

Environmental standards and dynamic comparative advantages. The case of boilers industry in Poland

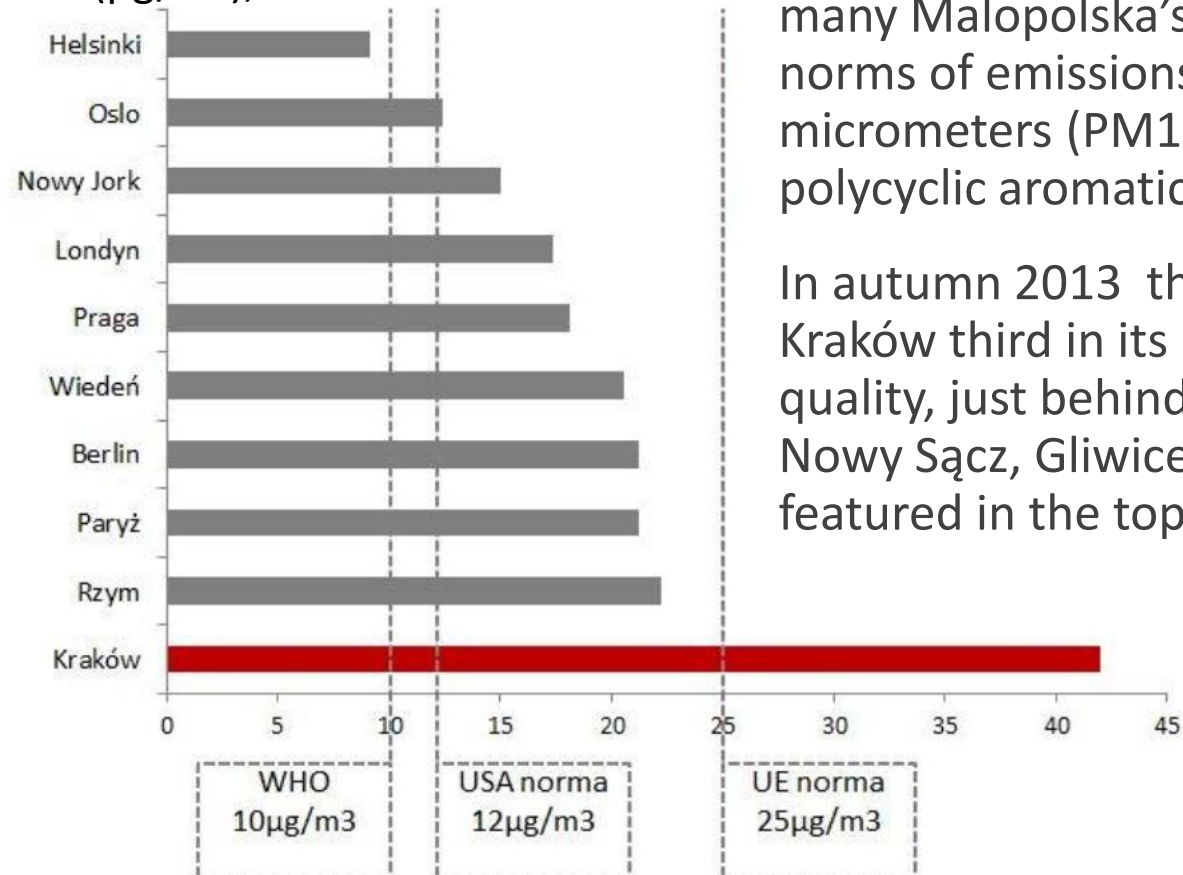
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EAEPE SYMPOSIUM, CRACOW, 13.05.2016

The environmental problem

(source: Cracow Smog Alert)

Average annual concentration of PM 2.5 ($\mu\text{g}/\text{m}^3$), 2011



Air quality in Poland is very poor.

The air in Krakow is especially polluted, but the problem is also present in many Malopolska's and Silesian towns due to their location in valleys. The norms of emissions are exceeded in case of particulate matter below 10 micrometers (PM10) and below 2.5 micrometers (PM2.5) as well as polycyclic aromatic hydrocarbons (e.g. benzo[a]pyrene).

In autumn 2013 the European Environmental Agency placed Kraków third in its list of cities in Europe with the worst air quality, just behind Pernik and Plovdiv, both in Bulgaria. Nowy Sącz, Gliwice, Zabrze, Sosnowiec and Katowice also featured in the top ten.

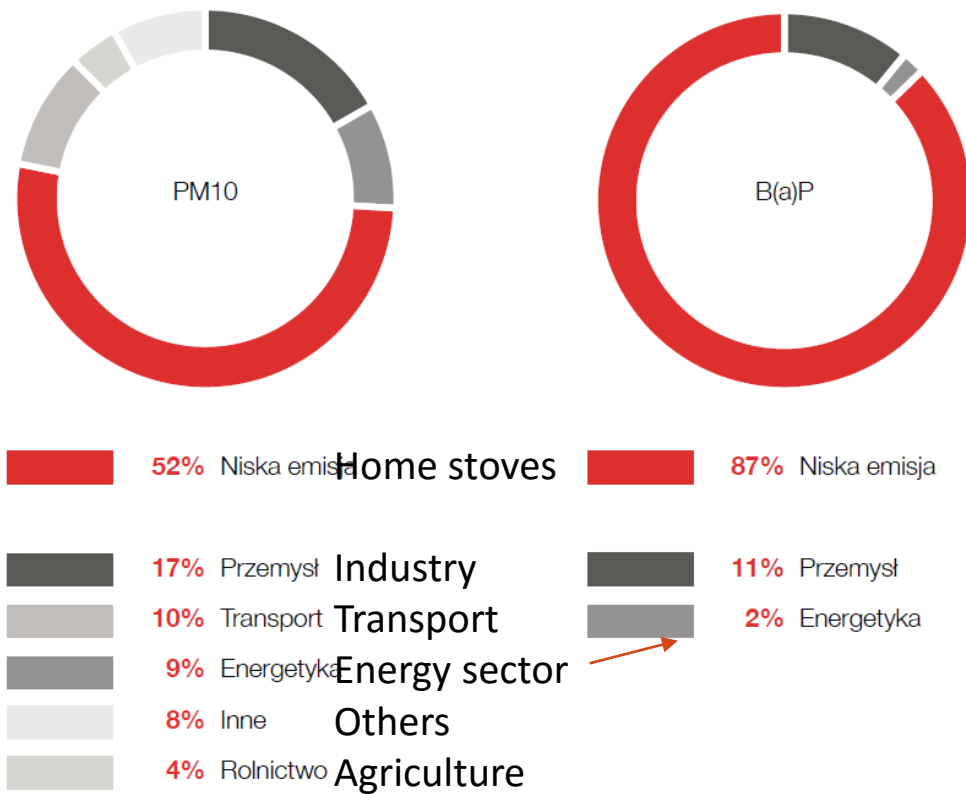
Average annual concentration of benzo[a]- pyrene (ng/m^3), 2013

CKI, BOILERS INDUSTRY IN POLAND

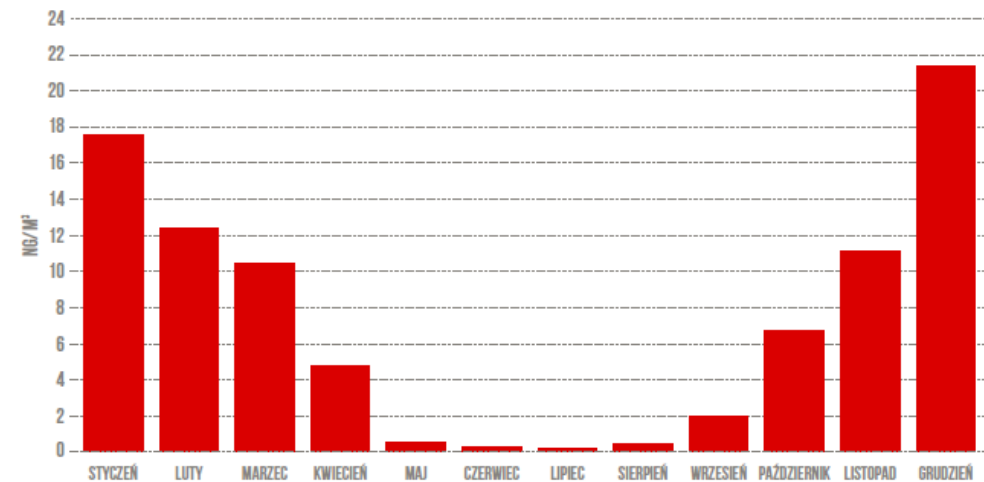




Sources of emission



source: Krakowski Alarm Smogowy

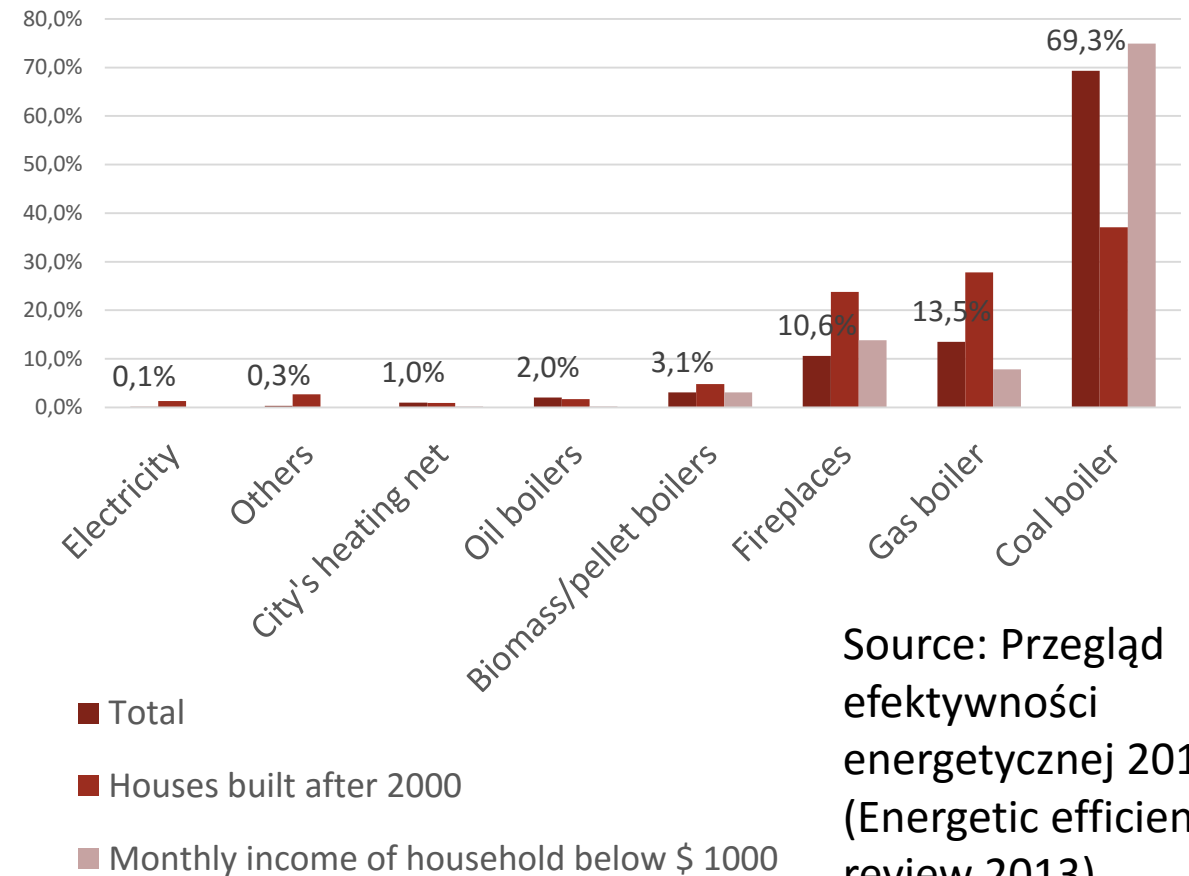


Wykres: Rozkład stężeń benzo[a]pirenu w poszczególnych miesiącach na stacji tła miejskiego w Krakowie w 2013 r. Źródło: Dane Wojewódzkiego Inspektoratu Ochrony Środowiska w Krakowie.

Distribution of benzo[a]pyrene concentrations in particular months in Krakow metric station in 2013.

Contributing factors

- Structure of sources of heating, with domination of solid-fuels (coal, wood) boilers
- The ways of using the boilers – inappropriate technique of combustion; making use of rubbish and industrial fuels
- Landform – towns situated in valleys
- Other: low thermal efficiency of buildings; servicing; improper chimneys
- **No standards on:**
 - **quality of small boilers (below 1 MW),**
 - **quality of fuels (coal),**
 - **emissions of individual houses (except punishments for rubbish burning)**



Source: Przegląd efektywności energetycznej 2013 (Energetic efficiency review 2013)

Standards of air pollutants emissions in Europe

England: London already 60 years ago introduced a ban on the use of solid fuels in individual heating systems. The decision was taken after an episode of smog which caused 4,000 deaths known as 'The Great Smog of 1952'.

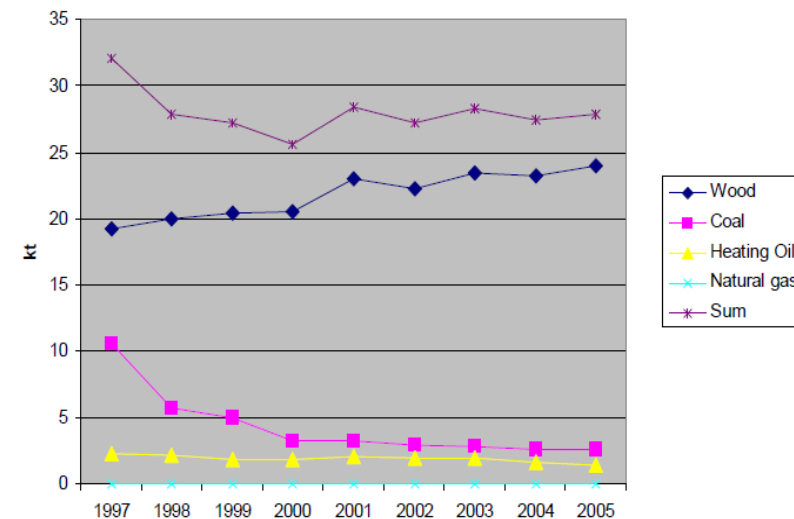
Germany: after 1997 significant downsizing of use of coal for heating purposes according to 1997 Ordinance on Small and Medium Combustion Plants (picture: development of dust emissions sources, K. Krauss, Determination of sectoral emission factors for small combustion installations in Germany, presentation, Rome 2/3 April 2007))

Czech Republic adopted emission norms for boilers of small power (below 300 kW). The requirements for coal boilers provide gradual standards enhancing:

- from 2014 – max. 125 mg/m³,
- from 2018 – max. 60 mg/m³.

Moreover from 2022 all used boilers should emit no more than 125 mg/m³.

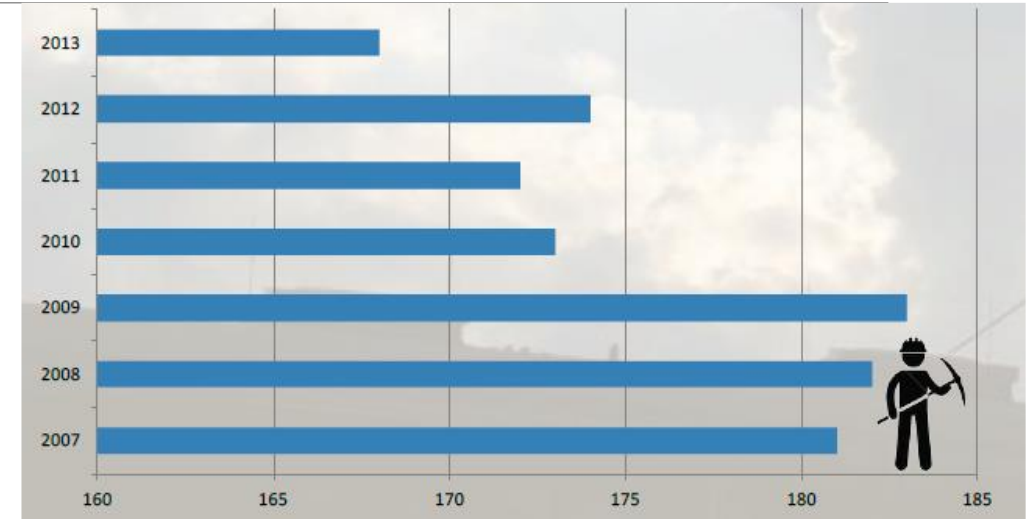
London, 1952



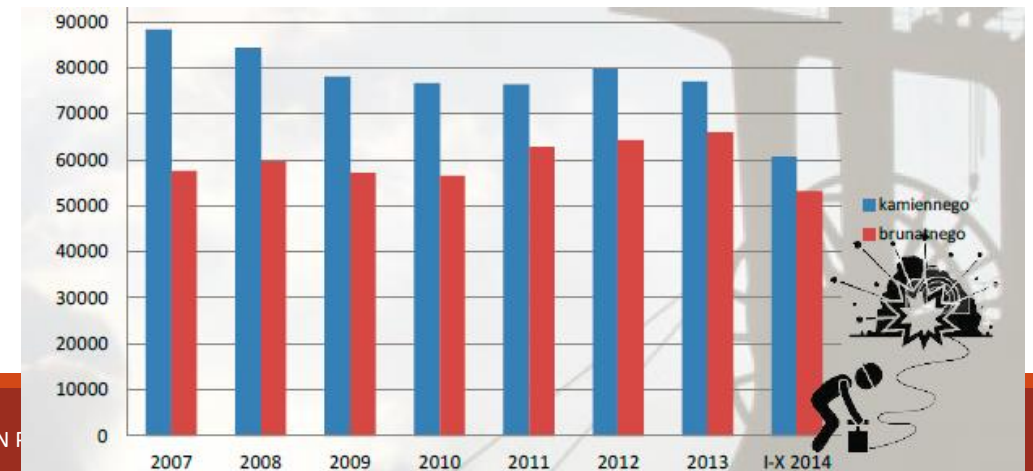
Germany, 1997-2005

Coal mining industry in Poland as source of solid fuels

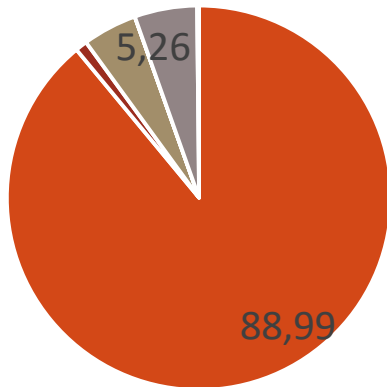
Average employment in mining in Poland (tho persons)



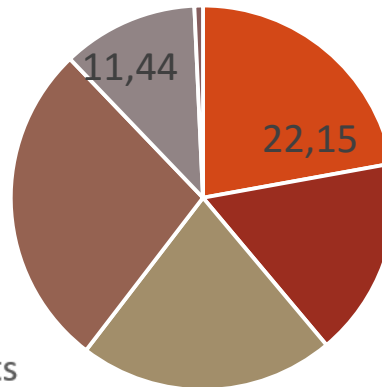
Average production of coal (anthracite & lignite) (tho t)



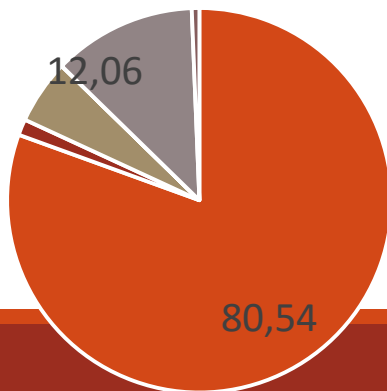
Poland 2003



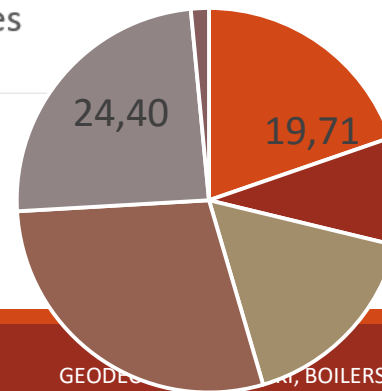
EU-28 2003



Poland 2013



EU-28 2013



- Solid fuels
- Petroleum products
- Gas
- Nuclear heat
- Renewable energies
- Other

Source of data:
Eurostat.

The environmental integrity and industrial growth. The environmental impact of a regulation (Ashford 1993)

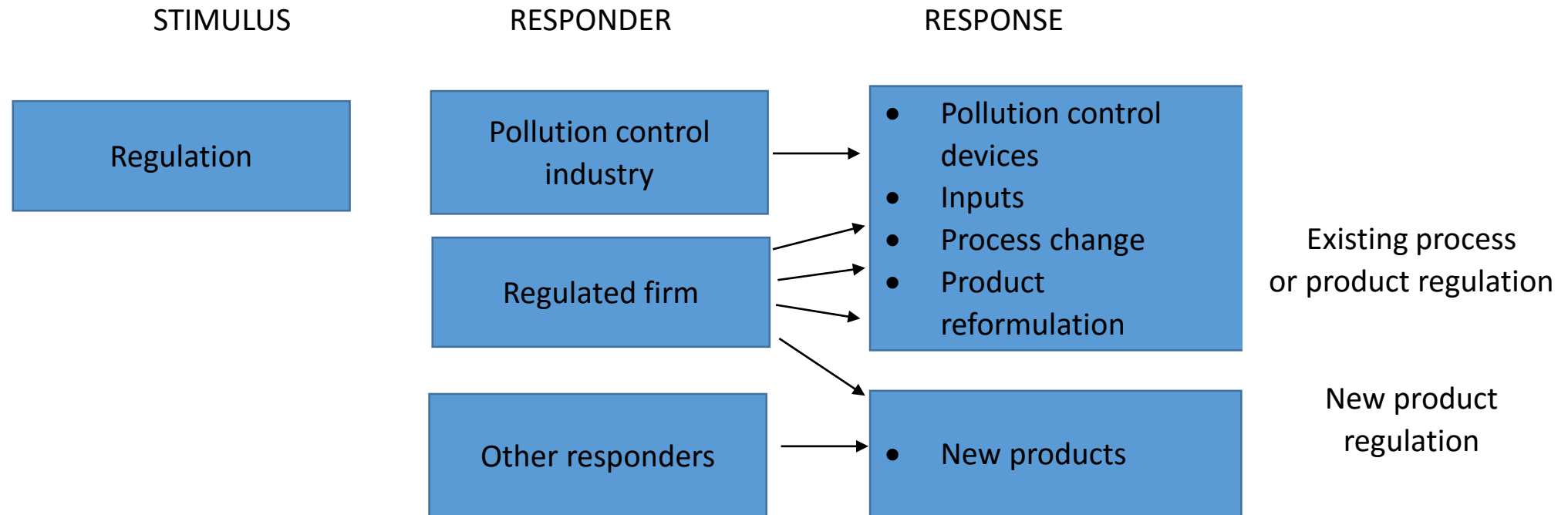
Industrial policy-makers according to Ashford (1993) reject the premise that regulation must achieve a *balance* or compromise between environmental integrity and industrial growth, or between job safety and competition in world markets.

Contemporary regulatory strategies aim at stimulating technological change and achieving a significant level of pollution prevention. They are built on the thesis that health, safety, and environmental goals can be *co-optimized* with economic growth through technological innovation.

Technological change is now generally regarded as essential in achieving the next major advances in pollution reduction. The necessary technological changes must include:

1. the substitution of materials used as inputs
2. process redesign
3. final product reformulation.

Model for regulation-induced technological change



Source: Ashford 1993.

Research questions

How to reconcile environmental regulations / safety of citizens with social objectives (replacement of boilers, fuel prices) and the needs of industrial development?

How different types of standards might influence the situation of the boilers industry?

What are the current and future adaptations in the industry in terms of technology, strategy, market selection?

How does the process of introduction of standards look like?

How producers influence this process, by i.a. collective actions of their sectoral organizations?

What are the critical factors in the decision making of industrial policy?

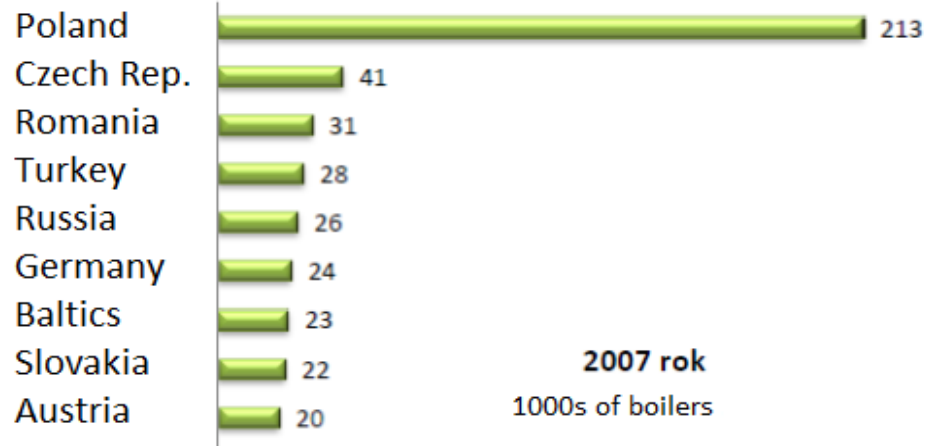
Research technique – case study

- Description of the industry – basic economic data
- In-depth interviews with:
 - Entrepreneurs from the industry (5) – from the Małopolska region, of varied size
 - Representatives of supporting and competitive industries (2)
 - Other stakeholders and experts (1)
- Working hypotheses:
 1. Business model of boiler industry in Poland has so far been closely linked to the lack of any regulation of the market and the lack of standards for the combustion of solid fuels.
 2. Domestic entrepreneurs were reluctant to any product regulations, but their attitude may vary depending on their market position.
 3. Ecodesign regulations significantly change the market situation and affect the prospect of activities of entrepreneurs, which is manifested in taking a variety of adaptation strategies.
 4. At the same time, the approach to regulation changes. Entrepreneurs recognize their complex effects and some of them are willing to support their introduction.
 5. These views are not always reflected in the current activities of entrepreneurs. Businesses run dual strategy - individually try to adapt to the situation after 2020 but collectively do not undertake strong actions.

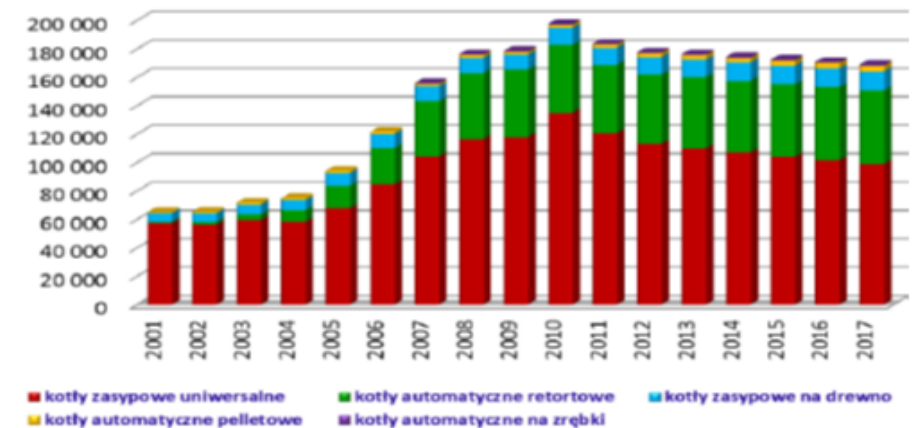
Solid fuels boilers industry

- In 2000s Polish industry of solid fuel boilers used to produce up to 200 thousand boilers per year
- 70% of households possessing a detached house use coal boiler as a device to heat
- In houses built after 2000 coal boiler are still popular, but over 60% use other sources of Energy
- Numerous small companies, large grey market, low margins and problems with liquidity
- Leaders (18 largest companies) organized in a Platform **PPUGPS**

Sales of solid fuels boilers in Europe (Bosch Markt)



Sales of solid fuels boilers (2013-2017: forecast)



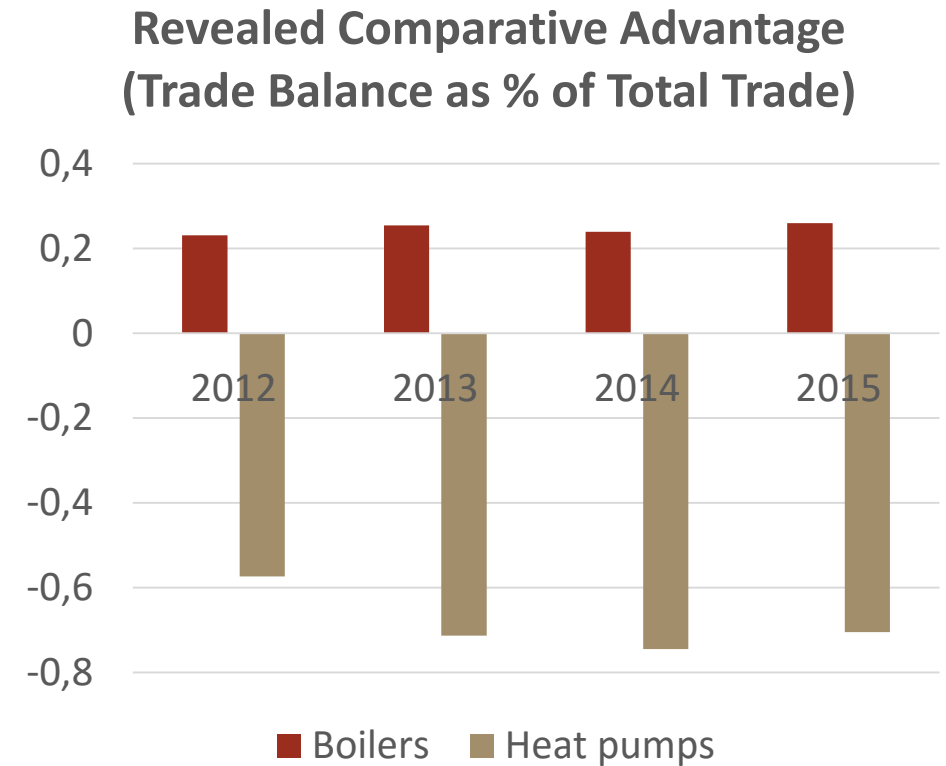
Comparative advantage of Polish boilers industry – static vs dynamic

Static efficiency:

- Poland as a leader of the solid-fuels boilers industry (7th in the world in terms of exports of all boilers; 3,3% of market)
- Independence in terms of boilers and fuels.

Dynamic and growth inefficiency?

- Barriers to further technical change (natural limitations of efficiency of boilers)
- Limited market size:
 - Coal boilers used in few countries
 - Growing popularity (due to technical change, relative costs and government inducements) of other heating technologies, incl. Solar systems or pumps
- On-going tightening of regulations



Source: own calculations of WITS data.

Stimuli: propositions of regulation

With no national standards on boilers, quality of fuels and emissions from houses' chimneys:

*PONE – regional programme in Silesia region aimed at reducing number of ineffective heating devices in Silesian communes

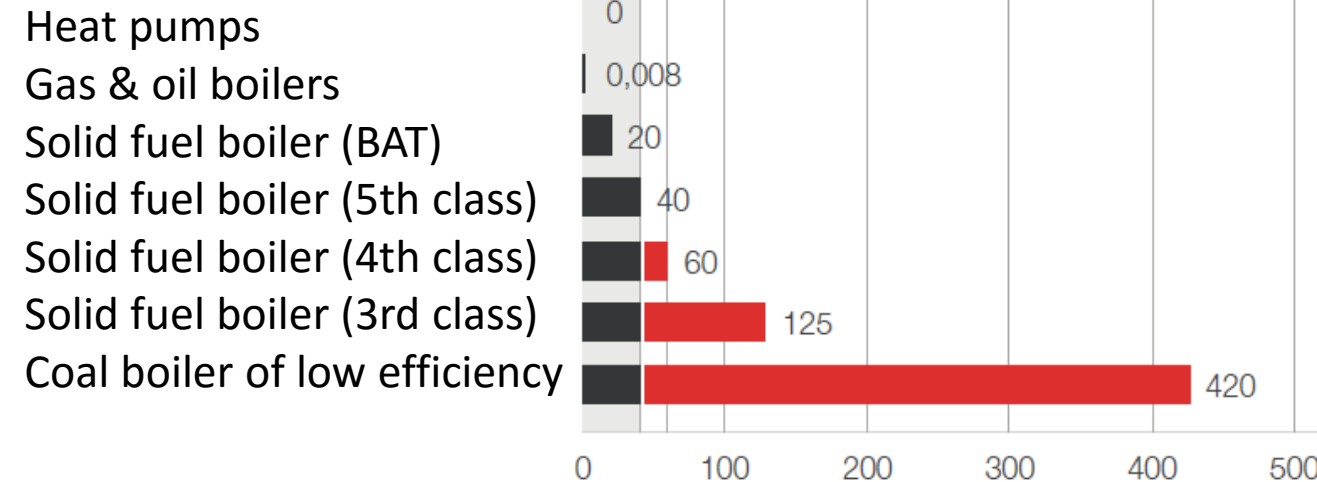
*Programmes of subsidization of boilers of 3rd, and then of 5th class adopted by national agency (with ban for additional firedog that enabled burning rubbish)

*At the beginning of 2016 Kraków introduced ban for solid fuels boilers from 2019

***ECODESIGN** (Directive 2009/125/EC) **after 2020:**

Question: how will it influence the boilers industry?

EU norms after 2020:
40 mg/m³ – auto feed
60 mg/m³ – manual feed



Only 5th class boilers fulfill EU requirements.

Conclusions from interviews I

Industry:

- stability and low dynamics of the market, competition based on price and design – not on effectiveness or environmental impact. Without fuel standards no serious technological change and environmental improvement can occur.

Perception of standards:

- Diverse level of awareness of and support for standards (the larger the company – the more supportive it is)
- Product standards enforce technical change (which is quite easy), market selection and diversification of the value chain (e.g. specialized suppliers) → which might increase international competitiveness of the industry
- Gradual implementation of standards before 2020 might reduce uncertainty and facilitate technical adaptations
- Importance of technical issues – access to laboratories, certification costs
- Fuel standards and regulation of combustion necessary to achieve environmental benefits

Conclusions from interviews II

Problems with implementation of standards of the solid-fuels market:

- There is no policy regarding boiler producers – policy instruments are resultant of interplay of public opinion (NGO), gas producers and coal mines. Traditional model of regulatory impact fails – with no interest of future of boilers market. Regulation ad hoc destroys smaller firms, which are unprepared to sell higher class boilers.
- Chaos and uncertainty regarding policies, no dialogue or cooperation between the regulator and the industry
- Role of other interest groups (incl. the mines and gas suppliers)
- Difficulties with coordination of collective action (individual adaptations vs cooperation)

Ambiguities of industrial policy – how they influence the model of technical change

Multiple market failures (coordination, information, externalities) – scope for intervention but also difficulties

Complexity of goals – makes their reconcilability harder to achieve:

- Environmental (reduction of pollution)
- Competitiveness and technical change – short-term vs long-term efficiency („**magic circle**”)
- Energetic security
- Social cohesion – of customers (costs of boilers and fuel) but also regions (spatial clustering of industry)

Complexity of reaction of customers (incl. Illegal ones)

Uncertainty about technological and market potential of alternative technologies

Coordination of the processes within government (different ministries, local vs central gov.)

Pressure of interest groups

Thank you for your attention!

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