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ECONOMIC CONSEQUENCES OF A EUROPEAN-WIDE NUCLEAR PHASEOUT

Results of a study on behalf of the Upper
Austrian State, Department for
Environmental Protection, Group for
Radiation Protection

HANDOUT (PRESS CONFERENCE)

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The target: a nuclear power free Europe

14 of the 28 member states of the European Union produce energy by nuclear power (Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, the Netherlands, Romania, Sweden, Spain, Slovenia, Slovakia and United Kingdom). That way, they produce almost 30% of the total electricity generated in the EU. In Europe, Switzerland and Ukraine also have nuclear power plants. The nuclear power plants of Russia in Europe are not considered.

Numerous arguments support the end of nuclear power generation. Besides the risk inherent to disposal and possible accidents, economic arguments come into play as well: high investment costs and competitive, cheaper alternatives lead to low to negative return on investment and loss of profits, which was shown by numerous studies before.

So far there is a lack of surveys that take into account integrated environmental, social and economic perspectives when analysing a European-wide, nuclear power phaseout. This study specifically focuses on the economic consequences and implications of a step-by-step nuclear phaseout from a broad perspective. By means of the world-model GINFORS, we model a setting in which the EU takes the lead on climate and environmental protection and enables a progressive, European-wide nuclear phaseout determined by a runtime limitation of 45 years for nuclear power plants and an end to the construction of new plants. We determine which consequences Europe would be faced with from an integrated economic point of view.

SERI and GWS were part of a European consortium working on large-scale EU project POLFREE (<http://polfree.seri.at/>) in which a comprehensive scenario of European leadership in environmental policy (including however continued use of nuclear power) was modelled. This scenario forms the base for this study and is extended by a step-by-step nuclear phaseout until 2050. The phaseout scenario is contrasted with a business-as-usual scenario that continues to use nuclear power. The results show the economic consequences (economic growth, import dependency, employment, prices), but also environmental implications (CO₂, energy consumption) for the EU and its member states

The starting Point: "EU Goes Ahead"

The scenario „EU Goes Ahead“, developed in the POLFREE project, hypothesizes that the EU takes the lead on sustainable development, even if the rest of the world decides not to participate. This forms the base for the nuclear phaseout scenario.

In this scenario, the member states of the EU achieve four specific sustainability goals until 2050. These comprise an 80% reduction of CO₂ emissions compared to the level of 1990, a decrease of raw material consumption per capita (RMC) to 5 tons, a decline of the cropland footprint by 20% in comparison to 2005 and a limit of the water exploitation index to under 20% in all EU member states.

For this study the earlier “EU Goes Ahead“ scenario was modified to include a step-by-step phaseout of nuclear energy until 2050. Within this new scenario, it is assumed that nuclear power plants are shut down after a 45-year lifespan, which leads to a step-by-step phaseout in the individual member states. Deviations from the 45-year period phaseout plan arise only if plans for an early switch-off are already in place. For instance, in some member states (Germany, Belgium, Spain and Switzerland) provisions for an earlier nuclear phaseout have been made. Therefore, a shutdown of nuclear power plants before the 45-years-span in these countries is anticipated. Furthermore, the nuclear power-plants currently under construction are not put into operation and plans to build new nuclear power plants (for example in France, the United Kingdom, Poland, the Czech Republic, Hungary, Lithuania and Turkey) are not realized. In 2030, 60% of all current nuclear power plants in the European countries are already shut down.

To ensure continued supply of electricity in the phaseout scenario, the potential for the expansion of renewable energies is used. Aiming to fulfill the EU's climate agreement obligations, intensified use of fossil fuels is not an option.

Business as usual (BAU) scenario

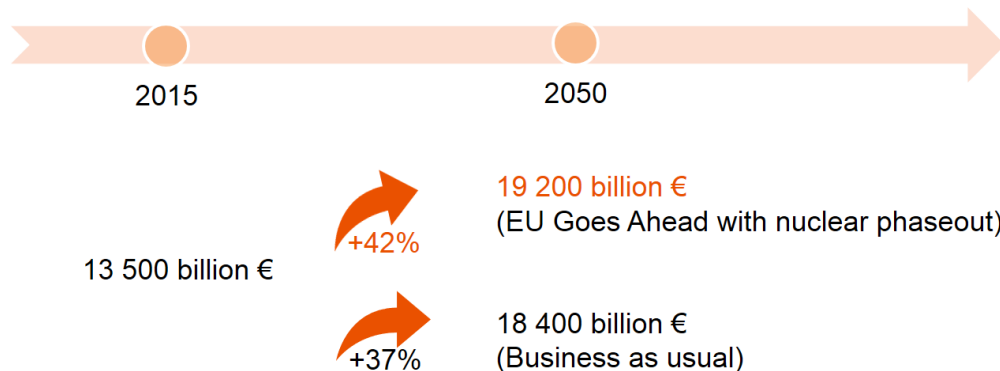
The nuclear phaseout scenario is contrasted with a „**Business as usual**“ (BAU) **scenario**. In this scenario, already existing policy tools on environment and climate are maintained, but not further developed nor are other complementary measures introduced. It shows that market forces alone are not able to keep the world from an impending ecological collapse. Even though the scenario does not and cannot include all risks of a further expanded resource exploitation of our planet, it is clear, that business-as-usual does not represent a positive option, even from a purely economic point of view.

Results for the EU27

If the EU chooses to take the lead in environmental policy and nuclear phaseout, it gains a first mover advantage compared to the rest of the world. This would lead to high income gains and the achievement of the environmental goals outlined above, without negatively impacting jobs and employment.

In comparison to the BAU scenario the real gross domestic product (GDP) in the EU27¹ in the nuclear phaseout scenario is distinctly higher at the end of the observation period (depicted in Fig. 1).

Fig. 1 Gross Domestic Product in the EU27
in 2010 prices

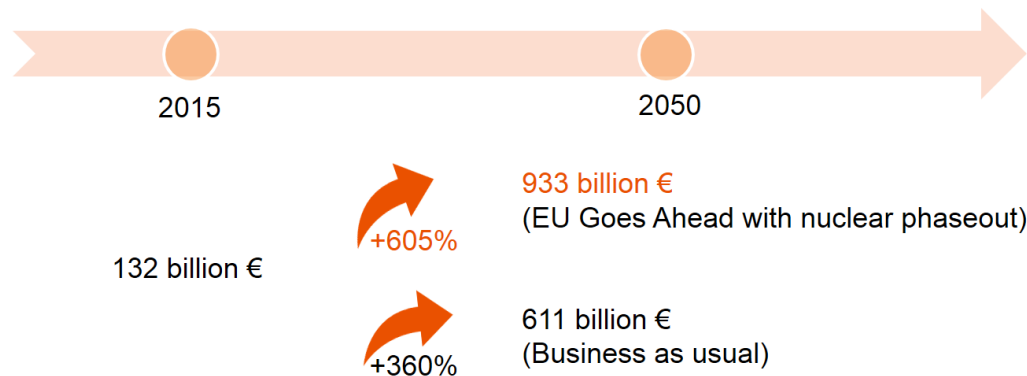


Source: own calculations

From 2025 onwards the **balance of trade** compared to the BAU scenario also improves (depicted in Fig. 2): Even though the expansion of renewable energy is more expensive in the short- to mid-term, import-dependency is reduced in the long term. The comparative advantage achieved through resource- and energy-efficiency has positive effects on external trade. EU exports are strong, while imports into Europe decrease. Therefore, the trade surplus is more than 50% higher in the phaseout scenario compared to the BAU scenario.

¹ EU27: including UK, without Croatia

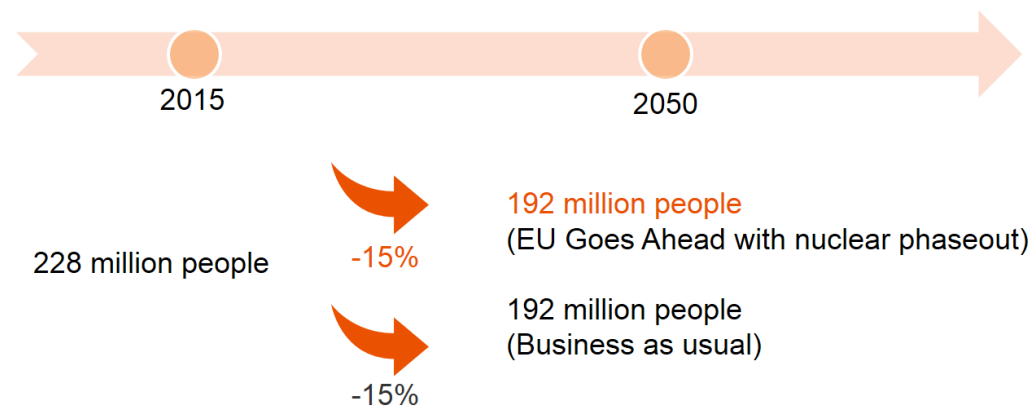
Fig. 2 Extra-EU trade balance of the EU27
in 2010 prices, rounded



Source: own calculations

The **labour market** (depicted in Fig. 3) does not appear to be negatively impacted by the „EU Goes Ahead with nuclear phaseout“ scenario when compared to the BAU scenario. Until 2045, even slight gains are visible. In general, the number of employed persons is decreasing over time in the EU, due to the demographic development (progressively older society) on the one hand and decreasing demand for employment as a consequence of increased labour productivity on the other hand.

Fig. 3 Employment in the EU27

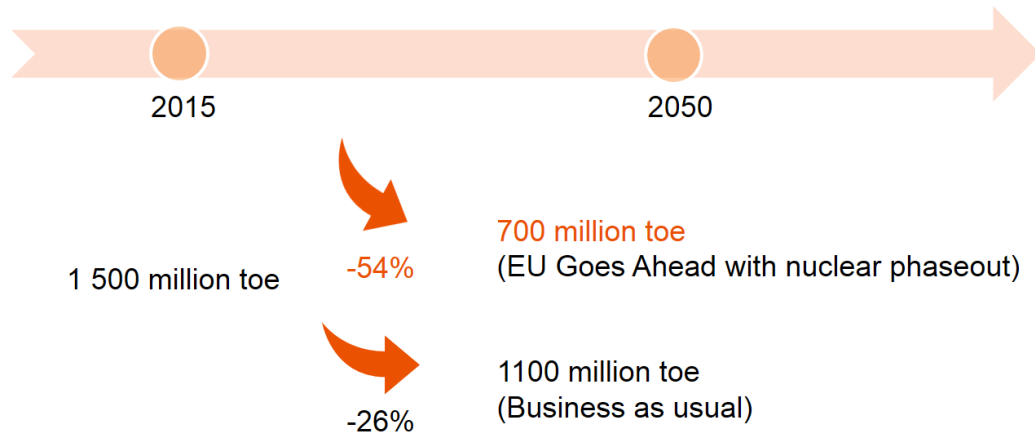


Source: own calculations

Simultaneously the measures in the phaseout scenario are able to cut 80% of **CO₂ emissions** in the EU in comparison to 1990, while the BAU scenario clearly fails in this respect, mainly due to the continued consumption of fossil fuels.

In addition, a nuclear phaseout has positive effects on energy productivity and leads to a significant reduction of **energy consumption** (depicted in Fig. 4), because investment in renewable energy power plants are needed to make up for the loss of nuclear energy, which leads to more efficient energy production.

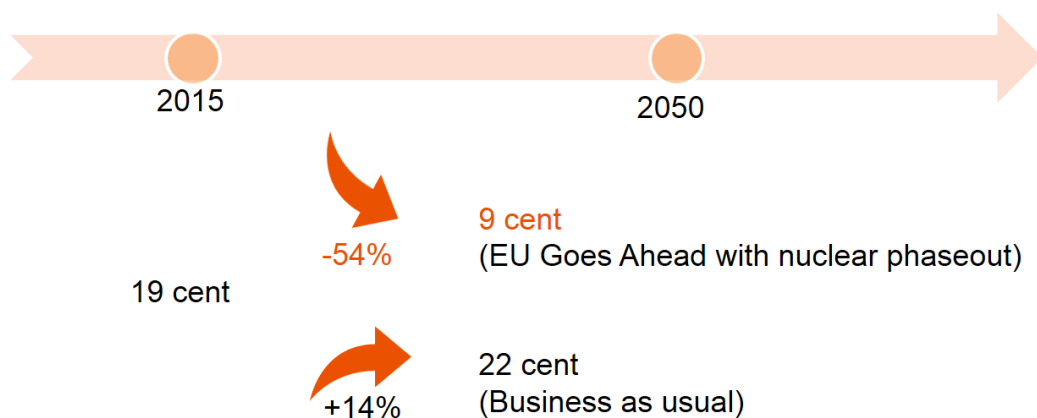
Fig. 4 Primary Energy Consumption in EU27
in tonnes of oil equivalent (toe)



Quelle: own calculations

The consequences of the scenarios on the **mean electricity and heating prices of private households** are depicted in Fig 5. In the BAU scenario, the price is much higher than in the phaseout scenario and shows an increase from 2020 onwards, as a further dependence on fossil fuels leads to a significant rise in prices until 2050. In the case of a nucleuse phaseout, the learning curve of renewable would improve further, which leads to decreasing prices over time and a small advantage over the original „EU Goes Ahead” scenario (including nuclear power). Initially however, electricity would be slightly more expensive in the scenario without nuclear power, because the resulting increased demand for investments and amortization increases the price of electricity in the short- to mid-term.

Fig. 5 mean electricity & heating prices of private households in EU27
in cents per kWh (2010 prices)



Quelle: own calculations

Results for selected countries

With the GINFORS model an analysis of individual countries is possible, therefore we analyzed the consequences of a nuclear phaseout in **countries that are currently heavily reliant on nuclear power** (France, Czech Republic). Even in these two countries, the phaseout would have positive aggregate economic effects under the assumptions we have

GDP in France shows a great increase in contrast to the BAU scenario, similarly in the Czech Republic, the development would be positive, although it remains below the EU mean. The employment rate rises in both countries in comparison to the BAU scenario, even though the improvement is larger in France. The CO₂ emissions in the Czech Republic are reduced more in comparison to the BAU scenario than in France, but both improve substantially. The abandonment of nuclear power has significant positive effects on primary energy productivity, which is even better in the Czech Republic than in France. Concerning the price of electricity and heating for private households clear improvements are made in both Czech Republic and France.

Conclusion

Even though the modeled scenarios are very comprehensive, a detailed analysis of the costs and the potential of renewable energy production would be desirable for future studies. For instance, it was assumed, that the individual member states would be able to manage the shift from nuclear to renewable energies in their own country. Moreover the risk of nuclear accidents and costs of nuclear waste repositories were not included in this study

However, the results allow for the valid conclusion that increasing the share of renewable resources and improved resource productivity in all economic sectors would have positive effects on the European economy, independent of other countries' decisions to follow such policies. Moreover it can be concluded, that a nuclear phaseout within the EU by no means has major negative economic effects.

A Europe wide nuclear phaseout in connection with an ambitious climate and environmental policy would have positive effects on all significant economic indicators and on climate protection.

In general, political assessment of analyses based purely on economic indicators such as GDP must take into consideration that these indicators do not differentiate between „good“ and „bad“ economic activities. Thus, investments in nuclear technology would initially have the same “positive” impact as equal investments in domestically produced renewable energy technology. The rising risk of incidents involving nuclear power plants and the problematic waste repositories which would go along with the option of nuclear-based investments cannot be concluded from the indicator GDP.

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