

James Kallaos, Andrew Sudmant, Patrick Driscoll, Dirk Ahlers, Andy Gouldson

C-Valuate: Improving City-Scale Low-Carbon Investment Decision-Making

Final report

Climate-Kic Pathfinder

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Correspondence regarding this publication should be addressed to james.kallaos@ntnu.no.

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Executive summary

Access to reliable, timely, and relevant information is fundamental in most areas of decision-making but may be especially important in complex fast-moving fields where multiple ideas, approaches, or options compete for limited resources.

The low-carbon cities space is exactly such a field, with many cities seeking to accelerate and intensify their flow of low-carbon investment. However, there are diverse sources of information making different and sometimes competing claims about the potential contribution of various low-carbon options. The ability of city-level decision-makers to access real, empirical, data on different options, drawn from monitoring and evaluation of actual *ex-post* performance, is widely lacking.

This is a significant concern as the absence of such data hampers decision-makers'¹ ability to make sound and informed investment decisions, which restricts the rate of decarbonisation by increasing the risks and costs of low-carbon investment while reducing rates of innovation and learning.

This feasibility study examines the nature of this challenge in the context of low-carbon investment decision-making in cities and whether it could be resolved through a new approach to the collection and communication of evidence on the real performance of a wide range of low-carbon options that could be adopted in cities and communities around Europe.

It finds that:

- City-scale low-carbon investment decisions are typically taken against a backdrop of multiple stakeholders, competing priorities, tight budgets, pressing deadlines, contextually-specific conditions and a wide range of competing options. It therefore highlights the prevalence of context-specific decision-making under conditions of complexity and uncertainty.
- When making investment decisions, city-level decision-makers rely most heavily on their own experience, on internal sources of information and on personal contacts to guide decision-making. If economic data on the performance of a low-carbon options is available, it is not available for all alternatives, and data on the chosen option is often considered only late in the decision-making process.

Drawing on a review of existing platforms and organisations, a survey, and interviews with city-level decision-makers, this study proposes an approach that could be applied by c-valuate to stimulate evaluations of the real performance of low-carbon options and the provision of trustworthy, relevant information on performance to investors and decision-makers. It is argued that this approach could reduce the costs and the risks of low-carbon investments in cities and communities across Europe whilst also accelerating innovation and learning and the transition to a low-carbon economy.

¹: For the purposes of this policy brief, decision-makers are defined as administrative and political operatives affiliated with municipalities responsible for the development and/or implementation of climate policy actions

Output/Section 1: Review of existing data, methods, and quality of economic assessment, financing, policy arrangement

What information are city-scale decision-makers able to draw on as they review different low-carbon options? This section assesses the data sources that are currently utilised in European cities, with a critical focus placed on whether the information is accessible, relevant, transferable, and comprehensive (as defined below).

Methodological approach

Based on a systematic review by the project team, followed up by surveys and interviews (see Section 2), a list of 88 tools, platforms, and information databases was compiled. It should be noted that this set is not comprehensive – some data sources, particularly those not in English, may have been omitted.

The analysis of this list consisted of two steps. First, a set of 4 'gateway' criteria were used to narrow the list to a set specific to urban economic decision-making around climate actions. These criteria were assessed on a yes/no basis and are found in Table 1.

1. Contains specific low-carbon options
2. Intended to provide economic information
3. Relevant to European cities
4. Up to date (updated in 2017 or 2018)

Table 1: Gateway criteria for tools, platforms and information databases

Applying these criteria reduced the list from 88 to 10 tools, platforms, and information databases. An example of a platform excluded was the IEA energy efficiency database² that provides detailed information on policy options but is intended for national and regional decision-makers rather than urban decision-makers with very limited economic data. Another example is the UK-CIP Adaptation Wizard³, a website focused on adaptation rather than low-carbon options.

A second step then applied a scoring system to three sub-criteria attached to each of four key high-level criteria for each of the platforms and data sources that passed through the 'gateway' assessment. These criteria (Table 2) were subjectively scored on a scale from 1 to 5, with 5 indicating a sub-criterion was entirely met and 1 presenting a case where a sub-criterion was entirely missed. Scores were compiled by two researchers and compared for consistency.

² <https://www.iea.org/policiesandmeasures/energyefficiency/>

³ <https://www.ukcip.org.uk/wizard/>

Accessible		
Purpose of the source is clearly defined	Does not require specialist knowledge	Does not require licence and/or membership
Relevant		
Focused on the economics of mitigation	Includes information on specific actions	Is up-to-date (in terms of technologies and price)
Transferable		
Has an urban focus	Applies to a wide set of European contexts	Targets decision-makers
Comprehensive		
Includes <i>ex-ante</i> and <i>ex-post</i> analysis	Offers appropriate detail regarding costs, benefits, and timelines	Provides information on more than one course of action within a sector

Table 2: Sub-criteria attached to each of four key high-level criteria for tools, platforms and information databases.

This approach included a high level of subjectivity and strict criteria were not assigned to differentiate between each of the five possible scores in all cases. Minor differences between the scores of platforms are not significant. Relatively larger differences, however, can provide a high-level indication of the quality of data available and the gaps urban decision-makers may face when searching for information to support/compare low-carbon investments.

Key findings

Figure 1 provides an overview of the first step of analysis, wherein platforms and organisations were excluded from a more in-depth study if they failed to meet 'gateway' criteria. Overall, only 10 platforms/organisations of 88 considered (12%) passed all criteria. Of those that failed, more than half (56%), did not contain information on specific low-carbon options, almost one-half (44%) had little to no economic information, more than one-third (37%) were not relevant to European cities, and almost one-fifth (18%) were not up to date.

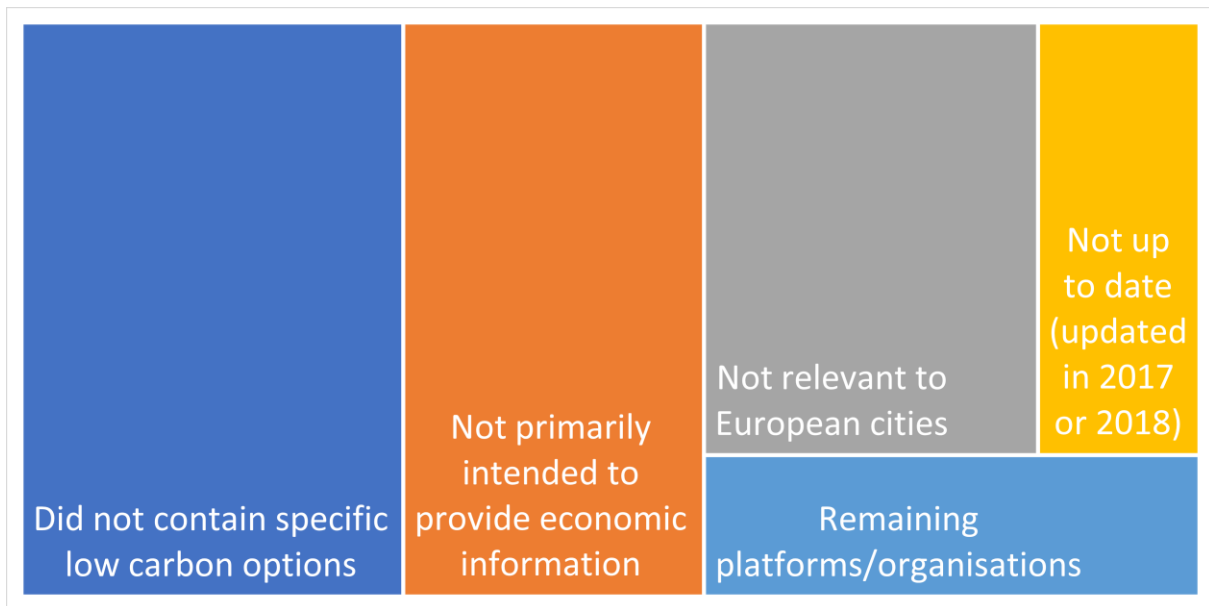


Figure 1: Breakdown of platforms/organisations by gateway criteria. Where a platform was excluded for multiple reasons, a 'share' was apportioned to each criterion.

These high-level findings suggest that only a relatively small set of existing platforms and organisations provide economic data relevant to low-carbon decision-making. Further, within those organisations/platforms that focus on the economic case, a smaller set is relevant to Europe, and only a limited number of those are active platforms that might be expected to provide the most up-to-date information. These findings suggest that locating information to support low-carbon urban action may be relatively challenging for European decision-makers. However, this section of the analysis does not consider what platforms/organisations urban decision-makers are actually using – a question left for the following section of this report.

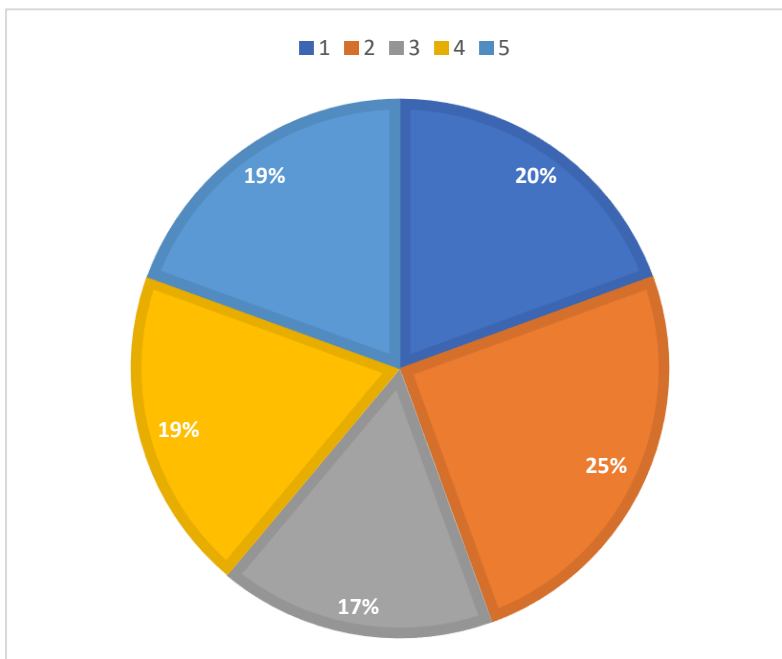


Figure 2: Breakdown of key data sources by the sectors they address

Investigating the 10 key organisations/platforms remaining (detailed in Appendix A), Figure 2 considers the relative focus across sectors considered in this analysis. Applying a simple yes/no framework, each platform/organisation was scored for each of the sectors it covered.

Results show a balance between sectors, with each of the five considered in similar proportions. It is worth pointing out, however, that this relative balance does not reflect of the quality

of the information (investigated in Figure 3), the balance of emissions in the cities, or the areas where urban decision-makers have influence. The waste sector is considered in 17%

of cases, but only very rarely makes up more than 3% of urban European Scope 1 and 2 GHG⁴. Similarly, transport is considered in one-fifth of cases, but in many urban areas decision-makers only have limited influence – by way of affecting infrastructure development.

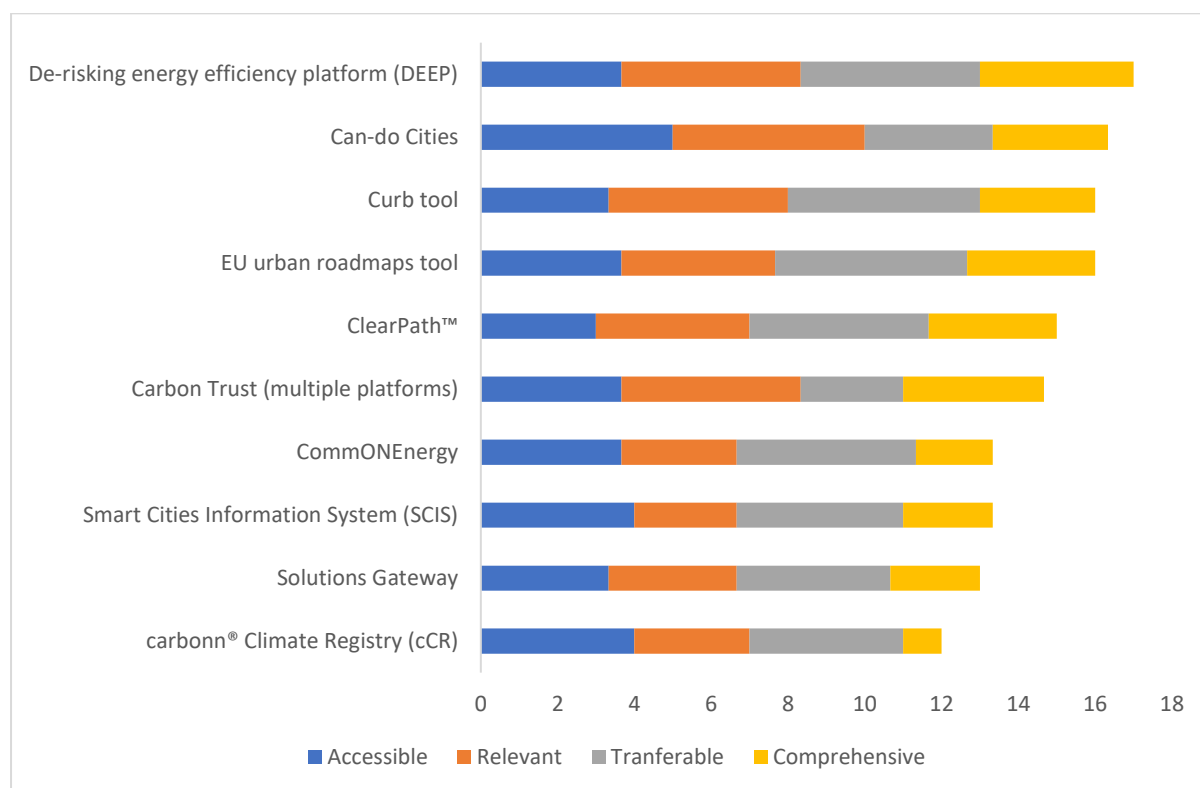


Figure 3: Platforms and data sources ranked by overall score

Within the remaining 10 platforms and organisations, Figure 3 presents the results of an assessment of the quality of the information for informing economic analysis of urban European low-carbon investments. As highlighted in the methodological section, these 10, rather than providing a definitive set of sources, should be viewed as a snapshot of the information sources available to, and currently being used by, European urban decision-makers.

In terms of 'Accessibility', most platforms scored highly. However, limitations were found in two areas. First, several platforms scored poorly on the sub-criterion around 'specialist knowledge'. For example, to interpret results from the 'Curb Tool' from the World Bank requires expertise in low-carbon systems that may be a barrier for some users. Second, several platforms required licencing and/or membership that could pose a barrier for users. The highest scoring platform for 'Accessibility' was the Can-Do Cities platform from the University of Leeds⁵.

⁴ Gouldson, A., Colenbrander, S., Sudmant, A., McAnulla, F., Kerr, N., Sakai, P., Hall, S., Papargyropoulou, E., Kuylenstierna, J. (2015). Exploring the economic case for climate action in cities. *Global Environmental Change*, 35, 93-105. DOI: 10.1016/j.gloenvcha.2015.07.009

⁵ Individuals involved in the development of this platform were also involved in this project, including in the scoring of platforms.

In terms of 'Relevance', platforms scored highly on the sub-criterion "Economics of mitigation" and "Up-to-date" – in part due to the fact that 'gateway' criteria excluded tools that would have scored poorly by this criterion. Lowest scores were recorded for the sub-criterion "Information on specific actions", where platforms including the "Smart Cities Information System (SCIS)" and "CommONEnergy" scored poorly. These, as well as other platforms, rely heavily on case studies which users are required to compile and then compare in order to draw conclusions. The investment of time and effort required to collect information on an action increases the likelihood of users missing or misinterpreting relevant use-cases. The 'Curb Tool' from the World Bank was the highest scoring in terms of 'Relevance'.

In terms of 'Transferability' platforms/organisations scored highly for the sub-criterion "urban" but relatively more poorly, in some cases, for "applies to a wide set of European contexts". Specifically, the Can-Do Cities platform and several tools (scored collectively) from the Carbon Trust, apply to the UK but have more limited relevance for wider European contexts.

Finally, scores for the 'Comprehensiveness' of platforms and organisations were the lowest across criteria. Very few platforms/organisations contained any information on *ex post* analysis, little detail was present on timelines or the breakdown of costs, and in cases (for example, the Carbonn® Climate Registry), there is no information on multiple measures and/or courses of action within a sector.

Discussion

As urban centres have emerged as leaders in the fight against climate change, sources of information to support urban action have proliferated. These include city networks/alliances (The Cool Cities Network, United Cities and Local Governments, Compact of Mayors, Covenant of Mayors), academic institutes (LSE Cities, Climate Smart Cities, Can Do Cities) and NGOs (C40, ICLEI, 100 Resilient Cities) and multi-lateral lending bodies such as the World Bank.

Assessing a large set of these sources reveal that a substantial body of high quality economic data on low-carbon action in cities is readily available to urban practitioners. Urban, European-specific, economic data, that is up to date and contains specific information on low-carbon options is available for each of the transport, buildings, industry, waste and renewables sectors. Within each of these sectors (to greater and lesser degrees), data is available that is accessible (clearly defined, does not require specialist knowledge, and does not require membership), relevant (up-to-date, contains economic information, contains measure specific information), transferable (urban, European, and targeting decision-makers), and, to a lesser extent, comprehensive (*ex-post*, detailed timelines, timelines and costs around multiple actions).

However, while this information is available, there are significant shortcomings. A majority of information sources in the low-carbon space are not focused on economics in an urban European context. Consequently, time and effort are required to find and stay up to date with the most relevant sources of information.

Where platforms are focused on the economics of low-carbon action in an urban European context, information often:

- Requires specialist knowledge to interpret and/or membership to access – barriers that may be most significant for smaller municipalities without dedicated climate staff and budgets;
- Relies heavily on small numbers of case studies of 'success stories' that provide limited information on the contingencies and contextual factors that will make similar action a success or failure other urban areas, and that require substantial time and effort to compile;
- Are highly regionalised, even within a European context, limiting their relevance and visibility to wider decision-makers; and
- Contain limited financial data, and only a very small number contain *ex post* analysis with detailed economic and/or financial information and timelines.

These limitations suggest that we should not assume decision-makers necessarily have access to the economic information they need to inform low-carbon actions. The information landscape is quickly evolving, however, and many of the gaps in the evidence base may be closed in the near future.

A more significant issue is likely the manifold barriers to accessing this information. Websites not updated in the last two years may be drawing attention away from those recently updated, and platforms that require membership or specialised knowledge may not be accessible for small municipalities. In the following section, interview and survey results of decision-makers are presented to understand to what extent these barriers are affecting the diffusion of knowledge on the economics of low-carbon action in European cities.

Output/Section 2: Review of existing business and investment models

In this section, a survey conducted among 27 urban decision-makers and follow-up interviews with 8 urban decision-makers are used to explore the business and investment approaches applied to low-carbon investments. All respondents were involved in city decision-making for low-carbon actions, including local and municipal government positions, consultants working with city governments, and officials linked to the city without being directly employed by them (such as through a university, NGO, or development office). An anonymized list of survey and interview respondents is included as Appendix B. Particular focus was placed on the economic data that feeds into the options appraisal process and the extent that economic data is a driver of low-carbon action. Consideration was also given to the availability and quality of calibrated data from *ex-post* evaluations of project/investment outcomes.

Methodological approach

Based on the initial review of literature, platforms, and organizations, an online survey (Appendix C) was developed to elicit the sources of data that decision-makers use to inform decision-making and ascertain their subjective opinion of the quality of data available. A relevant but non-comprehensive sample of city decision-makers was then built from personal networks, city websites, and online databases. Over one hundred (141) city decision-makers were contacted. Of those contacted, 64 opened the survey link and 27 fully completed the survey..

To investigate further some of the findings of the survey, an open-form interview (Appendix D) was designed to evaluate the decision-making process of the city administration, assess screening tools, systematized methodologies, and business / investment models, and to explore the value of membership in low-carbon city organizations. This was accomplished through direct questions regarding decision-making methodologies and the use of *ex-post* data, as well through a walk-through of two projects – one successful and one unsuccessful.

From the survey respondents, 19 agreed to be interviewed. Seven interviews were conducted, with eight interviewees representing six European countries. (One of the interviews was with two partners representing the same city-affiliated agency).

Key findings: survey

The first section of the survey explored data/information sources used to make decisions around low-carbon projects. Figure 4 shows that the most cited sources for data and information are *direct experience*, *external city networks*, and *internal city networks*. Rounding out the top five are *technology suppliers* and *business partners*, all cited by more than half of respondents. Other sources of information, including *online platforms*, *research groups*, and *international organisations* were cited by less than half of respondents. Surprisingly, information from the investment community was among the least cited sources.

These findings raise questions around the quality of information and data urban actors are drawing on to support low-carbon investments. While *external city networks* include many of the key sources of quality data and information cited in the previous section, *direct experience*, *internal city networks*, *technology suppliers* and *business partners* are sources of

information that may be limited in critical ways. Most importantly, these sources are likely to be secondary or tertiary information sources, meaning that the information they provide came from a previous source, creating scope for bias in the interpretation of that data, and for that data to have become out of date.

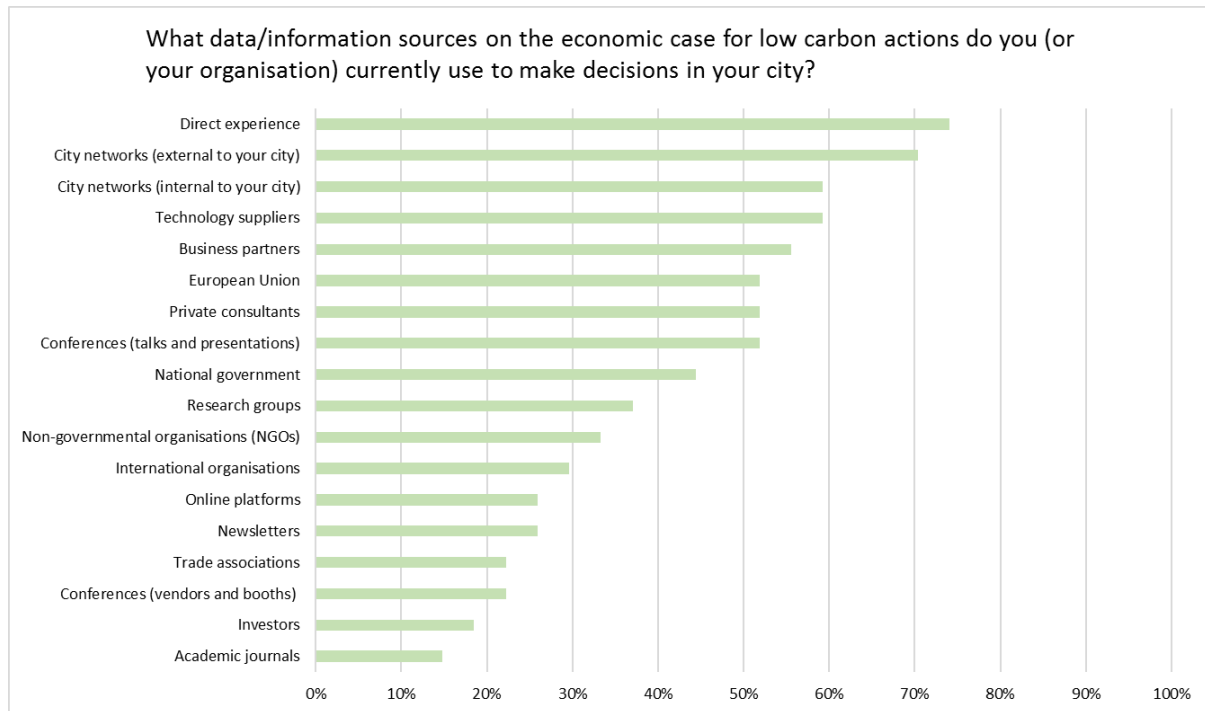


Figure 4: Data/information sources in use by city decision-makers.

The following question investigated whether respondents felt that data/information sources available to them were providing what their organizations need to make informed decisions. Responses indicate that approximately half of urban decision-makers feel that they *always* or *very often* have access to the information they need, implying that approximately half see gaps in the information sources available to them, or of which they are aware.

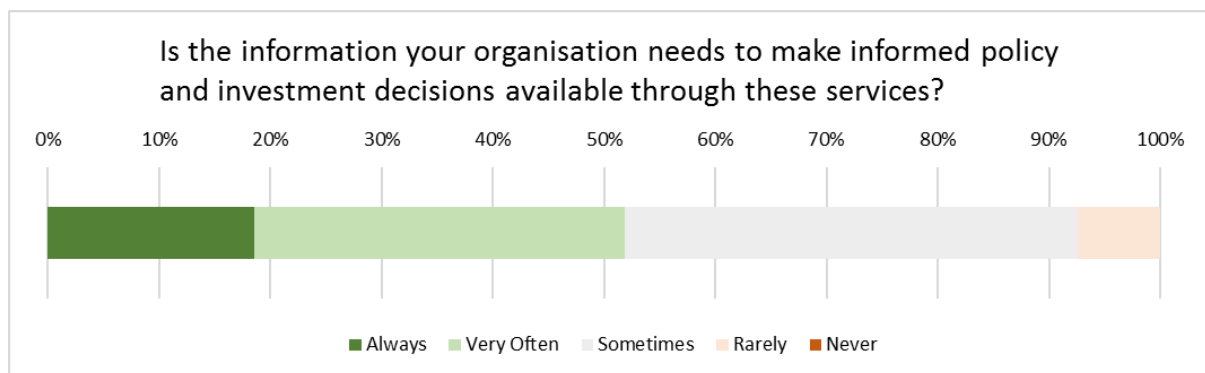


Figure 5: Survey responses on the availability of information for informed policy decisions.

To investigate this question further, an open-ended question asked what was missing from the available data. Responses to "What is missing?" (Figure 6) indicate that urban actors are lacking some very basic information required to inform low-carbon investments, including *detailed energy data* and *economic information*. Further, many of the responses indicate a need, not just for technical data, but wider sources of information. These include calls for *socio-economic information* and information on *indirect economic impacts*.

- Energy consumption/production data, RES potential
- Tools to assess the economic value of data in cities
- Better validated material/models
- Due to the innovative character of low carbon cities and the transition towards it, evidence of economic benefit is scarce.
- Information adapted to local context specificities
- Reasonable percentage of developments energy needs that can be provided through on-site renewable energy
- Too many uncertainties on financial and business model information
- The actual impact on CO₂ emissions is often unclear
- Easy to find solution
- Good quality GHG inventory, consistency in national policy, socioeconomic analysis of measures
- Evaluation of indirect economic impacts and long-term visions
- Sectoral data on different buildings and installations
- Detailed energy data
- Complete statistics with sources
- Economical information

Figure 6: Quoted responses (sic) to the question: What is missing?

Respondents were then presented with two questions as to whether or not they considered their organisations to be limited by the quantity and quality of economic/financial information regarding low-carbon actions.

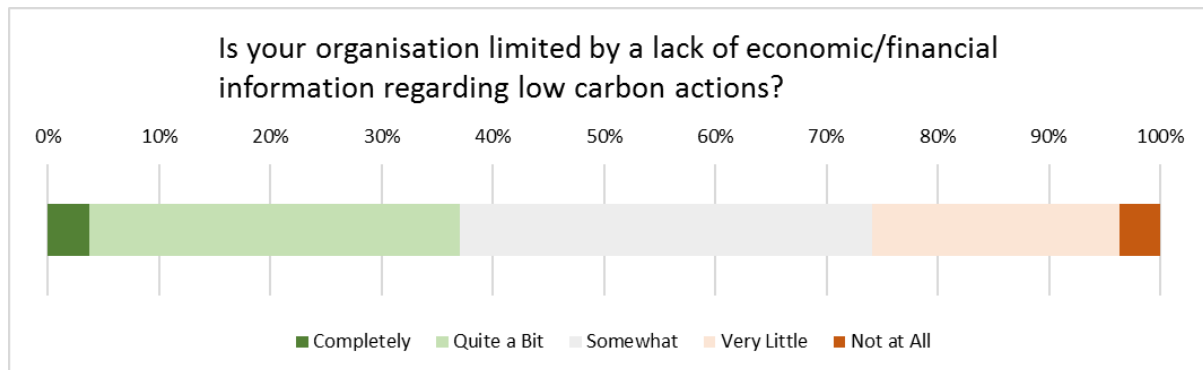


Figure 7: Is your organisation limited by a lack of economic/financial information regarding low-carbon actions?

Regarding the quantity of information, nearly 75% of respondents (20/27) felt that they were at least *somewhat* limited by a lack of economic/financial information regarding low-carbon actions, while over 35% (10/27) felt they were *quite a bit* or *completely* limited.

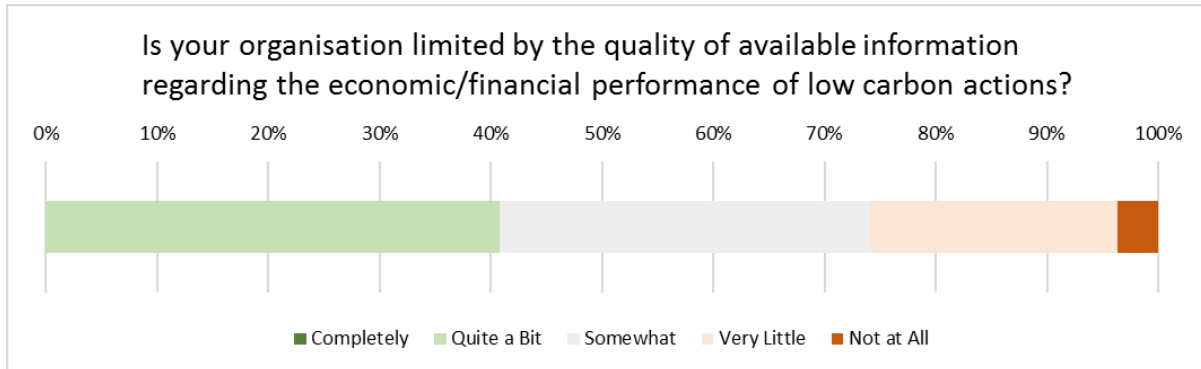


Figure 8: Is your organisation limited by the quality of available information regarding the economic/financial performance of low-carbon actions?

Regarding the quality of information, a similar proportion felt that the quality of the information that was available was a limiting factor, though none felt *completely* limited by economic/financial data quality. One respondent was very positive, replying *not at all* to both questions. These findings corroborate and extend on the findings in Figure 5. Somewhere between half and two-thirds of respondents see gaps in the quality and quality of data and information available to them.

Further, these findings suggest a need to further investigate the quality of data available to urban actors, and to seek to understand what the specific gaps are in the data/information available. In the following questions, respondents were asked how important they considered the following criteria in the information/ data that they use to inform low-carbon actions, and how well current sources of information meet these criteria:

- Accessible (presented in a way that is easy to interpret, does not require membership or special programs to use)
- Relevant (information on the economics of mitigation, information on the sector/area we are working on, up-to-date - in terms of technologies and costs)
- Transferable (information presented is transferable to the context you work in: is European, urban and policymaker focused)
- Comprehensive (supported by *ex-ante* and *ex-post* analysis, appropriate detail regarding costs, benefits and timelines, provides information on more than one course of action for a given challenge)

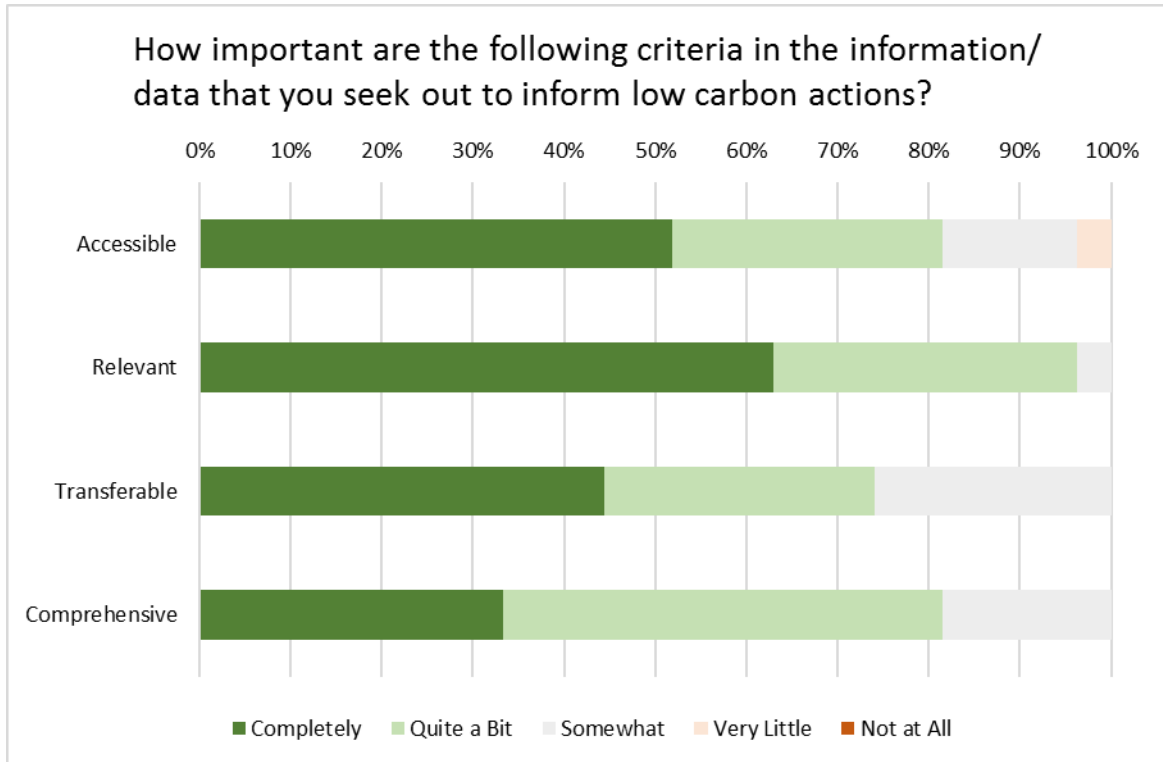


Figure 9: How important are the following criteria in the information/data that you seek out to inform low-carbon actions?

Results indicate that 75% - 95% of respondents place high value ('completely' or 'quite a bit') on each of these criteria, with the highest value on the *relevance* of data/information, and the lowest relative value on the *transferability* of data/information.

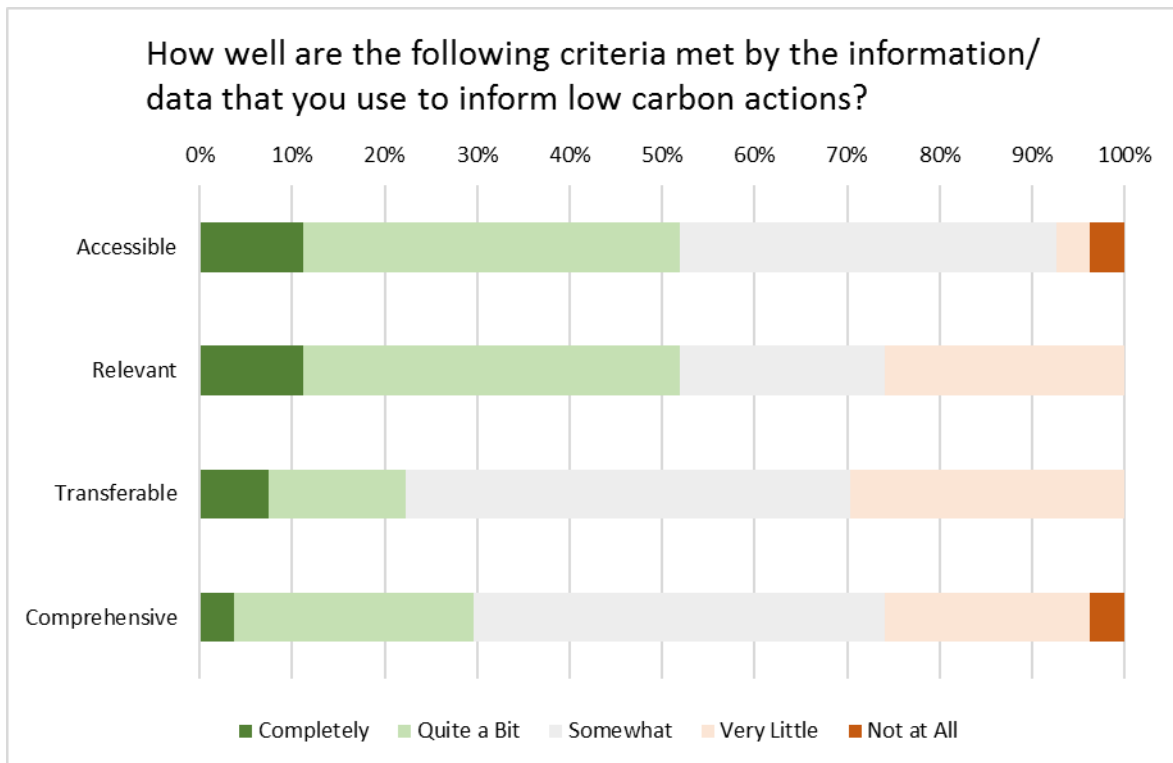


Figure 10: How well are the following criteria met by the information/data that you use to inform low-carbon actions?

In contrast, more than half of respondents report that the data/information available to them does not meet these criteria more than *somewhat*. Results are particularly stark

between the first two criteria *Accessible* and *Relevant*, and the second two criteria. *Transferable* and *Comprehensive*, with less than one-third of respondents reporting that data and information for them is more than *Somewhat* met by the latter two criteria.

Key findings: interviews

Interviews with eight urban decision-makers helped to provide detail to the findings from the survey and the review of platforms and organisations. Key points from across these discussions centred around three areas.

First, approaches to decision-making around low-carbon projects are highly context specific, but are strongly influenced by the source of funding. Externally funded projects, supported by state, national, or EU level finance, tend to contain specific targets and objectives and involve a considerable amount of external scrutiny. Projects and project results are generally published and *ex-post* evaluations, though not always timely or publicly available, are frequently required. In these cases, respondents emphasised that they often had little influence over project choice or implementation approaches as these were prescribed by project documents. In these cases, expertise at the urban level was applied to 'acquiring'

"*ex-post* data is not a driver because it is generally not available" (Interviewee #1, 2018)

pre-determined projects looking for a place to be implemented. Externally funded projects were reported to generally make up a small percentage of the urban climate related investments.

Conversely, where low-carbon projects were partially or wholly internally funded, respondents emphasised that scrutiny and accountability were generally internal, often unpublished, and varied on a project to project basis, potentially limiting learning processes. Project ideas often originated from an overall city strategy, but also from internal city discussions, and other urban stakeholders, and projects most frequently included a climate 'aspect' rather than strictly addressing climate change. For example, an externally funded project referenced was the installation of solar panels on existing municipal buildings, while an internally funded project referenced was the inclusion of solar panels on a new public building.

"... external funding in ... from EU sources or national sources ... there is a form and a method described on how to calculate carbon emission reductions – then that format is applied, because you have to. [But in] ... the bulk of projects in cities, where it might be the city, or it might be private or publicly owned companies doing the investments ... there is not too much use of standardized tools, so it's more on the experience from, say the participating housing companies, energy companies, municipality departments..." (Interviewee #4, 2018).

Comparing the approaches to accountability around internally and externally funded projects provides some insight into the role of internal networks in both the development, and governance, of low carbon projects. Processes of accountability and governance for externally funded projects were described as highly formalized and centred around specific technical, economic and environmental indications. In contrast, processes around internally funded projects were relatively more informal, tending to provide more consideration for local social and political considerations, and often supported by informal networks.

"When it comes to the cost-benefit side of things we have very little to go on. But we try and look at things like the ... roadmaps for 2030 and 2050 at the national level, which we then try and break down and group measures into low cost / medium cost / and high cost per ton of carbon. It is very difficult to go from these kinds of national, very general, categorizations down to the local level" (Interviewee #6, 2018)

Interestingly, respondents did not provide a clear bias towards either of these approaches as having more legitimacy or efficacy, possibly suggesting that each can play a complimentary role in supporting urban low carbon transitions. Formalised approaches brought by external actors may help overcome capacity limitations (most importantly financial capacity limitations), focus policy priorities and overcome institutional inertia. Internal processes, supported by informal networks both within government and between government, citizens, businesses, and the third sector, may be more effective at ensuring local 'buy-in', building coalitions

of support for action, and including wider social and political considerations. These informal networks and processes may also provide space for experimentation around low carbon action outside of the structures provided by more formalised processes, an area that has received substantial academic interest in recent years⁶.

Interviews provided only a limited view into the makeup of the informal networks respondents described. Respondents spoke of colleagues in their own departments, colleagues in other departments, 'contacts' at other agencies, industry groups, personal contacts, and academic conferences, amongst other influences. These networks, by their nature, are organically developing, place specific, and influenced both by the history of each member (including where they previously worked, went to school and lived), and the structure of the organisation they currently work in – with some organisations supporting a more open and 'fluid' work process and others developing strict procedures and work processes. Understanding these networks more fully may be an area for future research.

"...the city ... is not extremely overambitious when it comes to decarbonization" (Interviewee #5, 2018)

"...the project is defined by people who have other priorities ... And of course you want to build schools, nurseries, infrastructure, that have the user in focus. I think our challenge is to get in early enough in the decision-making process where you can find those co-benefits (Interviewee #6, 2018).

Second, interviewees were rarely able to specifically cite the sources of information that entered the decision-making process, even as they walked the interviewers through specific projects that they had worked on and were otherwise intimately knowledgeable about. Exploring why interviewees were not able to cite specific sources, respondents tended to emphasise the number of sources that contributed to the processes, and the competing, and sometimes conflicting interests that needed to be addressed.

⁶ See, for example, Bulkeley, H., & Castán Broto, V. (2013). Government by experiment? Global cities and the governing of climate change. *Transactions of the institute of British geographers*, 38(3), 361-375.

These findings emphasise the importance of wider political, social and environmental considerations that are contributing to decision-making around low-carbon projects. In addition, they suggest that rather than being strictly technical inputs, economic information is being seen as an 'input' into a wider process. Platforms and organisations therefore need to consider the ways their information can inform and engage these processes, for example, by considering some of the political, social and environmental co-costs and benefits alongside economic costs and benefits.

Third, interviewees cited a range of points where economic information contributed to the decision-making process, but rarely cited economic information, internally or externally provided, as a starting point for guiding decision-making. This reinforces the importance of economic information as an input into a wider socio-political process, but also raises questions about the decision-making processes taking place. Respondents described projects around climate change as having originated out of urban strategies, but also suggested that these strategies

"when it comes to housing and refurbishment, we rely a lot on producers' information on the reduction of energy demand and CO2 emissions ... that's why now we, in this project ... we closely evaluate the actual effect of refurbishment ... as it is quite important for us to have independent, measured, information on energy consumption and CO2 emissions. It is easier to rely on industry information, but the rebound effects are massive and completely under-observed, and so we as a city are quite happy to have this chance to collect our own information, and to really know based on our own data what exactly happens" (Interviewee #5, 2018)

"...to a certain extent it always depends on personal engagement in the issues. How or to what extent people in charge consider energy and climate issues to be important" (Interviewee #6, 2018).

primarily outlined targets (rather than measures), and that climate actions were frequently added to existing projects designed to address other issues. This process of embedding climate action is critical, but if climate change is only considered after projects have started being developed, the scope for meaningful consideration of climate impacts is reduced, and the opportunity for employing best practices is made more limited.

Collectively, these findings describe a

complex and contextually specific process for urban decision-making around climate action. Rather than being a "straight-line", starting with the prioritization of climate action, following with the comparison of options and ending with an investment decision, low-carbon policymaking processes in cities seem to be an iterative process whereby targets are set, ideas are generated, and then made to 'embed' into existing plans and policies. Economic considerations are at times a secondary consideration for an issue that could be considered to be of secondary importance. Climate considerations are only one among a diverse set of considerations on the minds of urban actors working in this space.

"I don't think a city would see it in the same way. It would say: "what is the main objective with the investment we are thinking about? Is it an infrastructure project? Is it a social upgrading project? Is it a housing project?" and that would be the main basis for deciding on investing or not. Then ... [they would ask] ... "OK, how do we make this as climate-efficient as possible?" So it would be kind of a second-tier objective, though there would be more overarching strategic goals for the city" (Interviewee #4, 2018)

Discussion

A strong commitment to urban climate action can be seen in both the survey and interview results. Urban decision-makers are implementing a range of options, both independently and with regional, national, or international support. These decision-makers are drawing on a wide set of information sources and are integrating climate action into urban investment. However, current approaches to urban climate action may be limited both by the data sources urban actors are relying upon, and by the approaches to urban action that are being employed:

- Decision-makers cite knowledge from *direct experience, internal city networks, technology suppliers* and *business partners* as 4 of the top 5 sources of information for informing low-carbon action in cities, sources that may not be up-to-date or unbiased
- Urban decision-makers place high value on having access to information that is *accessible, relevant, transferable, and comprehensive*, but more than half do not feel current data sources available to them more than "somewhat" meet these criteria
- Internally funded climate actions much less frequently follow strict and consistent protocols for implementation of tracking outcomes, potentially preventing cities from learning from their mistakes
- Urban climate actions, especially internally funded ones, are frequently designed as parts of wider investment programs, but climate considerations are often considered too late in the process to be meaningfully integrated
- Urban climate decision-making is a socio-political as well as a technical process, with economic information as one among many inputs. Platforms and organisations therefore need to consider ways their information can inform and engage these processes, for example, by considering some of the political, social and environmental co-costs and benefits alongside economic costs and benefits.

Output/Section 3: Business plan for c-valuate

Market Need

The rationale for developing c-valuate is based on two key observations:

- That the ability of investors and city-level decision-makers to make sound and informed investment decisions is being hampered by the absence of easy access to trustworthy, actionable data on the performance of different low-carbon options, drawn from *ex-post* monitoring and evaluation;
- The absence of this data is increasing the risks and the costs of low-carbon investment, while reducing rates of innovation and learning, thereby restricting the rate of decarbonisation.

Mission

C-valuate will therefore work with key stakeholders (R&D funders, investors, technology suppliers, advisors, cities and city networks) to:

- Co-develop a template for the conduct of evaluations of the real performance of different low-carbon options and a related reporting standard that can enable normalised assessments of performance;
- Encourage the widespread application of the template and the reporting standard to generate a significant flow of real, empirical, data on the performance of low-carbon investments drawn from *ex-post* monitoring and evaluation;
- Provide the related data in forms that enable improved low-carbon investment decision-making and accelerated innovation and learning in cities and communities across Europe.

The business model canvas (Figure 11) provides a high-level overview of the key categories, which are described in more detail below.

Key Partners

C-valuate will work with key stakeholders on the supply-side of the information provision equation to stimulate the flow of information, and with key actors on the demand side to ensure that the information provided meets user needs for improved decision-making.

On the supply-side, in the start-up phase we will engage with key supporters of low-carbon investment – particularly with European and national R&D funders and bodies, publicly supported investors, research groups, technology developers, user groups and stakeholders – to co-develop the evaluation template and reporting framework. A critical aspect will be ensuring that these groups require the projects that they support, invest in, or conduct, to apply the template and reporting framework. Once the framework has generated a significant flow of performance information from these sources, we expect other actors to voluntarily add to the information pool, both as a mark of good practice and as a way of getting access to paid tiers of information available through c-valuate (see below).

On the demand-side, in the start-up phase we will work closely with city-scale decision-makers and other stakeholders to understand their context for decision-making and their information needs. This understanding will feed back into the design of the evaluation framework and the reporting template, as well as into the communications strategy that will guide the ways in which the information is provided to decision-makers. Wherever possible,

we will supplement existing platforms and networks with new content rather than creating new channels of information.

Key Resources

Through work on the economics of climate change in cities over the last 8 years, the team comprising c-valuate has access to a unique set of skills and modelling capabilities to support the development of a template for project evaluation, and to support partners and stakeholders supply information on low-carbon projects. The c-valuate team has also developed a substantial database of contacts involved in low-carbon investment in cities.

Channels and Customer Relations

Face-to-face interactions that will be the primary method of interaction during the development of the evaluation framework. Supplementing this, a simple low-cost website (www.c-valuate.com) has been secured and will be developed to gather information and interface with city-scale decision-makers. A previous product created by members of the team, www.candocities.org, provides an example of how this website could look.

Business Model

After a start-up phase, c-valuate will support its activities by employing a tiered model of access, split between public and private actors.

For public actors (accredited by their email addresses), a freemium model of free access, supported by premium (priced) value added data and information services will be utilised. To encourage the supply of relevant information, we envisage a model where organisations that reach a threshold for the provision of a required quantity and quality of information will be given access to wider information sets that allow them to benchmark performance against other options and explore contingencies and sensitivities. For organisations supplying the most and the best information, we envisage them securing access to a verification service which accredits their performance evaluation and endorses the performance claims that they make. Additional services on a consultancy basis will be advertised to members.

For private actors, including financing organisations, data and access would be available through a tiered model. Figures provided below are based on research of similar networks.

Tier 1

- 100€ per month
- Access to high-level data. No ability to interact with members through the platform or to see the names of organisations participating

Tier 2

- 500€ per month
- Access to all data, full access to data, and organisations named. An ability to interact with municipalities provided through the platform.

Provisional Cash Flow

Provisionally, we envisage the need for financial support for core staff (c2.5 FTEs) and running costs during a two-year start-up phase, with revenues then covering half of the costs in year three and all of the costs in year four.

C-value business model canvas

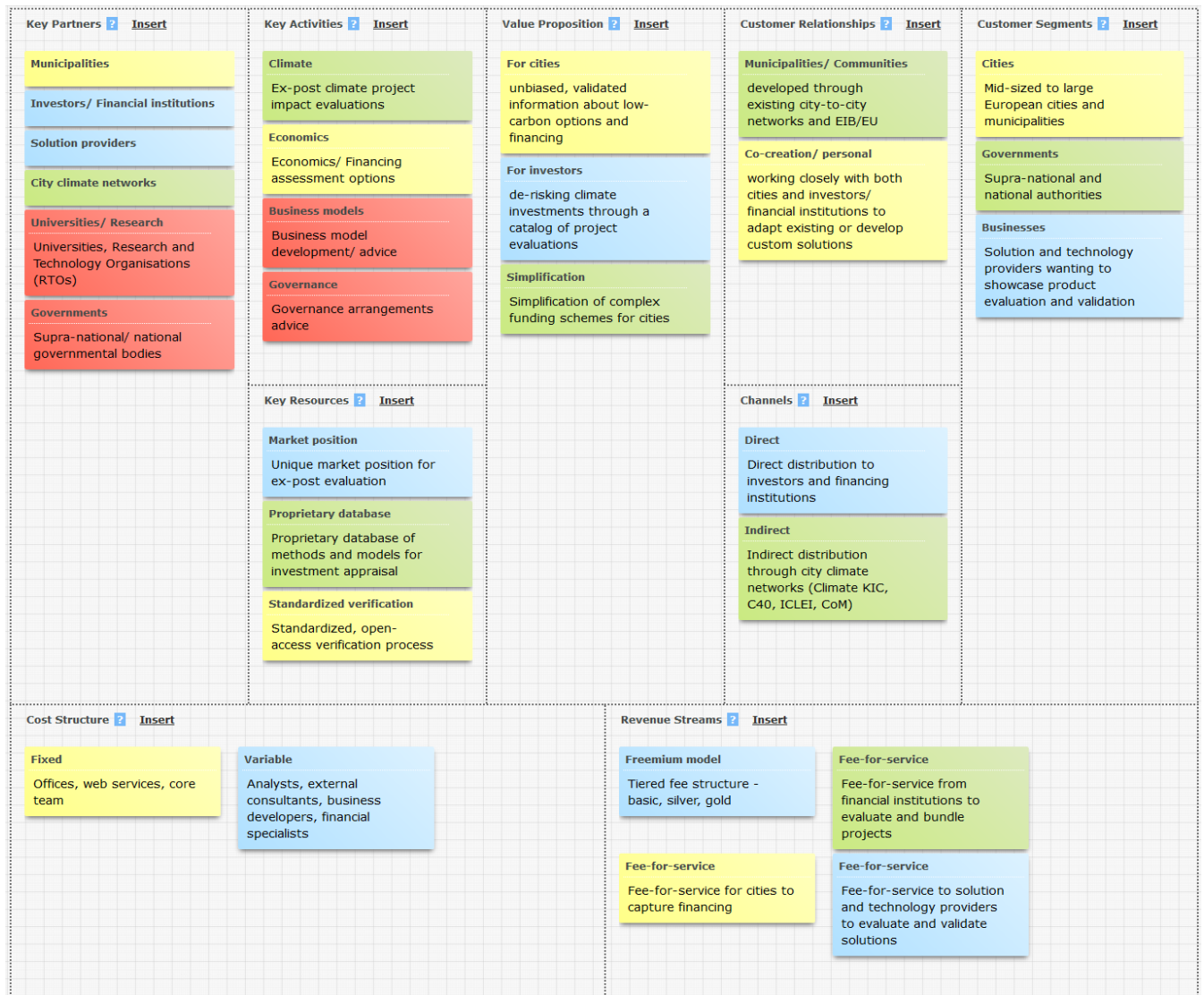


Figure 11: Business model for development of the c-value platform

Conclusions

Urban low-carbon decision-making is hampered by the absence of easy access real, empirical, data on the performance of different low-carbon options. This leads not only to increased risks and costs, but also reduced rates of innovation, learning, and decarbonisation.

The survey and interview based assessment conducted for this report finds that:

- City-scale low-carbon investment decisions are typically taken against a backdrop of multiple stakeholders, competing priorities, tight budgets, pressing deadlines, and contextually specific conditions.
- When making low-carbon investment decisions, decision-makers rely most heavily on their own experience, on internal sources of information and on personal contacts to guide decision-making.
- If economic data on the performance of a low-carbon options is available, it is not available on all alternatives, and data on the chosen option is often considered only late in the decision-making process.

These findings highlight the need not only for better information to improve low-carbon investment decisions, but also for information that meets user needs in the contexts in which they operate. The provision of such information could help to provide a more complete picture of the landscape of risks and costs that decision-makers face when considering low-carbon investments. By evaluating the real experiences of investments from a variety of contexts, the critical factors and contingencies that drive the success or failure of projects can emerge more readily. Moreover, by looking back on experiences, the prospective and retrospective analysis can be compared and contrasted – with gaps between the technical potential and the actual performance of different technologies being closed more rapidly.

The challenge then is in developing a model for the evaluation and reporting of the actual performance of different low-carbon options, and the presentation of this information in a form that can actively shape investment decision-making in cities and communities around Europe. The outline business plan in Section 3 sets out an approach that has the potential to meet this need, and in so doing to reduce the costs and the risks associated with low-carbon investment and to accelerate the rate of low-carbon innovation and learning.

C-valuate will work with key stakeholders (R&D funders, investors, technology suppliers, advisors, cities and city networks) to:

- Co-develop a template for the conduct of evaluations of the real performance of different low-carbon options and a related reporting standard that can enable normalised assessments of performance;
- Encourage the widespread application of the template and the reporting standard to generate a significant flow of real, empirical, data on the performance of low-carbon investments drawn from *ex-post* monitoring and evaluation;
- Provide the related data in forms that enable improved low-carbon investment decision-making and accelerated innovation and learning in cities and communities across Europe.

Policymakers can support this process by:

- **Supporting baseline local data collection using best practice standards**

The availability of basic data continues to hinder the development of a business case for action in many municipalities, both for local governments and for private actions. Centralised, open-source data, using best practices, such as those put forward in the Global Protocol for Community-Scale Greenhouse Gas Inventories⁷, can support this process.

- **Requiring post-hoc data collection of energy and economic performance for low carbon investments**

Investments very frequently require forward-looking studies to show an economic and financial case. Rarely, however, are the result of those studies used to assess whether the targets were achieved. This reconciliation between planning and results is essential for developing institutional learning around low carbon investments.

- **Implementing processes to bring knowledge and expertise from informal networks and the wider community into formal decision making**

C-valuate will help bring together members of the public, academic community, businesses, the local government, and the third sector, to use the communities' collective knowledge and expertise to support low carbon action.

⁷ Available from <<https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities>>

Appendix A: 11 key platforms and organisations for providing low-carbon information to European low-carbon decision-makers

Platform	Website	Organization(s) / Key funding body
Smart Cities Information System (SCIS)	http://smartcities-infosystem.eu/	EU
Solutions Gateway	http://www.solutions-gateway.org/	EU funded, implemented by ICLEI and UN-Habitat
carbonn® Climate Registry (cCR)	http://carbonn.org/	Bonn Center for Local Climate Action and Reporting
ClearPath™	http://icleiusa.org/clearpath/	ICLEI
Can-do Cities	http://www.candocities.org/	University of Leeds
EU urban roadmaps tool	http://www.urban-transport-roadmaps.eu/	EU
De-risking energy efficiency platform (DEEP)	https://deep.eefig.eu/	European Commissions
CommONEnergy	http://www.entranze-scenario.enerdata.eu/site/	EU
Carbon Trust Empower, Heat network investments cashflow template, Enplanner, Carbon Trust Thermometer, Energy management self-assessment tool, Biomass Decision Support Tool	Various	Carbon Trust
Curb tool	http://www.worldbank.org/en/topic/urbandevelopment/brief/the-curb-tool-climate-action-for-urban-sustainability	World Bank
Exceed Project	http://www.exceedproject.eu/	EU

Appendix B: Survey/Interview respondent list

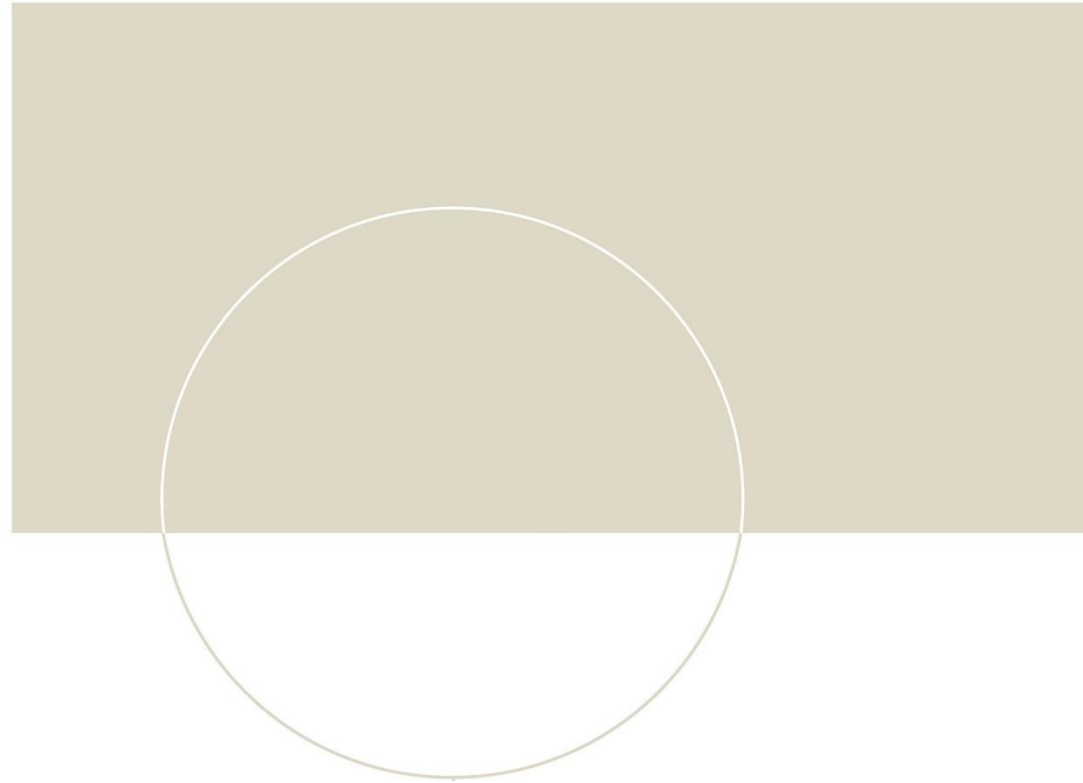
Survey	Interview	Country	Organisation	Job Title/Role
X	X	Austria	Research and Technology Organization (RTO)	Research engineer
X	X	Austria	City government	Project Manager, Coordinator for EU Horizon 2020 project
X	X	Belgium	Regional government corporation	Project manager, Coordinator for EU Horizon 2020 project
X		Bulgaria	Economic cooperation organization	CEO
X		Croatia	City government	Expert associate, EU funded sustainable development projects implementation
X		Croatia	Regional energy agency	Managing director
X		Estonia	Local/Regional Development Agency	CEO, Member of the management board
X		Germany	RTO	Head of urban governance and innovation
X		Greece	Regional energy agency	Consultant, Environmental economics
X		Greece	Regional energy agency	Director, Energy agency
X		Italy	Provincial government	Director, Coordination of operations, maintenance, renovation activities
X		Italy	Provincial government	Executive director, Energy agency
X		Lithuania	Community innovation centre	Project coordinator
X		Netherlands	National infrastructure department	Senior advisor, Local climate policies
X	X	Norway	Municipal government	Advisor, Climate and energy policy
X		Norway	Municipal government	Project manager, Climate action plan
X		Romania	Energy management agency	Director, Coordinator of energy management
X	X	Spain	Provincial government	Director, Provincial energy agency
X		Spain	Municipality commonwealth	Director, Energy department
X		Spain	RTO	Project coordinator, Coordinator for EU Horizon 2020 project
X		Spain	Provincial government	Head of service, environment department
X		Spain	RTO	Area director, Energy efficiency in buildings and industry
X		Spain	City economic development department	Project coordinator, Smart strategy
X		Spain	Provincial government	Head of environmental department
X	X	Sweden	Consultancy	Senior advisor, smart sustainable cities
X		Sweden	City government	Project manager, Climate strategist
X	X	UK	County government	Project manager, Community projects

Appendix C: Survey of urban decision-makers

- 1) What data/information sources on the economic case for low-carbon actions do you (or your organisation) currently use to make decisions in your city? (checkboxes: (checkboxes: Direct experience, City networks (internal to your city), City networks (external to your city), National government, European Union, International organisations, Business partners, Technology suppliers, Private consultants, Trade associations, Investors, Non-governmental organisations, Research groups, Online platforms, Newsletters, Academic journals, Conferences (talks and presentations), Conferences (vendors and booths), Other (open ended)
- 2) Is the information your organisation needs to make informed policy and investment decisions available through these services? (radio button: completely, mostly, somewhat, some not all, little)
 - a) What is missing? (conditional – open-ended text)
- 3) Is your organisation limited by the quality of available information regarding the economic/financial performance of low-carbon actions? (Completely, Quite a Bit, Somewhat, Very Little, Not at All)
- 4) Is your organisation limited by the quality of available information regarding the economic/financial performance of low-carbon actions? (Completely, Quite a Bit, Somewhat, Very Little, Not at All)
- 5) How important are the following criteria in the information/data that you seek out to inform low-carbon actions? (Completely, Quite a Bit, Somewhat, Very Little, Not at All)
 - a) **Accessible** (presented in a way that is easy to interpret, does not require membership or special programs to use)
 - b) **Relevant** (information on the economics of mitigation, information on the sector/area we are working on, up-to-date – in terms of technologies and costs)
 - c) **Transferable** (is the information presented transferable to the context you work in? i.e, is it European, urban and policymaker focused?)
 - d) **Comprehensive** (supported by *ex-ante* and *ex-post* analysis, appropriate detail regarding costs, benefits and timelines, provides information on more than one course of action for a given challenge)
- 6) How well are the following criteria met by the information/data that you use to inform low-carbon actions? (Likert scale: 5 being completely, 1 being not at all)
 - a) **Accessible** (presented in a way that is easy to interpret, does not require membership or special programs to use)
 - b) **Relevant** (Information on the economics of mitigation, information on the sector/area we are working on, up-to-date – in terms of technologies and costs)
 - c) **Transferable** (European, urban, targeting decision-makers)
 - d) **Comprehensive** (supported by *ex-ante* and *ex-post* analysis, appropriate detail regarding costs, benefits and timelines, provides information on more than one course of action for a given challenge)
- 7) Would you be available for a short follow-up conversation about the way your organisation makes decisions about low-carbon actions? (radio button: yes/no – if yes: radio button preferred communication: email/phone/skype)

Appendix D: Interview of urban decision-makers

1. We have found that urban decision-makers are relying on a range of sources of information to inform low-carbon decision-making, some formal and some informal. Can you describe to us some of the most important sources of information you draw on to inform low-carbon project development and investment decision-making?
2. Is there a specific approach used when making initial decisions about projects? A specific screening process, or business and investment model currently being used?
 - 2.1. Do you use data from *ex-post* evaluations or project/investment outcomes in your decision-making process?
 - 2.1.1. If yes, did it meet your expectations?
 - 2.1.2. If no, why do you think that is? (Prompt: In the survey you answered, we used the criteria: Accessible, Relevant, Transferable, Comprehensive)?
3. Would you be able to walk us through an example of a low-carbon project, either invested in by the city or supported by the city (through policies or enabling actions), that was realised? (If yes, ask the following series of questions:)
 - 3.1. Where did the idea for the project come from?
 - 3.2. Were alternative projects considered?
 - 3.2.1. If yes, was there a systematic approach to deciding between them?
 - 3.2.2. If yes, What is the approach to deciding between potential projects? (possible prompts: internal consensus, stakeholder consensus, living labs, cost-benefit analysis / cost effectiveness, multi-criteria analysis, life cycle assessment)
 - 3.3. What factors led to the project moving forward?
 - 3.4. Was there a process to compare the final project impacts against what was expected? (An *ex-post* evaluation or *post hoc* analysis?)
4. Can you walk us through the same for a low-carbon project that has not been realised (built)? (If yes, ask the following series of questions:)
 - 4.1. Where did the idea for the project come from?
 - 4.2. Were alternative projects considered?
 - 4.3. What factors led to the project not moving forward?
5. Are you a member of a low-carbon city organisation (e.g. ICLEI, Covenant of Mayors, C40)?
 - 5.1. If yes, can you describe what led you to join, and whether it meets those expectations?
 - 5.2. If not, why not?
6. Does your city have a person or team dedicated to low-carbon action?



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