



CONSTRUCTION LCA AND EMBODIED CARBON EXPERTS OUTLOOK 2024

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1. EXECUTIVE SUMMARY

The lack of national regulation and policies significantly limits progress in lifecycle assessment (LCA) and embodied carbon, a factor 83% of respondents agree upon.

Additionally, over 80% of all respondents reported that lack of understanding from developers and investors, as well as lack of best practices were limiting progress. In North America, the lack of interest from developers and investors was also of higher concern. The availability or cost of services was not seen as a concern, except among respondents from Northern Europe.

From the supply side, the lack of manufacturer environmental product declarations (EPDs) was rated the most limiting factor to LCA and embodied carbon progress, with 87% of respondents agreeing. On the other hand, the cost of delivering services was viewed as the least limiting factor, although regional differences occurred.

Considering manufacturer EPDs, 86% of the respondents saw **that lack of national regulations and policies was limiting progress**, while lack of trust in EPD reliability was rated least significant. From the supply side, the complexity and cost of creating EPD data was viewed as limiting by 77% of respondents. Differences between program operators were seen as least impactful. Almost half of all respondents highlighted their need for EPDs in all suggested material categories.

Most of the respondents evaluated their companies' resources to be less than the current demand:

48% of all respondents agreed. More respondents from North America and the rest of the world are experiencing higher demand than their resources permit. An increase can also be seen in the overall willingness to hire, as 80% of all respondents replied they would hire 1 or more people for LCA and embodied carbon work in the next year.

The share of respondents conducting LCAs for their projects has remained fairly similar compared to 2021, with a half of all saying they conduct LCAs for less than 5% of projects. When questioned about the potential carbon reduction gained from conducting an LCA study, the share of respondents expecting at least a 10% carbon reduction remained the same between 2021 and 2023 (59%). The expected reduction in workload within the next three years is the same as in the previous outlook, with 80% of respondents evaluating this to be at least 15%. To reach the reduction must involve LCA automation with software, according to 34% of all respondents.

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3. ABOUT THE REPORT

The Construction LCA and Embodied Carbon Experts Outlook 2024 report analyzes the results of a global survey of professionals in the construction sector and related industries.

The survey was conducted by [One Click LCA](#) between August 2023 and September 2023. The questions focused on life-cycle assessment (LCA) practices, environmental product declarations (EPDs), resource requirements, and observed limitations for LCA and embodied carbon progress. The results are compiled from responses by 129 qualified experts. The respondents were approached via social media, industry networks, and email newsletter. The survey was open to all and offered an option for anonymous response. The responses were filtered by relevant professional sectors and countries, merged into suitable regions for further analysis. Most respondents came from the field of consulting services (close

to 40% of all respondents) and the most common region was the UK and Ireland (near 40% of all respondents). This report follows up on the Construction LCA and Embodied Carbon Experts Outlook report from 2021. Where relevant, the results of this survey are compared to those from 2021.

The data collected through this survey is intended to play a crucial role in shaping regulations aimed at reducing carbon emissions in the construction sector. The survey's results will be shared with policymakers and authorities responsible for formulating these regulations at a higher level.



4. TYPOLOGY OF RESPONDENTS

The survey received a total of 129 qualified responses. **The majority of respondents were from the UK and Ireland (38%).** Continental Europe represented 22% and Northern Europe 9% of the respondents. North America (including Mexico) accounted for 16%, and other countries, 15% of responses. Because of the small number of Northern European respondents, region-specific responses should be regarded as indicative only.

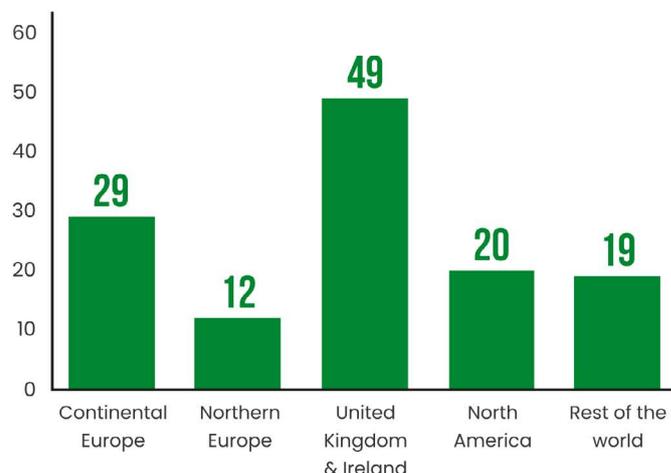
Similar to One Click LCA’s previous outlook, published in 2021, consultants represented the largest group of respondents, at 38% of the total. Engineering, construction management, as well as architecture & design service providers followed with 17%, 16%, and 14%, respectively. The responses for “other” included typed responses for “mineral extraction,” “software vendor,” “housebuilder,” “public sector,” and “real estate development.”

The respondents’ company size was rather evenly spread between response options from 1 to over 5,000 employees.

The majority of respondents from the field of architecture and design, engineering services, and consulting services replied that their main work with LCAs was to provide them as a commercial service for a fee (Fig 2).

For construction management, the main task was to use them for purposes that generated no additional income (66%). Respondents from

Respondents by region



Respondents by profession

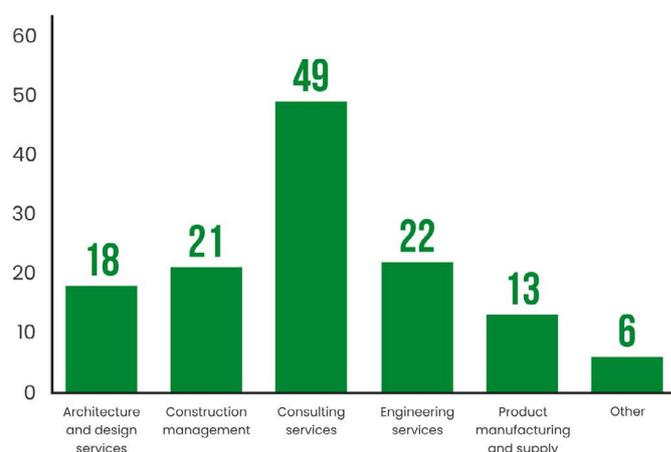
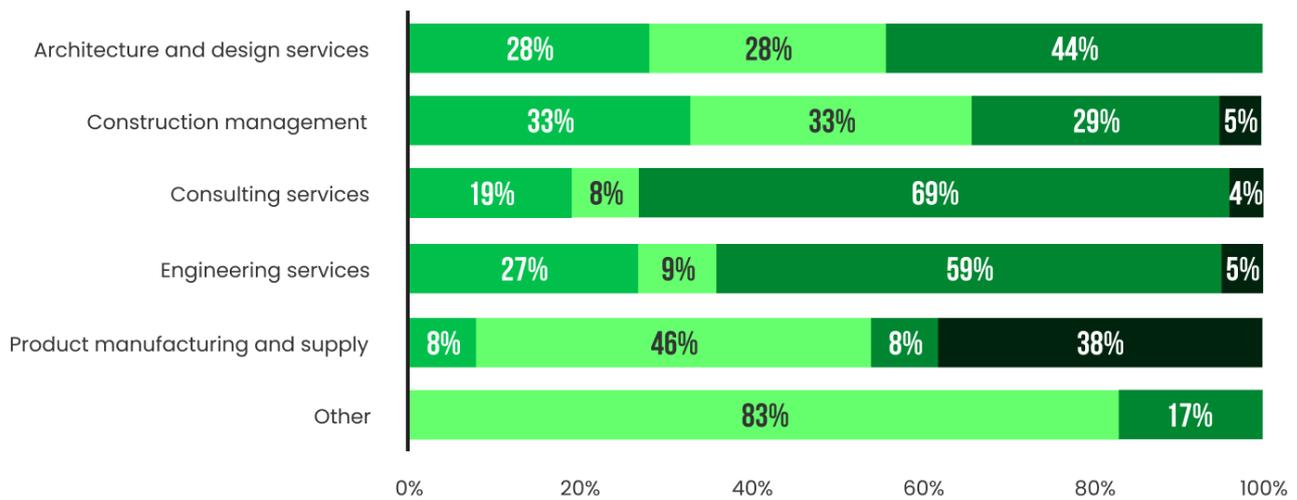


Fig 1. Demographic distribution and field of work of the respondents

“Product Manufacturing” and “Other” fields replied that the main task was to perform LCAs for their organisation for no additional fees. Roughly half of the respondents (47%) said that they performed LCAs for less than 5% of their projects.

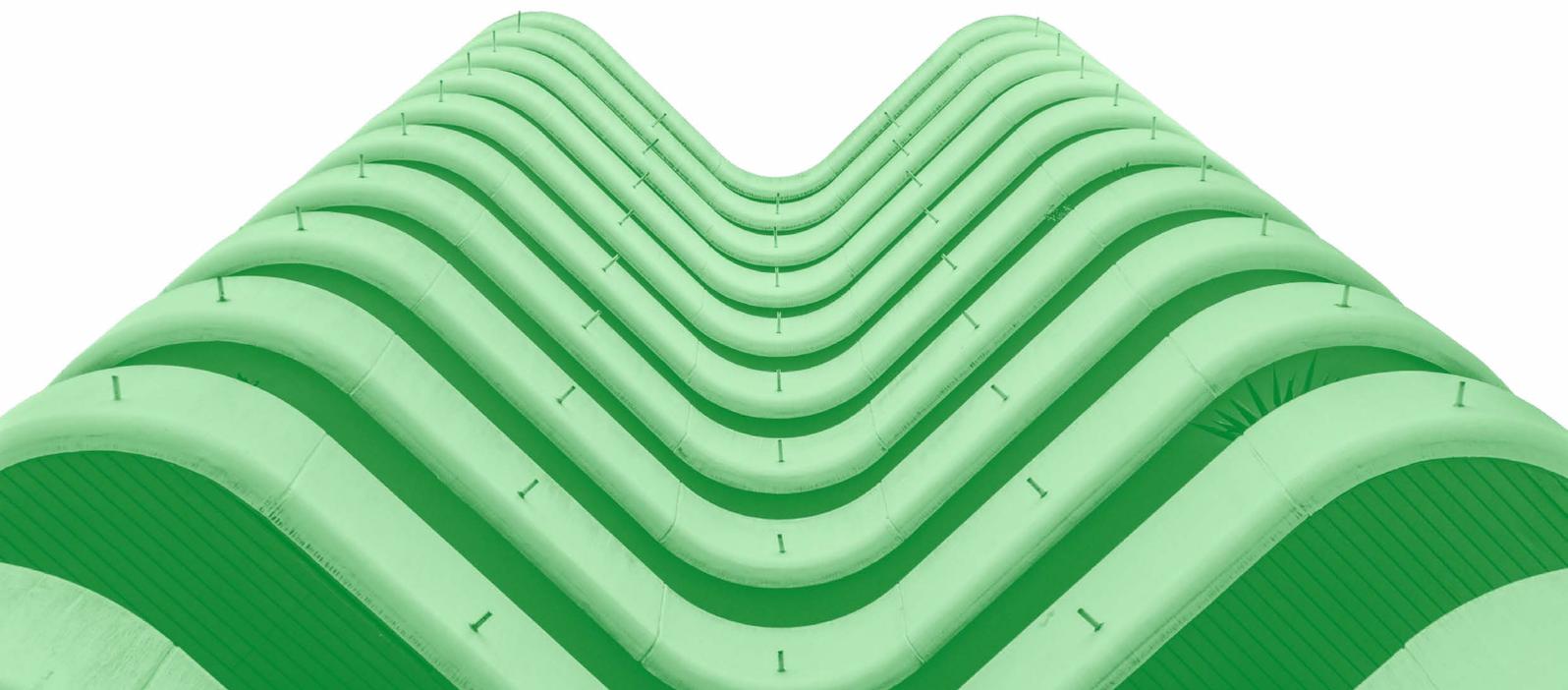
47% of respondents perform LCA for less than 5% of their projects. 30% perform LCA for more than 20% of their projects.

Which of the following characterises most of your LCA and embodied work?



- We incorporate them in our commercial services directly (and do not charge separately)
- We perform LCAs or receive LCAs for our own organisation but do not generate direct income from them
- We provide them as a commercial service for a fee
- We use them to market and sell our main product(s)

Fig 2. Use cases for performing LCA and embodied carbon work, per field of work



5. CARBON REDUCTION POTENTIAL FROM ASSESSMENTS

5.1 Potential carbon reduction from LCA or embodied carbon studies

Among all respondents, 59% saw that the potential for carbon reduction in a construction project utilizing LCA or a carbon study was over 10% (Fig A1).

Divided by profession, half the consulting services sector said the potential was 10-20% (Fig A2), while a third of product manufacturing and supply said this is zero (small sample size).

Below is a comparison of perceived carbon reduction potential from an LCA or embodied carbon study between 2021 and 2023. The answers presented below have been summed up from response options of "10-20%", "20-30," and "over 30%." In comparison to the 2021 One Click LCA report, the confidence of respondents from continental Europe and the rest of the world in achieving at least a 10% reduction has decreased.

Carbon reduction potential from LCA or embodied carbon study: at least 10%

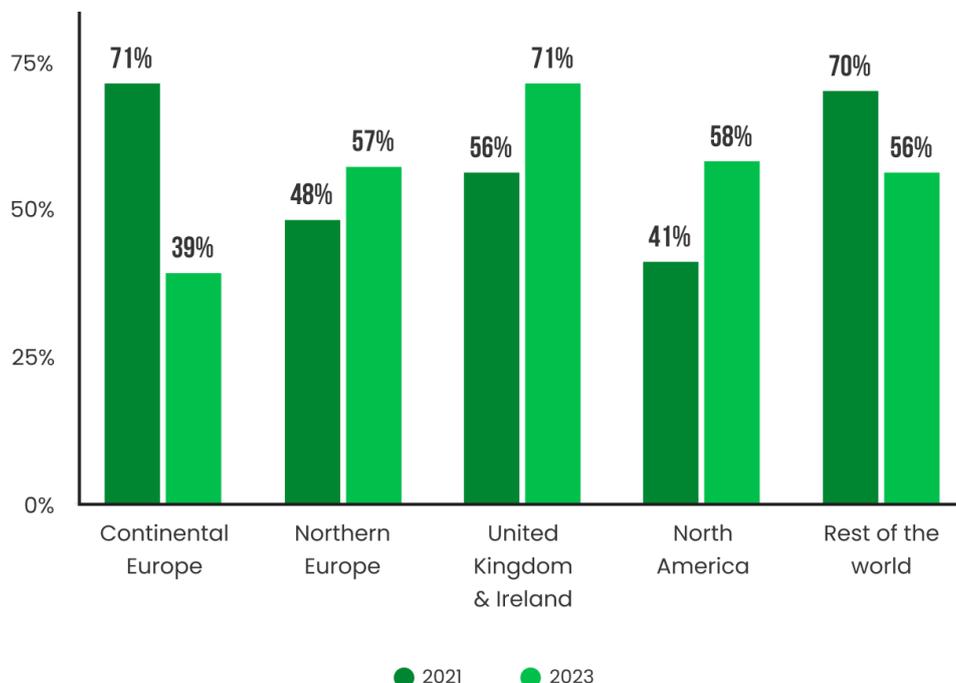


Fig 3. At least 10% carbon reduction potential from conducting an LCA or embodied carbon study

6. DEMAND- AND SUPPLY-SIDE FACTORS LIMITING PROGRESS ON LCA AND EMBODIED CARBON

6.1. Demand-side factors limiting progress

Among all respondents, the most significantly limiting factor for LCA and embodied carbon progress was seen to be the lack of national regulations or policies (50% of all replies). When combining the options “somewhat limiting” and “significantly limiting,” the lack of understanding from developers and investors was highlighted, with 87% of respondent replies. Similarly, over 80% of respondents said that lack of best practices limits progress.

Compared to One Click LCA’s 2021 report, lack of national regulation and policy is still the topic of greatest concern. However, there are some positive developments in municipal regulation and policy. In 2021, 84% of respondents said that lack of regulation was limiting LCA and embodied carbon progress – in 2023, the share dropped to 75%. Also, general lack of awareness in the market was of less concern among respondents in 2023 than in 2021.

Which of these demand-side factors limit progress on embodied carbon and LCA?

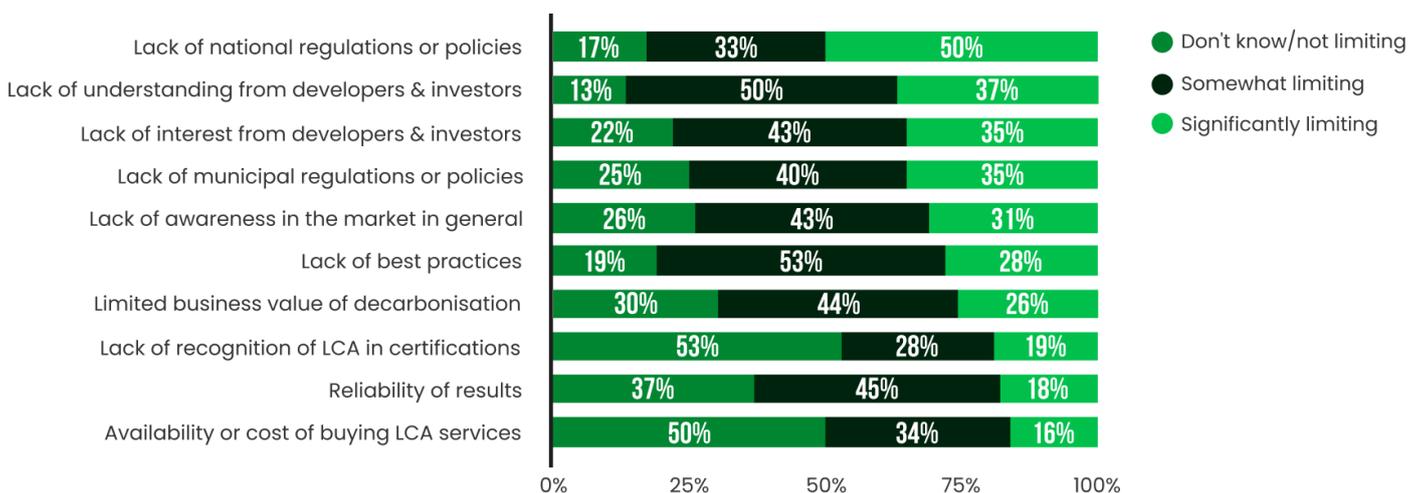


Fig 4. The demand-side factors limiting progress on LCA and embodied carbon

Survey results from 2021 to 2023 show that fewer industry experts see lack of national regulation, policy, or market awareness as a significant limit to progress.

6.2. Demand-side factors limiting progress, by region

This section explores demand-side factors limiting progress in embodied carbon and LCA, by region. The graphs for each region are presented in the Appendix (Fig A6-A10). **For continental Europe, the most limiting factor was lack of understanding from developers and investors, with 93% seeing this option to be somewhat or significantly limiting.** Also, 62% saw that lack of national regulations or policies was significantly limiting (in contrast to 79% in 2021). The least limiting factors were lack of recognition of LCA in certification and the availability or cost of buying LCA services.

Overall, Northern European respondents' view of the limiting factors was less significant than for other regions: the option "significantly limiting" was less prevalent than for other regions. **The lack of best practices was reviewed as the most limiting factor, with 83% replying "somewhat" or "significantly limiting."** In contrast to other regions, the availability or costs of buying LCA services was reviewed as the most significantly limiting factor by 33% of respondents, but the small sample of respondents from this region should be noted upon interpretation.

For the UK and Ireland, the lack of national regulations or policies stands out as the most important factor with over half of respondents viewing this as significantly limiting. Lack of understanding from developers and investors was, however, viewed as the most limiting factor for progress, when combining the responses for "somewhat" and "significantly limiting" (90%).

The lack of interest and understanding from developers and investors were the most limiting factors for respondents from North America, with 60% indicating they were "significantly limiting."

For respondents from other countries, the lack of best practices is considered most limiting (96% of all responses). The impact from developers and investors is also of high significance.

North American respondents see that "lack of interest and understanding from developers and investors" is the great limiting factor. In Northern Europe, they cite "availability or cost of buying LCA services," while the remaining respondents cite "lack of national regulations or policies."

6.3. Supply-side factors limiting progress

Of the listed supply-side factors, the respondents viewed lack of manufacturer EPDs to be the most limiting factor for the progress of LCA and embodied carbon. This option was chosen by 88% of all respondents, in contrast to 77% in 2021. On the other hand, there has been some positive development with national generic data availability, as the significance has decreased from highest concern in 2021 to fourth place in 2023. Among the least significant options, cost

of delivering the services is seen as not limiting or unknown by 47% of respondents in 2023, compared to 37% in 2021.

In 2021, 46% of respondents considered the lack of national generic data to be “significantly limiting,” whereas in 2023, the proportion agreeing with this decreased to 35%.

Which of these supply-side factors limit progress on embodied carbon and LCA?

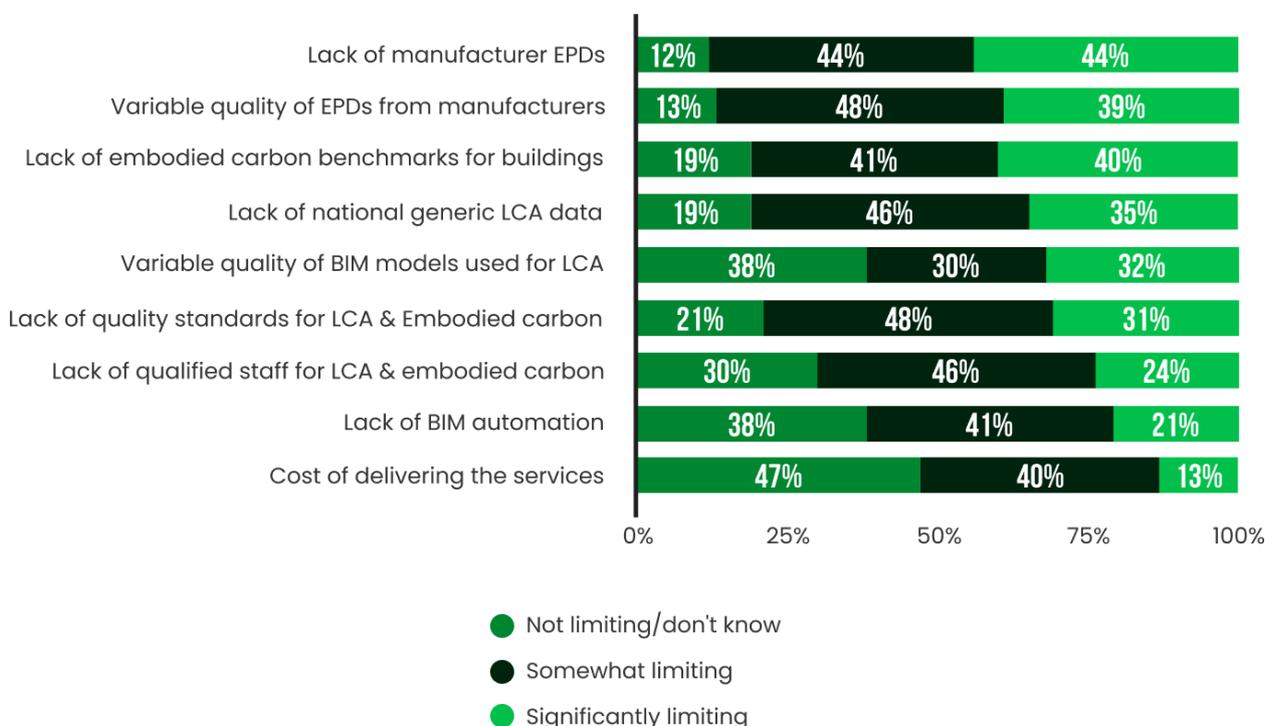


Fig. 5. The supply-side factors limiting progress on LCA and embodied carbon

6.4. Supply-side factors limiting progress, by region

The supply-side limiting factors by region are visualized in Fig A11-A15 in the Appendix.

Respondents from **continental Europe** listed both the variable quality of EPDs and lack of embodied carbon benchmarks as the most limiting factors.

For **Northern European** respondents, the variable quality of BIM models was seen as the most significant limitation.

The lack of embodied carbon benchmarks was evaluated most significant in **North America**, along with the lack of manufacturer EPDs.

Lack of manufacturer EPDs was also the most significant factor among the respondents from the **UK and Ireland**.

Among the respondents from **other countries**, lack of national generic data and embodied carbon benchmarks were also prevalent.

The most significantly limiting factor is “variable quality of EPDs from manufacturers” for Continental Europe, “variable quality of BIM models used for LCA” for Northern Europe, “lack of manufacturer EPDs” for the UK & Ireland and North America, and “lack of national generic LCA data” for rest of world.



7. EFFORT ESTIMATE FOR LCA OR EMBODIED CARBON ASSESSMENT

7.1. Time use for assessment and optimization

Most respondents evaluated the time spent on carbon assessment to be less than 40 hours. However, many respondents highlighted that this varies significantly between projects, with the time spent tied to the amount and quality of information. When results for effort estimates for an LCA study were investigated between different fields of work (excluding the “don’t know” answer option), 55% of respondents from the construction management sector estimated the time to be less than 20 hours. For product manufacturing and supply, the share of responses was divided evenly between “below 20 hours” and “above 40 hours.” Time estimated to carry out a further optimization study was, for most respondents, below 20 hours, but there was significant variance depending on the depth of study and number of optimizations.

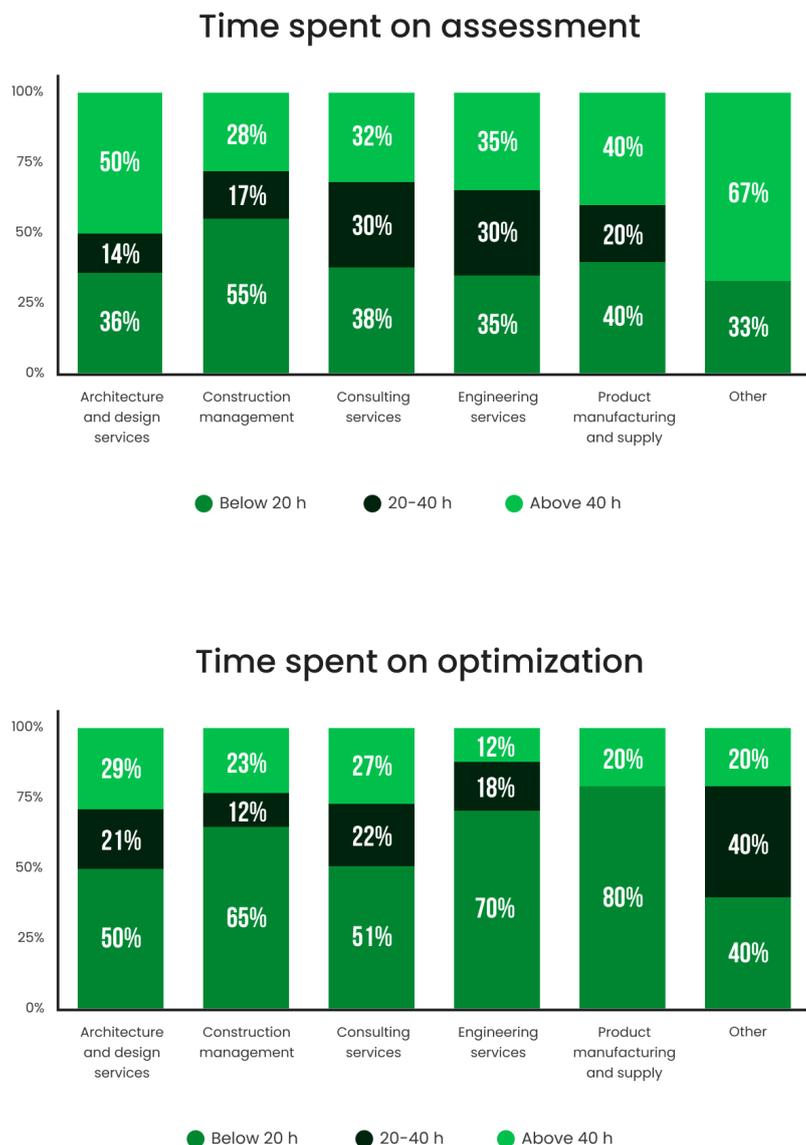


Fig 6. Estimated time (h) spent on an LCA or embodied carbon assessment for 5000 m2 building with the usual level of information available (top); optimisation for the same project (bottom)

Matching demand and resources for LCA work

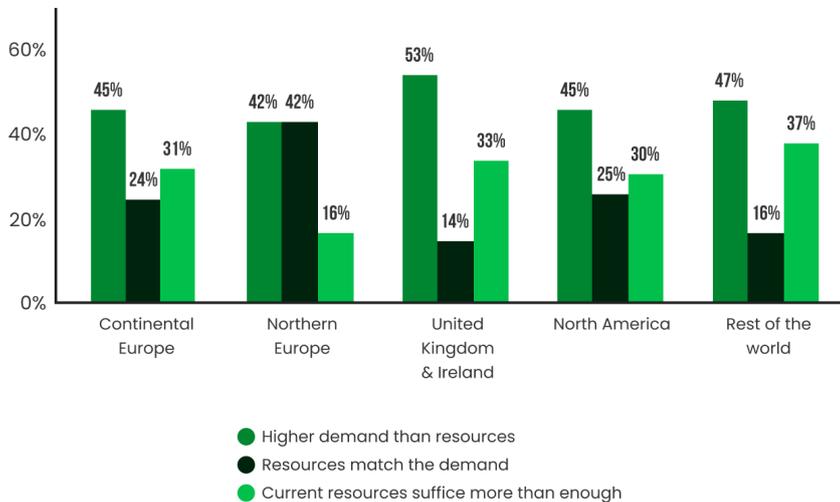


Fig 7. Matching resources to demand, per region

Hiring needs, comparison 2021 - 2023

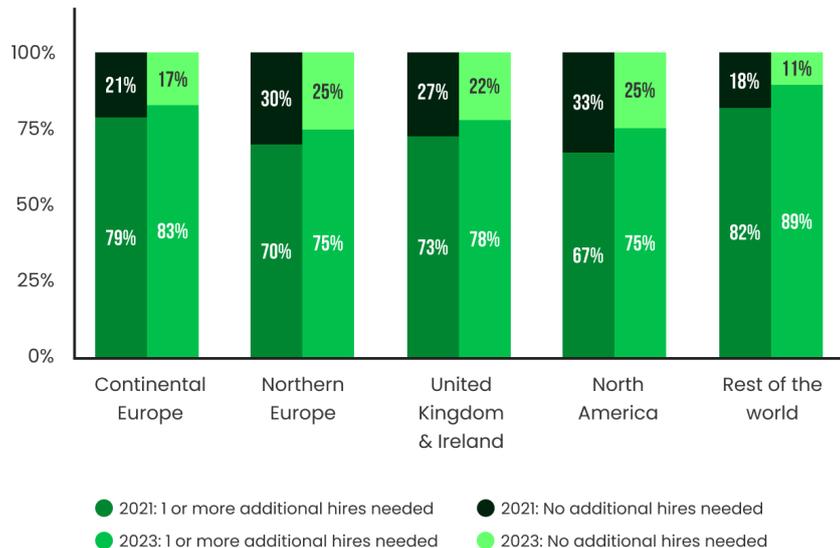


Fig 8. Hiring needs, comparison 2021 - 2023

7.2. Matching resources to demand: workload and hiring needs

Overall, respondents experienced workloads higher than their current resources could accommodate. This issue was most pronounced in the UK and Ireland and least in Northern Europe, where an equal proportion of responses indicated that resources matched the demand.

Reflecting on hiring needs, an increase is seen in the companies' overall requirement for additional employees in comparison to 2021. The majority (65%) of all respondents stated that, assuming they find suitable experts, their companies would hire 1-2 additional people in the coming year to conduct LCA and embodied carbon work. This did not vary much between companies of different sizes.

7.3. Expected time savings within the next three years

When asked to estimate the reduction in required working time over the next three years from developments in technology, processes, and learning, the most common response was between 15% and 30%. An overall 78% of respondents estimated at least a 15% reduction, the share of which remained approximately the same as that in 2021. Divided by regions, 43% of

continental Europeans, but only a third of UK and Ireland respondents, saw that the reduction would be over 30%. Between professions, the engineering services field showed higher confidence in future potential time savings, as half estimated the time saving to be at least 30% (Fig A3). In contrast, only 15% of product manufacturing and supply agreed.

Working time reduction in the coming 3 years

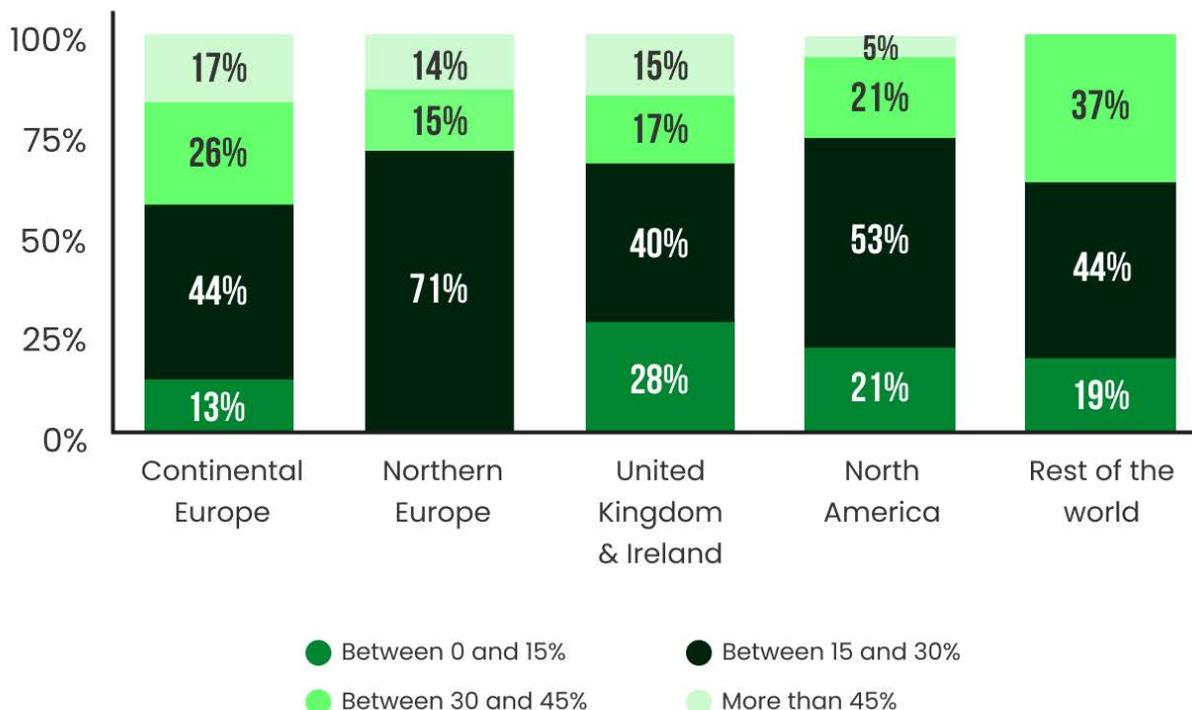


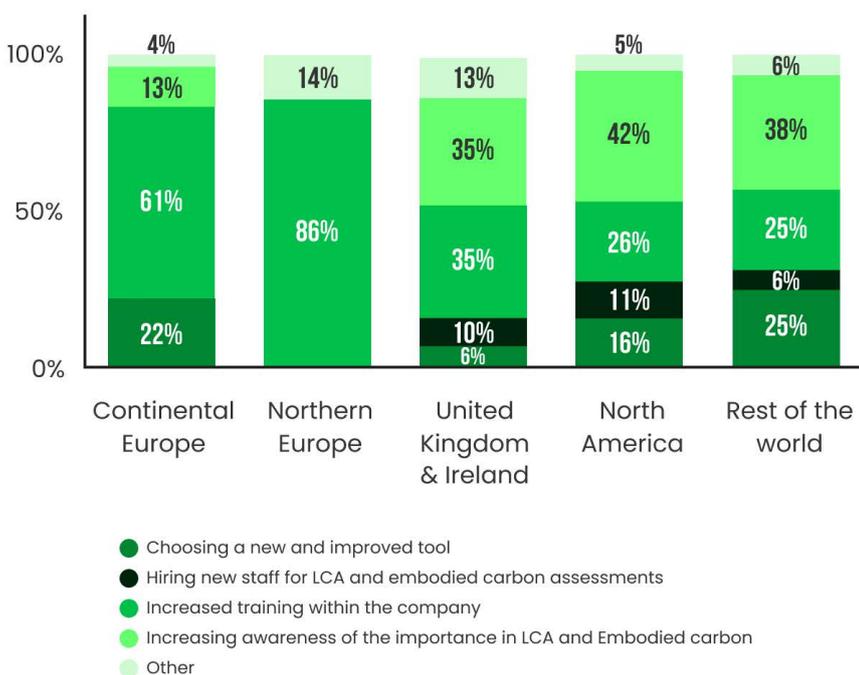
Fig 9. Estimated working time reduction due to developments in technology, processes and learning in the coming three years

7.4. Actions taken to reduce cost and time spent on assessments

To reduce costs and time spent on LCAs and embodied carbon assessments, 41% of all respondents had already increased or were planning to increase training within their company. This was the case for 86% of Northern European respondents and 61% of continental European respondents. The other regions utilized a more even array of options, from increased training to increasing awareness (35-42% for UK and Ireland, North America, and rest of world).

Other responses included improving the quality of BIM models, improving in-house tools, and improving automation. Divided between different professions, the companies chose to implement several means to reduce time and costs spent on LCAs and embodied carbon assessments (Fig A4).

Actions taken to reduce time and costs spent on LCAs



Over 60% of respondents from the engineering services and product manufacturing fields & supply have or are planning to increase training within the company.

47% of construction management have or are planning to increase awareness of the importance of LCA.

Fig 10. Actions taken or planned to reduce costs and time spent on LCA and embodied carbon studies

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In the respondents' view, the main factor driving reduction of time spent on assessments and optimization in the future will be LCA automation with other softwares such as BIM tools (34% of all). The next most important factor is improved data availability and accessibility (at 27%).

Between regions, the options are rather evenly distributed. From the viewpoint of the Northern European respondents, it seems that knowledge of LCA is already at a good level; however, the small sample can distort the results. Data availability and accessibility are more pronounced in the UK and Ireland and the rest of the world, with slightly over a third of responses. Divided

between professions, the option "LCA automation with other softwares" was most important for the sectors among most respondents, but the need for training was also identified (Fig A5).

In addition, most respondents stated need for access to training materials from external sources (38% - 80% per profession). Only respondents from engineering services primarily rely on company-generated training materials. An overwhelming majority of **all respondents stated the need for additional high-quality training materials** (84% to 100% of respondents in all fields of work, except product manufacturing and supply, at 69%).

More than 40% of architecture services and construction management believe LCA automation to reduce efforts for future assessments. A quarter of engineering services rely on development of easy-to-use tools.

Main reasons for reducing time spent on assessment and optimization

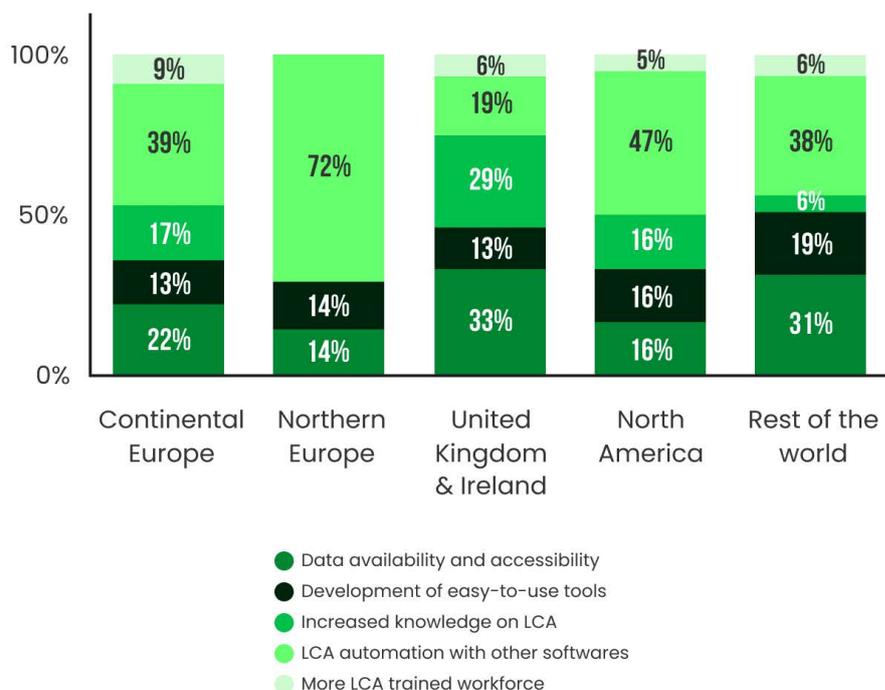


Fig 11. The main reasons for reducing time spent on assessment and optimisation in the future

8. DEMAND- AND SUPPLY-SIDE FACTORS LIMITING PROGRESS IN EPDS

8.1. Demand-side factors limiting progress

When asked about the demand side factors limiting creation of EPDs by manufacturers, the survey revealed several limiting factors.

Over half of all respondents said that lack of national regulation and policy limits creation of construction-related product EPDs.

Which of the following demand side factors limit creating EPDs by manufacturers the most?

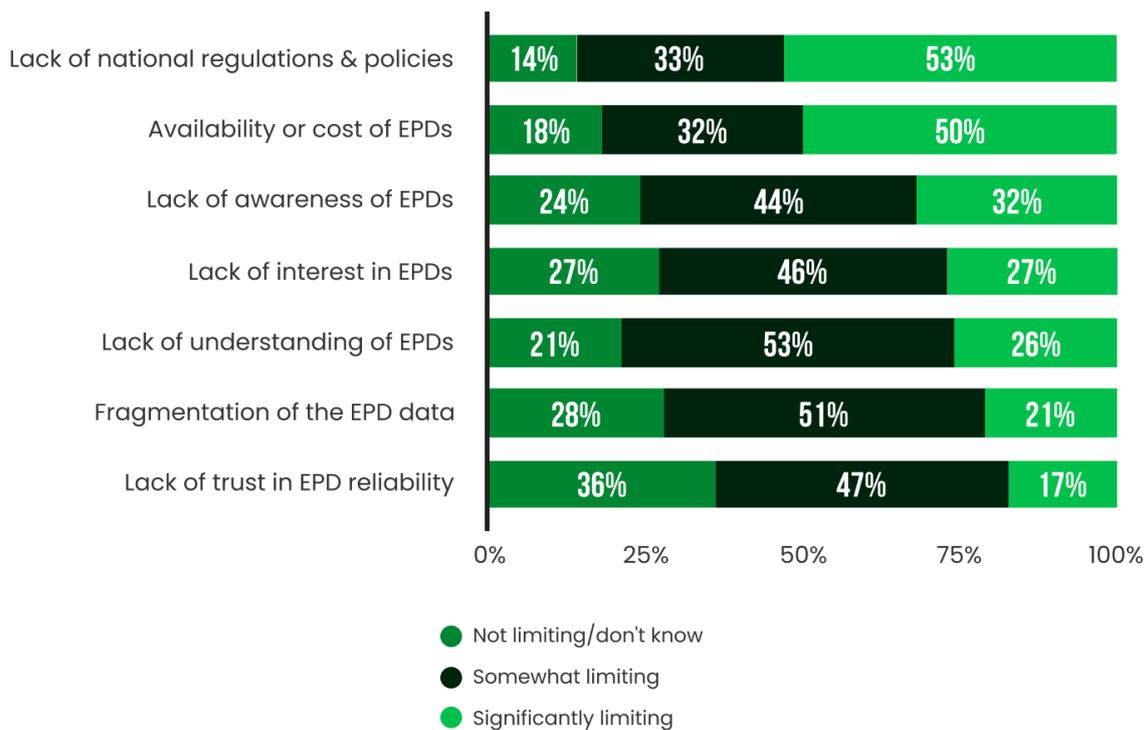


Fig 12. The demand-side factors limiting progress for EPDs

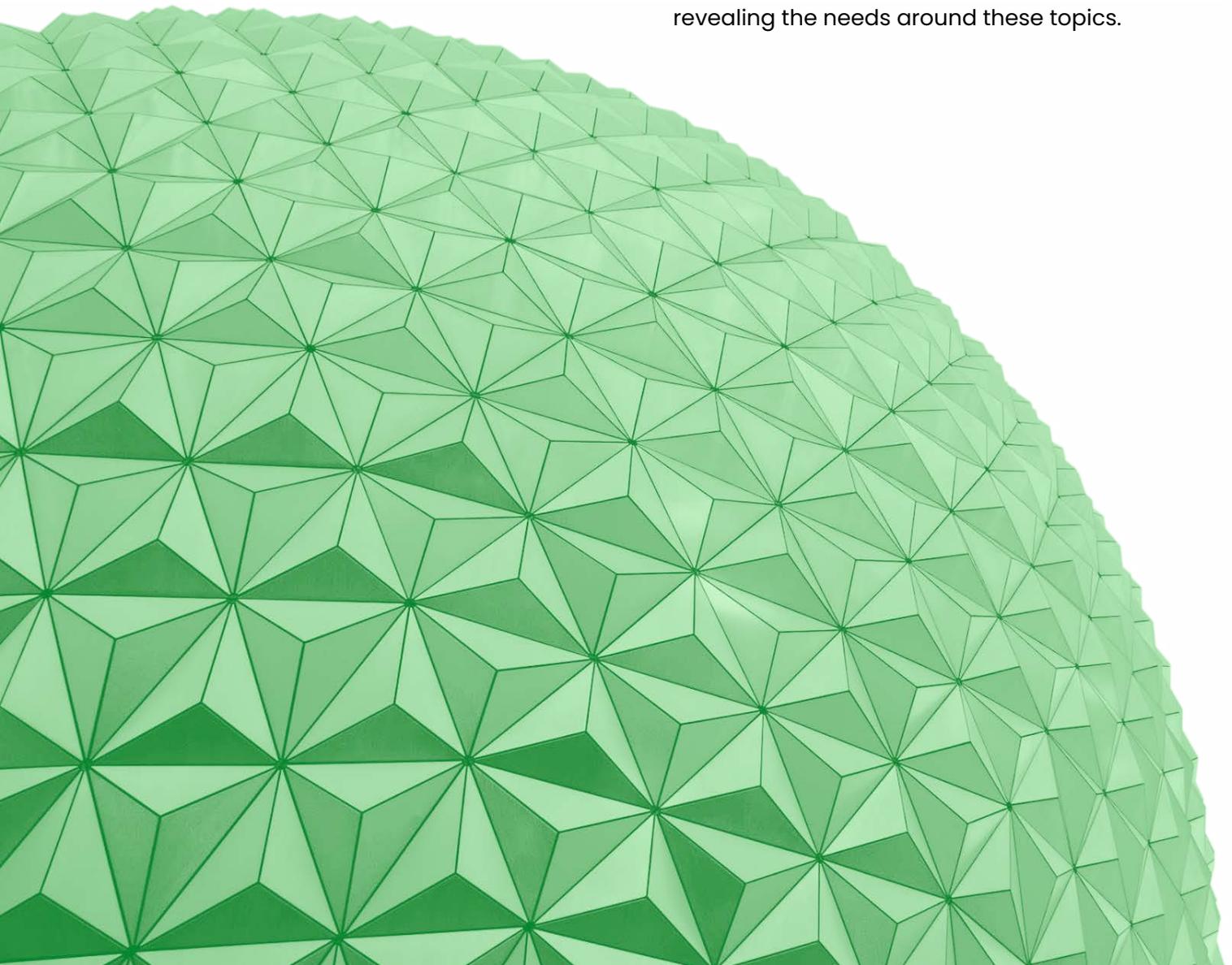
In most of the regions, respondents raised the lack of national regulation and policy as the most limiting factor for EPD progress.

The availability or cost of EPDs was also raised as an important factor. The lack of trust in EPD reliability was rated as the least significant factor, although 17% of respondents also considered this as significant. The EPD-related questions were not included in the 2021 report; thus, no comparison is given.

Respondents from continental Europe replied that availability or cost of EPDs was the most significant factor, with over 90% agreeing, and lack of trust in EPD reliability was least limiting, with 36% replying “don’t know or not significant.” Among the **Northern European respondents,**

fragmentation of of EPD data was viewed as the most limiting factor, with 86% agreeing.

Between the North American respondents, the lack of national regulation and policy is the most limiting factor, while the fragmentation of data is rated least important. For respondents in the **UK and Ireland,** the lack of national regulations and policies is the most limiting factor, with around 60% agreeing on its significance, similarly to North America. The **rest of the world** follows the same trends, citing the lack of national regulation and policy as the most limiting factor. Note that there are no replies for “not limiting / don’t know” for lack of awareness and lack of interest in EPDs, revealing the needs around these topics.



8.2. Supply-side factors limiting progress

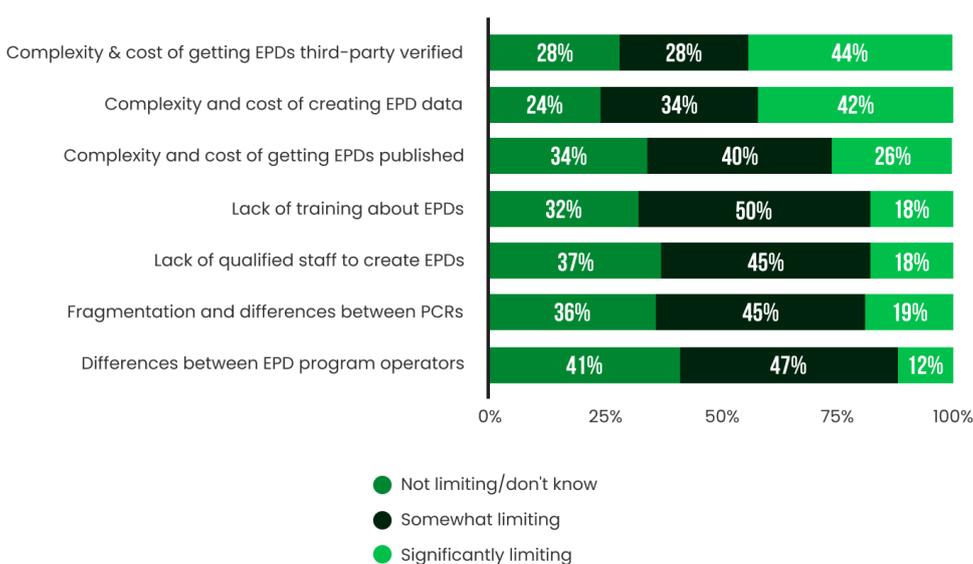
From the supply side, the complexity and cost of creating EPD data, as well as getting EPDs third-party verified are rated almost equally important, with rated as important, with 76% and 70% agreeing on the significance of these limitations.

Across geographical regions, **continental European respondents aligned with overall results**, highlighting the complexity and cost of getting EPDs third-party verified and created, with 86% viewing these as limiting, and 59% choosing the option “significantly limiting.” Differences between EPD program operators were assessed as least limiting. **Northern European respondents** continued the trend, with 59% replying that complexity and costs of creating EPD data was

the most limiting factor, with 57% reviewing it as “significant”.

For respondents in North America, the trend was also similar, highlighting the complexity of processes. However, lack of training was reviewed as least significant, contrasting with overall and European responses. **UK and Ireland** respondents also cited the complexity of processes related to EPDs as the most limiting factor. From **other countries**, the responses were similar to other regions in terms of complexity. Of note, lack of training was raised as the third-most impactful factor, with 79% agreeing.

How limiting are the following non-demand factors to overall creation of construction related EPDs



In most regions, respondents cited lack of national regulation and policy as the most limiting factor for EPD progress.

Fig 13. The supply-side factors limiting progress for EPDs

9. THE USE, NEEDS, AND PERCEIVED INFLUENCE OF EPDs

When asked what most characterizes their use of third-party verified EPDs, the respondents were rather unanimous. Excluding the product manufacturing and supply sector, 74% - 100% of respondents said they primarily use EPDs for

assessing construction LCA projects. For product manufacturing and supply, the responses were divided between options, with the option “we make EPDs for our own products” more prevalent compared to others, as expected.

Use of EPDs

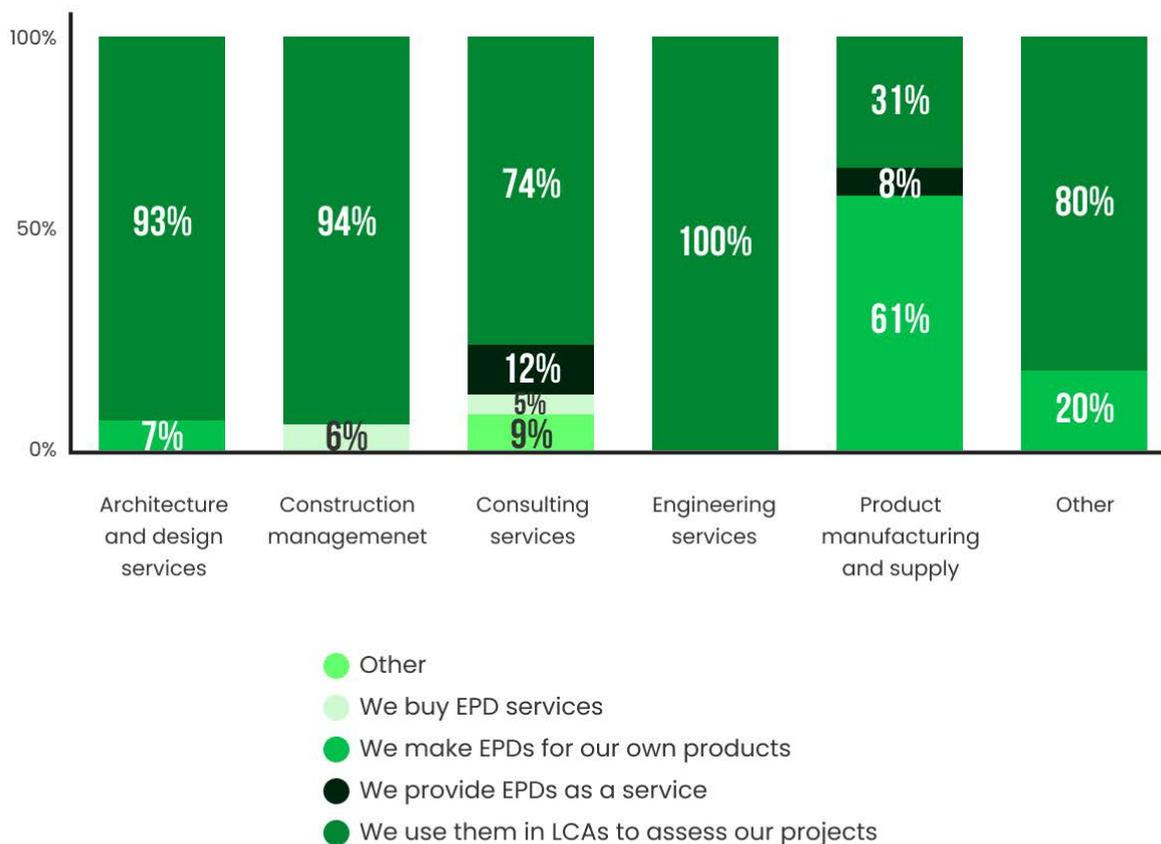


Fig 14. The main use of third party verified EPDs, per field of work

The respondents were also asked about their needs for EPDs, with different alternatives given to represent major material groups. Nearly 40% of the respondents said they would need more data from all suggested categories.

The second-highest rated group was mechanical, electric, and plumbing equipment, at 22% of all responses, followed by concrete at 11%.

EPD needs by product sector

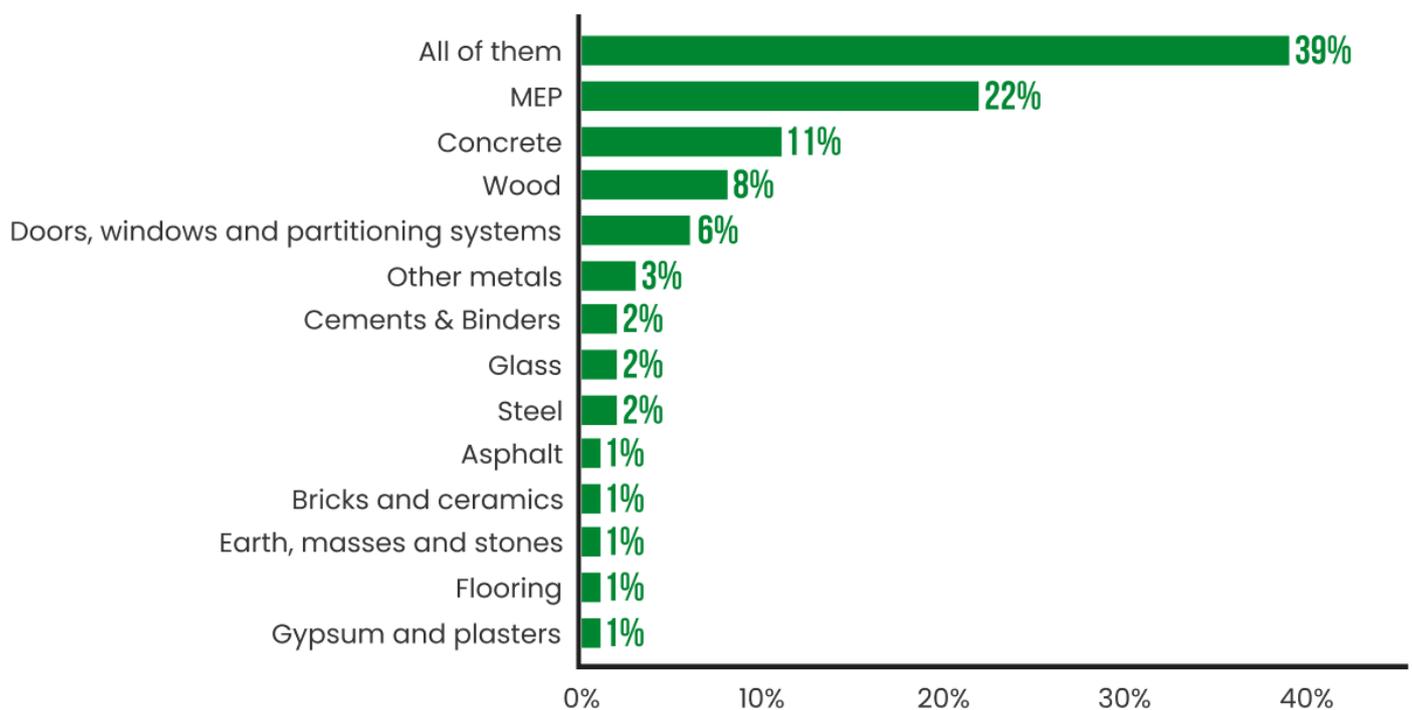


Fig 15. The need for EPDs in different material groups

Over 60% of respondents in architecture, engineering, and construction fields recognize the need for EPD data on mechanical, electrical, and plumbing services. One Click LCA's new [MEP Carbon Tool](#) helps MEP designers and engineers reduce whole-life carbon in projects.

Finally, respondents were asked to evaluate how EPDs have affected their business. The results are presented by field of work, with the answer “no impact / not relevant” excluded from the calculations. Most of the respondents evaluated that by using EPDs in their work, they would impact internal sustainability goals (40% of all

responses), while over half of the respondents from engineering services believe EPDs would increase demand and generate revenue. Nearly a fifth of those in product manufacturing and supply stated that using EPDs ensures a stable market position. Note that this is based on a small sample size.

Influence of EPDs in business

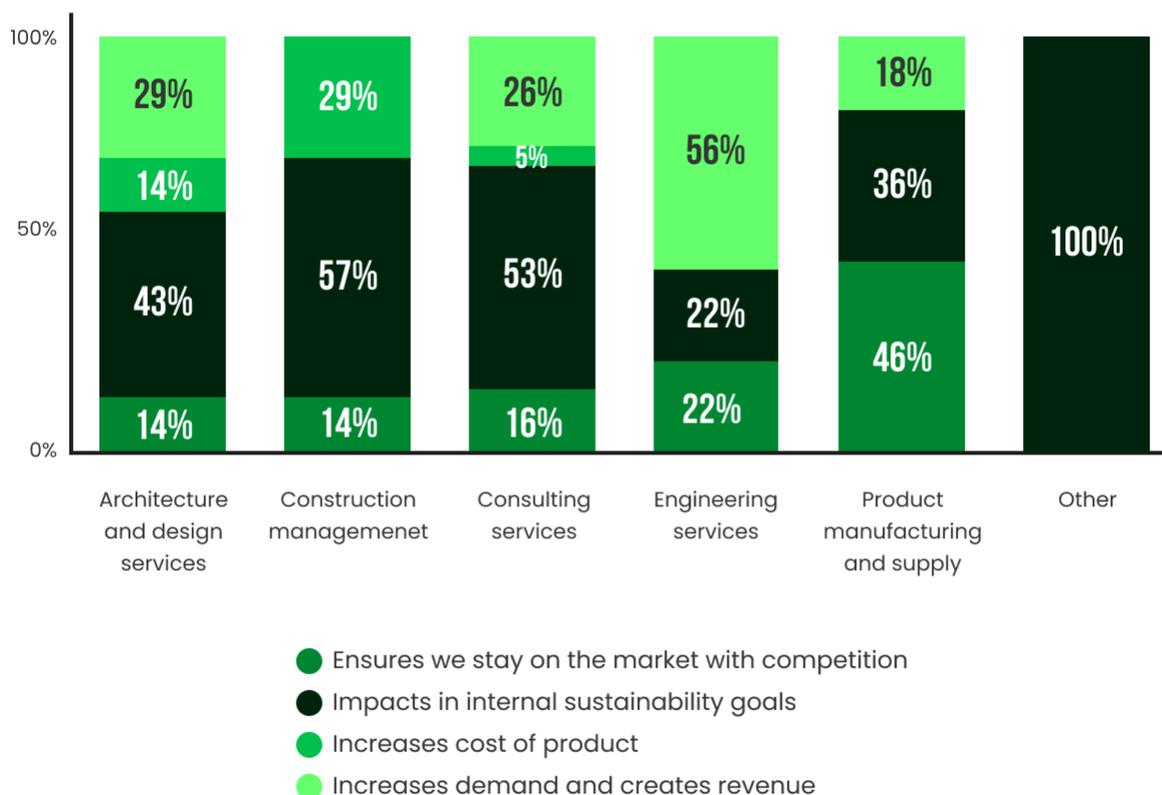


Fig 16. The perceived influence on business from using EPDs

10. ABOUT ONE CLICK LCA

One Click LCA is a Helsinki-based tech company decarbonizing construction and manufacturing with world-leading, easy-to-use, and automated life-cycle assessment (LCA) to calculate and reduce the environmental impacts of building, infrastructure, and renovation projects – as well as construction and other manufactured products. It also enables manufacturers to generate and publish third-party verified EPDs, and allows assessment of circularity, life-cycle

cost, and soon also biodiversity. One Click LCA is used in +150 countries. Its decarbonization platform includes a unique global database with +200,000 LCA datasets, and it supports +70 standards and certifications, including LEED, BREEAM, GRESB and other national regulations. One Click LCA was founded in Finland in 2001, and has a team of +170 people on all continents.

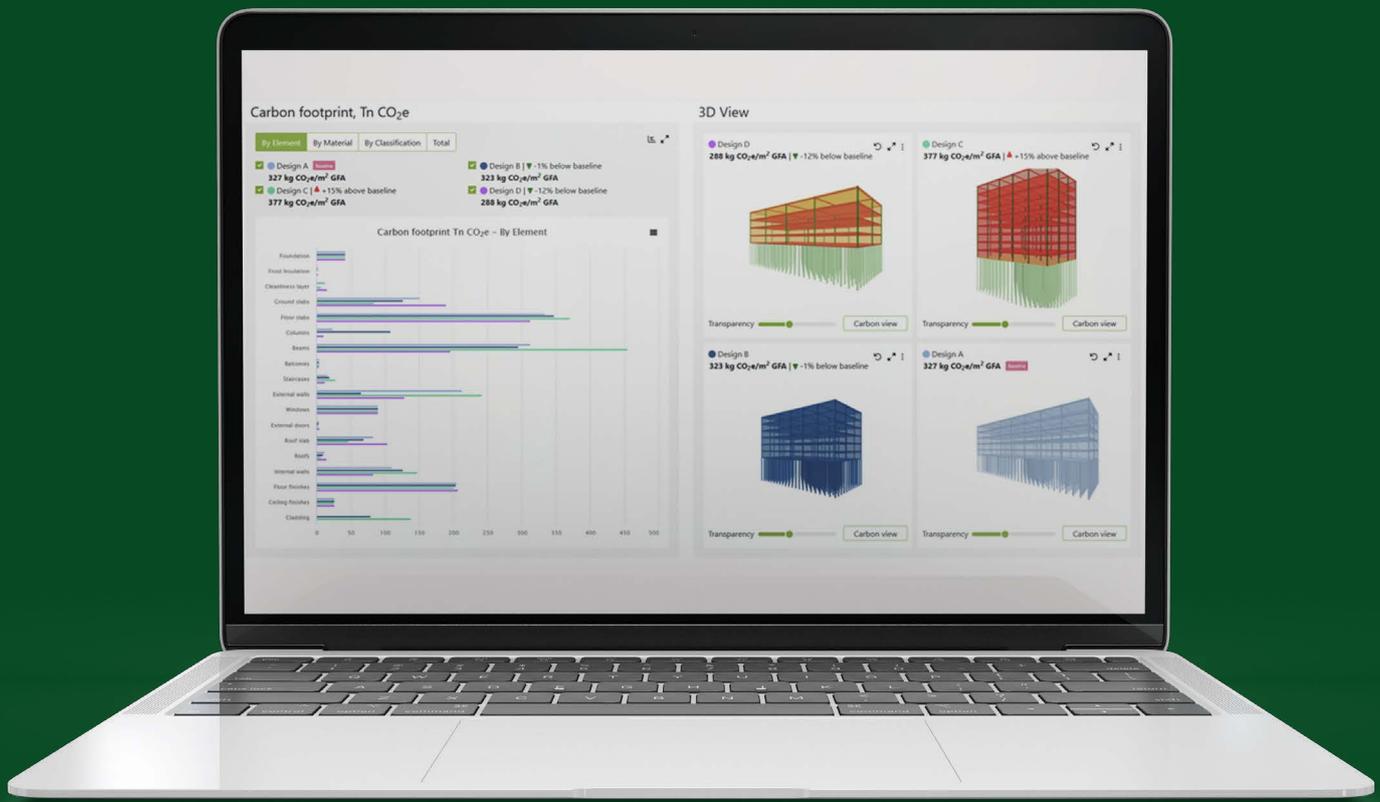
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All the tools you need to scale carbon calculations and gain a business edge.

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11. APPENDIX

Fig A1. Level of carbon reduction potential from an LCA or embodied carbon study, by region

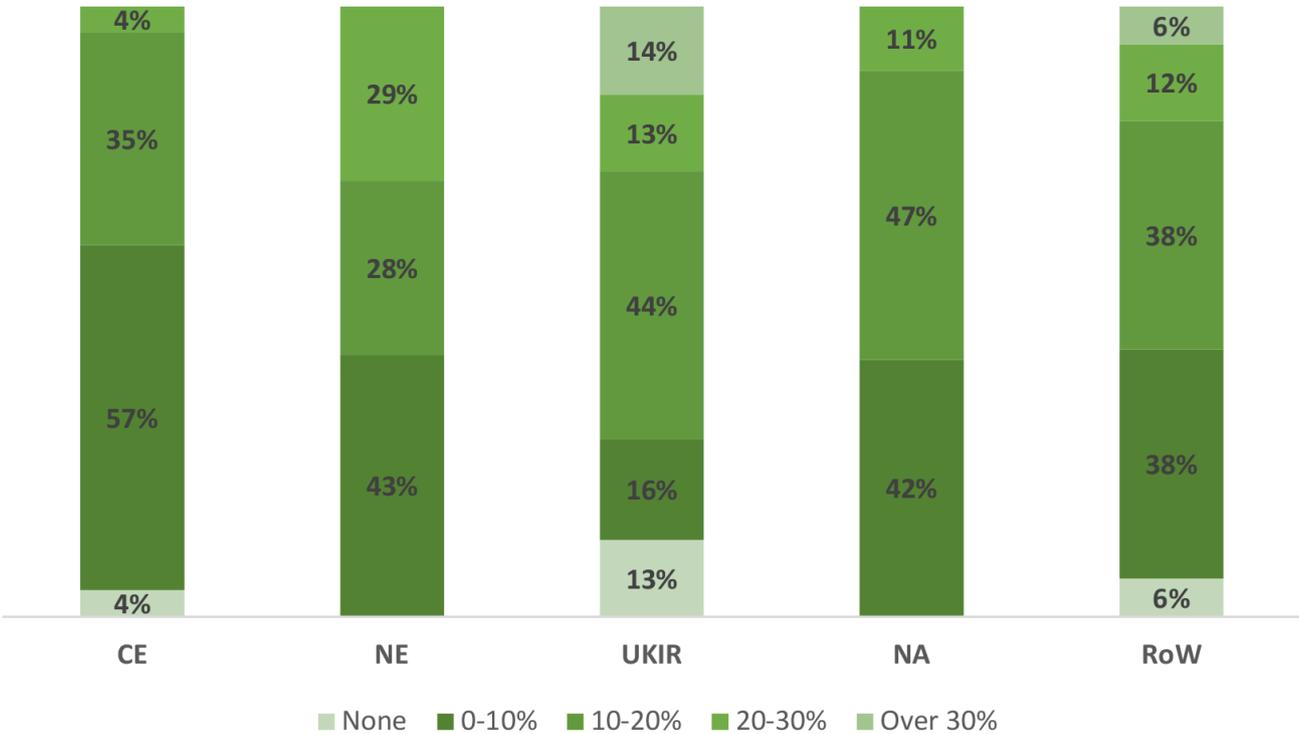


Fig A2. Level of carbon reduction potential from LCA or embodied carbon study, by field

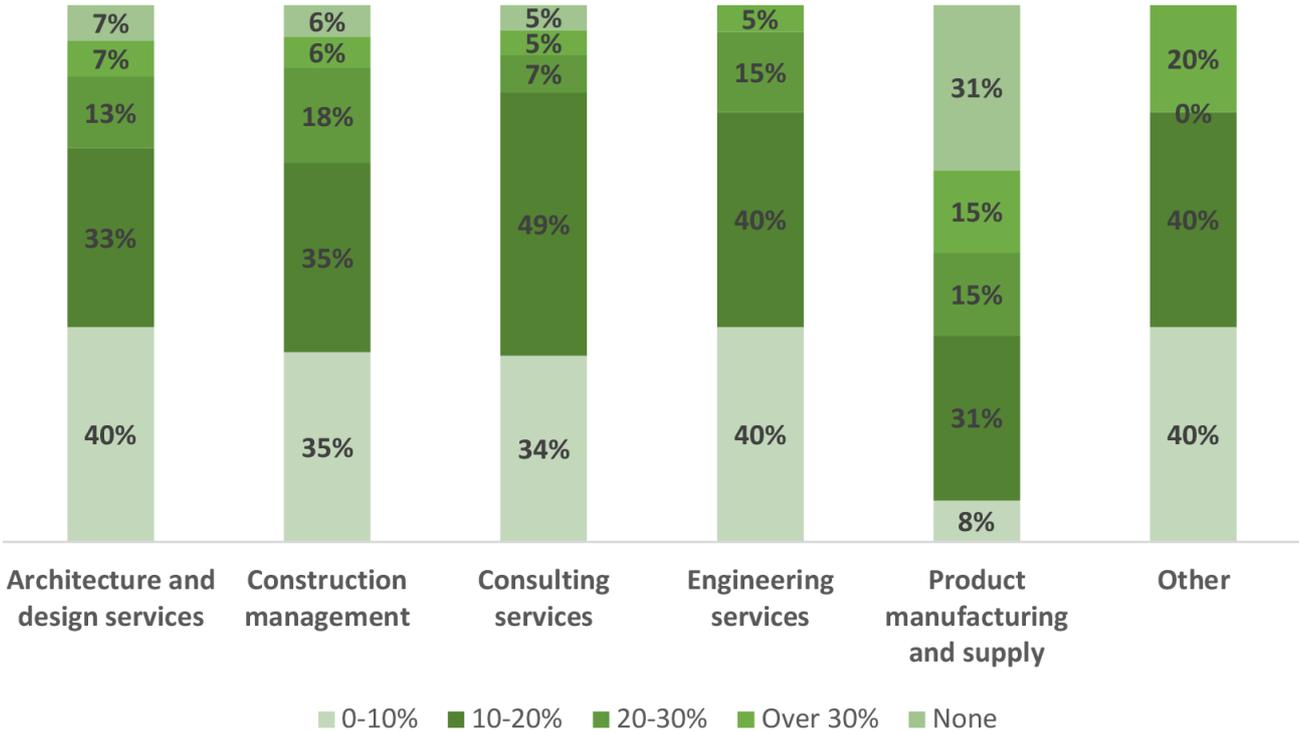


Fig A3. Working time reduction in coming 3 years due to progress in technology processes and learning, by field

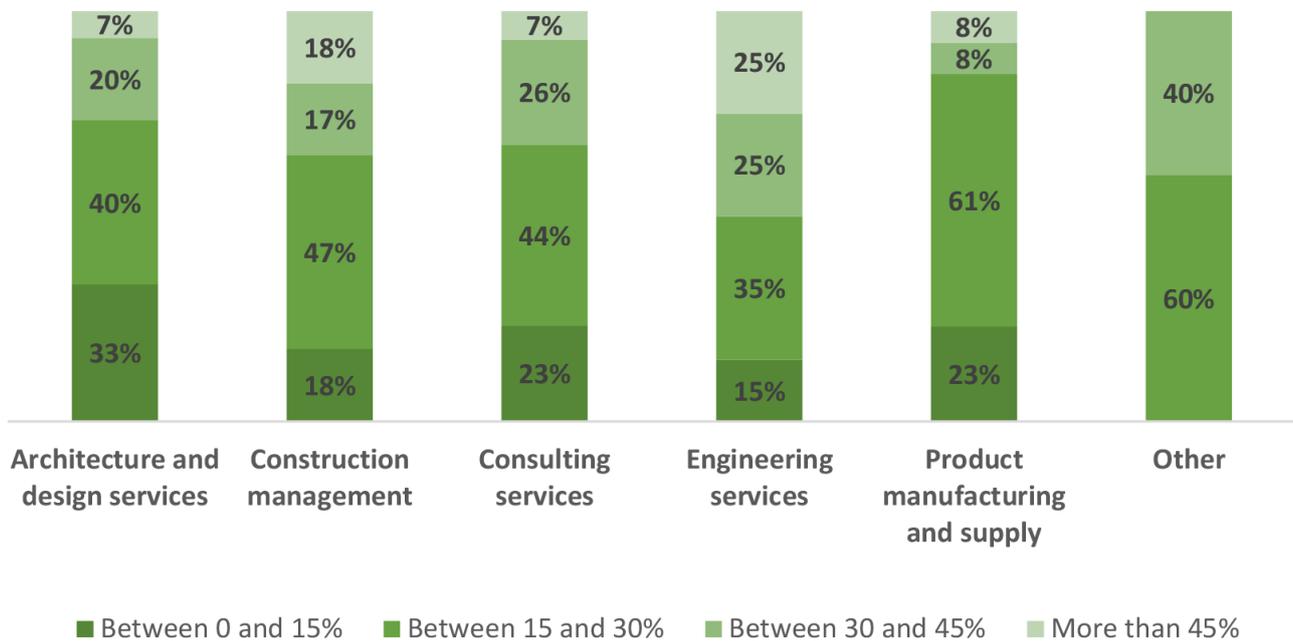


Fig A4. Actions taken or planned to reduce costs and time spent for LCA and embodied carbon studies, by field

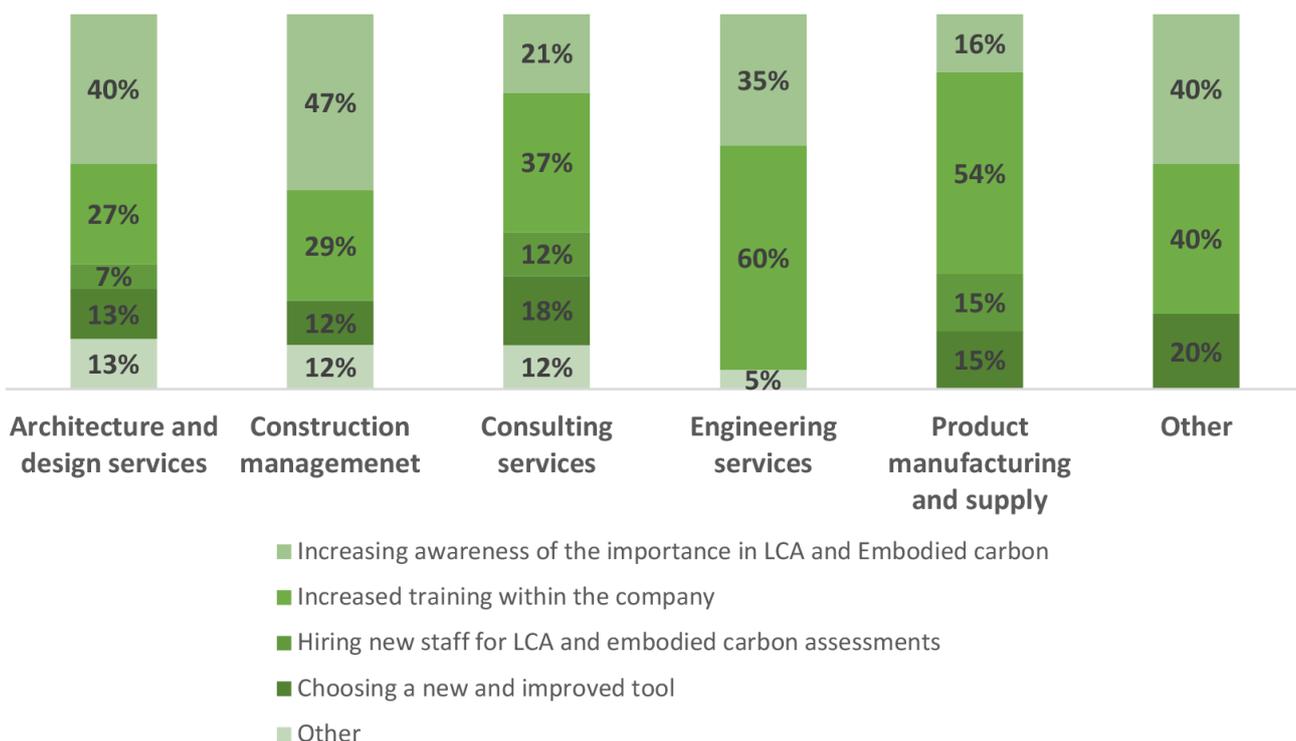
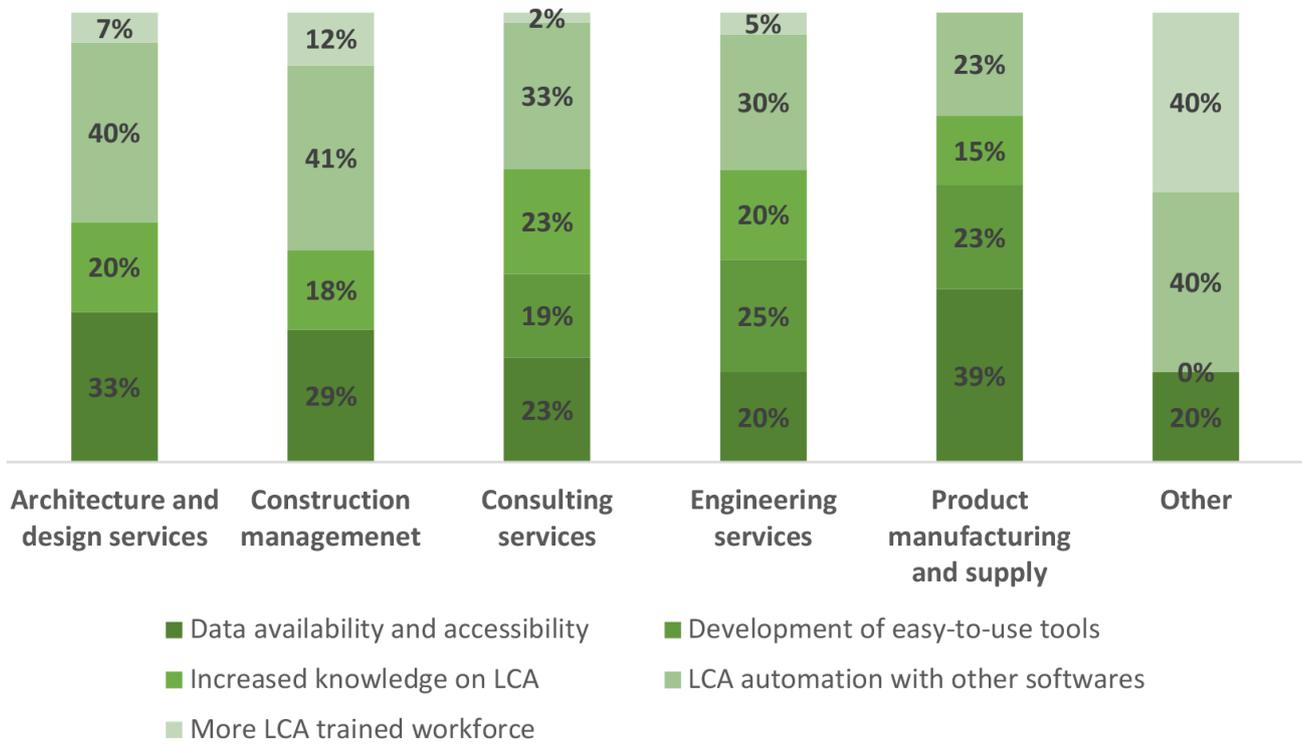


Fig A5. Main reasons behind reducing time spent on assessment and optimisation in the future, by field



Demand-side factors limiting progress for LCA and embodied carbon work, responses per region. Note that response options are arranged in descending order by entries to option “significantly limiting”.

Fig A6. Continental Europe

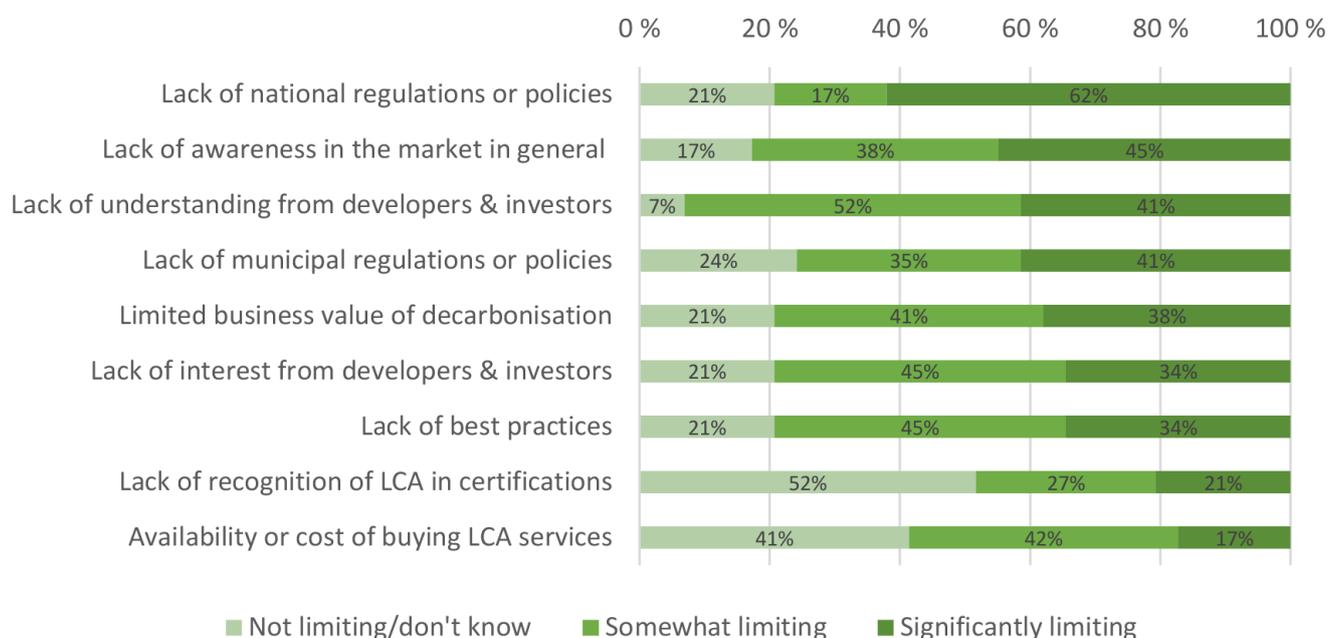


Fig A7. Nordic countries

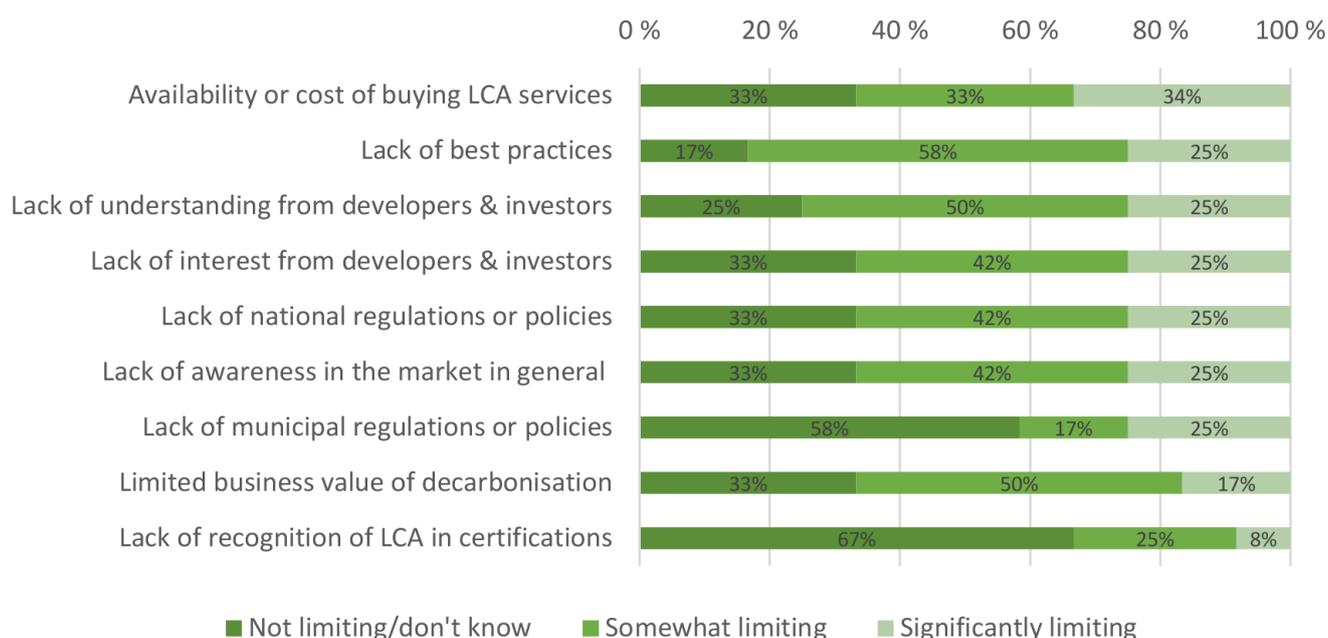


Fig A8. UK and Ireland

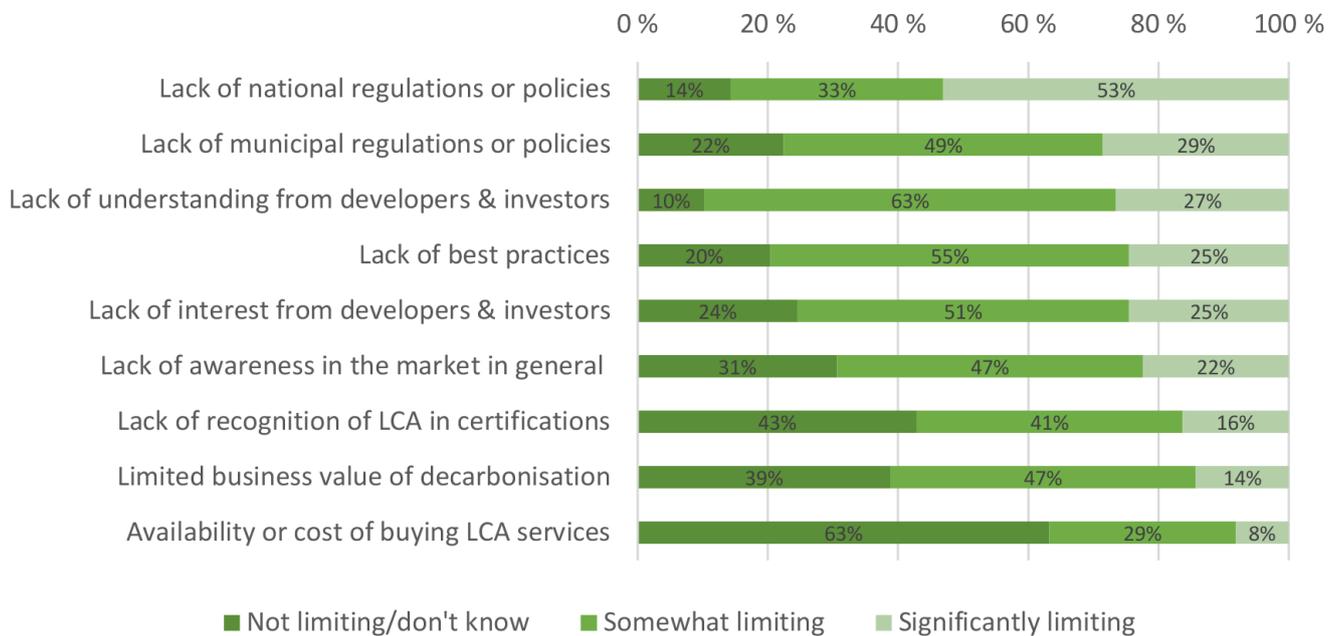


Fig A9. Northern America

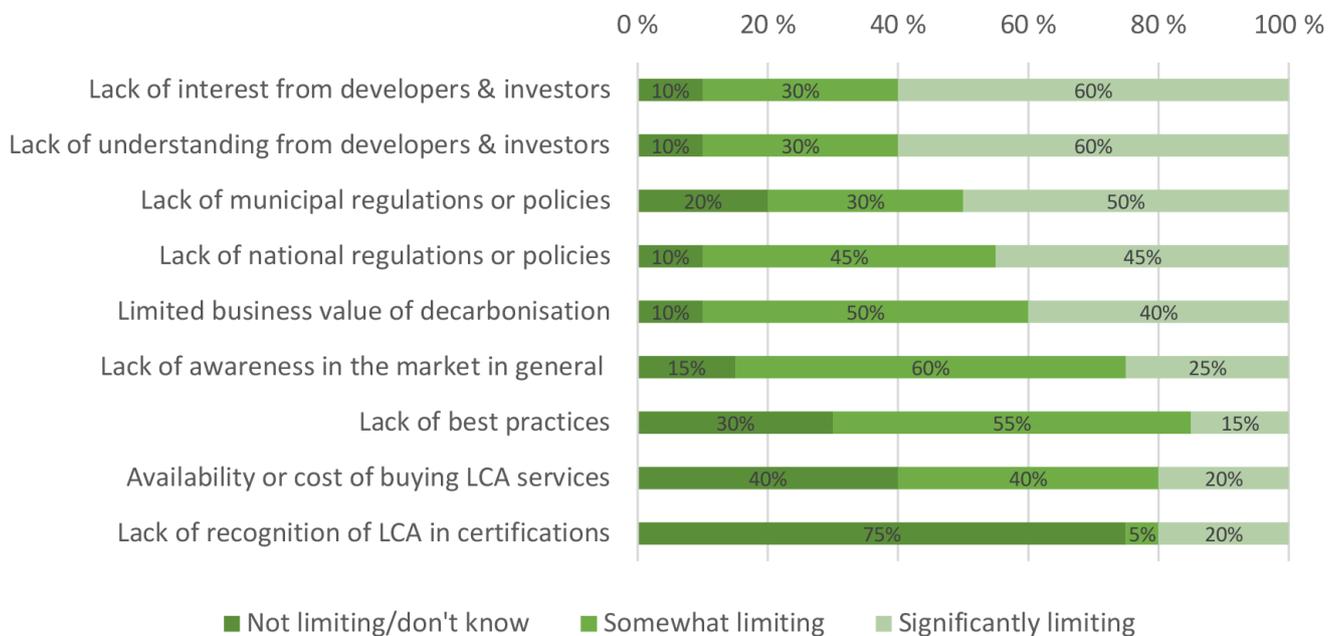
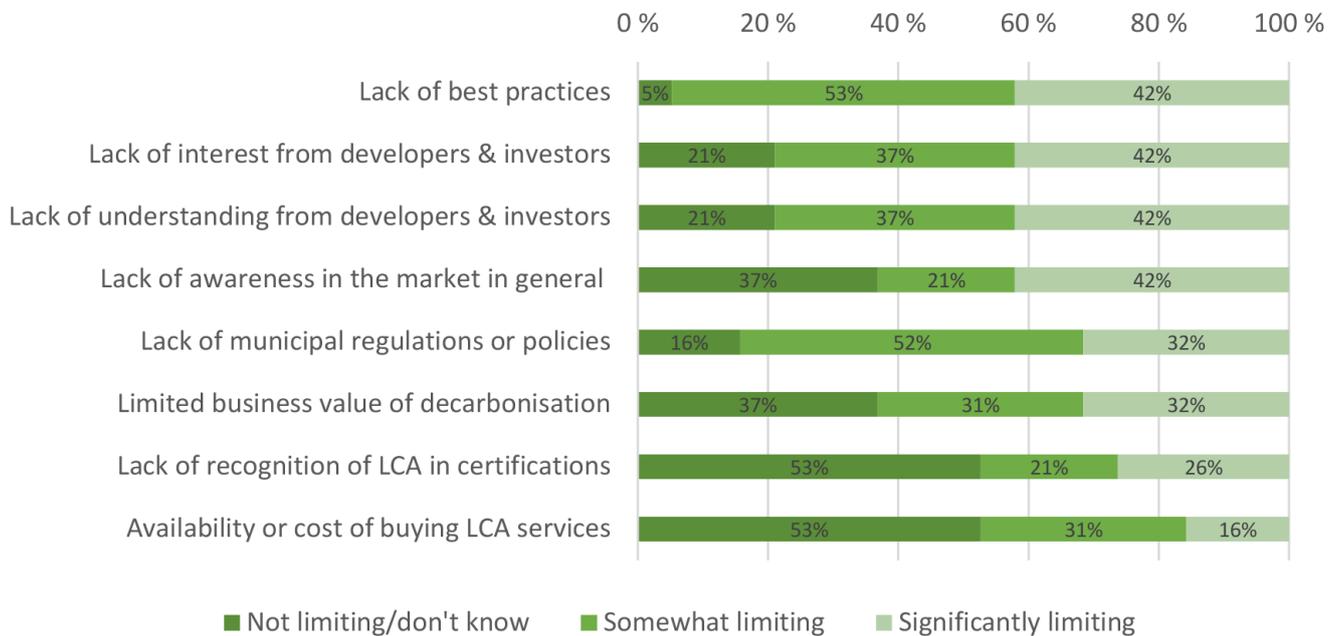


Fig A10. Other countries (RoW)



Supply-side factors limiting progress for LCA and embodied carbon work, responses per region. Note that response options are arranged in descending order by entries to option “significantly limiting”.

Fig A11. Continental Europe

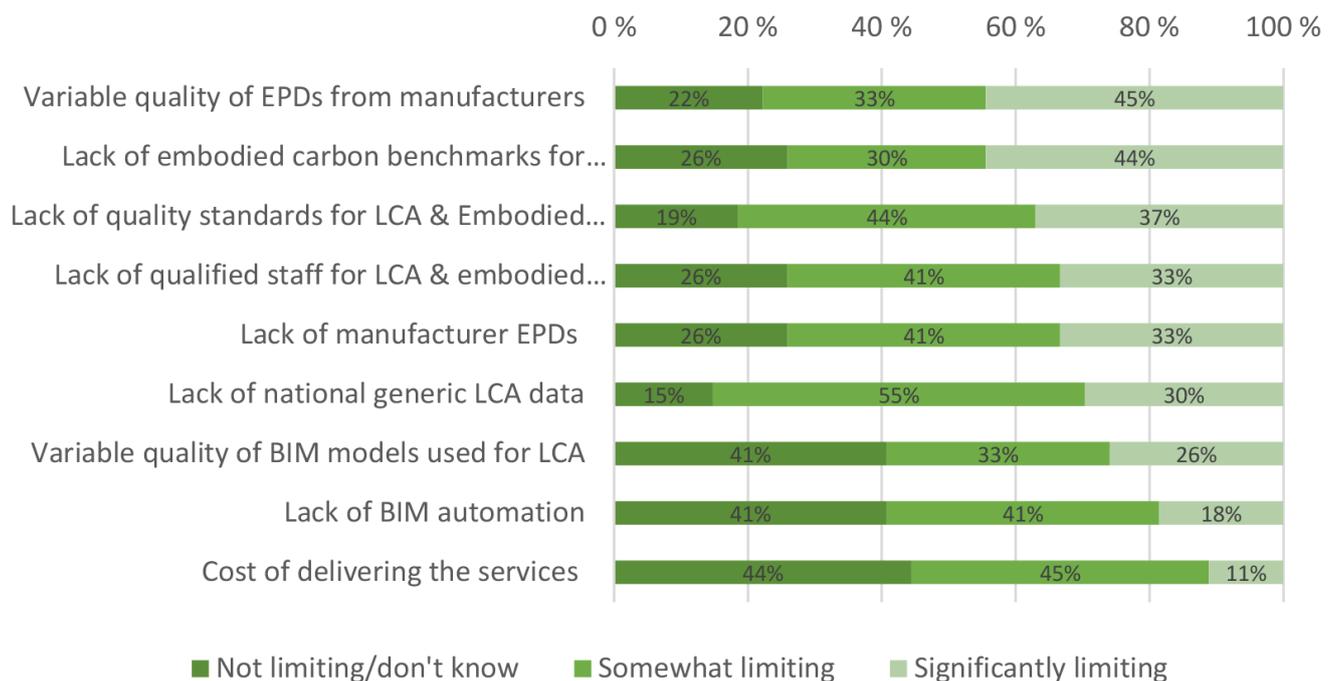


Fig A12. Nordic countries

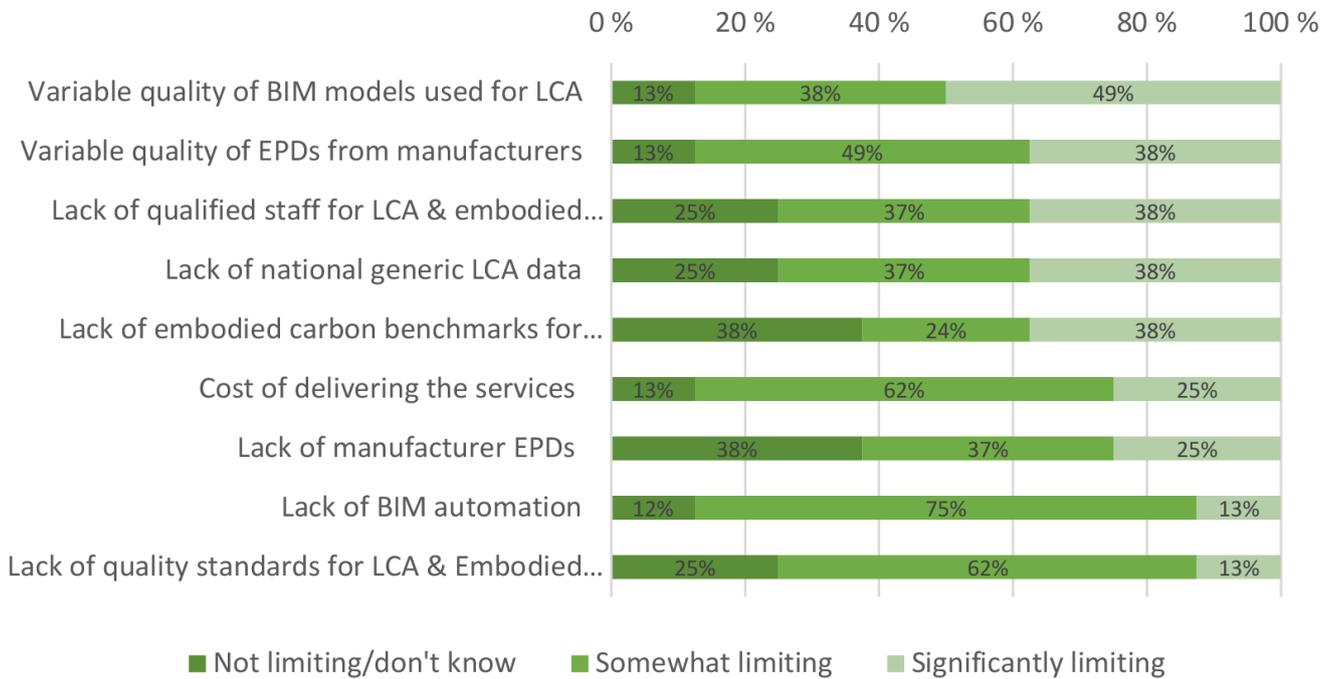


Fig A13. UK and Ireland

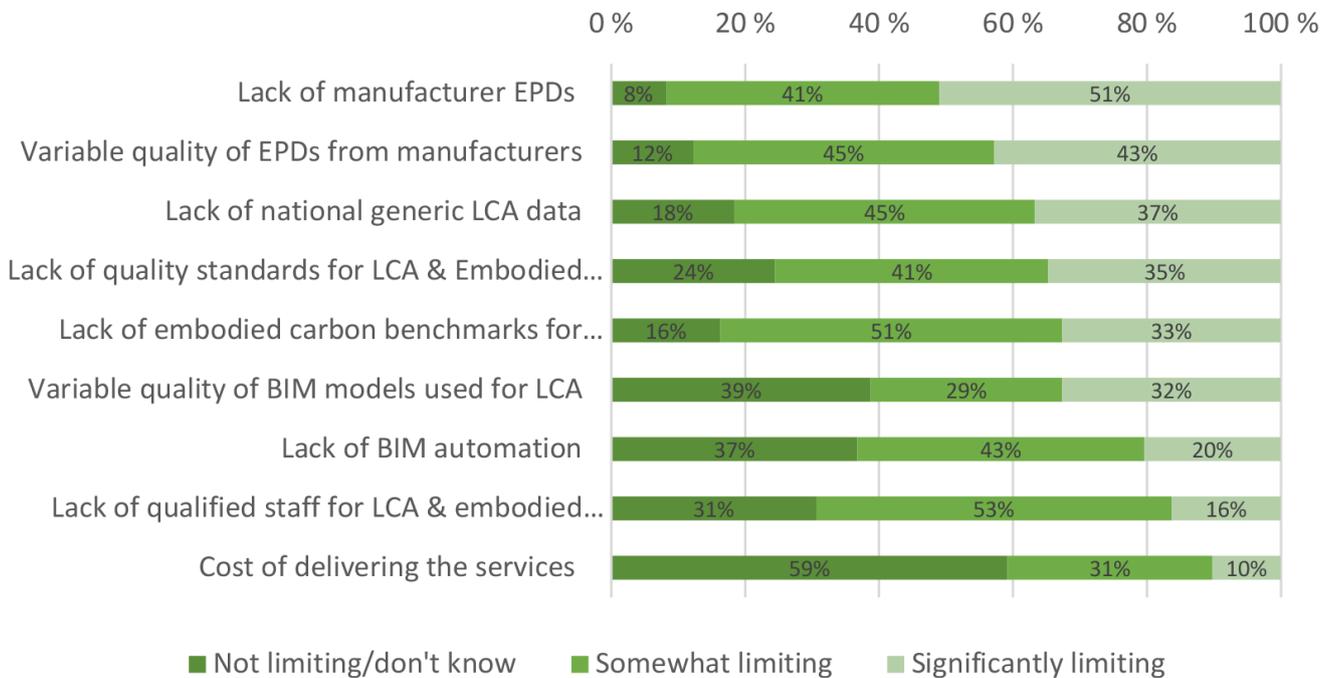


Fig A14. Northern America

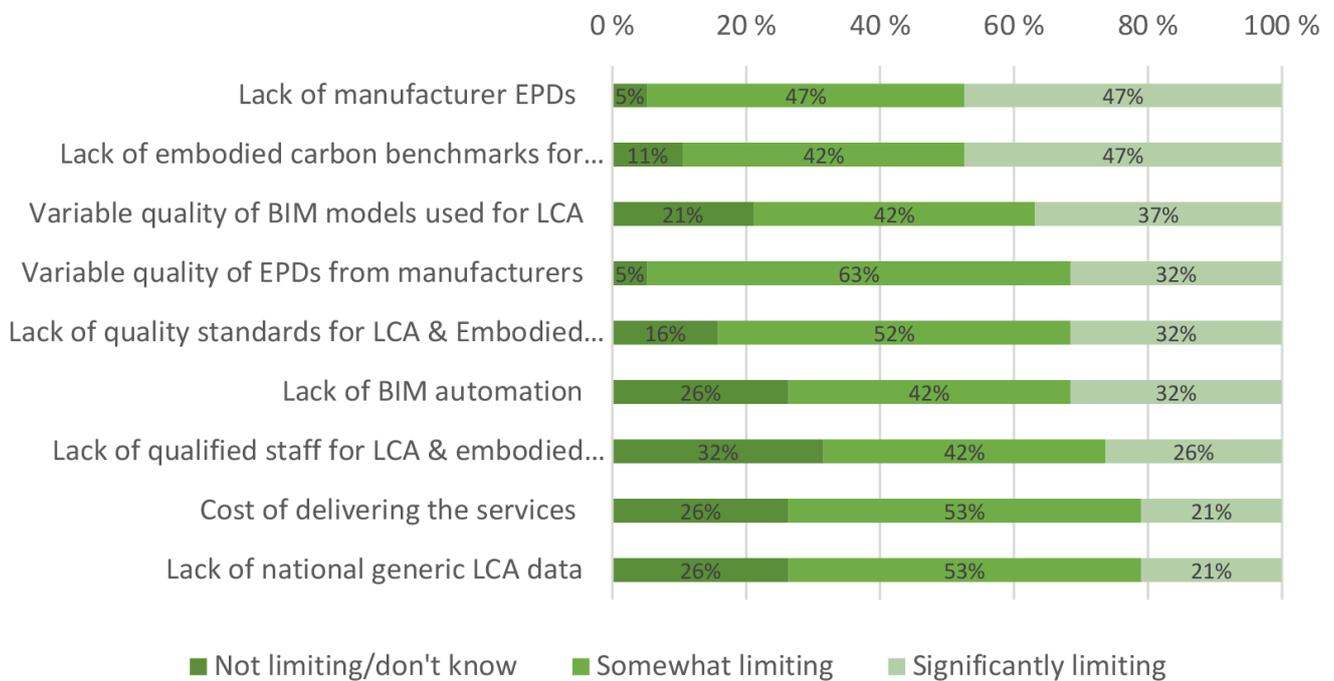


Fig A15. Other countries (RoW)

