



Building Greener Cities: **Green Job Opportunities** **in Clean Construction**

Global Policy Report

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Acknowledgements and further information

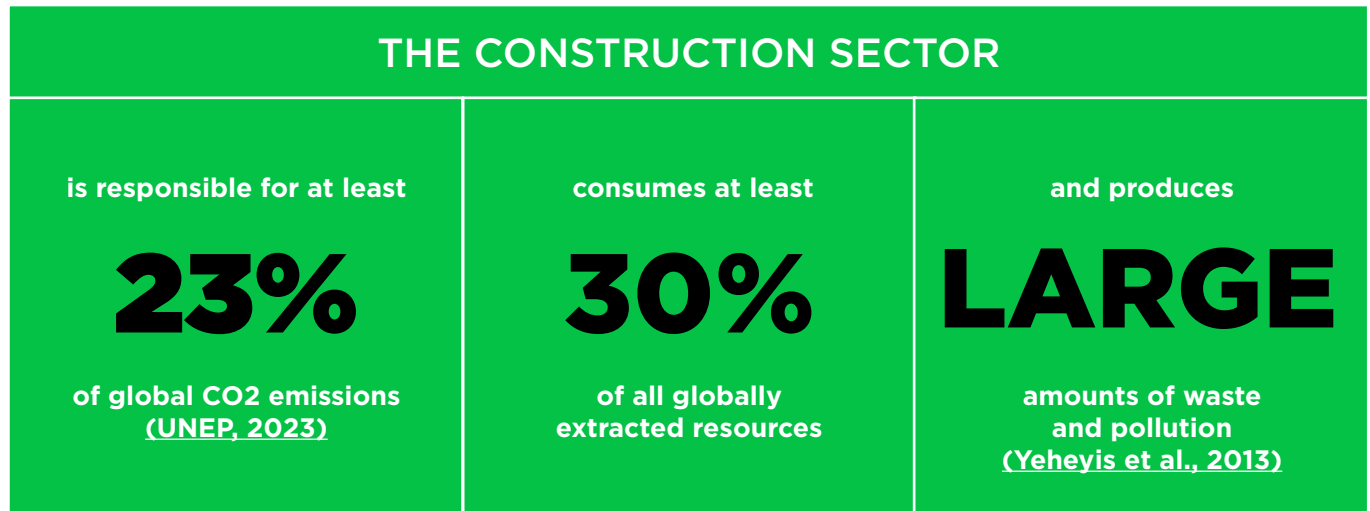
This research was conducted by C40 Cities, Buro Happold and the New Economics Foundation, with the generous support of the City of Oslo and Laudes Foundation. The work is independent and has not been commissioned or influenced by any business, government or other institutions. This report highlights the overall findings of seven city-specific reports, which can be accessed [here](#).

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What is this research about?

The built environment is where our lives unfold, spanning our homes, offices, schools, hospitals, streets and squares, electricity lines, waste pipes and so much more. The built environment and construction sector are critical to our economy and well-being, accounting for 11-13% of global gross domestic product and directly employing more than 273 million people globally ([UK Government, 2018](#)).

Cities are driving demand for construction activities, from maintenance and retrofitting projects to new buildings. Over 2.5 billion more people are expected to live in urban areas by 2050 ([United Nations, 2018](#)). At the same time, however, the construction sector is fuelling the climate crisis:



On top of these high environmental costs, current construction practices struggle to meet society's needs. Over 1 billion people live in informal settlements, with many cities finding themselves in the midst of a housing and cost-of-living crisis ([UN Habitat, 2023](#)).

A transition to 'clean construction' is, therefore, critical. C40 defines clean construction as decarbonised, resource-efficient, resilient and socially just construction systems for thriving and healthy communities, workers and cities. In other words, clean construction tackles the negative impacts of our current built environment practices in terms of emissions, resource depletion, pollution, climate risks and urban inequalities. 'Socially just' means providing safe and good quality jobs for all and contributing to providing affordable, accessible and sustainable infrastructure and buildings for

all people, especially the most vulnerable and marginalised groups and communities. A shift to **clean construction gives cities the opportunity to meet housing and infrastructure development needs while generating good green jobs and reducing environmental impacts**. Cities have a critical role to play in supporting and accelerating the adoption of clean construction, from setting a clear vision of the path ahead and leading by example with their municipal building stock to approving policies and bringing all stakeholders together.

This research analyses, for the first time, the number, quality and types of jobs generated by a transition to clean construction compared with business-as-usual practices. It showcases the policy options available to cities to support an inclusive workforce and foster clean construction industries.



The research has projected two scenarios for 2023-2050:

A business-as-usual scenario:

Construction continues in its current form for the next 20-25 years, generating high emissions and waste, as well as air, noise and soil pollution through the use of high-carbon steel, concrete, on-site practices and so on.

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Clean construction scenario:¹

The city and the sector decides to tackle high-carbon and resource-intensive construction practices and gradually adopts several clean construction practices, such as retrofitting, using local, low-carbon materials and industrialised and modular construction.

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Using available data, this research identifies the jobs potential, challenges and opportunities of adopting clean construction. For a comprehensive dive into the results and the methodologies used in this study, we invite you to explore the complete reports and the accompanying methodological statement on our website (c40.org).

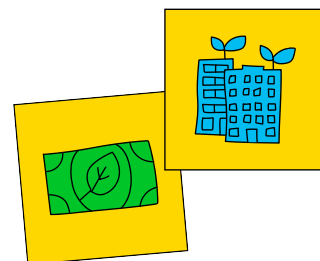
KEY FINDINGS

1. Adopting clean construction generates net job gains in cities' construction workforces.

For the cities analysed in this research², switching to clean construction will generate more jobs than continuing with high-carbon construction over the next three decades (chart 1). These clean construction jobs will be created primarily in maintenance and repair, retrofitting, adaptive reuse and timber construction. Furthermore, they will mostly remain within cities' physical boundaries (around 70%, on average), which will help ensure local workforces benefit directly from the transition to cleaner construction. Clean construction provides a significant socioeconomic opportunity for cities by generating new positions that can contribute to both economic inclusion and income generation. This is further supported

by [other C40 publications on green jobs](#), which identify retrofits and other construction shifts as key sources of green jobs for the future³.

All cities will experience an important increase in the total number of construction jobs as a result of shifting to clean construction, however, that job-creation potential will vary significantly by city. Mexico City sees a 193.1% increase in construction jobs, while the increases in Seattle and London are proportionally less significant because of these cities already have significant green transition efforts. The variation depends mostly on which clean construction practices cities plan to adopt and to what extent they



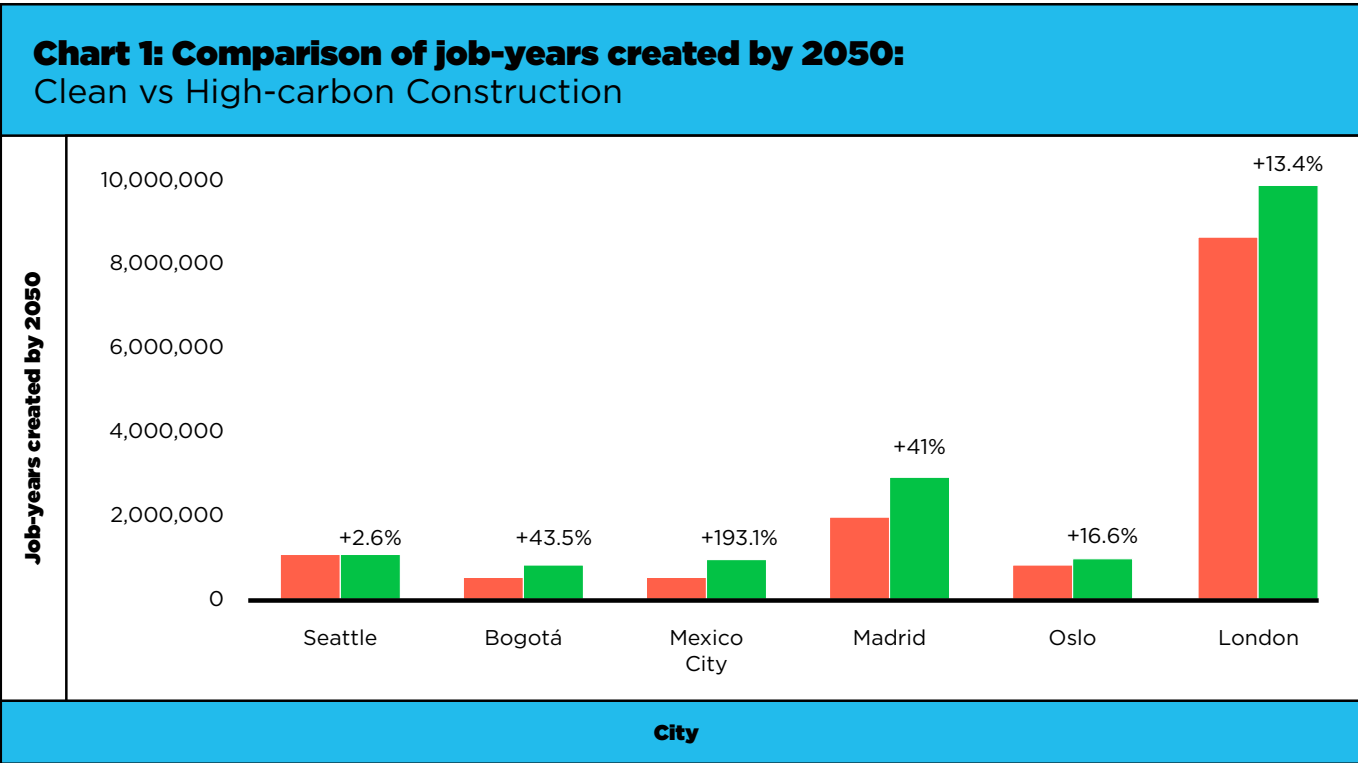
¹ For this research, clean construction was split into eight quantifiable 'shifts', or key overarching actions required to transition the construction industry from a 'business-as-usual' to a 'clean construction' scenario. They are: maximising building occupancy; regular repair and maintenance of buildings; supporting building retrofit and encouraging adaptive reuse; prioritising industrialised construction; encouraging timber construction; specifying low-carbon products; reusing materials and structural components; and promoting disassembly and deconstruction.

² Bogotá, London, Madrid, Mexico City, Oslo and Seattle.

³ A job year can be defined as one year of a full-time job. Job years are preferred for this research, as they are a more specific measure than just "jobs" (which have an undefined length). For example, three job years could mean that there will be three full-time jobs available for one year, or that there will be one full-time job available for three years. More information on how jobs were calculated is available in the full technical report and the methodological statement.

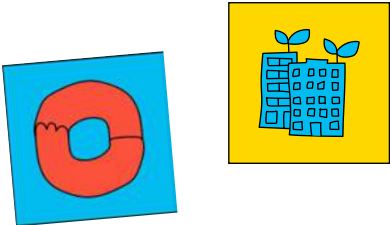
do so. For example, in most cities, retrofits and maintenance of buildings (highly labour-intensive activities) are a crucial part of a clean construction future – generating lots of jobs. In cities like Seattle, activities such as modular or timber construction (which tend to be less job

intensive) are still creating jobs, but at a lower rate than retrofits. Shifting to low-carbon cement and concrete would not significantly impact the job intensity of the sector, according to the data currently available.



Clean construction offers cities the opportunity to address broader socio-economic issues. A skilled workforce is essential to equip the sector for the transition and for cities to achieve their climate goals,, while addressing pressing local challenges such as unemployment and labour shortages. Mexico City and Bogotá, both with high unemployment rates, stand to benefit significantly from the job-creation potential of clean construction. In cities like London, where the construction sector workforce faces shortages, clean construction offers a chance to reinvigorate the industry and ensure a more resilient, diverse labour market.

According to interviews, upskilling and training will be necessary in different degrees to prepare workers for each of the new clean construction positions. To meet the needs of low-carbon cement, deconstruction, maintenance and retrofits sub-sectors, upskilling efforts are likely to be less steep, as these areas have high skills compatibility with current high-carbon positions. As to modern methods of construction and timber, the innovative aspects of such practices should require higher upskilling efforts from the sector.



2. Built environment policies (such as procurement, construction permits and upskilling programmes) must embed a just transition approach⁴ to improve equity, diversity and inclusion in the sector.

The transition to clean construction presents a critical opportunity to improve equity, diversity and inclusion and the quality of working conditions in the construction sector, but it will not happen automatically. Many workers in the construction industry have poor working conditions, low wages and subcontracting practices that undermine their rights and the Construction industry is not immune to global trends toward non-standard forms of employment ([ILO, 2023](#)). Construction sites often have high injury and death rates. The workforce is predominantly male, with often little representation of women and minority groups. Without deliberate action, clean construction could replicate the same poor labour conditions seen in high-carbon construction.

A number of clean construction practices are relatively new and are an emerging industry in most cities, such as industrialised construction in Mexico City and timber construction in Madrid. **Municipalities have a chance to shape these industries by setting mandatory inclusivity standards from the outset.** Cities can leverage public procurement as a tool to enforce best inclusive practices, as seen in Oslo, with its 'Oslo Model', which uses public investment to promote fair wages, job security and safer working conditions. A transition to clean construction practices, if properly regulated, can address not only environmental challenges but also social inequalities in the labour market.

Intentional policy design is crucial to ensure the benefits of clean construction reach underrepresented groups. For example, Bogotá's

'Mujeres que Construyen' and Seattle's Green New Deal programmes have successfully upskilled women in construction, showing how targeted initiatives can increase diversity in a sector traditionally dominated by men (women represent, on average, 1% of the construction workforce in the regions analysed ([ILO, 2015](#))). Other cities, such as London, where a significant portion of the construction workforce consists of migrant workers, have an opportunity to improve working conditions for vulnerable groups, as they are already doing with programmes such as London's Responsible Procurement and the Workforce Integration Network, as highlighted in this recent [C40 report](#). In Madrid, the TANDEM pilot project is training refugee workers in various clean construction and energy-efficiency skills, preparing them for future jobs in the sector. Cities can reshape the workforce to be more inclusive while addressing labour shortages and unemployment by introducing training programmes and initiatives aimed at upskilling underrepresented groups.

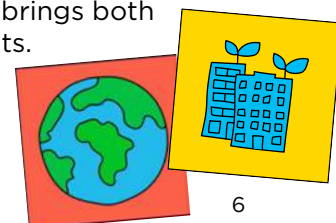
Lastly, **clean construction offers a chance to create safer and more controlled working environments, particularly through industrialised construction methods.** In Seattle and Oslo, for instance, off-site industrial construction has protected workers from harsh weather conditions and hazardous materials, reducing workplace injuries. However, these improvements depend on robust safety regulations and oversight from cities, national government and employers in the sector, as a transition to clean construction will still require attention to labour rights and workplace conditions.

3. Key policy levers to achieve a green and just transition in construction largely already exist at the city level.

A green and just transition in the construction sector will require the active collaboration of industry, union and public sector stakeholders. Cities have a range of key policy levers already at their disposal to promote and enable change, including [greater inclusion and social dialogue for a just transition](#). While cities will have varying powers at their disposal, levers include public procurement, municipal asset management, planning and urban development

control, taxation, building codes and industry collaboration, among others. From regulations that set sustainability standards for buildings to public procurement policies that prioritise low-carbon materials, cities can actively shape a regenerative, equitable future for their construction industries, ensuring that the transition to clean construction brings both environmental and social benefits.

⁴ <https://www.ilo.org/publications/guidelines-just-transition-towards-environmentally-sustainable-economies>



Several cities have already started to use the powers they have to support clean construction. For example:

SEATTLE



has implemented the Building Emissions Performance Standard and the Building Tune-Ups programme to improve energy efficiency in existing buildings, helping to reduce emissions while prolonging buildings' lifespan.

BOGOTÁ



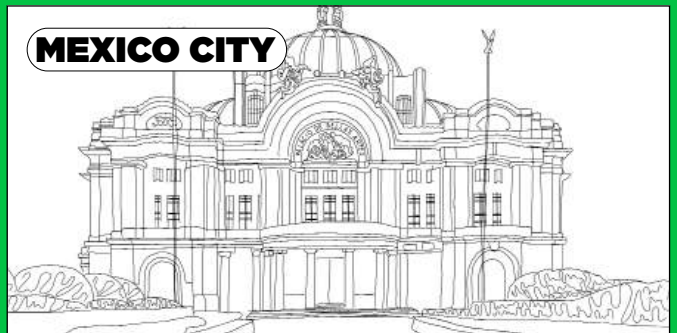
is making strides with programmes such as the Building Efficiency Accelerator and its Eco-Urbanism and Sustainable Construction Regulations, which are setting minimum sustainability standards for new buildings.

MADRID



is progressively adopting clean construction practices. The Spanish Recovery, Transformation and Resilience Plan aims to retrofit 510,000 homes by 2026, with initiatives such as Plan Adapta Madrid and Energiesprong seeking to tackle financing barriers.

MEXICO CITY



efforts are being made to promote clean construction through the Sustainable Building Certification Programme, which incentivises resource efficiency and low-carbon materials. The city also targets the recycling of construction and demolition waste, setting specific goals within its climate action plan.

OSLO



is a leader when it comes to zero-emission construction sites, where electric machinery is used to reduce air and noise pollution, with health improvements for workers and nearby communities. The 'Oslo Model' further promotes fair labour practices through public procurement, setting an example for other cities on how to link sustainability to worker rights.

LONDON



is prioritising retrofitting through the Greater London Authority's ambitious plan to retrofit 2 million homes by 2030, a key part of its strategy to meet net-zero goals. London is also exploring the adaptive reuse of vacant office spaces as residential units to meet housing demand while reducing the need for new builds.

These examples show that cities are already acting to combine sustainability policies for the built environment with actions that support equity.

Cities can't do everything - challenges such as skills shortages, regulatory barriers and financial constraints will also need action by industry, national and state government, unions and others. However, cities do have a range of powers and tools at their disposal to drive significant change in the construction and built environment sector.

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4. This transition will require public and private investment and will be well compensated by the benefits it brings.

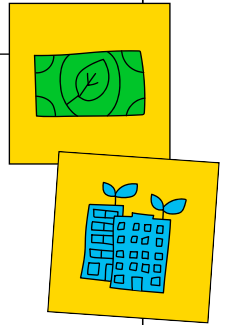
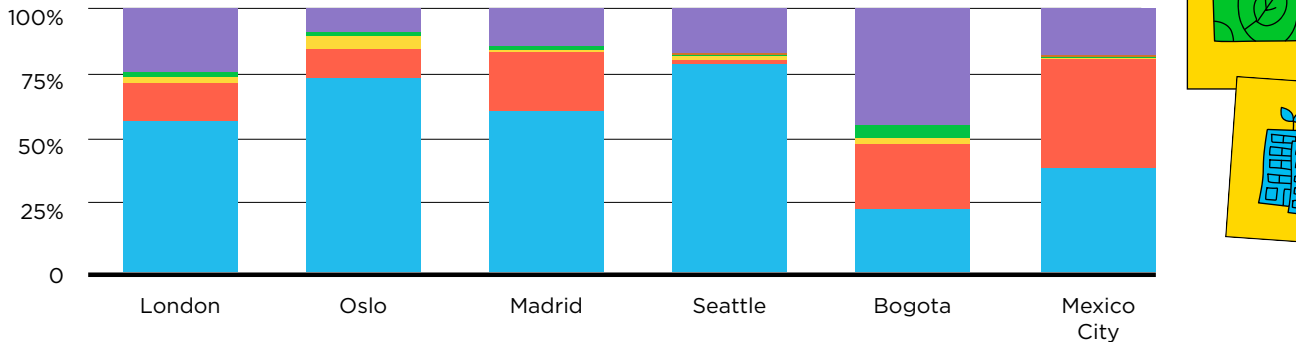
Shifting to clean construction is crucial for cities to reduce their carbon footprints and meet their climate targets, as the construction sector contributes to more than 23% of GHG emissions globally. While the investment required for a transition to clean construction will be higher in the short term, the benefits and rewards more than justify the costs.

The investment required from all stakeholders for the clean construction scenario is higher than for business as usual (ranging from 2% to 127% more across cities), primarily due to a steep uptake in existing buildings maintenance (which includes all buildings in the city) - which will account for 67.5% of the cost on average in Seattle and the European cities, and 31.5% on average for the Latin American cities. Clean construction methods do not require more maintenance than high-carbon buildings - yet, in the clean construction scenario, the sector recognises that maintenance is necessary to keep and extend the life of existing buildings, while in the business-as-usual scenario, this activity is mostly disregarded. Although maintenance activities may be less costly than building new homes, the sheer volume of buildings that will require upgrades or repairs by 2050 calls for significant financial commitment. Regular maintenance is currently overlooked and under-invested, which leads to financial and economic damages, health impacts and lives lost, due to increased climate impacts on buildings ([Pryce, Chen, 2011](#)) ([UNEP, 2021](#)). For example, poorly maintained buildings have a higher risk of collapsing in events such as

flooding and storms; also, people living in such buildings are further subjected to urban heat, cold temperatures and humidity, which leads to health impacts and more financial costs (GLA, 2022a) ([Kazi and Macfarlane, 2022](#)) ([Milner et al., 2023](#)). For Latin American cities, retrofits also play a major role in costs (24.6% in Bogotá and 42.9% in CDMX), mainly due to large rates of building vacancy, for which retrofits are a crucial way to generate more housing. Finally, high-carbon practices remain an important part of the required investment in the clean construction scenario since the transition will be gradual, not immediate (see chart 2 below).

When it comes to new construction exclusively, our data indicates that clean construction practices such as mass timber and industrialised construction are cheaper than regular concrete and steel construction. As mentioned above, most of the costs in a clean construction scenario would emerge from keeping and upgrading existing buildings. For new buildings, clean construction leads to savings through reduced construction times, material and energy efficiency. As supply chains mature and economies of scale are realised, the costs of clean construction can be reduced by these savings ([Arup, C40 Cities and University of Leeds, 2019](#)). Industrialised construction methods, in particular, have been shown to reduce project timelines and minimise construction-related traffic and disruptions ([Bassi et al., 2021](#)), further contributing to lower costs for cities. As such, clean construction practices will help cities to build homes faster and cheaper.

Chart 2: Investment distribution in clean construction scenario



There are multiple benefits to adopting clean construction that could motivate greater levels of investment. Clean construction practices reduce air pollution ([Morel, 2021](#)), enhance living conditions ([Milner et al., 2023](#)), generate better-quality green jobs ([Nahmens and Ikuma, 2009](#); [Court et al., 2009](#); [Acharya, Boggess and Zhang, 2018](#)), produce energy-efficient homes with cheaper energy bills and increase climate resilience, all of which contribute to improved public health ([CLC, 2021](#)) and social equity. Retrofitting homes, for example, can significantly improve air quality, reduce health risks from

substandard housing and enhance thermal comfort for residents. In London, addressing the city's subpar housing standards could mitigate health issues associated with damp and cold conditions ([Kazi and Macafarlane, 2022](#)). In addition, clean construction helps cities become more resilient to the increasing climate risks, further safeguarding communities and promoting a higher quality of life. Sticking to high-carbon practices or climate inaction comes with a high economic cost estimated in trillions of dollars, all sectors included, making the transition to clean construction even more attractive ([source](#)).

Conclusion

The transition to clean construction practices presents a unique opportunity for cities to achieve both environmental and social progress, meet their climate targets and address pressing social priorities. Adopting clean construction reduces carbon emissions, improves air quality and increases climate resilience, whilst helping cities to tackle the housing crisis by maximising efficiency and resources. Clean construction holds the potential to create millions of green jobs, promoting decent work opportunities and improving local economies.

C40 has identified a range of policy recommendations to facilitate this transition (more details can be found in the individual [city policy reports](#)). For example, cities can:

Leverage public procurement to prioritise clean construction projects and establish sustainability standards.

Offer tax incentives to construction firms that follow sustainable practices.

Update building codes to incorporate low-carbon materials.

Expand vocational training to address skills shortages in partnership with the private sector, unions and educational institutions.

Produce a long-term plan for sectoral transition (in collaboration with unions, residents, the private sector and civil society).

