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Qualitative analysis of promising materials and technologies for the design and evaluation of Climate Adaptive Opaque Facades

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1 **Qualitative Analysis of promising Materials and Technologies for the design and**  
2 **evaluation of Climate Adaptive Opaque Facades**

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13

14 **Abstract**

15 Over the last decades, new concepts of building envelopes have been proposed to achieve  
16 environmental targets. Adaptability of transparent components and facade integration of  
17 renewable energy harvesters are being widely studied. However, opaque facade components  
18 are less developed, even if their performance can be further optimized. When searching  
19 responsive technologies to propose new opaque facades, we learned they were usually created  
20 for other fields, which hampers their direct application in new envelopes. The successful  
21 implementation of these technologies in façade industry depends on the fulfilment of diverse  
22 requirements, such as durability, security or flexibility in design among others, but this  
23 information was not easy to get when they were not developed for the built environment. There  
24 is a lack of empirical studies evaluating these characteristics for adaptive technologies, which  
25 are mandatory to define the technical specifications of a facade. However, literature review  
26 provides a great amount of qualitative information and this study uses it for its analysis in order  
27 to gain insights into the degree of accomplishments of aforementioned requirements. Analysed  
28 technologies were kinetic elements, shifting thermal behaviour elements, dynamic components  
29 and systems. Overall, they still need to face several technical challenges for their suitable  
30 facade application. The novel visual analysis proposed in this paper is an useful tool for  
31 researchers undertaking this task, as it allows a fast and holistic comparison of the potentials

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