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The Costs of Transition in a Coal-dependent Economy

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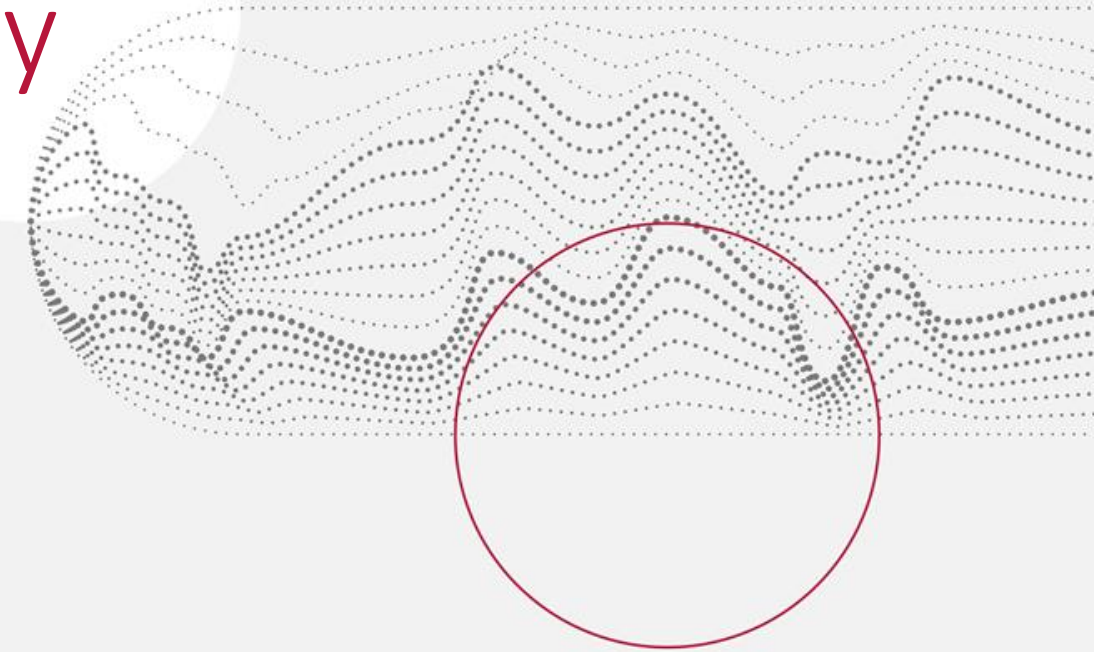
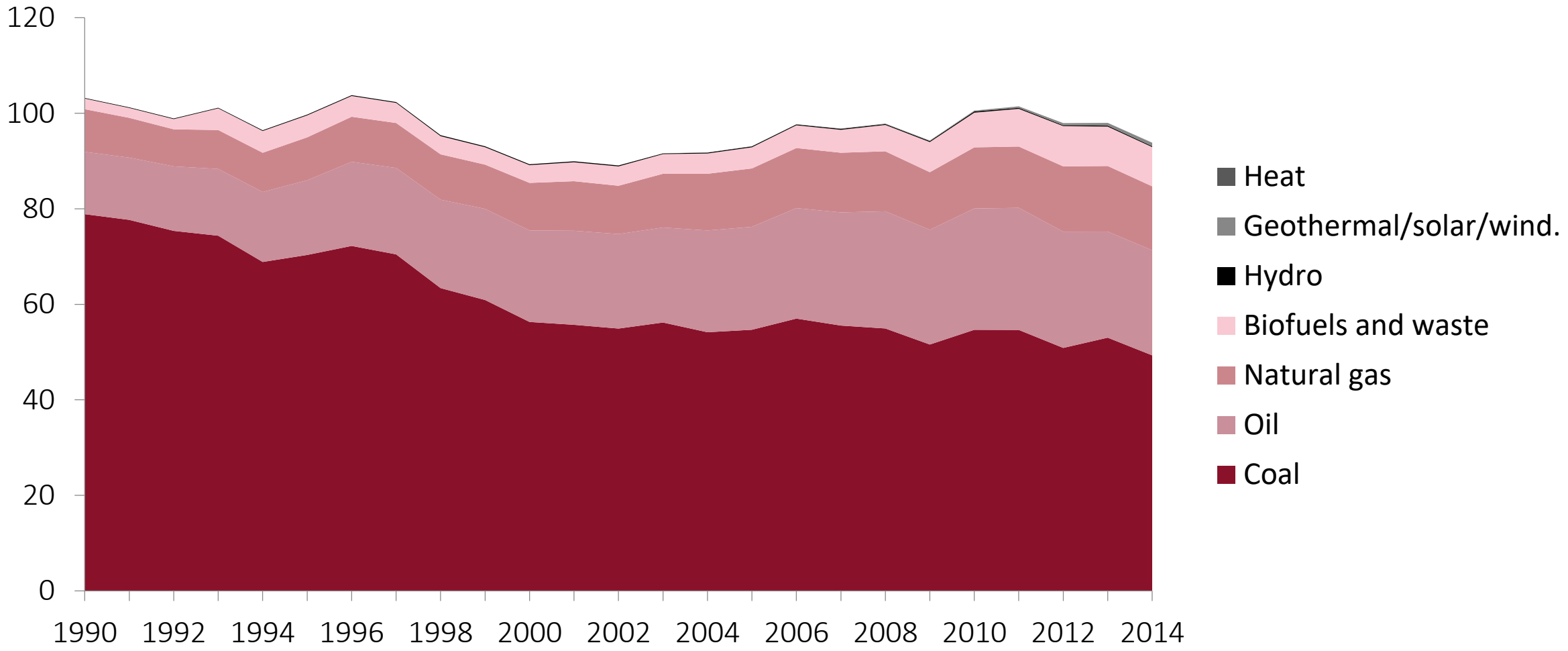
The Polish case study



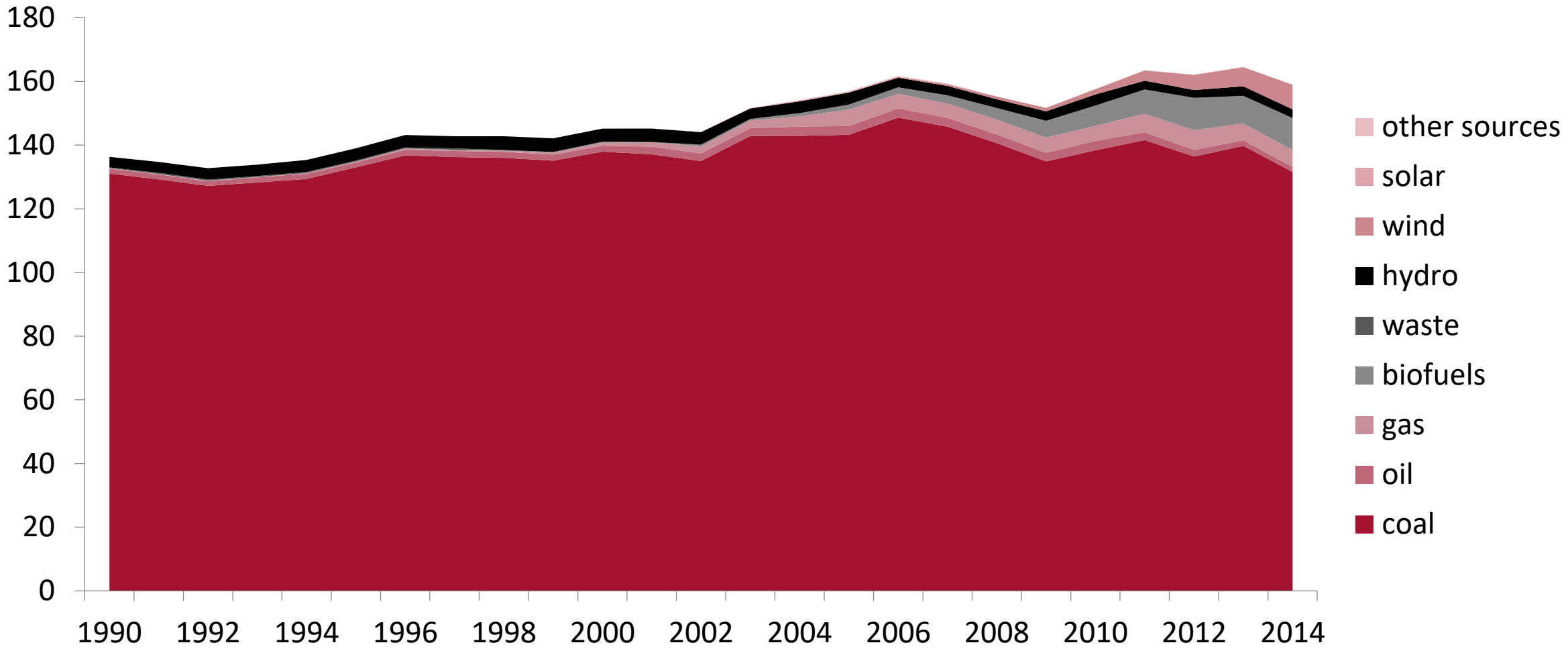
Prevalence of coal in the TPES (Mtoe*)



*Without electricity; crude oil and oil products combined

Source: IEA

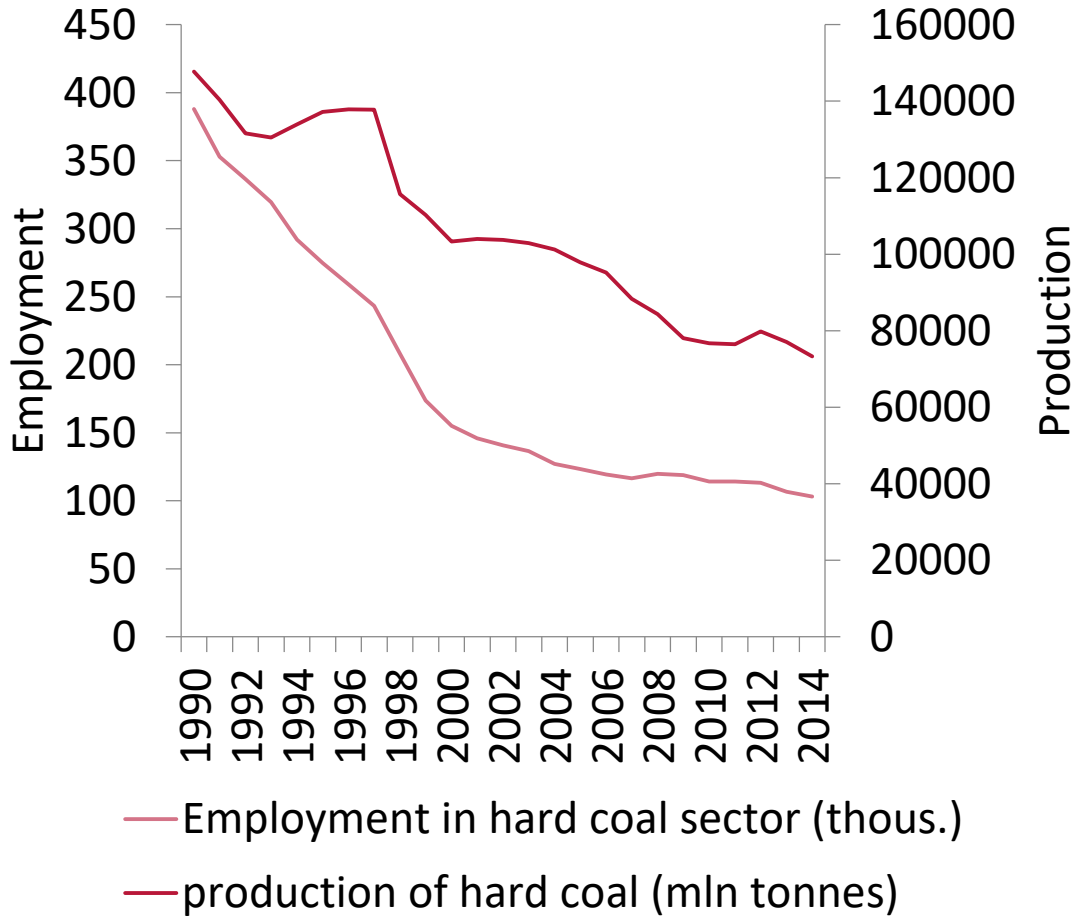
Domination of coal in the electricity production (TWh)



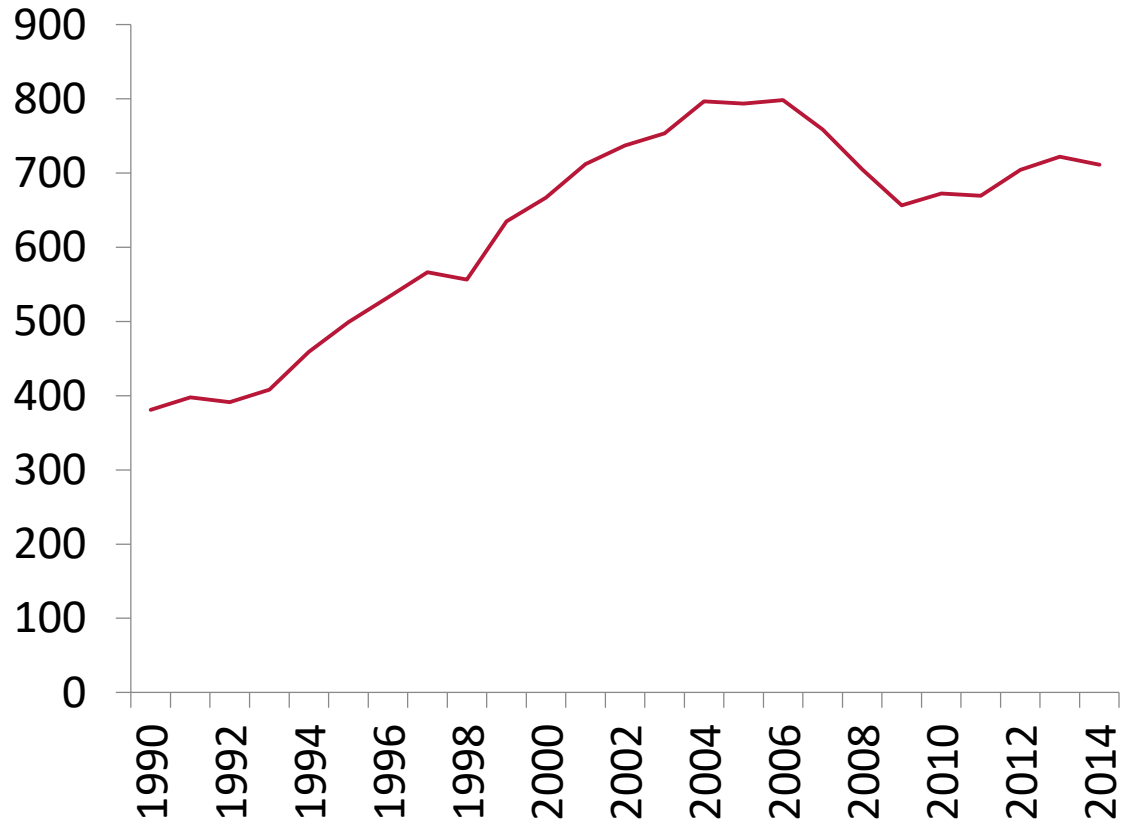
Source: IEA

Productivity in Polish hard coal mining sector

Employment and production



Productivity (tons of coal/person)

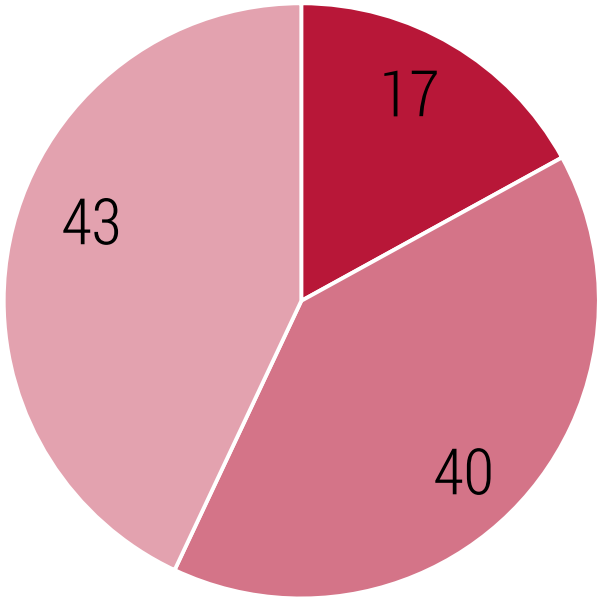


Dependency on coal – economic vs. social dimension

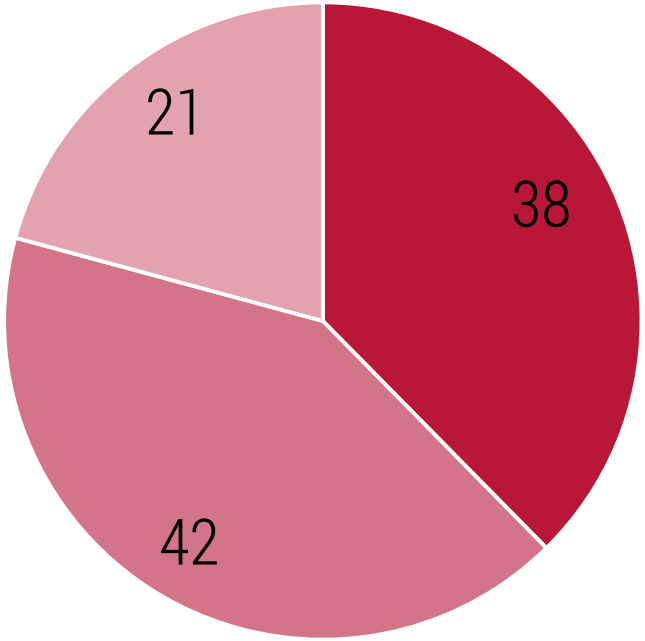
- Dependency on coal is not related to profits from export
- It is related rather to labour (and have also a political context) through a combination of different factors:

Lower level of education among miners (%)

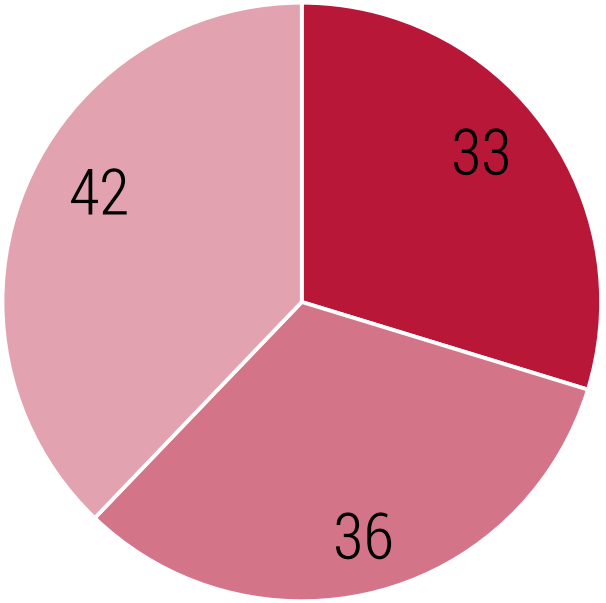
Coal and lignite mining



Electricity generation and distribution



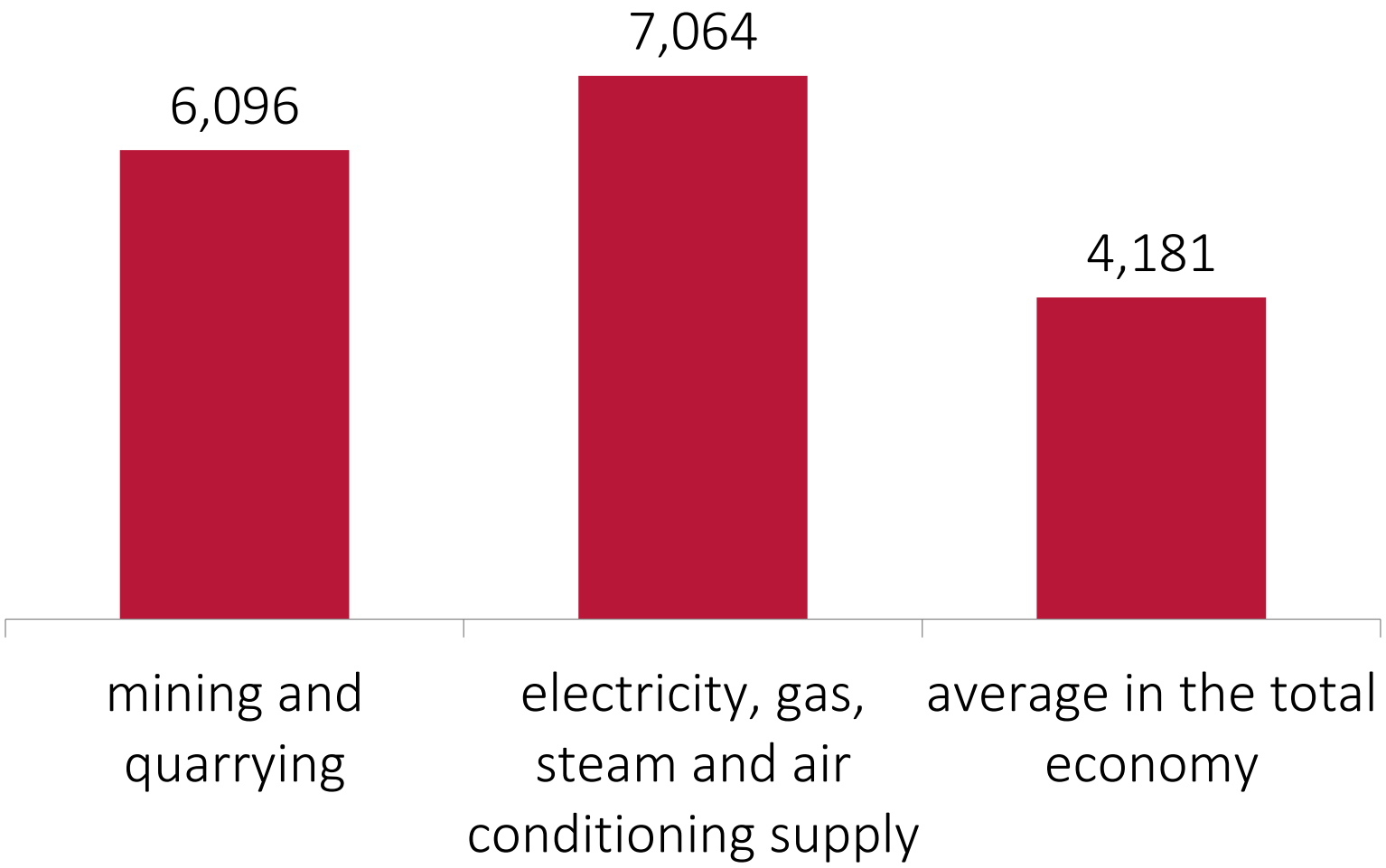
Total economy



tertiary education
secondary education
primary education

Source: LFS

Wages in mining and other sectors (1q of 2016, zloty)



Wages in mining sector are relatively high, although the workers are low-skilled

Source: GUS

Labour force status of workers a year after leaving particular sectors in Poland (%)

Quitting the mining sector unlike the Energy sector for the vast majority of people means inactivity or unemployment.

Source: LFS

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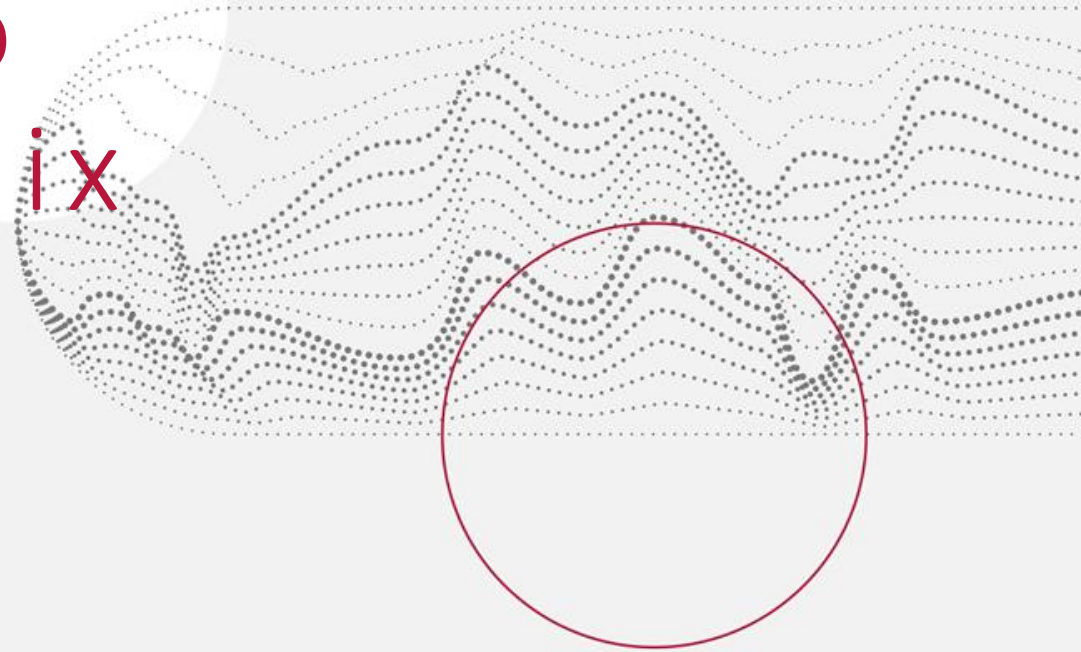
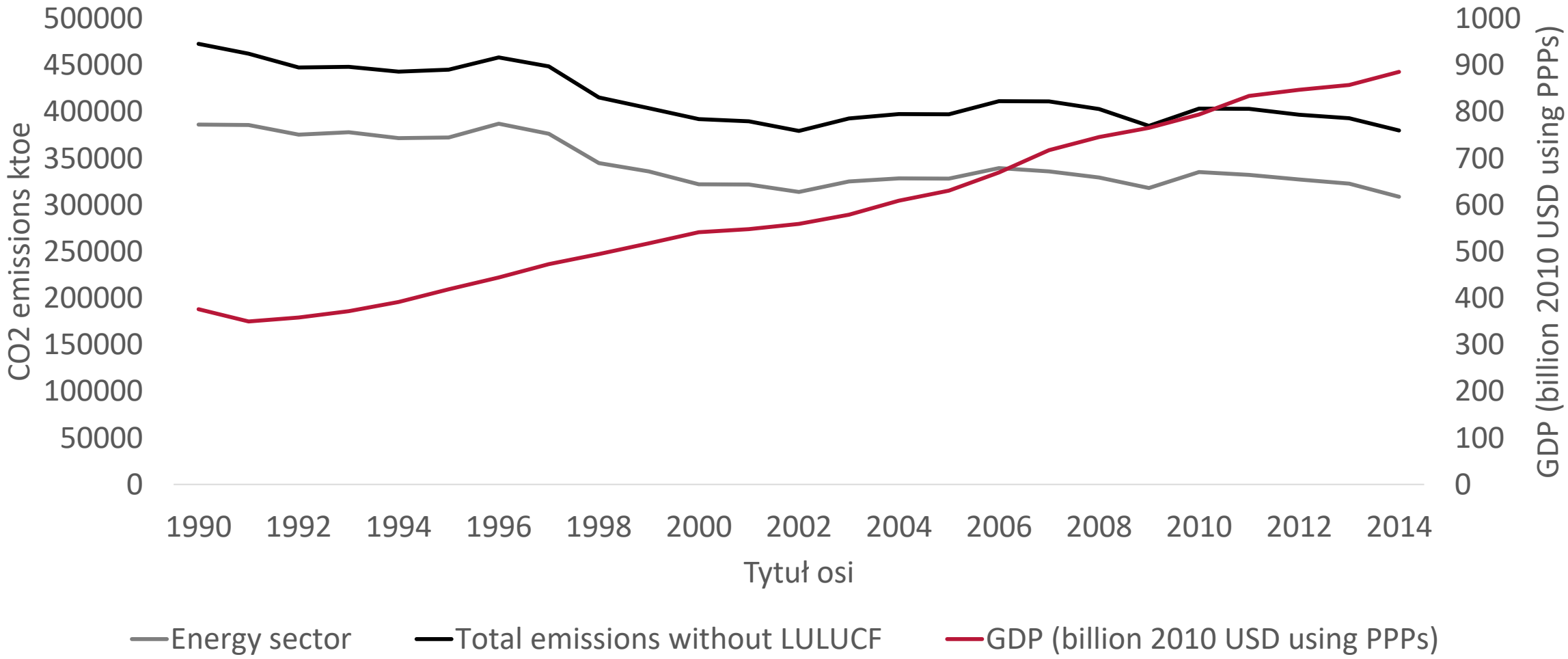
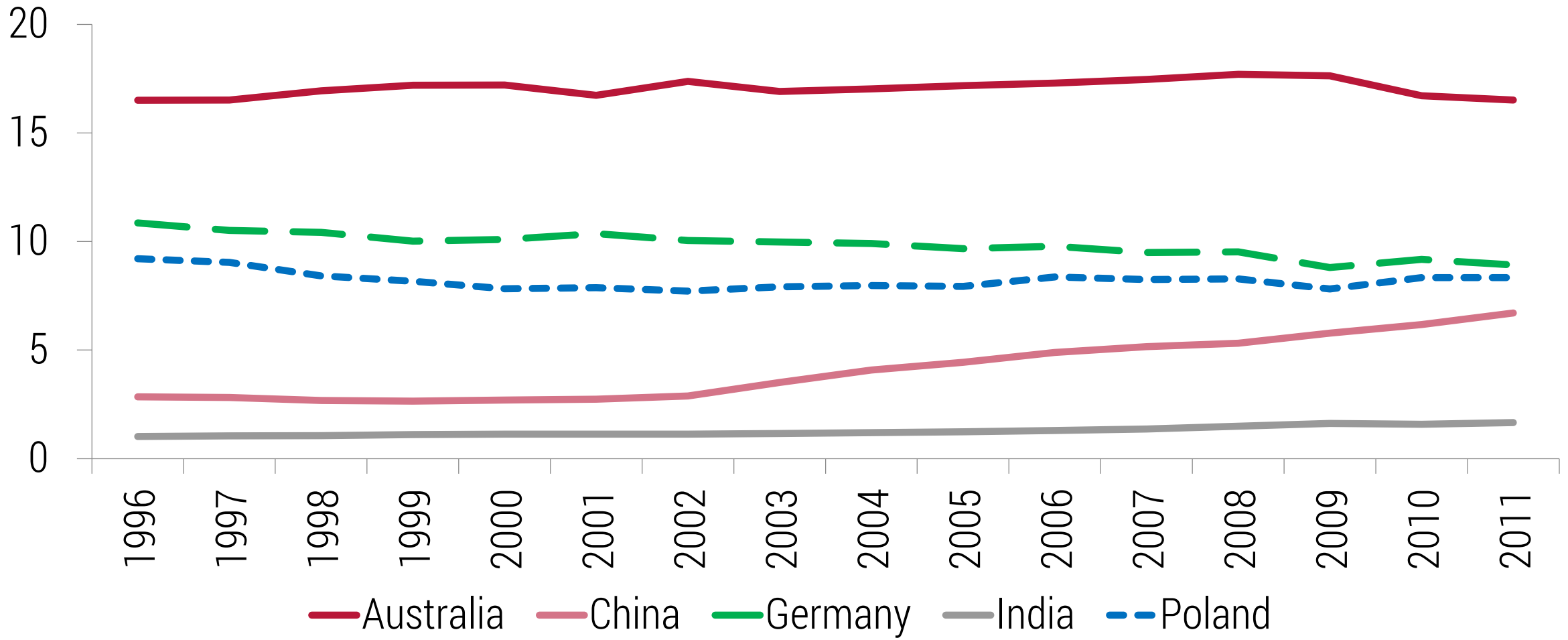
Why Poland needs to change the Energy mix – EU context



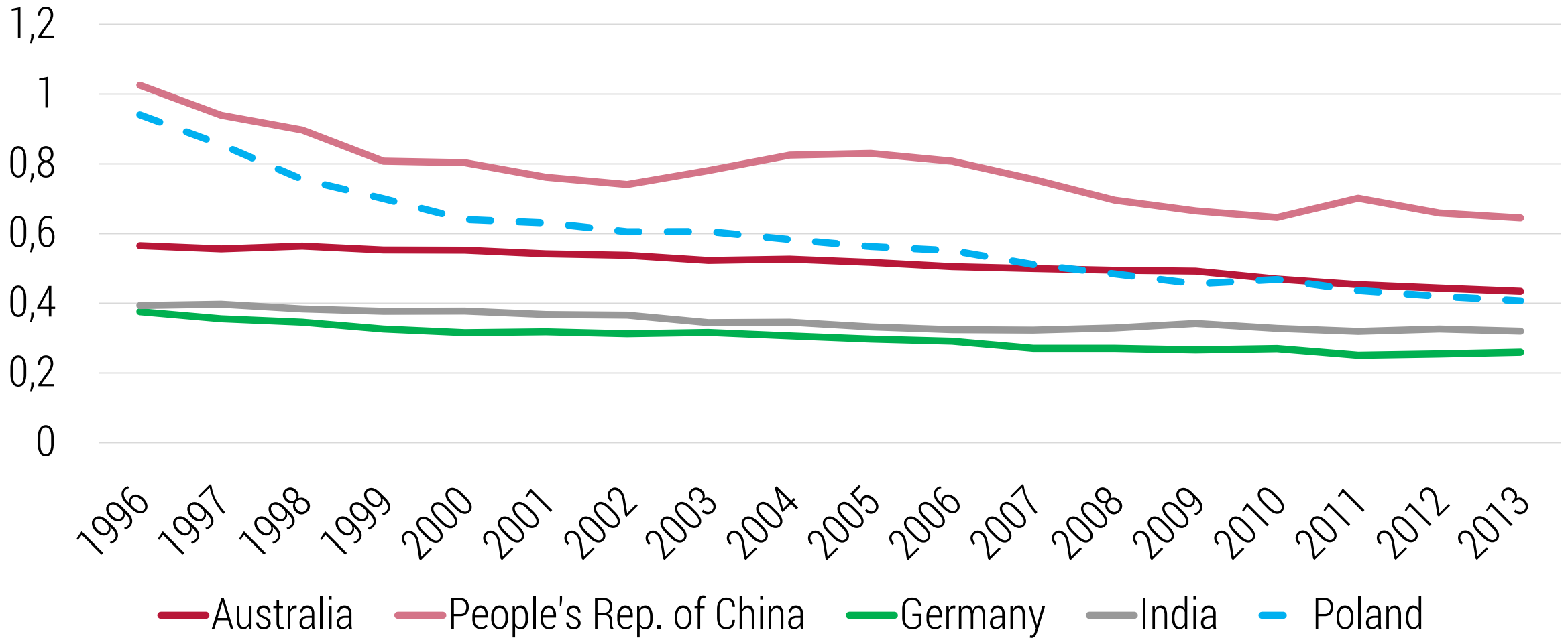
Decoupling of CO_2 emissions and growth



Tonnes of CO_2 emissions per capita



CO_2 emissions per GDP (PPP) (kg/$)



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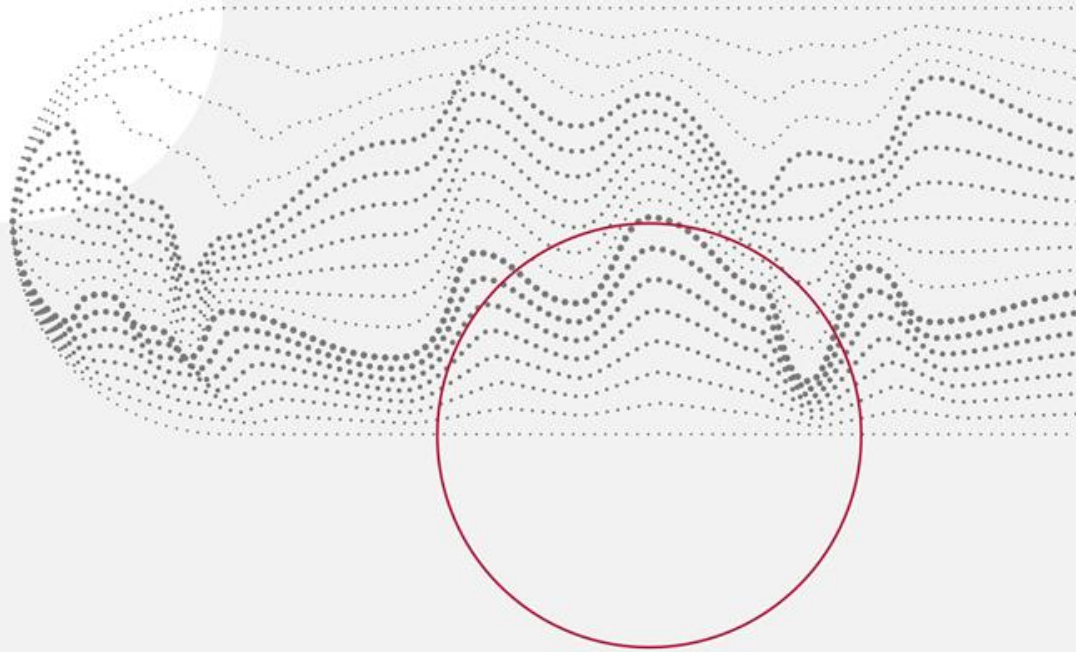
The stylised model



Pathways (horizon 2030)

- Three potential pathways for CO_2 emission reduction
  - **EFFICIENT COAL**: Replacement of old coal power plants with new, more efficient plants -> lower demand for coal, less emissions
  - **GAS**: Use of gas instead of coal -> lower emissions
  - **RES**: Deployment of non-intermittent Renewable Energy Sources -> CO_2 emissions from coal exclusively

Stylised model

- Central Planner must meet a given reduction in CO_2 emissions
- Four substitutable ways to produce electricity:
  - „Old coal”: requires only coal use with no additional investments
  - „Efficient coal”: requires investment and coal
  - Gas: requires investment and imported gas
  - RES: requires only investment
- Labour is used to produce:
  - Investment good
  - Coal extraction
  - Final good
- **Probability of finding job in other sectors after loosing job in mining is less than unity.**

The model's predictions

- **Proposition 1**

Pathways EFFICIENT COAL and RES have exactly the same impact on emissions and employment

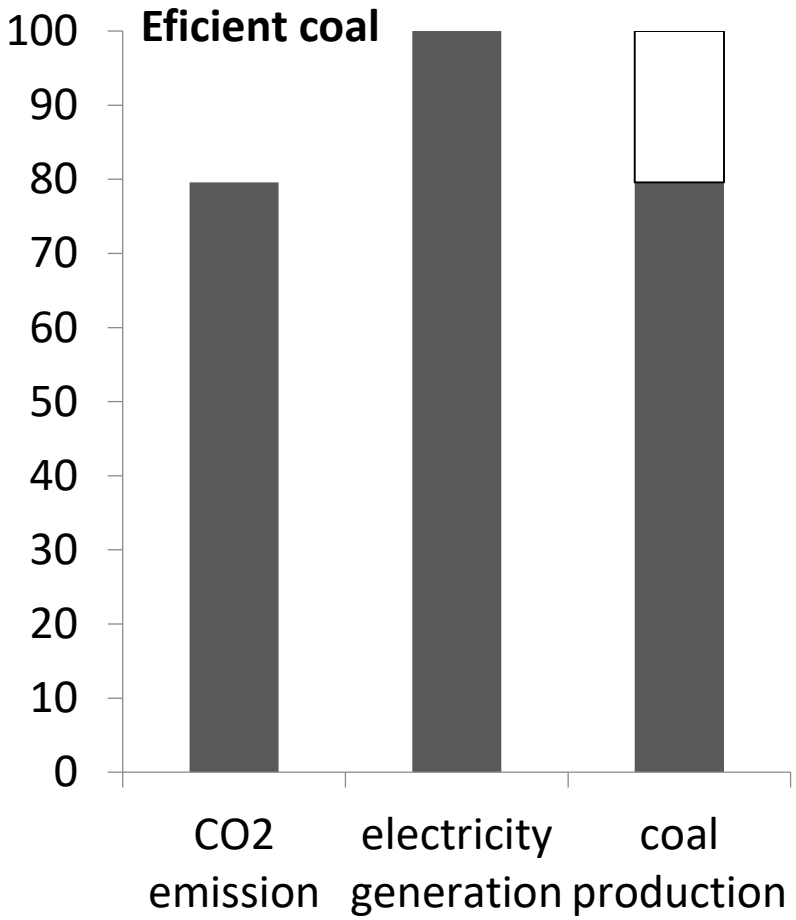
- **Proposition 2**

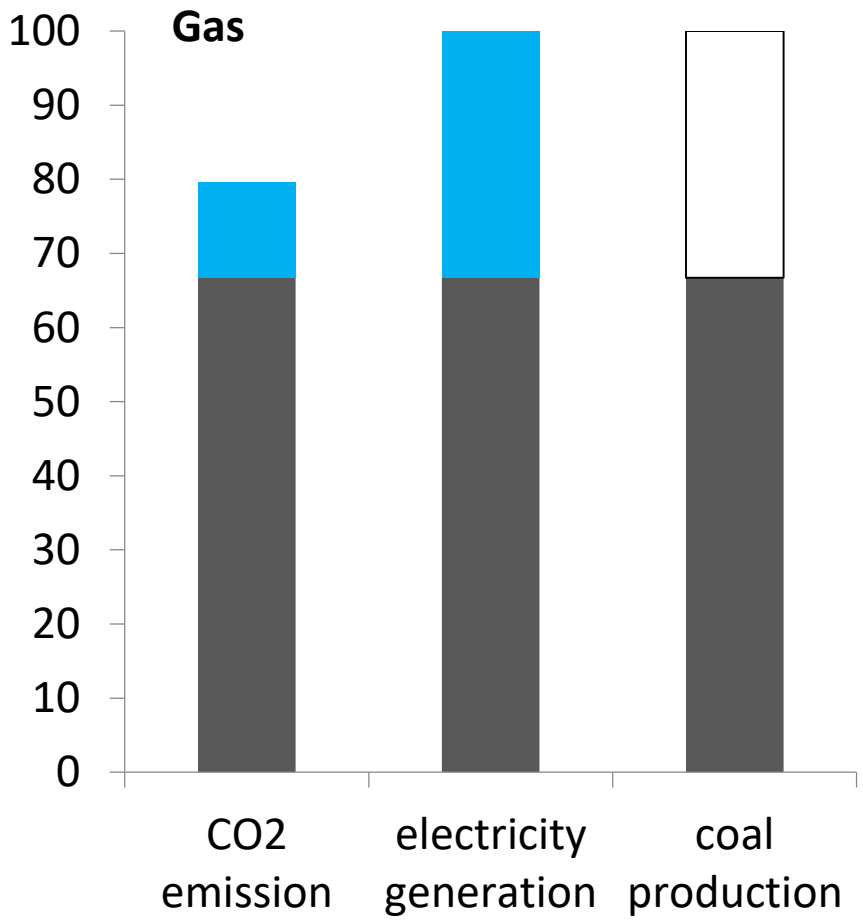
Pathway GAS have larger negative impact on employment than Pathways EFFICIENT COAL or RES

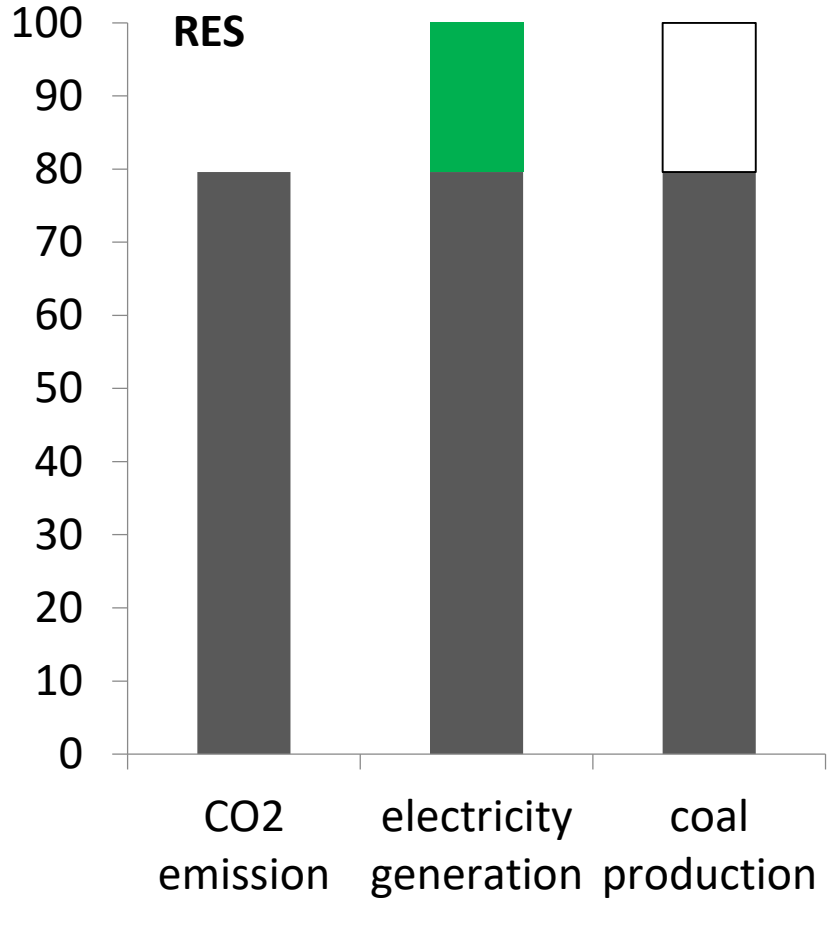
- **Proposition 3**

TC = fuel cost + tech cost + unemployment cost

Three pathways of CO_2 emission reduction in electricity production by 2030 (percentage of the baseline)







Key messages

- Important reason for coal dependence of Poland is the combination of relatively low-skills and high wages of miners protected by strong trade unions.

- Probability of employment after quitting the coal sector in models is usually 100% although empirically this is not the case

Thank you!

In case of questions please contact us at:

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TRANSrisk

TRANSITION PATHWAYS AND RISK ANALYSIS FOR CLIMATE CHANGE POLICIES