations – the debate about costs and a suitable localization**

Almost technological state of the art in the Polish heavy industry: chemical and petrochemical, steel and non-iron mills, glass and paper

Communal waste in Poland is one of the biggest problems with waste in EU

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Is climate policy too risky for Poland? II

Transport almost **dead end street**

Agriculture and forestry today do not play the important role in climate protection

Overuse of the argument that the risk of carbon leakage is too large.

Lack of **integration** between the climate and economy policies as well as strong center for long-term strategic planning

BUT

In 2009, **73%** of Poles recognized climate problems as severe or very severe

In 2011, GHG emissions per capita were at the level of **10,5 tones CO_2eq** – 5 times more than the estimated amount needed globally to stabilize the climate

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The choice

Poland can chose between one of the two development paths:

- **Limited development scenario that keeps the current status quo ante with respect to the reform agenda;**

- **Modernization scenario in which future development is based on three pillars:**

  High quality institutions and regulations

  Innovation

  Resource efficiency;

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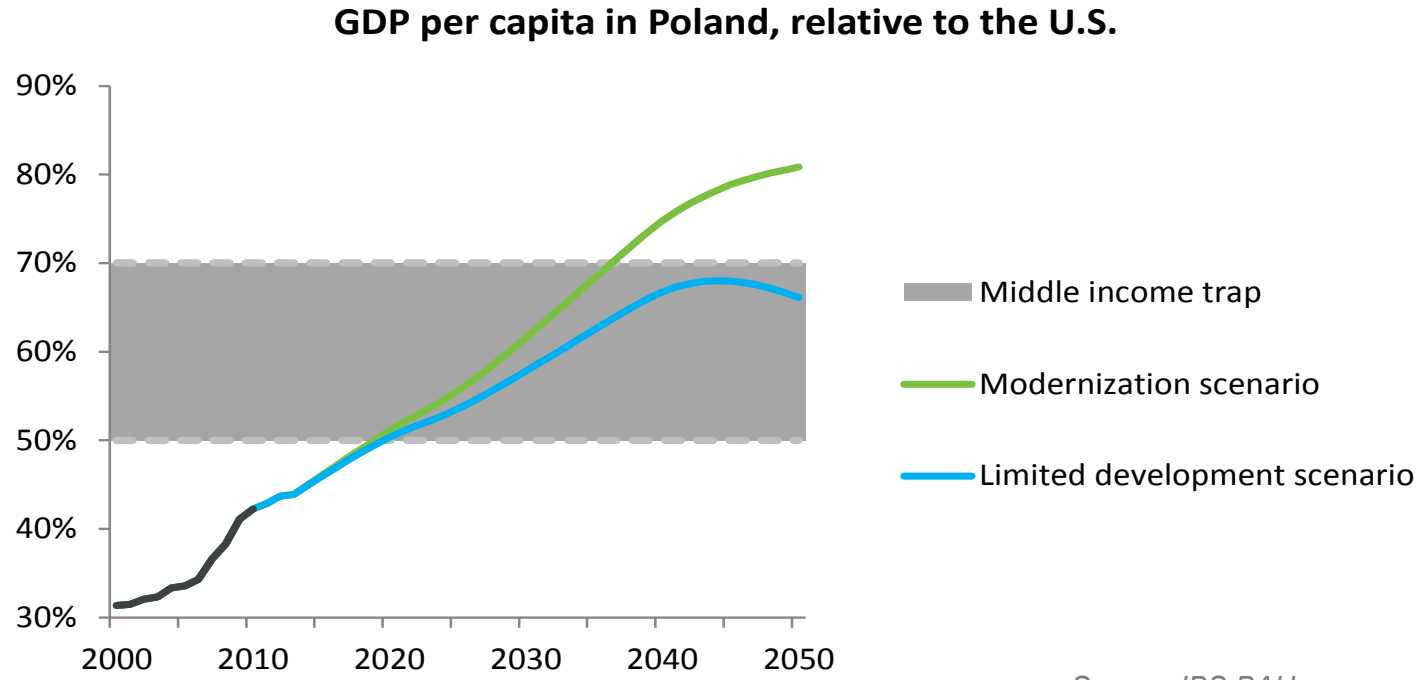
Two development paths



Source: IBS BAU

Limited development scenario – the reference tool for report analysis.

Modernization scenario – scenario that incorporates many reforms and takes into account the green growth agenda.

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About the project

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Towards 2050 - project objectives

The project's goal is to show the relationship between development and the low-emission economy:

- **benefits of choosing the path of modernization based on resource efficiency and innovation;**
- **positive impact of the economic modernization on the sustainable development and its implementation;**
- **the consequences of reducing CO_2 emissions and development (low-emission policy does not hamper the development but drives it in).**

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Goals – the journey to 2050

- The main goal of the project is **to lead the public discourse** about the greenhouse effect reduction and **transformation towards low-emission economy** in Poland.
- Use **„solid", substantive arguments** for the GHG mitigation and the attempt **to change the attitude** of politicians and business towards low-emission policy.

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Goals – the journey to 2050

- **To show the relationship between development and the low-emission economy**:
  - benefits of choosing the path of modernization based on resource efficiency and innovation;
  - the consequences of reducing CO_2 emissions and development (low-emission policy does not hamper the development but drives it in);
  - positive impact of the economic modernization on the sustainable development and its implementation.

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Scope of the work

BAU scenario

Assessment of the **technological potential** to reduce GHG up to 2050

Cost analyzes of the technological potential on the micro level (including micro-MAC, scenario building etc)

- **Alternative scenarios** for GHG emission reduction up to 2050
- **Macroeconomic simulations** of the scenarios (macro-MAC - MEMO 2)
- **Neutral narrative** stemming from the well documented information
- Some others types of **research** (eco-innovation, financing, climate policy) – 4 discussion papers

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Forum of Experts

The results of the study have been consulted with a group of 50 experts from the scientific community, social activist, politicians and members of the central administration and local authorities.

The full list of the involved parties can be consulted here:

http://np2050.pl/pl/forum-ekspertow

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Key findings

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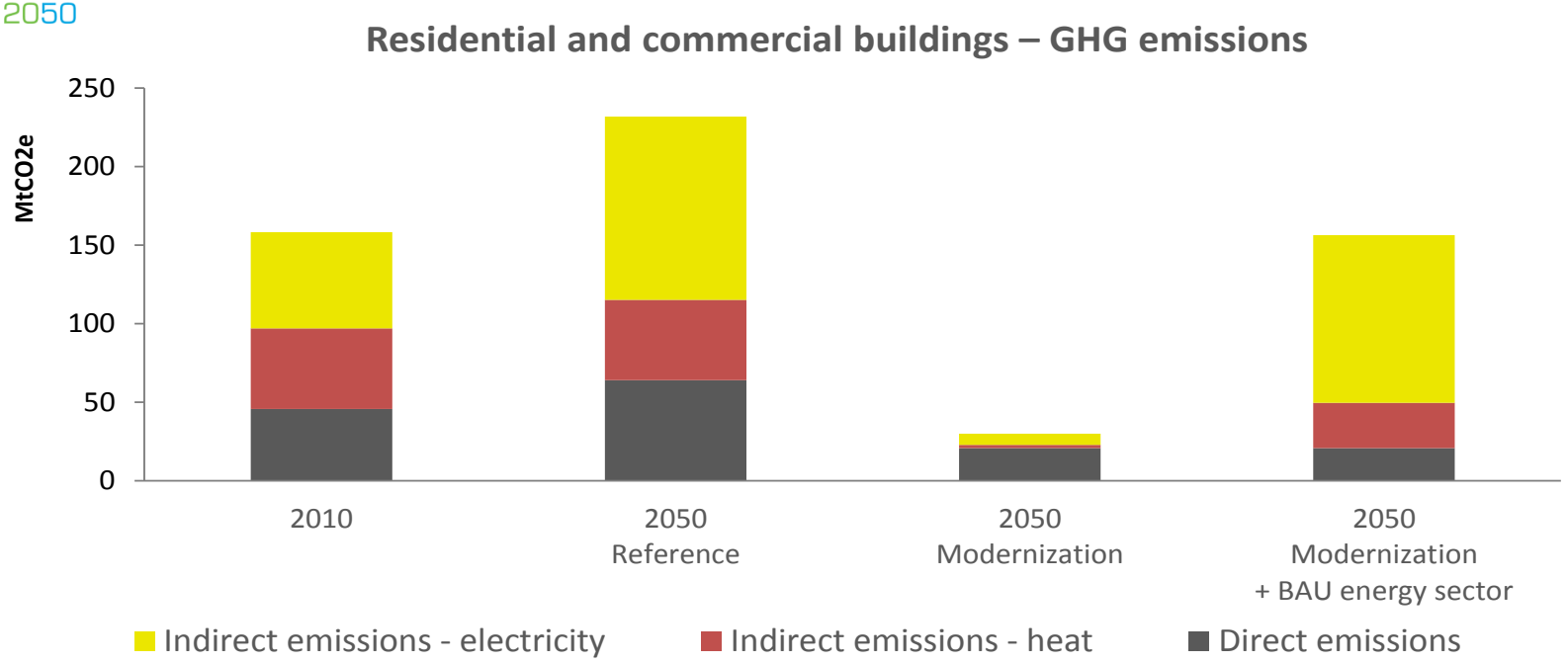
Sectoral perspective – buildings



Key sector for energy efficiency improvements – in the modernization scenario the total energy saved up to 2050 can satisfy Poland's energy needs for 8 years.

Even conservative scenario for deeper retrofit and technologies implementation leads to substantial energy savings and GHG reductions -40% in comparison to BAU and by 25% comparing to the current GHG level

Total reduction and net costs depend on developments in energy sector (i.e. low emission energy → increased savings in appliances, but higher costs of fuel switch to electricity).

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Energy and emissions

The energy sector in the reference scenario (BAU) maintains the current structure based on the traditional coal power plants.

Improvements in the energy intensity of the economy and the gradual reduction of emissions per unit from electricity production due to the use of more effective modern coal technologies are not able to offset the effects of a fast growth of the Polish economy and the gradual increase of the role of electricity in the energy mix.

In the BAU scenario the emissions grow and in the **2010-2050** period reach **8830MtCO2e** compared to **50-60% less** in the modernization scenarios.

Electricity production will reach **320-330 TWh** in 2050 and heat production **58-96 TWh** (compared to 155TWh and 96TWh at present)

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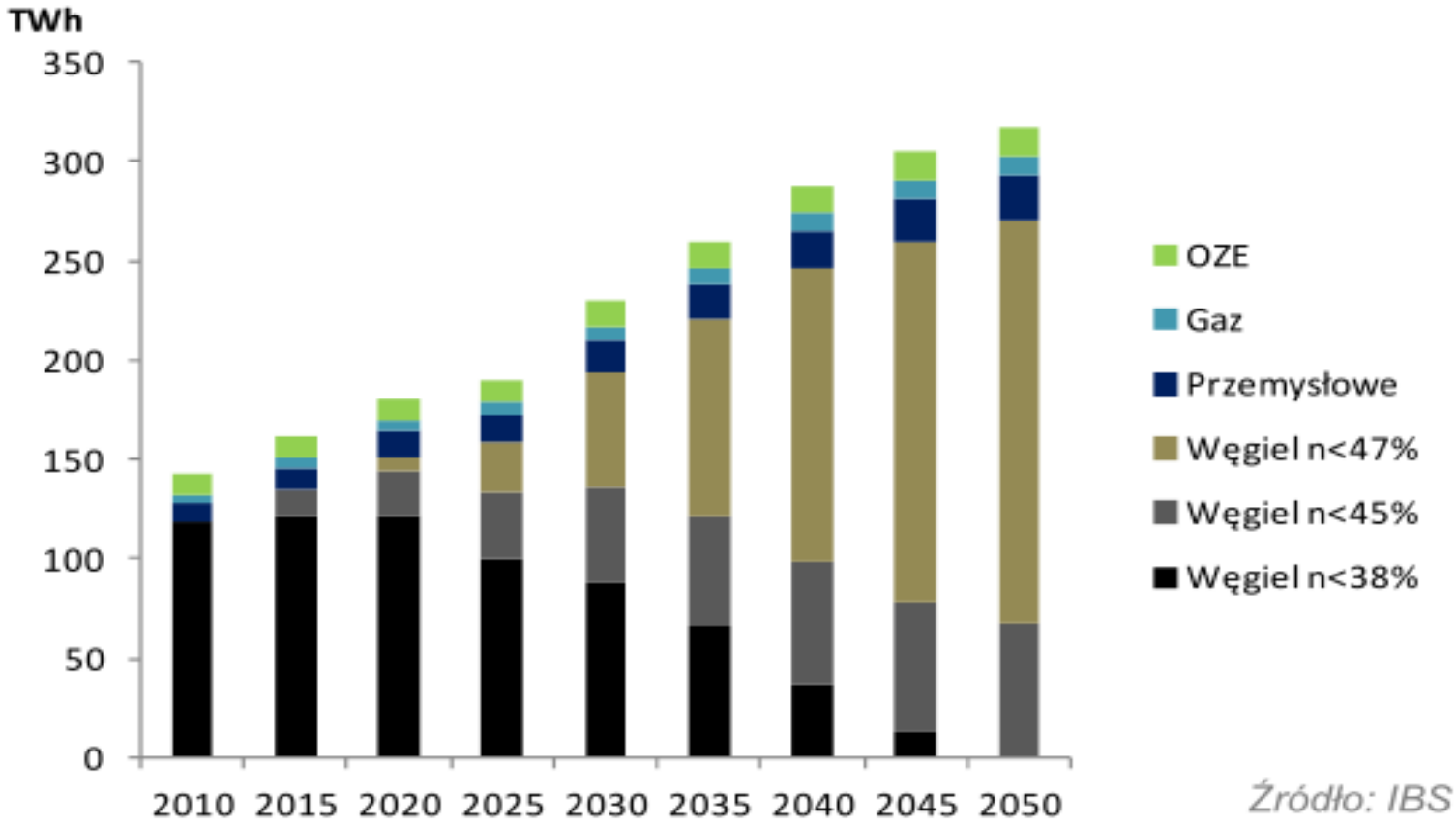
Reference scenario BAU for the energy sector



Currently 30,5 GW of electricity generated on the basis of coal (9,7 GW lignite and 20,8GW hard coal). In the BAU reference scenario the demand for coal for the energy sector will go up by 35% (approx. 35 million tones) in 2030 and by 50% (approx. 50 million tones in 2050).

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Sectoral perspective – energy I
The general philosophy of scenarios

Openness

allowing (or not) net import from the EU

Power sector structure

affecting network costs and competitive pressure on coal

	Autarky	Integrated EU energy market
Large-scale power generation	***BAU*** ***French model*** ***Low Emission Coal***	***The Balanced Path*** ***Switch to gas***
Distributed generation	***Distributed generation***	***European scenario***

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Sectoral perspective – energy II

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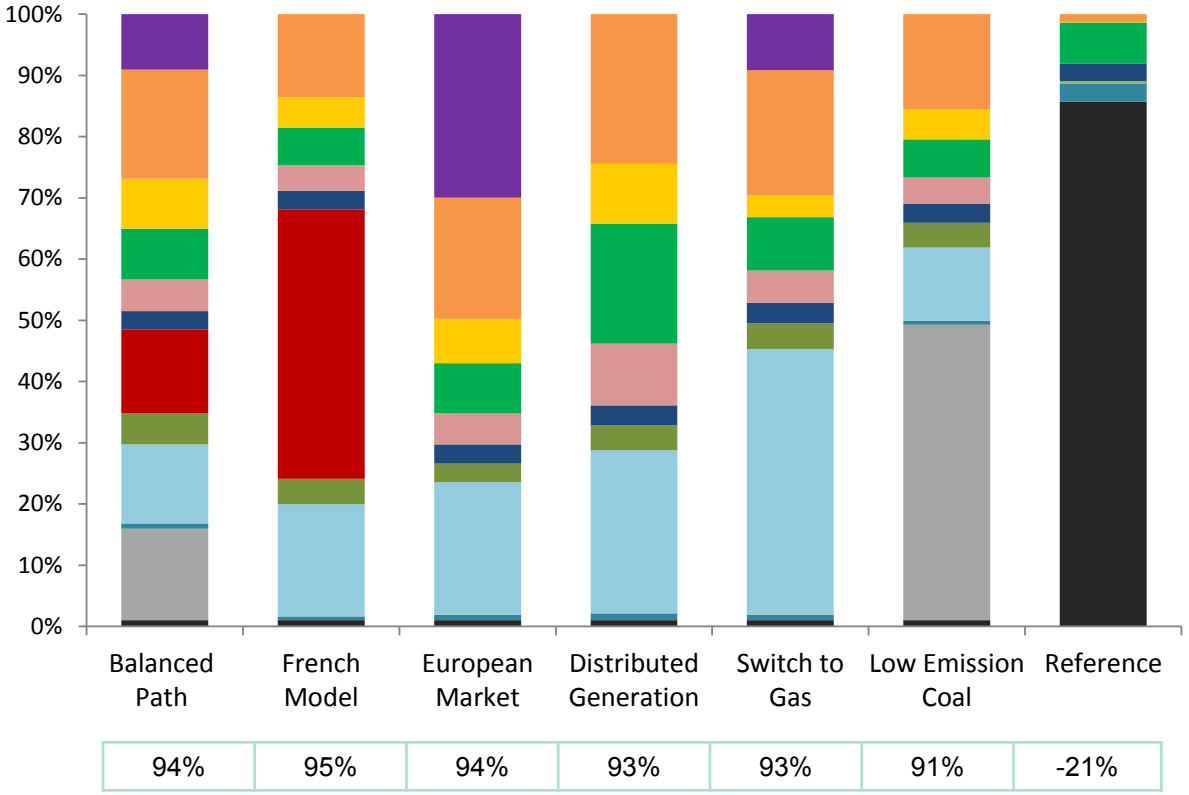

Energy mix 2050

- Coal
- Coal + CCS
- Gas
- Gas + CCS
- Biomass
- Biomass + CCS
- Nuclear
- Hydro
- Geothermal
- Distr. non-intermittent
- Distr. intermittent (incl PV)
- Wind
- Imports

Balanced Path	French Model	European Market	Distributed Generation	Switch to Gas	Low Emission Coal	Reference
94%	95%	94%	93%	93%	91%	-21%

Reduction relative to 1990

Source: IBS

Several different low-emission paths are possible. Coal is not a must.

2050 perspective allows for gradual evolution, but it should start now to avoid lock-ins.

Costs increase, but are not prohibitive. Investing in distributed generation and European energy market needed to avoid being left behind in case of tech breakthroughs.

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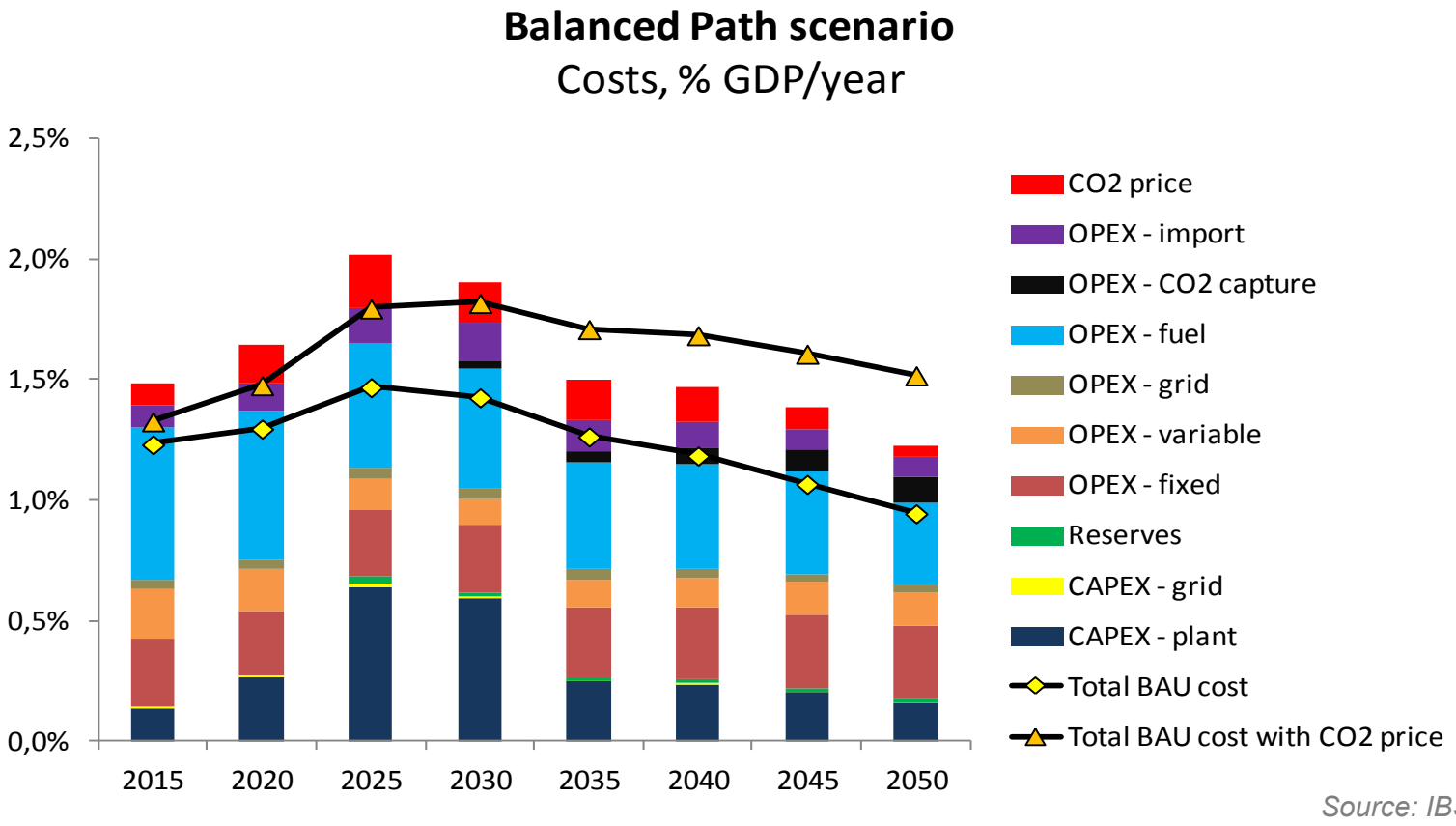
Sectoral perspective – energy III
CO_2 price impact



Source: IBS

Price of GHG allowances rising to 45 euro in 2050 → some scenarios cost less than BAU after 2030. For scenarios based on CCS coal/gas this price does not fully cover costs of CO_2 capture. Reduction from the current 400MtCO2e to 171MtCO2e in modernization scenarios compared to 525MtCO2e in BAU.

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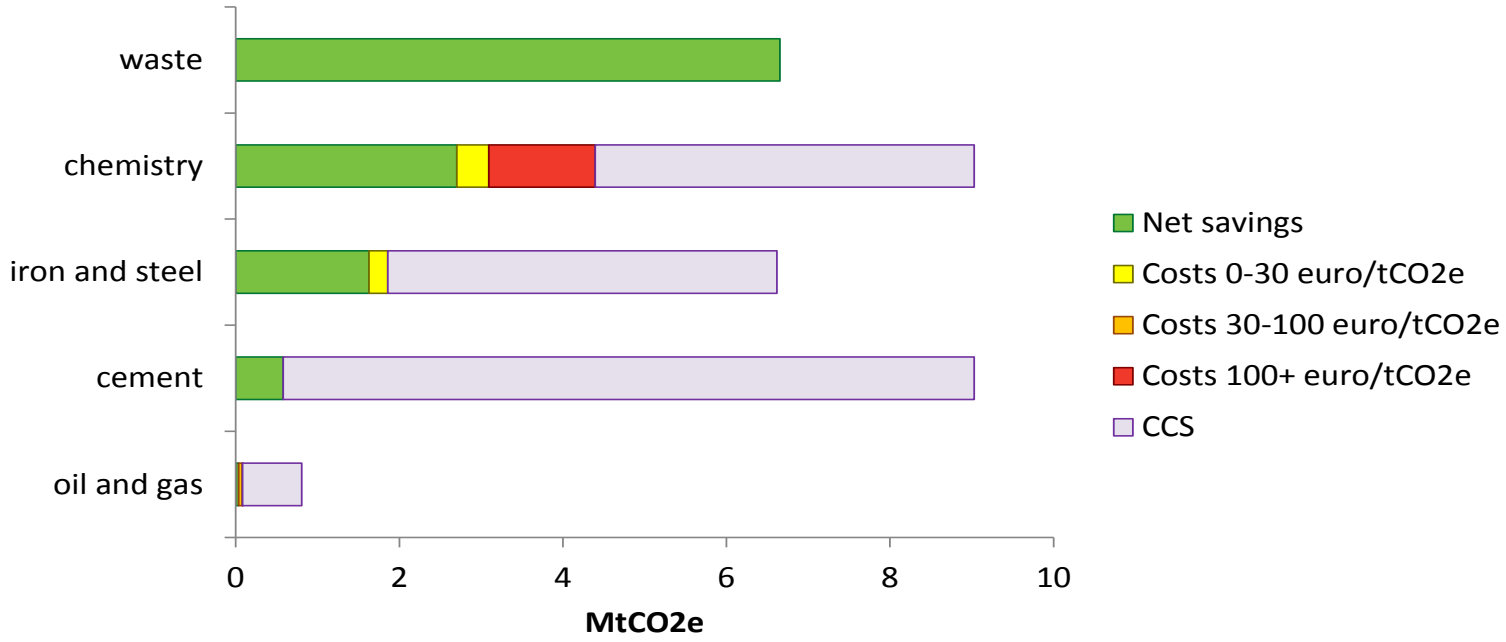
Sectoral perspective - industry and waste



Source: IBS

- **Iron and steel – industry expects benefits (demand for new materials) from transition in other sectors**
- **Oil and gas – without CCS only marginal reductions achievable**
- **Chemicals – ethylene cracking significant, but costly lever**
- **Skepticism of the industry towards CCS (especially oil and gas)**

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Sectoral perspective – industry

Chances/benefits

- ✓ **resource and energy efficiency**
- ✓ **indirect effect of the transition – increase in demand for some products (low-emission investments, e.g. steel for wind farms, innovative materials for energy efficient buildings)**

Risks/costs

- ✓ **High initial capital expenditure, returns depend on volatile fuel prices**
- ✓ **CCS: decrease in energy efficiency, technological and environmental uncertainty, high costs**

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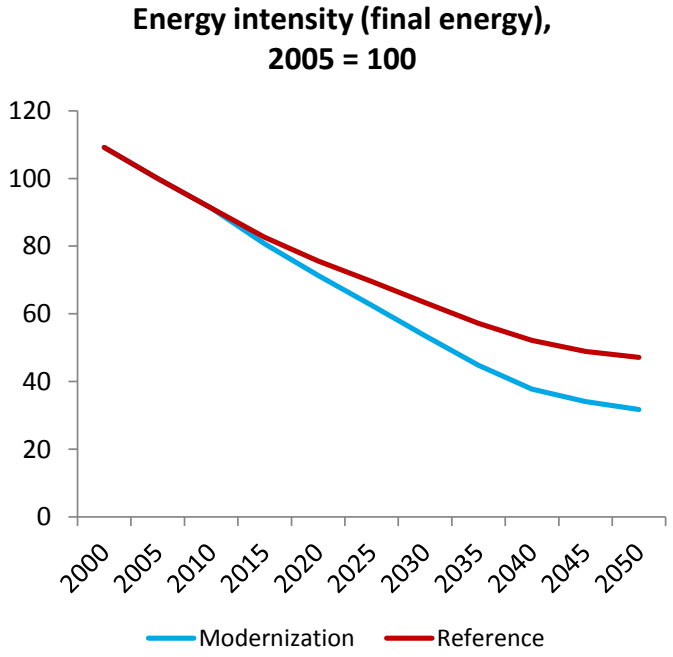
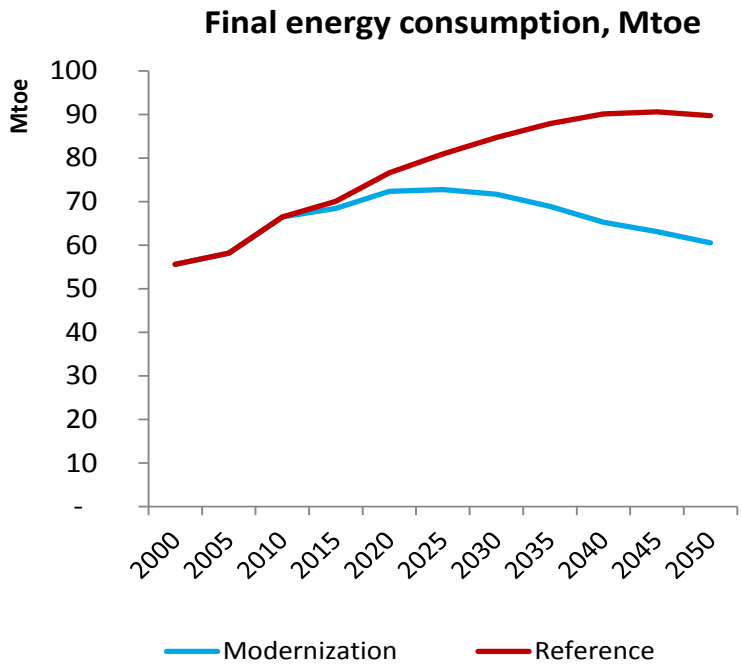
Energy savings





Source: IBS

Energy efficiency push in buildings and transport, as well as other sectors, can lead to full decoupling of economic growth and energy consumption.

Poland has already shown that it is capable of rapid improvements in production sectors. In next decades the consumption choices (buildings, transport) will be more important.

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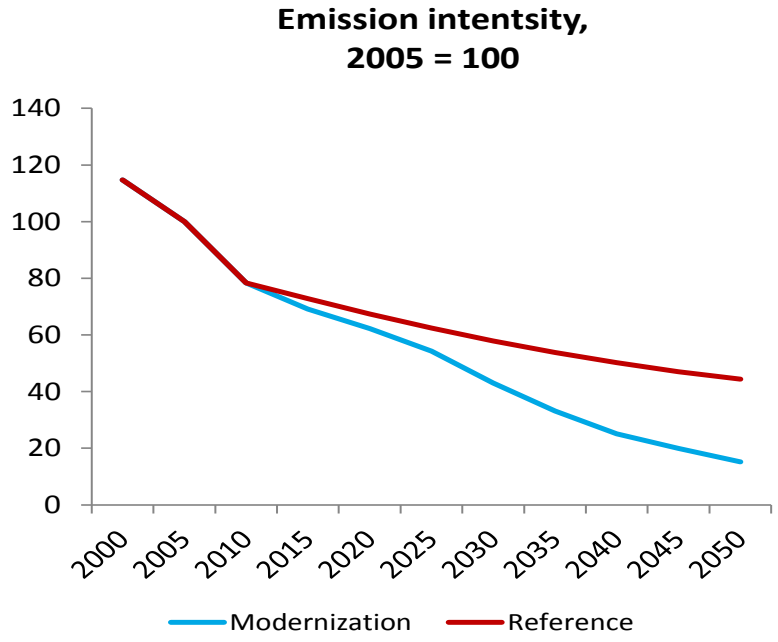
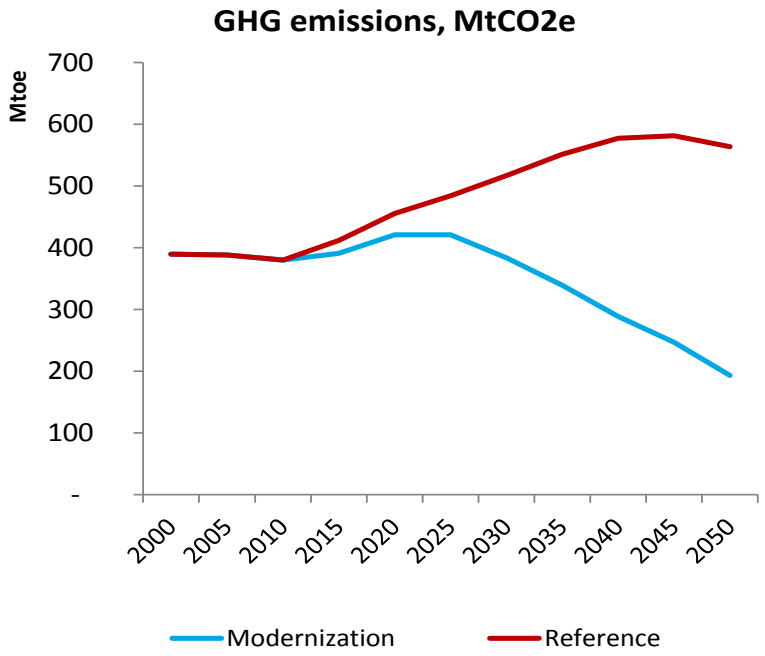
Emission reduction





Source: IBS

Poland can achieve both dynamic economic growth and significant GHG emission reduction through beneficial energy savings and affordable energy sector decarbonization (additional 1% of GDP in 2050*)

Technological and organizational breakthroughs in cheap low-emission power generation with additional subsequent fuel switch can lead to 80% GHG reduction.

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Additional actions

Analyzed package allows to reach **55%** emission reduction in 2050 including **30%** for „free" with net profit.

However, broad range of other measures is available:

- **additional fuel switch in buildings** (electricity supplemented by gas)
- **widely used electric vehicles** (-85% GHG relative to BAU vehicle)
- **fuel switch in industry** to low emission electricity and biomass; ½ of mix in light and ¼ in heavy industry
- **decline in mining and fuels** (75% decline due to reduced demand for fossil fuels)
- **high cost agriculture** (implementing 1/3 of costly measures)

Additional measures allow to reach **80%** reduction of GHG emissions in 2050 relative to 1990.

These actions mostly depend on major (and **uncertain)** technological advances in low emission electric power generation (e.g. **energy storage**). Thus, it is **difficult to provide reliable cost estimates** for them.

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Key messages

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Key messages (1)

- ✓ **Active modernization agenda** can transform Poland from a middle to a high income developed economy in 40 years

  Limited development = Poland as 3rd Iberian country

  Modernization = Poland as a 5th Scandinavian country

- ✓ **Certain effort in the reform implementation phase is necessary** but the improvements in **energy and fuel efficiency** constitute an attractive, **low hanging fruit** to be picked up.

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Key messages (2)

- ✓ **Emissions will fall significantly** as a
  - **byproduct** of the modernization agenda and
  - **desired policy choice** made by a transforming society.

- ✓ **Overall impact on the economy** will be unequivocally positive – **costs** will be smaller than **benefits**

- ✓ **Wisely designed policy** is a key factor if the **window of opportunity** is to be successfully used before it is closed

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Key messages (3)

- ✓ **Putting Poland on the low-emission path** is wise and **beneficial choice** for coming decades.
- ✓ **Interim, achievable targets (i.e. for 2020 and 2030)** are important to keep the pace of transition and provide incentive for **economic improvements** in the next decades.
- ✓ **Despite technological uncertainties** it is worth investing in both **low-hanging fruits of energy efficiency and innovative methods of power supply.**

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The Renewable energy directive has yet to be fully transposed.

For now the new energy law makes it easier for the so-called prosumers (producers and consumers of energy) to sell the energy they produce to the grid and they receive 80% of the average energy price from the previous year.

Poland has yet to transpose the EU ETS directive, Industrial Emission Directive, Energy Performance for Building Directive and 5 other energy related directives.

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The latest analysis “Optimal energy mix for Poland until 2060 – DAS Model” stresses that according to Polish Transmission System Operator (PSE Operator) as much as 6,2 GW of wind power can be received by the Polish energy electricity grid in 2020 with a slight increase to 7,6 GW in 2025.

That is compared to 2,8GW as of 30.06.2013.

Lack of willingness to support the RES above the minimum 2020 EU obligations – 15% of final energy, 19,2% of electricity.

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In 2012 7TWh from co-firing constituting 48% of the green energy produced in Poland.

Estimates for 2013 suggest 5TWh due to the sharp fall in the prices of green certificates in Poland.

Currently there is 9TWh of oversupply in the Polish green certificate system due to the unrestricted growth of the co-firing that has caused most of new renewable energy investments to be shelved or frozen.

The recently published report by the Polish Ministry of Economy warns of the security of supply threat due to the necessity to retire old coal units from the Polish energy system at the end of 2015 (IED requirements).

The analysis states that approx. 95 MW of power may be missing from the energy system in 2015, 800 MW in 2016 and 1100 MW in 2017.

The peak uncovered summer demand in 2016 may reach approximately 520 MW to reach 680 MW in 2017.

Meanwhile all the new big coal investments apart from the 1000MWe unit in Kozienice will be operational at the earliest at the end of 2018.

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Thank you for your attention!

For more information visit: www.np2050.pl

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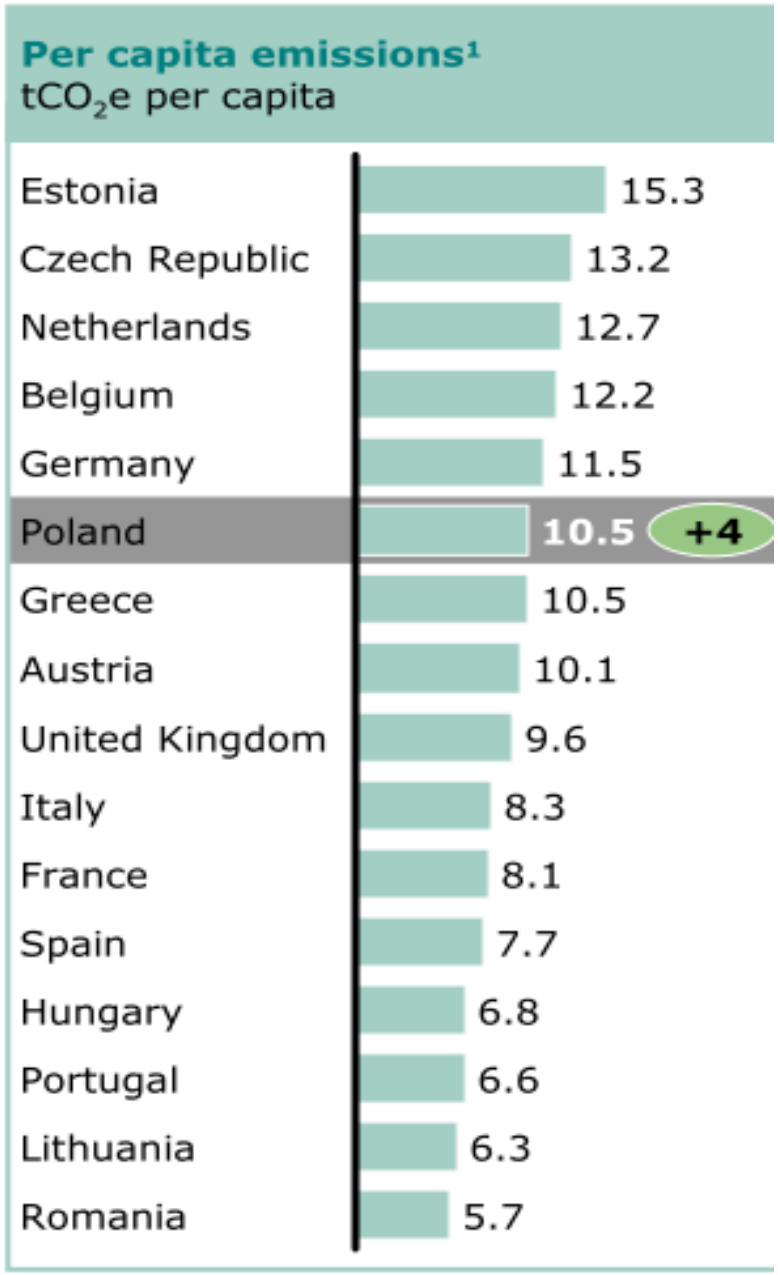
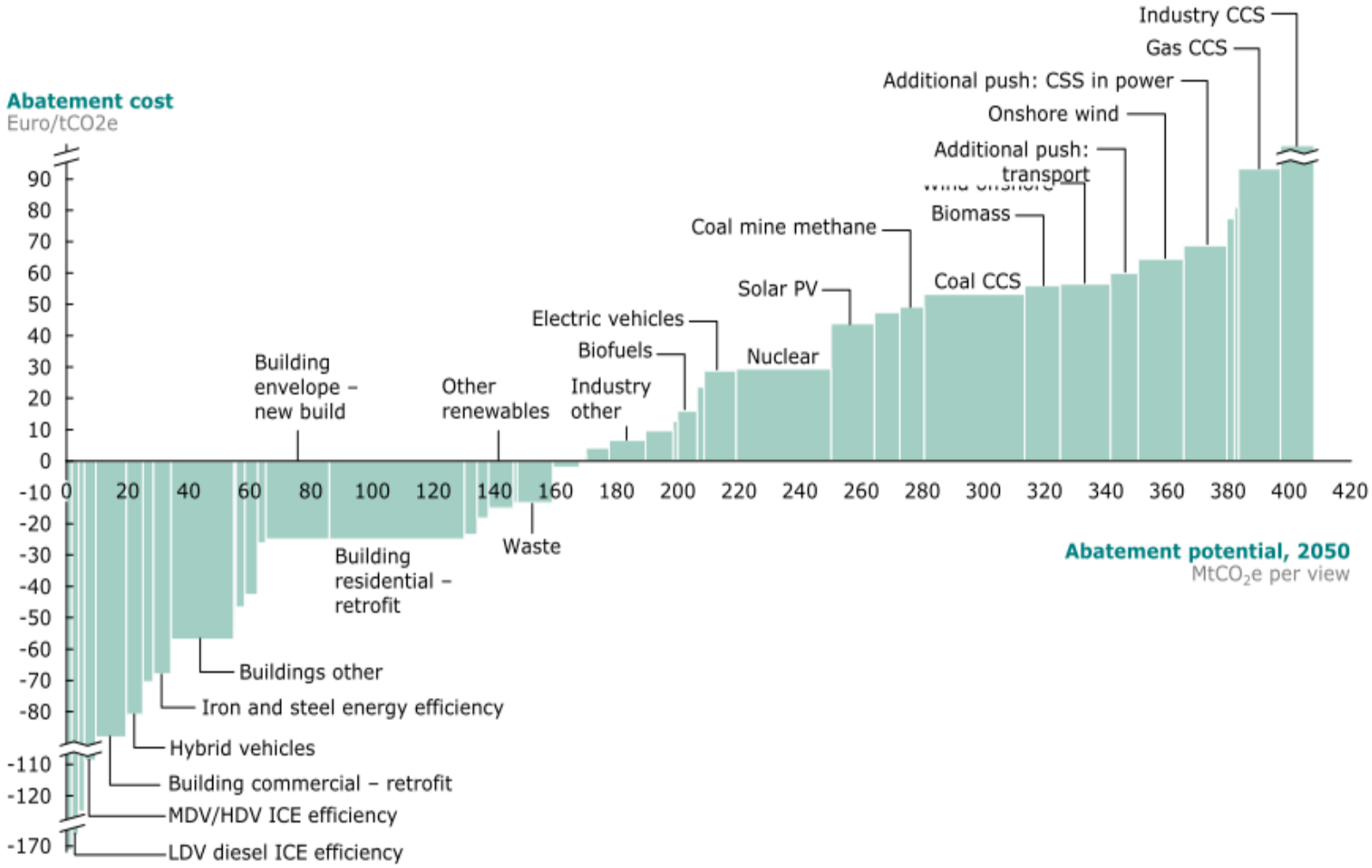
Percentage change vs. 1990 Change in the ranking vs. 2005



2050 Cost curve for greenhouse gas abatement

HIGHLY PRELIMINARY

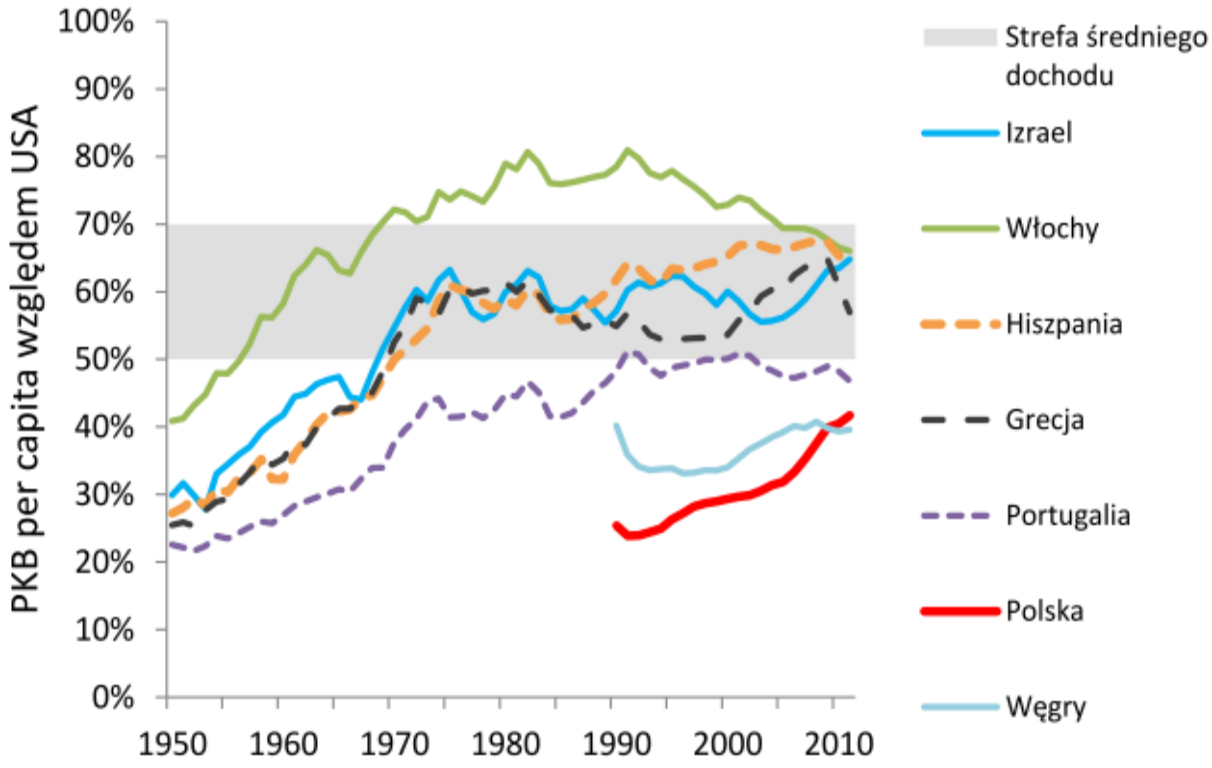


SOURCE: Greenhouse gas emission reduction cost curve (developed by McKinsey & Company); Poland 2050 Climate Report

niskoemisyjna Polska 2050

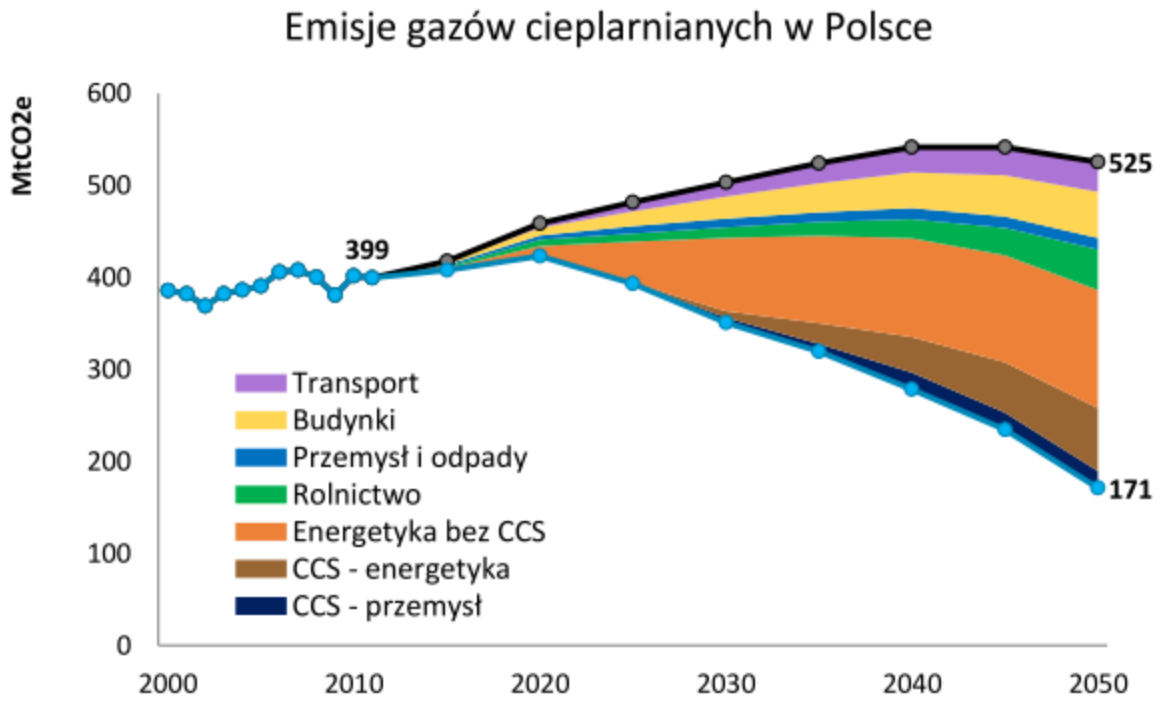
Pułapka średniego dochodu

Liniami przerywanymi zaznaczono ***strefę „średniego dochodu”*** *ulokowaną orientacyjnie w granicach* ***50-70 proc. PKB per capita USA***



Źródło danych: Total Economy Database

Czy głęboka redukcja emisji jest osiągalna?



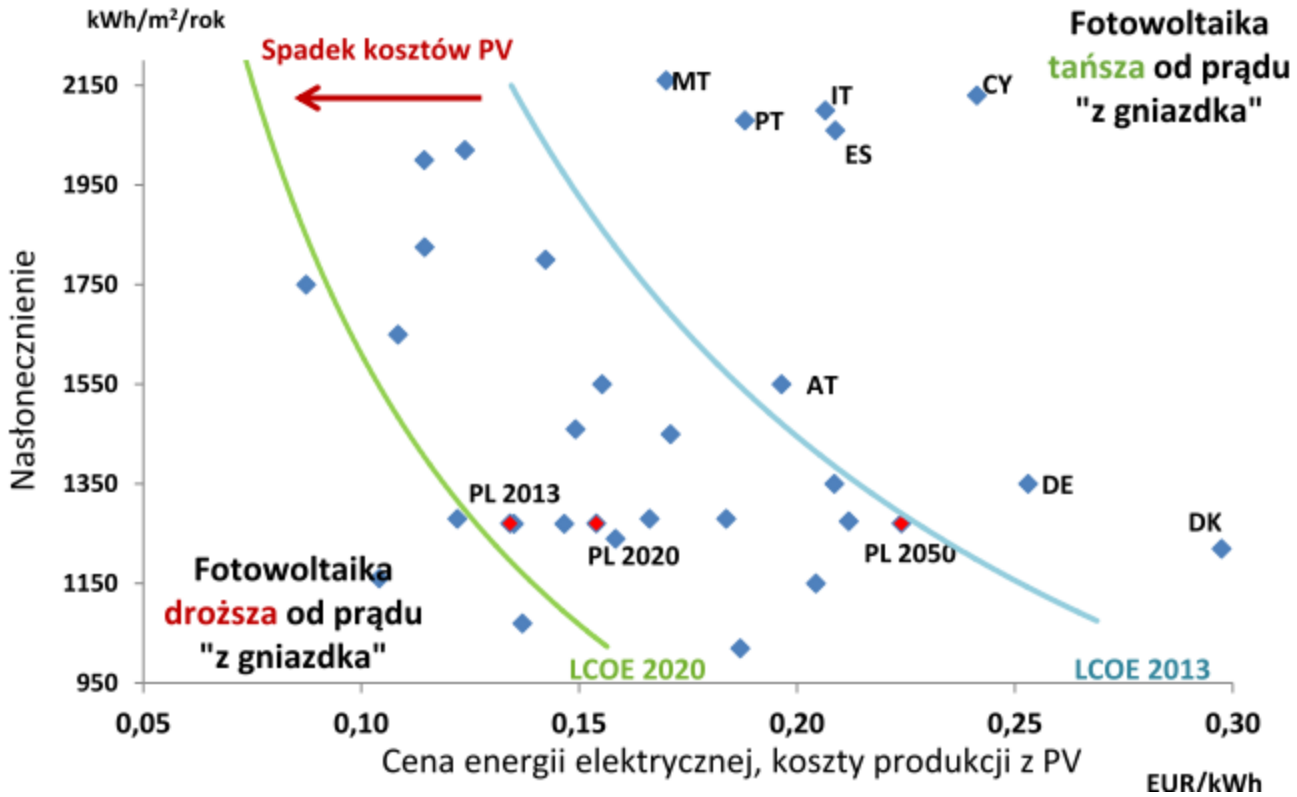
Źródło: opracowanie własne

niskoemisyjna
Polska 2050

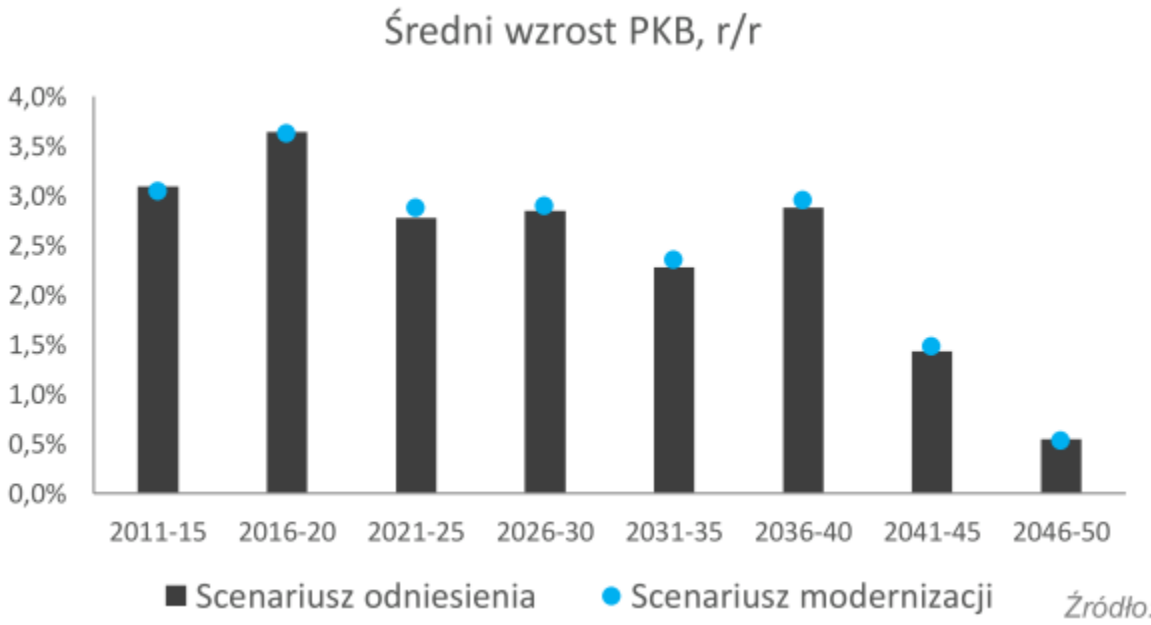
Polski węgiel w 2050 r.?

Krajowe wydobycie, mln ton	2010	2030	2050
Węgiel kamienny	76	47	28
Węgiel brunatny – bez nowych odkrywek	61	46	0
Węgiel brunatny – utrzymanie wydobycia	61	60	60
Węgiel brunatny – zwiększenie wydobycia	61	95	110

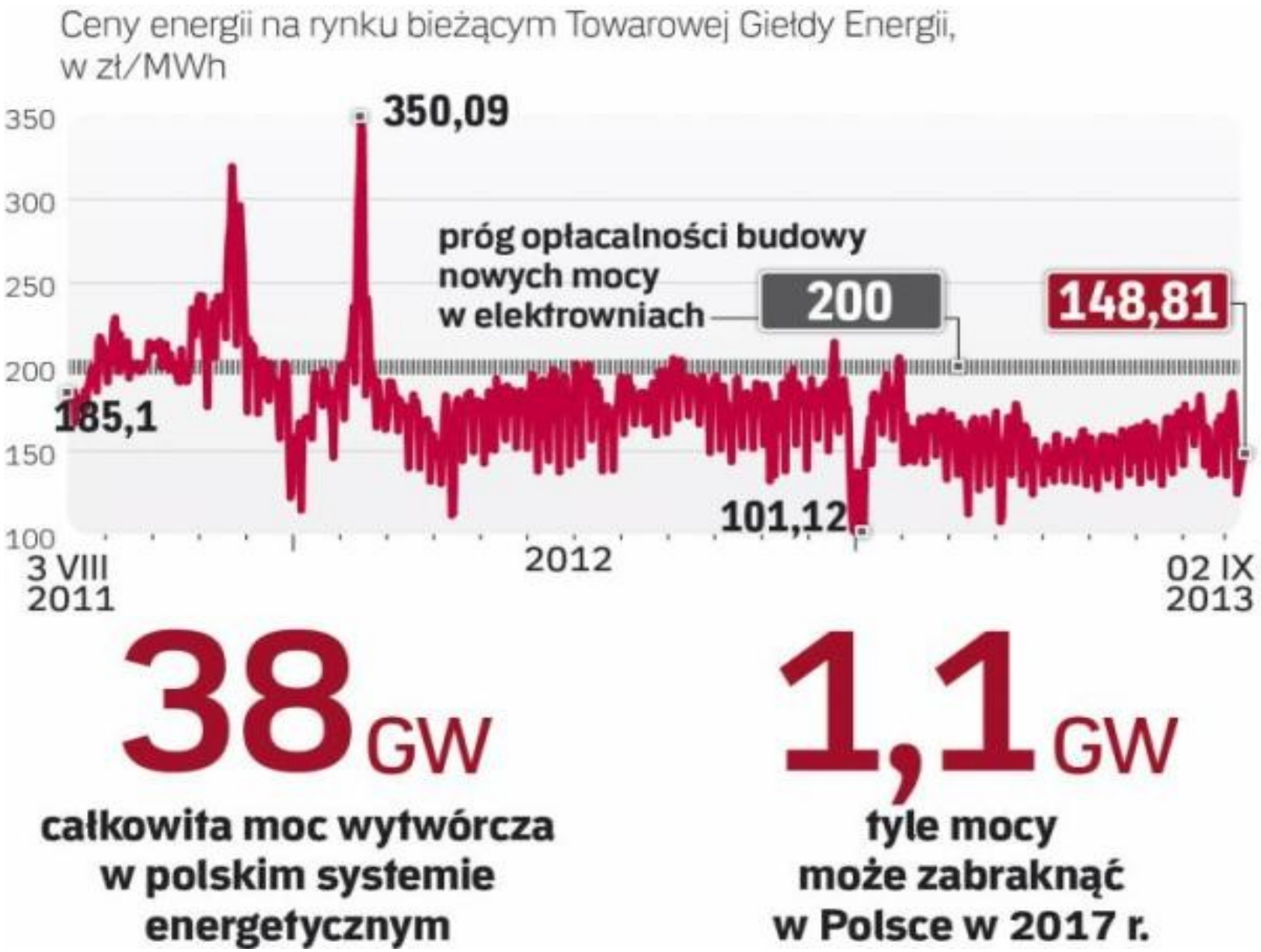
1 tona węgla kamiennego = 0,57 toe
1 tona węgla brunatnego = 0,20 toe



Uwaga: Ceny energii elektrycznej dla Polski w roku 2020 i 2050 na podstawie scenariusza odniesienia, bez ETS



Źródło: opracowanie własne



Source: ”Rzeczpospolita”
http://www.ekonomia.rp.pl/galeria/532088,2,1044323.html