POLAND:
Carbon Capture Roadmap

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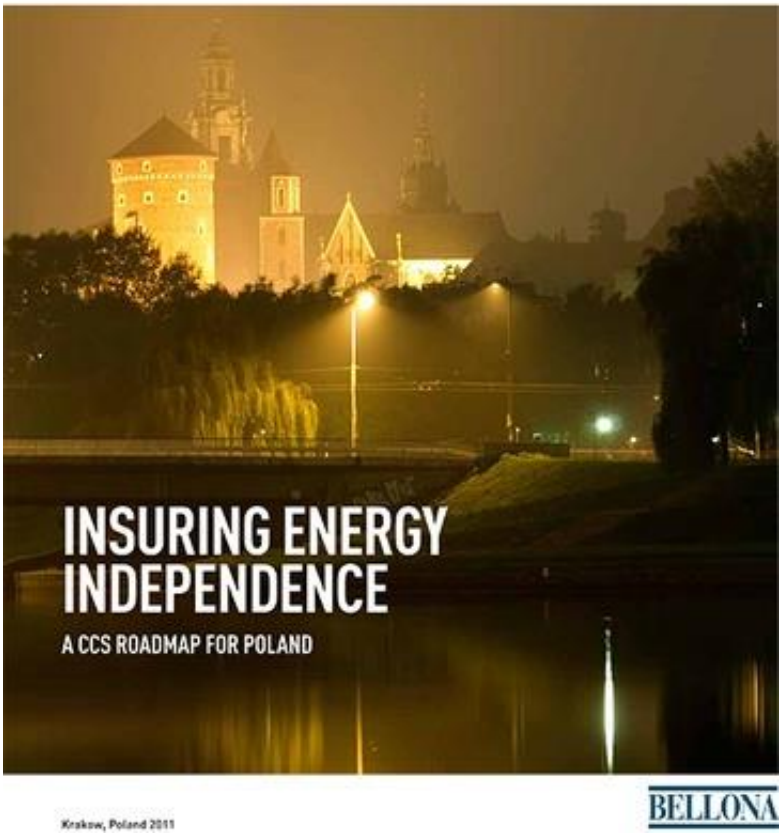
ENVIRONMENTAL
CCS
TEAM


Murmansk
Oslo
St. Petersburg
Kiev
Brussel
New Orleans

An example: Bellona's work on CCS



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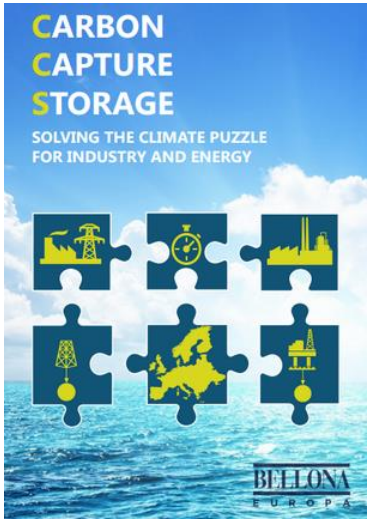

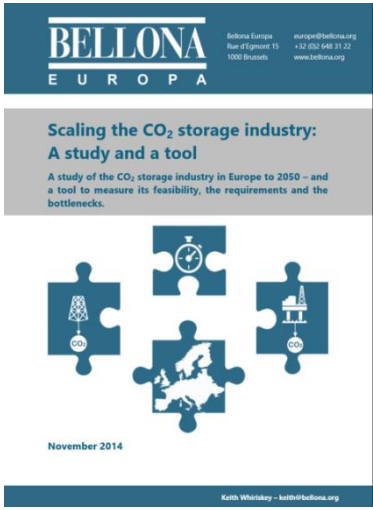

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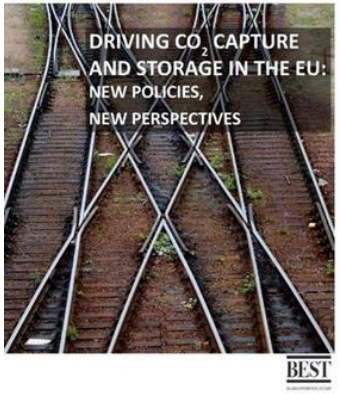
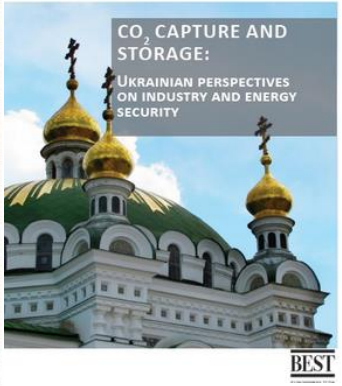
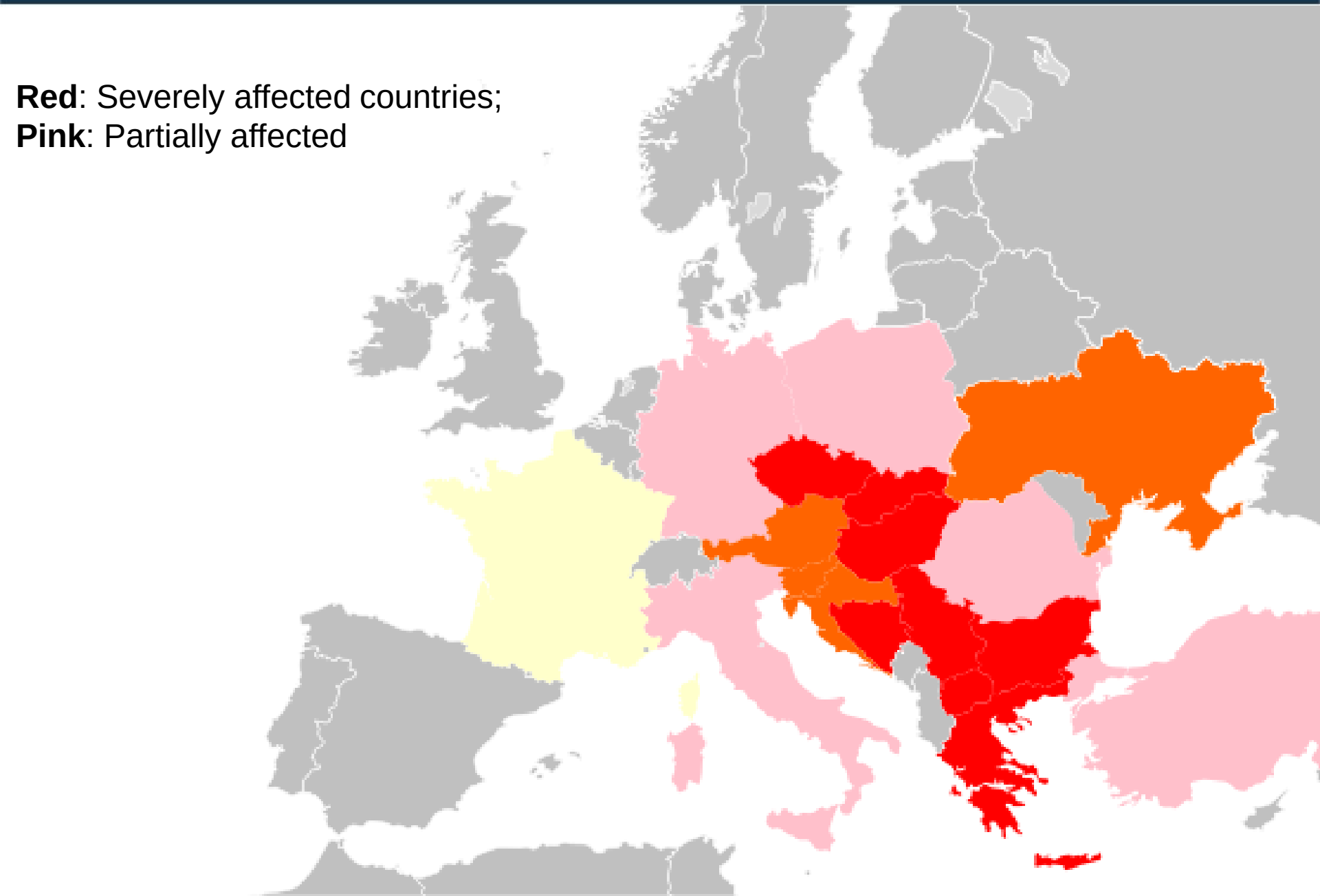




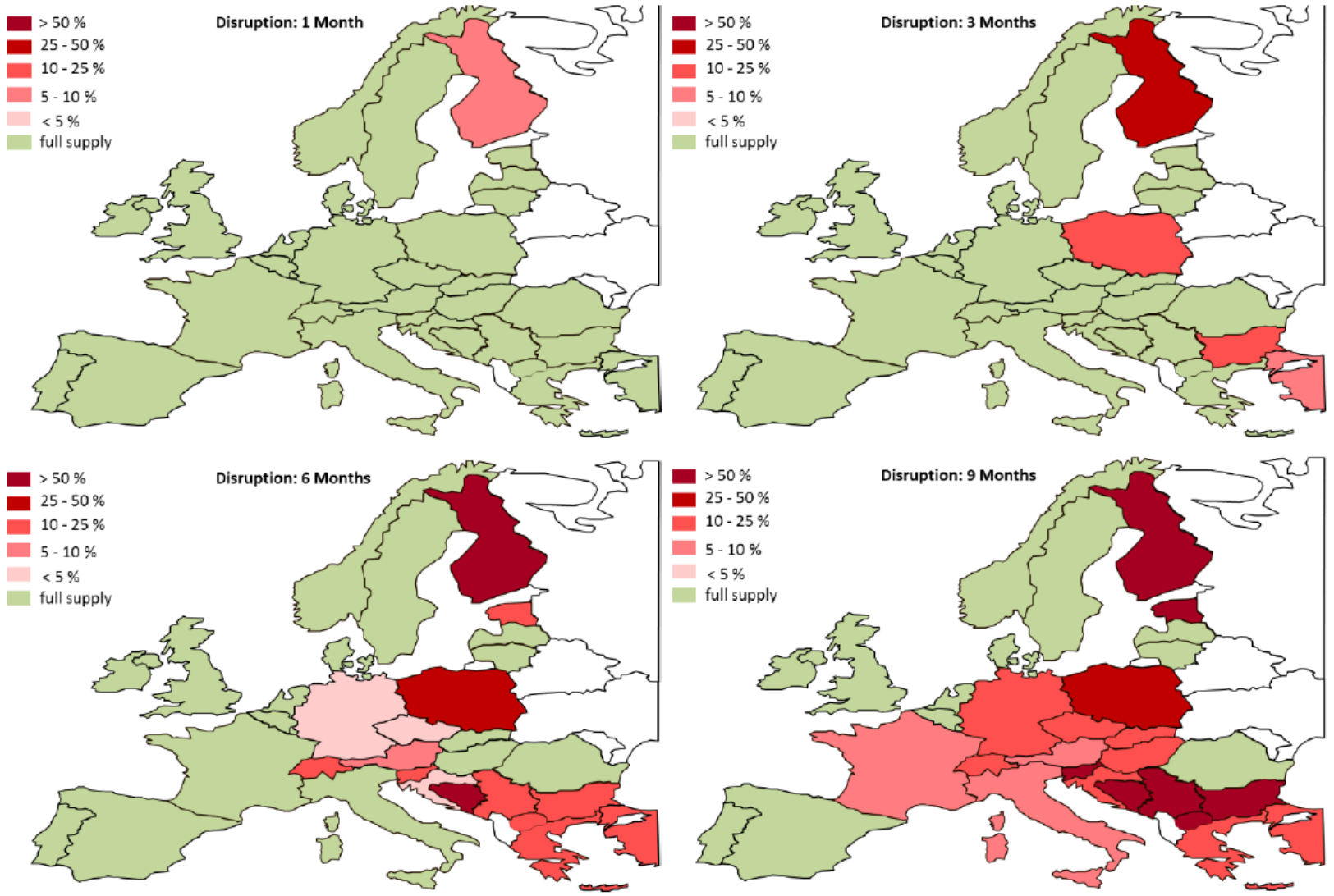
The story is not new for those on the periphery

2009 Russia–Ukraine gas dispute

Red: Severely affected countries;
Pink: Partially affected

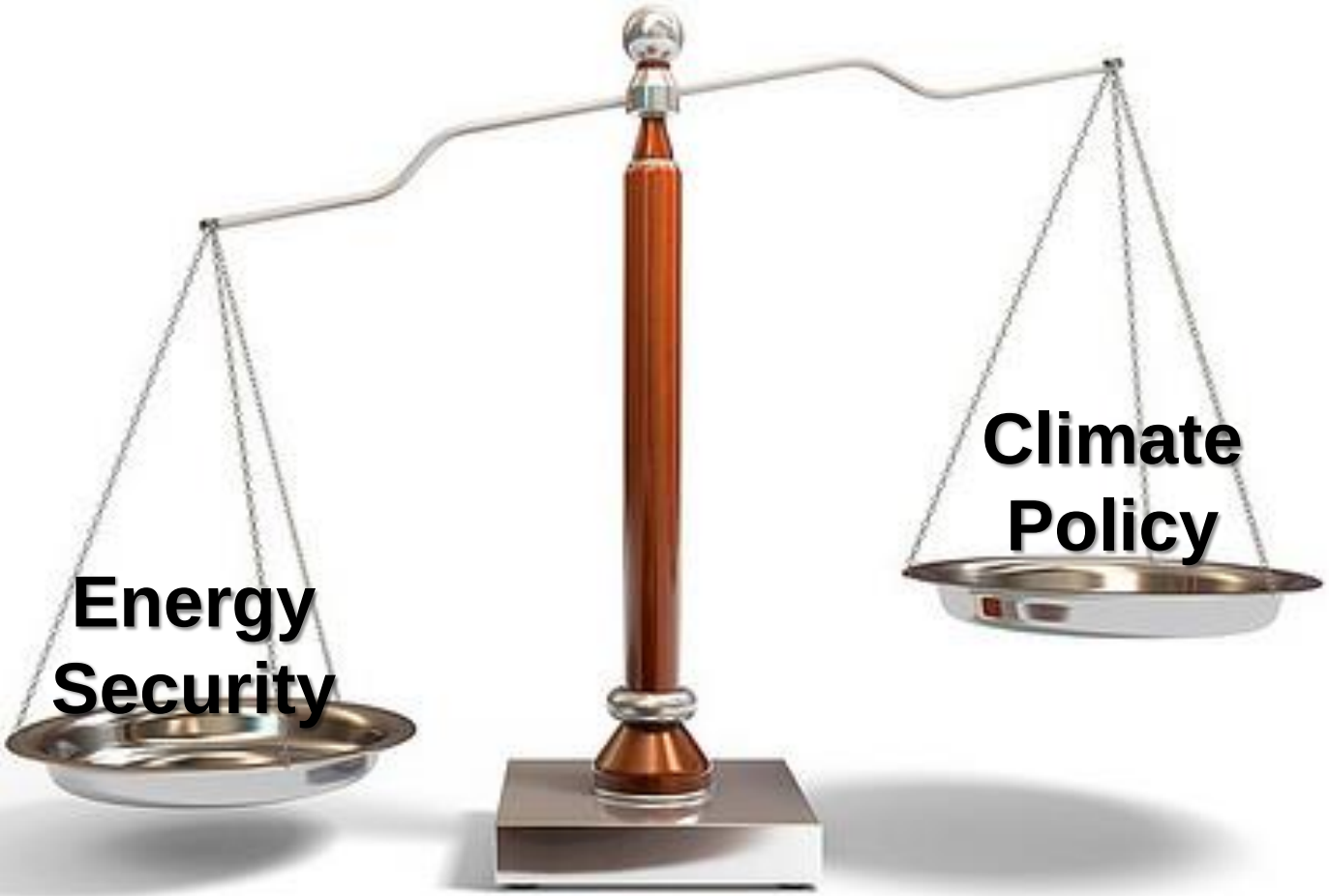


Natural Gas Supply Shortfalls in European countries




Indigenous fossil energy resources in Europe is in large part coal and lignite.
Together they constitute more than 80% of EU fossil reserves.
Poland reserves: Hard coal ≈ 19.1 billion tonnes
Mineable lignite ≈ 1.6 billion tonnes.

The Polish Dilemma



European Energy Security Strategy

"**Due to the large climate cost of coal, any significant use of the fuel is inseparable from Carbon Capture and Storage (CCS).** The development and deployment of CCS technologies in Europe is therefore imperative should Europe utilise its largest indigenous energy source"

From Bellona's input to Commission on the EESS

"**Coal and lignite's CO_2-emissions mean that they only have a long-term future in the EU if using Carbon Capture and Storage (CCS).** CCS also offers the potential to further improve gas and oil recovery that would otherwise remain untapped. Therefore, bearing in mind the rather limited uptake of CCS to date, further efforts in research, development and deployment should be made in order to fully benefit from this technology"

Text of the EESS

EU 2030 Climate and Energy Framework

EU has set itself clear climate goals of reducing greenhouse gas emissions by at least **40% by 2030**

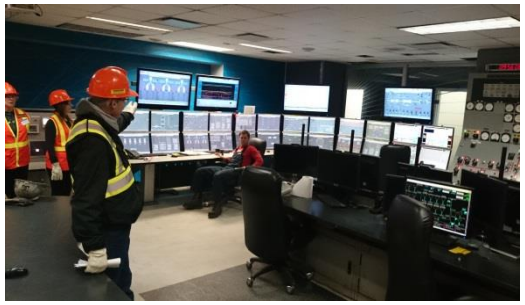
EU reaffirms commitment to CO2 Capture and Storage (CCS)

New NER400 scheme is in place to promote CCS deployment

World's first full-scale CCS plant is open

Canada wins CCS race with Boundary Dam, Saskatchewan

'Seeing is believeing'

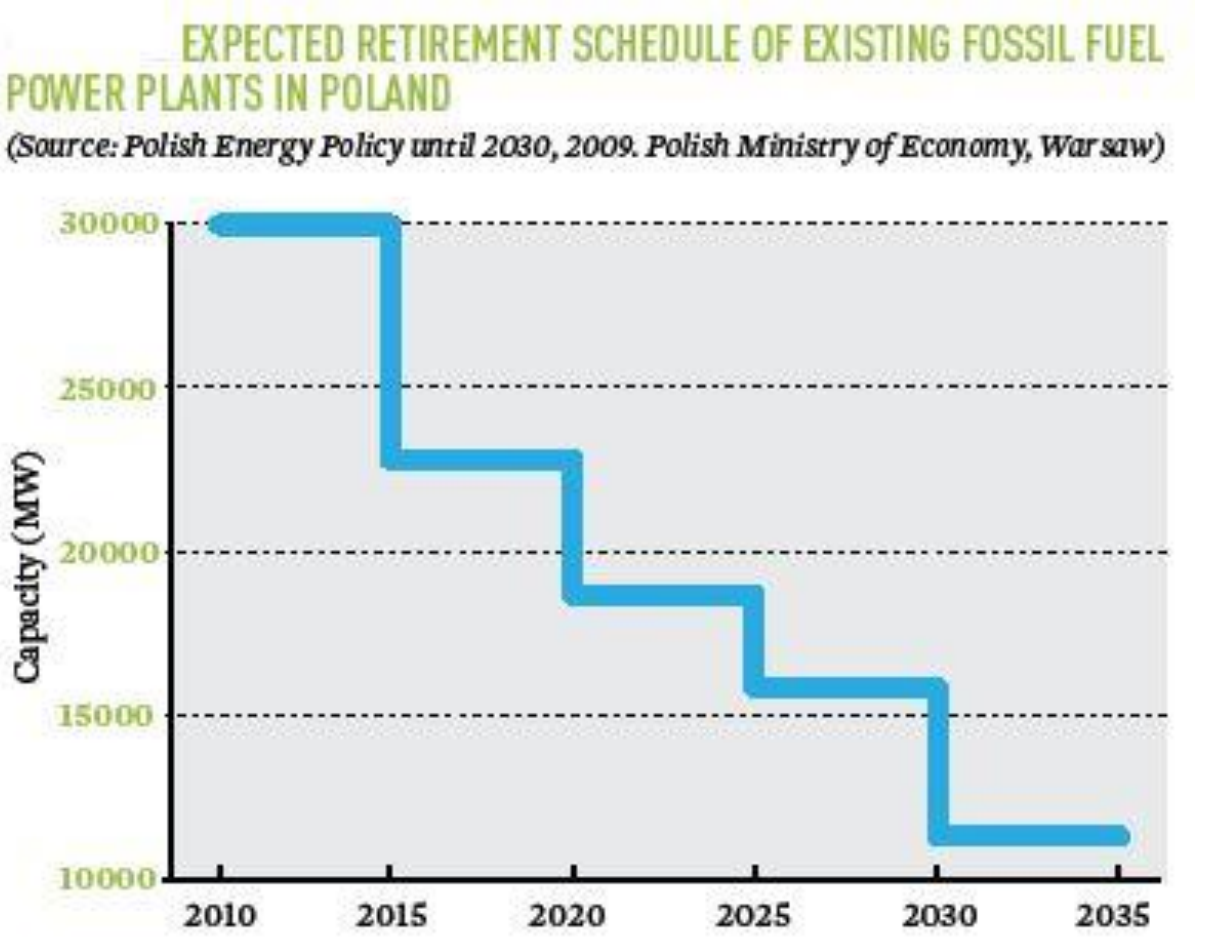


What does this mean for Europe:

There are no longer any technological excuses not to deliver CCS – only lack of political will

Dynamic energy market in Poland:

- What will the energy demand be in the future?
- Energy sector transformation
- Energy efficiency
- Change in energy mix in Poland – greater contribution from gas



Energy Mix Trajectories

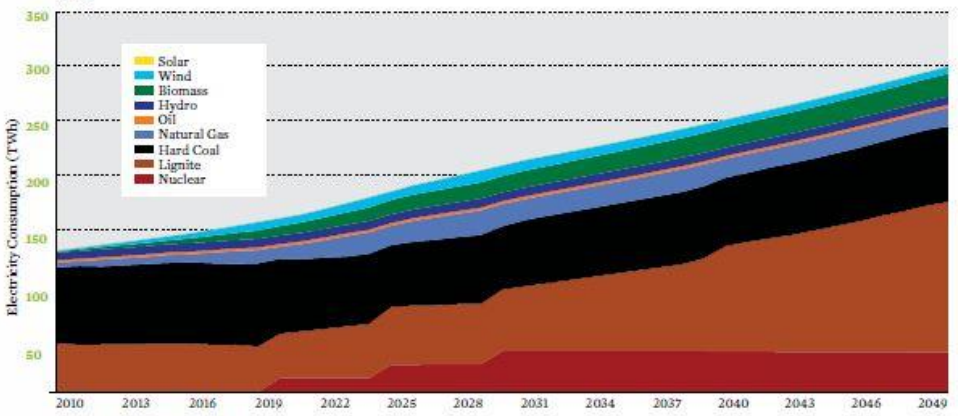
Follows government plans & projections

Significant coal & lignite

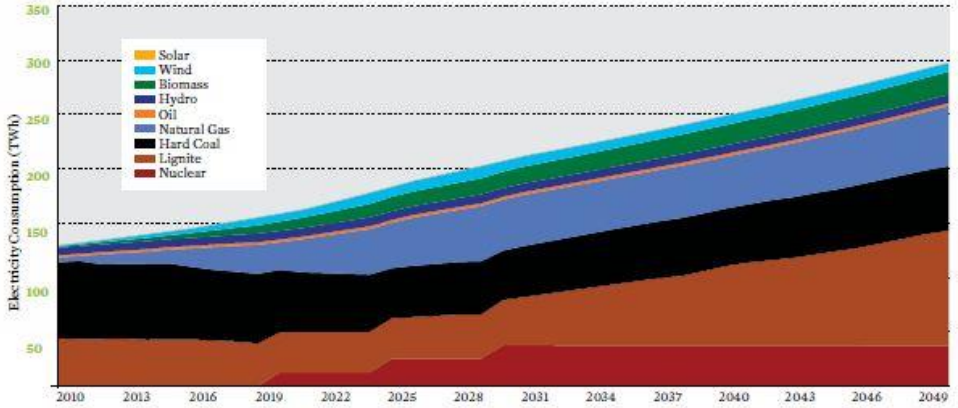
Replaces some coal & lignite with natural gas

Greatly reduces demand
Less coal, lignite, & gas

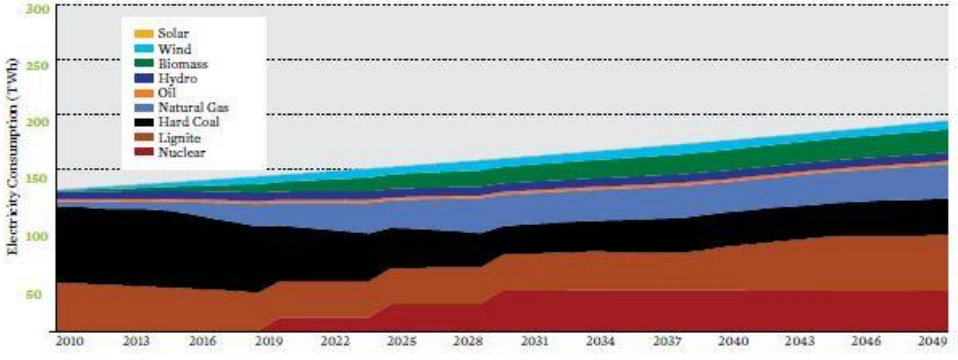
PEP

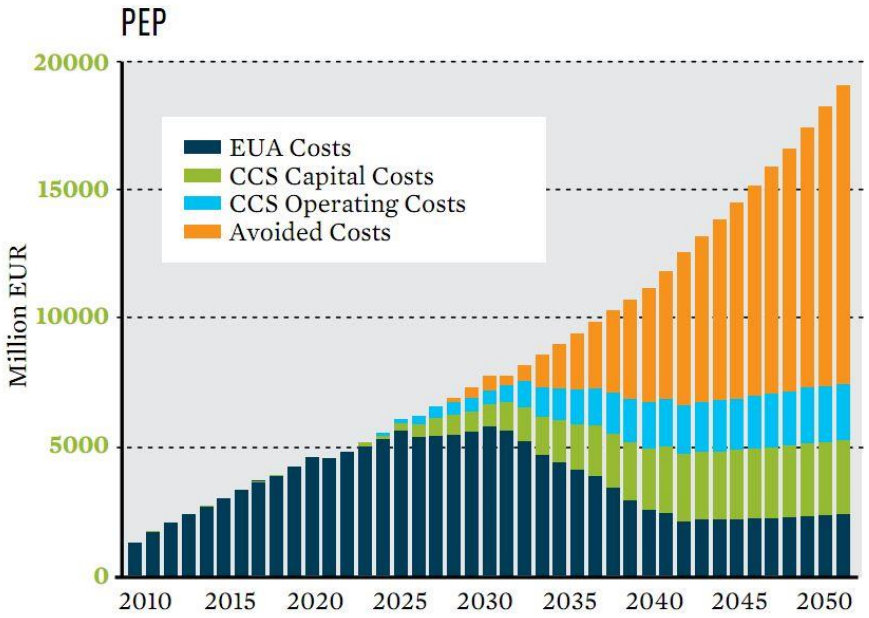


GAS EXPANSION



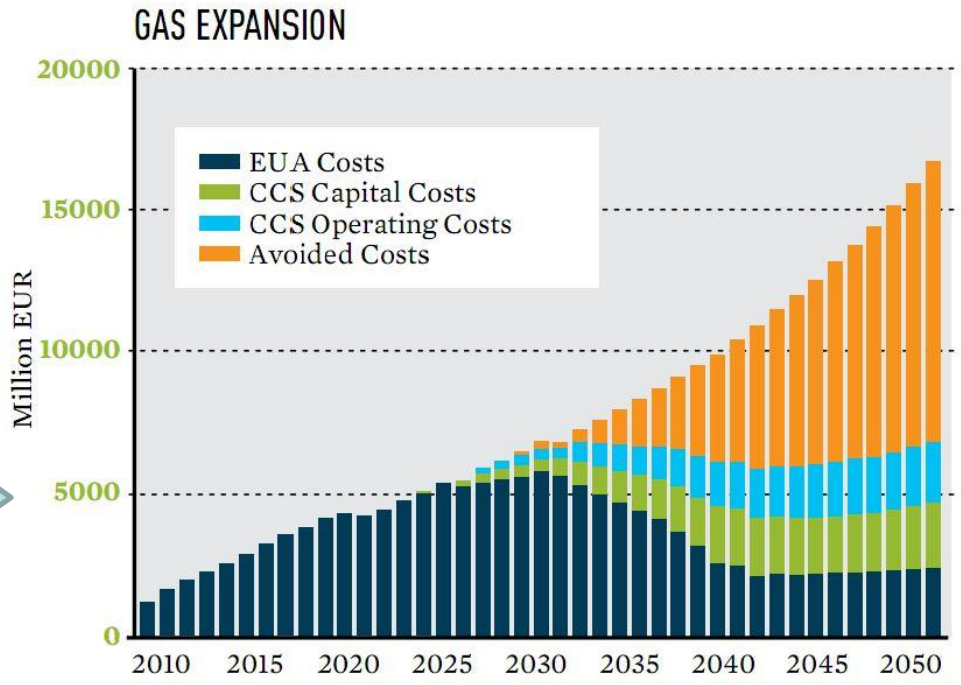
EE





In the Full deployment scenario applied to the PEP and Gas Expansion trajectories, power sector emissions are 108 Mt and 106 Mt by 2030 respectively, and fall to below 26 Mt in both cases by 2050.

The Full Deployment scenario demonstrates that a 30% reduction in power sector emissions compared to current levels is fully possible by 2030.
These reductions represent a more than 80% reduction in total electricity-related emissions by 2050 as compared to 2010 levels.

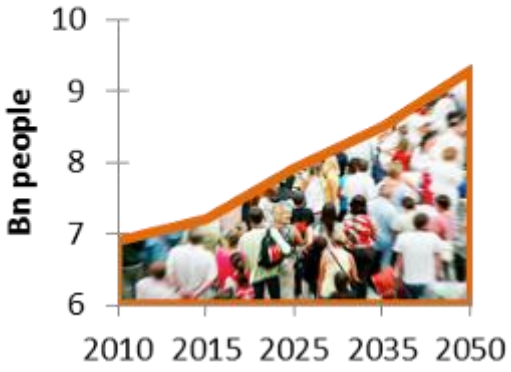


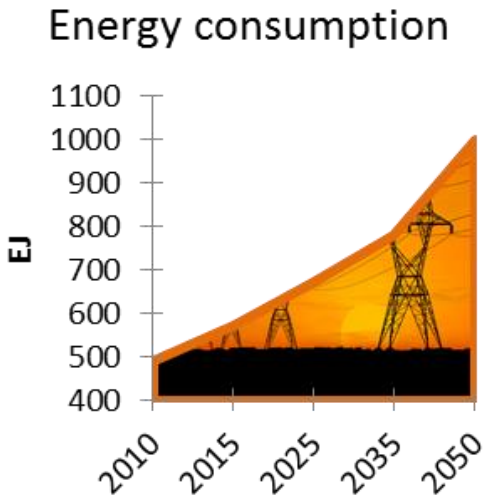
In the face of unknown but likely future climate mandates, whether in the form of rising EUA prices or new emissions performance standards, CCS gives Poland the power to ensure it can utilise its native energy resources, meet its internal energy demands, protect its energy independence, and guard against potentially unlimited future economic costs.

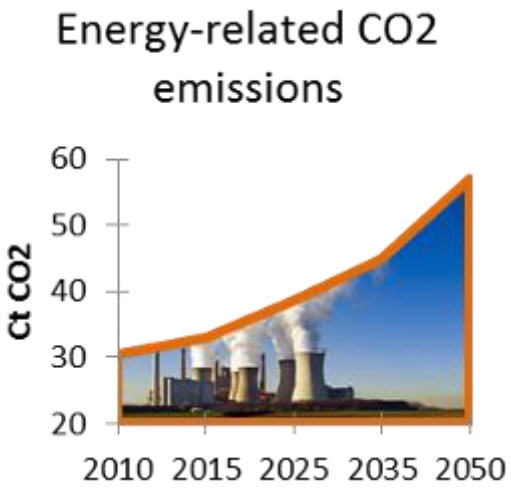
CCS thus is shown to be a potentially vital tool for preserving the future health of the Polish power sector under any future ambitious climate policy. However, as discussed earlier in this roadmap, that power sector is in a period of transition and may develop along quite different paths over the coming decades. How does CCS fare in a future that looks more like the Energy Efficiency energy mix and demand trajectory?

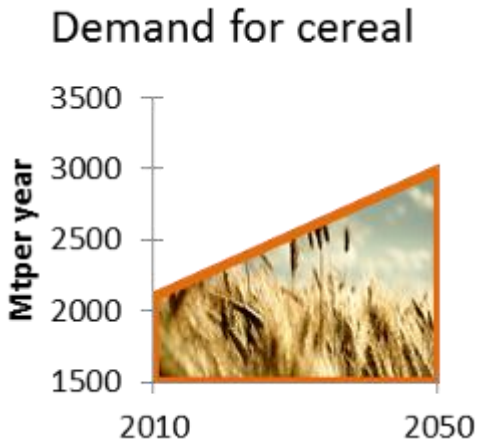
Economic Growth and Poverty Reduction = Rising global demand for energy and goods

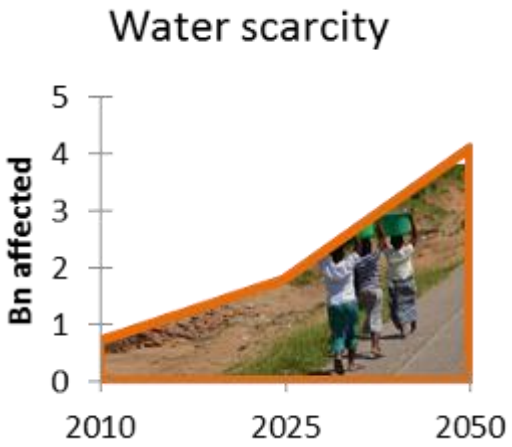
Matrix of Bad News

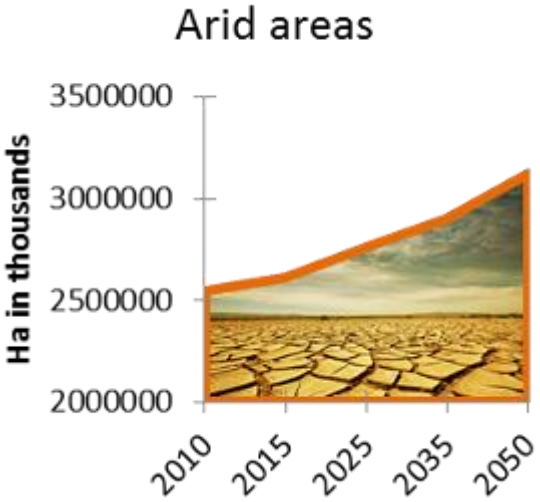












Thank you!

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Nord Stream
The n pply route for Europe
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