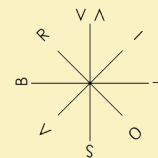




Build-in-Wood Policy Catalogue

Making wood cities happen: New urban policies for sustainable and carbon-neutral cities



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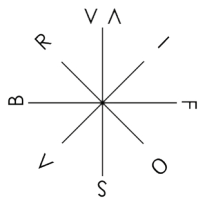


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Purpose & Methodology

While European cities make consistent progress towards increasing energy efficiency through strategic plans such as SEAPs, SECAPs and SUMPs, accounting for, and reducing embodied energy and carbon in the built environment is still a challenge for achieving true carbon neutrality.

Wood is a renewable and carbon-positive building material, which can have a meaningful contribution in changing paradigms on net-zero carbon ambitions of cities from all over the world.

The purpose of this catalogue is to provide useful resources for policymakers in cities and regions. It offers an overview of current best practices and new developments in the policy and regulatory environment governing the construction sector, specifically in relation to building materials and the use of wood in multi-storey buildings.

Developed through the Horizon 2020 “Build-in-Wood” project, the catalogue presents the rationale, characteristics and impact of different policy instruments at global level, offering insights with respect to strengths and weaknesses of different policy approaches at sub-national level and supporting cities and regions who aim to channel their efforts for creating a more sustainable built environment by prioritizing wood, either implicitly or explicitly.

Furthermore, Build-in-Wood brought together seven Early Adopter City (EACs) affiliates across Europe – Metropolitan Region of Amsterdam (NL), Braşov Metropolitan Area (RO), Copenhagen (DK), Haringey Borough of London (UK), Innsbruck (AT), Trento (IT) and Trondheim (NO) – to support wood to become a first-choice, competitive building material for multi-storey buildings.

This catalogue presents several conclusions from the analysis of their strategic and urban planning and regulatory framework, urban development preconditions, together with the local participatory process implemented with their relevant stakeholder ecosystem from the wood construction value chain.

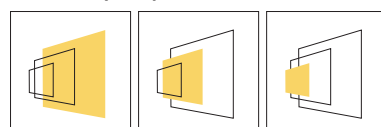
The catalogue identifies in the end transferable lessons learned and recommendations which can serve as guidance for other European cities that want to advance their agenda towards a sustainable construction environment.

Shortcuts

Policy Impact

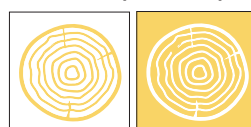


Policy Implementation Level



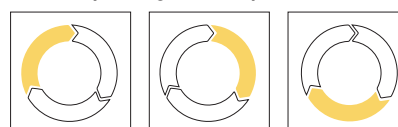
national regional local

Policy Quality



explicit implicit

Policy Stage of Implementation



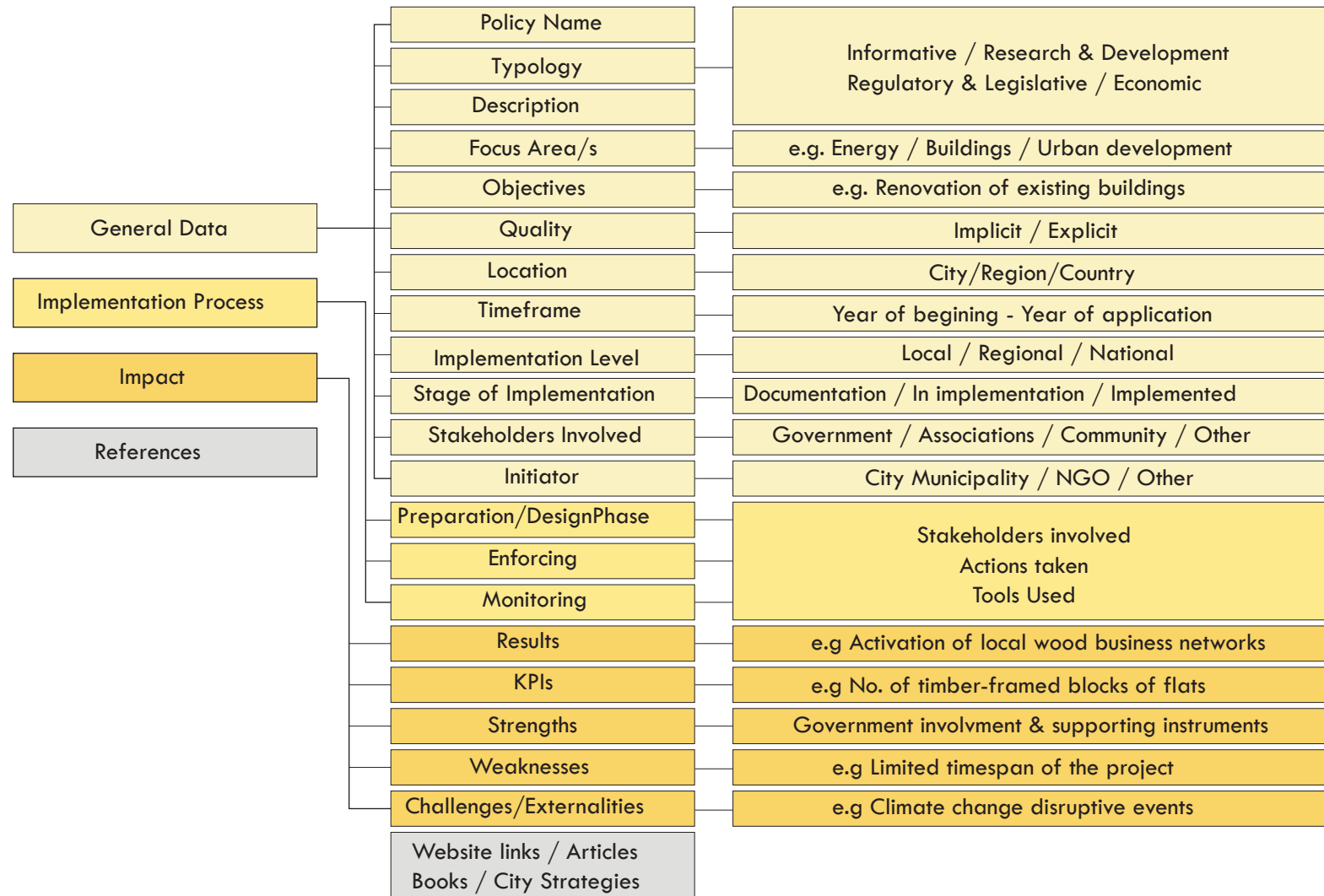
documentation / in implementation / implemented

Policy Typology

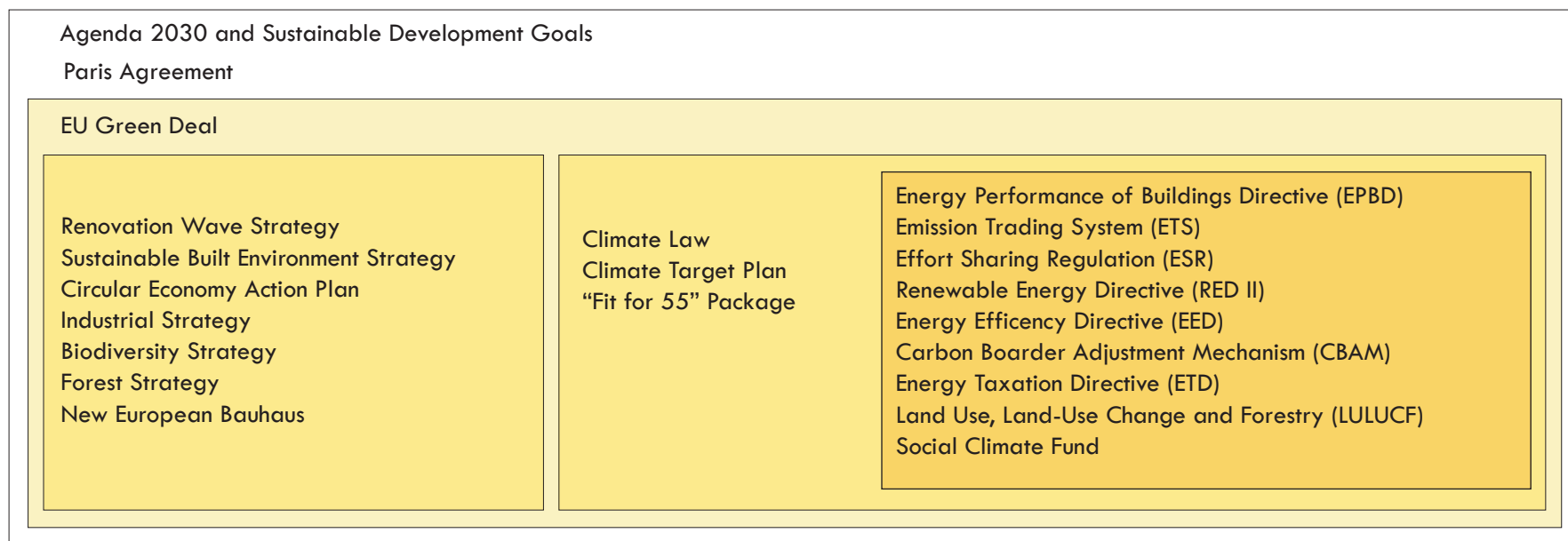


informative economic research & development regulatory & legislative

Research structure



Legislative layers



Agenda 2030

Action for people, planet and prosperity

Addressing the emerging challenges of sustainable development in an integrated way through 17 SDGs

(9) Build resilient infrastructure, promote sustainable industrialization and foster innovation;
(11) Make cities and human settlements inclusive, safe, resilient and sustainable;
(15) Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;

Paris Agreement

Limit global warming to well below 2°C / 1.5°C

- Legally binding international treaty on climate change under UNFCCC;
- Works on 5 years cycle of increasingly ambitious climate action;
- Nationally determined contributions (NDCs);
- Long-Term Low GHG emission development strategies (LT-LEDS).

EU Green Deal

Climate neutrality by 2050

- Roadmap leaning towards implementing the Paris Agreement and building a more sustainable and fairer society.

Climate action / Clean energy / Sustainable industry / Buildings and renovations / Sustainable mobility / Eliminating pollution / Farm to Fork / Preserving biodiversity / Research and development / Preventing unfair competition from carbon leakage

Renovation Wave Strategy

- Double renovation rates in the next 10 years for both public & private buildings;
- Promotes sustainable building practices, reusing building materials and reducing construction waste as well as emissions in construction, renovation, demolition.

Circular Economy Action Plan

- Prevent waste and keep the used resources in the EU economy as long as possible.

Sustainable Built Environment Strategy

- Promote circularity throughout the lifecycle of buildings.

Industrial Strategy

- Promote a more greener, more circular and digitally transformed industry, while remaining competitive on the global stage (including construction sector).

Biodiversity Strategy for 2030 “Bringing nature back in our lives”

- Cover the whole forest cycle;
- Promotes green infrastructure and nature-based solutions to be integrated in the design of buildings; Sustainable forest management and increasing resilience of the forests.

EU Forest Strategy for 2030

- Improve the quantity and quality of EU forests and enhance their multifunctional role;
- Promote sustainable forest management and sustainable use of wood-based resources;
- Prioritise wood products and promote long-lived wood products, as buildings;
- Optimal use of wood in line with the cascading principle.

New European Bauhaus

- Support innovative projects in wood construction sector;
- Supports research and innovation in architecture, green design and construction materials, as well as including industrial improvements to use more low-grade wood;
- Enhance cascading use and increase circularity, targeting the recovery of existing wood for the manufacture of engineered wood products.

EU Climate Law

Making the 2050 target binding

Climate target plan

55% reduction target by 2030

- Prepare the ground for necessary adaptation of the policies playing a key role in the decarbonisation of EU economy;
- Stress out that EU certification systems based on the GHG performance for low-carbon basic materials and for carbon removals should be developed;
- Sustainably harvested timber, designing building which use less material, as well as resource efficiency approaches including more intensive use of homes, are on the list of methods mentioned in the Climate Target Plan, which could reduce substantially emissions from the material cycle of residential buildings in the G7 countries.

Fit for 55

Review of the key legislation to meet the 55% target

The Energy Performance of Buildings Directive (EPBD)

- Measures to accelerate building renovation rates
- Minimum requirements for emissions from the use phase of buildings, as well as requirements for new buildings- “ zero emissions building”;
- National building renovation plans with concrete targets;
- Digitalization, buildings data and information tools.

Emission Trading System (ETS)

- Main engine for pricing GHG emissions in the EU (it reduces the ceiling of emissions from specific sectors of the economy each year);
 - Reduced cap and more ambitious linear reduction factor for GHG emissions;
 - Separate new ETS for buildings and road transport (to be establish from 2025);
- Revenues reuse - Climate Social Fund.

Effort-Sharing Regulation (ESR)

- Annual binding GHG emissions targets for MS for sectors not included in the EU ETS (building, agriculture, waste, small industry and transport);
- More ambitious targets per country, ranging from 10% to 50%, while annual emissions allocations would be progressively reduced until 2030.

Renewable Energy Directive (RED II)

- New target for 2030-minimum 32% share of renewables in final energy consumption;
- Sub targets in heating and cooling-annual increase of RES become binding;
- Increase in the use of RES in district heating and cooling;
- New target for energy use in buildings to come from RES-49% non binding.

Energy Efficiency Directive (EED)

- Sets rules and obligations for achieving the EU's 2020 and 2030 (at least 32,5%) energy efficiency targets;
- Use energy more efficiency at all stages of the energy chain.

Carbon Boarder Adjustment Mechanism (CBAM)

- Complement EU ETS on imported goods, addressing the risk of carbon linkages, targeting carbon-intensive products imported from non EU countries.

Energy Taxation Directive (ETD)

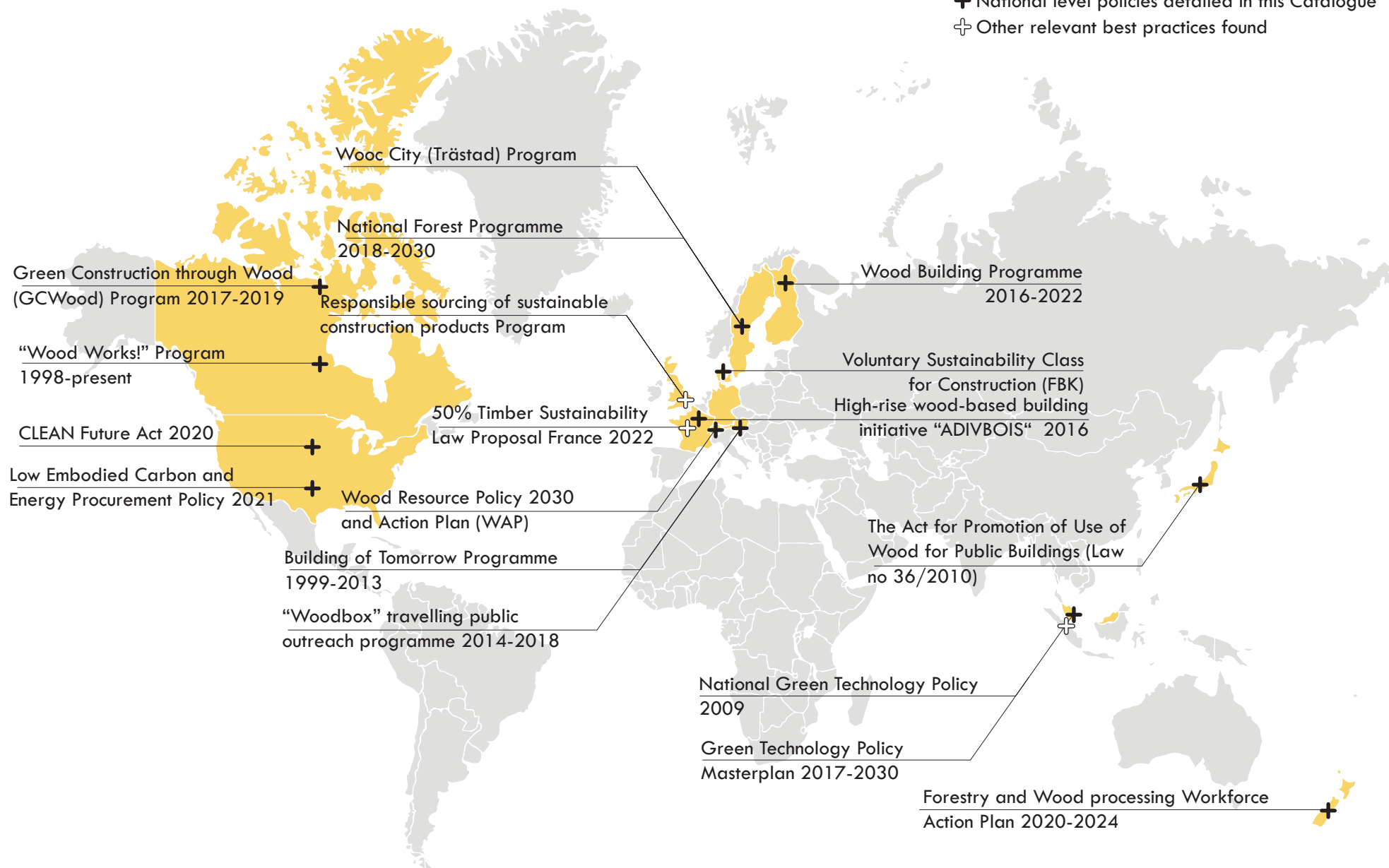
- Complement EU ETS, ensuring that fuel taxation incentivises an efficient use of energy and the consumption of more sustainable energy products, while not including a CO2 specific tax component.

Social Climate Fund

- Address possible negative distributional effects; EC will finance temporary direct income support for vulnerable households ;
- A dedicated part of the revenues from EU ETS (building & transport) will be available within the fund, to support measures and investments in increased energy efficiency of buildings, decarbonisation of heating, and cooling of buildings.

National level policies

- ✚ National level policies detailed in this Catalogue
✚ Other relevant best practices found



Low Embodied Carbon and Energy Procurement Policy

Location: USA

Timeframe: year of approval 2021

Initiator: US General Service Administration & RMI (NGO supporting clean energy transition)

The purpose of this policy is to encourage the use of low embodied energy and carbon construction materials and design principles in federal building projects, including the use of energy-efficient new materials, the use of recovered materials, building reuse and material-efficiency strategies. It acts on the procurement level for USA federal building projects, imposing minimal standards for energy efficiency, materials, recycling, etc.

Implementation Process

Embodied Energy Task Group identified opportunities to study the energy, pollution, and cost savings that may be achieved by reducing the embodied energy and carbon in federal building construction and renovation. Due to significant potential energy savings, EETG has produced relevant and readily adoptable procurement recommendations that could help GSA encourage the specification and adoption of low embodied energy and low embodied carbon materials. Green Building Advisory Committee (GBAC); an advisory body to the US General Service Administration (GSA) approved its adoption.

- Gradually decrease embodied energy and carbon material specific thresholds to net-zero GWP by 2050; Review and lower carbon material specific thresholds (where feasible) at least every three years;

The GWP results from the WBLCA must not exceed the GWP cap for the project building type as indicated by the GSA baseline building information provided publicly; Lower GWP caps over time;

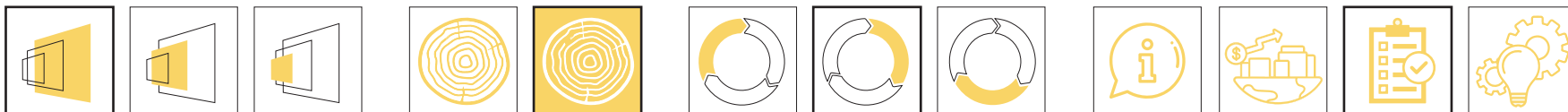
Key Policy Recommendations

Materials: All projects require EPDs for 75% of materials used & to demonstrate that their emissions fall in the best-performing 80 % of GWP among functionally equivalent products as demonstrated by EPDs.

Applicability: Projects costing less than the total prospectus value for construction/reuse projects based on the year they are funded & Arrangements to improve the rented spaces to the greatest extent possible.

Buildings: Larger projects require a building design which should result in a 20% carbon reduction, compared to a baseline building. The project team have to perform a whole building LCA of the project's structure and enclosure.

Applicability: Projects costing more than the total prospectus value for construction or/alteration projects based on the year they are funded, that are not limited to rented improvement fit-outs.





- ★ Expected: Lower production costs for lower embodied energy and carbon materials, cost savings for building owners by reducing the quantities of materials used, job opportunities for skilled deconstruction through expanding the market for salvaged and reused building materials, quicker construction timelines and lower total project costs if material savings are achieved through prefabrication of building components.
- + Support advance federal energy and environmental goals, as well as the industrial innovation and competitiveness of product manufactures within the US;
Simple to adopt into current GSA procurement standards, due to similarity with the existing requirements;
Attempts to align with existing federal policy and systems.
- The amendments of the law have only recommendation statute and are applicable just for public federal buildings.
- ! Climate change effects caused damage to some of GSA's more at-risk facilities, due to disruptive events such as hurricanes and wildfires and are predicted to continue.



CLEAN (Climate Leadership and Environmental Action) Future Act

Location: USA

Timeframe: 2020-2030-2050

Initiator: House Energy and Commerce Committee
CLEAN Future Act is a comprehensive legislation that addresses the reduction of pollution, reduction of hazardous waste, rebuilding, and modernizing infrastructure, deploying clean energy and protecting human health and safety.

This act includes sector-specific and economy-wide solutions to address the climate crisis and incorporates a set of policy proposals that has the scope of empowering states on their path to a clean economy.

Its main objective is to reduce GHG emissions to at least 50% below 2005 levels by 2030, and achieve a net-zero target by 2050. For this, each federal agency must develop a plan to achieve the goals.

Implementation Process

The Committee on Energy and Commerce worked on developing policy solutions to address the climate crisis. Along the process, it collected extensive feedback from experts testimony and stakeholder engagement, presenting the draft of the document to the 116th Congress (2020).

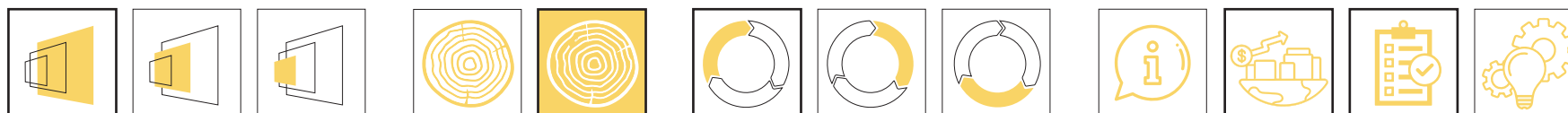
The draft bill included the creation of a national climate bank to help states, local communities and the private sector to make the transition to a clean economy, as well as a Buy Clean Program. After one year the legislation came with new provisions and modifications.

The bill establishes a variety of requirements, programs, and incentives to achieve its objective, such as:

- modernizing the electric grid and supporting clean energy microgrids;
- increasing the use of renewable energy and advanced nuclear power technologies;
- increasing energy efficiency in buildings, homes, and appliances;
- supporting clean transportation, including electric vehicles and related charging infrastructure;
- issuing GHG standards for certain vehicles, engines, and aircraft;
- promoting manufacturing and industrial decarbonization, including through buy-clean programs;
- supporting environmental justice efforts
- reducing methane, plastics, and super pollutants.

- ⊕ The bill addresses energy use in both new and existing buildings in several ways:
- call for more stringent building energy codes that seek to achieve 50% reduction in energy consumption for all newly constructed buildings by 2029, compared to those built under the current codes;
 - call for highly efficient buildings that are “zero energy ready” for those new buildings built in 2030 and after;
 - call to retrofit the nearly 140 million existing residential buildings.
 - establish an energy-saving program based on financial incentives: reduction of prices to property owners for the installation of insulation, air sealing and replacement of a heating, ventilation and air conditioning system. The discount could increase if modifications leads to 40% reduction in energy consumption.

⚠ The CLEAN Future Act incorporates other previous legislative and policy measures. Even if it has several limitations (e.g does not include carbon taxes, other taxes or tax credits; the contribution that natural and working lands can make to remove carbon; transportation system planning and construction; lack of a national emissions cap with limits for sources outside the electricity sector), it provides a great starting point and direction for more specific policies to be further outlined.



Wood WORKS! Program

Location: Canada

Timeframe: 1998-on going

Initiator: Canadian Wood Council

Stakeholders: developers, architects, engineers, planning officials, wood products industry, regulatory bodies

The Canadian Wood Council (CWC) is a national federation of forest and wood industry associations founded in 1959 and located in Ottawa.

WoodWORKS! program is an industry-lead CWC initiative, intended to support increasing the use of wood in non-residential, mid-rise, and tall building markets in Canada.

The general aim of the program is to ensure the built environment in Canada maximizes the use of wood-based solutions by advocating, educating, and connecting.

The initiative seeks to build proficiency in using wood through training, networking, direct technical support, organizing workshops, collaborating with research and education institutions etc.

CWC is responsible for monitoring periodically and for offering technical support, while applying regularly surveys to target audience representatives to remain relevant.



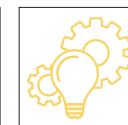
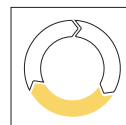
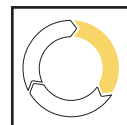
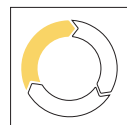
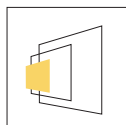
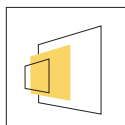
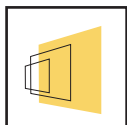
- ★ Since 1998, the program directly influenced more than 1800 projects; generated incremental wood sales of \$1.1 billion and carbon-storing benefits of 6.85 million tonnes CO₂.
Numbers for 2017-2018 period: 238 projects were influenced by the program, 126 million bd. fr. equiv., \$163 million in wood sales; 47500 education hours; 20 100 construction professionals were reached.

Other results: had inspired exemplary buildings development - awarded wood designs, received community recognition, organized seminars, conferences, luncheons, enabled universities/colleges / rade programs.

Had developed an e-learning website with an ArcGis online map showing all project developments and a software used in both Canada and USA in which developers can simulate wood construction and the use of wood in different parts of buildings.

- + It values collaboration: being a partnership between the primary industry, manufacturers and the provincial and federal governments.

- ! The main challenge perceived was to convince the construction sector to use wood through “soft instruments” (i.e training, networking) instead of procurement and legislation.



Green Construction Wood Program (GCWood)

Location: Canada

Timeframe: 2017-2022

Initiator: Government of Canada

Stakeholders: Government of Canada, construction sector, investors, banks

The GCWood program supports Canada's transition to a more wood-inclusive construction industry by funding projects that encourage:

- higher adoption and commercialization of wood-based products in the construction of innovative tall wood buildings, timber bridges, and low-rise wood buildings;
- replication of innovative non-traditional wood-based buildings and timber bridges;
- research that addresses the gap in terms of technical information needed to facilitate revisions to the National Building Code of Canada to allow taller and larger wood buildings.

The program started in 2017 with almost \$40 million available funds, to support demo projects and activities that increase the use of wood as a green building material, by providing non-repayable contributions of up to 100% of a project's eligible incremental costs.

Implementation process

It builds upon the success of the Tall Wood Building Demonstration Initiative (TWBDI), through which between 2013-2017, the Government invested \$5 million to demonstrate the commercial viability of tall wood building construction. The GCWood Program had three open expressions of interest, within its implementation process, as follows:

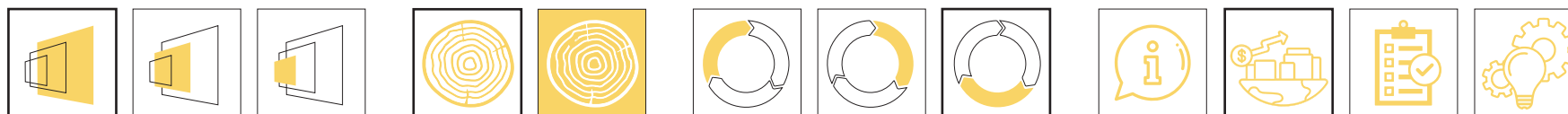
- 1st request targeted tall wood building projects (10 storeys and up);
- 2nd request targeted low-rise non-residential buildings (commercial/ industrial and office/ institutional buildings with a maximum of four storeys);
- 3rd request targeted timber bridges (traffic and pedestrian bridges with a minimum span of 20 metres) .

The program provided an applicant's guide, based on which the projects were evaluated against mandatory criteria (eligibility, building type, location) and program's rated criteria (technical feasibility, innovation, experience and expertise, business plan, cost effectiveness and replicability, timing, value, GHG mitigation.

★ The following environmental, social and economic benefits were anticipated:

- reduced GHG emissions from renewable and sustainable resources;
- innovative energy-efficient building designs;
- new jobs and development opportunities;
- more options and affordable housing for home buyers;
- increased market opportunities for rural and indigenous communities dependent on forestry activities;
- new revenues for companies;
- a reduction in the incremental cost of using wood;
- new or diversified building portfolios;
- updated building codes that allow taller and larger wood buildings;

⊕ There are several beneficial conditions for Canada's leadership in mass timber construction such as the strong forestry industry and robust network of suppliers, engineers and architects experienced with this material, market-specific drivers for boosting cost-competitiveness as well as the constant support from the federal and provincial governments to reduce costs and regulatory barriers. Since 2007 Canada's environmental agency has backed up the development of the mass timber industry through funding programs oriented towards research and development of new materials and further on through the TWBDI initiative.



National Green Technology Policy (NGTP)

Location: Malaysia

Timeframe: 2009 - ongoing

Initiator: Ministry of Energy, Science, Technology, Environment and Climate Change
The main aim of this policy is to be a driver for national economy acceleration and to promote sustainable development through green technology, focusing on renewable energy production and the intensification of energy efficiency.

The policy addresses 4 key areas: the energy sector, buildings sector, water and waste management sector and transportation sector. It has 5 strategic objectives:

- strengthen the institutional framework;;
- create a conducive environment for green technology development;
- intensify human capital development in green technology,
- intensify green technology research and innovations;
- promotion and public awareness.

Under the building sector key area, the national policy focuses on the adoption of green technology in the construction, management, maintenance and demolition of buildings.

Objectives

- To minimise growth of energy consumption while enhancing economic development;
- To facilitate the growth of the green technology industry and enhance its contribution to the national economy;
- To increase national capacity and capability for innovation in Green Technology development and enhance Malaysia's competitiveness in green technology in the global arena;
- To ensure sustainable development and conserve the environment for future generations;
- To enhance public education and awareness on green technology and to encourage its widespread use.

Implementation Process

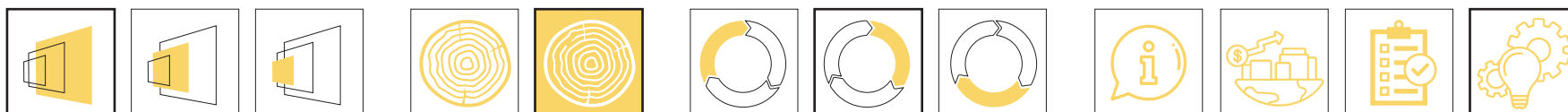
One of the areas that was given priority in this policy was the growth of construction of green and energy efficient buildings sector, especially through the use of wood and wood products, which will continue to be further evaluated under Green Building Index (2009).

The policy continues efforts in 1970 when tangent mentions of green technology, wood and sustainable development first started.

All those provisions were gathered together by the Government within this national policy. The Ministry of Energy, Green Technology and Water is responsible for its enforcing and monitoring.

- ★ The Green Technology Master Plan adopted a few years later complements the NGTP. Since the introduction of the NGTP, the Government has initiated various programmes to facilitate industry growth in the Green Technology domain through key market enablers: FiT (Feed-in-Tariff), Eco-labelling mechanism, Tax incentives and duty exemptions, GTFS (Green Technology Financing Scheme).
In 2017 prefabricated timber framing systems were among 5 commonly used industrialised building System types in Malaysia (together with precast concrete framing, panel and box systems, steel framework systems, steel framing systems, blockwork systems)

- 📈 Progress of the rise in ranking of environmental performance bt 2030;
Improvement in air and river water quality;
Sizeable number of investments in GreenTechnology through FDIs and domestic direct investments.
Increasing number of green jobs in the manufacturing and services sectors;



Increasing value of spin-off and supporting industries;

Increasing number of cities, townships and communities embracing Green Technology;
Improved quality of life in Malaysia.

- ⊕ According to the Green Technology Master Plan (2017-2030), the building sector has made relevant steps in realising the aspirations towards sustainable construction and green buildings. Projects and measures include green building ratings, industrialised building systems, green building designs, green construction materials, and green product directories.

The Government has lead the way by implementing initiatives for a 5% reduction in energy consumption of ministry buildings in the federal capital by 2020 as well as for the adoption of green building rating scheme. These policies had a direct impact on the level of awareness and knowledge of Malaysian architects with respect to common types of timber products in the market, supporting wide acceptance of these technologies by architects, designers, consultants to owners in projects.

- ⓘ Malaysia is one of the largest producers and exporters of wood products in the world but the use of wood materials and wood products in the domestic construction sector is relatively small due to the general perception that the quality of wood in products available for domestic use is lower.

Malayan Grading Rule, the mark of quality for wood products exported from Malaysia, is not applied to wood products used in the domestic market.

The low energy cost in Malaysia for heating and cooling throughout the year does not encourage use of wood, as almost all buildings are cooled in the tropical heat through air conditioning rather than using timber products for their good heat insulating properties.

The existing national building codes and laws do not explicitly encourage the use of wood.

As many architects and contractors in the country pointed, outbuilding by-laws including the fire rating of buildings in the country are outdated.

The lack of a regulatory push factor and uncertainty in real costs also contribute to the low interest from developers and contractors to invest in green building technology

The higher cost incurred for green materials and technology importing also hinders the shift towards sustainability.





Forestry and Wood Processing Workforce Action Plan 2020-2024
www.mpi.govt.nz

Jointly developed by the forestry and wood processing sector, government and the education sector, the action plan aims to support the development of a workforce that meets the current and future needs of the forestry and wood processing sector through 4 focus areas:

- Knowledge: Forestry and wood processing sector makes good workforce decisions based on robust information and data;
- Attraction: The forestry and wood processing sector inspires and attracts a larger, more diverse workforce;
- Education and training: People have the right skills, knowledge and capabilities to be successful in the forestry and wood processing sector;
- Employment: People thrive in forestry and wood processing workplaces with good practices and conditions.

The action plan covers: the forest growing industry and some parts of the primary wood processing industry (sawmilling, wood treatment)

Forestry and Wood processing Workforce Action Plan

Location: New Zealand

Timeframe: 2020-2024

Initiator: a working group composed of industry organizations and government agencies coordinated by MBIE (Ministry of Business, Innovation and Employment)

Stakeholders involved: Ministry of Business, Innovation and Employment, Future Foresters; School of Forestry from University of Canterbury; NZ Institute of Forestry; NZ Timber Industry Federation, Ministry of Primary Industries; NZ Forest Owners Association, etc.

The document acknowledges the importance of the involvement of different stakeholders across the system having different roles and responsibilities and working together to achieve the objectives.



KPYs are established based on the focus areas.

Among them could be mentioned:

- forestry and wood processing workforce requirements are anticipated through robust analysis and forecasting; the sector has a good understanding of programmes that eliminate barriers and prepare people for working in the sector;

- a diverse range of people want to study and work in the forestry and wood processing sector; the public views the forestry and wood processing sector as a respected and attractive career choice.
- the education and training system meets the needs of the sector and of trainees and employees with specific learning requirements; individuals on different career pathways are supported to train and gain relevant credentials at any stage of their careers and lives;
- all contractors and forestry employers run sustainable businesses and provide fair pay, stable work, and positive employment experiences; forestry is seen as a safe industry to work in; employees remain in the sector because of good conditions and a sense of pride in their work.



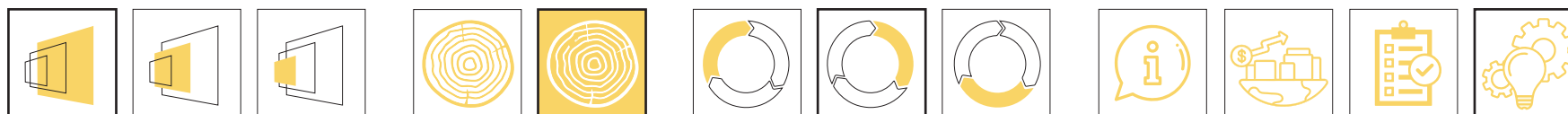
It is expected that meeting the challenges and opportunities related to sustainable development through investment in workforce, will stimulate innovation and the growth of new timber-derived products, resulting in new job opportunities in expanding areas of work.

Implementation process of the proposed actions is based on 3 development stages based on funding availability/readiness for implementation:

- 'quick wins' that have funding (already underway/starting soon);
- actions dependent on/related to the Forest Strategy and the RoVE (may require new or additional funding);
- longer-term actions that require further scoping and a business case to secure funding.

The key implementation milestones are structured and phased on 5 dimensions: governance, industry engagement, scoping & funding, delivery, evaluation & review.

A Wood Processing Workforce Steering Group oversees implementation of the forestry and wood processing-specific actions. It works with key government agencies and wider primary sector stakeholders to oversee the implementation, evaluation, and further development of the Action Plan and it provides input on the implementation.



Wood Resource Policy 2030 and Wood Action Plan [WAP] 2021-2026

Location: Switzerland

Timeframe: 2021-2026 with previous phases. 2016 -first programme phase

Initiator: FOEN (Federal Office for the Environment)

This policy encourages the consistent and sustainable harvesting of wood from local forests and its resource-efficient use as a raw material for a range of products. It focuses on the proportion of wood in buildings, setting.

It sets clear performance targets and indicators to be achieved by 2030 in order to reach 3 main objectives:

- Increase the use of Swiss wood and wood-based products;
- Supply, process and use wood and wood-based products from Switzerland sustainably and in line with demand at all stages;
- Secure the competitiveness of the forestry, timber and energy wood industry through innovation.

Indicators and specific target values were defined for each objective at national level:

- (1)a. Switzerland's final wood material consumption (excluding paper/ paperboard products); b. Proportion of Swiss wood in final wood consumption, as a material; c. Production of sawn timber and timber materials, Switzerland; d. Wood used for energy; e. Efficiency;
- (2)a. Wood volume harvested from Swiss forests by round wood, industrial wood and energy wood; b. Round wood cutting from Swiss wood
- (3)a. Applied research and development projects; b. Product and process innovations; c. Technology development, Industry 4.0; d. Pilot, demonstration and lighthouse projects for innovative technologies and solutions for the wood-based industry with market proximity; e. Patents and awards.

Implementation Process

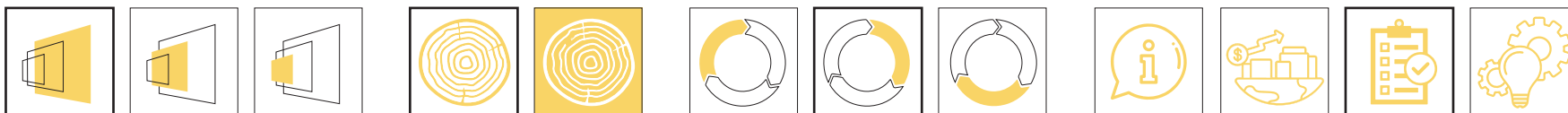
The policy was initially piloted in Basel in 2001. In some cities, like Zurich, a referendum was held after a few years of public engagement on whether the programme's goals should be enforced.

There are currently 20 cantons and 100 towns and cities that use regulations, guidelines and targets, software and tools, datasets and lifecycle inventories to calculate and regulate embodied energy associated with building operations, materials and construction practices.

The Federal Office for the Environment is the lead agency and has to update the policy periodically based on the different societal interests and scientific data.

WAP (2021-2026) is the most important instrument for implementing the Wood Resource Policy. It has two focal themes:

- Climate-appropriate buildings and 2) Swiss wood value added, as well as two cross-cutting themes (Communication and Innovation). The FOEN can support projects on these central themes. Four million Swiss Francs per year are allocated annually until 2026 for this program.



Even if primary implementation vector is regulatory in nature, the Wood Action Plan acts in an integrated way, supporting measures also in the domains of: education, information and knowledge transfer; awareness raising, cooperation, harmonisation and coordination; applied research and development; implementation projects

Its main priorities are:

- Swiss wood value added. Revitalise and develop Swiss forestry and timber value added networks;
- Eco-friendly Buildings. Increase the use of Swiss wood in construction, refurbishment and heating and highlight the environmental advantages of wood and wood-based products.



- Increase the demand for wood products used for materials by 30% from 3.07 million m³ (2012) to 4.0 million m³ (2030);
- Increase the use of Swiss wood in Switzerland's total final consumption of wood as a material from around 35% (2012) to 40% (2030), based on 4.0 million m³;
- Exploit the potential for energy wood use of around 6 million m³ or 16 TWh final energy annually.

Stakeholders involved

The FOEN acts as the lead agency for the Wood Resource Policy (strategic and coordination function and overall responsibility).

Its implementation through WAP is a joint mission shared by the Confederation and its partners (cantons, the Swiss forestry, timber and energy wood industry and other committed stakeholders).

An Advisory Group consisting of representatives of the Swiss forestry, timber and energy wood industry, the cantons, other federal authorities, environmental organisations, the property sector and communications collaborates on strategic issues; An Expert Group have an operation role, supporting the programme management on project evaluation.

Other partners involved: stakeholders from the bioeconomy field, chemical and pharmaceutical industries, public sector decision makers, building and property organisations of the Confederation and enterprises affiliated with it, public clients at cantonal and municipal level, contracting authorities, institutional and private clients and investors, media etc



High level of general building activity which supported to drive forward market adoption of wood construction;
Positive stimulus for the timber sector through the development of fire protection and sound-proofing systems;
Several projects on technical noise protection and fire safety were running under the umbrella of the WAP 2021-2026;
Important contributions to the objective of a 2000-Watt Society. Absolute per-capita consumption has been declining since 2005 while the proportion of renewable energy sources used, including wood, has increased;
Over 100 projects realised through WAP
Prioritization of eco-friendly construction and refurbishment;
Contribution to a positive perception of wood as a resource.



The funding programme : allocation of FOEN financial support for projects under the condition of meeting a set of eligibility criteria, proposed by professionals, wood and forest cantons or by universities - under the 4 priority areas);
Government involvement - aprovision of accompanying and supporting instruments, which created the preconditions and bases necessary to achieve the WAP objectives (e.g innovations for fire and noise protection measures in timber construction);
The policy takes changing framework conditions and new developments into account.



The policy does not address the on-going maintenance of existing buildings.



Increasing reliance on imported wood products. Switzerland cannot meet the demand of increase the proportion of the Swiss building stock accounted for by timber-framed structures purely from domestic forests and local wood processing capacity;
Meeting policy targets requires continuous implementation;
Greater use can be made of synergies with other sectoral policies and funding institutions by cooperating with stakeholders from other sectors on specific topics or projects.

Wood Building Programme

Location: Finland

Timeframe: 2016-2023

Initiator: Ministry of the Environment, Ministry of Economic Affairs and Employment, Finnish Government.

Stakeholders involved: authorities, developers, construction firms, timber product suppliers, research and development organisations, public sector, students

The main aim of the programme is to increase the amount of wood used in construction, as a way of reaching the energy and climate targets established in the National Energy and Climate Strategy and to reduce Finland's carbon footprint by 2030.

Secondary objectives:

- promote and develop the skills base to take wood construction to an internationally competitive level;
- support industrial wood material manufacturing in Finland to boost exports;
- support the Finnish Bioeconomy Strategy by increasing the use of wood in construction and thereby the quality of long-term stored carbon.

The programme also aims to diversify and expand different applications for wood while creating as much value added as possible.

It focuses on 5 main areas:

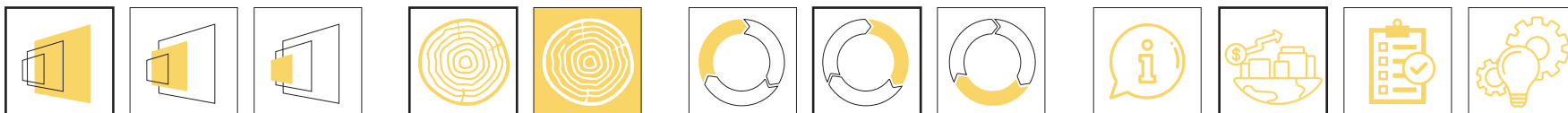
- Increasing the use of wood in urban development;
- Promoting the use of wood in public buildings;
- Increasing the building of large wood constructions (such as bridges and halls);
- Strengthening regional skills bases;
- Promoting exports.

Implementation Process

The policy was designed through a joint government commitment and coordinated by the Ministry of the Environment. It received funding for two periods, from 2 different sources: from the government's spearhead project funds for (2016–2018) under the National Energy and Climate Strategy (2018-2021). Implementation is addressed through a wide range of methods: developing rules and regulations regarding communities, the built environment and housing, publishing reports and studies on wood construction, promoting industrial wood construction solutions, supporting international research and development cooperation and offering impartial information on the use of wood in construction.

Moreover, the programme communicates and shares information and training with stakeholders and target groups across the board, including the public sector, construction industry professionals and students. The programme is evaluated through an annual impact assessment.

- ★ Funding for the wood building research projects like ERA-NET ForestValue, activation of the WoodFinland business network, a national database with a compilation of the development projects in wood construction, testing measurement and assessment tools to establish the carbon storage and carbon footprint in wood building projects, engagement with developers together with client organisations
- Wood construction is promoted as part of the government's spearhead project "Wood on the move" and new products from forests. The financing model includes different funding sources, each for only a part of the project;





- ⚠ Meeting the requirements of the Finnish Bioeconomy Strategy and the National Energy and Climate Strategy goals by 2030 without a good correlation with other national initiatives/policies.
- 🔗 The outcomes of the programme will be evaluated on the following indicators evaluated annually:
 - increase in the number of timber-framed blocks of flats;
 - % of industrial wood construction of all wood construction;
 - increase in the exports of wood-based construction products, the amount of carbon bound by buildings,
 - increase in the number of non-profit developers active in wood construction.
- ⊕ National governmental funds for the project; Active collaboration with local authorities; Government subsidies for municipally funded wood construction projects; Existence of procurement guidelines for public building projects and electronic contracting tools; Aid Scheme for Growth and Development for Wood; activation of the WoodFinland business network; Funding for wood building research projects (e.g. ERA-NET ForestValue); Pan-Nordic legislative development work on wood construction, and participation in the Nordic Wooden Cities Network.

The Act for Promotion of Use of Wood for Public Buildings

Location: Japan

Timeframe: 2010 - revised in 2021

Initiator: Ministry of Agriculture, Forestry and Fishery (MAFF)

Stakeholders involved: Ministry of Land, Infrastructure and Transportation, public authorities, national and local governments, wood producers, architects and designers

This law serves to extend the deadline for repayment of government loans provided to eligible wood material manufacturers and simplifies the process of obtaining development permits for these manufacturers. Additionally, it promotes the widespread utilization of wood in construction projects.

With the aim of safeguarding forests' survival and ensuring the sustainable use of wood resources, this law mandates national and local governments to prioritize the use of wood materials in public buildings that are three stories or less.

This prioritization aligns with environmental protection objectives.

Implementation process

MAFF drafted a bill to promote the use of wood in public buildings. The bill was approved by the Cabinet submitted to the Diet, and then became a law on May 26, 2010

MAFF and Minister of Land, Infrastructure, Transport and Tourism must establish the basic policy for the promotion of use of wood for public buildings (Basic Policy). In line it, prefectural governors must establish the policy on the promotion of use of wood for public buildings within the area of the prefecture (Prefectural Policy). In the line with the Prefectural Policy, municipalities must establish the policy on the promotion of wood within their area (Municipal Policy).

After every 5 years after the enforcement of this Act, the government must review its status. Based on the results, it shall implement necessary measures.

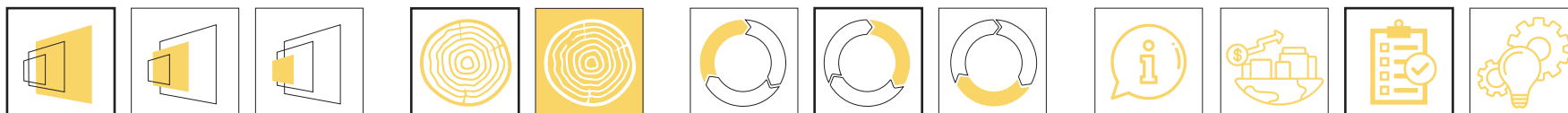
The measures for promoting the use of wood in **public buildings** are formulated based on 3 mentioned levels (Basic Policy, Prefectural Policy and Municipal Policy), setting aspects such as:

- Define and promote the use of wood in public buildings;
- Set goals and measures for the use of wood;
- Ensure sufficient wood supply for construction;
- Revise the policy as needed and consult with relevant authorities;
- Advertise the policy and report implementation annually; notify relevant municipalities.

The measures for promoting any use of wood **other than public buildings** are referring to governments that shall:

- Support the use of wood in housing by providing information, organizing exhibitions, and fostering demand;
- Encourage the use of wooden structures in public facilities for aesthetic and user benefits;
- Promote research and development for optimizing the use of wooden biomass in various applications;
- Promote the use of wooden biomass as an alternative energy source for carbon reduction and effective utilization.

According to the law, wood manufacturing enterprises must also prepare a **Timber Manufacture Improvement Plan** and submit it to the Minister of Agriculture, Forestry and Fisheries for approval. The plan should include: objectives, implementation strategies, facility details, funding, and location, deployment, structure of development activities in private forests covered by the regional forest plan.



The Minister approves suitable plans, while prefectural governors give consent, considering opinions from forest chambers and municipalities. Ministerial approval is required for Approved Timber Manufacturers to modify their Timber Manufacture Improvement Plans. The funding and redemption period for these plans are specified by Cabinet Order, with a maximum duration of twelve years.

Approved Timber Manufacturers who carry out development activities in accordance with their approved plans are considered compliant with the Forest Act.

The national government has the authority to establish reduced fees for utilizing national research institutes for wood-related research.

The Minister has the right to request reports on the progress of Approved Timber Manufacture Improvement Plans.

Failure to submit reports or providing false information by Timber Manufacturers may lead to fines of up to 300,000 yen.

- ⊕ The law sets several responsibilities of different stakeholders: (1) National Governments to:
- Develop and implement measures to promote wood use, providing guidance to local governments;
 - Lead by example in using wood for public buildings;
 - Provide fiscal support to increase wood demand;
 - Secure a reliable supply of quality wood for construction;
 - Review regulations on wooden buildings and make necessary changes based on research and expert opinions;

- Foster research, technology, and training for wood utilization;

- Conduct public awareness campaigns for promoting wood use.

(2) Local Governments: promote and use wood in public buildings based on national policies according to their local soci-economic conditions;

(3) Enterprises and citizens shall make their own efforts to promote use of wood in their business activities, and shall also cooperate with measures of the national government, local governments for promoting use of wood;

- ⊕ Japan achieved an increase in the self-sufficiency rate of wood materials from 24% (2010) to 50% (2020).

The Ministry of Land, Infrastructure and Transportation amended the building standards to accommodate the policy set forth under this law. The law was revised in 2021 in order to expand its scope to the private sector. According to an Wood Products Trade Office Forestry Agency, MAFF (2022 report), ratio of wooden structure in public buildings increased from: 8.3% in 2010 to 13.8% in 2019.



Voluntary Sustainability Class for Construction (FBK)

Location: Denmark

Timeframe: 2020 test phase - 2023 mandatory from 2023 - Continuous collection of latest knowledge and data

Initiator: Danish Building Research Institute (SBI)

Stakeholders: wood industry sector, researchers, experts and relevant organizations, national government, municipalities

It is a holistic attempt to improve not only the climate impact of buildings through LCAs, but also other issues including resource use, indoor climate, natural light etc. Its aim is to reduce the construction and building impact on the climate, while at the same time encouraging the use of wood as an alternative and sustainable construction material.

Moreover, it wants to give a clear pathway in the short term in order to increase the number of wood buildings, to raise the current floor limits for timber construction in regard to fire regulation and to reduce the negative impact on the environment.

Implementation process

It prioritizes nine specific requirements that address environmental, social, and financial aspects throughout a building's lifecycle, focusing on building materials, construction, maintenance, operation, indoor climate, and the potential for reuse and recycling.

Initially, the voluntary sustainability standard, invited the industry to test new requirements for construction over two-year period, serving as a backbone to integrate minimum requirements into the Danish building code by 2023.

With the test phase, FBK wanted to obtain industrial experience and acquire feedback on the provisions and whether they fit the industry level.

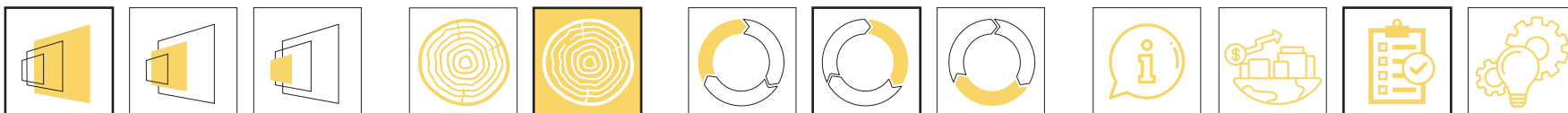
- ★ Starting from January 1st, 2023, the Danish building regulation has been updated to incorporate climate requirements for new buildings, aiming to reduce the country's CO2 emissions originating from the construction sector:

- all new buildings (under 1000sqm) are obligated to assess their environmental impact using LCAs calculations over a 50-year lifespan;
- for buildings exceeding 1000 sqm, they must adhere to a threshold of 12 kg CO2 equivalent per square meter per year.

According to the National Strategy for Sustainable Construction (2021), climate requirements for buildings' CO2 emissions are gradually becoming more stringent towards 2030.

- By 2025, the CO2 limit value requirement will be determined based on the latest knowledge and data. The parties involved will meet at the end of 2023 to decide the limit value for 2025. Limit values from 2025 must also apply to new buildings under 1,000 m².

- From 2027 to 2029, further revisions and limitations will be implemented, aiming for CO2 emissions to reach 9 kg CO2-eq/m²/year and eventually 7.5 CO2-eq/m²/year by 2029. Additionally, building owners have the option to voluntarily comply with the limit values for the low emission class.





- ⊕ Municipalities are critical actors in monitoring and uptaking procurement in wood construction. Denmark has strong competences in architecture, design and urban planning, which have not been fully leveraged to accelerate wood in construction. However, interest in wood construction is growing at student level.

Besides the benefits of the requirements to reduce the climate footprint of construction, they can also teach the industry and developers to build more sustainably/promote climate-friendly construction solutions.

- ⊕ In connection with the agency's preparations towards the entry into force of the climate requirements, the Housing and Planning Agency organized open webinar on the content of the guidance text.

Guidelines and annexes for LCA determination were also published.

The phased implementation of LCA requirements and limit values is expected to lead to CO₂ reductions not only in the construction sector but also in other sectors and internationally.

- ⊕ Greater certainty is needed on long term goals the and how the industry will develop sufficient competences to comply to the requirements.

- ⊖ Challenges are fire and height limits for wood buildings, which should be addressed in the future. To meet fire safety requirements when building higher than four storeys, individual technical assessments are needed in planning and wood buildings must withstand at least 120 minutes of burn.

Lisbjerg Bakke is a best practice case study of what sustainable social housing can be in Denmark. It is a hybrid timber construction of 40 apartments, with an open source design and low carbon emissions and lifecycle costs compared to the Danish standard.

Building of Tomorrow Program

Location: Austria

Timeframe: 1999-2013

Initiator: Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMVIT)

Stakeholders involved: Austrian Research Promotion Agency (FFG), Promotional bank of the Republic of Austria (aws), Austrian Society for Environment and Technology (ÖGUT)

Research and technology program designed to support environmentally friendly and renewable materials in construction. The program aimed to increase the energy efficiency of the construction sector to a point where GHG emissions from the entire life cycle of buildings are reduced to zero overall, by:

- create the technological basis for the building of tomorrow, especially the plus-energy house;
- focuss also on office and factory buildings and on modernizing existing buildings;
- adapt innovative technologies and products for large-scale industrial manufacture;
- initiate demonstration projects (buildings, settlements, networks) to develop new technologies;

- support the interlinking of key Austrian providers of know-how internationally, boost the transfer of knowledge across borders, accumulate human resources and integrate existing knowledge into suitable training schemes.

Specifically, the program wanted to develop marketable building components and concepts for residential, office and commercial buildings – for both new and renovation purposes – to further use them in demonstration buildings.

Implementation process

It had two implementation phases:

- (1) was focused on low solar energy, passive houses and ecological buildings materials and systems;
- (2) was focused on renewable sources of energy, energy efficiency and renewable materials, ecology of construction.

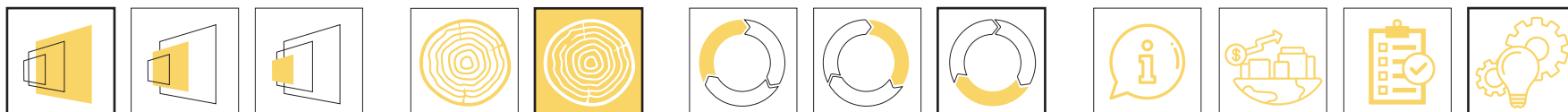
The last call for proposals was launched in 2007 and in 2008 the Ministry started a subsequent call “Building of Tomorrow Plus” with the aim to achieve the technological preconditions for making buildings that don’t consume energy but instead generate it. The implementation was realised based on technological and research promotion, instruments of investment and project coaching.

A set of criteria had to be met by the proposed products/developments:

- Reduction of energy and materials input;
- Widespread use of renewable energy sources;
- Use of renewable and ecological materials;
- Consideration of social aspects;
- Improvement of the quality of life;
- Costs comparable to conventional construction methods;

Different types of projects were supported within the program:

- Research studies (socio-economic as well as technical);
- Development of technologies, systems and components;
- Technology related basic research;
- Innovative building and reconstruction concepts;
- Support for pilot and demonstration projects that have been developed within the program;
- Evaluation and monitoring of demonstration projects;
- Support for dissemination and know how transfer.



- ★ The program can stand for positive results:
- Brought forward innovation and sustainability in the field : more than 250 research and development projects as well as demonstration and diffusion measures, 23 demonstration buildings have been built in Austria up to 2010;
 - Austria has accumulated a significant amount of scientific expertise in this field;
 - Facilitated the establishment of connections and collaborations between researchers and professionals in the building sector;
 - Austria currently boasts the highest concentration of passive buildings globally;
 - Austrian companies have emerged as pioneers in sustainable construction technology on a global scale;
 - Assistance has been offered to update the Austrian system of subsidizing accommodation construction to align with the latest advancements in the field;
 - The program called klimaaktiv, initiated by the Austrian Ministry of the Environment, has integrated these findings and is actively supporting their continued implementation;
 - Austrian companies have taken the lead in the technology of sustainable construction world-wide.

- ⚠ According to OECD the initiative faced several challenges such as:
Although the program's goals were derived from the important sustainability and climate change challenge, there were issues with the precision of performance targets and a lack of clear milestones;

While efforts were made to promote collaboration between the private and public sectors through accompanying measures aligned with the program's objectives, private funding was primarily utilized through co-financing within the funded projects, limiting its broader leverage;
While a monitoring framework centered around technological indicators was developed and implemented, there was a gap in designing a specific indicator framework to support future evaluation studies during the program's initial design stage.

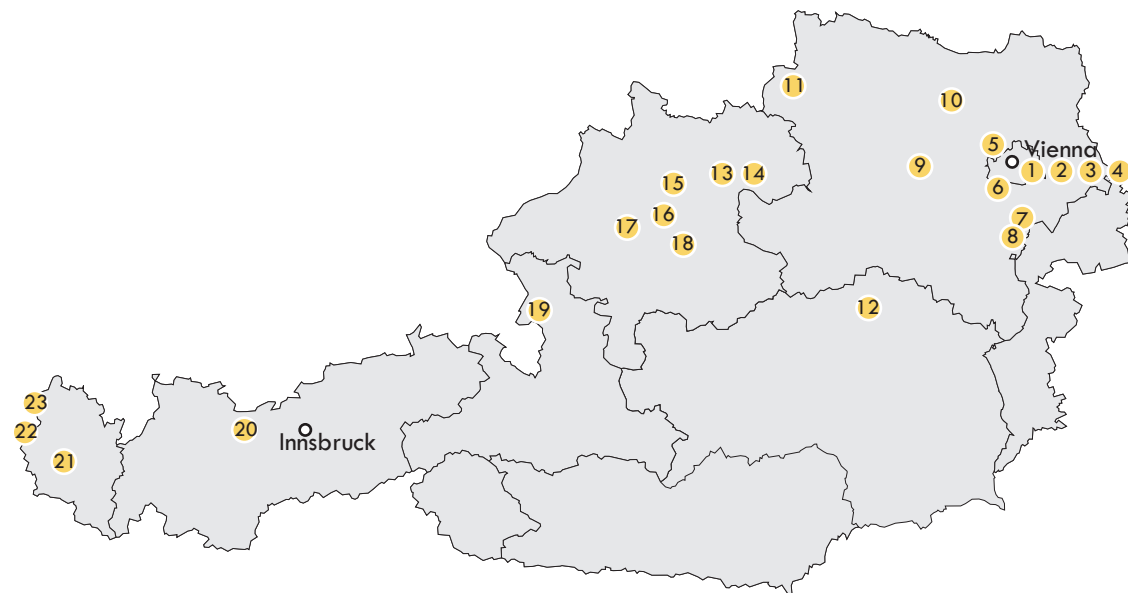
- ⊕ OECD also highlight the overall opportunities of the initiative such as:
Focus groups were formed to create visions of a sustainable future for Austria and provide recommendations. The program embraced a learning approach through jury meetings, workshops, and consultations. International exchanges advanced the discourse on relevant issues. Stakeholders actively participated through focus groups and a Delphi survey. Accompanying measures involved potential users in identifying needs for sustainable building standards. Program reflexivity led to its evolution into "Building of Tomorrow Plus."



The program's annual budget fluctuated between EUR 6 to 10 million, varying each year. In 2010, EUR 9.8 million was allocated for 24 selected projects. The 2017 "Cities of Tomorrow" program's 5th call granted EUR 6 million to 23 selected projects. In 2019, the 6th call received a total budget of EUR 6.7 million.

+ Demo buildings

- S-House - an office and exhibition building designed as a passive house, constructed with timber and insulated with straw bales. All building components are recyclable after their service life and innovative technologies such as the "Treeplast Screw" (made from lignin and wood fiber) are used to directly mount the ventilated facade and other items onto the straw bales.
- Schiestlhaus - an ecological alpine passive house refuge. It was built using a timber-prefab system, with building elements delivered and assembled by helicopter. The refuge utilizes rainwater collected from the roof, which is then refined for human use. It also incorporates solar water heating and a photovoltaic installation.
- Holz-Passivhaus Mühlweg - Five-story social housing using timber/mixed construction. Industrial prefabrication of loadbearing structure and facade elements ensures dimensional accuracy, Use of wooden frame passive house windows that meet the demanding requirements of the Vienna Building Code; Water-based backup heating (small radiators) ensures individual temperature control in different rooms; Evaluation of tenants' experience in the use phase



Demonstration projects within the research programme "Building of tomorrow"
Own representation after nachhaltigwirtschaften.at

- | | |
|--|---|
| (1) Utendorfsgasse – Cost-effective passive house technology in social housing | (13) Multi-family house Makartstraße, Linz |
| (2) Klima.Komfort.Haus | (14) einfach:wohnen solar city |
| (3) Timber passive house Mühlweg | (15) Bio-farm Achleitner |
| (4) Sunny Research (Energy Base) | (16) Christophorus-Haus |
| (5) User-friendly passive house remodeling in Klosterneuburg/Kierling | (17) Renovation of the school Schwanenstadt |
| (6) sol4 Office and conference center, Eichkogel | (18) Renovation of a single family passive house Pettenbach |
| (7) Clay passive house office building Tattendorf | (19) VIP – Vacuum insulation panels for passive house renovation |
| (8) Historical residential development "Tschechenring" | (20) Haus Zeggele – Renovation of a historical residential building |
| (9) S-House | (21) Ecological community center Ludesch |
| (10) Passive house kindergarten, Ziersdorf | (22) Freihof Sulz |
| (11) Passive house village for trial live-in | (23) Apartment Park Sandgrubenweg – Sustainable dwelling units |
| (12) Alpine refuge – Schiestlhaus/Hochschwab | |

Woodbox Travelling Outreach

Location: Austria-international

Timeframe: 2014-2018

Initiator: proHolz Austria and Department of Timber Construction at the Technical University of Munich

Stakeholders involved: city halls, European Organisation of the Sawmill Industry, European Panel Federation

The initiative had a two-fold objective: to raise awareness and provide information about the importance of incorporating sustainable construction materials, including wood, and to achieve this through exhibitions worldwide.

WOODBBOX, a specially designed compact and mobile exhibition element, served as a platform for showcasing this initiative. The exhibition featured fifty innovative architectural projects from around the world, aimed at illustrating the immense potential of forward-thinking timber-based architecture in Europe. It aimed to highlight new possibilities and dimensions in construction using wood. The WOODBOX exhibition was strategically placed in various cities, directly accessible to the public.

Moreover the initiative aimed to:

- how technological developments in the past several years now allow for new ways of building using wood, making this sustainable material suitable for ambitious building projects in urban areas;
- how wood can be used in unfamiliar situations, from long-span structures to high-rises and expansions of existing structures;
- establish viable networks for the increased utilization of wood in construction and to communicate its value in sustainable building.

Implementation process

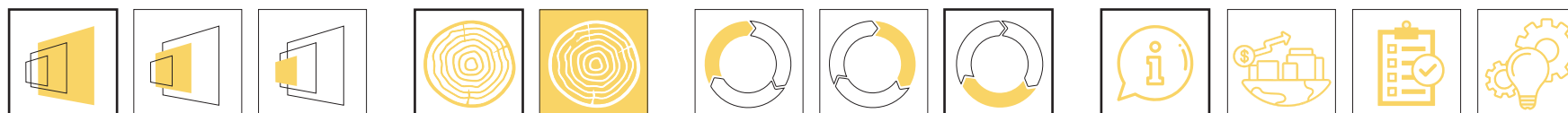
The concept and direction of the WOODBOX, which was honored with the European Design Award 2013, originated from the design office Gassner Redolfi and Hermann Kaufmann.

The program featured WOOD-DAYS exhibitions in various cities during 2014 (Milan, Bratislava, Ljubljana, Klagenfurt, Brussels), 2015 (Zagreb, Torino, Linz, Aachen, Vienna), 2016 (Berlin, Salzburg, Thal, Regensburg, Hohenems), and 2018 (Bozen, Eisenstadt, Donnerskirchen, Schloss Hof, Munich).

Monitoring of results, KPIs, and objectives was conducted for all exhibition cities, with reports created for advocacy purposes.

- ★ In Milan, an estimated average of 250 visitors per day attended the WOODBOX over the 10-day display period. Additionally, 450 students received guided tours, resulting in approximately 3,000 visitors. Assuming a similar attendance in other locations, the total number of visitors to WOODBOX in 2014 would be around 15,000. The WOODBOX itself is a condensed version of the larger exhibition "Building with Timber – Paths into the Future," held in Munich (2011/2012) and Vienna (2012/2013).

- ⊕ The exhibition is mobile and can be transported from one city to another, increasing the awareness towards wood construction; It is a proof of successful international collaboration between the wood industry and government agencies whereby costs can be shared; It builds and sustains the general dialogue about pressing issues related to the use of sustainable construction products and the role wood plays in lowering the environmental footprint of buildings.
- ⚠ The costs to design and construct the project and then to transport it from Austria to five different countries are not available but are likely to be significant. Projects such as this need to be regularly updated and, ultimately, land will need to be provided on which to permanently locate it when the travelling is completed.



Wood City (Trästad)Program

Location: 17 municipalities and 4 regions in Sweden

Timeframe: 2010- 2012

Initiator: The County Administrative Board of Västerbotten

Stakeholders involved: Local builders, architects, planners, consultants, entrepreneurs and politicians, supported by Luleå University of Technology, Växjö University, Högskolan Dalarna College and SP Träteknik

In 2002, Sweden took its first steps towards promoting wood construction by appointing a national coordinator to lay the foundation for a national level strategy. This led to the adoption of the 'More Wood in Construction' strategy in 2005, which aimed for 30% of new buildings to use wood frames within the next 10-15 years.

While achieving this target remains challenging, it marked an important milestone in sparking discussions and mobilizing public and private stakeholders. The strategy was developed through comprehensive analyses of the forestry and construction sectors, uncovering transformative changes and systemic barriers.

Three frontrunner municipalities: Skellefteå, Växjö, and Falun, were selected to lead strategy implementation. Collaborating with local authorities as well as short-term and long-term objectives were formulated, including research and pilot projects to enhance sector knowledge. The Ministry of Industry also appointed a coordinator to oversee the listed activities.

Although that initiative came to an end in 2008, it led to the development of future ones. In 2010, the County Administrative Board of Västerbotten received a government assignment, in collaboration with interested municipalities, with four objectives:

- to foster a cost-effective and sustainable wood construction;
 - to increase knowledge on the benefits of using wood as a key building material;
 - to involve more municipalities to use wood in construction;
 - to contribute to achieving the national climate goals.
- The implementation of Trästad 2012 project involved seventeen municipalities, each focusing on specific themes.

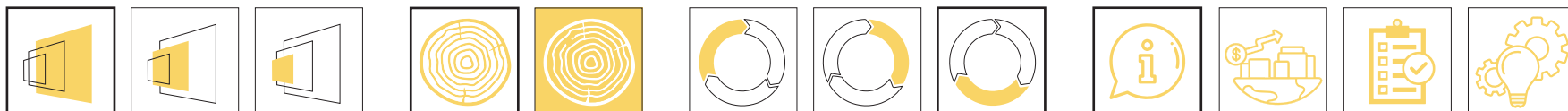
Its main objective was to foster construction of wooden buildings in Sweden, given wood's ability to act as a carbon dioxide reducer².

Particularly, it aimed to:

- Shorten the construction process by 70%;
- Cut labour requirements by 50%;
- Build industrially and replace the construction site with an assembly site;
- Use industrial precision and build in a dry, quality-assured factory environment – the purpose is to industrialise the wood construction process by manufacturing wood construction components off-site under high quality factory conditions;
- Reduce CO2 emissions in the construction processes by 90%.

The project also promotes wood construction through strategic and practical assistance, such as in planning and public procurement, while highlighting the benefits of wood in various contexts, including social housing.

Four main participating regions were included - Västra Götaland, Kronoberg, Dalarna and Västerbotten (National coordinator). The project was supported by knowledge institutions, as well as carried out in close collaboration with major wood construction projects in Skellefteå, Falun and Växjö. The purpose of the collaboration was to monitor wood construction projects, presenting findings at seminars and workshops, maintaining records and



information, fostering collaboration with educational and research institutions, and facilitating the growth of supplier groups in the wood construction sector

Several positive results can be linked with this project:



- facilitated knowledge transfer and set the ground for the establishment of Trästad Sverige, a platform for collaboration among over 60 members;
- Wood First, a digital platform, supports regions and municipalities in developing wood-building strategies, providing guidance on regulations and legislation;
- contributed to increase the knowledge on sustainable construction, foster sustainable construction across Sweden, and raise awareness on the negative impacts that some building materials can have;
- 15 major wood construction projects, 3 initiative projects and 12 joint action projects were documented;
- acted as a source of inspiration for local builders, architects, planners, consultants, entrepreneurs and politicians by fostering exchanges of knowledge and experiences on wood construction;
- member municipalities adopted policies to support wood construction (e.g designate planned areas for wood-framed buildings; stipulate that wood-framed alternatives should always be investigated for new buildings)

⊕ Town of Trollhättan adopted Declaration of Aalborg-holistic approach to work on sustainable construction development. Similarly Falun, Mora and Rättvik, Leksand and Orsa municipalities have individually adopted timber construction strategies.

Formed in 2016 as a continuation of the project, the Trästad Association actively promotes wooden construction growth in Sweden through dialogues with stakeholders (e.g seminars, conferences, and roundtable discussions on various topics, often with government representation).

⊕ For Sweden's context wood is a sustainable choice (e.g for only 20 000 apartments of concrete building 0.2% of Swedish growth of productive forest are required).

Following years showed positive perspectives in sustainable building in Sweden: in 2016, 10% (3598 apartments) of the newly built apartment stock was constructed in wood.

According to a European Construction Sector Observatory fact sheet (2018) almost 10% of all buildings in the country are made of wood and the number is expected to increase to 20-30% in the following years.



National Forest Programme

Location: Sweden

Timeframe: 2018-2030

Initiator: Government

Although Swedish forests make up less than 1% of the world forest covers, Sweden is the third largest exporter of wood products worldwide, after the US and Canada.

The strategy has five target areas:

- Sustainable forest management integrated with climate change policy;
- Multi-faceted use of forests for more jobs and sustainable growth nationwide;
- Innovation and world-class processed raw forest materials;
- Sustainable management and conservation of forests as a key area of concern for Swedish international cooperation;
- An expansion of the knowledge base for sustainable management and conservation of forests;

Implementation process

The strategy originates in the Tropical Forest Action Plans from the 1980s, and it was developed based on the principle of pluralistic, voluntary, and diverse decision-making procedures in a participatory decision-making process.

On May 17 2018 the Government adopted a strategy for Sweden's National Forest Programme, and in July 2018 the Government adopted an action plan with specific measures. The action plan will be constantly updated in dialogue with interested parties. Regional dialogue processes began in 2018 and successfully applied with a project plan to create a regional forest action plan that would operationalize the national strategic focus areas.

Particularly the programme wants to:

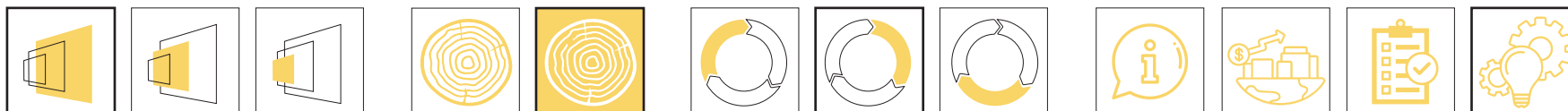
- Promote sustainable forest growth and ensure access to domestic biomass resources from Swedish forests to achieve national environmental objectives;
- Foster job creation, sustainable growth, and the development of a thriving bioeconomy across the country;
- Enhance employment opportunities, sustainable growth, and rural development while considering the social aspects of forests.

- Establish Sweden's forest industry as a global leader in innovative and sustainable production of processed forest products for a growing bioeconomy, meeting the demand for sustainable and fossil-free products and services in global markets;
- Integrate forests and their value chains into global sustainable development and the implementation of the 2030 Agenda, with forests being a prominent issue in Sweden's international cooperation efforts.
- Strengthen export, investment promotion, and exploring synergies between development cooperation and forest-related issues when applicable. Safeguard national autonomy in forest matters in relation to the EU.
- Advance knowledge and innovation across the entire value chain of forest resources to ensure a sustainable and expanding bioeconomy.



70% of the Swedish forestland is privately owned by individual forest owners or companies, regulations for biodiversity conservation often interfere with economic interests and private ownership rights.

There are ongoing struggles between the forest industry and environmental organizations about how to manage the forests and which forest ecosystem services to preserve or develop.



High-rise wood-based building initiative “ADIVBOIS”

Location: France

Timeframe: 2016

Initiator: the French government through Ministry of Agriculture and Forest and Ministry of Housing
Stakeholders involved: Wooden Residential Buildings, PUCA (Plan Urbanisme Construction Architecture), architects, designers, engineers, integrated furnishing companies, industrialists

In 2016, the government took steps to overcome obstacles related to regulations, technology, and economics in high-rise wood-based construction. As part of the government's "New Industrial France" initiative, a dedicated organization called AdivBois (Association for the Development of Wood Apartment Buildings) was established in 2016. This initiative is based on two goals: (1) building tall wood buildings while integrating two industrial sectors - construction and furniture - to envision buildings that provide a better quality of life beyond their structure. Through this project, Wooden Residential Buildings aim to (2) promote the resources available in France, from wood to financial resources, with the objective of "decarbonizing" construction and the French economy.

More specifically, it want to: develop symbolic projects with a high architectural value, including great-height buildings; increase expertise and feedback in the filed; activate the operation and management of French forest regions, that are large but under-exploited, (less than 50% of the yearly net production being actually harvested); consider the entire value chain of wood construction sector, starting from the top (building) to the forest.

A call for expressions of interest (AMI) was launched, targeting stakeholders in urban development who own building land (e.g local authorities, developers, social landlords , institutional owners) to identify and qualify potential land to accommodate future wooden buildings.

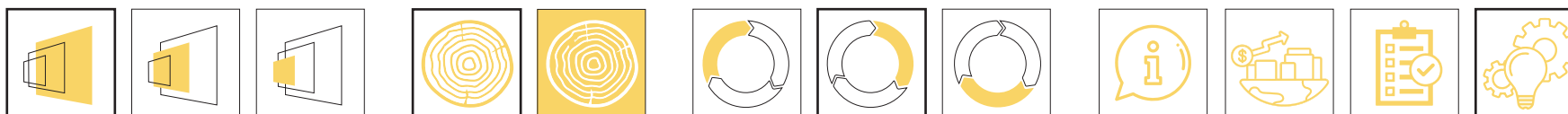
★ In 2018 out of several potential sites, 13 locations for the construction of 48 wood-based demonstrative projects were selected, that are currently in different phases of implementation. The first construction sites of the demonstrator buildings started in 2020.

During the construction phase and after project's acceptance PUCA coordinates the monitoring and evaluation process, as well as promoting the results.

Projects received financial support from “Wood Industries” Plan for upstream studies, research and expertise to assess and secure the development. The "wood-industries plan" aims to construct tall buildings with 30+ storeys by 2030. As an intermediate step, mid or high-rise family buildings (10-15 storeys) will be built to showcase wood construction capabilities, influence regulations, and serve as architectural references in Europe. By focusing on flagship projects, the plan aimed to make mid-rise buildings (3-4 storeys) the majority in developed cities' residential markets, leading to rapid adoption and improved building performance.

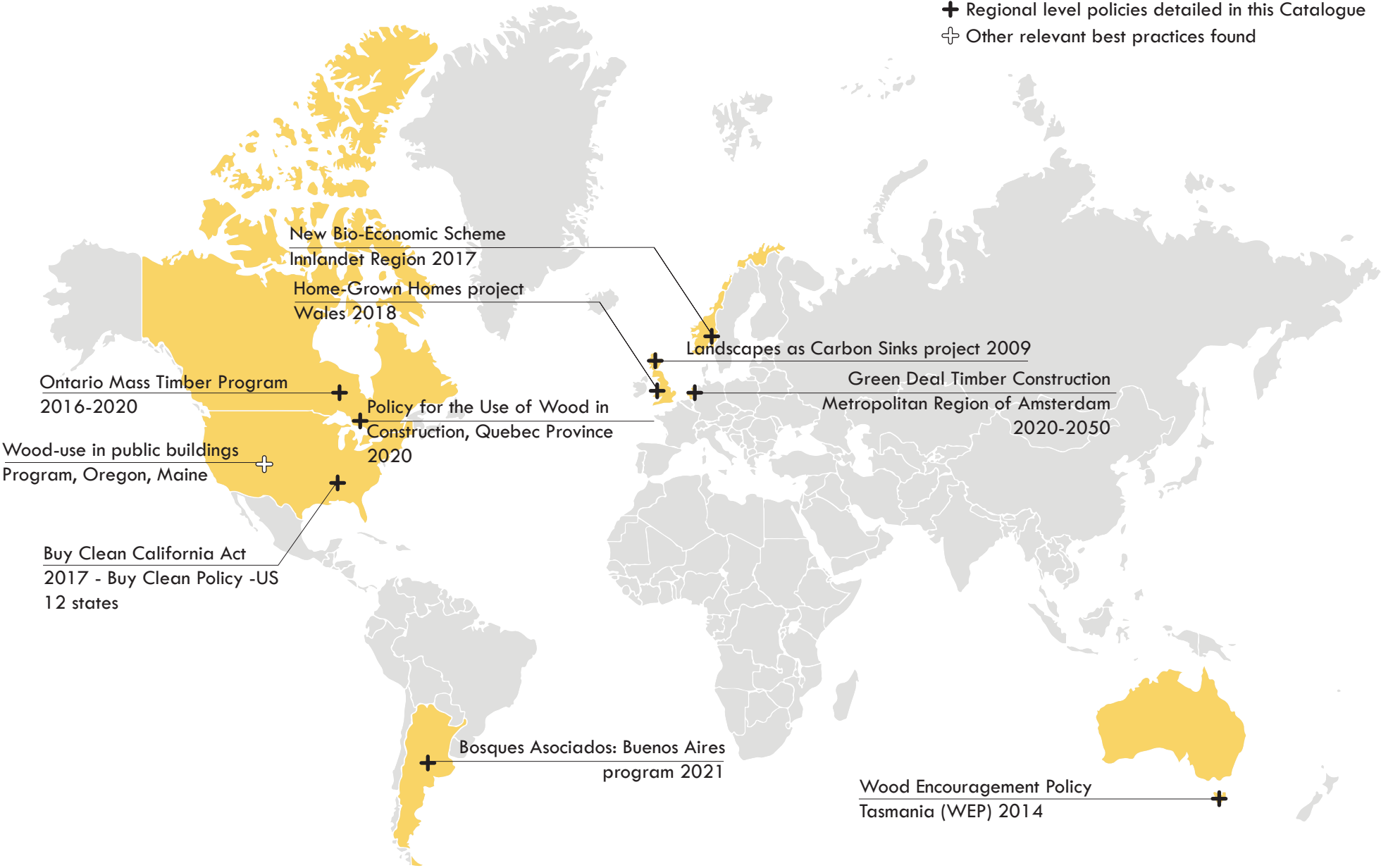


Over 90% of the French population highly prefers wood in construction, design solutions, and everyday items, emphasizing its potential for creating living environments (ADIVBOIS studies). To support the development of living environment solutions, a Call was organized, for the winners, to design and construct life-sized prototypes, focusing on industrializing concepts that incorporate reuse, modularity, flexibility, personalization, and reversibility of spaces, with the ambition to address societal concerns. The co-creation process involving multidisciplinary teams is crucial, fostering dialogue and identifying synergies and improvements for the technical/economic development of the prototypes. Companies/industries were encouraged to embrace this experimentation and develop replicable solutions.



Regional/Metropolitan level policies

- + Regional level policies detailed in this Catalogue
- + Other relevant best practices found





Home-Grown Homes Project

Location: Wales, United Kingdom

Timeframe: 2018-2020

Initiator: Powys County Council

This project aimed to boost local supply chains and bring benefits to the rural economy of Wales, by studying and designing interventions that could substantially improve the timber construction supply chain in Wales. Secondly, the project aimed to improve the links between local wood suppliers, consumers, and developers.

Focus: rural economic growth/sustainability of social housing.

The project foresees to build 250 new residential homes over a period of 4 years, using national and regional-grown timber to boost local supply chains and the rural economy of Wales. It also operates through research & development instruments, aspiring to identify and test out interventions that could have a transformative impact on the Welsh timber construction supply chain and on the delivery of low-carbon social housing in Wales.

Three sectors that have an impact on the timber construction supply chain are targeted: social housing, timber manufacturing, and forest industries.

Implementation process

The research project was delivered by Woodknowledge Wales with project partners Cardiff Metropolitan University, Coed Cymru, and BM TRADA. Its implementation was led by Powys County Council and its funding was ensured by Welsh Government and the EU Rural Development Programme.

14KPIs and 30 performance measures were agreed upon and have been monitored as part of ongoing research. Moreover, two independent evaluation exercises in the form of Project Assessment Reviews have been carried out by consultants requested by the Welsh Government.



Deliverables: a report for the government identifying which supply chain interventions may be the most effective and how they might be applied, a net zero whole life carbon framework, a design guidance for net zero whole life carbon, training and leadership programs, a guide to better timber buildings, exemplar housing projects, building performance guideline, etc.

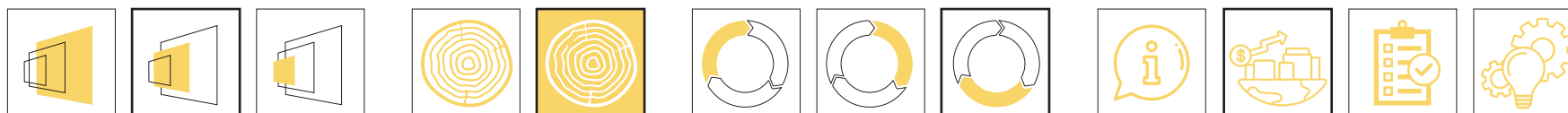
The research methods were based on three main activities: 1) applied research, 2) knowledge exchange, and 3) strategic engagement.

- Number of co-operation operations supported;
- Number of information dissemination actions/promotional and/or marketing activities undertaken;
- Number of jobs created, total public expenditure for training/skills;
- Number of feasibility studies;
- Number of stakeholders engaged.

Several discouraging results: thermal weakness at openings; appeared endemic with poor performance issues of doors and/or windows identified in 84% of the project sites. Almost half of the project sites showed thermal bridge failures.



Potential social opposition if the change of land use will be too fast;
The presence of a local stereotype of how the natural environment should look (typical rural pastoral landscape with animals, which is far from the coniferous forest);
Timber manufacturing resistance to change which can lead to low productivity growth, low margins, fragmented supply chains, and skills shortages.



Policy for the use of Wood in construction

Location: Quebec, Canada

Timeframe: 2020-ongoing

Initiator: Ministry of Forests from Canada

Its purpose is to increase the use of wood in construction in order to foster the sustainable development of all of Québec's regions and reduce the carbon footprint of buildings.

Focus areas

- Leading by example in the Government: enhancing the use of wood in the construction of buildings financed by the Government; documenting the carbon performance of buildings financed by the Government;
- Regulation: aiming to change local and regional regulations and to speed up the approval process for the equivalent measure requests;
- Research & innovation;
- Knowledge & development;
- Economic development of Quebec;
- Training and technical support: improving the training given to future construction professionals and technologists; expanding the supply of continuous training to reach a varied client base; diversifying the supply of technical support and tools;

- Outreach: increasing the number of timber demonstrator buildings and demonstrating the benefits of using wood in construction

Implementation process

The Policy for the Use of Wood in Construction will be implemented through a series of measures, selected by the Government and published at a later date following the Policy's focus areas and objectives.

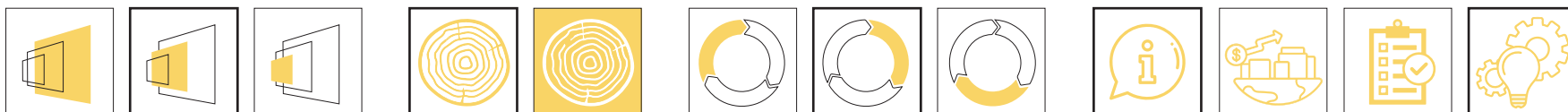
Responsibility for implementing the Policy throughout the government device will be shared by the Government and its partners, requiring their participation. The process will be coordinated by the MFFP (Ministère des Forêts, de la Faune et des Parcs) in collaboration with the other government departments and agencies concerned. Actions will be taken in partnership with specific government departments and agencies, as well as with educational institutions and centers of expertise. The high-level inter-ministerial committee on government leadership in wood construction will be responsible for implementing the measures associated with Focus Area 1.

It will also decide on the steps that must be taken to increase the number of public buildings and road infrastructures built using wood and will be responsible for monitoring the actions taken by setting up an accountability framework.

- ★ The percentage of wood-framed non-residential buildings of four storeys or less increased from 28% in 2016 to 34% in 2020.

The government announced in June 2020 a financial assistance package for the Quebec Wood Export Bureau to help with the introduction of a specific type of environmental product declaration (EPD) for Quebec wood product companies.

Introduction of a new integrated wood construction postgraduate micro-programme through distance education at Université Laval, available since 2020 January.





- Enhance the use of wood in the construction of buildings financed by the Government;
- Document the carbon performance of buildings financed by the Government; Change Quebec's regulations;
- Speed up the approval process for the equivalent measure requests;
- Support new research and development initiatives relating to construction and wood;
- Improve the training given to future construction professionals and technologists;

- Expand the supply of continuous training to reach a varied client base;
- Diversify the supply of technical support and tools;
- Increase the number of timber demonstrator buildings;
- Demonstrate the benefits of using wood in construction;
- Innovate, automate, and further optimize the performance of companies, processes, and products;

⊕ This policy focuses on all important aspects of promoting wood: information and awareness raising, research and innovation, legislation, and economic measures.

Its success stems in large part due to Government involvement in the design, implementation and monitoring of the policy and its role as an active promoter of the policy.

⊖ There was, in the beginning, a strong focus just on administrative or public institutions, in order to give a best example. Adaptability needs to be taken into consideration due to the differences between multi storey wood residential housing and public buildings.

The main challenge is the constant change in the construction sector, which requires continuous

! adaptation of the tools and technical support. Canada has one of the largest unaffected boreal coniferous forests in the world, and using wood in economic activities past a certain threshold might affect the integrity of those natural surfaces.

Green Deal Timber Construction

Location: Metropolitan Region of Amsterdam (MRA), Netherlands

Timeframe: 2020-2025-2050

Initiator: Metropolitan Region of Amsterdam

Stakeholders involved: Triple helix cooperation: MRA, two public-private working groups, knowledge institutions, MRA municipalities (32 municipalities and 2 provinces), Economic Board with input from umbrella organizations (eg. NEPROM, Bouwend NL)

Officially signed on 21 October 2021, the general aim of the Green Deal Timber Construction is that at least 20% of the planned MRA housing production annually from 2025 be made from wood or other biobased materials.

In order to reach the defined objective, MRA through its “triple helix” cooperation will:

- support large-scale production of timber-framed houses to cope with foreseen housing shortage crisis;
- support municipalities’ close agreements with builders, start-ups etc. on pilot projects in timber construction (short-term: business cases);
- develop production and assembly capacity in at least two MRA municipalities and use local



production forests for the strategic growth of the sector.

Through this agreement the parties involved will get locations available that are suitable for timber construction homes, will explore if more stimulating regulations for timber construction are possible, and will actively work together to improve the business cases of the wood construction chain.

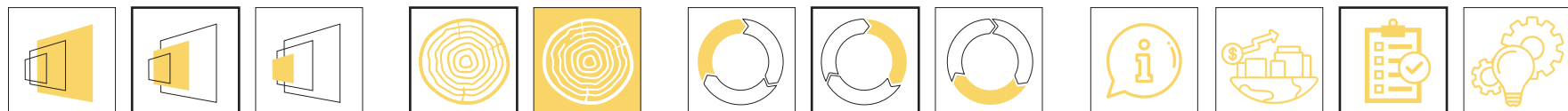
Foreseen impact: With the leap in scale and the increase in knowledge about wood construction, it is expected that the current price of wood construction will be improved within the foreseeable future.

- From 2025 (or earlier) 20% per year of the entire MRA housing will be made in timber (best efforts obligation). 20,000 homes/year scenario, avg. 30 m3 wood/house: 120,000 m3 wood – produced in a sustainable way in less than half a day by EU

- Effect on employment: increasing from +1750 to 3700 new jobs per year;
- Environmental effect:
 - Reduction in emissions of approximately 220,000 tons of CO2 saved per year and significant reduction of nitrogen emissions;
 - Reduction of CO2 emissions through the long-term realization of approximate 150 ha of production forest.

The overarching goal established is that the economy will be 100% by 2050.

- % of new buildings made in timber, per year;
- % of m3 of sustainably-sourced wood replacing other higher embodied carbon materials;
- Number of new green jobs per year;
- Tons of CO2 savings from construction sector;
- Surface of new afforested areas;
- Tons of CO2 captured through the creation of productive forests;



Bosques Asociados: Buenos Aires program

Location: Buenos Aires, Argentina

Timeframe: 2021 - 2022, renewed 2022-2023

Initiator: University of Buenos Aires School of Architecture and Urbanism and Cities4Forests

Stakeholders involved: local cities and communities, municipal officials, students, university professors, leaders, and NGOs.

This is a co-created program featuring Partner Forests as a core urban design strategy presented to students in Argentina, with the aim to showcase how wood and wood-related products can be used in a sustainable way.

The aim related to the regional context is to connect cities with specific tropical forest areas and communities for mutual benefit, especially in support of forest conservation and restoration strategies.

Implementation process

Over the course of a year, students will explore ideas for how to best connect best the needs of metropolitan Buenos Aires with the conservation needs of tropical forests in Argentina. Municipal officials will be involved in course instruction, reviewing student work, and selecting the best ideas for implementation.

The University of Buenos Aires, Bosques Asociados (FADU), Cities4Forests and Conservacion de la Biodiversidad (EXACTAS) are responsible for monitoring the project and collecting the results through period workshops.

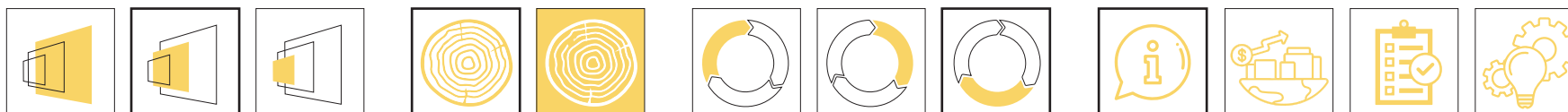
The University of Buenos Aires included the course in its curricula and municipal officials are involved in course instruction, work review, and best ideas selection.

Expected outcomes

Each peri-urban municipality committed to the course will select a different forest area as a partner. The partnership tackles various subjects (the use of sustainably sourced wood for a visible city landmark, and the use of non-timber forest products, such as rubber, coffee, or cocoa in a creative and sustainable way).

- Research and exchange trips for citizens, students and leaders between the forest and the city;
- Identify the needs and operations of the city region;
- Publications of students' works;
- Implementation of strategies and projects resulting from this initiative.

Local partnerships and commitments between public authorities - universities - NGOs and commitment of local authorities to implement the best ideas generated. The program was renewed for the 2022-2023 year, and the targeted group are students of urbanism and architecture, geographers, environmental specialists, and forestry students.



Landscapes as Carbon Sinks project

Location: Scotland regions

Timeframe: 2009-2035

Initiator: ECCI, EIT Climate - KIC, the Edinburgh's Centre for Sustainable Forests and Landscapes (CSFL)

Stakeholders involved: NGOs, city councils, local communities, Edinburgh University, Scottish Government

The purpose of the project is to investigate potential interventions to be made in order to accelerate the land sector's contribution to Scotland's 2045 net-zero emissions of greenhouse gases target. As part of this initiative, it is considered how the carbon benefits of wood fiber in construction can be scaled-up, using Scotland as an example.

This project was initiated in the context of Land Use Strategy (LUS) section 57, of the Climate Change (Scotland) Act 2009, which sets out a strategy by which climate targets might be achieved through land use, land use change, and forestry;

Secondary objectives

- Increase the use of sustainably sourced wood fiber to reduce emissions by encouraging the construction industry to increase its use of wood products were appropriately;
- Maximise the economic outputs of Scotland's forest and fier resources;
- Improve the safety and productivity of the wood fiber supply chain;
- Expand markets and add value;
- Develop a workforce with skills for the future which support inclusive growth;
- Understand and communicate the forest and wood-based industries' contributions to Scotland's economy.

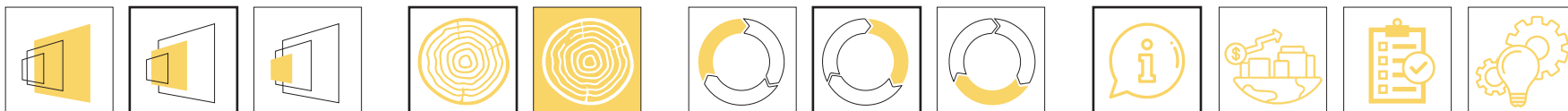
⊕ Within the policy description, it is recommended that research into all three carbon functions of forested lands: sink, storage, and substitution, should be linked; due to the fact that woodland research is very rarely tied to research on harvested products, and this link needs to be made for a systems understanding of carbon mitigation potential.

Implementation Process

2019-2020: Working with partner organizations to explore future options, identify key challenges, and elaborate potential levers for change;

2020-2021: Priority shifts to designing approaches for unlocking the levers of change and testing these approaches through experimental implementation, which can take different forms: creative new business models, governance systems, innovative financing, new technologies, new products, or management approaches and behaviors;

2021-2030: Transformative ideas structured and trialed over a period of 3-10 years. Each project has to be tested for its social, environmental, and economic impact, working towards the ultimate goal of net-zero carbon across Scotland. A model is used to estimate the impact of the use of harvested wood from forests in Britain and periodical legislative amendments are made to reach the target faster.





- ⑧ Three carbon storage scenarios were made by Committee on Climate Change:
 - 2.0 MtCO₂e/yr to 3.2MtCO₂e/yr by 2050 for UK residential buildings (with similar levels may be possible also for non-residential buildings);
 - Up to a further 1 MtCO₂e/yr would be achieved by displacement of carbon-intensive materials as long as the operational carbon of the timber buildings is equivalent;
 - At least 15,000 ha/yr of forest should be planted in Scotland by the mid-2020s.
- ★ The commitment of the Scottish Government to significantly reduce carbon emissions and environmental footprint and to establish Regional Land Use Partnerships (RLUPs), with 5 pilots delivered (Phase 1) in 2021-2022 and a wider roll-out expected by 2023;
The commitment of Scotland to significantly reduce carbon emissions and environmental footprint;
Scottish Government Commitment to achieve the third carbon scenario within Scotland's Forestry Strategy (SFS) 2019-2029;
- ⊕ Wood is seen as a means to achieving a bigger goal and its use is positioned in a larger context, in relation to other factors affecting the environment (this policy involves a broader perspective for mitigating climate change).
- ! Current building standards include only operational carbon, with no recognition of timber products, short supply chains, and locally sourced materials;
Taking into consideration the carbon footprint of imported wood.

Ontario Mass Timber Program

Location: Ontario Province, Canada

Timeframe: 2016-2020

Initiator: Ontario Regional Authorities

Stakeholders involved: Public authorities, national government, educational and research institutions, universities, construction sector stakeholders

The Program is part of Ontario's Climate Change Action Plan, being funded through the province's carbon market revenues.

It was developed to promote the use of wood in taller buildings by:

- Providing funding for research and development of innovative wood products, undertaken by academic and private research organizations, to support potential wood-related changes to the Building Code and other standards;
- Funding post-secondary education institutions to provide skills development and technical training and to create tools relating to using wood in construction;
- Supporting the establishment of a tall wood research institute in Ontario, in partnership with researchers, universities, and colleges;

- Demonstrating the successful use of mass timber in design, construction, and the fire safety of taller wooden buildings (seven storeys and higher) including four tall wood demonstration projects.

Implementation Process

The Program provides \$3.15 million for research and development of new mass timber building systems and \$2.2 million to support mass timber skills development and training, by establishing partnerships with research and innovation centers and universities.

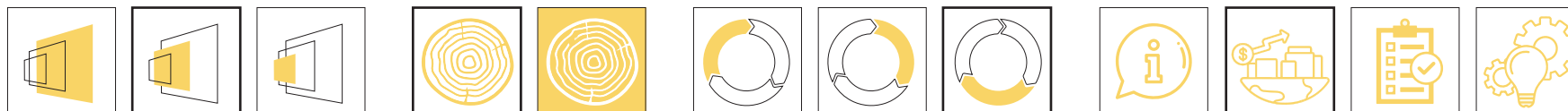
While British Columbia allowed an increase to six storeys in **2009**, five years passed before Ontario accepted increasing building height from four storeys to six. The main obstacles to acceptance were fire, acoustics, building envelope and structural design concerns, and the need for training.

Since the Building Code change allowed six-storey wood buildings in Ontario (2015), there has been similar uptake compared to BC, showing thus, the fact that the market will be slow to adopt new technologies if there is a perceived risk in the approvals process.

On the other hand, if the approval process is simplified with design examples, the option will be more attractive and many stakeholders will shift from the 'business as usual' approach. The changes in the Building Code requirements, together with the implementation of the Mass Timber Program led to the design and implementation of numerous projects in Ontario.

✚ In **2017** the province has released Ontario's Tall Wood Reference: A Technical Resource for Developing Alternative Solutions under Ontario's Building Code to assist architects, engineers, building and fire officials, and developers in the development of safe alternative solutions for taller wood projects. Moreover, it illustrates how wood buildings could be designed as alternative solutions in a way that could achieve the level of performance required by Ontario's Building Code.

★ In **2018** The Mass Timber Institute was founded in the province as a collaborative network that wants to establish Canada as a global leader in mass timber research and education and support the development and export of sustainable mass timber products and technologies. It supports knowledge transfer among different groups of stakeholders, holds virtual classes and practical training, supports living lab experiences at demo projects as well as provides resources for training and education (e.g Mass Timber Design Manual).





! Buildings constructed of wood could only be six storeys tall in 2018 accordingly to Ontario Building Code (OBC) requirements, while Washington and Oregon were ranked in the same year as the first American states to allow mass timber buildings of up to 18 storeys (based on early adoption of the proposed changes in the IBC - International Building Code).

Because the costs and timelines associated with obtaining special approvals were high (an alternative solution in OBC) to make taller wooden buildings, builders often opt for concrete or steel.

+ In 2018, as part of Mass Timber Program, Ontario provided up to \$2.45 million to offset the costs associated with four mass timber pilot building projects (e.g. George Brown College's Arbour development-12 storey building, The University of Toronto's Academic Tower 14-storey building etc), an initiative meant to further support the changes to the OBC by providing valuable transferable knowledge that can be used in future tall wood construction projects.

Revisions made to the National Building Code of Canada in **2020** are expected to allow the use of mass timber construction up to 12 storeys.

★ The popularity of mass timber has grown over the years in British Columbia due to its constant wood policies adoption and update, Ontario Wood Building Program being one piece of a greater puzzle:

- The province has the highest number of timber facilities of any other province (9 locations out of which 4 in Ontario);
- Collectively Ontario and Quebec account for close 200 mass timber projects while British Columbia accounts for 450 of Canada's mass timber projects, with that number increasing steadily (according to the GCWOOD **2021** report).

Bio-Economy Strategy for the Inland Region

Location: Norway Inland regions

Timeframe: 2017-2024

Initiator: county authorities and county governors of Hedmark and Oppland

Stakeholders involved: partnership with businesses, municipalities, R&D environments and other authorities and stakeholders in connection with the action plan implementation

The necessity for this strategy and its formulation came in response to population growth and global climate and environmental challenges:

“The need for food, energy, and materials will grow, but further growth and development will have to take place within the limits of what the natural environment can tolerate. This will require a transition to products and services that have a significantly less negative impact on the climate and environment and the more efficient utilization of resources than today”.

Thus, it provides a path for the development of the bioeconomy in Hedmark and Oppland, aiming to lay the groundwork for increasing the value creation, number of jobs and competitiveness in bio-based value chains.

Focus areas: Knowledge and expertise; Market and competitiveness; Biological resources and return streams; Cooperation; Visibility and communication.

The strategy is linked to an Action Plan which contains several measures that support wood construction, in connection partners responsible for implementation.

(1) Strengthening industrial environments within the bioeconomy

- Developing the Norwegian Wood Cluster collaboration further;
 - Help to establish NTNU in Gjøvik as a leading expert environment in the development of the mechanical wood industry;
- (2) Use of wood in construction
- Demand and give weight to life cycle analyses when making purchases for public buildings;
 - Develop an "expert program for increasing the use of wood in the Inland Region";

(3) Increased production of forests and quality wood

- Support the further development of the Norwegian Forest Seed Centre;

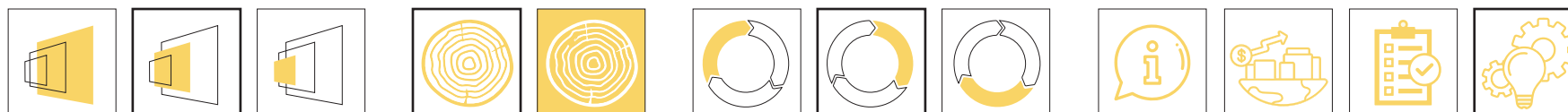
- Contribute to the establishment of a processing center for forest plants in Biri;
- Strengthen long-term investments related to the building up and management of forests;
- Develop the forestry and wood strategy further.

Implementation process

In the design/preparation phase of the strategy, several activities were organized based on a clear timeline, such as contact meetings with relevant environments to gain input for the work and seminars on the topics of biotechnology and reproduction, bioenergy and forestry industries.

The Steering Group, comprising the four strategy owners, will have the responsibility for implementing the strategy, ensuring day-to-day coordination and good collaboration and overall use of the funds between the funding agencies, while Innovation Norway will be an observer.

A Council for Bioeconomic Growth in the Inland Region will be established by SG, consisting of six to eight national leaders with a high degree of expertise in bioeconomy.





Among its roles, the Council will: provide knowledge, contribute to result-oriented strategy development, provide input to the SG, offer recommendations and advice and ensure that the advocacy work by the public sector, business, and funding agencies in relation to national and international stakeholders is coordinated.

The action plan will be revised in cooperation with municipalities, businesses, expert institutions, and other stakeholder groups, and will be the operating document for follow-up and implementation.

As stated in the strategy, the Inland Region is already a significant stakeholder in the bioeconomy with a strong position of its businesses both nationally and, to some extent, internationally.

Its bioeconomy ecosystem covers a wide range of businesses with relevant actors: from food technology and the food industry, genetics, breeding and reproductive biotechnology, agriculture, forestry, inland fish farming to the wood mechanical industry, bioenergy, and the recovery, recycling and renovation technology and industry.

The region holds a significant proportion of Norway's land-based biological resources, strong professional and expert environments, and complete value chains for the management and development of a number of bio-based products.

- ★ Moreover, it has a tradition of producing and creating value from raw materials and a business sector structure with individual companies to networks, clusters, and innovation systems. Because of its dynamic bioeconomy, new opportunities may arise, as well as new knowledge, connections, and new policies may come from expert environments, from business or as new political declarations.

Wood Encouragement Policy (WEP) Tasmania

Location: Tasmania, Australia

Timeframe: 2014

Initiator: launched by the Minister for Resources and incorporated as a procurement policy within the Tasmanian Government Treasurer's Instructions

Stakeholders involved: Industry and government stakeholders, inner budget agencies, architects, designers and urban planners, suppliers, city councils, regional councils, local communities, NGOs

It aims to stimulate economic growth in the area's timber and wood products industry and the development of value-added products within the timber sector while encouraging the use of verified sustainably sourced timber and wood products in the construction sector.

Being a WEP doesn't mandate using wood but rather seeks to ensure it is considered a key design element as well as, where feasible, responsibly sourced wood to be considered as the primary construction material in all public new-build and refurbishment projects.

Through this policy, the Government encourages the use of wood and wood products as a preferred material in building and construction procurement solutions, in cases where:

- it represents value for money;
- it provides appropriate quality and functionality;
- it complies with the Buy Local Policy and associated Treasurer's Instructions or there are no technical or performance reasons for not considering wood;
- when it complies with relevant Australian Standards.

Wood is particularly encouraged in structural elements, visual/decorative products, wood fit-out options, building envelopes and included joinery, outdoor structures and landscape projects, and biomass heating and associated energy production

Application

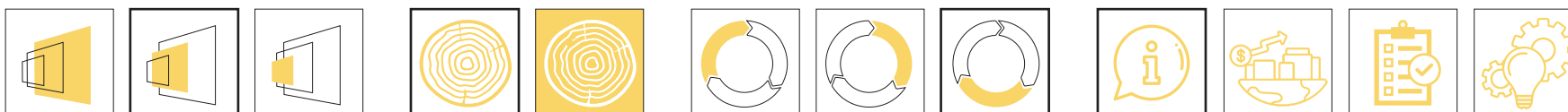
This policy applies to inner Budget agencies and other entities subject to the Financial Management and Audit Act (1990).

For private sector and local government building and construction projects that receive support from the Government, or are to be leased by Government – agencies are to request that proponents have their designers/architects fully consider the use of wood in the project, where feasible.

Architects and designers have to be familiar with this WEP and meet its requirements in their design briefs, as well as identify suitable wood products and options and ensure they specify appropriate and available wood products. Where a detailed comparison of life cycle benefits is required, suppliers may consider an LCA and/or the use of an EPD available through the Australasian EPD Program or similar.



KPYs: encourage the sourcing of wood products; actively seek to develop demonstration projects that showcase the use of wood; ensure that, where possible, comparisons between the cost of building materials take into account all long-term and life cycle considerations; ensure the use of responsibly sourced wood and wood products





Implementation

The development of the WEP was supported by a sub-committee of the Ministerial Advisory Council on Forestry (MAC) and informed through extensive consultation with industry and government stakeholders.

Councils and local government entities had to report on compliance with policy periodically, and the data will be monitored on an ongoing basis to address and wood-related issues.

WEP's adoption brings Tasmania in line with the other 3 local government authorities and 18

councils across Australia that have adopted WEPs, starting from December 2014, such as Latrobe City.

The Tasmanian WEP aligns also with Wood Encouragement Policy for Western Australia published in 2019 and with a number of the State's existing procurement policies aim to support the State Government's key objectives of boosting the economy and increasing employment. Moreover, the WEP for Western Australia is a key action item from the Djarlma Plan for the Western Australian Forestry Industry.



In order to facilitate continuous improvement in the operation of the policy, government entities and suppliers are encouraged to report any identified issues or impediments to the use of wood, such as the availability of technical data or supply.

The context has favorable conditions for the adoption of WEP Tasmania: local materials are commonly used in southern Australia, the strong openness of local authorities and long history of using wood at the administrative level, involvement of both NGOs and local authorities (public-private partnership), legislative measures introduced in the Building Codes to promote wood as construction material.

Today, several initiatives/projects are supporting building with wood, providing knowledge and technical resources, such as WoodSolutions (Australia's leading online resource for people designing and building with wood and wood products).

WoodSolutions developed Technical Design Guides on a wide range of issues, including information on Building Codes and Standards applicable in Australia and providing technical guidance to ensure that timber-related projects comply with these codes. Planet Ark Foundation (Australian NGO) has worked closely with Forest and Wood Products Australia (FWPA) to raise national awareness of WEPs through the "Make It Wood" campaign.



Buy Clean California Act (BCCA)

Location: California, SUA

Timeframe: 2017-on going

Initiator: a Coalition of labor and environmental groups

Stakeholders involved: State of California and specific departments, US Navy, agencies, manufacturers, industries, researchers and tool developers, architects, engineers and contractors

Core elements: disclosure, standards, and incentives.

According to CLF (Carbon Leadership Forum) 32% of the embodied carbon of construction in the United States between 2008-2018 was attributed to public projects resulting in approximately 472 million metric tonnes of CO₂ e per year in emissions.

This procurement policy was signed into law in October 2017 in an effort to reduce GHG emissions released during the manufacture and transport of products used in public work projects. More specifically, it was designed to mitigate embodied carbon by prioritizing the use of low-carbon materials and incorporating procurement requirements that address the GHG emissions from construction materials into government purchasing.

Thus, the BCCA requires agencies to set Global Warming Potential (GWP) limits and submit Environmental Product Declarations (EPDs) for certain materials used for state-building projects.

Implementation process

The State's Department of General Services (DGS), in consultation with the California Air Resources Board establish the GWP limits that awarding state agencies must not exceed in the procurement of certain materials. Based on ISO (International Organization for Standardization) which discloses a product's environmental impact as determined by a Life Cycle Assessment (LCA), the Environmental Product Declarations (EPDs) reports are third-party verified to establish the GWP limits and determine compliance.

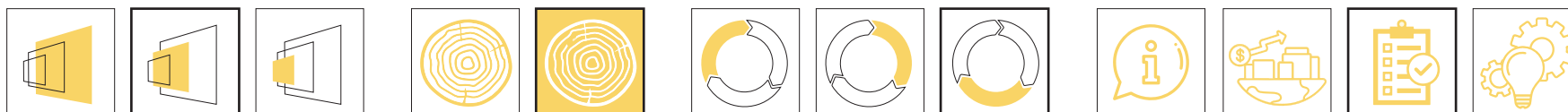
EPDs are developed according to a set of requirements and guidelines known as Product Category Rules (PCRs). The GWP limits for BCAA were set at the industry average for each covered material using data from facility-specific EPDs or industry-wide EPDs based on domestic production data.

The BCCA suffered subsequent amendments after its adoption in 2018 and 2021. By January 1, 2024, and every three years the DGS shall review the maximum acceptable GWP for each category of eligible materials and adjust that number downward for any eligible material to reflect industry improvements.

Submission

Contractors shall submit to the University of California a current facility-specific EPD, Type III, as defined by ISO 14025 standard, or similarly robust LCA methods that have uniform standards in data collection, industry acceptance, and integrity for each Eligible Material proposed to be used on the Project.

According to DGS, for qualifying projects with contracts after July 1, 2022, contractors must submit facility-specific material or product EPDs before the material will be approved for installation. The EPD must show that the GWP of the material or product is less than or equal to the most current (GWP) threshold values published by DGS.





Submission requirements

- Product Category Rule (PCR) identification;
- Identification of the organization making the declaration;
- Product description;
- Name and address of Program Operator (the body that develops and certifies the EPD);
- Date of publication and period of validity;
- Verification by third-party evaluator;
- Data from life cycle inventory analysis (LCI) or life cycle impact assessment (LCIA) to include: GWP;

★ **Results**

⊕ BCCA adoption has had a strong and important impact on the initiatives that came after at both the federal, state and local levels across the United States, being now a common practice.

At the federal level, A Buy Clean Program was drafted in the Clean Futures Act in 2020, and clean manufacturing programs and incentives are included in Biden's Climate Action Plan.

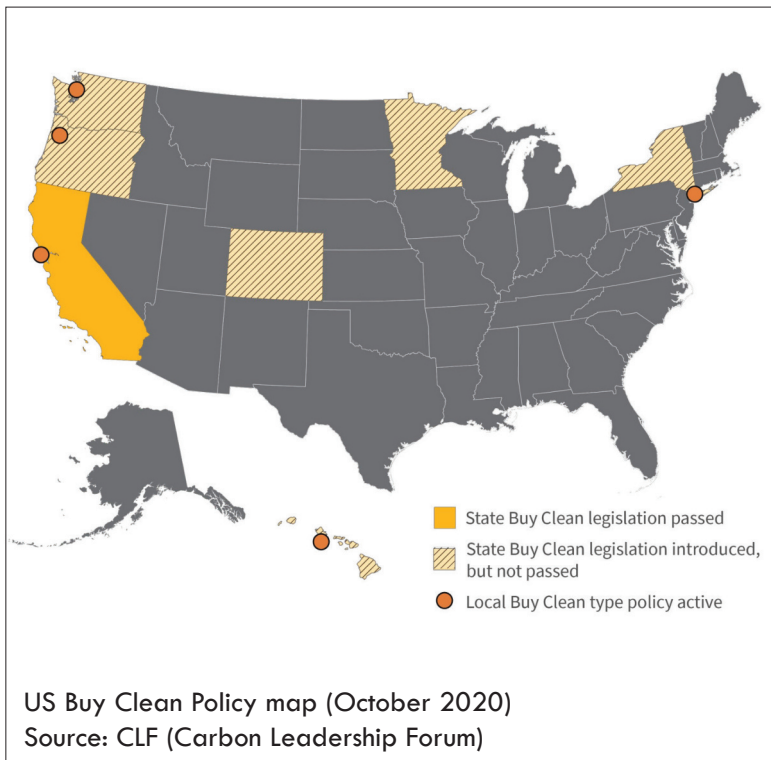
Since its adoption, subsequent iterations of Buy Clean or Buy Clean related policies were adopted by other states: (2017) Oregon, in (2018) Washington State, (2019) Minnesota, (2020) Colorado and New York State, New Jersey).

⊖ BCCA identified initially just four construction materials to be covered by the policy (structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation), while some widely used construction materials, such as cement, concrete, and aluminum were excluded. Today, many Buy Clean-related policies start with structural materials like concrete and steel due to the significant carbon footprint and a large range of solutions for emissions reductions.

The US Navy through a \$170-billion budget, encouraged contractors to cut their overall output of climate-changing pollution, while major California companies like Apple, Google, Chevron, PG&E, CalPERS, and others are already addressing their in-house and supply chain emissions, recommending to other companies they work with and invest in to do the same.

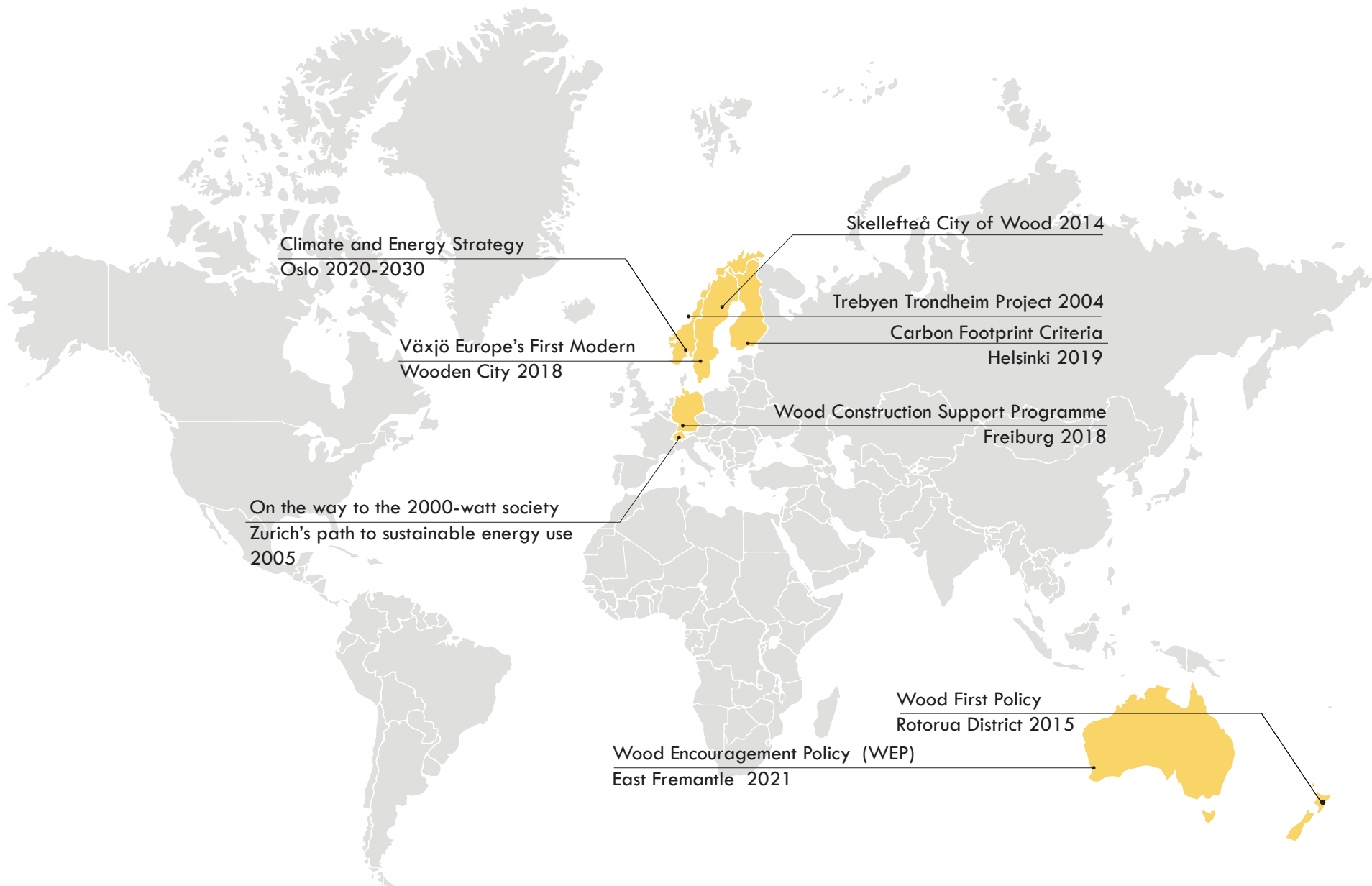
⚠ Among essential elements to the program's further success could be mentioned:

- education and training provided (to awarding agencies, procurement profession, private sector industry associations and manufacturers), sufficient funding and administrative capacity at the federal agencies in the implementation of BCCA, market stimulation to participate in the program, including materials with the highest level of embodied carbon etc.



At the local level, cities are adopting regional-or material-specific variations (e.g. lower-carbon concrete procurement in Portland, Oregon) and many organizations in the private sector have also developed ambitious procurement practices to mitigate embodied carbon. In 2019, Marin County (San Francisco Bay Area) passed the first embodied carbon building code, requiring Buy Clean-like procurement for both private and public sector projects built in Marin County. In 2021 Biden Administration, created the first-ever federal Buy Clean Task Force, gathering leaders from across the government and making recommendations to guide cleaner procurement efforts.

Local level policies





Skellefteå City of Wood Strategy

Location: Skellefteå, Sweden

Timeframe: 2014-ongoing

Initiator: City Council

Stakeholders involved: Collaboration with research institutes, such as SP Trätek and Luleå University of Technology, by Skellefteå's wood companies

The Swedish Government initiated the national timber construction strategy in 2014, in which Skellefteå Municipality participated actively. Since then, the city has taken big steps towards wooden construction wider adoption, becoming a regular destination for technical visits from all over the world.

This strategy has the purpose of further raising the motivation for more people to choose to build in wood. It focuses on increasing construction in wood both where it is visible and also where it is used as a load-bearing structural material while considering to be both technically and economically sustainable to build in wood.

"We are promoting industrial, sustainable construction that is strategically significant for society." (TRÄSTAD SKELLEFTEÅ)

The strategy identifies 4 reasons to build using wood such as:

- Minimal environmental impact: An apartment building made of wood has an environmental impact half that of an equivalent concrete building;
- Only young-growth forest sequester: Forest that has stopped growing no longer sequesters carbon dioxide – it's environmentally friendly to cut down and plant new trees!
- Climate+economy=smart: Thanks to our creative solutions in modern timber construction technology, there need be no quality compromises;
- Pleasant living environments: Wood is the natural choice of material to create a cozy and harmonic experience of life.

The strategy identifies and details 41 projects that were built in wood in the city with different architectural programs (bridges, housing, educational, commercial etc).

Favorable context

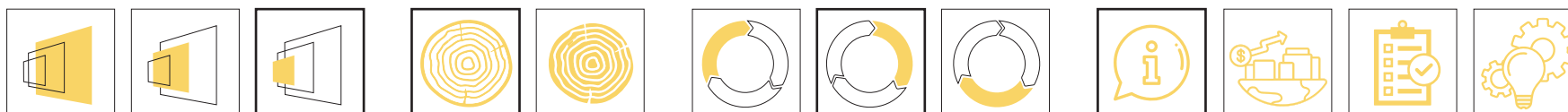
Skellefteå's has a leading position in Swedish wood processing, founded on the plentiful availability of raw materials and driving technical development forward.

Out of 3 million hectares of the region's late-grown and extremely strong spruce and pine forest, 11.6% is processed each year.

The forest resources are close to the city as well as the sawmill (50km away), keeping the entire process close. The area has also a strong tradition of building with wood as well as timber industries and the Research Institute.

Because many of its homes and properties are built in wood, Skellefteå becomes both an "attraction pole" for visitors that want to see and learn and a place for knowledge exchange for different wood-related organizations (e.g European Confederation of the Woodworking Industries, CEI-Bois).

One of the tallest wooden buildings in the world (20 storeys-80-metre-high skyscraper) was built in 2021 in Skellefteå, the city is in the process of building the longest wooden bridge in Sweden in the city center.





Wood First Policy

Location: Rotorua District, New Zealand

Timeframe: 2015 - ongoing

Initiator: Grow Rotorua - council-controlled organisation CCO (Rotorua Lakes Council)

Wood First Policy is a flagship project which has the main aim to ensure that the character of the Rotorua District reflects the history and recognizes the importance of the forestry sector to the local economy through information sharing, mandatory construction requirements, support, and advocacy.

It facilitates and encourages the use of wood as a sustainable building material for all projects within the district, while requiring wood to be used in council projects.

The Council wants to lead by example within the wood construction industry, engaging and supporting local forestry, wood products, and building industries. The policy started as an initiative to make wood the first-choice material choice for construction, interior design, and living developments within Rotorua Lakes Council.

Implementation Process

Until the adoption of the Policy, around a third of logs harvested each year were being exported in raw form to China. Implementation was seen as an opportunity for economic growth if more wood would be processed into local products to compete in national and international markets.

Grow Rotorua which is also implementing the Rotorua Sustainable Economic Growth Strategy, has led the development of the policy and Action Plan and assisted with the implementation of the action plan until 2017.

The policy is promoted and implemented within the local community via the Council portfolios. The Council committed to maintaining processes and updating the Wood First Action Plan every 2 years. The Strategy and Partnership Group is responsible for the implementation as well as for monitoring annually and reporting to elected members.

+ Rotorua is the founding city of the World's Plantation Forest Industry; 40% of NZ wood is harvested within a 100km radius of Rotorua. This policy can impact positively on each of the council's Rotorua 2030 goals.

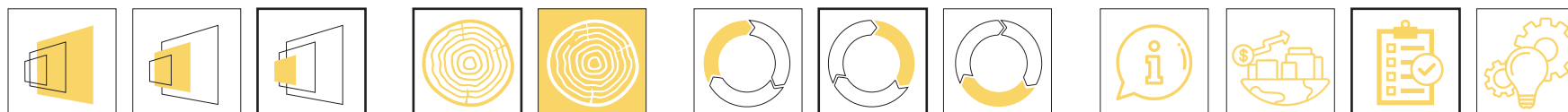
The council wants to develop further an assessment toolkit for all council-led building projects to understand how wood might be incorporated as a component in the design.

The policy seeks to build proficiency in using wood through training, networking, and direct technical support, and to encourage contractors to include wood options in their proposals to their Council.

- There is no national wood policy in New Zealand supporting it, even though there is interest in using wood as a post-Covid recovery material and expanding this local policy at the national level.

! At the time of the policy's development, building and earthquake standards within the Central Government needed adjustment to ensure building with wood.

Rotorua is a seismically active area and wood building systems must prove to be seismically safe even in the scenario of severe earthquakes.



Carbon Footprint Criteria

Location: Helsinki, Finland

Timeframe: 2019-2024

Initiator: Helsinki City Hall

In the context of finding new ways to mitigate climate change through procurement, the city of Helsinki introduces through this initiative sustainability and low-carbon aspects as decisional factors in procurement processes.

In particular, this program investigated how the calculation of the carbon footprint can be applied in different procurement groups and what kind of criteria can be developed for the carbon footprinting, in order to create successful examples and applicable tools that contribute to the development of sustainable procurement in Helsinki and other cities in Finland.

Implementation Process

In May 2019, existing procurement procedures in Helsinki were mapped and several pilot cases procurements were selected, in collaboration with the city's experts in the field.

The following were taken into consideration among the criteria for selection: the climate impact significance of procurements, their size, and the possibilities to include carbon footprint in the procurement process, as well as the city's procurement schedule.

★ Nine pilot procurements were selected focusing on construction and maintenance work, food, textiles, ICT and vehicles.

Within the construction and maintenance area specifically, two cases were selected:

- In the design and build contract, bidders calculated the carbon footprint of their plans during the tender phase, which was then introduced as part of the tender (Asetelmakatu DB case);
- During the renovation of apartment buildings, the life cycle carbon footprint, energy consumption, and life cycle costs were optimized and the circular economy potential was examined by a separate re-use investigation and plan (Planning and development in the renovation of residential buildings case);



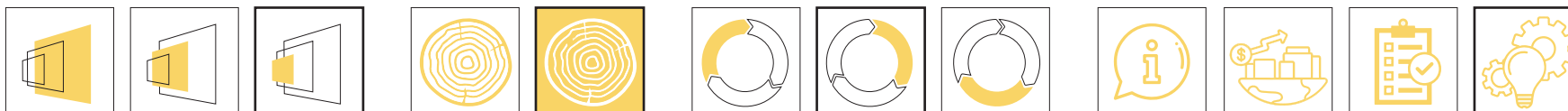
The Asetelmakatu DB project apartment buildings project is the city's first test platform for piloting the criteria for a fossil-free worksite in building construction projects. The project is located in the new Kuninkaantammi residential area, already planned with an emphasis on walkability, biodiversity, circular economy, mass balance, energy efficiency, renewable

energy production, wood construction, stormwater processing, green roofs, urban farming, etc. Tenders were evaluated competitively, according to a scoring method based on:

- Qualitative and quantitative criteria: environmental criteria (20 points, of which 14 for the lifecycle carbon footprint of the project and 6 for energy efficiency exceeding the minimum requirement); and architectural and technical quality (30 points)
- Project price (50 points, i.e. 50%)

Using wood was introduced among the climate criteria used in the procurement: use of primarily wooden structure, application of low-energy construction principles, use of wood in the outdoor and indoor facilities, primarily wooden upholstery for facades etc.

For this project, the preliminary agreement with the supplier was signed in September 2020, with construction expected to start in October. The carbon footprint of the offer will be monitored during the construction process twice: once by the contractor in the planning phase and again by the client after the construction phase has ended. (both calculations must be at least equal).





Stakeholders involved in this case:

In the preparation phase of the procurement: an HVAC planning manager, developer architect and project manager from the Helsinki Housing Production Department (HHPD) took part. The preparation was supported by the CANEMURE project (funded through the LIFE program of the EU), experts and climate specialists of the City of Helsinki Environmental Services. Experts from the Finnish Environment Carbon footprint calculation consultant as well as other companies were involved in consulting the low-carbon objective of the project.

- ⊕ The financial contribution of the EU LIFE Programme for procurement cases. City of Helsinki committed to reducing emissions at construction sites by signing a green deal, which aims to achieve fossil-free construction sites by the end of 2025. The good practices are actively shared, and the capacities of the suppliers are developed by providing guidelines, tools, and procurement training. Procurement pilot case solutions can be further replicated in other cities in Finland as well as the whole competition process model.

The lessons learned can be useful in the future when/if the carbon footprint of new buildings is regulated by law.

The climate and environmental criteria used in the procurement pilots can be applied to other projects.

- ⚠ **Key takeaways:** When the carbon footprint information is requested as part of an offer, it must also be monitored during the construction process (a bonus-sanction model can be applied); In order for the climate and environmental criteria to have a real impact, it must be given sufficient consideration (at least 20% based on results from other cities in Finland).

Active market dialogue and cooperation with companies, research institutes, other municipalities, and cities are essential pillars behind successful pilots.

⊖ There are only a few wood construction operators in Finland, which is why only two offers were received for the procurement pilot under the construction field.

Zurich's path to sustainable energy use [2011] and Roadmap [2016]

Location: Zurich, Switzerland

Timeframe: 2019-2024

Initiator: 2000-Watt Society energy vision and framework which was developed by the Swiss Federal Institute of Technology

The long-term goal of the 2000 Watt Society is to achieve a sustained primary energy use of 2,000 watts per person and emissions of no more than one tonne of CO2 equivalent per person per year by 2050.

General focus areas of the Roadmap:

- Energy supply: Increasing usage of renewable energies and waste heat;
- Buildings: Constructing, operating and renovating them in a climate-friendly, and energy-efficient way;
- Mobility for the future: Reducing burdens caused by traffic;
- Settlement: Concentrating settlement areas in high quality and developing them efficiently;
- Consumption: Resource-friendly production and consumption.

Implementation Process

The City of Zürich joined the 2,000-Watt Society project in 2005. In 2008 through referendum, the city established to achieve 2000-Watt Society Objectives by 2050. The roadmap proposed measures for 2 timeframes: 2015-2020 and 2020-2050.

The roadmap was designed and developed by the GUD/Environmental and health protection Service Zurich (UGZ) project team. The work was accompanied from a technical perspective by the Committee Specialist Pool for the 2000-Watt Society.

It presents the most important measures that are currently being implemented or are planned on each focus area, at 3 levels: municipal, cantonal, and federal.

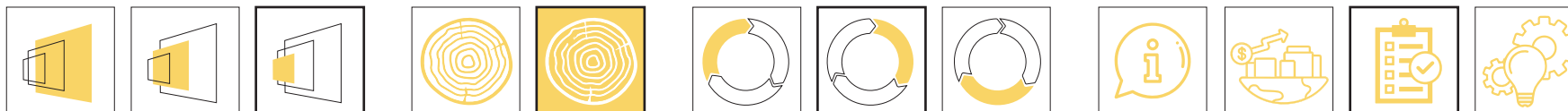
The Roadmap proposes a series of 57 measures: **16 measures on Buildings**, 15 measures on Energy Supply, 12 measures on Mobility, 8 measures on settlement, and 6 measures on Consumption. Currently, 30 out of 57 are ongoing.

UGZ is the entity responsible for the reporting and further development of the roadmap, drawing up status reports every four years; Reports also indicate in what areas the municipal implementation strategies and the ranges of measures would have to be calibrated if necessary, in order to respond to changing boundary conditions.

- ★ Between 2001-2016 more than 500 000 m² of energy reference area has been newly built or redeveloped in accordance with the 7 Milestones in the Roadmap, and more than 800 property owners (2001-2016) benefitted from the energy consulting program.
- Trotte Retirement Home - "flagship project" fulfilling the comprehensive sustainability requirements of the 2000 Watt Society.
- The city implements the cantonal building regulations, through which can advise the contractors and motivate them to voluntarily adhere to higher standards.

SwissEnergy for Municipalities, the federal agency for supporting of energy town's activities, recommended that all "energy towns" adopt the City of Zurich's specifications as the "2008 Building Standard".

2000-Watt-Society plays an integral role within the Swiss regulatory infrastructure, both for the building industry and the key materials manufacturing sectors (such as forestry) that support it.





- ★ Its adoption has grown across Switzerland to currently encompass 20 cantons and 100 towns and cities.
The local referendum provided democratic legitimacy to the program objectives and enshrined them in the constitution.
Other cities (Lucerne, Zug, Aarau, Dietikon, Nidau and Winterthur) have also committed to the 2000 Watt Society through a referendums.
Energy-related redevelopments and the usage of renewable energies in buildings are being funded via the building's program.

The financial funds for this program originate from the CO² tax of the federal government and of the canton.

- ⌚ A set of guidelines and targets must be met: SIA 2040 Energy Efficiency Path, SIA 2032 Embodied Energy of Buildings, the Minergie-ECO buildings rating standard, 2000-watt society, etc. Also, some software and tools are used to assess the LCA of new projects such as Therm, Lesosai, Ecoinvent, etc.
- ⊕ Under the 2,000-Watt Society, a building's energy and GHG footprint is considered to include the materials and processes associated with construction, retrofits, maintenance, and operation during use and demolition.
The Swiss Wood Resource Policy and Action Plan have been organized in a manner that aligns with, and supports, the 2000-Watt Society.
- ⚠ The City or the City Administration respectively only has limited influence for the achievement of the 2000-Watt objectives. In specific areas, it can take steps to implement it on its own; in others, it creates only the necessary premises and provides incentives.



Wood Construction Support Program

Location: Freiburg, Germany

Timeframe: 2018 - ongoing

Initiator: Ministry of Forestry

Stakeholders involved: City Hall, government, construction sector, wood sector, NGOs, community, activists, architects

This program promotes the construction of new buildings and extensions with wood and renewable resources, focusing on the development of additional residential areas.

It promotes construction of new buildings through financial incentives: Financial incentives are limited to 1.00 €/kg of natural carbon-storing materials or 1.20 €/kg of renewable construction material that is regionally sourced.

The felling of 35,000 m² of woodland raises € 2 million in revenue for the city annually, and its use in local construction (nursery schools, apartments blocks) is encouraging through this fiscal policy. The city council is responsible for applying regular surveys and monitoring the results.

★ Funds have been increased significantly and the number of funding applications more than doubled from 2019-2022.

The Baden-Württemberg region promotes ecological construction methods, being considered by the Ministry of Forestry as “the state with the most progressive building legislation for the use of wood in structural engineering”.

The City Hall is one of the first in the world to be conceived as a zero energy building, with 800 solar panels on the façade which feature locally sourced larch elements.

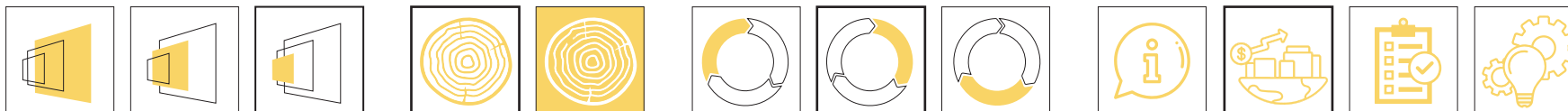
⊕ Is well connected with other **local, regional, and national initiatives:**

The development program for rural areas was topped up with a funding bonus of 5% for timber construction projects, which supported more than 500 timber construction projects in 2020. The ministry announced that other programs such as the one for tourism infrastructure should also receive a wood bonus.

Freiburg is a German best practice: from the 17 new buildings in the construction program for the 2020/2021 budget, 7 have been planned in wood. “Buggi 52”, an eight-storey wood building also benefits from the subsidies. The building has become the first FSC (Forest Stewardship Council™) - certified building in Germany in 2021. The building, almost 22m in height, is also recognized for the use of wood from well-managed sources. The majority of wood that was used to build it comes locally (Black Forest region, where the relevant suppliers are also based).

⊖ The measures taken to make Freiburg the greenest city in Germany made it the third most expensive in regard to renting, which makes housing unaffordable. This can cause economic segregation and gentrification.

! In the context of the aim of the city to achieve climate neutrality by 2038, as well as with the newly planned housing district “Dietschbach” which has to provide climate-neutral homes for 15 000 people, using wood materials could be a solution.



Växjö

Europe's First Modern Wooden City

Location: Växjö, Sweden

Timeframe: 2018 - ongoing

Initiator: Växjö Municipal Council

Stakeholders involved: architects, contractors, researchers, municipality and municipal companies, academic institutions, trade and industry business sector

The main objective of the strategy is to increase the use of wood where it is possible and appropriate to replace more finite materials. Specifically, it will test wood in all municipal premises and homes, as well as in the municipal outdoor and indoor built environment.

Based on the experience gained through former incentives "More Wood in Construction" (2005) and Växjö – "The modern wooden City 2013", the strategy came in response to Municipality's Environmental Programme "A fossil fuel free Växjö" by 2030 and to the regional framework: "Regional strategy for timber and wood-related industries in Småland" (2012).

- Until 2020, 50 % of all new construction will be wood-based;
- From 2020, 50% of all new construction will be wood-based and should include a climate impact statement;
- From 2022, buildings with the smallest carbon footprint of the load-bearing structure are preferred for building permits;
- From 2025, priority shall be given to new construction with the least climate impact from the whole construction (by using LCA/EPD, or similar).

Implementation process

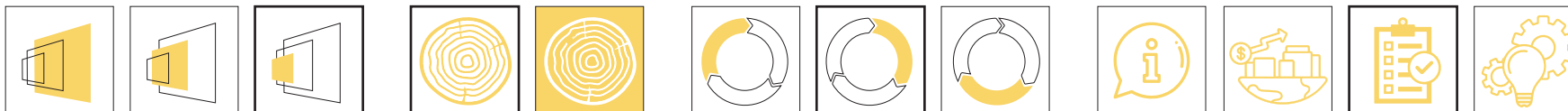
The defined targets are measured in number of completed newly-produced homes and buildings, construction projects, with timber frames/year by the total number of completed, newly-produced homes and buildings/ year.

A specific Council for Urban Planning has been established in order to maintain and develop Växjö's wood construction engagement, implement the strategy, increase coordination, transparency and the disseminate knowledge.

A follow-up is carried out annually in Växjö Municipal Group's control model, while the Municipal Executive Board is responsible for monitoring the goals of the strategy.

Among all the activities, is envisioned that Växjö Municipality will:

- use the selling municipal land as an instrument for increasing wood as a construction material;
- monitor wood construction projects for increased quality and to learn from one another within the group's companies;
- stimulate, support, and develop the business sector related to buildings made of wood;
- strengthen Linnaeus University as a center of wood research and wood expertise;
- pursue and increase the designated wood construction area Välle Broar;
- annually award a wood construction prize.



★ Due to its strong experience gained in time, Växjö reached the municipal objective already in 2015: 25% of the construction directly controlled by the municipality to be wood-based;
In 2005 “Välle broar” construction project was identified as an R&D focal point for wood construction, where all buildings will be realized using timber and timber-based products as the main load-bearing material.
Torparängen is a pilot area (2017), where most of the construction will be made using wood frame solutions - specific requirements regarding wood buildings were mandatory for the land allocation competition. The completion of all the expected buildings in the area is planned for 2023.
In 2019, of all new buildings which were under construction in Växjö, 47% have been made in wood;



- Total area of wooden construction in the municipal Group - Completed area (for homes in living area/for premises in usage area) of wooden buildings during the year in the Municipal Group;
- Total area (living area/usage area) completed/year in the Municipal Group;

- Impact on the private construction market - granted start requests before multi-occupancy properties and timber frame buildings measured in comparison with the total number of start requests for multi-occupancy properties and premises.



Since 2013 the municipality adopted the 'Triple Helix' model, showing Växjö municipality's cooperation approach with the university and the business community as well as with various public and private entities.

The Municipality supports research and education in the construction field by participating in various research projects at a national and international level to strengthen development in the region.

For several years, among the measures taken by the municipality in support of wood constructions can be mentioned:

- conducting an active and early dialogue with interested builders, architects, developers, and researchers to develop wood construction projects;
- actively working with land policy programs to allocate areas for wood construction, through the purchase and sale of municipal land;

- including research partnership as a prerequisite for an agreement between the municipality and developer;
- municipality's role as a contractor actively looking for wood-building solutions during their procurement activities;
- including in the directive from the municipal council a stipulation that wood-based construction solutions shall always be tested at the start of each project;
- specifying in the building permit process documentation that the municipality's wood-building strategy should be taken into special account, being the basis for the design of all new buildings in the area;
- advising its affiliated companies to test the potential of wood in each new building project where the possibilities of using wood in their projects must be documented;
- using land allocation contests with requirements for wood construction. The developers have to present their intended solution to a steering committee.



The developers find the land allocation process to be unclear, since they see themselves as a seller of a building solution rather than a buyer of land.

Wood Encouragement Policy [WEP] East Fremantle

Location: Town of East Fremantle (local government area), Perth, Western Australia

Timeframe: 2017-ongoing

Initiator: East Fremantle Council

Stakeholders involved: Regulatory Services

Since 2014, starting with Latrobe City, Local Councils in Australia have formally established WEPs.

On October 2017 the Council of East Fremantle adopted a WEP that relates to the Council's owned buildings/infrastructures aiming to: encourage the use of wood in the construction and fit-out, recognize all of the benefits that make wood a smart choice and demonstrate local and national leadership by the adoption of WEP.

Moreover, in December 2017, the Council released a new document that shifted focus from public buildings to residential buildings, aiming to:

- reinforce Council's preference for quality wood buildings;
- encourage the design of residential development in a manner that promotes the use of wood within the built form;

- recognize all of the benefits that make sustainably sourced wood a smart choice for residential buildings and infrastructure;
- encourage the use of sustainably sourced wood in the construction and fit out of any development/ redevelopment of a property where it is practical to do so.

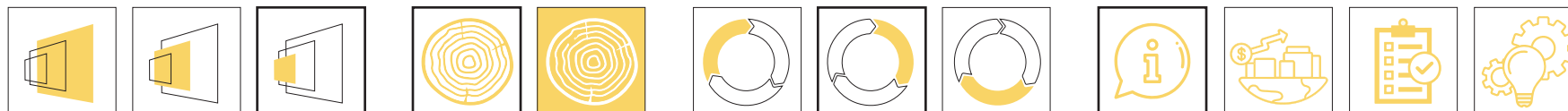
This policy acknowledges the use of wood as a low-emission substitute for materials that require larger amounts of fossil fuels to be produced but does not mandate its use.

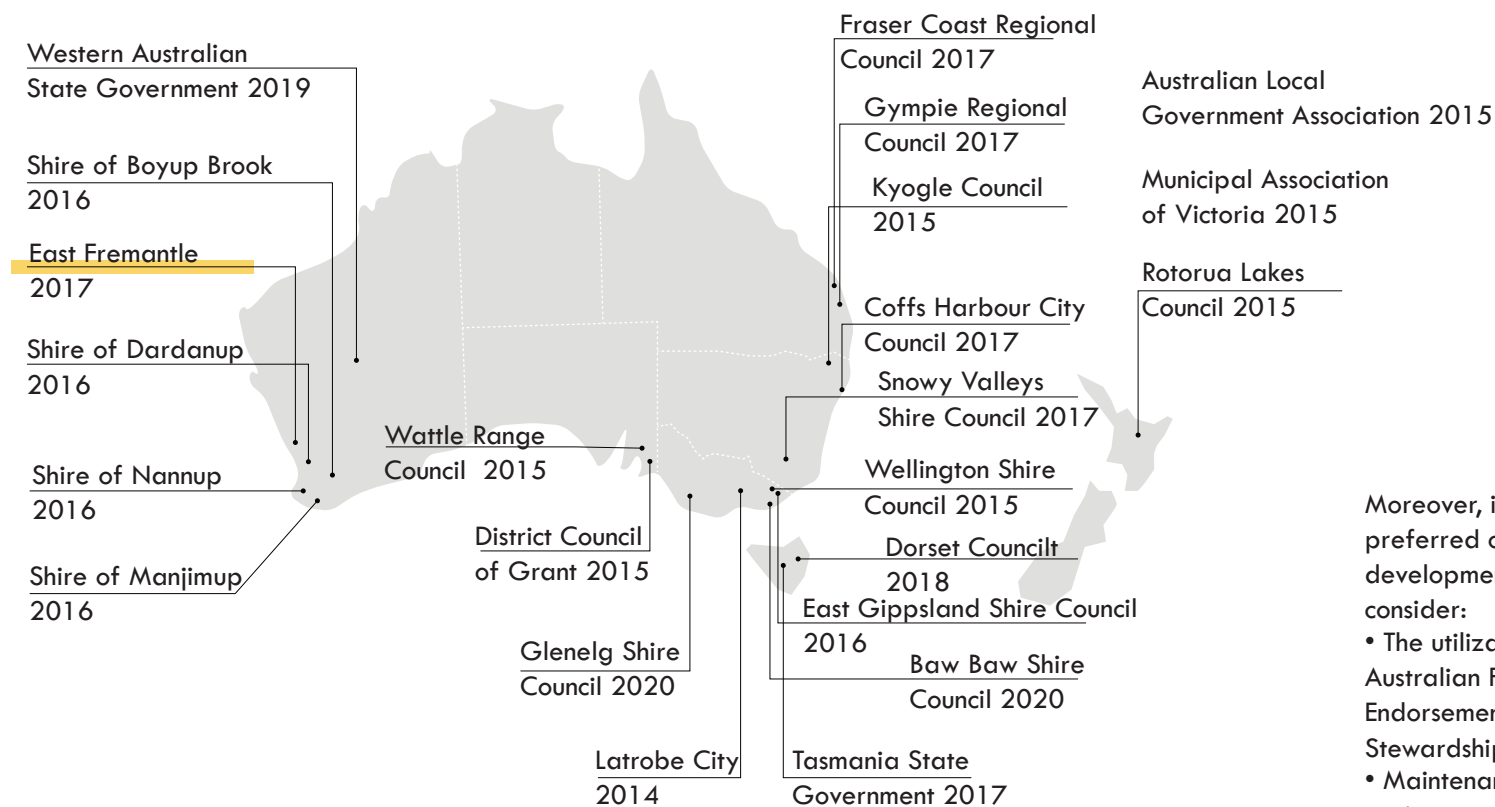


Implementation process

The Council will achieve its objectives within the Local Government area by:

- Facilitating the wider use of wood as a construction and fit-out material in any development/ redevelopment;
- Giving preference to the use of wood as a construction material, where deemed appropriate;
- Where possible, promote the sourcing of locally produced wood products;
- Encouraging relevant professionals to use new, innovative wood design, products and/ or materials to work with the existing built environment to enhance the urban fabric.





WEPs adopted by Local Councils and Local Government Associations in Australia

Own representation after Forest Industries Federation (FIFWA) and MAKE IT WOOD (PlanetArk) sources

Moreover, in facilitating the use of wood as a preferred construction material for new developments/redevelopments, the Council will consider:

- The utilization of wood products that meet the Australian Forest Standard, Program for the Endorsement of Forest Certification and/or Forest Stewardship Council certifications;
- Maintenance required throughout the life of the project;
- Pest and fungus protection;
- Using wood only when it is the right material for the selected application;



Climate Strategy for Oslo towards 2030

Location: Oslo, Norway

Timeframe: 2020-2030

Initiator: City Council

This strategy is a Paris Agreement-oriented climate action plan, in connection with Oslo's Climate and Energy Strategy (2016) and Climate Change Adaptation Strategy (2014-2030).

Its main goal concerning GHG emissions is to reduce them by 52% by 2023 and by 95% in 2030 compared to 2009.

To tackle the city's biggest emissions sources, and cut GHG emissions, it features 16 target areas. Among them, there are two in connection with the construction sector:

- Building and construction activities in Oslo will be fossil-free and thereafter emission-free by 2030;
- Oslo's buildings will use electricity and heat efficiently and reduce their energy consumption.

Implementation process

To achieve its target in Building and Construction activities, The City Council will:

- build in climate-friendly ways and earmark resources for innovative tenders and development projects for zero-emission vehicles and machinery;
- will collaborate with other cities to demand zero-emission construction machinery and create a market for this technology;
- will strengthen cooperation with industry to promote zero-emission buildings and construction projects;
- call on the government to introduce stronger policy instruments and opportunities to set requirements for zero-emission construction activities.

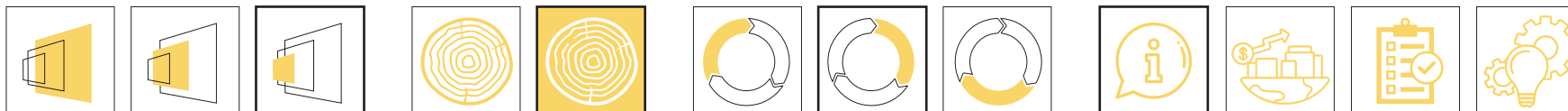
Among the actions established to use electricity and heat efficiently and reduce energy use, the City Council will:

- facilitate the use of district heating where it is appropriate and works for a district heating system with increased use of waste heat;

- work for stricter requirements for smarter energy use, local energy production and also reduced GHG emissions from material consumption in future national building regulations;
- work to make the municipality's own buildings more energy efficient and follow up and further develop requirements in the municipality's new building.

Moreover, it is mentioned that in the acquisition strategy, the requirements concerning new public buildings were tightened, to a necessary plus house standard (as defined by SINTEF, NTNU): "The building's renewable energy production compensates for the GHG emissions from the entire lifetime of the building. This applies to building materials, construction, operation, and production, as well as to demolition and recycling".

ⓘ Although the energy use in existing buildings in Oslo is estimated to be reduced by 8 % in 2030 (NTNU), with many new buildings, the total energy consumption is expected to increase by 4% without new measures.



Trebyen Trondheim project

Location: Trondheim, Trøndelag region, Norway

Timeframe: 2004 - ongoing

Initiator: City Council

Stakeholders involved: Advisory team consisting of skilled professionals in various fields, Housing Bank, ENOVA, National Heritage Board, the applicants for the model projects

The vision of the Trebyen Trondheim project is to contribute to the further development of wood projects in the historic and modern wooden city of Trondheim and in the Trondheim region.

It wants to play a part to the positive further development of wooden houses while increasing knowledge of the quality of wood as a building material and it's importance in an environmental context, both within the professional environment and the community.

Its main aim is to realize a wide range of different model projects to be characterized by high quality, proper use of wood with a focus on the environmental aspect, and good craftsmanship and professional understanding.

The model projects established are divided into three main groups:

- innovation in TRE (implementation of various new buildings and transformation projects);
- repair of TRE (repair of historic buildings and urban environments from different eras);
- WOOD in urban spaces an arena for art installations, interiors and furniture inside and out (temporary and permanent wooden projects, including student projects from various academic environments);

Implementation process

The model projects must meet specific quality criteria specifically prepared for the three main groups. An advisory team will be established consisting of skilled professionals in various fields, which will map the challenges in the individual projects, add important expertise for the image projects in the wood field and contribute to achieving the best possible solutions.

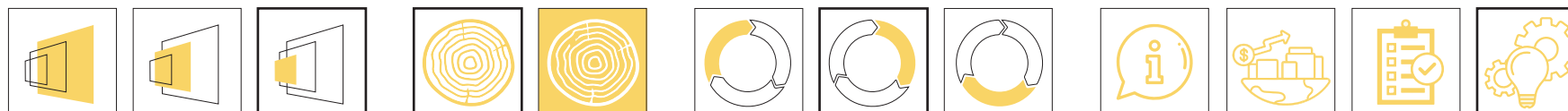
The composition of the advisory team will be adapted to each individual project. The model projects get easy access to various support schemes from other key players, depending on the category they belong to.

The quality criteria are reviewed periodically, and if necessary calibrated. The working group assesses relevant projects and the use of instruments in the projects. It assists in relation to construction cases and applications for grants from relevant actors, ensuring that the quality criteria are complied with and plans & implements project completion with industry tours, printed matter and open events.

The working group assists in the early phase of new projects to map out the requirements and puts together the advisory team for each individual wood project. It will also assist in the final phase of the model projects, ensuring that the project is visible in the media and plan a closing event.



A higher number of projects have been completed: kindergartens, schools, housing, commercial buildings, student housing, and also in ongoing projects like Moholt 50|50. In 2010, TREbyentrondheim was included as a sub-project under the municipality's initiative within Cities of the Future.





- ⊕ Number of completed pilots/wood buildings as a result of this strategy;
Opportunity to receive a significant increase in competence and visibility - as an exemplary work characterized by high quality, proper use of wood, focus on the environmental aspect and good craftsmanship and professional understanding.

- ⊕ Access to the project's advisory team.
Opportunity to be qualified to apply for competence grants and basic loan from the Housing Bank, investment support from ENOVA, and to be pre-qualified to gain access to the advisory team to ENOVA.

Through the project, the National Heritage Board will contribute to technical expertise to the model project that meets the specific quality criteria for TRE repair.

It also wishes to contribute to the development of craftsmanship expertise in wood and skills development related to the development of the energy efficiency of the historic building stock, in parallel with the consideration of cultural-historical values.

- ⊖ There is a need for operating funds to continue the tasks of the strategy and to increase the targets. In order to make wood an attractive material, it must also be proven first as financially sustainable investment.
- ⚠ Considering that the bulk of the building stock that will stand in Trondheim in 2030 is already built, one of the biggest challenges, therefore, lies in doing existing buildings more energy and climate-friendly.

Working with Early Adopter Cities through Build-in-Wood

Braşov
Metropolitan Area

Haringey Borough

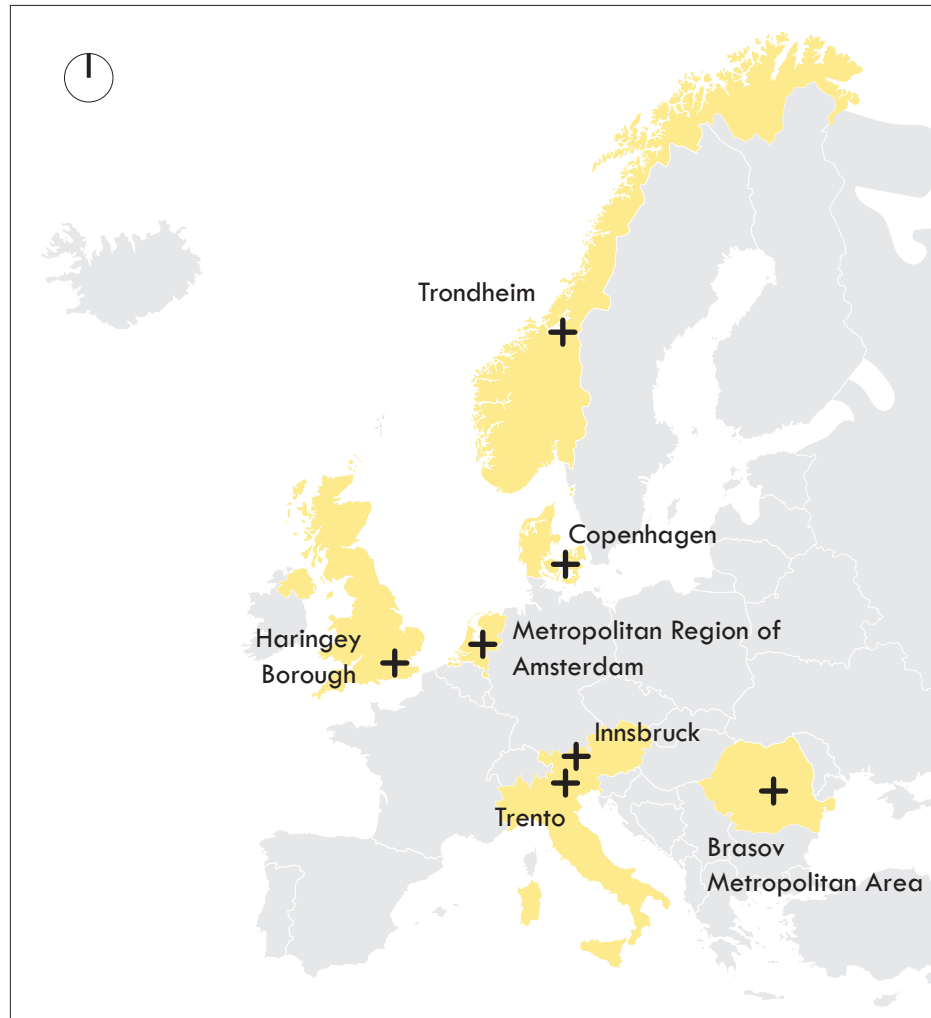
Copenhagen

Innsbruck

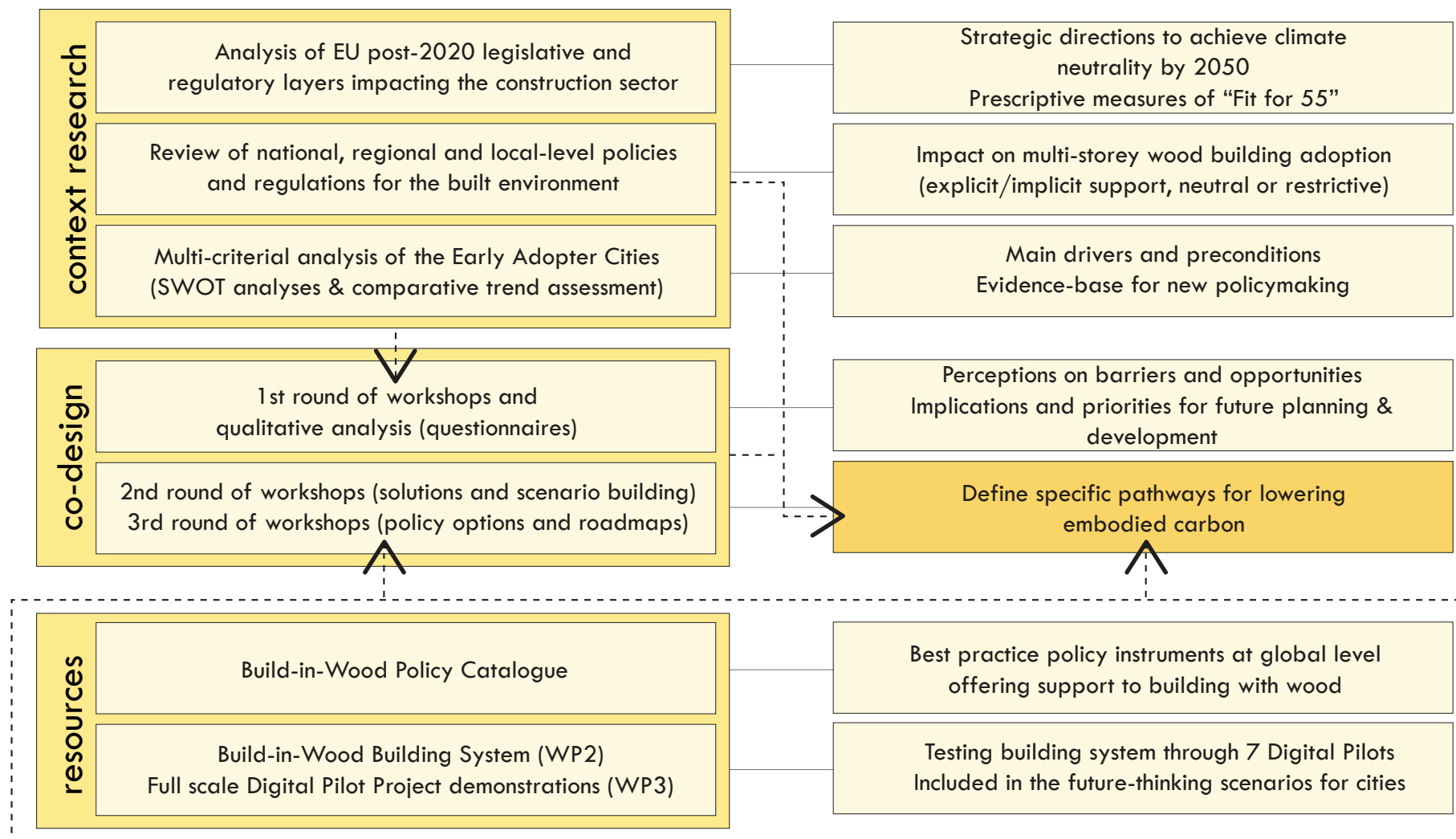
Trondheim

Metropolitan Region
of Amsterdam

Trento



Methodology



<ul style="list-style-type: none"> • Increased demand for housing (new-build and renovation of older building stock); • Lack of knowledge and experience in the field; • Lack of interest for building sustainable from the clients; • No value chain integration; • Legislative constraints and public perceptions; • Lack of integration in the local wood value chain. 	<ul style="list-style-type: none"> • Ensuring carbon offsetting, circular economy principles & performance-oriented heritage building refurbishment; • Setting targets for embodied energy in planning policy; • Low carbon materials challenge; • Ensuring interoperability and encouraging potential future re-use. 	<ul style="list-style-type: none"> • Lack of experience with wood construction, especially renovation and rebuilding; • Lack of knowledge regarding: constructing different types of wood buildings, dealing with financial risk in construction and operation processes, fire demand in wooden constructions.
Brasov Metropolitan Area	Haringey Borough	Copenhagen
<ul style="list-style-type: none"> • Pro-wood policies (WEP, tax, rates, procurement); • Support to ongoing legislative changes through scientific research; • Identifying, integrating and supporting local value chain in the wood construction industry. 	<ul style="list-style-type: none"> • Supporting a building in wood policy (stand-alone or supporting a larger embodied carbon policy); • Supporting a retrofit-first approach in planning policy that is low-carbon and circularity-oriented 	<ul style="list-style-type: none"> • Wood building strategy: carbon accounting; • Simplification of legislation and building codes; • Local “task force” for wood; • Timber-positive tendering.

- Compact, high-density urban area with little undeveloped land: densification;
- Traditional/outdated perception of timber as material for “wood cabins” not urban housing;
- Knowledge gaps and preconceptions of end users;
- Lengthy and difficulty of permitting procedures for wood structures.

- Focusing on re-use of building materials;
- Public tendering system;
- Wood building logistics;
- Changing the perception of the population;
- Lack knowledge and experience of developers and constructors;
- Optimisation of the connection points between wood components.

- Overcoming knowledge gap;
- Lack of supporting regulation and true pricing; outdated frameworks;
- Accounting for stored carbon and monitoring health and well being effects;
- Preconceptions about cost versus benefit;
- Lack of general awareness.

- Compact, high-density urban area with increasing population growth and natural constraints;
- Very high retrofitting need;
- Outdated regulatory framework;
- Cultural barriers related to clients and final users;
- High fragmentation of forestry ownership;
- Certifications required at the end of works;

Innsbruck

Trondheim

Metropolitan Region of Amsterdam

Trento

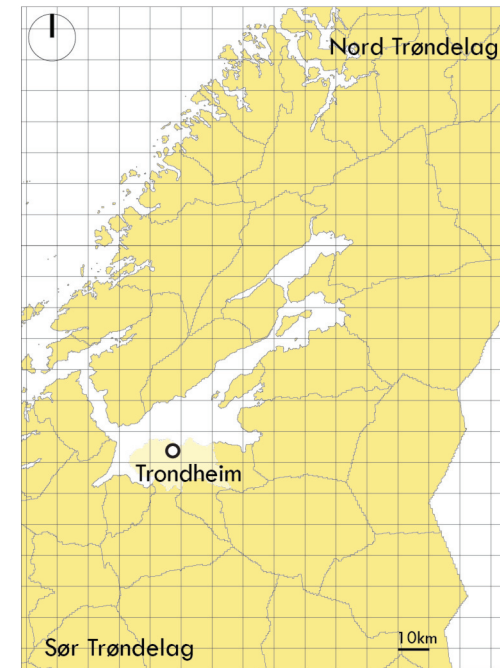
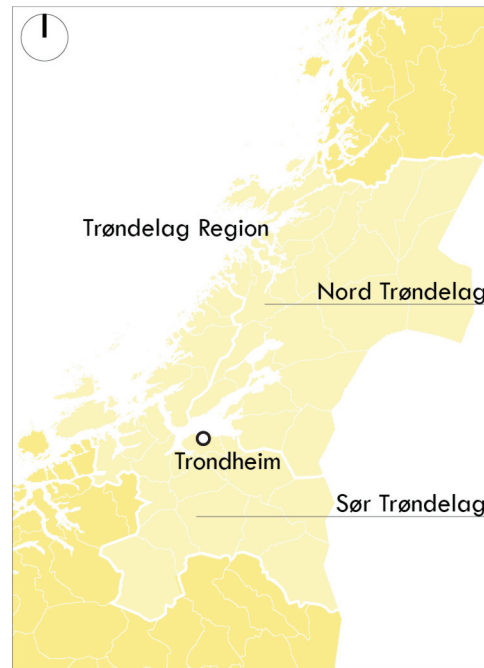
- Policies for timber construction support (quota, Co2 and energy requirements)
- Carbon accounting and cost analysis as a whole ;
- Simplification, standardization and perception change.

- City sustainability strategy (beyond wood);
- Building regulations focusing on material use, design for dissassembly;
- Communicating the benefits of using wood in buildings;
- Innovation and optimisation for timber building systems;
- Tender system for more local sustainable buildings materials.

- Policy development regarding wood buildings;
- Timber-positive tendering;
- Standardisation;
- Integral assessment of sustainability on a systems level.

- City sustainability strategy;
- Embedding wood building in the green policy framework;
- Strengthening the urban-rural linkages and overcoming value chain fragmentation.

Urban and Strategic Context



As the 3rd largest city in Norway, Trondheim functions as the primary center of the Trøndelag region. Although it has a low density compared to other European cities, there are strongly positive growth prospects until 2030: the population increased by 13.8% (2010-2020), surpassing building stock growth (12.8%).

The population trend led primarily by a decrease in population migration signals a necessity for more dwellings, aspect reinforced by the growing trends over the last couple of years in the region, in both the number of constructions, real estate companies, wages, the number of personnel and turnover. The number of constructions has steadily increased over the years, while the number of permits has been declining (2018-2020), which can signal that the current trend is to build vertically. The declining rate of homeownership and continuous growth of residential rental prices both signal that the general market trend is going to build-to-rent as opposed to build-to-sale, concluding that sustainable solutions like wood that cost a little more but it pays off quickly can become more attractive. The current trend to build more vertically with the increasing price of the apartments for sale (2018-2020) represents a sustainable market opportunity for Tall Wood Buildings.

This is also sustainable given that soil stability is an issue, and a lighter material like wood gives possibilities to add more storeys to both new or existing buildings, this, in a city where the seismicity is moderate to low and the magnitude is also low.

CO2 emissions have fallen slightly in recent years in Trondheim (2.46 tonnes CO2/capita), reflecting progress in the city's actions towards sustainability. However, both emissions from energy industries and transport, as well as the incidence of respiratory disease within the population have increased (2015-2020). Using more wood in homes can be a solution to improve indoor air quality due to its moisture buffering capacity, and Trøndelag makes up for 29.8% of the total forested area of Norway, which makes the resource accessible. The reforestation rate has always exceeded the one of deforestation, concluding that the wood sector relies on an ongoing circularity and continuity of raw material supply.

A low unemployment rate with the constant increase in work intensity, both locally and nationally, and with a highly educated and generally wealthy population represent good premises for shifting to sustainable construction, even in the context of higher up-front costs.

Mainly known as an incubator for cutting-edge technology, a knowledge and innovation center, Trondheim is also a pioneering wooden city with clear goals for sustainable urban development and increased quality of living.

This is supported at regional level by the Strategy for innovation and value creation in Trøndelag (2017), which aims to increase sustainable value creation and international competitiveness, based on five priority areas: bioeconomy, circular economy, ocean space, smart communities and experience industries.

The flagship initiative "TREbyen Trondheim", initiated in 2004, has been an ongoing urban development project facilitating innovative wooden construction projects through municipal investment, initially through regulating a city-centered neighborhood affected by fire (2002) to a new urban ecological wood building trial area.

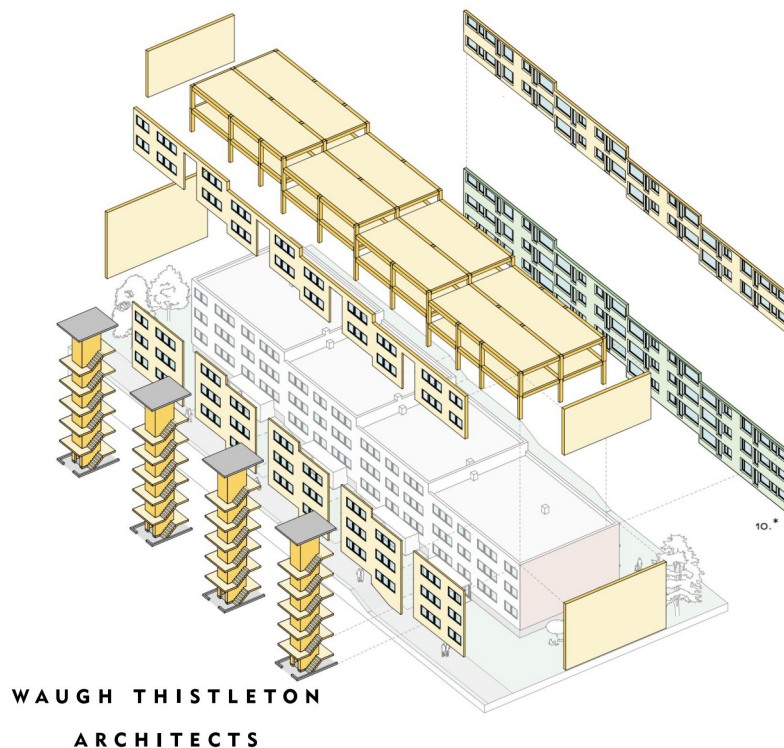
According to the Municipal sub-plan for Energy and Climate (2017-2030), all major municipal investment projects should have a 30 % lower carbon footprint (including materials), provided that life cycle costs do not increase significantly. The goal has already resulted in wood being chosen as a construction material in several municipal projects subsequently.

The strategy's chapter on the built environment ("bygg og anlegg") also incorporates a target to develop more climate-friendly projects, including "zero emissions neighborhoods"; an ambition that is being followed up in several large development projects in present. The plan also envisioned that until 2025, Trondheim is resilient and ready to meet future climate change challenges. In 2030, stationary energy consumption in construction is foreseen to remain at the same level as in 2013, with direct GHG emissions reduced by 80% compared to 1991 and the municipality will be a zero-emission business.

** The in-depth socio-economic, planning and regulatory context analysis for each EAC is provided within the Build-in-Wood Community together with the references and data resources used for the analysis.*

Participatory approach

Vestlia housing retrofit - Digital pilot project developed by Waugh Thistleton Architects. The aim was to explore ways for Trondheim's Vestlia housing associations and co-owners to retrofit and extend their building stock using wood based, sustainable building systems. It showcases the adaptability of the Build-in-Wood structural and façade systems through components that are used to enhance accessibility and quality, improve the thermal performance of the existing envelope and extend an existing residential structure by adding two floors.



WORKSHOP 1

An outdated tender and municipal building procurement system, which makes early decision making and wider adoption of multi-storey buildings difficult

A lack of focus on the re-use of building materials after end-of-life

Wood building logistics: the transportation of solid construction elements from the factory to the building site (panels, beams, columns, which have a specific design that makes it hard to manipulate)

Resistance to change in the perception of the population and lack of knowledge and experience of developers and constructors

Optimisation of connection points between wood components and articulation of wood with existing construction (i.e. "building out", both vertically as well as horizontally, to address densification needs)

Local survey
(governmental, industry and planning stakeholders)

Trondheim & Orkanger



Wood City Festival

LOCAL COMPETITION sponsored by Trondheim Municipality and Kystskogbruket (association of county authorities, governments, forestry and wood industry)

WORKSHOP 2

Demonstrating measurable effects

Circularity

Ability to change and adapt

Local value chains

Tender process

Vulnerability

Regulation adaptation to technical solution specificity

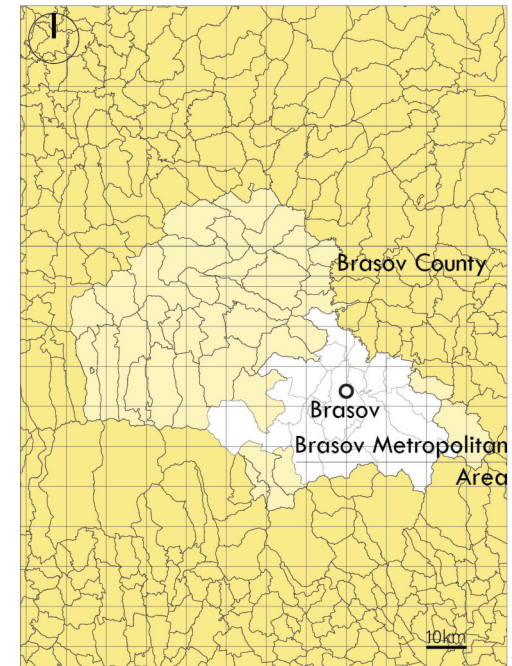
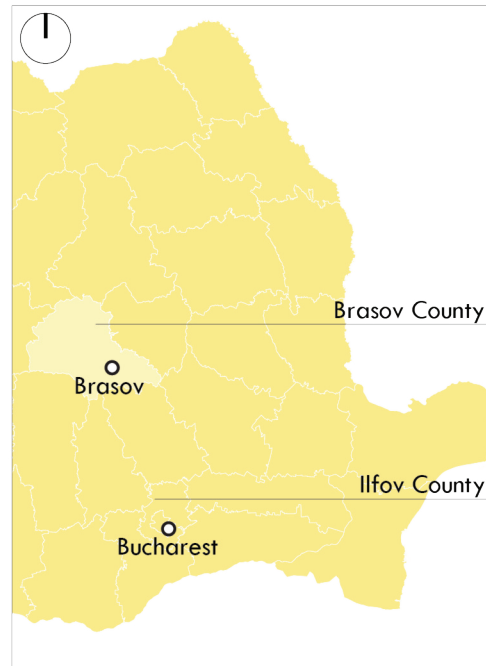
WORKSHOP 3

Action menu for tender processes: Reducing the number of tenders and investigating how higher involvement of local actors can be ensured through good tender processes

New local value chains: A "living lab" approach focusing initially on the use of local hardwood (birch) resources as well as the reuse of the material and reuse of furniture and wooden interiors

Local working groups to create project ideas by addressing seven core policy-related challenges

Urban and Strategic Context



Today, Braşov is one of the most important economic centers of Romania, being the 8th largest city in the country (289,502 inhabitants in 2020) and the largest one in the Center Development Region. Together with 13 other localities, Braşov has been a metropolitan area (BMA) since the end of 2005, and since 2008 it has been designated one of 7 national growth poles.

The regional economy has a balanced structure, with an important share of industry, mostly specialized in food, textiles, wood processing, construction materials, and the production of automotive components and parts. Although Braşov has a strong heritage in the wood processing and furniture industry, it is more focused on the traditional aspects of the wood industry and has not yet strongly supported the adoption of wood-based products in the building (P+2) construction sector.

The socio-demographic context shows premises for the uptake of tall wood buildings by signalling a strong demand for new constructions, a competent trainable workforce, and a very high ownership rate. In terms of opportunities, there is a critical mass of relevant actors that can support this endeavour in order to address identified threats and weaknesses such as high levels of population inactivity, low buying possibilities, legislative/regulatory constraints, strong resistance to change from the local population and lack of qualified workforce.

The colder annual temperature, which shifts focus on the building's thermal system and high relative humidity that encourages the use of breathable materials such as wood and natural thermal isolation

solutions, represent strong points for the use of wood in construction.

However, there are still challenges needed to overcome, such as the low availability of residential properties that use wood-based materials, a well-established and profitable concrete building culture, a strong local/national perception that wood is not durable and the rising concern about toxicity from the local wood processing industry.

The regional sustainable wood resources are more than enough to support the construction of tall wood buildings and the relevant value chain actors are present. Still, the links are missing and BMA is faced with the challenge of bringing added value from cooperation in a context of strong national opposition to wood-cutting activities, rigid building regulations (especially related to fire and earthquake) and a national regulation encouraging the processing of wood for export purposes.

Since 2012, the region has been engaged in several international projects aiming at improving the framework conditions for the regional innovation system. IDWOOD is a transnational project providing Central Regional Development Agency with tools for supporting innovation in the wood sector. In connection with it, the region published its plan to build a Regional Technology Center for the Wood Sector, which is intended to support technology and knowledge transfer and service orientation for the regional wood sector enterprises.

Moreover, as stated in the 2014-2020 Action Plans for supporting the Wood Industry and the Bioenergy

industry, the Central Region is planning to promote the technological development of both domains. Approved on July 2014, the Regional Development Plan (2014-2020) had the general objective to reach a balanced development of the Central Region by stimulating the knowledge-based economic growth, environment protection, sustainable valorisation of natural resources and strengthening the social cohesion.

According to the Development Strategy of the Central Region (2021-2027), the Central Region is the second basin of forest harvesting of Romania and the first region in the research timber production.

Among its priorities, it indicates (a) Superior exploitation, in a sustainable manner, of the regional forestry potential, through modernization of forestry operations, development of specific infrastructure and supporting the use of forest residues for energy purposes measures and (b) Supporting the regional research and development sector for smart economic growth in targeted areas including the sustainable built environment (37 research infrastructures).

The Integrated Urban Development Strategy of the BMA defines the development goals and priorities of the territory for 2014-2030, establishing five objectives that will guide the development, focusing on: Connectivity and mobility, Innovation, entrepreneurship and human capital, Quality and way of life, Tourist attractiveness and Public management in partnership with citizens.

** The in-depth socio-economic, planning and regulatory context analysis for each EAC is provided within the Build-in-Wood Community together with the references and data resources used for the analysis.*

Participatory approach

Good practices and initiatives of building with wood
in Romania



Build-in-Wood Brasov Stakeholder Meeting

Local working group definition
and engagement for future workshops

Local survey addressed to stakeholders
Desk-analysis conclusions

WORKSHOP 1

Support a better connection between
the private and public sector

Initiate a document that can propose legislative
changes supported by scientific research in the field

Need of a research center in the wood
industry

Value chain should start with education
Lack of specialists in the field with few students
that specializes on wood

Support needed from the national strategy and
through fiscal facilities

Wooden Constructions in Brasov Region

Fit for 55 Legislative Package

WORKSHOP 2

Lacks the practical tools to put the directions in
practice

Applied for both public and private entities

Wooden constructions will be favoured (due to its
contribution throughout the entire lifetime)
At least three standards will be developed in the next
2 years regarding constructions and energy efficiency
in constructions

Wood is the only building material that, at the same
time sequester carbon but its also the main element as
a substitute material, and its use will produce gains
throughout the production chain

**Wooden Constructions: a sustainable solution in
the context of Fit for 55**

Carbon footprint management and how it will
affect the wood industry in Romania

Good practices policy instruments from
Early Adopter Cities

WORKSHOP 3

Importance to build upon the city tradition and
opportunities
(medicine, sports, infrastructure investments)

Corelate the findings from the Build-in-Wood project
to the possible extent with other
municipal initiatives / develop guidelines and
recommendations on the use of wood

The new version of the regulation for the fire safety
of buildings is planed to be more restrictive

Center of Excellence for Sustainable Mountain
Communities project - proposal to capitalize on
the Build-in-Wood findings for its development.
Potential working group on Sustainable
Environment department

Sustainable mountain communities

Urban and Strategic Context



Trento has long-lasting experience in promoting pilot initiatives and cooperation at the international level in support of climate change adaptation strategies, being a frontrunner among Italian cities, as concerns its commitment towards sustainable development and innovative pilot projects.

With a population of 119,288 inhabitants, Trento concentrated 21,9% of the county population recorded in Trentino Alto Adige Province in 2018, being also the 3rd most populated city in the Alps Region.

It's a compact city with natural constraints due to different geomorphological and anthropic landscapes, shaped by the surrounding mountains, and an urban area with positive trends in what concerns population growth and density in the last years.

Although the activities of the construction sectors in the last years steady decreased, as well as the number of building permits issues (73% in 2018 compared to 2010) and to a lesser extent the number of retrofitting and maintenance works, an important increase in the average floors above the ground for residential building was noticed.

On the other hand, the strong presence of regional/local clusters and standardization of wood products supporting sustainability, together with the growing activity rate (much above the national average) and an unemployment rate below the national and northern Italy average, could mean that Tall Wood Buildings may represent a sustainable market opportunity for the future construction sector.

The city has favourable conditions for multi storey wood buildings adoption, such as rich forestry sector (forest covering 60% of the Province), low incidence of forest fires and low level of earthquake risk. The wood industry slightly increased its value added by around 1,15% (2010-2018), the forestry field developed better in the last period (construction and forestry salaries higher with 6% than the national average while the salaries in the forestry sector are higher than the ones in construction), the GDP / per capita in PPP and overall value added produced at county level have been steadily growing.

However, as stated by the local stakeholders, Trento has to overcome several challenges, such as: outdated regulatory framework, general cultural barriers especially linked to clients and final users, lack of knowledge and specialized training, high fragmentation of forestry ownership (high prices for acquiring primary resources) one missing link of the value chain (wood primary processing).

The whole provincial and regional territory derives from a common strategic approach built in the last 20 years, as reflected in the different strategic plans and programs adopted. The Trentino Clima 2021-2023 Program was approved as a guideline for the development consent and implementation of the Provincial Strategy for Mitigation and Adaptation to Climate Change and as a reference tool for guiding the administrative action of the PAT.

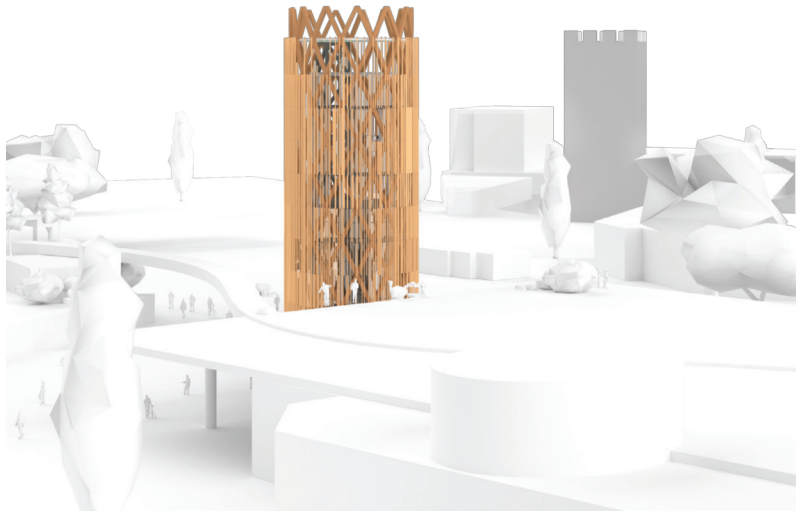
At least two regulations facilitate the adoption of sustainable solutions in the building sector in Trentino: the urbanistic code (updated in 2017), and the county law (nr. 15/2015) on land management. In particular, the urbanistic code refers to buildings' certification of environmental sustainability, whilst the county law promotes new mechanisms for the conservation of soils, by introducing incentives for building rehabilitation and renovation, including the volumetric extension of existing buildings for architectural rehabilitation and energy efficiency. After the 2020 Covenant of Mayors for Climate and Energy, the Municipality commits to draft a document called Action Plan for Sustainable Energy and Climate in order to introduce mitigation and adaptation aspects into relevant policies, strategies, and plans.

In line with the provincial urban planning law, the Municipal Urban Planning Instrument is based on the principle of minimizing land consumption, while the vision of the new urban plan targets 5 focus areas: Eco-Trento; Welcoming Trento; Trento Accessible; Smart Trento; Beautiful Trento.

While the urban plan does not contain specific rules for climate change adaptation, the municipal law "REGOLAMENTO EDILIZIO" (updated in 2020) contain a chapter "Rules regarding the sustainability of buildings", where, among others, recommendations on the use natural or recyclable materials and finishes, which require low energy consumption and have a limited impact on the environment.

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Participatory approach



Observation Tower and Bicycle Parking Facility - Digital Pilot project developed by C.F. Møller Architects. A tower with an integrated bicycle parking facility is planned as part of the mobility hub that will be developed by the Municipality of Trento in the city center. The design principles of the Build-in-Wood Guide were translated into a diagrid structure that forms a stable observation tower.

CF MØLLER
ARCHITECTS

Local survey
(governmental, industry and planning stakeholders)

WORKSHOP 1

Compact, high-density urban area with increasing population growth and natural constraints

High fragmentation of forestry ownership: high prices for acquiring primary resources; one link of the value chain (wood primary processing) is actually missing

Untapped potential of the forestry resources: the fragmentation of property limits the opportunity to cultivate (economically and environmentally sustainable) forests

The weakest elements of the value chain: local legislation / general cultural barriers especially linked to clients and final users

Very high retrofitting need

Outdated regulatory framework

Certifications required at the end of works

Live Questionnaires



What we can do if we decide to build in wood?

WORKSHOP 2 - TECHNICAL ORIENTED

Extend the use of wood for construction purposes, not just for packaging. Enhance the production of wood products

Lower the cost of the resources (also from a transportation viewpoint due to the morphology of Trentino)

Increase the knowledge and specialization in carpentry, finishing and use of the wood resources and products

Ensure technical and targeted training and consultation for architects and engineers, cost-product ratio and facilitate procedures for using wood in construction

Develop more good practices/examples. The building system and digital pilot give a good headstart - 90% of the participants perceived the Build-in-Wood system highly applicable / usable in Trentino Region

Study the supply chain with specific verification of growth times and consumption cuts

Increase the interest of the wood construction enterprises system

What can be translated in terms of policy/strategic directions for easing the solution of building with wood?

WORKSHOP 3 - POLICY ORIENTED

Almost 70% of the participants pointed out that the paradigm shift in the construction sector from “building as usual” to “building with wood” should be first supported through Local initiatives/projects which can be scaled up at macro levels

Almost 70% of the participants consider to be of highly & medium and highly important the implementation of mandatory regulations at the spatial planning level in order to support this paradigm shift in the construction sector

More than 60% of the participants consider to be highly&medium and highly important the implementation of mandatory regulation at building level

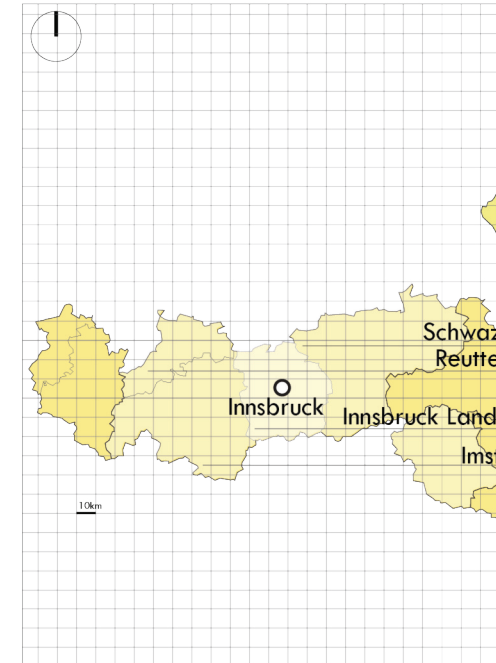
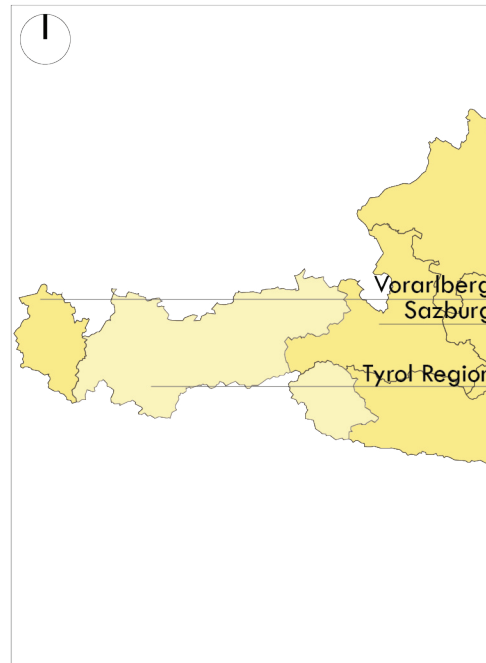
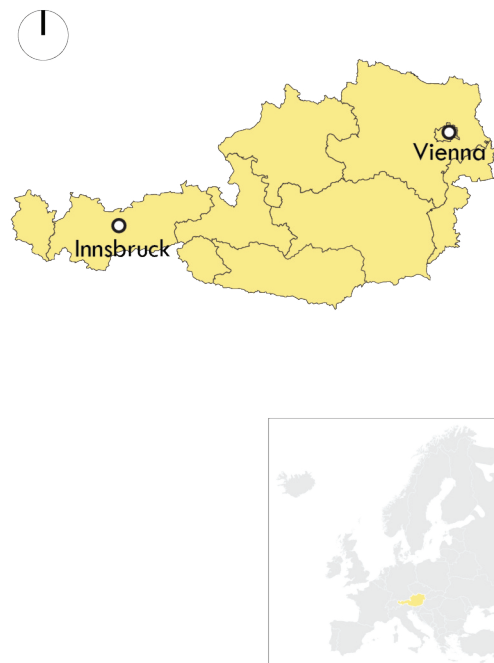
Setting specific guidelines for using wood in open competitions for architecture/spatial planning projects can be a driver to wider adoption of wood as the main construction material

PARADIGM SHIFT POTENTIAL IMPLICATIONS

- (1) increasing construction speed and simplicity of execution
- (2) new realities/opportunities which are no longer based on traditional construction techniques
- (3) raising customer's awareness of the use of wood and what this entails

- (4) economic investment and growth in the construction sector
- (5) new construction methods for a green and sustainable city
- (6) strengthening of the production sector of panels and products for wooden houses
- (7) strengthening the demand for wooden buildings, digital supply chain, production/cost control

Urban and Strategic Context



As the capital city of the Tyrol Province and the fifth-largest city in Austria, with a strategic location along an important mountain-crossing transport route, Innsbruck developed into one of the very few inner-Alpine urban areas with more than 100,000 inhabitants in its core, reaching 133.206 inhabitants in 2020.

The city ranks low on population density compared to Vienna (4556 P/km²) or other European cities, nevertheless witnessing a consistent growth since 2005 (approx. 15%). In terms of area (104.9 km²), Innsbruck is about the same size as Paris (105.4 km²), but only about 28% of the area can be settled.

Even though the GDP per capita has fallen almost continuously since 2010, the construction sector has not been affected. Data showed a continuous increase in the number of industrial, as well as in construction and real estate companies, which together with the increasing trend in the number of inhabitants is not only a good indicator of development, but also an indicator of a strong growing need of new dwellings. The average level of revenue per household indicates however low buying possibilities for more expensive building solutions.

Innsbruck has great favourable conditions to connect and strengthen the existing ecosystem due to a strong rise in work intensity and employment rate, high level of innovation and also positive trends in both construction and forestry sectors.

Moreover, the city relies on a strong presence of regional/local clusters, business incubators and competence centers related to the wood industry, the availability of forests near the city and the availability of wood processing industry at local/regional level.

From an environmental perspective, several aspects encourage the use of wood such as: colder annual temperature that shifts focus on building's thermal system, humidity which encourages the use of breathable materials and natural thermal isolation solutions and low incidence of earthquakes and low magnitude.

The timber industry is one of the most important economic sectors in Tyrol with a world-leading source of know-how. For centuries old "Tyrolean wood knowledge" and the equally old handicraft tradition contribute significantly to this. The proportion of wood buildings has increased significantly in recent years, multi-storey wood buildings still having great development potential, in particular for student and family housing.

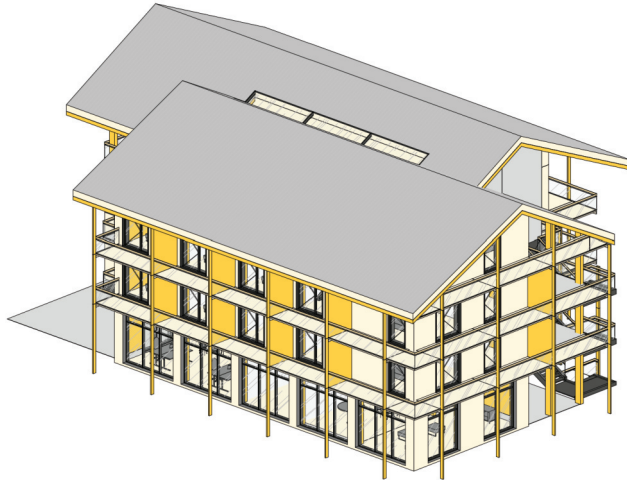
However, it has to face several challenges, as stated by local stakeholders, such as: knowledge gaps and preconceptions of end users, companies' reluctance in embracing wood as the main construction material, mainly because of the legislation on civil building design and the outdated regulatory frameworks on wood building safety and fire rescue strategy.

The Tyrolean government implements various innovation and technology policy instruments. Tyrol's research and innovation strategy had the objective to continuously develop cooperation structures between all players of the regional innovation ecosystem. It aims at promoting Tyrol's strengths, focusing on opportunities of the "Grand Challenges" as well as pushing science-industry cooperation. Defined until 2020, these objectives were the basis for strategic principles and action fields with specific goals and target groups. Moreover, the strategy supports regional strengths in life science, mechatronics, renewable energies, information technology, wellness, wood and tourism. Further supra-national cooperation activities are realised in the frame of European initiatives.

Within the implementation tool: The Action Plan (2020-2021) one focus area is related to "Buildings in times of climate change", having the main aim to increase the resilience of urban buildings to the effects of climate change. It includes measures such as: (1) Elaboration of criteria: promotion of timber construction, (2) Taking into account the adaptation to climate change in public tenders: Consider climate change in public tenders/competitions in the evaluation, Avoidance of gray energy (e.g. building materials, insulation) and (3) Awareness raising to consider the overall energy balance of building materials, the life cycle of building projects and among architects and citizens for aspects of climate change.

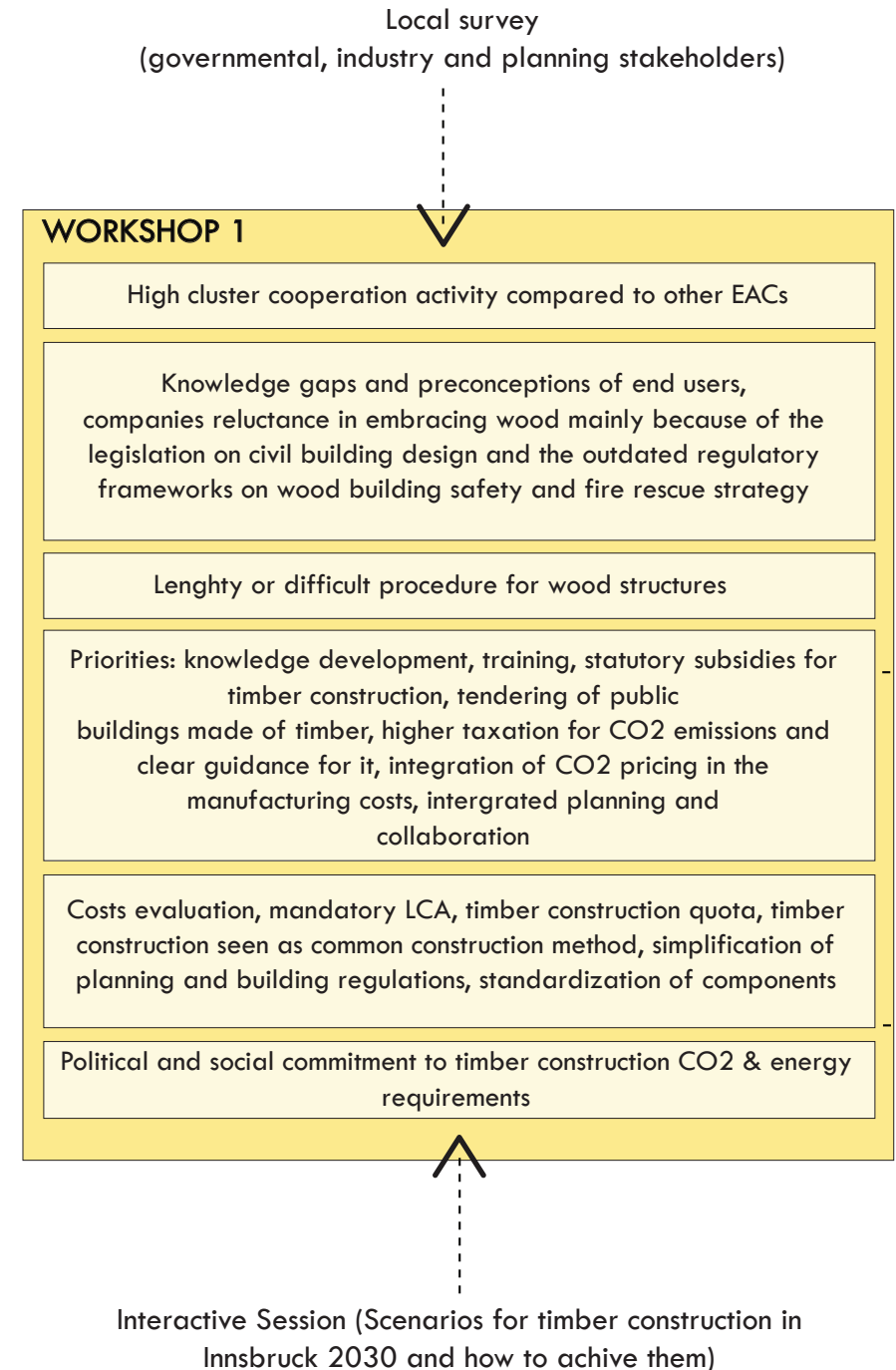
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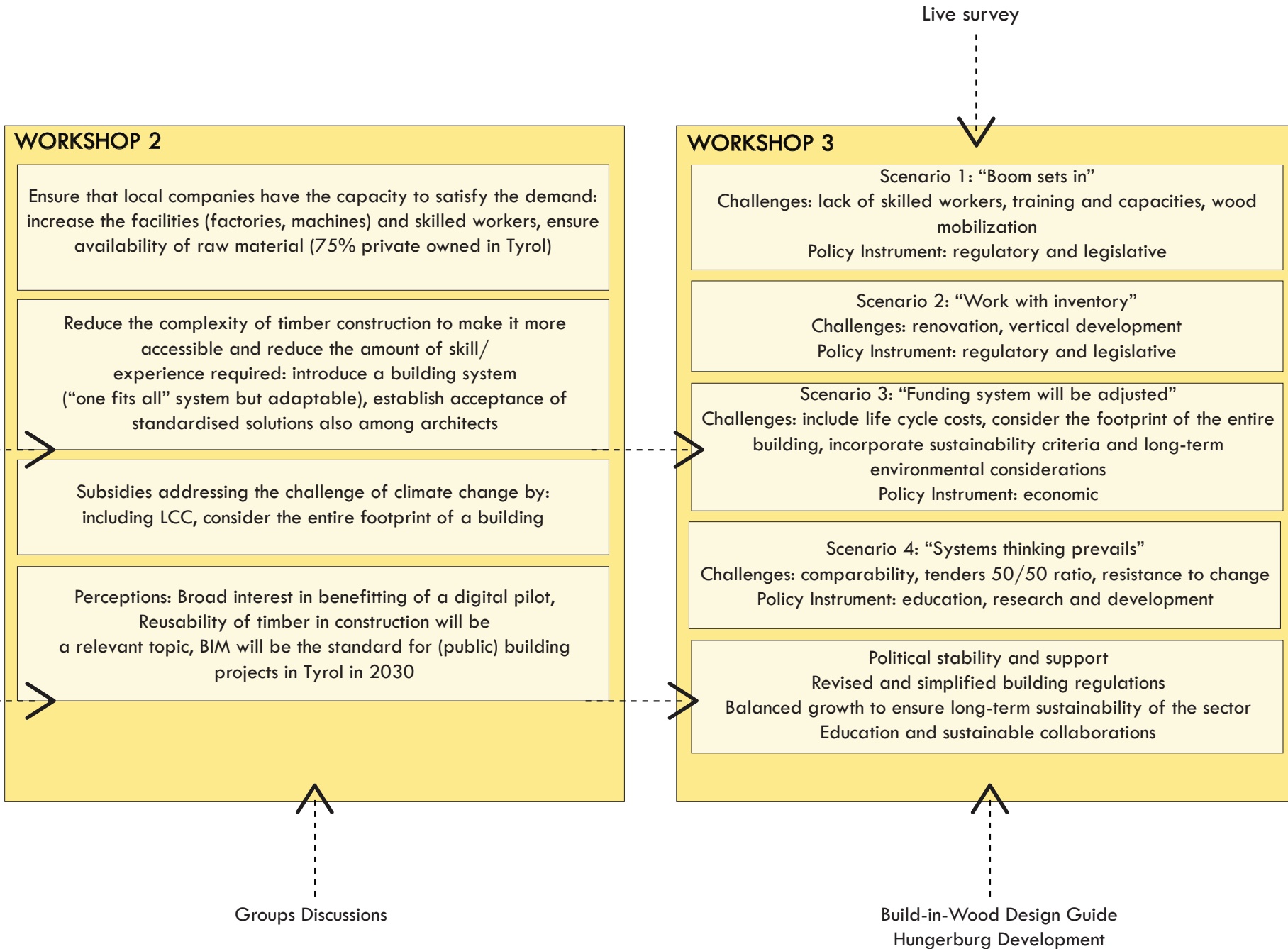
Participatory approach



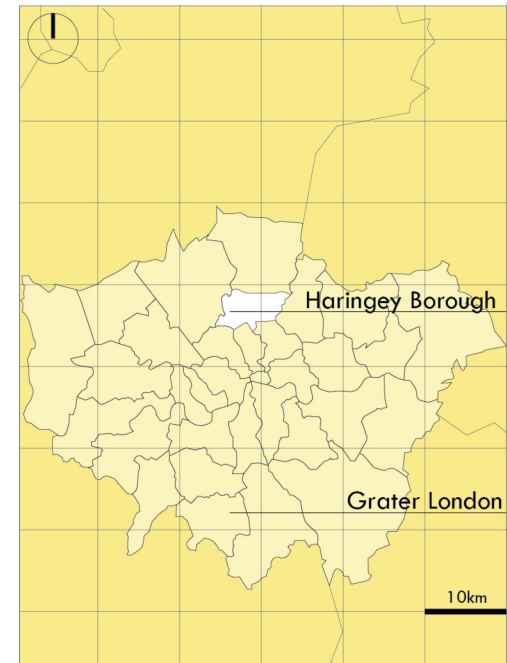
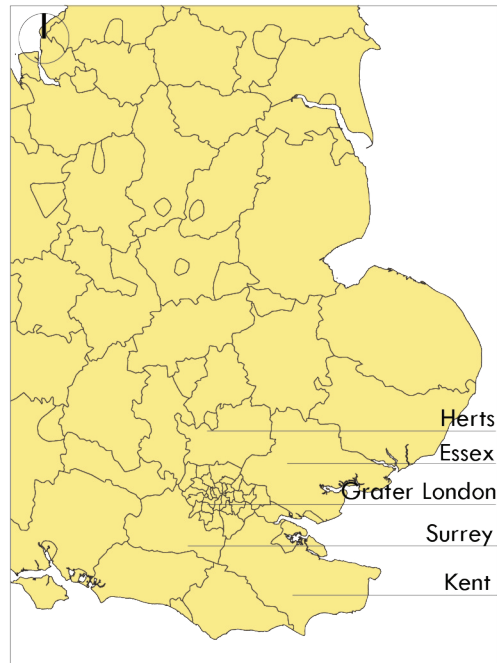
Hungerburg Development - Digital Pilot Project developed by C.F. Møller Architects on a site in a former quarry region where the use of wood in construction is a common practice. The new structure should accommodate a diverse range of uses, both within the building and in the outdoor facilities. The ecological and sustainability standards are intended to be set as high as possible, aiming for the lowest achievable CO2 balance. The BIW System offered a flexible design for different apartment sizes and an open ground floor.

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Urban and Strategic Context



Haringey is one of the 32 London local authority districts that constitute Greater London, being located in the Northern part of the city. Even if the Borough had a lower population increase (3.6%) compared to national level (6.6% between 2011-2022), it has strong growth prospects: its population will increase with 8% by 2040, and approximately 15.920 new homes will be needed in the next ten years.

The GDP in London was always fluctuating, but in 2020 it fell by 9,9% , the biggest decline in years. The rising rents for residential and commercial spaces in central London are leading to displacement of businesses, causing rents / land values to increase in Haringey (selling prices increased by 18% in the last 5 years, with 5% more compared to Northern London).

Housing affordability is one major issue in Haringey. According to Trust for London data, 27% of London's population is living in poverty, while in Haringey the percentage is 34%; Haringey is the 4th most deprived borough of London. The unemployment rate in Haringey was fluctuating over time, with an increasing trend of 4.5% (2020-2021), while in London the trend is opposite (2% decreasing).

The Haringey Higher Level Skills project aims to improve residents' skills in construction, engineering, health, and childcare sectors, while according to Building the Green Economy Action Plan, 3600 new jobs will be created in the construction sector.

Half of all Haringey's emissions come from heating and power, and in order to achieve the Net Zero Carbon objective, this will require not just the Council, but also the developers to contribute, by building sustainable and energy efficient buildings. Solutions like using more wood in construction, that cost a little more in the beginning, but it pays off quickly can become a more attractive and sustainable answer over time. However, Haringey made big steps in reducing its carbon emissions over the last years by 36.7% (2020 Annual Carbon Report) being thus on the right path in meeting the 40% reduction by 2020 comparing to 2005 baseline.

Between 2019-2020 local authorities across the UK adopted climate emergency declarations which encourages Councils to prepare Climate Actions Plans. The Haringey Climate Change Action Plan (HCCAP) adopted in 2021, sets the target to be a net zero carbon borough by 2041, while the council's corporate buildings have to achieve this by 2027. It aims to create a healthy and sustainable borough with a high quality of life, considering six factors (council, housing, workplaces, transport, energy, and community). Among its objectives, it wants to include carbon reduction as a core requirement in all procurements and seek to set targets to reduce embodied energy. One action is linked to the declining trend of carbon related jobs by supporting 'smart retrofit academies' to train local builders and apprentices in retrofit techniques for modern and old buildings, digital innovations and natural building materials.

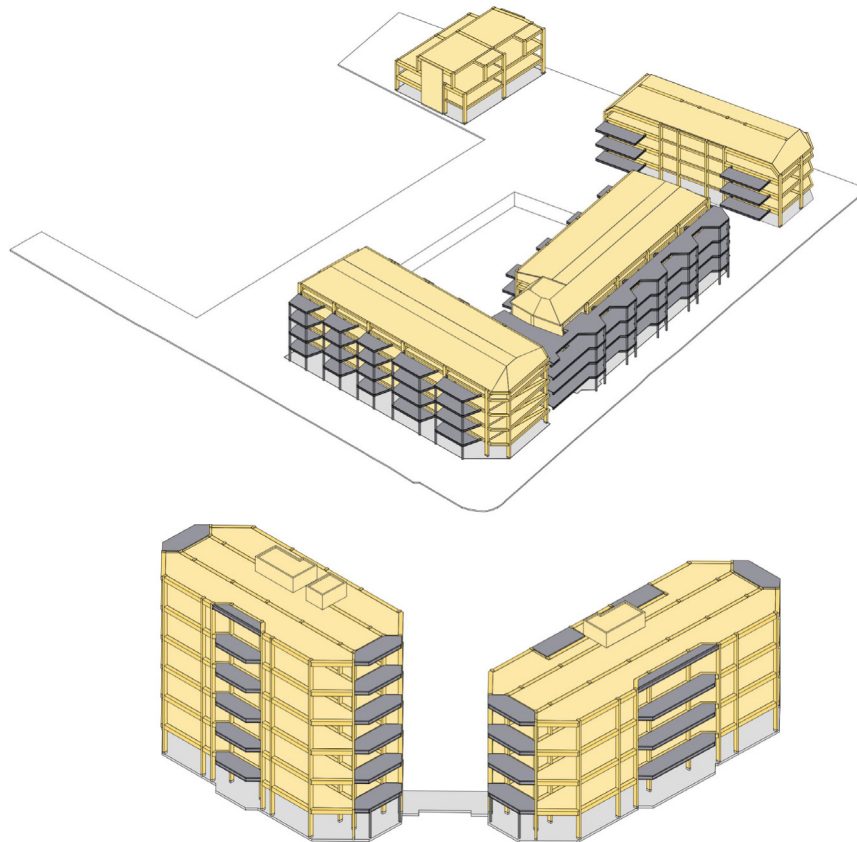
Through the Borough Plan of Haringey (2019-2023) the Council is committed to ensure a safe, stable and affordable homes for everyone, whatever their circumstances, by delivering as many new, good quality homes of all kinds, in good quality neighbourhoods, getting as close to the Mayor of London's emerging target for Haringey (1,502 new homes/year).

The plan will require, among other, all new developments to achieve the Zero Carbon Standard and improve the carbon footprints of the council's corporate buildings, encourage energy efficiency projects and implement measures through planning controls and sustainable design to reduce the impacts of emissions from developments and buildings on the local community.

The initiative is further supported by Council's draft: „A New House Strategy for Haringey (2023-2028)“ which integrates climate change, carbon management, and sustainability in the design of the new generation Council's homes. Among regulating operational emissions of the housing developments, it highlights the use of environmentally sustainable materials to reduce carbon emissions from the sourcing and production of materials. Moreover, the new generation homes will be built with high-quality materials that are simple to maintain, repair and replace.

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Participatory approach



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Kerswell Close and Woodside Avenue - Digital Pilot Projects developed by Waugh Thistleton Architects

In these workshops, Waugh Thistleton Architects presented to Haringey and other London Boroughs a report about the Kerswell Close and Woodside Avenue schemes as well as considerations about the use of the Build-in-Wood system and engineered wood in general. Both above-mentioned schemes had been designed to a level suitable for planning submission by respective local architects. The request was to keep the exterior appearance of the buildings and their internal layouts, as far as possible, whilst showing how the Build-in-Wood structural and façade systems could be adapted to achieve these designs.

The intention was to highlight how the Build-in-Wood kit of parts could be shaped to suit, not only the local planning policies and building regulations, but also somewhat irregular pre-made choices about form and formal aesthetic appearance.

A distinctive feature of the London pilot projects are the façade panels; in fact, to complying with UK statutory guidance, was developed a non-combustible version of the Build-in-Wood façade system, demonstrating a way of building, within the current UK regulation context, that responds to the challenge of meeting net zero carbon. The Haringey borough intends to publish the report as an “evidence-based” annex to the local planning documentation focusing on the use of timber in the context of Zero Carbon policies.

Planning policy and carbon management experts



WORKSHOP 1-ZERO CARBON ROUNDTABLE

A blended approach for the design process can be addressed by using materials from recycling process

Within a circularity plan, the sequestered carbon could be included in the numbers of LCA and sustainable forestry calculations

Encourage potential future re-use from the beginning of the project

Retrofit targets need to be demonstrable with costs for policy making

Retrofitting should take into consideration not just the carbon savings but also drivers such as: whole life costs, grid capacity, fuel poverty, health & wellbeing, heat pump effectiveness and other co-benefits: reduced renewable energy demand, reduced peak load, less grid storage required, significantly lower energy bills

From the embodied carbon point of view, it is better to retrofit than to build a new construction, especially if you have a lower operational demand

Coercion mechanisms for building companies should be designed in order to support the production of a retrofit scheme before producing a new build scheme



Focus: Low carbon materials & Retrofitting and existing buildings
Providing evidence to support setting targets for embodied carbon planning policy of Haringey Borough Council

WORKSHOP 2-PROFESSIONAL ROUNDTABLE

Explore appropriate applications and policy making for timber buildings in Haringey

Identifying the criteria to develop a prototype modular timber system and the potential pilot sites where this approach could be tested



Local survey
(governmental, industry and planning stakeholders)

WORKSHOP 1

Main regulatory and planning barriers: legislation on civil building design

Weakest perceived elements in the wood value chain: the education and training system, national government and regulators

Financial/market obstacles: price of wood constructions; fear of extra planning costs, maintenance and excessive regulation; working against the established industry; too much focus on the up-front costs; lack of cooperation, know-how, political changes in construction, conversion in industry

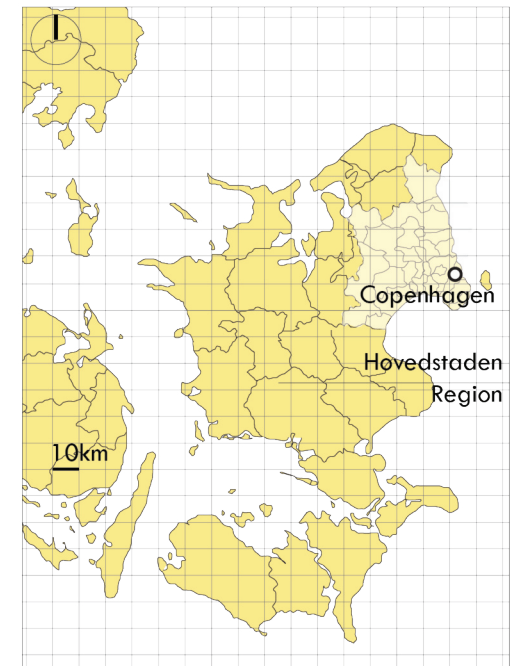
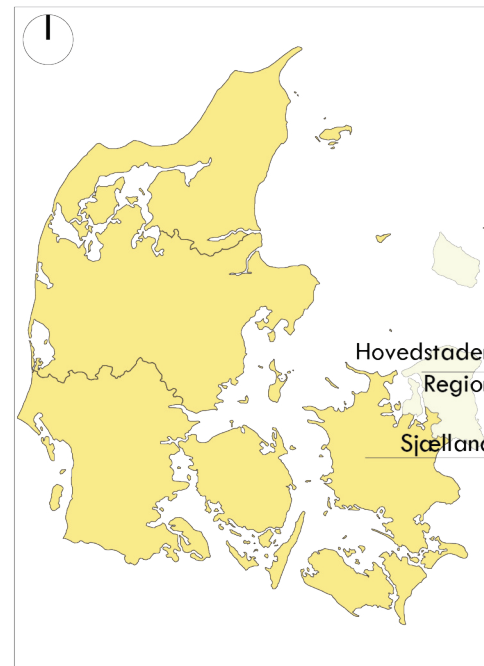
Socio-cultural barriers: lack of knowledge and education opportunities, no building tradition, pre-conceptions about cost versus benefit

Up to date fire regulation and guidelines; support from the administrations (e.g sustainable policies, stimulation, leading by example), public awareness and communication; general education; training of engineers and more knowledge on all levels; co-creation with producers and contractors

Setting up a Task Force around this work

How can we start using more timber in urban environments to provide sustainable and affordable housing to our citizens?

Urban and Strategic Context



Even though the statute of capital and the naturally advantageous coastal position locate Copenhagen at a higher chance of economical and urban development, the city has yet to have reached its peak, but it's going on the right path towards sustainability and innovation.

The city had an impressive growth in population for the last 10 years, rising continuously with an annual rate of 1.82% and reaching 632,340 inhabitants in 2020. Not only because of this, but also because of the constant growth in revenues (26.53% increase between 2010-2018), a growing demand of housing will inevitably occur.

This need has already started to show as data reveals that the number of construction and real estate companies has been growing for the last couple of years and is expected to continue its growth. The raise in the average income in Copenhagen had also an influence on the real estate demand, the price trend of apartments for sale continuing to increase since 2018. However, the demand for new vs. existing apartments also changed, existing apartments being more appealing. Just a few local stakeholders mentioned refurbishment and retrofitting as inclined to develop more sustainably, wood-based solutions. The trend to build more vertically is also visible in Copenhagen, due to the declining number of construction permits year over year, despite an increasing number of dwellings.

Correlated with the low seismicity and low magnitude of earthquakes, these particularities point to the viability of Tall Wood Buildings as a future option.

From a selling point of view, the average value for multifamily houses has continued to rise since 2015 with an astonishing rate in just 6 years. An important aspect of lack of public health is related the increase in incidence of cardio and respiratory diseases in Copenhagen since 2015. At the residential level, the CO2 emissions have decreased since 2010, while increasing in the construction and transport sectors since 2014. This means that the quality of the building is not enough to ensure sustainability, and that the construction processes are important emissions contributors. Thus, the wood building sector could have an extremely important impact upon this matter.

Additionally, the overall forestry sector remains at a balanced and sustainable level, with the reforestation rate always exceeding the one of deforestation, concluding that the wood sector relies on an ongoing circularity and continuity of raw material. In Copenhagen, the local wood resources are considered some of the smallest problems in the wood value chain, the biggest threats being the education and training system as well as the framework and regulations regarding tall wood building.

The Capital Region of Denmark's Regional Growth and Development Strategy is based on an ambitious vision of creating a green and innovative metropolis with high growth and quality of life, to be achieved through targeted investment within two frameworks (Efficient and sustainable mobility, Highly-skilled workforce and Internationalisation) and four strategic growth areas: health and welfare, green, creative and smart.

At local level, the CPH 2025 Climate Plan (2012) aims to make the city carbon neutral by 2025, focusing on four pillars with specific measurable goals: Energy Consumption, Energy Production, Mobility and City Administration Initiative. In 2021, Copenhagen entered the last phase of implementation and its 'Roadmap 2021-25' defined the parameters for the last 4 years. CPH 2025 includes goals for both public and private buildings: Reducing emissions from private building stock with 20% and with 40% from the city-owned buildings by 2025 (compared to 2010).

The city already implemented initiative in support of wood value chains development/ wood building promotion is the Life Cycle Assessment used for building parts in own buildings. This initiative resulted in a higher demand for LCA for building components, paving the way towards better development of performance-based approaches for sustainable design of buildings and efficient use of resources in construction.

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Urban and Strategic Context



The Metropolitan Region of Amsterdam is comprised of 32 municipalities and 2 provinces, functioning as a single city with 2,5 million inhabitants (more than 14% of the Dutch population), 300.000 businesses, 1.5 million jobs and 26 million overnight stays per year. With a 1.1 million inhabitants (2023 data), Amsterdam city's population represent almost one half of the MRA's total, expanding strongly over the years, mainly due to foreign and domestic inflow into the area. Even though the GDP is the highest (2020), Amsterdam's unemployment rate (5,3%) is still higher than the national one (3,8%).

From a selling point of view, between 1995 and 2020 the prices have increased by an average of 7.1% per year. Comparing 2022's first and second quarters data, in the latter the average purchase price for an apartment was €602,474, slightly higher than in the first one. The renting prices per square meter in Amsterdam are above the national average, according to the average monthly rent: a house of 75 square meters costs 979 euros in Amsterdam and 793 euros on average in Netherlands.

Even if the number of construction companies have increased by 64.3% between 2010 and 2018 in Amsterdam, according to median gross salaries by occupation data (2022), the wages in construction sector are lower than the average salary of Amsterdam & Netherlands.

In what concerns the environment, Amsterdam emits more than 4,5 million tons of CO₂ annually, 1.5 million tons more compared to the 90s. Forest areas used for production has been decreasing between 1990 and 2010 (12,9%), while the city gained 17ha (2000-2020) of tree cover region-wide (9.2% of all tree cover gained in Noord-Holland).

At city level, due to its fastest population growth rate among major Dutch cities (an average of 11.000 inhabitants/year) Amsterdam's City Government wants to build 52,500 houses by the end of 2025 (an average of 7,500 per year), including social housing corporations, medium-priced rental properties and affordable homes and rooms for students/young people. According to Amsterdam's Housing Development Plan (2018-2025), there are enough plans and building land to meet this number with no new locations needed.

Amsterdam's Circular Strategy (2020-2025) aims to significantly reduce the use of new raw materials, contributing to the sustainable development of the city, that why within this period the city will map out various material flows, from entry to processing, in order to preserve valuable raw materials.

Adopted in the same year, Amsterdam Green Infrastructure Vision 2050 wants to create a green city with green policy goals, that is liveable and attractive, through 4 principles: ensure the city has

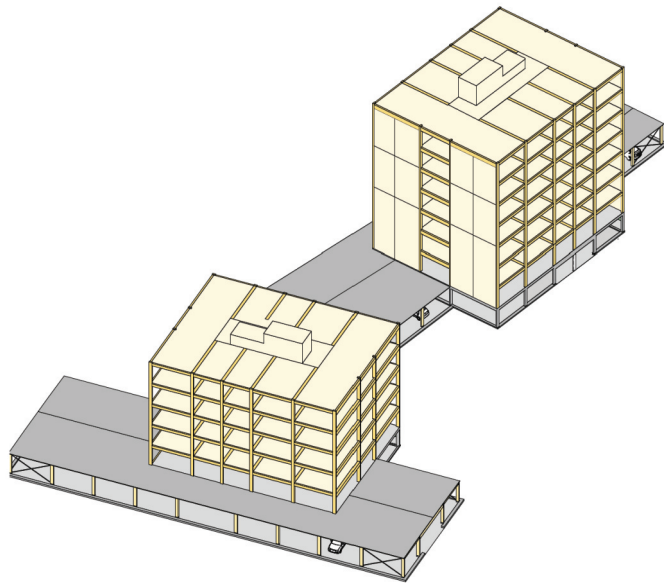
enough and diverse green spaces for everyone, making these green infrastructure multifunctional, biodiversity integrated into urban planning, construction, and management, and working together on green spaces.

On May 25th, Amsterdam Agreement 2022-2026 has been brought to light, focusing on creating an inclusive city with opportunities for everyone, a more sustainable, green and safe environment with responsible growth, addressing four key policy themes (city in balance, sustainability and energy, traffic and transport, and lastly, green space).

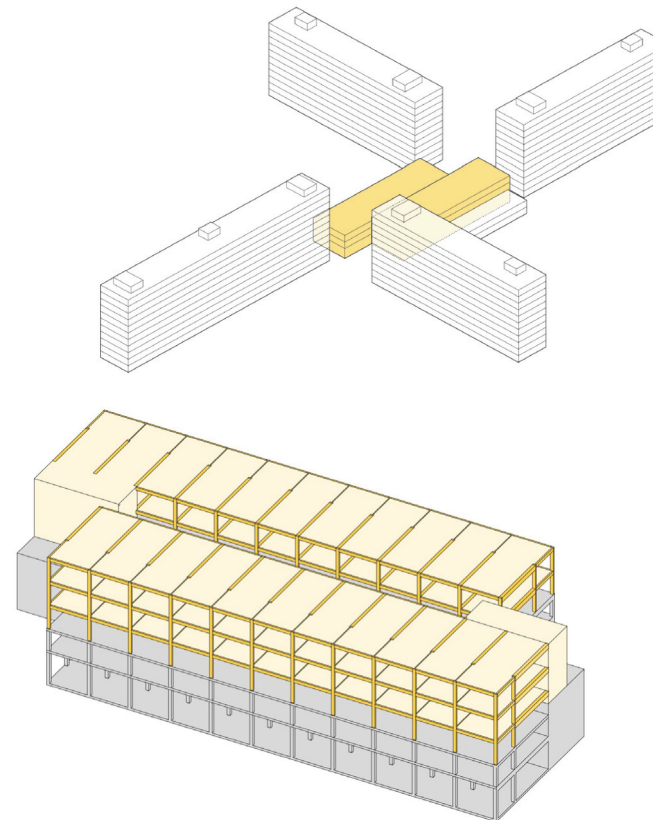
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Participatory approach

Schagen - Muggenbrug Zuid



Molenwijk, Amsterdam



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What are other cities doing ?



Two pilot projects were developed by Waugh Thistleton Architects for the MRA proving a mechanism - holistic system approach - examples, and a narrative that could be used for most of the strategies developed through Green Deal Timber Construction (Houtbouw).

- A residential development in Schagen - Muggenbrug Zuid: the brief was for a series of five to eight storey, affordable housing blocks which should be designed from scratch so that both structural and façade systems could be optimized throughout the design process. This, at the same time, allowed the opportunity to undertake a comparison with equivalent concrete schemes;
 - A renovation and extension development in Molenwijk, Amsterdam: the brief called for a 2 to 3 storey mixed use timber extension over an existing carpark.
- Multiple options for both schemes were provided, focusing on how to:
- maximise an efficient use of timber;
 - adapt the Build-in-Wood system to coordinate with car park structures standard;
 - provide outline information about the economic sustainability of timber-based building systems;
 - reach data driven decisions based on early stage LCA studies and demountability/end of life considerations;

WORKSHOP 1

Provide support to the Green Deal Timber Construction (Houtbouw) programme of the region, experience exchange and best practices, scenarios and pilot development

- ambition/target and how to deliver it (i.e locations)
- addressing potential additional cost
- carbon accounting (i.e carbon tax to stimulate wood buildings)
- monitor health and well-being effects related to wood buildings
- arguments to motivate developers to build in wood
- communication strategies to influence the (critical) opinion of the public and the potential renters and buyers
- incorporate circularity principles in building in wood
- life cycle costs of building in wood (i.e. including process benefits, carbon tax, health effects, value development, etc)
- building requirements correlation

LESSONS LEARNED AND RECOMMENDATIONS

Lessons Learned and Recommendations

Conclusions

21 out of the 33 policies reviewed and included in this catalogue are European (particularly Northern European), with the rest North American (7), Oceanian (4) and Asian (2). While the oldest policies date to the 1990s (“Wood Works!”, Canada, 1998; “Building of Tomorrow”, Austria, 1999), they have been predominantly of an informative and research & development nature.

Front-runners in developing regulatory and legislative policies, i.e. criteria have explicitly been introduced only in the mid-2000s, with pioneers such as Japan (The Act for Promotion of Use of Wood for Public Buildings, Law no. 36/2010) and Sweden (“Mer trä i byggandet / More Wood in Construction”, 2004) and front-running cities Vaxjö, Sweden (Construction Strategy, 2005), Zurich, Switzerland (“the 2,000-Watt Society project, 2005) and Trondheim, Norway (TREbyen, 2004).

More recently, Wood Encouragement Policies (WEPs) and new explicit regulations have been increasingly shaping the direction of planning, new urban development as well as regeneration: France prepared legislation mandating that all new public buildings must be made at least 50% from wood or other sustainable materials from 2022, Denmark will introduce CO₂ ceilings for building materials from 2023, while cities such as Helsinki in Finland introduced Carbon Footprint Criteria of their own.

In the case of the Metropolitan Region of Amsterdam the “Green Deal Timber Construction” (2021) represents a new historical accord of 32 municipalities mandating at least 20% of the planned MRA housing production annually to be constructed in wood or other bio-based materials, from 2025 (AMS Institute, 2021).

These policies will produce significant impacts ranging beyond the form and function of the built environment, changing to the local economy and job market and challenging the status quo with respect to site planning, masterplanning and normative regulations.

12 out of 33 policies reviewed are indirectly supporting wood constructions development within their narrative, mainly highlighting in their wider scope one of the following:

- Low embodied energy and construction materials or environmental friendly and renewable materials use;
- Low carbon procurement requirements/criteria for GHG emissions from construction materials;
- Energy use in existing and new buildings;
- Fossil-free buildings and construction activities;
- Climate-friendly and energy-efficient construction, operation, and renovation of buildings;
- Green and energy-efficient building sector;
- Improve timber construction supply chain;
- Support the development of the workforce in the forestry and wood processing sector;
- Climate requirements for new buildings (LCA calculations).

Conversely, policies that offer explicit support of wood (21 documented policies) wider adoption were framed under one of the below directions:

- Use of wood-based solutions through education, training and support;
- Use of wood for a wide range of products from sustainable harvesting of local forests;
- Increase the amount/use of wood in construction;
- Raise awareness of sustainable materials (incl. Wood);
- Targets for new buildings using wood-frames;
- Targets for the future building stock to be made in wood/other biobased materials;
- Targets for new wood-based constructions, new buildings that include climate-impact assessments, preferred smaller carbon footprint in load-bearing structure for building permits;
- Showcasing how wood products could be used in sustainable ways;
- Promote the use of wood in taller buildings;
- Increase production of forests and quality wood;
- Stimulate economic growth in the timber and wood products industry;
- Raise motivation for more stakeholders to choose to build in wood;
- Facilitate and encourage the use of wood for all projects and mandate the use for council's projects;
- Financial incentives for new buildings using wood/renewable resources;
- Encourage the use of wood in the council's buildings and infrastructure;
- Develop model projects in wood (new, renovation, public space);
- Building high-rise wood-based pilot projects;

The documented **national-level policies** (8 explicit, 6 implicit) were initiated usually by the government (government-controlled agency), sectoral ministries (e.g. environment, energy, agriculture), or national councils. Not as common, but they could be also initiated by a research institute, a collaborative arrangement between counties; research institutes and market entities, or industry organizations and government agencies.

On the other side, **regional policies** were initiated mainly by the County authorities (councils, government) but also by coalitions of regional authorities (MRA case), coalitions of labor and environmental groups/ universities, and knowledge and innovation groups. There are several cases in which the policy was initiated by the Ministry (Policy for the use of Wood in construction, Quebec; WEP Tasmania;)

Many regional-level policies have an integrative and extensive approach in terms of the types of instruments applied, tackling besides the informative/awareness-raising component the research and development one, in order to provide the necessary scientific evidence to build further (e.g. develop design guides for net zero whole life carbon, building performance guidelines).

The **local policies documented** (6 explicit, 3 implicit) were developed to respond to different challenges such as: finding new ways to mitigate climate change through procurement; decreasing Co2 emissions from energy use; decreasing GHG emissions from the building and construction activities, and promoting and use low-emission substitute for materials that require larger amounts of fossil fuels to be produced;

Moreover, they were usually initiated by the City Council or a City Council-led organization, which could play on one side the **(1) model role**, by encouraging the use of wood for all projects, while requiring/testing wood first in municipal projects (Rotorua District), on the other side it could represent a **(2) facilitator** encouraging contractors to include wood options in their designs, engaging and supporting local forestry and the building industry professionals or a **(3) contractor**, operating through land allocation programs (Växjö).

There were 2 cases (Freiburg, Zurich) where policies were initiated by high-level entities such as the ministry or state (federal institute), in which the initiator played a **(4) direct financial supporter** and **(5) promoter**.



Model



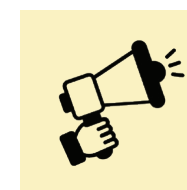
Facilitator



Contractor



Financial supporter



Promoter

Potential roles of the municipality in the development and implementation of a pro-wood policy

Despite many policies operating in an integrative way in terms of the typology of instruments applied to achieve their objectives, each of them has a primary implementation vector in their nature: 10 policies are driven by a regulatory and legislative instrument, 9 policies by an informative instrument, 8 policies by a research and development instrument and 6 policies by a financial one.



POLICIES DRIVEN BY LEGISLATIVE AND REGULATORY INSTRUMENTS

• Wood Resource Policy 2030 and Wood Action Plan (WAP) 2021-2025, Switzerland

Clear performance targets and indicators to be achieved by 2030:

- Increase the demand for wood products used for materials by 30%;
- Increase the use of Swiss wood in Switzerland's total final consumption of wood as material from around 35% (2012) to 40% (2030), based on 4.0 million m³;
- Exploit the potential for energy wood use of around 6 million m³ or 16 TWh final energy annually;

• Zurich's path to sustainable energy use (2011) and Roadmap (2016), Switzerland

Achieve a sustained primary energy use of 2,000 watts per person and emissions of no more than one tonne of CO₂ equivalent per person per year by 2050;

• Green Deal Timber Construction, Netherlands

At least 20% of the planned MRA housing production annually from 2025 to be made from wood or other biobased materials;

• Voluntary Sustainability Class for Construction (FBK), Denmark

Set requirements for new buildings after 2023:

- LCAs calculations for all new buildings;
- for buildings exceeding 1000 sqm-must adhere to a threshold of 12 kg CO₂ equivalent per square meter/year;
- 2027 to 2029, further revisions and limitations will be implemented, aiming for CO₂ emissions to reach 9 kg CO₂-eq/m²/year and eventually 7.5 CO₂-eq/m²/year by 2029;

• Växjö Europe's First Modern Wooden City, Sweden:

- Until 2020, 50 % of all new construction will be wood-based;
- From 2020, 50% of all new construction will be wood-based and should include a climate impact statement;
- From 2022, buildings with the smallest carbon footprint of the load-bearing structure are preferred for building permits;
- From 2025, priority shall be given to new construction with the least climate impact from the whole construction (by using LCA/EPD, or similar);

• Low Embodied Carbon and Energy Procurement Policy, US

Impose minimal standards for energy efficiency, materials, recycling for federal buildings:

- All projects require EPDs for 75% of materials used & to demonstrate that their emissions fall in the best-performing 80 % of GWP among functionally equivalent products;
- Larger projects require a building design which should result in a 20% carbon reduction, compared to a baseline building (WLCAs for project's structure and enclosure);

• Buy Clean California Act (BCCA), US

Requires agencies to set GWP limits and submit EPDs for certain materials used for state-building projects;

• CLEAN Future Act, Canada

Include several provisions: „zero energy ready” buildings after 2030, codes that seek to achieve a 50% reduction in energy consumption for new buildings by 2029 compared to those built under the current codes, Buy Clean Program, etc;

• The Act for Promotion of Use of Wood for Public Buildings, Japan

Mandates national and local governments to prioritize the use of wood materials in public buildings with three stories or less;

• Wood First Policy, New Zealand

Encourage the use of wood as a sustainable building material for all projects within the district, while requiring wood to be used in council projects;



POLICIES DRIVEN BY INFORMATIVE/AWARENESS RAISING INSTRUMENTS

- Wood Works!, Canada

Provide training, networking, direct technical support, facilitate collaboration with research and education institutions, organize workshops;

- Woodbox Travelling Outreach, Austria

Provide information about the importance of incorporating sustainable construction materials through exhibitions worldwide;

- Policy for the use of wood in construction, Canada
Training and technical support

- Improving the training given to future construction professionals and technologists;
- Expanding the supply of continuous training to reach a varied client base;
- Diversifying the supply of technical support and tools;

- Bosques Asociados: Buenos Aires program, Argentina

Showcase how wood and wood-related products can be used in a sustainable way;

- Students to explore ideas on how to connect best the needs of metropolitan Buenos Aires with the conservation needs of tropical forests in Argentina;

- Wood Encouragement Policy, Tasmania, Australia
Encourages the use of wood and wood products as a preferred material in building and construction procurement solutions, where feasible;

- Skellefteå City of Wood Strategy, Sweden

Raise the motivation for more people to choose to build in wood

- Identifies and details 41 projects that were built in wood in the city with different architectural programs;

- Wood Encouragement Policy, East Fremantle, Australia

Encourage and facilitate the use of wood in the construction and fit-out, recognise all of the benefits that make wood a smart choice, promote locally produced wood products where possible;

- Climate Strategy for Oslo towards 2030, Norway
Strengthen cooperation with industry to promote zero-emission buildings and construction projects. Call on the government to introduce stronger policy instruments and opportunities to set requirements for zero-emission construction activities;

- Wood City (Trästad) Program, Sweden
Research and pilot projects to enhance sector knowledge;

- Monitor wood construction projects, present findings at seminars and workshops, foster collaboration with educational and research institutions, and facilitate the growth of supplier groups in the wood construction sector



POLICIES DRIVEN BY RESEARCH AND DEVELOPMENT INSTRUMENTS

- National Green Technology Policy (NGTP), Malaysia
Support the development that meets the current and future needs of the forestry and wood processing sector;
- Building of Tomorrow Program, Austria
Develop marketable building components and concepts for residential, office, and commercial buildings (both new and renovation) to further use them in demonstration buildings;
- National Forest Program, Sweden
Sustainable forest management, multi-faceted use of forests for more jobs, innovation, and world-class processed forest materials, expansion of knowledge base for sustainable management and conservation of forests;
- Landscape as Carbon Sinks project, Scotland
Understand and communicate the forest and wood-based industries' contributions to Scotland's economy;
Investigate potential interventions to be made in order to accelerate the land sector's contribution to net zero GHG emissions;

- Carbon Footprint Criteria, Helsinki
Investigate how the calculation of the carbon footprint can be applied in different procurement groups;
What kind of criteria could be developed for the carbon footprinting - for successful examples and applicable tools;
- TREbyen Trondheim project, Norway
Realize a wide range of different model projects characterized by high quality, proper use of wood with a focus on environmental aspects and good craftsmanship and professional understanding;
- Bio-Economy Strategy for the Inland Region, Norway
Develop Norwegian Wood Cluster, an expert program for increasing the use of wood, Norwegian Forest Seed Center, demand LCAs in public buildings, a processing center for forest plants, long-term investments in forest management;
- Forestry and Wood Processing Workforce Action Plan, New Zealand
Investment in the development of the workforce to stimulate innovation and growth of new timber-derived products;



POLICIES DRIVEN BY FINANCIAL INSTRUMENTS

- Ontario Mass Timber Program, Canada
Funding for research and development of innovative wood products, for pilot building projects that support further changes in building code and provide transferable knowledge;
 - Funding post-secondary education institutions to provide skills development and technical training;
- GCWood program, Canada
Funds for demo projects and activities that increase the use of wood, encourage research that addresses the gap of technical information needed to facilitate revisions to the National Building Code;
 - Provide a non-repayable contribution of up to 100% of a project's eligible incremental costs;

- Wood Construction Support Programme, Freiburg
Promotes the construction of new buildings with wood and renewable resources through financial incentives;
 - Limited to 1.00 €/kg of natural carbon-storing materials or 1.20 €/kg of renewable construction material that is regionally sourced;
- Home-Grown Homes Project, UK
Foresees to build 250 new residential homes over a period of 4 years, using national and regional-grown timber to boost local supply chains and the rural economy of Wales;
- High-rise wood-based building initiative „ADIVBOIS“, France
Demonstrative wood projects receive financial support from Wood Industries Plan (government initiative) for upstream studies, research, and expertise to assess and secure their development;
- Wood Building Programme, Finland
National governments funds for the program, government subsidies for municipally funded wood construction projects;
Grants and support schemes for research and development projects;

US AND CANADA

As we saw, **constant revision in national construction regulation** (i.e National Building Code), can trigger the adoption of regional/local level policies that encourage wood at a wider territorial scale (i.e Canada), can grow the popularity over time of multi-storey wood buildings, together with the number of storeys that are allowed to be built.

Still, the **risk of the market being slow in adapting to continuous changes** (adopting novel technologies and tools) is high if the approval process of wood constructions is not optimized (i.e speed up the process for ancillary requests), if guidance and assistance will not be provided to relevant entities in the construction sector and if the timber costs are not revised accordingly.

At the same time, local, regional, and national policies can support and **speed up wood-related changes** in the building codes, standards, and regulations, by providing:

- **funding for: research and development of innovative wood products that are up to date, for developing skills and technical training (i.e Ontario Mass Timber Program) and demo projects (GCWood);**
- **recommendations/explanatory technical fact sheets related to timber construction (e.g Policy for the Use of Wood in Construction, Quebec).**

Besides the major role that the forestry sector play's in its economy and its historical experience of pro-wood policies implementation;

Canada's success towards wider adoption of wood constructions stems in many aspects:

- **a generally mixed approach of policy instruments applied (soft and hard);**
- **constant governmental and federal entities active involvement - not just as promoters but also through financial support and support in reducing costs and regulatory barriers correlated with a robust network of suppliers;**
- **experienced engineers and architects in the field and market-specific drivers for boosting cost-competitiveness.**

Although both Canada and US have many exemplary tall wood buildings, the policy situation is very different between these 2 countries together with their mode of operation towards decreasing GHG emissions.

Since 1998 Canada has been at the forefront of adopting pro-wood policies (Wood Works 1998, Wood First Act 2009, etc.) while the US currently has no explicitly wood support policy (several bills have been drafted to promote wood products in Oregon, Maine, and other states, but with no legislation passed).

However, being the largest purchaser in the world, over the past years policies that had a greater impact mitigating embodied carbon mainly acted at the procurements level, mostly in public projects (most significant contribution to embodied carbon) and more recently for the private sector (San Francisco Bay Area 2019).

The country set procurement recommendations and requirements, imposed standards for energy efficiency, materials, and recycling, and released comprehensive legislation to address the climate crisis and empower states toward the clean economy path (CLEAN Future Act).

These policies operate through tools such as Environmental Product Declarations (EPDs) developed according to Product Category Rules (PCRs), which have to meet specific Global-Warming Potential (GWP) thresholds and Life Cycle Assessment (LCA) methods.

Under the CLEAN Future Act umbrella, Buy Clean California Act Program (2017) has had a significant and influential effect on the US subsequent initiatives at federal, state, and local levels, being now a widespread practice, triggering its application also for the private sector.

US experience has also shown the importance of:

- **offering financial support for public entities, local communities, and the private sector by establishing a national climate bank, energy savings or output cut pollution programs;**
- **collecting extensive feedback from experts along the process of policy definition and implement stakeholder engagement activities;**
- **securing sufficient administrative capacity in implementing the policy.**



- Take into consideration from the beginning the future **adaptability of using wood** in different architectural programs (i.e housing, commercial) not just in public buildings, despite this being the kick-start, due to their different functional/structural necessities;
- Set a **specific threshold for using wood for economic activities** (products, buildings), to ensure the sustainability of natural resources and minimum environmental impact;
- Ensure **correlation and integration of the proposed pro-wood policy** on three levels:
 - **align with different pro-wood, procurement, and forest-related policies/initiatives that are being implemented at different territorial levels;**
 - **between policy instruments typologies (soft and hard/ informative, research and development, economic, regulatory);**
 - **with national standards and requirements for wood products and their origin;**
- When setting a procurement material-specific policy, **consider initially widely used materials** and those with the highest level embodied carbon as eligible materials and **revise regularly the maximum acceptable GWP** for each category of eligible material, in connection with industry improvements over time;

Recommendations

- To **ensure guidance for relevant stakeholders** in the construction field on how to use and incorporate wood in construction: develop detailed toolkits (e.g how to apply the policy requirements, design solutions, technical assistance and support), provide access to an advisory group/steering committee, form a task force around wood, provide training;
- Introduce through the pro-wood policy **complementary actions** that could work in synergy with the proposed policy development directions to support revisions of building codes, standards, and norms (GCWood);
- To facilitate the continuous improvement in the operation/implementation of the policy its important that **relevant stakeholders from the field are encouraged to report continuously impediments or lack of technical data or supply;**

Recommendations



- Critical starting points/favorable conditions for the success of policy implementation and its sustainability in time:

- **availability of the forest resources and wood processing facilities near the city/region, keeping the entire process as close as possible** (e.g 40% of the NZ wood is harvested within 100km radius of Rotorua, the NZ's forestry focal point; the forest resources and the sawmill are at 50km close to the city-Skellefteå)
 - **building on the existing tradition/history and gained knowledge in using wood materials** (e.g Trondheim, Skellefteå, Tasmania);
 - **openness of local authorities as well as general population opinion on wood as a construction material (France);**
 - **general orientation of city /region towards research and innovation;**
- Building an identity around constructing in wood and **sharing completed best practices** could increase attractiveness in time, the city being recognized as an innovator and a place of knowledge, providing the basis to drive forward the technological development in the field;
- When working with a land allocation program, **establish the benefits and requirements for the wood development from the beginning of the collaboration**, while keeping the entire process clear and simple for the developers;

While **research-oriented pilot projects** represent a great tool within a policy for bringing forward innovation and sustainability in the construction sector, municipalities should consider several aspects:

- Establish **precise performance targets/quality criteria and clear milestones** to be achieved together with a **specific monitoring framework centered around the indicators** to support future evaluation studies and knowledge transfer (incl. potential change in a building code);
- Establish **categories of projects**, correlated with the local needs, for flexibility (e.g renovation, new buildings/ urban space, private, public buildings)
- Provide an **advisory team** that can give assistance for implementation, monitor the process, ensure communication and visibility of the projects, and support funded projects in getting easy access to various support schemes from other key players;
- Identify a **financing model that includes different funding sources**, while promoting public-private partnerships. In case of a regional, or national authority, support other municipalities to close agreements with the private actors (builders, start-ups etc) and **identify and improve business cases in the wood value chain;**

NORTHERN EUROPE

Making wood a first material choice came as a natural option for nordic European cities, which showed how a strong commitment towards research and innovation could lead to the implementation of best practice pilot projects and entire wood-based areas developments for both public and private use.

Among their operation tools could be mentioned:

- **Flexible collaboration mechanisms/arrangements between the municipality and other stakeholders (e.g public-private partnerships, quadruple helix approach);**
- **Research partnerships included as a prerequisite for an agreement between the municipality and developers;**
- **Working with land allocation policy programs and contests with requirements for using wood;**
- **Adopt the contractor role and actively find opportunities for purchase-sale/purchase-lease municipal land for wood-building solutions;**
- **Introduce recommendations within relevant procedures for acquiring building permits (e.g stipulate that wood-based construction solutions shall always be tested at the beginning of a project) or introduce the policy as a reference and basis for the design of new constructions;**
- **Conduct an early dialogue with interested builders, architects, developers, and researchers to develop wood construction projects.**

Finland acknowledged many years ago that **public procurement of wood-based products can be used for supporting the placement of environmentally friendly solutions on the market** and the importance of establishing procurement guidelines for public building projects, electronic contracting tools, and testing measurement and assessment tools to establish the carbon storage and carbon footprint in wood building projects.

Furthermore, Finland (Finnish National Public Procurement Policy for Wood-Based Products, 2010) emphasizes various essential aspects to promote the advancement of sustainable public procurement. These include:

- **establishing a proficient network of expertise and support;**
- **crafting tools to aid contracting entities in sustainable operations, enhancing knowledge about sustainable procurement;**
- **making pertinent and effective information accessible to contracting entities, securing proper funding and support;**
- **enhancing collaboration and communication of exemplary approaches, and introducing nationally standardized operational frameworks to facilitate the tendering process.**

Northern cities such as Helsinki and Växjö showed that **sustainable public procurement its a viable tool** through which municipalities can operate in different ways for making wood-building best practices.

Setting climate and environmental criteria in the procurement process its still a feasible kick-start option to ensure the sustainable development of the construction sector and further replication of best practices.

However, its important that:

- **enough wood construction companies are available within the city/region that could apply (wood market analysis upfront);**
- **sufficient consideration is given to the climate and environmental standards within the procurement brief in order to have a real impact (at least 20% based on results from other cities in Finland);**
- **monitor the carbon footprint also during the construction process (a bonus-sanction model can be applied).**

Through FKB, Denmark acknowledges that **municipalities are critical actors in monitoring and uptaking procurement in wood construction**, while Wood City (Trästad) Program also promoted wood construction through strategic and practical assistance such as in planning and public procurement.

CENTRAL AND WESTERN EUROPE

In Central Europe, even though implicit policies were adopted for many years in cities (i.e Zurich's path to sustainable energy use 2005), seems like not much advancement was achieved for specific pro-wood policies at the regional and city levels, but important steps were made at national level in Austria and more recently in France.

Mobile wood exhibitions such as Wood Box Travelling Outreach (Austria-international scaled), and Building with Timber-Paths into the Future (Munich, Vienna) had a great impact over the years in raising awareness and disseminating information about wood construction.

The Austrian-led initiative was not just proof of **successful international collaboration between the wood industry and government agencies where costs can be shared**, but also an open door to monitor and assess the impact within the population from various cities across EU. The Building of Tomorrow Programme was an implicit policy oriented towards research and technology to support environmentally friendly and renewable materials in construction, it led to several best practice demo timber buildings across Austria.

Through ADIVBOIS, France is among the frontrunners applying one approach to make mid-rise buildings (3-4 storeys) the majority in developed cities' residential markets leading to rapid adoption and improved building performance by building first tall buildings (30+ storeys) and mid and high-rise family buildings (10-15 storeys). This approach will showcase wood construction capabilities, influence regulations, and serve as architectural reference for Europe. Moreover, the 2022 law its expected to bring France forward in achieving their climate neutral objectives by mandating that 50% of the public construction projects to contain wood or other bio-based materials, an initiative in line with the Sustainable City Plan (2009).

Even though the situation seems to be similar to Central Europe in terms of advancing pro-wood policies, in Western Europe planning in this direction seems to happen more from the regional level.

The Metropolitan Region of Amsterdam, recently took great legislative steps towards a sustainable construction sector by imposing the 20% timber target, investing in mutual support of the parties and municipalities involved, locations, production and assembly capacity, improving business cases and stimulating regulations.



On the other hand, UK's effort focused indirectly on wood: towards land sector contribution in decreasing GHG emissions and scaling up wood fiber in construction (Landscapes as Carbon Sinks Project 2009-2035) and boosting local supply chain and bringing benefits to the rural economy (Home-Grown Homes Project 2018-2020).

Addressing housing affordability and the provision of social housing stand out as significant challenges in the UK's construction sector. The Home-Grown Homes Project tackled these challenges by envisioning 250 new residential homes over a span of 4 years, using national and regional-grown timber.

Recommendations

- To identify and qualify potential land to accommodate future wooden buildings a **call for expression of interest** could be launched for both public and private actors;
- To showcase wood construction capabilities, influence regulations and make mid-rise wood buildings a widespread and rapid construction option „**Start big**” and **inverse the path by building tall buildings and high-rise wood demo projects first**. This will improve performance, increase the city's attractiveness, serve as an architectural reference across the globe;
- While financial support will ensure a higher and wider interest in implementing policy stipulations, **including carbon taxes for overtakings** could provide a balanced and sustainable approach; In the same time **financial funds for implementing a policy could originate from the CO2 tax** (i.e Zurich)

Recommendations



- Increase the **quality of wood products also for domestic use** (i.e include a quality marking rule) to grow attractiveness and use for local wood construction sector purposes;
- To ensure forest resources sustainability in the process of expanding the wood construction sector require **improvement plans from the timber manufacture industries**; In addition eligible material manufacturers could benefit from government loans;
- For a well-aligned policy deployment, establish concrete **responsibilities for each stakeholder**: national, regional and local authorities, enterprises and citizens and keep an active collaboration with other territorial-level authorities while providing guidance applicable to their different local socio-economic contexts;
- Establish **platforms for collaboration** between government bodies, industry, academia, and communities to drive coordinated efforts;
- Invest in education and training programs to develop a **skilled workforce and create awareness** about wood construction's potential;
- Establish **reduced fees** for utilizing national research institutes for wood-related research.

OCEANIA

Owning an important forestry sector could come with several challenges in terms of finding proper ways to valorize it for the economic benefit of cities and regions of the respective country.

Examples in this direction are the regions from Oceania (Australia, Tasmania, New Zealand), where Wood First Policies or Wood Encouragement Policies were developed mainly to address the challenge of exporting raw wood resources due to a locally undeveloped processing industry, by focusing on boosting economic growth in the area of timber and wood products, recognizing its importance and increase employment and forestry and wood processing workforce.

In Australia, adopting wood encouragement policies escalated quickly, since 2014 local authorities formally established WEPs, while Tasmania was the first state in Australia to adopt a state-wide policy. However, the Australian WEPs don't mandate the use of wood but instead, they acknowledge its benefits in construction while encouraging responsibly sourced wood where feasible. In parallel, the Australian National Construction Code (NCC) with subsequent updates (2016, 2019) allows now designers, developers, and builders to go up to 25 meters (8 storeys) for all classes of buildings (incl. schools, retail, hospital).

Having the „inform and encourage” prevalent character, usually the WEPs don't have any related financial instruments or budgets to facilitate implementation and uptake, but instead are focused to have an **impact on specific target groups**:

- **Encourage contractors to include wood options in their proposals to their Council;**
- **Encourage relevant professionals to use new, innovative wood design, products and/ or materials,**
- **Encourage architects and designers to be familiar with the policy and meet its requirements in their design briefs, as well as identify suitable wood products and options;**
- **Build proficiency in using wood through training, networking and direct technical support.**

Compared to Europe, where legislative rules generally stipulate a minimum requirement for legally sourced wood and occasionally extend to sustainable wood as well, Oceanian WEPs ensure that 2 important elements are taken into account:

- **The origin of the wood:** wood products have to meet Australian Standards, Program for the Endorsement of Forest Certification and/or Forest Stewardship Council certifications; Buy Local Policy, sustainable /responsibly sourced wood and wood products, locally produced wood products; verified sustainably sourced timber and wood products

- **The feasibility of using wood:** using wood only when it is the right material for the selected application, where deemed appropriate or feasible (e.g cost benefits, quality and functionality), where there are no technical or performance reasons for not considering wood.

However, similar to many European cities and regions, New Zealand recognize the opportunity that **public land represents for requiring wood-based projects** and for an in-depth assessment and understanding of these projects, as a basis to incorporate wood in future private projects;

From Europe, two examples can be mentioned that stipulate requirements for the provenience of wood:

- Finland, highlights through the Finnish National Public Procurement Policy for Wood-Based Products 2010, several verification requirements for legally harvested wood, sustainably produced wood such as: forest certifications schemes (PEFC, FSC), management systems (quality and environmental systems such as EMAS, ISO 9001 and 14001), eco-labels that include wood raw material sustainability criteria;
- Germany, Freiburg: where the wood-oriented policy (Wood Construction Support Programme) requires the wood to be sourced locally (maximum of 400 km) and sustainably (certificate of FSC, PEFC, Naturland, or comparable certificate).

ASIA

With a long-standing tradition of building in wood , being among top commonly used materials, Japan is one of the front-runners in mandating wood.

As we saw, successful policies are adaptable and evolve to address changing market dynamics, technological advancements, and industry needs.

Japan enacted in 2010 one policy to prioritize wood in public buildings while safeguarding forest survival in the process, applied for different territorial levels (national, prefectural, and local), **where the high-level authorities have the responsibility to provide guidance to local governments and each territorial-level policy should be adapted for alignment with the others.**

Along to national, regional and local authorities, enterprises and citizens, the industry was involved directly as it was obligated in creating Timber Manufacture Improvement Plan that directed their resources and outlined the industry's goals in the mid-term.

While it require wood in public buildings it also encourage wood for other purposes, including housing through soft instruments such as: information, organizing exhibitions, and fostering demand

Tangentially, Malaysia under its NGTP underline growth of construction of green and energy efficient buildings sector, especially through the use of wood and wood products, to be further assessed under Green Building Index (GBI).

Guiding criteria for municipalities

FAVOURABLE PRECONDITIONS

- availability of forest resources
- wood processing industry (as close as possible)
- tradition and knowledge
- openness of local authorities and general public opinion on wood
- general orientation towards research and innovation



SUSTAINABILITY OF NATURAL RESOURCES

- specific threshold for using wood for economic activities
- origin of the wood
- locally sourced timber
- sustainable managed forests, under a certified scheme such as FSC, PEFC
- feasibility of using wood
- improvement plans for timber manufacture industries



RESOURCE OPTIMIZATION

- include directions to optimize the use of available wood resources, balancing domestic demand and potential export
- quality increase of wood products for domestic use



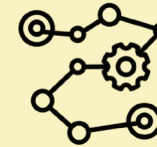
ATTRACTIVITY

- reduced fees (wood related research/projects)
- government loans, non-repayable funds, grants and financial stimuli
- career opportunities
- national climate fund



ALIGNMENT AND CORRELATION

- pro-wood/procurement/forestry policies at different territorial level
- policy instruments typologies (mixed approach)
- national standards and requirements for wood products & their origin
- building permit acquiring process
- adaptability to changing circumstances and emerging opportunities
- wood adaptability for different functional applications



LAND ALLOCATION

- benefits and requirements from the beginning of collaboration
- early dialogue with interested entities
- clear and simple process for developers
- research partnerships included as a premise of an agreement



RESEARCH-ORIENTED PILOT PROJECTS

- precise performance targets/quality criteria and clear milestones
- specific monitoring framework centred around indicators for future knowledge transfer
- categories of projects correlated with the local needs
- advisory team for assistance (monitoring, support fund attraction, communication, visibility)
- financial model with different funding sources
- identify and improve business cases



SUSTAINABLE PUBLIC PROCUREMENT

- climate and environmental criteria/carbon footprint/requirements for using wood (EPDs, LCAs)
- GWP threshold adjustment
- widely used materials & highest embodied carbon materials
- presence of wood construction companies (wood market analysis upfront)
- sufficient consideration within the brief
- proficient network of expertise and support
- tools to aid contracting entities in sustainable operations
- carbon taxes for overtakings



ENABLERS

- synergic complementary activities included in the policy - that address regulatory barriers
- research and development for up-to-date wood products/designs/solutions
- flagship projects first
- recommendations and explanatory technical fact sheets
- cost-competitiveness market-specific drivers

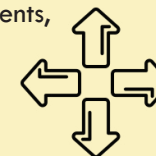
NORMATIVE SHIFT SUPPORT

- approval process of wood constructions optimized
- guidance and assistance to relevant entities
- costs revised accordingly



GUIDANCE AND ASSISTANCE

- detailed toolkits (for policy requirements, design solutions, technical assistance)
- access to an Advisory Board
- training and Networking
- direct technical support
- Local Wood Task Force



COMMUNICATION AND COLLABORATION

- flexible collaboration mechanisms (i.e public-private, quadruple helix)
- active and constant involvement of public authorities
- collaborative platforms for coordinated efforts
- sufficient administrative capacity
- extensive feedback from experts (policy definition and implementation)
- iterative stakeholder engagement activities
- relevant stakeholders to report continuously impediments or lack of data
- share completed/exemplary best-practices
- enhance and maintain international collaboration
- mutual support of parties involved and other municipalities
- responsibilities for stakeholders (authorities, industry, citizens)
- skilled workforce: training, networking, technical support
- public awareness campaigns



Working with Early Adopter Cities

TRONDHEIM

The project experience shows that overcoming stakeholder fragmentation in the construction sector can significantly accelerate the uptake of new building systems and technologies with a direct contribution to urban decarbonization and the Paris Agreement targets.

The Trondheim collaborative approach represents an **innovation policy in itself**, building on an already-advanced experience in creating regulatory and planning preconditions for multi-storey wood buildings. Through an **iterative involvement of stakeholders** for the definition of challenges and city priorities, and through the **provision of small grants and financial stimuli as an open competition** for solutions, it has so far managed to accelerate the definition of evidence-based policies and instruments for the built environment. This lean approach to urban innovation can easily be replicated in other cities.

Moreover, the flagship project TREbyen Trondheim highlights once again the importance of providing attractive benefits to contractors/professionals, for the implementation of a municipal-led wood policy and for bringing quality and innovation in the sector one step further, such as: the opportunity to increase competence and visibility, access to an advisory board of skilled professionals, the opportunity for competence grants.

TRENTO

The Early Adopter City where the **digital pilot project** had the greatest impact due to its close alignment with the municipality's current agenda towards sustainable and integrated mobility development through urban regeneration practices. Project experience showed that providing a **wood-based architectural model** can be an open door to **raise awareness among the population, the city's visibility, and an evidence base for the procurement process assigning the final design and construction works**.

The participatory process highlights once again that **developing and promoting innovative pilot initiatives**, an approach that the city is well recognized for, is still the way to advance the paradigm shift in the construction sector from „building as usual” to „building in wood” in Trento.

Additionally, greater steps are planned by the municipality for the purpose of preparing urban planning agreements, to scaled-up sustainability practices, and preparing guidelines aimed at ensuring that urban planning interventions are also taking into account urban, environmental, and ecological quality criteria such as (i.e use of materials with low environmental impact and energy efficiency measures).

However, towards this pathway, the city has to consider additional strategic steps such as: facilitating and streamlining the procedures for using wood in construction, strengthening the processing and production industry, increasing knowledge, and ensuring targeted training and consultation for relevant stakeholders in the field and lower the costs of the resources.

INNSBRUCK

With a high cluster cooperation activity compared to other Early Adopter Cities, exploring and co-developing timber construction scenarios for Tyrol was the backbone in identifying the best solution for advancing the local planning agenda, by focusing on complexity reduction, subsidies system, and increase in local capacity necessary to satisfy projected new demand.

Based on a pragmatic approach that correlates different scenarios with potential challenges/risks that could occur and policy instruments responses, the main critical components identified that will shape the timber construction industry successfully and ensure its future viability are: **the political stability and support, revised and simplified building regulations, balanced growth for the long-term sustainability of the sector and education and sustainable collaborations**.

BRASOV METROPOLITAN AREA

As we saw, not so much attention to multi-story wood buildings was given within Central European cities to advance their sustainable construction agenda. Braşov proved to be a good example showing what challenges those cities that are at the beginning of the road have to overcome towards multi-storey wood buildings adoption such as: poor collaboration between the private and public sector, lack of education and specialists in the field, lack of interest to build sustainably from the clients, lack of practical tools to put into practice EU legislative measures.

With many regional favorable conditions (i.e the presence of wood resources and relevant value chain actors, an important industry focused also on construction materials, wood processing, and a strong heritage in this direction), BMA needs to take steps in **expanding beyond the traditional methods of building in wood**. From the national level is still a strong opposition to wood-cutting activities, rigid building regulations, and encouragement the wood processing for export purposes.

Within the context of new fire safety regulation that is planned to be more restrictive, **a blended policy that correlates research, education, and awareness raising** could bring BMA forward while providing much-needed evidence to speed up the national

regulation shift and stimulate the economic growth of wood industry for the benefit of its cities and regions. The participatory approach showed that compared to Trento, where the paradigm shift from “building as usual” to “building with wood” is seen to be first supported through local initiatives (as the city already took steps in this direction) and then scaled up at macro levels, in Brasov local stakeholders perceived that there is a need of **fiscal facilities and support from the national level** to built on this direction.

COPENHAGEN

While at the beginning of the participatory approach, some of the main challenges identified were related to legislation on civil building design, national government and regulators, and carbon accounting, Denmark took greater steps advancing the Voluntary Sustainability Class for Construction (FKB) into law, introducing CO2 ceilings for building materials from 2023 and mandatory LCA's calculations for all new buildings.

While this law will support the number of wood buildings growth and the current floor limits for timber construction to raise in regard to regulation, the participatory process showed that the city is not yet prepared from an educational and market point of view (lack of knowledge, cooperation, know-how)

Throughout initial guidance was already provided from the national level (i.e webinar, annexes with LCA determination), additional support from the city level will be needed for the relevant entities in the construction field and the industry on how to comply with the new requirements and develop sufficient competence. Nonetheless, **defining a local Wood Task Force, providing training and direct technical support could smooth the market uptake, together revising timber costs accordingly.**

HARINGEY BOROUGH

Despite its new restrictive legislation in what concern the use of combustible materials in facades, the Borough's strategical planning directions within the built environment are focused towards achieving Zero Carbon Standard (Borough Plan of Haringey 2019-2023) and be a Net Zero Carbon Borough by 2041 (Haringey Climate Change Action Plan 202) with even more ambitious objectives for public buildings: achieve by 2027 net zero carbon in corporate buildings.

The digital pilot project demonstrates that using timber and find the appropriate application of the Build-in-Wood system is still possible within the current UK regulation context while addressing the challenge of net zero carbon.

The collaboration with Haringey within the Build-in-Wood project emphasizes the (1) **importance of addressing the normative limitations through concrete evidence-based research and demonstrative digital applications** and on the other hand the (2) **relevance of involving stakeholders for knowledge exchange on requirements for a retrofit first approach in embodied carbon planning policy.**

METROPOLITAN REGION OF AMSTERDAM

The participatory approach within the Metropolitan Region of Amsterdam highlights the **importance of international collaboration** for experience exchange and support, during the implementation of a specific pro-wood policy.

Moreover, it showcased that providing digital pilot projects could provide **evidence-based addressing many directions within a pro-wood policy** (e.g locations, business cases, communication, stimulatory regulations)

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* The in-depth socio-economic, planning and regulatory context analysis for each Early Adopter Cities is provided within the Build-in-Wood Community (Media Center - D7.3: Socio-economic, planning and regulatory context in Early Adopter Cities) together with the references and data resources used for the analysis.



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