

# Interaction between energy and material consumption in East Asia

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## 1. Introduction

The importance of the complex interactions between material and energy consumption is increasingly recognized. The issue is related to the energy-water-food ‘nexus’. The UN’s Sustainable Development Goal (SDG 12, responsible consumption and production) covers the use of mineral and other inputs to production processes. The UN’s overview of this theme links rises in many East Asian economies, with potentially irreversible environmental damages as increases in consumption require increased use of various mineral-based resources. Most East Asian economies are net importers of raw material inputs. An over-reliance on *imported* material inputs could also become a security risk if imported products become too expensive or are made unavailable to the importing state for a range of geopolitical or economic reasons. As our aim in this study is to find a scenario of future prosperity in East Asia that is environmentally sustainable, we investigate in this chapter whether it is possible to simultaneously reduce greenhouse gas (GHG) emissions and mineral consumption

## 2. Scenarios and methodology

We apply a materials tax up to 2030 to encourage a reduction in minerals consumption and an increase in the material efficiency of production using E3ME global macro econometric model. The policy that we model across China, Japan, Korea and Taiwan is relatively basic, with the tax increasing over time, resulting in a 10% increase in non-energy mineral prices by 2030.

The policy does not address a variety of other goals or revenue-recycling options that might enable industry to increase the resource efficiency of their production and achieve lower levels of materials consumption. We show that, while a tax may help to reduce consumption levels, further policies would be required to yield a large reduction in material consumption levels.

The firstly we presents current patterns of material consumption in East Asia. The secondly we describes some of the main linkages between energy and material consumption, and the thirdly the modelling approach is summarized. Finally we present results from the model simulation.

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### **3. Expected results and Analysis**

The UN's Sustainable Development Goal for reducing materials consumption (and increasing responsible consumption and production) is a priority for countries in East Asia, as living standards continue to rise, the middle class in China expands rapidly, and Japan and Korea continue to expand their economies. A burgeoning middle class requires various material inputs to satisfy its consumption habits. The deleterious environmental impacts of materials consumption are well-identified and the connection between materials consumption and CO<sub>2</sub> emissions is evident. It is, therefore, important to recognize the issue of material consumption when it comes to meeting carbon budgets and climate goals.

It is possible, through a variety of policy interventions, to encourage increased resource efficiency and continued economic growth. Such policies are being explored in Europe through its circular policy roadmap; they are starting to be recognized in East Asia as well (European Commission, 2017).

We have shown in this study that – although a simple materials tax is effective to modestly reduce materials consumption – it does so with potential negative economic effects. A variety of policy options that draw on the revenues collected from material taxes could mitigate some of these negative effects. However, as we have shown in previous chapters using the example of carbon taxes, their interaction with other policies is important as it determines the overall impact of any measures. This analysis has yet to be done for material taxes.

### **4. Conclusion**

This study explored some of the key linkages between energy and material consumption, including the potential resource requirements of reducing greenhouse gas emissions. Using the E3ME model, we estimated the economic and environmental impacts of applying a material (or resource) tax. We find that a simple material tax is effective at reducing material consumption, but it may lead to negative economic impacts. A broader range of policy options, however, may mitigate some of these negative economic effects and could even lead to positive impacts on GDP.

#### **<references>**

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