Press Release

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Material Efficiency is critical to accelerate climate action

- Emissions from the production of materials are now comparable to those from agriculture, forestry, and land use change, yet they have received far less attention.
- Material efficiency strategies could reduce an extra 40% of GHG emissions from the lifecycle of homes in G7 countries. It could reduce up to 70% of these emissions in China and India.
- Material efficiency strategies could reduce an extra 40% of GHG emissions from the lifecycle of cars in G7 countries. It could reduce up to 35% of these emissions in China and India.

Paris, 13 November 2020 -- Emissions from the production of materials like metals, minerals, woods and plastics more than doubled in 1995 - 2015, accounting for almost **25% of all greenhouse gas (GHG) emissions worldwide**. This is equivalent to the total GHG emissions from agriculture, forestry, and land use change combined. Yet, material efficiency receives far less attention in climate discussions.

The International Resource Panel (IRP) Report, *Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future* – to be released on 18 November 2020 at the Race to Zero event - is the first comprehensive scientific analysis of potential GHG emission savings from material efficiency. For this, it zooms into two carbon-intensive sectors: residential buildings and passenger vehicles.

80% of emissions from the production of materials are linked to the construction and manufacturing sectors, in particularly our homes and cars.

Applying **material efficiency strategies can reduce GHG emissions** from the life-cycle of construction, operation, and deconstruction **of homes by an average of 40% in seven major developed countries** - Canada, France, Germany, Italy, Japan, the United Kingdom and the United States (G7 countries) and by **70% in China and India**. It can also reduce GHG emissions from the manufacturing, operations and end-of-life management **of cars by 40% in the G7 and by 35% in China and India.**

According to the total carbon budget proposed by the IPCC, the G7 would need to limit their remaining CO2 emissions to **50 gigatons** for temperature increases to stay at 1.5°C. The IRP estimates that **23 gigatons** of emissions could be saved in the G7 through material efficiency strategies in 2016-2060.

The IRP finds that the **most promising strategy comes from the consumption side – more intensive use.**

For cars, this means ride-sharing, car-sharing and a shift towards smaller vehicle sizes. **If one in four journeys in the G7, China or India was a shared ride, then the carbon footprint of the use and production of cars would decline by as much as 20%.**

For homes, more intensive use means increasing use rates through, for example, peer-lodging, or smaller and more efficiently designed homes. IRP modelling shows that **reducing demand for floor space by up to 20% could lower GHG emissions from the production of materials by up to 73% in 2050.**

Other material efficiency strategies to be considered include the recycling of building materials, less material by design in both cars and homes, and the use of alternative low-carbon materials (for example, sustainably sourced wood instead of reinforced concrete in homes).

"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," said Inger Andersen, UNEP's Executive Director.

The cuts revealed by the report are on top of emission savings generated by the decarbonization of electricity supply, the electrification of home energy use, and the shift towards electric and hybrid vehicles. **If the world focuses on energy efficiency without boosting material efficiency, it will be almost impossible and substantially more expensive to meet the Paris climate targets, the report warns.**

Many of these emission reductions will only be possible if countries create enabling policy environments and incentives. Policies that apply across sectors may have a greater impact than those targeting a single sector. These include building certification, green public procurement, virgin material taxes, and removal of virgin material subsidies.

The IRP urges policymakers to consider resource efficiency and materials in the next generation of their Nationally Determined Contributions (NDCs), broadening the scope of targets and increasing the magnitude of the intended mitigation ambition. Some countries have started doing this, as presented in the Resource Efficiency and Climate report:

- China's NDC specifically mentions a commitment to the efficient use of materials. It includes measures aimed at, among others, improving the efficiency and lifespan of existing and new buildings and promoting recycled construction materials.
- Japan's NDC includes a commitment to use blended cement
- India's NDC refers to recycling, "enhanced resources efficiency and pollution control" (in addition to energy efficiency) and the general need to "use natural resources wisely"

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Note

The full report, summary for policymakers and factsheets are available here: bit.ly/IRPrecc

About the International Resource Panel

Launched in 2007, the International Resource Panel is the leading global scientific panel working on the sustainable management of natural resources. It provides authoritative scientific assessments and policy recommendations around global resource use. A group of governments from developed and developing regions, civil society, industrial and international organizations provide strategic direction to ensure relevance and impact of the Panel's research. The Panel's Secretariat is hosted by the United Nations Environment Programme.

About the United Nations Environment Programme
UNEP is the leading global voice on the environment. It provides leadership and encourages partnerships in caring for the environment by inspiring, informing and enabling nations and peoples to improve their quality of life without compromising that of future generations.

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By the numbers - Key data from the report

General

- The share of global greenhouse gas emissions from the production of materials increased from **15% (5 Gt CO2e)** in 1995 to **23% (11 Gt)** in 2015.
- Most of the material-related emissions stem from the production of bulk materials: iron and steel (**32%**), cement, lime and plaster (**25%**), as well as plastics and rubber (**13%**).
- In 2015, **over 50%** of the carbon footprints of materials came from material production processes. In these material production processes, **35%** of GHF emissions came from energy supply, **2%** from mining and **9%** from other economic processes.
- Construction and manufactured goods **each** account for **40%** of the GHG emissions associated with global materials use.
- The remaining amount of CO2 that can be emitted before the 1.5 °C temperature increase is reached is estimated to be 500 billion tonnes by the end of 2019. If 1400 billion tonnes of CO2 are added, the Earth's surface would warm by 2°C. If these carbon budgets were distributed evenly across the global population, the G7's share would be **50 billion tons** of CO2 for 1.5 °C, and **140 billion tons** for 2°C. According to the IRP model, in 2016-2060, material efficiency strategies could reduce G7 emissions by **8-10 billion** tons for residential buildings and by **7-13 billion** tons for passenger cars.

Residential buildings

Material efficiency (ME) strategies in general

- The carbon footprint of materials used in construction was nearly **5 G**t CO_2e, or **10%** of global emissions in 2015.
- In 2050, material efficiency strategies could reduce emissions from the construction, operation and deconstruction (dismantling) of homes by **35-40%** in the G7. Analogous savings could be up to **50-70%** in China and India, where building energy use is lower and the importance of carbon storage in wood-based construction would play a larger role.

- Emissions of residential buildings in the G7 can be reduced by **8–10 Gt** CO_2e in the period 2016-2060 using all relevant material efficiency strategies.

Reducing residential floor area (more intensive use of homes)

- Reduce per-capita residential floor area by **20%** compared to baseline could reduce emissions by up to **73%** (120-130 million tonnes) by 2050; 7–9 Gt CO_2e cumulative emissions can be saved in the period of 2016-2060.
- In 2050, a reduced demand for floor area arising from their more intensive use of homes in the G7 could reduce annual, system-wide greenhouse gas emissions associated with the material and energy requirements of homes by **35- 40%** (250-300 million tons per year, Mt/a), compared to a scenario without these strategies.

Recycling building materials

- In 2016, the recycling of building materials saved **15-20%** of the emissions in the primary production of materials for residential buildings in the G7. Under optimistic assumptions, improved recycling could save an additional **14-18%**.
- Today's recycling practices would provide secondary raw materials savings of **1.5-2 Gt** CO_2e in the period 2016-2060 compared to virgin production. Improved recycling could increase these cumulative savings by another **0.7-0.8 Gt**.

Using less material in construction

- Buildings that are lighter and designed closer to technical specifications use less material and can lower associated emissions across the G7 nations by **8-10%** by 2050.
- Using less material for buildings would save **300-500 Mt** in G7 countries in the period of 2016-2060.

Using sustainably sourced wood

- In the G7, the use of sustainably sourced wood instead of reinforced concrete and masonry could reduce emission by **1-8%** in 2050 and cumulative savings of **100-500 Mt** in the period 2016-2060. Emission reductions would be even greater in China and India, where larger volumes of new construction are expected, and timber currently is not widely used.

Cars

Material efficiency (ME) strategies in general

- The material efficiency strategies researched could reduce total G7 GHG emissions for the manufacturing, operations and end-of-life management of cars by **30-40%** (the equivalent of 300-450 million tons CO_2) in 2050. Savings in China and India would be **20-35%** (the equivalent of 240-270 million tons CO_2). The most important strategies for the reduction in overall life-cycle emissions are ride-sharing, car-sharing and a shift towards smaller vehicle sizes.

Use-phase ME strategy

- The number of vehicles per capita is one of the most important drivers of GHG emissions for vehicles. The largest reductions of life-cycle emissions could be attained through car- and ride-sharing. Assuming that up to **25 %** of rides are shared and **25 %** of vehicles are car-shared, reductions in cumulative emissions from the manufacturing, operations and disposal of vehicles would be **8 Gt** CO_2e (or 17 %) in the period of 2016-2060.

- If 25 % of the trips in the G7 were conducted as shared rides, emissions would be reduced by 13 to 20 %. Reductions would be similar in China and India.

Material-cycle efficiency strategies

- Improvements in manufacturing yields, fabrication scrap reuse and end-of-life recovery can reduce annual material cycle GHG emissions by up to **38 %** by 2050. Lifetime extension for electric vehicles and increased reuse of parts leads to additional savings of **5-13%** in the G7, **14%** in China and **9%** in India.
- Using less material could be achieved by switching to smaller, trip-appropriate vehicles. A modest shift, for example reducing the share of light trucks and SUVs in the United States light-duty fleet from half to one third, could save about **5%** in cumulative emissions.

Note: The material efficiency strategies assessed in the report include end-of-life recovery rate improvement, fabrication yield improvement and scrap diversion, reuse, lifetime extension, material substitution, using less material y design/lighter structures and more intensive use.