Policy Design for Greening Construction Supply Chains[1]

Main insights from the Climate Friendly Materials Roundtable held at the Swedish EPA, Stockholm, on 24th May 2019

Karsten Neuhoff[2], Olga Chiappinelli[3]

Introduction

A successful transition of the construction sector to net-carbon neutrality will most likely require the portfolio of mitigation options. Enhancing material efficiency and recycling is essential to reduce the demand for primary production of carbon intensive materials and thus helps to alleviate resource constraints (available renewable energy for clean production processes, available input materials) and economic viability (incremental costs of clean production processes are compensated by less material demand). Developing and deploying clean production processes is likely to be necessary, as building and transport infrastructure will likely to continue to require significant volumes of currently carbon intensive materials.

So far different groups of researchers and institutions develop largely in parallel policies on (i) Carbon pricing, (ii) Green public procurement, and (iii) Carbon-intensity standards for buildings, to guide the construction sector towards net-carbon neutrality by (a) Improving building/infrastructure design, (b) Tailored material selection and dimensioning, (c) Optimization in logistics and construction techniques, (d) Clean material production processes, and (e) Enhanced durability, reuse and improved recycling.

The workshop brought together these different communities to discuss the potential of the three policy instruments mentioned above, the experience on their implementation and barriers met so far as well as possible solutions to overcome them.

This short document summarizes the insights emerged in the discussions with the following structure:

1. Complementarities of policy instruments
2. Interface between policy instruments
3. Insights on carbon pricing
4. Insights on green public procurement (mostly in the infrastructure sector)
5. Insights on building level standards
6. Conclusion and next steps

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[2] Head of Climate Policy Department at DIW Berlin and Professor for Energy and Climate Policy at TU Berlin
[3] Research Associate, Climate Policy Department, DIW Berlin

1. Complementarities of policy instruments

For the transition to new practices, materials and processes, different actors need to (i) revisit their decisions and overcome inertia resulting from habits and organizational practices, (ii) make choices that internalize the carbon externality, and (iii) make strategic choices to invest in new practices, materials and processes. To address these different decision modes it may be helpful to combine the above mentioned policy instruments – as indicated in the following table:

Role of policy instruments for mitigation options	**Carbon pricing**	**Green Public Procurement**	**Building level carbon standards**
Improving design	Enhances viability, but insufficient to change practices	May affect design in multiple ways, but is limited by time constraints, tendering costs and lacking systems for updating standard specifications	Essential to trigger change and define requirements
Tailoring material choice/dimensioning		Can create lead markets at national and sub-national level	Important to focus attention of firms on relevance
Clean production processes	Can make incremental cost technologies viable. Complemented with long-term contracts.	Can create demand for clean materials and overcome resistance/inertia for introduction of new materials, if credible long-term perspective on requirements is provided	
Enhanced durability, reuse, improved recycling		Specifications essential	

2. Interface between policy instruments

Currently advocates of all three policy instruments aim to design their instrument to create economic incentives for the development and deployment of new clean production processes for basic materials.

- Carbon pricing mechanisms are designed to cover the incremental costs for low-carbon production processes (free allocation of allowances to production processes at the scale of conventional production processes that can be sold in market) and project-based Carbon Contracts for Differences (CCfD) aim to secure regulatory stability for revenue streams.
- Green public procurement mechanisms create incentives for contractors to use materials from clean production processes to report lower carbon footprint of projects.
- Building level standards consider the carbon intensity of the specific material produced and can thus be achieved with a shift to materials from low-carbon processes.

More clarity may be required on the definition of these interfaces. For example, the following two main questions emerge:

- How to communicate link and complementarities between demand and supply side policies? Are some focused on covering incremental costs and providing long-term revenue stability by addressing policy uncertainty for low-carbon investments, while others for creating attention and overcoming inertia (satisficing behavior) of material choices?
- Should – analogously to the design of renewable remuneration mechanisms – materials produced with clean processes benefiting from economic incentives in one scheme (e.g. carbon pricing mechanism with CCfD) be equivalent to conventional materials in calculations of embodied carbon for GPP or building standards to double remuneration?

3. Insights on carbon pricing

The pass-through rate of carbon costs from EU ETS carbon price to material prices is low and uncertain. This is because materials can be traded international and therefore producers cannot increase sales price too much without losing market share and because free allowance allocation to discourage relocation of production. This creates a set of challenges:

- How to create business case for investments in clean production processes if they have incremental costs but these costs are not born by consumers?
- How to create demand for climate friendly substitute materials? A firm tried to sell a climate friendly product for 10-15% mark up, but did not find any buyers. So conventional material needs to become more expensive.
- How to ensure that during standard setting, construction design, construction procurement, and construction execution the full externality cost of carbon is considered (if at some instances, e.g. triggered with GPP or building standard, any such choices happen to be pursued actively, rather than following habits)?

Adding a climate deposit to European Emission Trading System (including consumption of carbon intensive materials) could reinstate a full carbon price pass through. Producers of basic materials receive free allowance allocation under EU ETS per ton of material produced and thus are incentivized to improve carbon efficiency of material production. Consumers pay a climate deposit per ton of material at the level of the benchmark and current carbon price in order to (i) cover carbon costs (ii) face incentives to substitution towards alternative materials and more efficient use of carbon intensive materials. A set of aspects were discussed:

- Administrative costs are moderate due to simplified benchmark approach and limited fraud risk in a system that does not include pay-outs.
- WTO compatibility is high as consumption based policies are not considered to be border related and thus broadly accepted.
- Incremental carbon costs for material production (up to 50% for products like cement) are born by final users (up to 0,5% cost increase of building, 1% of transport infrastructure).
- Consumers would pay climate deposit– either as incentive to move away from carbon intensive materials or to cover incremental costs of climate friendly material production. In initial years – with moderate shares of climate friendly material production – surplus revenue could be reimbursed per head.
- At national level, simplified schemes could be implemented in construction or automotive sector to create early incentives, experience and examples for a subsequent implementation at European scale, for example as part of the EU ETS review in 2023.

Uncertainty about longer-term development of carbon prices including due to changing policy preferences may continue to limit the ability of investors to bank on revenue from carbon savings and may continue to create uncertainty for ongoing operation of climate friendly production processes with incremental costs. Project based carbon contracts for differences can allow governments to commit to a predefined carbon price to investors in climate friendly products and thus address these concerns[4].

4. Insights on Green Public Procurement in the infrastructure sector

Procurement requirements to achieve carbon reduction are becoming more common. An international case study of infrastructure construction showed that various types of procurement mechanisms and requirements were used: contract award criteria, technical specifications of products and processes, requirements for sustainability assessment schemes, and overall functional reduction requirements. Functional requirements in principle offer more flexibility, also for innovative approaches, but in the construction industry, there are limitations due to the project-based organizing form, potentially high tendering costs and time pressure. Carbon reduction in construction affects many parties in the supply chain, but the time available in tender and design development processes may typically be too short for actors to explore new options and engage material suppliers and subcontractors. Moreover, functional reduction requirements related to a baseline were found to entail substantial calculation work that risk crowding out actual efforts to reduce carbon impact.

A longer-term perspective beyond individual public tenders is therefore important to enable innovation processes that extend beyond individual projects. A set of points where raised in this context:

- Developments of major projects, like UK High Speed Rail and California High Speed Rail, may provide a long-term predictability for suppliers and attract sufficient interest to establish new standards and practices.
- However, smaller pilots for quicker innovative projects are faster and allow for exploring new options and practices with less risk.
- Longer-term commitments, like 2025 and 2040 targets set by the Swedish Transport Authority on embodied carbon, may provide longer-term expectations for companies, but to more rapidly reach out in the supply and value chains, specific requirements should be considered.

In sum, strategies based on combinations of testing in small and shorter pilot projects and wider dissemination in large projects with high market impact are often preferable. Specific requirements for technical solutions, materials, processes and competences may be part of such strategies.

Due to the cyclical nature of the sector and the uncertainty inherent in public procurement is it difficult for private developers and construction contractor firms to have a long-term focus that extends beyond individual projects. This raises the question, whether shareholders of such companies can – in the context of sustainable finance – encourage and support the development of a longer-term perspective and strategy.

[4] See e.g., Richstein, J.C. (2017), "Project-Based Carbon Contracts: A Way to Finance Innovative Low-Carbon Investments". DIW Discussion Paper, 1714.

Client leadership

Long-term strategies require organizational bodies with a long-term perspective, such as public clients, to successively raise and develop new requirements in dialogue with the market. Strong client leadership is also important to achieve behavioral change. In complex projects, there are vast numbers of requirements and many objectives, so in order to make suppliers prioritize carbon mitigation, strong commitment and continuous presence by the client is crucial to encourage compliance, especially in early learning phases. Training and guidelines are needed to make participants aware of how their specific function may contribute in various stages. It is also important to establish a good collaboration between internal client functions for procurement, environmental expertise and project management.

"Cut-carbon cut costs" is a theme that is guiding the discussion on green public procurement for infrastructure construction in the UK. Cost savings are for example possible where a review of overall planning, design and more careful dimensioning of components reduces the overall material use. As such is it was pointed out that the carbon mitigation agenda will benefit from and can support efforts to enhance overall efficiency of the construction sector. Collaborative contracting may be useful to break the silo thinking and integrate supply chains to reach higher reductions. Thus, general policies to increase industry capabilities to implement such integrated contracting strategies would be valuable. Further, improved planning and design seem to be responsible for the biggest share of overall savings – both of which often precedes the procurement of contractors. In contrast, costs increase may result where green public procurement is used to create demand and cover costs for alternative low-carbon materials. However, according to current simulations such incremental cost is likely to be very contained (in the order of 1%) and therefore be compensated by savings from optimization at the design and construction stage.

Benchmark for BAU – developing the Swedish system

The most problematic point in Swedish system is the baseline work, since the same specialists are used for baseline work and actual mitigation measures. A proposal is advanced for the Swedish Transport Administration to revise their model in order to be less dependent on baseline calculation. One part is to identify the most important areas to focus mitigation on and calculate reductions ex-post when there is more time. Another aim is to use the same tools for cost calculation and carbon footprinting, which means that routines that you have for changing the cost then could be used for continuously updating baselines. A disadvantage would be that the client thereby reveals elements of their cost structure before tendering which can induce strategic behavior from suppliers**.**

Incentives to implement GPP

A possibility that was suggested is that green public procurement projects could apply for EU co-funding, e.g. GPP allows for higher EU co-funding (45% instead of 40%). This would (i) allow for moving beyond small national markets, ii) provide resources to address capacity barriers and foster initiative and uptake at the local level, iii) reduce problem that you go for specific benchmark. Connecting Europe Facility could be a useful example to follow in this sense on how to support low-carbon steel and cement.

5. Insights on Building level standards

Throughout the world there are now more than 100 systems incorporating a measure of embodied carbon in buildings. These systems take a variety of forms, from simple reporting requirements, through to comparison against baseline designs, rating against qualitative scales, or requirements to reduce carbon below set limits by design or through the use of offsets. In some instances, prescriptive standards requiring specific design options have been introduced (e.g. prioritizing use of timber), but the majority of measures are performance-based (e.g. limiting embodied carbon emissions per unit of floor area to practical completion). The majority of current systems are for voluntary certification, providing only a small non-financial incentive, such as additional points towards a sustainability rating. In the past 5 years, the number of such systems has doubled and a small minority of national and local authorities are starting to introduce mandatory requirements for embodied carbon assessment as part of the planning process. Typically such mandatory approaches initially require just an assessment of the development's embodied carbon and a qualitative statement of mitigation efforts, before introducing limits after an implementation period (for example, the Netherlands introduced assessment requirements in 2012 and then limits in 2018). This implementation period is required to familiarize industry with the assessment process, which in many countries to date, has been commonly assigned to dedicated sustainability professionals.

The introduction of mandatory standards has several perceived benefits:

- Requires consideration of embodied carbon from project conception and thus drives carbon reduction through the early design stages when the greatest reductions can be achieved
- Aligns incentives of project participants and makes it easy to assign responsibility and cascade requirements through contracts
- Allows alignment of ambitions with local or national targets. For instance, a local authority could align the number of planned developments and their carbon intensity limits to fit within a determined carbon budget or carbon reduction trajectory.
- Greater coverage than is achieved through public procurement

Pertinent questions about the design of such standards, and corresponding points made by participants, include:

- How to select the most effective point of implementation? This could be requirements on selected materials (e.g. the Buy Clean California Act) or building level limits (such as in the Netherlands).
    - Materials limits may be simpler to implement but such prescriptive requirements are less likely to prove politically palatable.
    - Building limits require more complex assessments but support a broader range of mitigation options and are seen as technology and material-neutral.
- Which authority should intervene? Should it be local authorities responsible for planning, national building regulations or supranational requirements (such as from the EU)?
    - The introduction of differing requirements amongst local authorities may provide a good testing ground for alternate approaches but increases complexity for developers.
    - Learning from approaches adopted in different localities should inform national or supranational responses.
    - An EU wide response may be impractical due to varying climates and local architectural styles across member states.

A number of barriers hinder the implementation of building standards at different levels:

- At national level: a lack of political awareness and associated support
- At local authority level: limited knowledge and resources; lack of legal clarity around compatibility of requirements with national frameworks
- Across all levels: availability and quality of data to ensure consistency of assessment; perceived additional costs; and inconsistencies in interpretation of existing standards (e.g. EN15978)

Possible enablers to overcome these barriers include the following:

- Creation of common resources: such as databases of LCA factors; assessment tools, methodologies and guidance packages for different actors
- Establishing platforms for collaboration and knowledge sharing: through Green Building Council Programmes, living laboratories etc.
- Integration with established reporting mechanisms: e.g. alignment with company carbon reporting requirements; local or national carbon budgets and decarbonisation trajectories; incorporation into corporate Science Based Targets etc.

To this end, a range of assessment standards and guidance have been developed in recent years. The discussion highlighted examples from the UK including standards supporting consistent carbon management (e.g. PAS2080) and consistent assessment (e.g. RICS 'Whole life carbon assessment for the built environment'); as well as tailored guidance for different actors (e.g. the UKGBC guide for clients and RIBA guide for architects). Discussions suggested it remains difficult for practitioners in Sweden and the UK to navigate this disparate body of guidance, though some international efforts have sought to establish common best practices (such as IEA Annex 57). Developing knowledge within the construction supply chain and planning authorities is essential to ensure that assessments are consistently applied and provide a robust basis for regulation. Best practice examples of companies voluntarily assessing and benchmarking embodied carbon were also highlighted. Their experience demonstrates the deep carbon reductions that could be achieved through the introduction of building level targets.

The following general recommendations were made for local and national authorities to:

1. Prioritize the development of enablers. Encouraging greater assessment and building familiarity with the process is an essential pre-requisite for effective regulation.
2. Introduce mandatory reporting for the largest developments.
3. After an implementation period, introduce set limits at levels that require mitigation on the highest carbon developments. A supplementary option may be to simultaneously introduce incentives for the lowest carbon developments, such as additional development rights.
4. Followed by a ratcheting down of limits aligned with local or national climate targets.

6. Conclusion – Next steps

The workshop helped bringing together different communities and highlighted existing barriers, implementation challenges and potential for interaction as a starting point for next steps needed for decarbonization of the construction sector.

As different perspectives and barriers are prioritized in different communities, what is needed is to broaden the perspective and integrate communities. The Climate Friendly Materials Platform and the Mistra Carbon Exit program can be the ideal channel for bringing the different communities more often together and the meeting place for these types of exchange of ideas, including discussion of these issues between countries.

Standards and procurement are easy to understand in abstract way but careful implementation is required to make them effective. Different policy instruments are overlapping and interacting. For effective policy design, it is important to take into account how economic and political forces shape existing instruments and find dedicated solutions for potential conflicting tools and unlock potential synergies.

More clarity for the financial sector is needed on both the portfolio of mitigation options and policy instruments. More effort is needed to provide investors in the financial sectors with information and means to understand and measure environmental performance, so that they can contribute in supporting the transition. In particular, information at the building level is essential to allow the financial sector to (i) identify green options and phase out brown options offering preferential loans or withdrawing financing opportunities, (ii) focus on efficiency that impacts future energy costs or will also consider (and thus encourage) structures with less embodied carbon (reflecting historic emissions), (iii) consider role of building/project – versus strategy (and financing of) developers. In a related situation, Anglian Water could for example issue green bonds against a strategy of cutting 50-60% of embodied carbon in new infrastructure in next 10 years (largely by avoiding constructions).

The timely and educational discussion initiated with the workshop has to be continued. There is interest from the public administration side in Sweden to follow such a discussion and possibly to be/set an example (in the momentum of the New Climate Law and ambitious government). In addition, from the perspective of the EU commission, when discussing new measures it is always helpful if there is already a use case in member states. Therefore, the priority should be bringing the policy faster to national level, in order to explain in advance some of the more complex issues. Also, clear positions from academic side are useful for policy implementation (e.g., on carbon levy).