



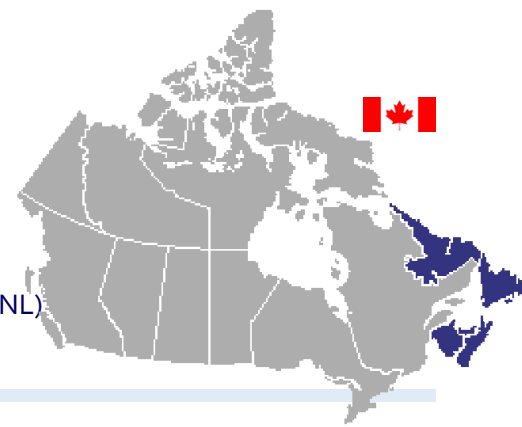
**Economic Information Observatory**  
A regional cooperation between  
**Atlantic Canada** and **Saint-Pierre and Miquelon, France**

## **Sustainable construction**



Atlantic Canada (p.1-4)

Saint-Pierre and Miquelon / France (p. 5-8)



## Green Building in Atlantic Canada

With a share of the national GDP totalling \$23.45 billion in 2014 (figures published in 2016), the **sustainable construction** industry is expanding rapidly in Canada, employing more than 297,890 people, or more than 13% of the construction sector. Against the backdrop of the country's climate, the industry has developed acknowledged expertise in sustainable construction (energy efficiency, innovative practices and materials, reduced environmental impact). Atlantic Canada is ideally positioned in this area, buoyed by the strong potential of its wood sector as well as dynamic companies, government programs and R&D. The convergence of these factors has stimulated innovation in the area of new wood products, composites, heating systems, etc. Additionally, Halifax hosted the **Green Homes Summit** of the Canada Green Building Council in 2015.

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### Economies of scale generated by green building over the last 10 years in Canada



► Energy savings of 4,230,206 eMWh, enough to heat 143,533 households for one year



► Reduction in greenhouse gases estimated at 822,731 CO<sub>2</sub>e tonnes, equivalent to taking 155,526 vehicles off the road for one year



► 8.7 billion litres in saved water, enough to fill more than 3,500 Olympic-sized pools



► Recycling of 1.1 million tonnes of waste from construction and demolition operations, the equivalent of 348,691 garbage truck loads



► Lowering of the temperature in cities associated with urban heat islands through installation of 157,309 m<sup>2</sup> of green roofs, a surface area corresponding to 104 hockey rinks

The federal government anticipates major investments in **green infrastructures, clean energy and climate-resilient infrastructure.**

### Environmental impact

Buildings are responsible for:

- **35%** of greenhouse gases
- **35%** of landfilled and other waste generated by construction and demolition activities
- **70%** of municipal water consumption
- by comparison, households are responsible for **17%** of secondary energy use in Canada

### Trends in sustainable construction

- Standardisation, labelling and regulation of practices
- Environmental impact disclosure, accountability and transparency
- Net-zero buildings, retro-commissioning and electrical and mechanical system optimization
- Community and human-centered design focused on health and well-being



### Green building in Canada

Number of jobs and revenue

(nationally in 2014)

	people	\$ billion
Professional services	29,490	2.377
Promotion, governance and policy, education and training	21,710	1.710
Materials and manufacturing	77,365	5.773
Construction and trades	164,445	13.131
Waste management and recycling	4,880	0.460
<b>Total</b>	<b>297,890</b>	<b>23.45</b>

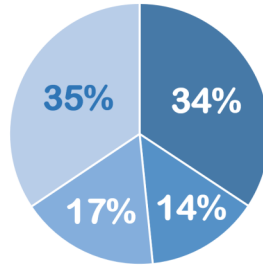
# Overview of the Construction Industry

The **construction industry** is a major driver of the national economy and a leading indicator of the vitality of the Canadian economy. The construction industry represents \$171 billion nationwide and employs more than 1.24 million people. This sector alone accounts for 40% of total energy use and consumes approximately 50% of primary resources.

Close to 35% of companies in the construction sector in Atlantic Canada estimate that 50% of their projects concern "green" construction projects.

Despite a certain deceleration, the construction sector in Canada continues to post growth in residential construction. **New housing construction in January 2016 accounted for \$3.7 billion in revenue, up 3.9% over the same month the previous year.**

**Construction sector revenue** across Canada as a whole in 2015 totalled \$119.4 billion



Residential construction	34%
Non-residential buildings	14%
Repairs	17%
Engineering and other work	35%

## Construction sector Company size (2014)\*

	micro	small	med.	large
	1-4	5-99	100-499	500+
PEI	157	84	1	
NB	610	365	6	
NS	602	430	6	
NL	567	397	3	2

## Construction GDP in Atl. Canada (in \$ millions, 2014)\*

PEI	256	4%
NB	1,241	22%
NS	1,725	30%
NL	2,553	44%

(\*data for 2014, published in 2016)

## Building construction sector in Atlantic Canada (2014)\*

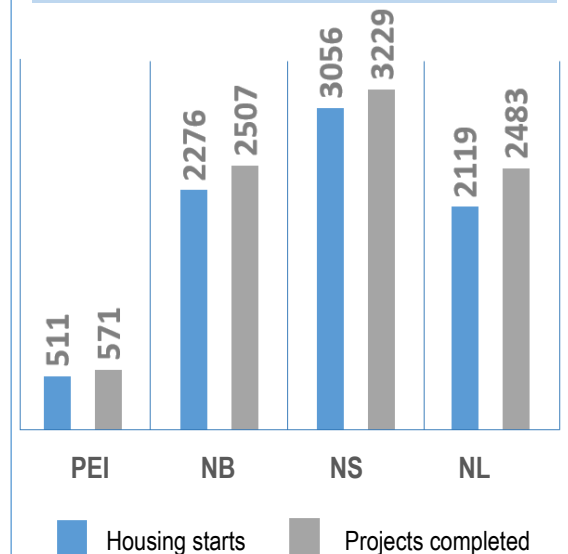
Number of establishments

	employers	non-empl./indeterm.	total
PEI	242	180	422
NB	981	866	1,847
NS	1,038	1,113	2,151
NL	969	527	1,496

(\*data for 2014, published in 2016)

## Vitality of the construction sector in Atlantic Canada

Total residential construction projects (all housing types combined) started and completed in 2014 (data published in September 2015) by province:



# Canada Green Building Council (CaGBC)

The **Canada Green Building Council (CaGBC)** is a not-for-profit, national organization that has been working since 2002 to advance green building in Canada. Together with its membership of more than 2,500 individuals and 1,600 industry organizations, the CaGBC seeks to reduce the environmental impact of the built environment by promoting green building and sustainable community planning, developing new industry norms and standards and serving as a benchmark for best practices in the sector. The CaGBC also develops new tools and strategies for education and training and undertakes support and lobbying activities targeting all three levels of government. Since its founding, it has educated more than 20,000 green professionals. The CaGBC is responsible for administering the **LEED (Leadership in Energy and Environmental Design)** rating system, which has become the mark of excellence in green building in Canada and is recognized in more than 150 countries around the world.

## The LEED standard: National statistics

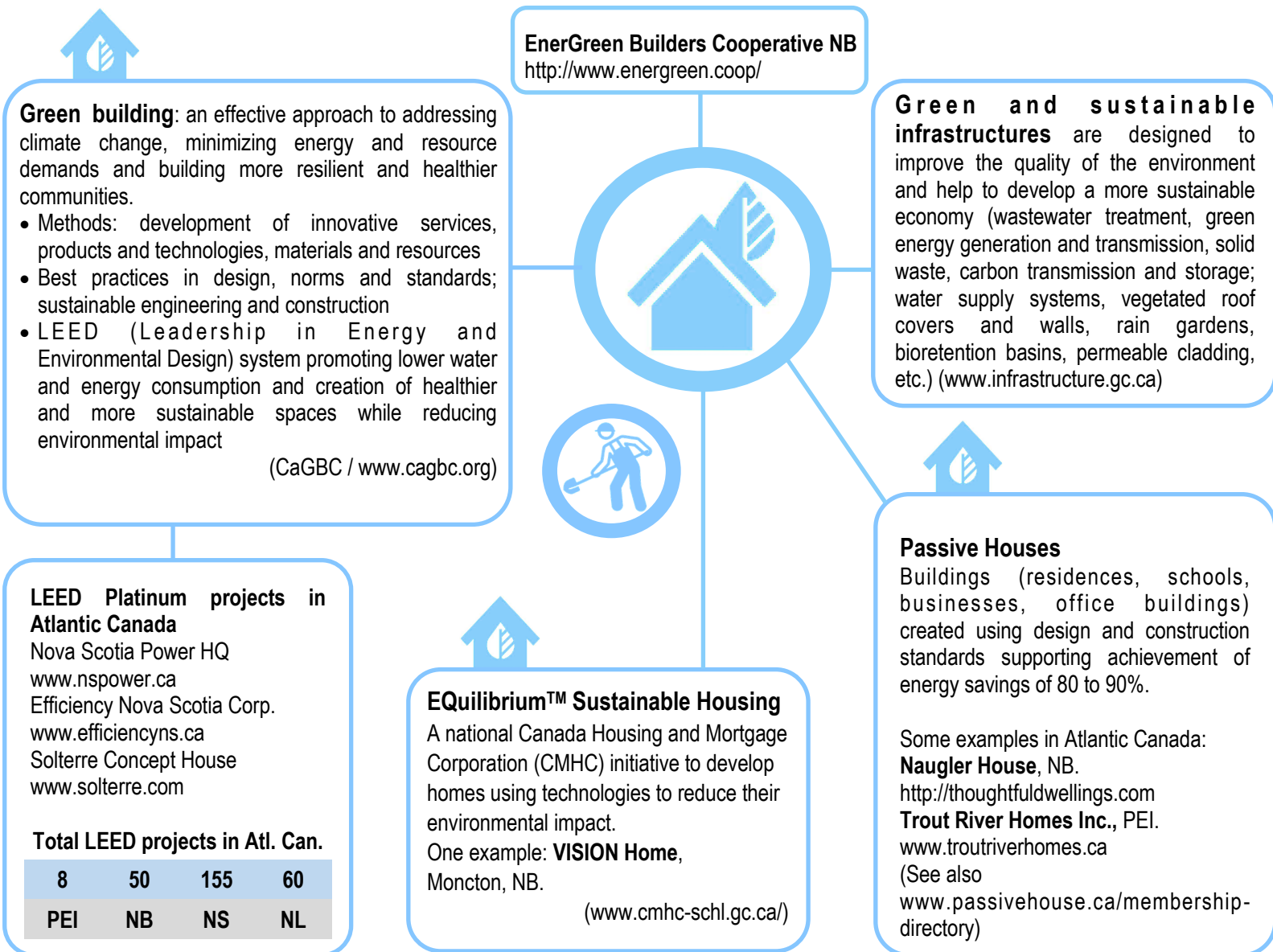
- ▶ 27 million m<sup>2</sup> of built space certified
- ▶ 2,049 LEED certifications and 3,142 registrations across Canada

## CaGBC – LEED Standard

### Estimated direct impacts of LEED construction projects in Canada over their economic lifetime


(2015)	residential	commercial	institutional	industrial
GDP (\$ billions)	1.542	13.689	9.733	0.474
Jobs	19,366	177,897	126,488	6,161

## Different Types of Sustainable Construction in Atlantic Canada



## Industry Standards Governing Green Building

The **Office of Energy Efficiency (OEE)** of Natural Resources Canada promotes and provides training and education in the area of residential construction and green building. For the past 25 years, the OEE has administered the **national R-2000 housing standard** governing technical performance, eco-energy efficiency, air sealing and environmental responsibility. The OEE implements the current **energy rating system** and the **EnerGuide Home Evaluation** (energy efficiency assessment). The OEE has overseen the **Energy Star** program for builders since 2005 (Energy Star international high-efficiency program).

- National and international standards, norms and evaluation tools currently used by the Canadian sustainable construction industry**
- BEST** (Building Environmental Standards) / **BOMA** (Building Owners and Managers Assn.)
  - BREEAM** (Building Research Establishment Environmental Assessment Methodology)
  - Built Green Canada**
  - National Energy Code of Canada for Buildings 2015** (CNEB)
  - CSA Plus 1132** (Environment Canada, ECD Energy, BREEAM)
  - Green Building Challenge/CaGBC**
  - Green Globes Design**
  - Energy Star Construction** (Natural Resources Canada)
  - ISO 14000**
  - LEED-CaGBC**
  - Passive House**
  - National Australian Building Environmental Rating System Project** (NABERS)
  - WELL Building Standard**
- 

## Energy Efficiency Programs Offered at the Provincial Level

### **PEI: Office of Energy Efficiency.** [www.gov.pe.ca/oe](http://www.gov.pe.ca/oe)

- **Home Energy Low-Income Program (HELP).** Initiative to assist low-income clients with comprehensive air-sealing of their homes.
- **Commercial Sector and Institutional Buildings Program for Energy Incentives.** Financial incentive of up to \$2,000 toward an evaluation to help retrofit existing commercial buildings to their maximum energy efficiency potential.
- **Prince Edward Island Residential Energy Efficiency Program.** Incentive program for residential property owners seeking to upgrade the energy efficiency of their properties.
- **Prince Edward Island Energy Efficiency Multi-Unit Residential Building Grant.** Grant program to assist with implementation of eligible upgrades by MURB owners who wish to upgrade the energy efficiency of their properties.

### **NB: NB Power.** [www.nbpower.com](http://www.nbpower.com)

- **Commercial Buildings Retrofit Program - Energy Smart.** Financial incentive of up to \$3,000 toward an evaluation to determine the potential for energy efficiency upgrades.
- **Low-Income Energy Savings Program.** Aid for low-income homeowners to help reduce their energy use and costs.
- **Ductless Mini-Split Heat Pump Program.** As of October 1, 2015, NB Power offers a \$500 point-of-sale rebate on ductless mini-split heat pumps for cold climates.
- **Home Insulation Energy Savings Program.** Advice on energy efficiency and incentives to help New Brunswick homeowners offset the costs of insulating and air-sealing their homes.

### **NS: Efficiency Nova Scotia.** [www.efficiencyns.ca](http://www.efficiencyns.ca)

- **Green Heat.** Rebates or low-interest financing for installation of wood or pellet stoves, heat pumps and other equipment.
- **New Home Construction.** Advice for customers building a new home and recommendations to help integrate energy-efficient principles and technologies from the start.
- **Strategic Energy Management.** Technical advice, incentives and other essential resources to assist organizations in adopting a structured and sustainable approach to energy management.
- **Home Energy Assessment.** Rebates toward home insulation and draft-proofing. Efficiency Nova Scotia covers a portion of the cost of a full evaluation of a home's energy consumption.
- **HomeWarming.** Home energy assessments and upgrades at no cost for eligible low-income customers.
- **Appliance Retirement.** Cash incentives for the pickup and proper recycling of old, energy-hungry working refrigerators, freezers and air conditioners.
- **Business Energy Rebates.** Efficiency Nova Scotia offers in-store and mail-in rebates on the purchase of energy-efficient products for commercial, institutional or non-profit use.
- **New Construction (commercial/industrial).** Efficiency Nova Scotia provides technical support and offers financial incentives to commercial and industrial customers seeking to incorporate energy-efficient technologies into new construction or major renovation projects.
- **Custom Projects.** Assistance for medium-sized and large enterprises seeking to implement energy saving projects.
- **Product Installation.** Installation at no charge to residential customers of energy-efficient products including LEDs, shower heads, electric hot water tanks and pipe wrap.
- **Small Business Energy Solutions.** Efficiency Nova Scotia assists small businesses with installation of energy-efficient products and covers up to 60 percent of the cost.
- **Your Energy Rebate.** Program designed to help Nova Scotians with the rising cost of home energy.

### **NL: Newfoundland Labrador Hydro.** [www.nlhydro.com](http://www.nlhydro.com)

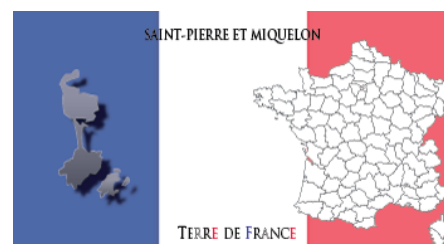
- **Residential Energy Efficiency Program.** Assistance for low-income households toward making energy-efficient retrofits to their homes.
- **Isolated System Business Efficiency Program.** Support and financial incentives for commercial customers in isolated systems.
- **takeCHARGE.** Energy efficiency awareness and rebate programs for everyone in Newfoundland and Labrador.
- **takeCHARGE business lighting program.** Assistance and rebates for businesses installing high-efficiency lighting.
- **takeCHARGE insulation rebate program.** Rebates for residents covering up to 75 percent of the cost of basement wall insulation.
- **takeCHARGE thermostat rebate program.** Rebates for residents on the purchase of an ENERGY STAR® approved programmable thermostat (\$10) or electronic thermostat (\$5).
- **takeCHARGE commercial product rebate program.** Rebates for businesses on the purchase of appliances including programmable thermostats, motion detectors, occupancy sensors, LED wall packs and high-performance shower heads.
- **takeCHARGE High-Efficiency Heat Recovery Ventilator Rebates program.** \$175 rebates for residents to offset the replacement cost of a heat recovery ventilator.
- **takeCHARGE Appliances and Electronics Rebates program.** Rebates for residents on the purchase of ENERGY STAR® approved appliances.
- **takeCHARGE Custom Solutions program.** Financial incentives for businesses to offset the cost of auditing energy consumption, conducting feasibility studies and implementing energy-efficiency upgrades.

**Information sources** —non-exhaustive list : Innovation, Science and Economic Development Canada; Statistics Canada; Natural Resources Canada; Environment and Climate Change Canada; Canada Mortgage and Housing Corporation; GNB, GNS, GPEI, GNL portals; information banks; Canada Green Building Council.

Observatoire d'information économique  
**Intell-Echo**

Bulletin d'information thématique  
 Vol. 3, no 3, mars 2016  
 ISSN 2292-518X

**Saint-Pierre  
 Miquelon  
 France métro-  
 politaine**



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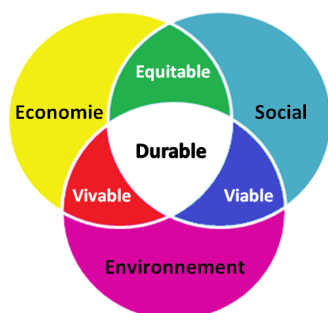
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**Who is responsible for the crea-  
 tion of the strategic plan for sus-  
 tainable development in Saint-  
 Pierre et Miquelon?**

In addition to the Territorial Col-  
 lectivity and the Prefecture, who  
 co-chair the consultation body  
 for sustainable development, the  
 steering committee includes  
 many members, such as the  
 mayors of Saint-Pierre and of Mi-  
 quelon-Langlade, parliamentari-  
 ans, the Director of Public Fi-  
 nance, the European Commis-  
 sion, the European Investment  
 Bank, CACIMA and SODEPAR.

**Do you know?**



*Sustainable construction in Saint-Pierre et Miquelon*

According to the Energy Transition Act of August 18, 2015, the overseas  
 departments overseas have to achieve energy self-sufficiency by 2030,  
 with an interim target of 50% renewable energy by 2020.

Saint-Pierre et Miquelon has therefore undertaken to develop a sus-  
 tainable construction policy. The guidelines are led by the territorial  
 council within the framework of the territory's strategic development  
 plan. The actions primarily target the reduction of energy consump-  
 tion.

The approach is focuses on four points:

- **Deploy a heating network for public buildings.**

In order to reduce the use of fossil fuels and create sustainable jobs.  
 This project, supported by ADEME, aims to reduce energy bills and CO2  
 emissions.

- **Establish an energy info-point.**

The objective is to support the territory and its stakeholders in moving  
 towards greater energy efficiency and to make Saint-Pierre et Miquel-  
 on an example in terms of energy efficiency.

- **Support the launch of local projects for the development of  
 wind energy and the enhancement of other sustainable  
 energies.**

In order to reduce the use of fossil fuels and develop renewable en-  
 ergy, the Territorial Collectivity will encourage such initiatives.

- **Initiate a multi-stakeholder plan to support training and  
 skills development in order to create a sustainable con-  
 struction sector in Saint Pierre.**

Also of note is the establishment of financial assistance for insulation  
 and a redesign of housing subsidies in order to encourage housing re-  
 habilitation.

Compléments d'information : CACIMA 41-05-30 [janick.cormier@cacima.fr](mailto:janick.cormier@cacima.fr)

# Sectoral focus



## Sustainable construction in France

In numbers, construction in France:

**124 billion euros (excluding taxes)**

in construction in 2014 - including 54 billion euros for new construction

**1,090,000 employees** - including 73.5% blue collar workers

**361,000** artisans

**382,000** companies

Construction represents 50% of industry in France

Source: [www.ffbatiment.fr](http://www.ffbatiment.fr)

**T**he construction industry is at the heart of the fight against climate change. The goals for the reduction of CO<sub>2</sub> emissions and energy consumption have just become the subject of a new framework under the August 18, 2015 energy transition act. And it can be understood why, because **today in France, residential and commercial buildings produce 24% of CO<sub>2</sub> emissions and consume 44% of the total energy used.**

The energy transition act establishes common goals with regard to eco-responsibility in order to protect the environment and fight against climate change.

See the press release regarding its implementation on:

[www.developpement-durable.gouv.fr/IMG/pdf/Communication\\_LoiRoyal.pdf](http://www.developpement-durable.gouv.fr/IMG/pdf/Communication_LoiRoyal.pdf)

This act builds on the *Sustainable Buildings Plan* launched in 2009 (which brings together all the stakeholders in building, real estate, and the public authorities) and on the *Thermal Regulations 2012*. One can also note the creation of France GBC, which is the French member of the World Green Building Council (a world association committed to sustainable construction). Its role is to encourage and accelerate the construction of sustainable buildings.

**Thus, sustainable construction focuses on renewable energy, eco-responsible companies, recycling, waste reduction, the fight against energy poverty, as well as the adaptability of buildings.**

Sustainable construction in France was thus imposed on other forms of construction and more and more buildings are renovated in the interests of environmental protection.

**In order to be successful in the energy transition in France, the stakeholders in the construction industry are mobilizing and defining new objectives:**

- **Reduction of greenhouse gas emissions in the building sector.**

Due in particular to the implementation of the 2012 thermal regulations limiting the primary energy consumption of new buildings to a maximum of 50 kWhEP / (m<sup>2</sup>.year) and the renovation of existing buildings according to this standard.

- **Reduction in the consumption of residential building, starting in 2017, to reduce energy consumption by 68% by 2050.**

The law on energy transition requires that the least energy efficient buildings must be renovated by 2025 to reach the "BBC" (low energy building) level in the future "BBC". This designation requires an annual primary energy consumption, depending on the area in which it is located, of less than  $80 * (a + b)$  kWh / m<sup>2</sup>ShonRT (where "a" is the climate factor of the zone in which the dwelling is located and the "b" factor is related to the altitude). Financial assistance is available for energy efficiency retrofitting of housing. This assistance includes an eco-loan at 0% interest and a tax credit for energy transition.

- **Foster the emergence of a competitive economy.**

Encourage and support innovation, job creation and the development of green growth industrial sectors.

- **Encourage the construction of POSitive Energy buildings (BEPOS) and define a set of criteria for these buildings.**

Construction of BEPOS buildings is being put in place for public building construction. This consists of fully integrating the building into the environment in a closed cycle (self-sufficiency in energy, recyclable raw materials, zero waste and pollution). *The method of "cradle to cradle" (see page 8) could then, one day, be imposed as a BEPOS standard.*

- **Make the RGE label (recognized guardian of the environment) a mandatory standard for companies.**

Today this label rewards companies that are competent in renewable energy or energy efficiency. 60,000 businesses and artisans already have this certification.

For more information, please visit the government web-site:

[www.developpement-durable.gouv.fr](http://www.developpement-durable.gouv.fr)

<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031044385&categorieLien=id>

Sources: CIEPA, SOeS, projection FFB ; [www.batirpourlaplanete.fr](http://www.batirpourlaplanete.fr) ; [www.francegbc.fr](http://www.francegbc.fr) ; [www.ffbatiment.fr](http://www.ffbatiment.fr) ; [www.developpement-durable.gouv.fr](http://www.developpement-durable.gouv.fr)

# Sustainable construction



## techniques and technologies of the futur

The construction field is constantly reinventing itself in order to become more environmentally friendly. Standards and techniques are constantly evolving which redefine sustainable construction. Without making an exhaustive list, let's do an overview of the major changes that should revolutionize buildings and their construction in the future

- **Hydrogen (H): future technology of energy storage?**

Being one of the most abundant elements on Earth and having water as its main source, hydrogen could be used as a fuel cell. A battery that produces electricity and heat, with the only waste being water. Thus, hydrogen could be used to store renewable energy for redistribution in the form of electricity upon demand, in order to better adapt to household consumption and thus make a building self-sufficient. Storing renewable energy is a major challenge, because in order to develop the energy sources of the future, it is necessary to be able to devise ways to ensure a supply of energy during periods when there is less wind and sun.

The two most significant obstacles to the development of this technology are the cost of producing hydrogen fuel cells, and the use of fossil fuels for the supply of these batteries. But new projects are being developed to produce "clean" hydrogen on an industrial scale. Thus, renewable energy could be stored and used as needed.

- **3D printing: Robots, builders of the future?**

And if the buildings could build themselves in the future? The use of 3D printing is becoming increasingly common in everyday life. Capable of great achievement, in a short period of time, projects are beginning to emerge around the world that are making 3D printing an all-purpose tool when it comes to building. Thus, in Dubai, they are planning to build a 3D printer with a scale of 6m for 40 wide to create offices (interior and exterior walls), including furniture. In a few work weeks, the cost would be reduced by 50% to 80% and waste by 30% to 60%, compared to conventional construction. The project led by WINSUN Global, a Chinese company, will use reinforced concrete, fiber reinforced plastic, and reinforced fiberglass. Meanwhile in the Netherlands, a "3D printer robot" is being invented to build a stainless steel bridge. In September 2016, the MX3D Bridge project will see the construction of a new bridge in Amsterdam. France is no exception, one notable example is the company Machines 3-D, which is aiming to build individual concrete houses using recycled materials. Not using a machine on a track, but with a small crane equipped with a mechanical arm.

The main obstacle to this advancement in technology and technique remains the regulations in force. It will have to be able to meet government regulations and satisfy inspections.

- **New imaging technologies to help construct buildings in the future?**

Will the 3D model be required in the terms of reference in calls for tenders in the future? All indications lead to this conclusion. Today virtual reality and augmented reality are economically accessible and demonstrate significant technological maturity. These tools can quickly become supports for communication, construction and training, especially in terms of technology. Today the *technical game* is invading the markets and is helping to train new apprentices, whether it is to repair a water boiler (*Klima e murale - IDSC Group*) or even to get training in the building trade (*Magic college 2 - fédération française du bâtiment*). There are even games designed to educate youth about sustainable construction and energy (*2020 energy - Tralere avec Universcience & France tv éducation or IQspot*).

Thus, new imaging technologies can help to train young people, to provide concrete answers to technical and economic issues, and even help innovate and better integrate a building into its environment.

Sources: [www.industrie-techno.com](http://www.industrie-techno.com) ; [www.pole-innovations-constructives.com](http://www.pole-innovations-constructives.com) ; [www.primante3d.com/machines/](http://www.primante3d.com/machines/)



# The future : “Cradle to Cradle”?

## Having a positive impact on the environment

Today ecology, the protection of the environment, is causing us to rethink the standards and regulations in force in many fields, in particular that of the building sector, since its impact on it is so great. Construction, as a symbol, becomes "sustainable construction" and has developed new minimum levels of environmental pollution and new standards. France, in order to set an example, goes even further and envisages the construction of public buildings with positive energy. That is, buildings that produce as much energy as they consume. But can't we do better?

**A** first step in the effective protection of the environment is beginning to emerge. There are, however, already methods of construction or production in existence, which permit us to go farther and to completely erase the impact on the environment, **to build sustainably and efficiently, and to create buildings that are 0-energy, 0-emissions, 0-waste and 100% recyclable! Such is the concept of "cradle to cradle"**. Not just to reduce the energy impact, but to strive to have a positive impact on the environment and, especially, to integrate production into a closed cycle of consumption.

### Explanation:

"Cradle to Cradle (C2C) is both a principle of eco-design and a concept of environmental ethics." It is based on the cradle to cradle model that is present in nature ("nothing is lost, nothing is created, everything is transformed"), and thus challenges the current principle - from cradle to grave - in the

industry.

The strategy rests on two pillars:

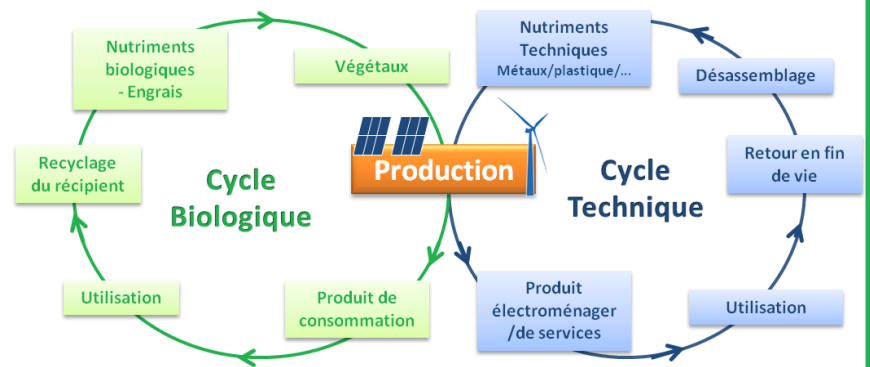
- **Using waste as nutrients, which keeps the raw materials in a closed cycle.**

This principle is based on maintaining the quality of raw materials throughout the multiple life cycles of products. To produce today, a lot of resources are needed, and these resources are not infinite. This means that, every day, the mass of the total resources on Earth decreases, and the amount of waste increases. Using resources in a closed cycle would curb this system. Thus, the original resource becomes an infinite resource.

- **Using "renewable energy" to cover 100% of consumer needs.**

This means using technological advances to their maximum, as we already know how to do to some degree, by using the sun, wind or even water.

**Process:** There are two different cycles: a biological cycle (the product becomes fertilizer to nourish the soil and then, the plants are used as a raw material for the product) and a technical cycle (the products remain the property of the industrialists; at the end of its life, the product is returned to the indus-



**Service products would then be available that were designed to become technical nutrients that are 100% reusable for the production of new generations of products and services.**

For example, tiles that are 100% recyclable could be produced ecologically. If they break or become obsolete and out-of-date, it would suffice to retrieve them and break them down into raw material, which, in turn, will be processed to become new tiles.

A building can be constructed with 100% of the materials being "C2C" certified. As an added bonus, it produces more energy than is needed, through the use of renewable energy. This would be the next step in environmentally friendly construction and production. Today, there are about 2,000 "C2C" certified products in many diverse fields, from the production of clothing to construction.

Widespread use of the "Cradle to

"Cradle to Cradle" philosophy in sustainable construction would require a re-design of the current system. C2C would involve long-term maintenance of buildings, given that the materials that are used remain within the ownership of a particular company. Over time, the company would recover used materials, replacing them with new ones, and would break down the old ones into raw materials.

Sources:  
<http://www.epeaparis.fr/cradle-to-cradle/principes/>  
<http://www.cradletocradle.com/>

# INTELL-ECHO



Are you seeking business opportunities in this sector?  
CACIMA and FCCC-AN can facilitate your business prospection process and help with establishing new partnerships  
(targeted information and network contacts)

**Intell-Écho** is a periodic bulletin published by the Economic Information Observatory, a regional cooperation project between Atlantic Canada and Saint-Pierre and Miquelon. The publication of this bulletin is made possible through the sponsorship of the Atlantic Canada Opportunities Agency in support of research initiatives, linguistic minorities and business development, and the Province of New Brunswick as well as the Université de Moncton, Shippagan Campus, and the Prefecture and Territorial Council of Saint-Pierre and Miquelon.

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**The Economic Information Observatory** is a regional cooperation project established between Atlantic Canada and Saint-Pierre and Miquelon. The publication of this information bulletin is made possible through the sponsorship of the Préfecture and the Conseil Territorial of Saint-Pierre et Miquelon, in support of the Atlantic Canada Opportunities Agency's programs for research initiatives, linguistic minorities and business development, and the Province of New Brunswick, as well as the University de Moncton, Shippagan Campus and the Prefecture and Territorial Council of Saint-Pierre and Miquelon.

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