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International Resource Panel

RESOURCE EFFICIENCY AND CLIMATE CHANGE

Material Efficiency Strategies for a Low-Carbon Future

Acknowledgments

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Foreword

In 2019, the UN Environment Programme (UNEP) published the tenth edition of its Emissions Gap Report, which revealed that the world must immediately begin delivering deeper and faster greenhouse gas emission cuts to keep global temperature rise to 1.5°C. To achieve this goal, we will need to use the full range of emission reduction options, including the implementation of material efficiency strategies.

The International Resource Panel (IRP) has been providing insights into how humanity can better manage its resources since 2007. Its research shows that natural resource extraction and processing account for more than 90 per cent of global biodiversity loss and water stress and approximately half of global greenhouse gas emissions. This new IRP report, Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future, commissioned by the Group of 7, points to exciting new opportunities to reduce these impacts through material efficiencies in homes and cars.

Climate mitigation efforts have traditionally focused on enhancing energy efficiency and accelerating the transition to renewables. While this is still key, this report shows that material efficiency can also deliver big gains. According to IRP modelling, emissions from the material cycle of residential buildings in the G7 and China could be reduced by at least 80 per cent in 2050 through a series of material efficiency strategies. A more intensive use of homes, design with less material, and improved recycling of construction materials are among the most promising strategies.

Likewise, material efficiency could deliver significant emission reductions in the production, use and disposal of cars. Specifically, material efficiency strategies could reduce emissions from the material cycle of passenger cars in 2050 by up to 70 per cent in G7 countries and 50 to 60 per cent in China and India. The largest savings would come from a change in patterns of vehicle use (ride-sharing and car-sharing) and a shift towards more intensive use and trip-appropriate smaller cars.

This report makes it clear that natural resources are vital for our well-being, our housing, and our transportation. Their efficient use is central to a future with universal access to sustainable and affordable energy sources, emissions-neutral infrastructure and buildings, zero- emission transport systems, energy-efficient industries and low-waste societies. The strategies highlighted in this report can play a big part in making this future a reality.

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Preface

We are living in a crisis of global heating, which poses a great threat to the wellbeing of the global population that will exceed 9 billion people by mid-century. At the same time, there is a great opportunity to reshape our production and consumption systems in ways that respect planetary boundaries and support societal wellbeing. Material- efficiency strategies will play an essential role in this endeavor, for example, by providing low-carbon housing and mobility services.

The International Resource Panel (IRP) was launched in 2007 to provide independent, authoritative and policy relevant scientific assessments on the status, trends and future state of natural resources. In 28 reports, the Panel has advanced knowledge as to how society can decouple economic development and well-being from environmental degradation and resource use.

The attention of policymaking to natural resources has increased in the last decade under frameworks such as the Circular Economy, Sustainable Materials Management and a Sound Materials-Cycle Society. Yet, as shown by this report, policies related to material use still largely focus on waste management rather than reduction of greenhouse gas emissions. Policies and research on natural resources must be better aligned to the urgent need of mitigating and adapting to climate change.

The IRP is a proud knowledge provider to the Group of 7 on sustainable resource management. Back in 2017, the IRP published a report commissioned by the G7 entitled “Resource Efficiency: Potential and Economic Implications”. This report provided scientific evidence showing that increased resource efficiency is not only practically attainable but also contributes to economic growth, job creation and climate change strategies. As a follow-up to this work, the G7 asked the IRP to zoom into the contributions of resource efficiency to greenhouse gas emission reductions.

Consequently, this new report, Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future, examines the mitigation opportunities presented by higher material efficiency in the production and use of residential buildings and light-duty vehicles.

The unprecedented integrated bottom-up modeling of the report shows, for example, that in 2060, these strategies could reduce a significant amount of GHG emissions associated with the material cycle of residential buildings. More concretely, the modelling tells us that within this sector, we would have 350 million tons less of GHG emissions in China; a 270 million tons less in India, and 170 million tons less in G7 countries, between 2016 and 2060. Opportunities are as significant for material efficiency strategies applied to cars. Even better news, material- efficiency strategies are based on proven technologies available today and therefore provide tangible options for moving towards a 1.5°C target.

The report finds that policy intervention from different angles is required to achieve these savings. Policies can influence how people live, which materials they use and how they use them. Instruments such as taxation, zoning and land use regulation play a role, but so do consumer preferences and behavior.

We are grateful to Edgar Hertwich and his team for their dedicated efforts to produce new insights into the material-climate nexus. Material efficiency is an important piece in the climate puzzle, particularly at a moment when more ambitious, fast-paced and impact-driven action is so urgently needed to ensure a prosperous future for all.

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