

Wood K plus
WOOD: Transition to a
sustainable bioeconomy

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WOOD IN ELECTRONICS CAN REDUCE SOCIAL IMPACT

THE NEGATIVE SOCIAL IMPACT OF SUPERCAPACITORS CAN BE DRASTICALLY REDUCED BY USING BIO-BASED MATERIALS.

Wood is a versatile material. Among other things, cellulose and lignin from wood can be used to manufacture supercapacitors. Supercapacitors are energy storage systems that can be rapidly (dis-) charged and are alternatives to batteries. They can be used in electric vehicles or smart textiles. Unlike conventional batteries or supercapacitors, these bio-based supercapacitors avoid critical raw materials such as lithium. Lithium requires mining activities that are associated with negative social impacts in the areas of child and forced labor, frequent workplace accidents, and unsafe working conditions.

Measuring sustainability impact of products generally poses complex challenges, but it is particularly difficult for new and innovative technologies because they do not have an established production process and little product-specific data is available. For an initial assessment of the potential social risks,

country- and sector-specific data for four European countries (Austria, Germany, France, and Greece) and China (as an example for global production) were therefore used. Although this generic data does not show the “real-life” social impact of the bio-based supercapacitor, it does provide preliminary information about the potential social risks and opportunities associated the relevant sectors, which are the automotive and chemical sectors.

In a social risk mapping exercise, the social impact of products is grouped into five overarching risk indicators: “Labor rights and decent work,” “Health and safety,” “Society,” “Governance,” and “Community.” These indicators classify the social risk on a scale from low to very high risk. Within these five groups, there are a total of 77 sub-indicators, 14 of which have been identified as relevant for this assessment. These largely relate to workers,

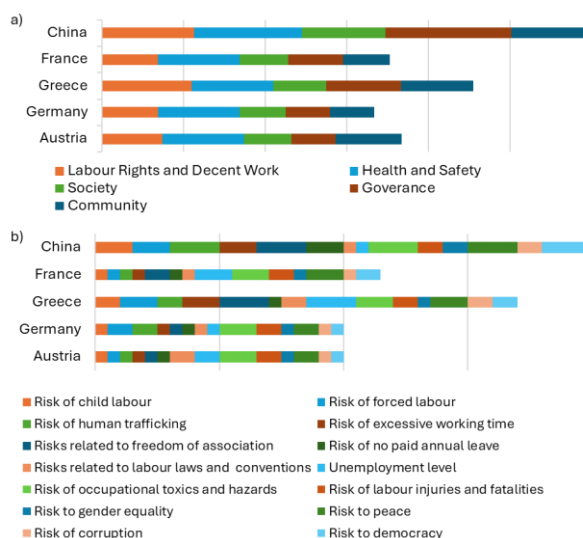
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as this group of people is exposed to the greatest direct risks.

The social risk mapping shows a wide variability of social risk across the five countries and (sub-) indicators considered. China has the highest risk in all indicators. Developing and emerging countries are generally exposed to higher social risk because they have less stringent labor laws and regulations (Shi et al., 2023). Within Europe, Greece experiences the highest risk, mainly due to high unemployment and poorer working conditions compared to other European countries. It is striking that Austria has a higher risk than France in the five overarching indicators but has the lowest risk together with Germany in the 14 relevant sub-indicators. These results show how important it is to consider multiple indicators and sub-indicators and to take regional contexts and regulatory frameworks into account when assessing social risks.

This study provides initial insights into the potential social risks associated with bio-based supercapacitors. The results underscore the importance of early assessment of social

sustainability and highlight how important it is to balance technological progress with social responsibility to create a sustainable future.



Social risk potential for a) the five overarching risk indicators and b) the 14 relevant sub-indicators for five (potential) production countries. Source: Leiter, H.S.; Groiss-Fuertner, D.; Charamkulath Vincent, T.C.; Hesser, F. Guiding Research on bio-based supercapacitors towards a socially viable value chain development in Circular and Decarbonized Vehicle and Transport Solutions, Eds.: Baumgartner, R.J.; Schöggel, J.-P.; Berger, K. in press.

Project coordination (Story)

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Project partner

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