INFRASTRUCTURE & HOUSING

The construction value chain accounts for **25% of global GHG emissions.** The main impact lever is **increasing the energy efficiency of the existing building stock** by 1) retrofitting buildings with more energy-efficient hardware solutions and 2) optimizing energy flows of new and old energy systems.

Thesis: Reducing operational emissions and improving the energy efficiency of the existing building stock will require 1) tech-enabled platforms to scale home improvements, pushing low-carbon hardware to the market in a cost-competitive and operationally-efficient manner, and 2) software platforms to optimize new and old energy systems, with easy-to-integrate tech and stellar teams that can bring products to market via challenging distribution channels.

The impact problem

- **40%** of global CO2 emissions come from the construction value chain, the majority of which are from operations
- **90%** of today's buildings will still be in use by 2050
- **75%** of EU building stock is classified as inefficient (poor insulation, inefficient HVAC)
- **EU** and **US** annual renovation rates need to double to reach 2030 Net Zero targets

Business opportunity

- Market size for building energy retrofits is valued at **$157B** in 2021
- **35M** building units to be renovated by 2030 in EU, requiring **€275B** p.a. of additional investment
- Regulatory support fueled by the energy crisis: **RePowerEU** plan and **IRA Bill** to incentivize energy retrofits
- Market Penetration of Distributed Energy Resources and Smart meters: opportunity for software to leverage better and more accessible data to optimize energy flows

CO2 emission by asset type (GtCo2e)

Lifecycle	Financing	Designing & Planning	Processing raw materials	Constructing	Upgrading	Operating and using	Total
Typical emissions	Energy usage in office, travel	Energy usage in office, travel	Energy used in cement production	Construction activity, transportation	Machinery and material during upgrading	Renewal and maintenance works, usage	
% of emissions			28%	2%		69%	100%
Gt emissions CO_2	0.02	0.04	3.88	0.27	0.10	9.40	13.71

Buildings are by far the largest contributer to total sector emissions (90%) vs Infrastructure (10%)

Solutions

Internal scorecard assessment: 1-10

- Building Envelope Solutions
- HVAC
- Energy Management Systems
- Home Improvement Platforms

Technology Plays

Early Stage

- Horizontal plays: Energy Management Systems in the multi-tenant residential space
- Vertical plays: Full-stack Building Management systems and Smart Home IoT

Growth stage

- Home Improvement Platforms offering full-suite of services and range of hardware solutions to decarbonize homes
- Energy Management Systems in the commercial space, where competitive dynamics high

10 key facts

- Current renovation rates in EU and US are **1%** and **1.7%** respectively. Doubling these rates implies 2M+ building renovations/year
- **50% of the European residential building stock is 50 years or older** (built before the 1970 thermal insulation norms)
- **Unwanted heat loss from the building envelope** (walls, windows, doors) consumes **2x the aviation sector's energy** (annual, US).
- **40 - 60% of total energy consumption** in both residential and commercial buildings is used for space heating/cooling.
- **Space cooling** is the fastest growing segment accounting for **1 Gt CO_2e** and about 8.5% of total final electricity consumption
- **Heat pumps** are a mature & readily available technology that could easily supply **90% of global demand** for heating/cooling
- **Cost** is the single highest barrier for consumers to consider home energy improvements.
- Abatement potential from Energy Management Systems & Smart Home IoT Controls = **1 Gt CO_2e /year**
- **Early-stage investments in building energy efficiency** grew at **55%** CAGR since 2017.
- Notable funding/exits include solar companies **Sunlight Financial** (SPAC for $1.3B 2020), Financing Platforms **Goodleap** ($800m growth round 2020), and home decarbonization platforms **Sealed** ($45M growth 2022)

Startups to watch

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