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Executive Summary

**Measurement and reduction of
embodied carbon in the Israeli
building sector**

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About the Milken Innovation Center Fellows Program

The Milken Innovation Center Fellows Program accelerates Israel's economic growth through innovative, market-based solutions for long-term economic, social, and environmental challenges. Our goal is to accelerate Israel's transition from a Start-up Nation to a Global Nation with solutions that others can replicate.

The Program awards annual fellowships to outstanding Israeli graduate students. We train and deploy some of Israel's best and brightest young professionals to create pragmatic financing and economic policy solutions. Our applied research and Financial Innovations Labs® are a launching pad for transformative change, using innovative financing mechanisms, programs and policies to bridge social, regional, economic and productivity gaps within Israel and between Israel and the world.

In addition, Fellows craft their own projects during their internship aimed at barriers to job creation and capital formation in Israel. The Fellows' research, carried out under the guidance of an experienced academic and professional staff, support business and policy makers to shape economic reality in Israel. The program offers the ultimate training opportunity, combining real-life work experience with applied research.

Throughout the year, Fellows receive intensive training in economic and financial analysis, public policy and research methods. They acquire tools for communication and presentation, policy analysis, leadership and project management. The fellows participate in a weekly research training workshop where they work with senior economic and government professionals, business leaders, and top academic and financial practitioners from Israel and abroad. They also participate in an accredited MBA course, taught at the Hebrew University School of Business Administration by Prof. Glenn Yago.

Fellows Program alumni can be found in senior positions in the public and private sectors. Some serve in key positions in government ministries while others work at private-sector companies or go on to advanced graduates studies at leading universities in Israel, the United States and Great Britain.

The Fellows Program is a non-partisan. It is funded, in part, by the Milken Institute and other leading philanthropic organizations and individuals in the United States and Israel.

Drastic reduction in Green House Gas (GHG) emissions is essential in the fight against global warming in the current climate crisis. Many countries around the world have set reduction targets for 2030 and 2050 and are implementing a variety of policy tools and national plans to achieve these targets. The State of Israel has committed to reducing GHG emissions by 27% by 2030 and will achieve net-zero emissions by 2050. Israel is now in the process of developing and implementing its policy tools and plans to achieve these goals.

The global construction industry is responsible for approximately 40% of total GHG emissions, and it is a key target for innovative programs and policies to reduce Israel's carbon footprint. The emissions from the construction industry are divided into two components: **Operational Carbon**, which is the emissions created from operating buildings and related systems, such as electricity, heating, and gas, and **Embodied Carbon** which is the carbon footprint of the full life cycle of materials. This study focuses on the role of Embodied Carbon and strategies to mitigate its use and impact.

Embodied carbon emissions are defined as the total CO₂ emissions generated throughout the full life cycle of a material or product: **from the production phase**, which includes quarrying raw materials, transportation, manufacturing and production, and construction; **the product use phase**, which includes emissions that are generated from maintenance and renovation; and **the end-of-life phase** that includes the emissions from disposal of the material at the end of its useful life. Because of its complex integration into production and its long life span, Embodied Carbon is difficult to monitor and measure. Embodied carbon emissions from the construction industry make up around 11% of total GHG emissions.

Until now, most of the efforts to reduce GHG emissions in the construction industry in Israel have focused on reducing operational carbon (through energy efficiency, integration of renewable energy, etc.). To a large extent, Operational Carbon is more easily measured than Embodied Carbon. As such, embodied carbon emissions will represent a more significant role and there is a growing importance to deal with embodied carbon. To continue these efforts, there is a need to accelerate the reduction of embodied carbon emissions in the construction industry in Israel, and to improve the methods of measurement of these reductions.

The research question is **what are the regulatory, economic, and information tools that can promote the measurement and reduction of embodied carbon emissions in the construction industry in Israel?**

Goals

The goals of this research include the following:

1. To provide recommendations for the implementation of economic, regulatory, and information tools that will cause the stakeholders in the market (manufacturers, entrepreneurs, planners, architects, etc.) to reduce embodied carbon emissions.
2. To create a reliable infrastructure for measuring embodied carbon, including mapping current best practices around the world that will form the basis for informed decision-making.
3. To raise awareness and empower the stakeholders to act.

Structure

After presenting the background on embodied carbon in the construction industry in the first chapter, the second chapter details the main causes and challenges that lead to significant emissions of embodied carbon in Israel. The causes vary from types of materials and construction methods in Israel that use high-intensity emission materials, to an absence of economic incentives, regulation, and information and awareness on the topic of embodied carbon.

Chapter 3 details the most relevant construction materials to this study, i.e high carbon intensity materials, that are widely in use in Israeli construction.

Chapter 4 will review the available methods for measuring embodied carbon emissions. The chapter will focus on Life Cycle Assessment (LCA) as a key tool for measuring embodied carbon, through the Global Warming Potential (GWP) value. Environmental Product Declarations (EPD) are also reviewed.

Chapter 5 details various methods for the measurement of the reduction of embodied carbon emissions. The policy tools and incentives that will be detailed later in the research can be implemented according to two different methodologies for measurement of emissions reduction: the first refers to reporting current emissions reduction in comparison to the same material/product's past emissions. The second methodology refers to a reduction in comparison to an accepted reference point or benchmark for the value of emissions. The chapter details the advantages and disadvantages of each methodology.

Chapter 6 details the recommendations and policy tools. Each recommendation is based on a review of similar tools that have been implemented in the world and the options for implementation in Israel. The recommendations are divided into different sections: creating a framework for the measurement of embodied carbon and setting benchmarks, recommendations of regulation policy tools, economic incentives, and information tools, that the common goal is to encourage measurement and reduction of embodied carbon emissions.

In this chapter, a framework for measurement and a framework for the reduction of embodied carbon is introduced. These frameworks are summarized here:

Framework for measurement (6.1) – **set criteria for a transparent and uniform method for measuring embodied carbon emissions.** The recommendation contains the need in setting a minimum scope for an LCA, compliance with Israeli and international standards, a scale between LCA and EPD, and many more relevant criteria. The goal of this recommendation is to increase the transparency of the measurement of environmental impacts and GHG emissions.

Framework for measurement of reduction (6.2) – **creating databases and benchmarks for materials and buildings.** Creating Israeli databases, or adopting existing databases, with benchmarks that will create a reference point for the emissions of building materials and buildings. Databases with emissions values are necessary for the implementation of the policy tools and recommendations that are presented. In the first stage, the adoption of an existing global database with accepted benchmarks and make the adjustments that are needed for the Israeli market are being proposed. At the same time, the creation of an Israeli database based on LCAs and EPDs of the Israeli industry is proposed.

Within these frameworks, the research includes specific economic policy, regulation, and information tools. **The economic policy tools include:**

1. To create a criterion for measuring and reducing embodied carbon emissions as part of the adoption of the **EU taxonomy**. The EU taxonomy is a financial tool that encourages investment in "green activities". The recommendation reviews the possibility of classifying as "green activity" the construction of a new building that has performed WBLCA (whole building life cycle assessment), or a building that has incorporated low-carbon building materials. Another recommendation is to classify low-carbon cement as a green activity.
2. To expand the **subsidy programs** for measurement of embodied carbon emissions through LCA: upgrade existing subsidies programs of LCA, creating programs for subsidizing EPD and verification bodies.
3. **Grants** for manufacturers and entrepreneurs for reduction of embodied carbon emissions. The grants are designated to manufacturers that produce low-carbon materials, or for new buildings with outstanding carbon performances.
4. **Tax refunds** for manufacturers or entrepreneurs that show outstanding carbon performance (in materials or buildings).

The regulatory policy tools that are proposed include:

1. **Revision in the materials** chapter in the Israeli standard for green building (No. 5281), in order to create scoring points for measurement and reduction of embodied carbon. The proposed sections will allow scoring for performing a Life Cycle Assessment (LCA) or Environmental Product

Declaration (EPD), using low-carbon materials, optimizing the concrete volumes for the building, and performing Whole Building Life Cycle Assessment (WBLCA).

2. **Green public procurement:** to determine binding rules for public and government procurement. According to this recommendation, the government housing administration can define environmental and carbon conditions for the procurement of materials and products for the construction of public buildings.

3. **Carbon budgets:** to determine the maximum embodied carbon emissions that are allowed for building or specific industrial sectors. The state establishes a binding regulation that sets maximum values of emissions for a particular sector or building.

4. **National reporting mechanism for embodied carbon emissions,** making a transparent and accessible reporting dataset of embodied carbon values to reach a reduction in emissions.

The information tools that are proposed include:

1. To upgrade the material catalog of the Israeli Green Building Council, including filters of measurement and reduction of embodied carbon such as Life Cycle Assessment (LCA), Environmental Product Declaration (EPD), and low-carbon materials.

2. To promote webinars, newsletters, and reports on embodied carbon reduction techniques and practices.

3. To create academic courses that will focus on the measurement and reduction of embodied carbon in the building sector. These courses will be oriented toward planners, engineers, architects, environmentalists, policy analysts, etc.

4. To create professional courses (non-academic) for green building councils and the public. Israel Green Building Council (ILGBC) will hold these courses.

In conclusion, this research shows the importance of creating a new set of tools that will incentivize the construction sector to measure and reduce embodied carbon emissions. There is no single recommendation, but a necessity to implement multiple tools at the same time across the industry. Some of the recommendations can be implemented immediately, and some will be possible for implementation in the future. Most of the policy recommendations will be led by the Department of Green Building, Standardization, and Eco-labeling in the Ministry of Environmental Protection, with partners from other government ministries, including the Ministries of Housing and Construction, Finance, Economy and Industry, and other entities such as the Israel Green Building Council (ILGBC) and Israeli Resource Efficiency Center (IREC).

Israel has much work ahead to implement solutions to meet its climate goals. But with the right tools available, the path is clear, and the potential benefit is substantial.



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