

## BAU Journal - Health and Wellbeing

---

Volume 1 Issue 3 *Urban Health & Wellbeing*  
*Building Collaborative Intelligence for Better*  
*Lives in Cities*  
ISSN: 2617-1635

Article 51

October 2018

### LEGISLATION FOR GREEN BUILDING REGULATIONS AND INCENTIVES

NABILA AL GHABRA Architect & Teaching Assistant (Part-time), Faculty of Architecture –  
Design & Built Environment  
*Beirut Arab University, Lebanon*, [nabilaalghabra@hotmail.com](mailto:nabilaalghabra@hotmail.com)

Follow this and additional works at: <https://digitalcommons.bau.edu.lb/hwbjournal>



Part of the [Architecture Commons](#), [Business Commons](#), [Life Sciences Commons](#), and the [Medicine and Health Sciences Commons](#)

---

#### Recommended Citation

AL GHABRA, NABILA Architect & Teaching Assistant (Part-time), Faculty of Architecture – Design & Built Environment (2018) "LEGISLATION FOR GREEN BUILDING REGULATIONS AND INCENTIVES," *BAU Journal - Health and Wellbeing*: Vol. 1 : Iss. 3 , Article 51.

Available at: <https://digitalcommons.bau.edu.lb/hwbjournal/vol1/iss3/51>

This Article is brought to you for free and open access by Digital Commons @ BAU. It has been accepted for inclusion in BAU Journal - Health and Wellbeing by an authorized editor of Digital Commons @ BAU. For more information, please contact [ibtihal@bau.edu.lb](mailto:ibtihal@bau.edu.lb).

---

## LEGISLATION FOR GREEN BUILDING REGULATIONS AND INCENTIVES

### Abstract

The world's nations encourage creating a health-friendly and sustainable environmental development, to achieve a balance between the economic development and environmental protection. Governments around the world settled regulatory frameworks for the development and usage of green building technology; they should adopt an appropriate legislation to protect people's health as well as the environment and its natural resources, by establishing a mandatory Green Buildings Regulations, green attractive incentives and Initiative to improve our building performance, encouraging all inventors to build with green. Energy efficiency and renewable energy incentives have attracted serious attention, it promote sustainable development. In some countries the municipality has made the Green Building standards mandatory for governmental buildings only and optional for private ones, but in others they are establishing a strategy, making it mandatory for all the new buildings. This research highlights on the problem and detail the government incentives and initiative, its effectiveness on promoting green building development. The paper draws attention on the shortage of the Lebanese government to protect its natural resources, since the environmental issues have reached dangerous levels. Some ministries are improving the rules for healthier environment, but it is still not enough. More effort should be done in order to achieve an acceptable level of environmental quality. It also provides an international and local review of the implementation of environmental incentives and financial schemes in order to have a better perspective of the Lebanese sustainability effort. The methodology used mostly an inductive methodology with an intervention of deductive and analytical methodologies.

### Keywords

Green building regulation, legislation, people's health, initiatives

# LEGISLATION FOR GREEN BUILDING REGULATIONS AND INCENTIVES

NABILA AL GHABRA<sup>1</sup>

<sup>1</sup> Architect & Teaching Assistant (Part-time), Faculty of Architecture – Design & Built Environment,

Beirut Arab University, Lebanon

**ABSTRACT:** *The world's nations encourage creating a health-friendly and sustainable environmental development, to achieve a balance between the economic development and environmental protection. Governments around the world settled regulatory frameworks for the development and usage of green building technology; they should adopt an appropriate legislation to protect people's health as well as the environment and its natural resources, by establishing a mandatory Green Buildings Regulations, green attractive incentives and Initiative to improve our building performance, encouraging all inventors to build with green. Energy efficiency and renewable energy incentives have attracted serious attention, it promote sustainable development. In some countries the municipality has made the Green Building standards mandatory for governmental buildings only and optional for private ones, but in others they are establishing a strategy, making it mandatory for all the new buildings. This research highlights on the problem and detail the government incentives and initiative, its effectiveness on promoting green building development. The paper draws attention on the shortage of the Lebanese government to protect its natural resources, since the environmental issues have reached dangerous levels. Some ministries are improving the rules for healthier environment, but it is still not enough. More effort should be done in order to achieve an acceptable level of environmental quality. It also provides an international and local review of the implementation of environmental incentives and financial schemes in order to have a better perspective of the Lebanese sustainability effort. The methodology used mostly an inductive methodology with an intervention of deductive and analytical methodologies.*

**KEYWORDS:** *Green building regulation, legislation, people's health, initiatives*

## 1. INTRODUCTION

The International organizations and analyses show the dangerous environmental situation our region reached.

Lebanon has a huge dynamic construction markets, but unrestricted control form the harmful building impact will cause an environmental degradation, so a green building option is essentially needed with efficient sustainability measures ("An urgent need to regulate sustainability in Lebanon", 2015).

The governments is taking more active role to encourage the movement toward green building investment through financial, energy efficiency, and community developments, and is making an effort to improve its environmental performance to be healthier. The green movement has appeared as a reaction to the fact that:

- a. The natural resources are limited and soon will be depleted; they should be managed carefully in order to last longer.
- b. Many people are impacted from global warming; it is not the problem of one nation or a group, but it is a worldwide problem that needs to be solved.
- c. The neglect of health for local and global ecosystem, rises many negative seeing ("An urgent need to regulate sustainability in Lebanon", 2015) for that there is an urgent need for sustainability to be regulating, reviewing and be mandatory to all construction. Governments have recognized their responsibility toward the environmental impact of buildings. The implementation of green building legislation may face certain challenges that politicians and legislators should consider.

This paper provides a perspective review of the international sustainability practice and their implementation, beside the Green Building Initiative which takes different method and techniques, in order to improve enhancing the Lebanese sustainability effort and become a healthier area.

The aim of this research is to highlight on the legislative and legal framework conditions, the initiatives implemented, the barriers and challenges in a wider range.

## 2. GREEN BUILDING LAWS, REGULATORY, AND INITIATIVES

The construction industry has the largest share of materials and energy consumption in the market, Therefore Sustainable construction should become the dominant way to achieve the sustainable development goal, to help the ecosystem environmental to be positively more healthy, efficiency, productivity, implement high performance construction and sustaining the resources. ("An urgent need to regulate sustainability in Lebanon", 2015)

### 2.1 Green Building Definition

"Green building is the practice of creating structures and using processes that are environmentally responsible and resource- efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation created an interest in energy-efficient and environmentally friendly practices and deconstruction. This practice expands and complements the classical building design concerns of economy, function, and comfort. Green building is also known as a sustainable or high performance building". It is designed to reduce the impact of the built environment on human health and the natural environment by:

- Using energy, water, and other resources efficiently
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation ("U.S. Environmental Protection Agency", 2016)

### 2.2 Environment Governance Definition

Environmental governance refers to the processes of decision-making involved in controlling and managing the environment and natural resources. Principles such as inclusivity, representation, accountability, efficiency, and effectiveness, as well as social equity and justice, are the foundations of good governance. ("State and Trends of the Lebanese Environment", 2010), UN Environment is placed to help countries establish and strengthen policy, legal and institutional measures, to achieve the Sustainable Development and other global environmental goals, provide governments with guidance, expertise and tools on environmental laws, policy and regulation, as well as assist them to reach their environmental goals. ("Environmental Governance Update March 2018", 2017)



Figure 1 the pieces of the environmental governance puzzle. Source: ("State and Trends of the Lebanese Environment", 2010)

### 2.3 Environmental Governance Puzzle:

Six major components of the puzzle make up a dynamic system, for environmental governance sustainability. (Environmental Institutions, Environmental laws and Regulations, Environmental Research, Environmental Information, Environmental Funding, and Environmental Advocacy and Public Participation)("State and Trends of the Lebanese Environment", 2010)

### 2.4 Regulating Mandatory Green Building Laws

Constructors and private clients focused on profit making, need payback period of between seven and twenty years, and it is difficult to convince them to inject more investment, they are not voluntarily

adopting green construction anymore, just want to release the cost barrier; therefore Governments provide regulations and green building incentives as an encouragement; looking over economic barriers to mitigate the financial shortages.

In some counties green practice is nearly becoming mandatory for all construction projects, unavoidable implementing the requirement, it is expected in the future that government incentives will be given for green building owners, while those who indiscipline the green building requirements will be face regulations and penalties ("Renewable & Sustainable Energy Reviews", 2016)

Green building certainly are linking to energy efficiency, water efficiency, air quality, on-site renewable energy production, green materials, construction waste, and building life cycle. Stronger regulatory policies continue to take place, Instead of providing incentives. We will provide examples of communities mandate green building laws and have implemented green incentives sightseeing the experiences.

#### 2.4.1 CALIFORNIA:

Is the first state to adopt a Green Building Code that applies to both public and private building and construction. It contains a mixture of mandatory and voluntary measures that apply to the "planning, design, operation, construction, replacement, use and occupancy, maintenance, removal and demolition of every building or structure or any addition connected or attached to building structures throughout the State of California."

(ASHRAE) The American Society of Heating, Refrigerating and Air-Conditioning Engineers has been working on Standard for the Design of High Performance, Green Buildings.

Standard 189.1 is the first green building standard in the United States, affords minimum criteria for green building practices and talks about energy efficiency and the building's impact, a site, water resources, materials resources, and indoor environmental quality. The standard itself will not be law without being approved by a specified jurisdiction.

The common way of legislation requiring LEED certification for public buildings

The mandates instructions are different, some are restricted by the size, cost, or type of project, or if it's funded, some require LEED certification, some mandates have additional control through regulations, and some projects must be designed, constructed, and certified to at minimum a LEED Silver standard or an equivalent rating system (Howe, Gerrard & Fucci, 2010) ("Local Leaders in Sustainability Green Building Incentive Trends", 2012)

#### 2.4.2 INDIANA

Governor, (2008) signed Order requires agencies, departments, offices, boards, commissions, and public universities to be "designed, constructed, operated, and maintained" to maximum energy efficiency on a "cost-effective basis". declared that Indiana hardwood lumber should be use in all projects "where possible" as a local source material

#### 2.4.3 UTAH'S:

State legislation raises the performance standard applicable to all new state buildings by requiring LEED Silver certification. In addition, projects must also achieve the LEED New Construction NC (reduce water used for landscaping by 50 percent); EA (enhanced building commissioning); EQ (construction indoor air quality management plan); EQ (use low-emitting adhesives and sealants); EQ (pow-emitting paints and coatings). The regulation mandates at least three-hour sustainability consultation with all stakeholders to ensure that state buildings saving energy water and preserving resources. (Howe, Gerrard & Fucci, 2010)

#### 2.4.4 CONNECTICUT:

The law requires projects to achieve at least LEED Silver rating or an equivalent rating system Connecticut's green building law order the public and private construction, to get LEED certification, or Green Globes certification, or any equivalent one otherwise implement the requirements adopted in regulations of the green building law. (Howe, Gerrard & Fucci, 2010)

2.4.5 NEW YORK'S:

State Green Building Construction enacted **اصدا** requirements to the new construction and renovations to obey the green building standards, including LEED and Green Globes. New York Governor George Pataki (2001) signed Executive Order "Guiding State Agencies and departments to Be More Energy Efficient and Environmentally Aware", his aim was to reduce energy consumption of buildings owned, leased, or operated by them, also mandate to implement energy-efficient practices in existing buildings and follow the green building guidelines in the state's tax code besides LEED guidelines.

The New York state legislature also allow government to provide "property tax exemptions" for up ten years for commercial and residential construction or improvements that meet LEED certification standards, Silver, Gold and Platinum, for the first three years exempt from 100% of increased tax. For Platinum projects, that 100% exemption continues through year six and then stages out done after year ten. (Howe, Gerrard & Fucci, 2010) (D. Kaplow, 2013). Some states have used the authority of the executive office to implement green building mandates in the form of executive orders.

2.4.6 ARIZONA:

Governor Janet Napolitano signed Executive Order, requires that all state-funded buildings constructed must get, at least, LEED Silver, to achieve the energy-efficiency standards and get at minimum 10% of their energy from renewable resource, for example solar, wind, or using thermal energy from biomass fuels. (Howe, Gerrard & Fucci, 2010)

2.4.7 WISCONSIN

Governor Jim Doyle signed Executive Order required a green building performance aim to reduce energy use in state 20 % by 2010. But 30% more energy efficient for the new state facilities, and be built according to sustainable guidelines established on LEED or other rating systems. (Howe, Gerrard & Fucci, 2010)

Many states Intended green building executive orders such as California, Colorado, Florida Illinois, Maine, Maryland, Massachusetts, Michigan,s' New Jersey, New Mexico, Rhode Island, and Virginia.

2.4.8 UAE and Qatar.

The governments put mandatory green building regulations, because they have noticed the trend and have seen the overall profits by increasing in sustainable market value, they made the new rating system obligatory for every new project. ("An urgent need to regulate sustainability in Lebanon", 2015)

**2.5 Municipal initiatives**

Municipal green building legislation has been legislated in one of three ways:

1. Mandates obligation for public construction projects to achieve upright levels in certification
2. Different kinds of incentives are given to the private construction projects
3. Mandates that offered to public and construction projects

Cities such as San Francisco, Los Angeles, and soon, Washington, D.C. require formal certification for private projects (Howe, Gerrard & Fucci, 2010)

**2.6 Governmental incentive types**

The most common incentive types offered by governments of the United States: • Tax Incentives (the reduction of taxes for implementing specific green measures and certifications); • Density/Floor Area Ratio Bonuses (reductions in landscaping requirements, and counting green roof space as landscaping/open space in return); • Expedited Permitting (the rearrange of the permitting process for building, planning, and site permits); • Net Metering; • Feed-in tariffs; • Grants (including fee subsidization); • Loans; • Insurance; • Technical Assistance/ Design Assistance; • Permit/Zone Fee Reductions; • Rebates and Discounts on

Environmental Products; and • Leasing Assistance. ("Local Leaders in Sustainability Green Building Incentive Trends", 2012) ("State and Local Green Building Incentives", n.d.)

**2.7 property tax incentives**

Governments are using the energy efficiency and renewable energy incentives to achieve their sustainability and public health goals. The successfulness of property tax incentives models in US is giving an example to benefit from the experiences have the same situation. Projects that achieve the most energy conservation points will benefit the mostly from partial property tax reduction program.

- **NEW YORK (2000)** Enacted a Green Building Tax Credit can be applied against tax companies, personal income, insurance corporation taxes and banking corporation taxes. The incentive offered to owners and tenants of eligible buildings and tenant spaces which meet certain "green" standards, which increase energy efficiency, improve indoor air quality, and reduce the environmental impacts. Owners and tenants must work through an architect or engineer who will help to get a credit certificate from the state to their project, under six different components:

- whole building(all tenant space are green)
- base building,
- tenant space (the base building must be green)
- fuel cell (fueled by a qualifying alternate energy source)
- photovoltaic module
- Green refrigerant (for new air conditioning equipment using an EPA-approved non-ozone depleting refrigerant) to meet all requirements for energy, indoor air quality, materials, water conservation and commissioning.
- It gives taxpayers nine taxable years to claim the credits once eligible (Openeci.org, 2015)

Table 1 Reduction on the property tax. Source: The researcher,(Energy.gov, n.d.)(Leg.state.nv.us, 2014)

Buildings certified	Buildings Must Earn points for energy conservation at least	Reduction of the property tax
	New Buildings	
LEED Silver	5 points	25%
LEED Gold	7 points	30%
LEED Platinum	11 points	35%
	Renovated to Existing buildings	
LEED-EB Silver	5 points	25%
LEED-EB Gold	7 points	30%
LEED-EB Platinum	11 points	35%

- **NEVADA (2005)** The property tax abatement law, (the most talked about tax incentive programs in the country), for new non-residential and multifamily residential green buildings, and existing buildings or structures, may qualify for a partial abatement of property taxes, by receiving LEED rating system certification for adapting requirements of the energy conservation. Buildings must earn a minimum number of points for energy conservation through the LEED rating system from USGBC. New Buildings certified

- LEED Silver: must have at least 5 points for energy conservation will get 25% reduction of the property tax payable each year
- LEED Gold: must have 7 points, will get 30% reduction of the property tax payable each year
- LEED Platinum must have 11 points, will get 35% reduction of the property tax payable each year`
- Renovated to Existing buildings certified
- LEED-EB Silver will get Reduction of the property tax 25%
- LEED-EB Gold 30% will get Reduction of the property tax 30%
- LEED-EB Platinum 35% will get Reduction of the property tax 35% (Energy.gov, n.d.) (Howe, Gerrard & Fucci, 2010)

Table 2: Nevada Office of Energy's Regulation, determining property tax abatements on LEED Certified buildings. Source: (A. Prum, 2009

LEED Certification Level	1-2 Points for Energy Conservation from U.S.G.B.C	3 Points for Energy Conservation from U.S.G.B.C	4 Points for Energy Conservation from U.S.G.B.C	5 Points for Energy Conservation from U.S.G.B.C	6 Points for Energy Conservation from U.S.G.B.C	7 Points for Energy Conservation from U.S.G.B.C	8-10 Points for Energy Conservation from U.S.G.B.C
Silver	NO Abatement	25 percent abatement for 5 years	25 percent abatement for 6 years	25 percent abatement for 7 years	25 percent abatement for 8 years	25 percent abatement for 9 years	25 percent abatement for 10 years
Gold	NO Abatement	25 percent abatement for 5 years	25 percent abatement for 6 years	30 percent abatement for 7 years	30 percent abatement for 8 years	30 percent abatement for 9 years	30 percent abatement for 10 years
Platinum	NO Abatement	25 percent abatement for 5 years	25 percent abatement for 6 years	30 percent abatement for 7 years	30 percent abatement for 8 years	30 percent abatement for 9 years	35 percent abatement for 10 years

When the project gets its Certificate from the Office of Energy specifying that the building has got Silver or upper level certification, administrations and agencies will receive notification explaining each building's applicability of property tax abatement, to be effective. (A. Prum, 2009) (Openei.org, 2015)

State	Green Incentive Type	Green Standard	State Financial Incentive	Financial Limitations	Preapproval Required
Nevada	Property Tax Reduction	LEED	Variable, 25% over 5 years to 35% over 10 years	None	Yes
Virginia	Property Tax Reduction	LEED or other listed Energy Preferred Standard	Left to the local government to decide	None	Unknown
New York	Income Tax Credit	New York's own standard	Maximum of \$7.50, \$3.75, or \$15.75 per square foot spread over 5 years	\$50M over a 9 year period	Yes
Oregon	Income Tax Credit	LEED	35% of eligible costs based on total square footage	None	Yes
Maryland	Income Tax Credit	LEED	8% or 6% of total cost in a priority funding area with more than 20,000 square feet	\$25M over a 5 year period	Yes
New Mexico	Income Tax Credit	LEED	Variable based on the building's square footage	\$5M for commercial, \$5M for residential up to 2013	Yes
Hawaii	Expedited Permit Processing	LEED or Green Globes	Not Applicable	Not Applicable	Not Applicable

Table 3: Comparison Chart of Commercial Green Building Incentives by State and Type of Incentive. source: (A. Prum, 2009)

Many states choose to follow a system like LEED or Green Globes, while New York decided to develop its own program. Because the LEED system was under development at the genesis of New York's Green Building Tax Credit initiative (Openei.org, 2015)

- **Virginia** has the most similar systems to Nevada's in providing green building incentives, recently took effect on 2008. Any building that exceed the Virginia Building Code to create a property for energy efficient buildings by over thirty percent 30% by using LEED or other registered energy performance standards will be classified as an energy efficient building, then will receives approval to reduce property taxes for buildings. (Creating State Incentives for Commercial Green Buildings: Did the Nevada Experience Set an Example or Alter the Approach of Other Jurisdictions? 2009)

### 2.8 Financial incentives

Many and divers of green building financial incentives can be found, and are needed, some cases are presented: It includes tax incentives, direct grants, rebates and discount in the application fees, they result a financial gains for beneficiaries. ("Local Leaders in Sustainability Green Building Incentive Trends", 2012)

### 2.9 Non-financial incentives

No direct costs are required, the government grants the right and more than the allowable, For example, expedited permitting allow owners with green building to speed up the permits more quickly than usual way. Incentive of Floor-to-Area density (FAR) allows the owners to construct more building area than allowed by the regular zoning. It include also a technical assistance, business planning and marketing assistance, guarantee programmers, and green management teams in building and planning departments ("Renewable & Sustainable Energy Reviews", 2016)

- **HAWAII** enacted a law giving priority by fast track permit application of sustainable construction projects, which is achieving LEED Silver certification, or another approved system
- **NORTH CAROLINA** gives cities the power to reduce building permit fees or provide partial discounts & saving for buildings that are constructed or renovated and certified to green standard system
- **CALIFORNIA** Enacted a law that permit of financing the installation for energy efficiency improvements in projects, it provides flexibility in reserve funds by selling bonds



- **OHIO** Enacted a loan program to provide financial incentives for home energy efficiency achievement, by an annual 3% interest rate reduction on the five-year loan (Howe, Gerrard & Fucci, 2010)

### 2.10 technology incentives

Some countries adopting technology-specific laws relate to green building,

- **HAWAII**, Will never issue a building permit for a single-family dwelling that does not hold a solar water system,
- **CALIFORNIA**, Enacted a law to solve the ecological problem, the Solar Shade Control Act, when overgrown trees prevent using an energy device like solar collector, "A solar panel owner asked his neighbors to trim their eight red-wood trees because shade were preventing his solar collector from usage, there was a lawsuit, and the court decided that the redwood trees owners were guilty; then he trimmed the trees to avoid a daily fine of \$1,000".
- **ARIZON**, Enacted a law that prevent any contract, restriction, or deal, or other agreement that forbids the use of a solar energy device, but in Colorado the law added more energy efficiency devices, the solar lighting systems, wind electric generators, energy-reducing shade structures, awnings, shutters, evaporative coolers, and energy-efficient outdoor lighting, (Howe, Gerrard & Fucci, 2010)

### 2.11 non-governmental initiatives

- The Energy Efficient Building Retrofit Program: formed by former President Clinton and the Clinton Climate Initiative." The program provide finance access to cities and private building owners to retrofit existing buildings with energy-efficient products, it leads to energy savings between 20 and 50 percent.

The Architecture 2030 is a nonprofit, nonpartisan, independent organization founded by architect Ed Masia, adopted by (AIA) and the U.S. Conference of Mayors, work with the global architecture and building community aim by 2030 to design and build carbon neutrality buildings, that all new buildings, developments, and major renovations reduce in fossil fuel consumption, greenhouse gas emitting, and energy consumption performance 50 % of the regional average

- The AIA's "50to50" program presents 50 strategies toward 50 percent fossil fuel reduction in buildings." It's like The 2030 aim to achieve carbon reduction, high-performance buildings for sustainability (Howe, Gerrard & Fucci, 2010) (Hinson & Miller, 2013)
- Hastings on Hudson has adopted a custom written Green Building Code; The Code is unique because it was written from scratch by a group of residents from this village, not based on any rating systems or standards (LEED, IgCC, ASHRAE,...) . (Village of Hastings-on-Hudson, NY Code, n.d.)

### 2.12 Green building law schemes

Green building law follows three different regulatory schemes:

- First: Governments Building Green scheme; is for government requiring that its government-owned buildings should be constructed to a Green building standard, as the President W. Clinton issued an executive orders for government to "use of recycled products, and the environmentally preferable building products
- Second: Voluntary Incentives scheme, when a government offers voluntary incentives to private developers, whether as tax breaks, direct grants or loans, or advantages in processing approvals for Green buildings.
- Third: Government Mandates scheme; an increasing, but still modest number of local governments are mandating by law that all new construction or major renovations which exceed a certain square footage, whether public or private, must be constructed to a Green building standard (D. Kaplow, 2013)

The International Codes are designed to be adopted by legislative action. Jurisdictions wishing to adopt the 2012 International Green Construction as an enforceable regulation governing structures, concerning the impact of buildings and structures on the environment. ("LEGISLATION, 2012 International Green Construction Code", 2012)

and premises should ensure that certain factual information is included in the adopting legislation at the time adoption is being considered by the appropriate governmental body.

There are three bases in calculating formula for property tax incentives models in US which are:

**a. Property tax exemption** Green elements installed or attached to a property are considered to add no value to the property. In other words, the exemption is given on the value of green elements installed or attached to the property but not on the existing property building. A green property assessed as a conventional property / non green property.

**b. Property tax reduction:** Green elements installed or attached to a property are given several percentages of discounts on value.

**c. Property tax credit:** Property tax credit is cash money given back to green property owner depends on the level of certification of the green building achieved. ("The Potential of Implementing Property Tax Incentives on Green Building in Malaysia", 2013)

### 2.13 hamburg's incentive mechanisms & initiatives

Germany is the most EU's energy consumer, even though the energy sources are limited, but strong management and rules save and control the buildings energy.

Hamburg, is a major industrial city in Germany facing many environmental challenges, alongside the other European cities, an increasing efforts and advance Progress

done to the environmental protection, Hamburg implementing the European environmental policy aspects, in the building energy code to achieve the goal of 40% CO<sub>2</sub> reduction by 2020 and 80% by 2050 by: They established incentive schemes, frequent boiler and HVAC testing, EPC Programs (European Policy Center) monitors how to achieve growth that is economically, socially and environmentally sustainable. ("EPC - European Policy Centre - Independent think tank", 2018)

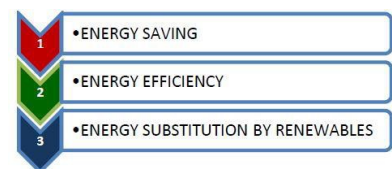


Figure 2; Source: ("EPC - European Policy Centre - Independent think tank", 2018)

#### 2.13.1 Financial incentives

The federal government, states, and municipalities established a number of systems to support and encourage the implementation of the guidelines, to change the situation and reach the government goals, some subsidies Examples implemented by the municipality are presented

- **The IFB** offers a program called "Energy Efficient Building", it encourage the construction of efficient and passive houses through low-interest loans. The level of funding is €50,000 per unit and the repayment term is a maximum of 30 years with a between 1-5 years grace period.

- **Ministry of Urban Development and Environment (Hamburg)** offer subsidies for installing renewable energy systems such as solar thermal panels or biomass systems.

- Subsidy program for inventions to improve energy efficiency. ("EPC - European Policy Centre - Independent think tank", 2018)

- **Ministry for Environment and Energy (Hamburg)** is providing financial support € 3 million for the green roofs. Building owners can get subsidies to cover 60% of installation costs.

Additional benefit for the maintenance costs to improve building insulation, result less energy costs and longer lifetime of green roofs, a 50% reduction on rain water fees thanks("Four pillars to Hamburg's Green Roof Strategy: financial incentive, dialogue, regulation and science — Climate-ADAPT", 2016)

- **(The KfW)** German development bank owned by government, it finances and supports programs, has a multi-billion euro of low-interest loans joined with repayment grants for efficient construction and renovation. The incentive Program (MAP) supports the installation of solar-thermal, biomass, heat-pump-based systems, also Geothermal and district heating solutions are supported, many federal states offer many more energy efficiency funding programs for buildings and HVAC systems

### 2.13.2 Promotion and awareness incentives

The municipality is offering and implementing with different stakeholders the **education and advice-giving services** and demonstrate the new technologies available

- **Financial incentives for schools to save energy:** The scheme Fifty/Fifty – for Energy saving Implemented in schools and kindergartens, first started in 1994 in the schools in Hamburg, then it raised, and now applied in all of Germany's 16 federal states as a result of the good reputation and success, funded by state government, provides financial incentives, half of the costs saved go directly to the schools in terms of rewards for lowering their energy consumption. The project affords both educational and technical support to schools to raise awareness on energy efficiency among its staff and students. Its main aim is behavioral change as well as the implementation of simple technical EE measures. The program impact assessment:

\*By the energy consumption behavior the schools can keep 50% of the financial savings at the end of the year\*The indirect savings generated through behavioral change\*energy savings per school per year an average amount of 110 MWh \*about € 2,000 of funds is provided from the state to every participating school for technical measures and energy management consulting.

The incentive of investment is considered low, the resulting cost-effectiveness ratio of 55 kWh per Euro invested is high for this program building measures for school students and staff.\*The program doesn't need pre-existing technologies \*the program involving a number of stakeholder, all students, teachers and school administrative staff \*a long impact received in retain from educated behavior and training the school children to save energy. \*In terms of job creation, only a few jobs are created because of the existing teachers and school staffs to afford awareness rise. ("Promotional Schemes for Demand-Side Energy Efficiency", 2015)

## 3. LOCAL GOVERNMENT LEGISLATION AND POLICY OF GREEN BUILDING

The Environmental degradation in Lebanon is taking high attention because it has been reached to dangerous levels, but no government policy organized, recording absent to protect the environment and the natural resources unless some initiatives are applied but still not enough("An urgent need to regulate sustainability in Lebanon", 2015)

### 3.1 Construction influence in Lebanon

The construction effect the Environment constantly, from extracting raw materials (quarries, cement production), or establishing the structures (noise, dust, hazardous materials), or using it (disposal of wastewater, energy consumption and emissions), the insufficient construction standards and lack of executing the existing regulations are causing a severe environmental degradation ("Lebanon State of the Environment Report", 2001)

### 3.2 (MEAs) Multifaceted environmental agreements

Lebanon, a full voting member in the United Nations General Assembly, agreed on many environmental conventions, which offered Lebanon millions of dollars in funding from international development organizations. ("State and Trends of the Lebanese Environment", 2010)

There are different rating systems available due to different needs of the region However; their main goals are the same, even if their criteria and methodologies may differ in some aspects. The two main certificates which are recognized worldwide are BREEAM, the UK certificate founded in 1990; and LEED created by the US Green Building Council in 1998, widely used in this region ("An urgent need to regulate sustainability in Lebanon", 2015)

### 3.3 Lebanon environmental institutions

3.3.1 **LEGISLATIVE BODY:** Represented by the Lebanese Parliament, holds 128 seats, the Parliament Committee for Environment which has 12 permanent Members, they meets to discuss and review draft legislation and environment issues, this body should be more active to speed up the approval of legislation, respond to public opinion and participate in environmental discussions, expected through Parliament to supervise the work of the executive body

**3.3.2 EXECUTIVE BODY:** Represented by the Council of Ministers, this enacts regulations in the form of decisions and decrees. Ministry of Environment, prepared a work plan contains themes and requires coordination with other ministries, and deal with many other Committees, Intergovernmental Agencies, and the environmental parties (Green Party of Lebanon (GPL), Lebanese Environmental Party (LEP)) for Strengthening environmental inspection and enforcement. Municipalities in Lebanon face continually shortages in municipal finances and incomes, also funds are limited.

**3.3.3 JUDICIARY SYSTEM:** Made up of judges and prosecutors, helps stop or restrict environmental abuses, as well enforcing environmental laws, regulations and policies. The World Bank funded a project “Supporting the Judiciary System to the Enforcement of Environmental Legislation” and managed by UNDP. Lebanon does not have general prosecutors who are specialists in the environment; but the Green Party of Lebanon and MOE produced a draft law to institutionalize the environment pursuant position to Environment Law 444, he will be able to prosecute environmental cases more effectively. , Lebanon has no environmental police as a final stage in the judiciary system to implement laws and regulations ("State and Trends of the Lebanese Environment", 2010)

### 3.4 Environmental laws and regulations

The Lebanese Parliament and the Council of Ministers organize and release a series of laws and regulations, but enacted procedures are not clear. There is no direct reference to the environment in Lebanon’s Constitution.

The private sector and the civil societies have collaborated in order to try to patch things up. The Green Party rises from this condition It targets both political players and the general public in order to achieve awareness about the environmental issues. ("An urgent need to regulate sustainability in Lebanon", 2015)

- **State of the Environment Report (SOER)** identify and analyze existing legislation affecting the environment in Lebanon.
- **Environment Law 444/2002.** Approved by parliament, it’s a legal tool for environmental protection and management, but this law needs application decrees, which some are difficult and have political debate, not expected to achieve implementation. ("State and Trends of the Lebanese Environment", 2010)
- **(SELDAS)** It helped strengthening the awareness of the environmental legislation development and enactment, application and liability, and promoted environmental law education in several universities. ((SELDAS) Strengthening the Environmental Legislation Development and Application System in Lebanon, 2003)
- **Building permits.** All building permit applications are controlled through the Order of Engineers (in Beirut or Tripoli) and must be approved by either the Director General of Urban Planning and/or municipalities. ("Lebanon State of the Environment Report", 2001)

### 3.5 Environmental incentives and financial schemes (locally)

Local governments in recent years implemented numerous of “green incentives.”

#### 3.5.1.1 Banque Du Liban (BDL)

Is working with the Ministry of Power, the UNDP, the European Union (EU), and the Lebanese Center for Energy Conservation (LCEC) to provide potential investors in green technology with low cost financing and medium to long term maturities. (Association of Lebanese Industrialists, 2018)

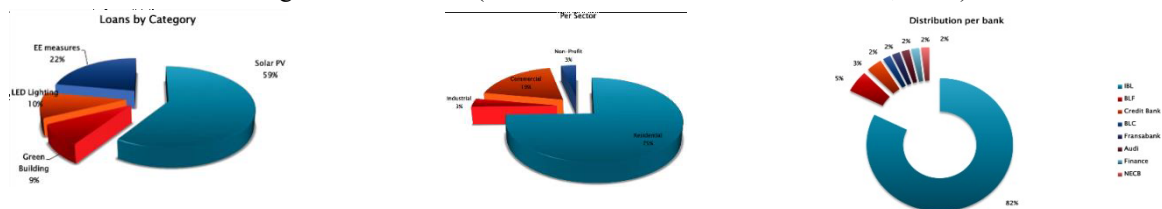


Figure 3: Loan allocated by Category, 2. Loan distribution by Sector, 3. Distribution per Bank  
Source: (Lcec.org.lb, 2013)

**3.5.2 EU and BDL (2007):**

Was signed The Grant Contract, aim to support the investments in sustainable energy with a value of €12,200,000. The Central Bank would pay a grant ranging between 5% to 15% to subsidize loans extended to finance energy projects based on a ceiling of \$5m. per energy loan. (Banqueduliban.gov.lb, n.d.)

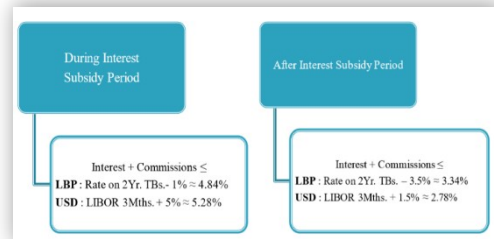


Figure 4 Subsidized Interest Environmental Loans Source:

Source:(Banqueduliban.gov.lb, n.d.)

**3.5.3 UNDP and (UNEP) (2009),**

The United Nations Environment Programme eligible “Global Solar Water Heating Market (GSWH) initiative and incentives led to installations, and the citizens benefited from interest-free loans offered by the BDL to install SWH.

**3.5.4 UNDP and BDL(2010)**

Was signed a Memorandum of Understanding to provide collaboration between both of them for:

- Progressing (NEEREA) the National Energy Efficiency and Renewable Energy Account, is a national financing mechanism initiated by the Central Bank of Lebanon
- Advance attention of building excessive activities, by encouraging the energy efficiency and renewable energy projects between Lebanese banks and their consumers.
- Involve the public sectors and the international organizations to support NEEREA.

Table 3 The value of the loan extended to finance energy Source: (Lcec.org.lb, 2013)

Nature of Project	Rating	Loan Amount
New Project	Not rated	15% of Total Project Value
	Certified	15% of Total Project Value
	Silver	25% of Total Project Value
	Gold	35% of Total Project Value
	Platinum	45% of Total Project Value
Existing Project	Rated or Not Rated	Energy Cost

**3.5.5 LCEC and BDL (2012)**

Signed an Agreement, Technical support and capacity building activities are done by the Lebanese Center for Energy Conservation (LCEC), under the name "Technical Support Consultancy Services Agreement in Energy Efficiency and Renewable Energy". (Lcec.org.lb, 2018) LCEC is a Lebanese agency concerning for all energy efficiency and renewable energy issues, associated to the Ministry of Energy and Water (MEW) and receives the direct managerial and financial support of the United Nations Development Program (UNDP). ("State and Trends of the Lebanese Environment", 2010)

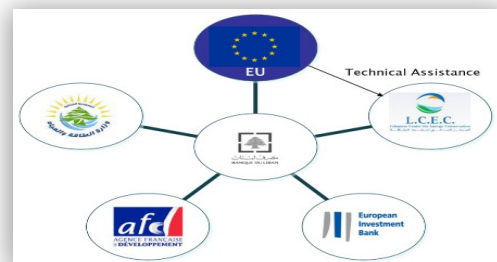


Figure4 NEEREA Mechanism Source: (Banqueduliban.gov.lb, n.d.)

**3.5.6 NEEREA CREEN FINANCING MECHANISM**

NEEREA (2010) "National Energy Efficiency and Renewable Energy Action", initiated by the Central Bank of Lebanon Loans are available to all sectors

- It provides interest-free long-term loans to residential, commercial, non-profit and industrial users for all energy efficiency and renewable energy projects for new and existing facilities.
- The loan is qualified for new environmental friendly projects or for existing projects to enhance their conditions in order to become environmentally sound.
- The loan has a ceiling of 20 million USD and is offered at an interest rate of 0.6% for period that should not exceed 14 years including a grace period of 6 months to 4 years. (Banqueduliban.gov.lb, n.d.) (Lcec.org.lb, 2013)
- Loans amount can be as low as USD 2,000 interest rate is low, 1.075% and reaching as low as 0.3%. The repayment period for existing projects is up to 10 years & 14 years for the new one. ("The National Renewable Energy Action Plan for the Republic of Lebanon", 2016)

- The green loans are provided through all the Lebanese commercial banks to directly reach the end user
- NEEREA documents application process for the “Technical Quality Control” have three template reports:
  - The GREEN template for EE/RE solutions in existing facilities
  - The YELLOW template for EE/RE solutions in new facilities (non-certified)
  - The RED template for certified approach in new facilities (International Certifications such as: LEED, BREEAM, HQE) (Cedro-undp.org, 2016)

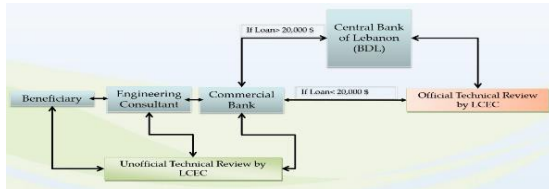


Figure 5 Application process Technical Review of NEEREA Loans. Source: (Cedro-undp.org, 2016)

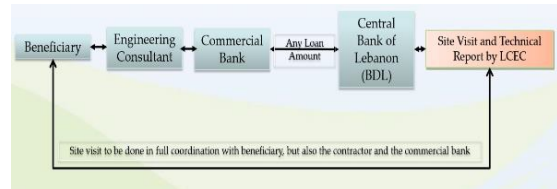


Figure 6 Application process, Site Visit and Review for the EU Grant. Source: (Cedro-undp.org, 2016)

### 3.5.7 European union support bdl (2014):

By two major support tools. A small part of the European Union grant is to finance the technical unit of LCEC, the other part is to launch for local wide marketing campaign to promote the use of green loans in the country. ("The National Renewable Energy Action Plan for the Republic of Lebanon", 2016)

### 3.5.8 Net metering mechanism;

Is a device encourages clean energy and gives back incentives to customers by measuring electricity consumption, it can offset the cost of power drawn from the utility. By installing a meter that records the bidirectional energy flow, and let the extra power to be transferred to the grid. Calculating the net output, the exported energy from the system is subtracted from the imported energy; the consumer receives electricity bill cover only the net consumption, if the energy produced by the system exceeds that imported from the grid, the excess is saved as an energy credit and can be used on later months. It is applied to Australia, Denmark, Italy, Japan, Mexico, and Spain. ("The National Renewable Energy Action Plan for the Republic of Lebanon", 2016) ("State and Local Green Building Incentives", n.d.)



Figure 5 Net metering is a RE incentive, and install SWH Source: ("The National Renewable Energy Action Plan for the Republic of Lebanon", 2016)

## 3.6 Regulatory policies from around the world

- **Renewable energy targets;** most countries had RE support policies in place, also Lebanon declared so
- **FIT/ Feed-in tariff premium payment;** policy states that utilities must obtaining all renewable power for sale and in return receive a premium- the government sets prices (tariffs) through long-term contracts. feed-in premium (FIP), where producers of electricity from renewable sources sell electricity at market prices
- **Electric utility quota obligation;** Renewable portfolio standard (RPS) requires electric utilities to supply renewable electricity to their customers with qualified sources of renewable electricity; most states have adopted RPS requirements use mandatory structure with financial penalties for the rules broken, because it is efficient and cost-effective; obedience for the requirements, will increase demand of



renewable resources. ("Energy and Environment Guide to Action - Chapter 5: Renewable Portfolio Standards | US EPA", 2018).

The differences between FIT and RPS policies. RPS mandates define how much customer request must be met with renewables, while FIT policies work to support new supply development by providing investor confidence

- **Tradable renewable energy credits;** are certificates representing the value of a specific amount of renewable electricity that generated, and collective in units of electricity, that Electric utilities will buy the credits to meet requirements that they produce electricity from renewable sources
- **Tendering;** Public competitive request, or tendering, continues to gain fame and distinction, with the number of countries turning to public auctions increasing, to be global selected in RE tenders

### 3.7 can green building law be the solution

Dose the Green building mitigating the negative impacts which human activity extends on the planet; David Gottfried, the U.S. Green Building Council co-founder believes that "all building should be green" and said, "LEED was designed as a voluntary standard" but many governments depend on it. Today, most U.S., "Class A" building requires Green building certification, and more than half of non-residential construction will be Green and most of that Green building will be certified voluntarily third party LEED®. Green building will soon be the norm and anything else will be substandard. (D. Kaplow, 2013)

Answering the key question, is yes, Green building law that promote improvement can be the Solution to save mankind and our way of life.

### 3.8 Green building profit motivating business

A link between green features and market value has been recorded by the Real Property Association of Canada.

Sustainability and business has a strong harmonious relation both achieves benefits from mitigating the negative effects on the environment; it will increase the income, reduce costs and handle the risk. ("An urgent need to regulate sustainability in Lebanon", 2015)

Tenants recognize and are looking for the profit and benefits that Green building offer, when the operational structures are a competitive, Risk mitigation, Financial Incentives, Employees are More Productive when its healthier and more comfortable environment, lower in the operating costs and maintenance with increase to the rental rates, and by increasing high performing building features will attract higher rents and more clients. Green buildings leasing rates increased 20% above average, owners stated an increase in occupancy by 6.4% for new construction and 2.5% for existing building projects which led into high rental rates.

Between 2008 and 2012 there was a growth in the percentage of businesses that built Green to achieve lower operating costs (from 17% to 76%) and to get higher building values

Market on rise, NEEAP set out a financial mechanism especially to the SWH market. It is initiated by BDL, enables private banks to offer 0% interest loans. It gives the market more improvements (from 22% to 38%).

Sustainability affords an access to a new businesses and a market rated billions of dollars.

("ARZ Building Rating System", n.d.) (D. Kaplow, 2013) ("The National Renewable Energy Action Plan", 2016)

## CONCLUSION

- Without appropriate legislation and controlled regulation, further deterioration on the sustainability measures and renewable resources could be exist, several solutions being recorded around the world against environmental degradation
- Many laws adopted do not reflect the transformational that environmentally extremely severe, which need improvement and upgrading to be suitable and meet with the essential requirement of these days.
- All new projects must meet the minimum requirements of the Green building standard, or need to be certifiable from LEED, ASHRAE, or any equivalent Green Construction Code.
- Governments of Green Communities are recommended to obligate its own Green Construction standards to be implemented mandatory for all commercial, residential, and major renovations constructions, and should

essentially provide property tax exemptions for the projects that meet the standards, with new law incentivizing Green building

- The long term effects of the projects allows to reduce the costs over the long run, developing a sustainable project may cost greater during the first phases but will be certainly reduced later on .
- National framework legislation and regulations must be studied in order to enable municipalities to publish it by laws concerning energy efficiency, "green building" and "green design"
- Different types of Green building incentives offered by governments as encouragement for example Tax Incentives; Bonus Density; Expedited Permitting; Net Metering; Grants; Loans Technical Assistance/ Design Assistance ;Permit/Zone Fee Reductions; Rebates
- Governments are giving tax incentives as an encouragement for using eco-friendly technologies and provide soft loans with very low interest rate, or afford a property tax exemptions for construction or improvements that meet green standards in parallel, the private sector has been developing eco-friendly products to meet the demand of society
- Educating green buildings obligation and incentives, will increasing the awareness of green development.
- Green Building Initiatives have different means; some are mandates, others are recommended, besides financial incentives temporary programs, or technology-specific laws and regulations.

## ACKNOWLEDGEMENT

First and foremost I would like to thank God for answering my prayers and giving me the strength. Second I would like to thank Beirut Arab University for giving me all the support and the resources needed to acquire the information in this paper. In particular, I want to greatly thank Prof. Dr. Amr Galal El-Adawi, president of Beirut Arab University, and Prof. Ibtihal El Bastawissi Dean, Faculty of Architecture - Design & Built Environment. Last but not least, I want to thank my family for their great support throughout this time.

## REFERENCES

- Green Building Regulations & Specifications. (2018). [ebook] Dubai: Dubai Municipality. Available at: <https://www.dm.gov.ae/wps/wcm/connect/662c2fc7-03b4-41a5-aad0-c9d1959773a3/Green+Building+Regulations+and+Speci.pdf?MOD=AJPERES>
- Howe, J., Gerrard, M., & Fucci, F. (2010). *The law of green buildings* (1st ed., pp. 50-90). Chicago, Ill.: American Bar Association, Section of Environment, Energy, and Resources.
- Openei.org. (2015). Green Building Tax Credit Program (Personal) (New York) | Open Energy Information. [online] Available at: [https://openei.org/wiki/Green\\_Building\\_Tax\\_Credit\\_Program\\_\(Personal\)International Partners & Sponsors\\_\(New\\_York\)](https://openei.org/wiki/Green_Building_Tax_Credit_Program_(Personal)International_Partners_&Sponsors_(New_York))
- Energy.gov. (n.d.). Property Tax Abatement for Green Buildings | Department of Energy.
- Leg.state.nv.us. (2014). Nevada Governor's Office of Energy, Green Building Tax Incentive Program: LEED – Leadership in Energy and Environmental Design.
- A. Prum, D. (2009). Creating State Incentives for Commercial Green Buildings: Did the Nevada Experience Set an Example or Alter the Approach of Other Jurisdictions?. [online] [Scholarship.law.wm.edu](http://scholarship.law.wm.edu).
- Banqueduliban.gov.lb. (n.d.). BDL Financing Incentives Banque Du Liban.
- Lcec.org.lb. (2018). NEEREA - About Us - WHAT IS NEEREA?
- Association of Lebanese Industrialists. (2018). BDL Environmental Loans.
- Lcec.org.lb. (2013). BDL'S GREEN LOAN-NEEREA Financial Mechanism.
- Cedro-undp.org. (2016). National Energy Efficiency and Renewable Energy Action.
- Climatechange.moe.gov.lb. (2014). CLIMATE FINANCE LOAN SHCEMS Existing and Planned Loan Schemes in Lebanon
- US EPA. (2016). Retrieved from <https://www.epa.gov/>
- U.S. Environmental Protection Agency. (2016). Retrieved from <https://www.epa.gov/>
- ARZ Building Rating System. Retrieved from <http://www.arzrating.com/pages.aspx?id=3>
- Hinson, D., & Miller, J. (2013). *Designed for Habitat: Collaborations with Habitat for Humanity* By David Hinson, Justin Miller (2nd ed., p. 266). New York, NY: Routledge.
- Howe, J., Gerrard, M., & Fucci, F. (2010). *The law of green buildings* (2nd ed., p. 85). Chicago, Ill.: American Bar Association, Section of Environment, Energy, and Resources.
- D. Kaplow, S. (2013). Can Green Building Law Save the Planet?. *University Of Baltimore Journal Of Land And Development*, Volume 2, (Issue 2, 2014), 137. Retrieved from <https://scholarworks.law.ubalt.edu/cgi/viewcontent.cgi?article=1031&context=ubjld>



- LEGISLATION, 2012 International Green Construction Code. (2012).
- Village of Hastings-on-Hudson, NY Code. (n.d.). Village of Hastings-on-Hudson, NY: Legislative intent.
- Lebanon State of the Environment Report. (2001). Retrieved from [http://www.moe.gov.lb/ledo/soer2001pdf/chpt4\\_con.pdf](http://www.moe.gov.lb/ledo/soer2001pdf/chpt4_con.pdf)
- Environmental Governance Update March 2018. (2017)
- State and Trends of the Lebanese Environment. (2010).
- SELDAS Strengthening the Environmental Legislation Development and Application System in Lebanon. (2003)
- An urgent need to regulate sustainability in Lebanon. (2015).
- The National Renewable Energy Action Plan for the Republic of Lebanon. (2016).
- The Potential of Implementing Property Tax Incentives on Green Building in Malaysia. (2013).
- Energy and Environment Guide to Action - Chapter 5: Renewable Portfolio Standards | US EPA. (2018)
- Local Leaders in Sustainability Green Building Incentive Trends. (2012)
- Renewable & Sustainable Energy Reviews. (2016)
- "State and Local Green Building Incentives", (n.d.) [http://resources.cleanenergyroadmap.com/SCPP\\_Z\\_green-building-incentives.pdf](http://resources.cleanenergyroadmap.com/SCPP_Z_green-building-incentives.pdf)
- EPC - European Policy Centre - Independent think tank. (2018). Retrieved from [http://www.epc.eu/prog\\_intro.php](http://www.epc.eu/prog_intro.php)
- Promotional Schemes for Demand-Side Energy Efficiency. (2015). Retrieved from [https://www.adelphi.de/en/system/files/mediathek/bilder/overview\\_study\\_igef\\_2015\\_1.pdf](https://www.adelphi.de/en/system/files/mediathek/bilder/overview_study_igef_2015_1.pdf)
- Four pillars to Hamburg's Green Roof Strategy: financial incentive, dialogue, regulation and science — Climate-ADAPT. (2016). Retrieved from <https://climate-adapt.eea.europa.eu/metadata/case-studies/four-pillars-to-hamburg2019s-green-roof-strategy-financial-incentive-dialogue-regulation-and-science>