Technology Neutrality, Technology Specificity, Technology Openness: What does it mean?

Dr. Carl-Friedrich Elmer
Senior Associate Transport Economics, Agora Verkehrswende

Webinar „TUMIVolt Charging Station: Technology Neutrality: Zero Emission Bus Selection“
6 October 2020

Titelmasterformat durch Klicken bearbeiten

Background

- Transition to low- or zero-emission drivetrains is inevitable to achieve climate targets in the transport sector
- Ongoing debate on the apt regulatory approach to steer this technological transformation
- Call for market-driven, technology-neutral, or technology-open policies in order to let technologies compete and reduce GHG emissions cost-effectively
- Widely synonymous use of the terms technology neutrality (Technologieneutralität) and technology openness (Technologieoffenheit)

Titelmasterformat durch Klicken bearbeiten

Technology Neutrality ≠ Technology Openness

- **Technology neutrality is a characteristic of the regulatory intervention**
  - **Regulation intervenes directly at the level of the predefined policy objective (GHG emissions)**
  - **All technologies are subject to the same regulatory policy, typically a uniform carbon price**
  - **No discrimination among technologies**
  - **Claim: The market will find the technologies that are most cost-effective in achieving the targets (i.e. reducing transport GHG emissions)**

- **…as is technology specificity**
  - **Technologies receive specific support (or face specific obstructions), depending on their needs**

Titelmasterformat durch Klicken bearbeiten

Technology Neutrality ≠ Technology Openness

- Technology neutrality is a characteristic of the regulatory intervention

- …as is technology specificity

- **Technology openness is a characteristic of the regulatory environment**
  - **A decision space is "technology-open" if the choice of technology is undistorted apart from the distortion to be corrected for (i.e. the external costs of GHG emissions).**
  - **A decision space is otherwise undistorted if the relevant decision-makers take all – private and social – costs and benefits into account …**
  - **If further market imperfections exist besides the external costs of GHG emissions, the decision space is distorted.**

Titelmasterformat durch Klicken bearbeiten

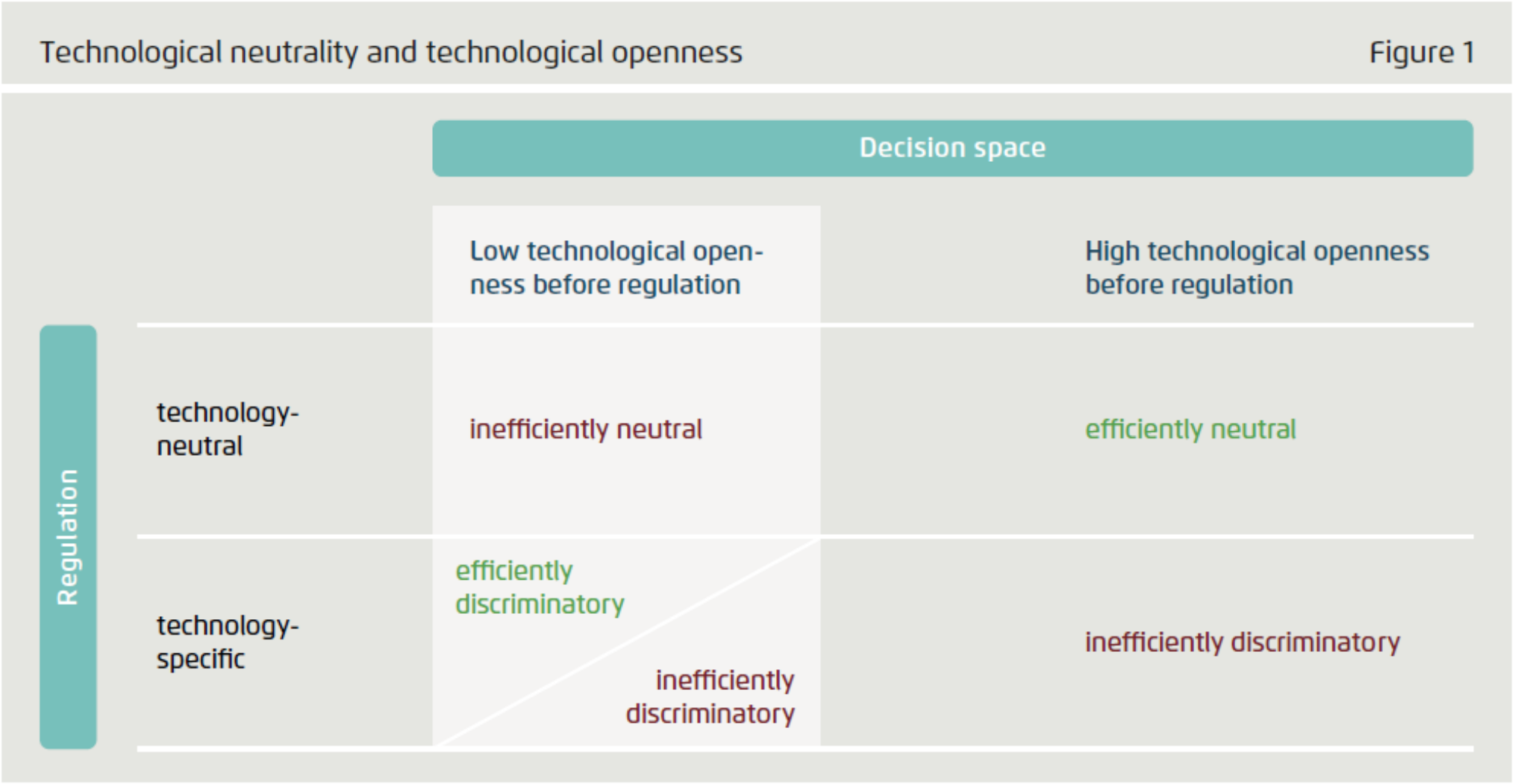
Rationale for technology-specific policies

- **Technology-neutral policies can achieve decarbonisation targets at minimal social costs only if they encounter a perfectly technology-open decision space**
- **In real-life climate politics, decision spaces are typically distorted, however, due to a number of market imperfections, e.g.**
  - **Path-dependencies, lock-ins, learning curve effects, knowledge spillovers**
  - **Imperfect information and cognitive limitations of decision-makers**
- **To correct existing distortions, the state may introduce technology-specific regulations**

Titelmasterformat durch Klicken bearbeiten

Cost-effectiveness of the regulatory approach depends on the circumstances in the decision space

Technological neutrality and technological openness — Figure 1



- Textmasterformate durch Klicken bearbeiten

Source: Agora Verkehrswende (2020)

Titelmasterformat durch Klicken bearbeiten

Rationale for technology-specific policies

- **Technology specificity may also be needed if the regulation pursues other goals in addition to decarbonization, e.g.**
  - **further environmental objectives**
  - **distributional objectives**
  - **industry policy objectives**

- **Yet, the requirements for technology-specific to be cost-effective are high, too**
  - **For instance, the regulator needs comprehensive information about the costs and benefits of the different technologies**

Titelmasterformat durch Klicken bearbeiten

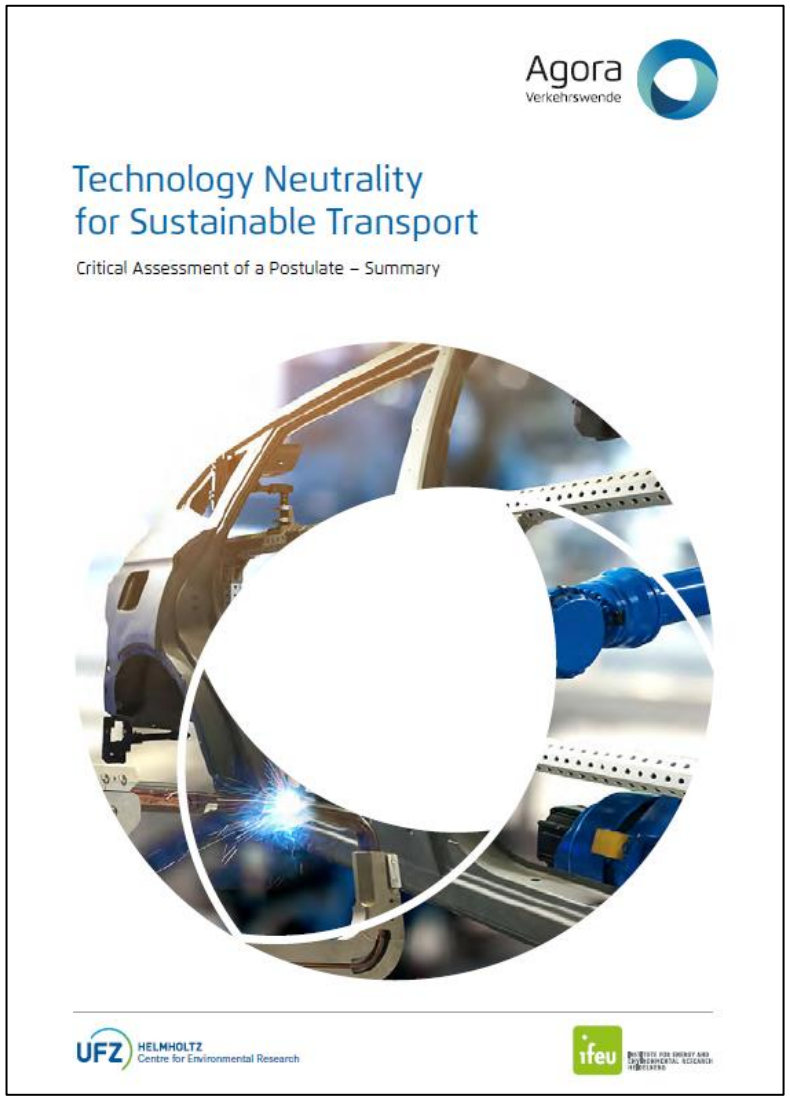
Reality warrants a well-aligned policy mix

- **Typically, a mix of technology-specific and technology-neutral approaches produces the most cost-effective solution.**
  - **Rather, the question is the appropriate level of technology specificity and the concrete design of the instrument mix**

- **Typical examples of well-justified technology-specific policies are**
  - **Support for the build-up of new energy supply infrastructures (hen-egg problem, network effects)**
  - **Temporary purchase incentives to foster the ramp-up of innovative technologies and to thereby enable learning curve effects**

Titelmasterformat durch Klicken bearbeiten

The study is available on our website



- **Technology Neutrality for Sustainable Transport:**

  Critical Assessment of a Postulate

- https://www.agora-verkehrswende.de/en/publications/technology-neutrality-for-sustainable-transport/