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Department of Economics

The Energy Crisis in Germany and the Design of a Resilient Energy System

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Motivation and Summary

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- **Energy price shocks matter:** The fossil energy crisis 2022 in Germany was an economic crisis with large social costs

- **We need to do better in the future:** The future renewable energy system should be more resilient than the current, fossil-based system

- **Resilient energy system 1:** The social gains from providing sufficient storage capacity for renewable energy by far exceed the costs of building it

- **Resilient energy system 2:** Public insurance against future price risk for renewable energy producers can speed up the process of building a renewable energy system (no slides today)

Natural Gas (Energy) Price Shock

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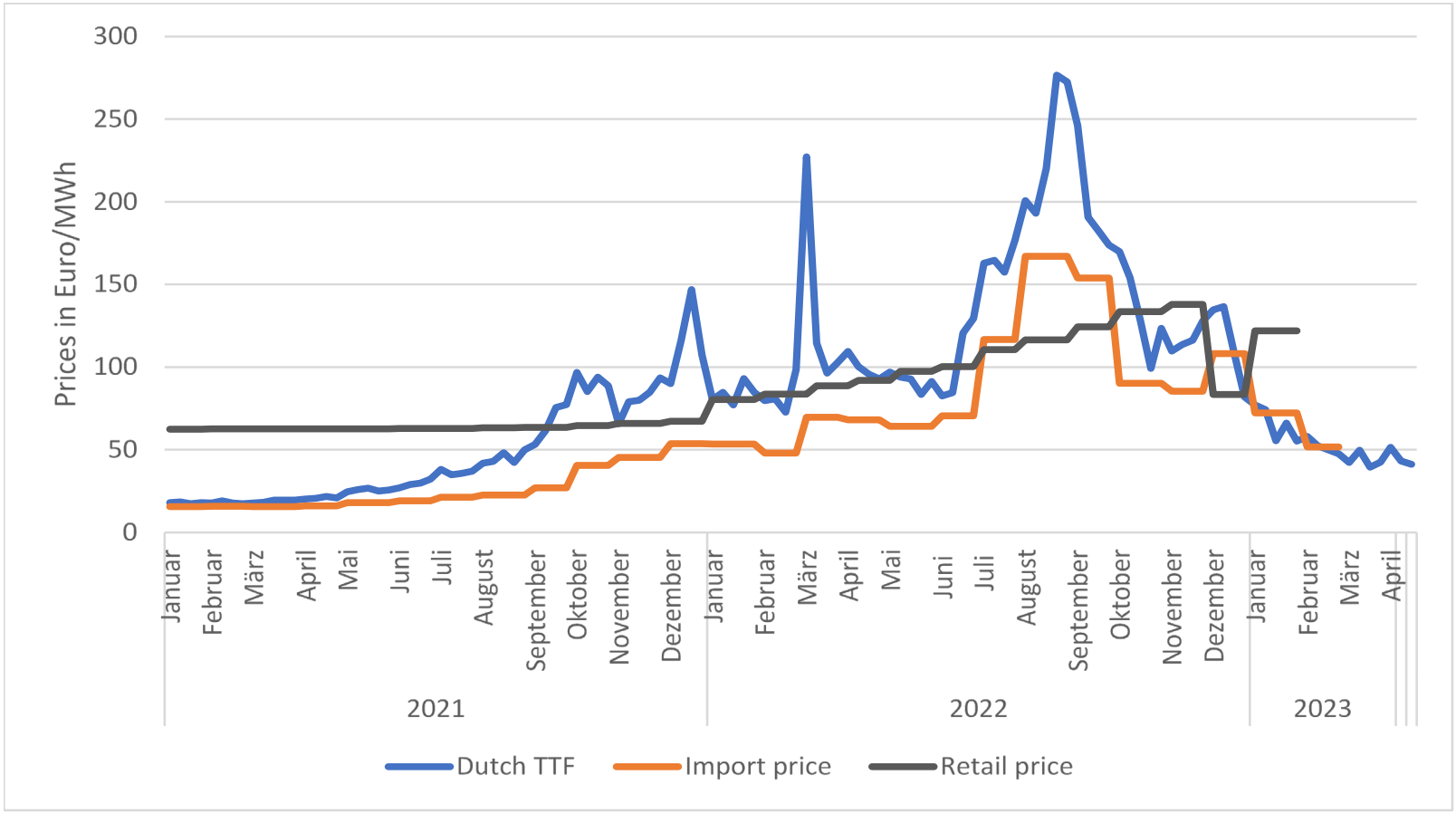

Sources: Dutch TTF prices from Statista; import prices and retail prices from Federal Statistical Office (Statistisches Bundesamt).

Energy Crisis

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- **What is the economic and social cost of the energy price shock depicted in the previous figure?**

- **Possible answer (often heard):** German GDP in 2022 barely declined (barely a recession) and therefore the energy price shock had only little economic impact

- **Problem 1:** We need to compute the difference between actual GDP and GDP without the energy price shock

- **Problem 2:** What matters for most people is real labor income (real wages)

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Table 1. One-year output and wage losses in Germany for three economic crises

	Output loss	Real wage loss
Energy crisis 2022	4.0 %	5.0 %
Covid-19 crisis 2020	2.5 %	2.2 %
Financial crisis 2009	5.8 %	0.1 %

- GDP and real wages in the economy without crisis are based on the before-crisis consensus forecasts of four economic research institutes (Ifo, IfW, IWH, RWI)

Resilient Energy System

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- The **future energy system** will be based to a large extent on the production of **electricity from renewable sources** (wind and solar)

- The future, renewable energy system **should be more resilient** than the current, fossil-fuel energy system – the **energy crisis 2022/23 has already cost Germany 100 billion euro**

- A resilient, renewable energy system requires **sufficient storage capacity** for the times when both wind and solar produce little electricity

- From a **macro/social perspective**, we **should build a lot of storage capacity** to avoid the loss of 100 billion euro – reduce the probability of an energy crisis to (almost) zero

Resilient Energy System

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- **Sinn (2017) entitled „Buffering volatility: A study on the limits of Germany‘s energy revolution“** argues that Germany needs storage capacity of 20 terawatt-hour to avoid energy shortage and that this is a problem

- **One can provide „storage capacity“ of 20 terawatt-hour using hydrogen power plants** -- initially built as hydrogen-ready gas power plants – that are only used as reserves and would have an **investment cost (capex) of 20 billion euro**

- Since 20 < 100, **the title of Sinn (2017) could also be “A study on the small macroeconomic cost of a resilient, renewable energy system“**