


## Brock Environmental Center

by Richard Cutler / © 2017-05-17 07:53:45 / International / 13663 / EN



Primary energy need :

# 44.6 kWhpe/m<sup>2</sup>.year

(Calculation method : Other )

**ENERGY CONSUMPTION**

*Economical building* *Building*

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

*Energy-intensive building*

**Building Type** : Office building < 28m  
**Construction Year** : 2012  
**Delivery year** : 2014  
**Address 1 - street** : 23455 VIRGINIA BEACH, USA  
**Climate zone** : [Cfa] Humid Subtropical - Mild with no dry season, hot summer.

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**Net Floor Area** : 975 m<sup>2</sup>  
**Construction/refurbishment cost** : 7 130 000 €  
**Number of Work station** : 80 Work station  
**Cost/m2** : 7312.82 €/m<sup>2</sup>

Certifications :



Proposed by :

**SKANSKA**

### General information

The Brock Environmental Center is certified to the Living Building Challenge (LBC) and Leadership in Energy and Environmental Design (LEED) Platinum. The center is designed to be energy positive and zero water, and resilient to the future risks associated with climate change. The center was completed at the end of 2014, but it became one of the world's few buildings certified to the LBC in 2016, after demonstrating its green credentials over a full year.

The Brock Environmental Center on Pleasure House Point in Virginia Beach, Virginia, serves as a hub for the Chesapeake Bay Foundation (CBF). The CBF works to defend one of the nation's most valuable and threatened natural resources, the Chesapeake Bay, by supporting various education, outreach, advocacy and restoration initiatives. The CBF has occupied the building since the end of 2014.

Skanska was involved in the project from the outset to manage the project on behalf of the client and ensure the LBC and LEED objectives were achieved within budget. The building was designed by SmithGroupJJR and constructed by Hourigan Construction. The center includes office space, meeting rooms, exhibit

display areas, an 80-seat conference room, a floating dock and an open-air education pavilion. The building is designed to blend in with the natural surroundings.

The Brock Environmental Center was one of the ten first buildings in the world to be fully certified to all seven petals of the very demanding Living Building Challenge (LBC), and also achieved LEED Platinum. The LBC is a demanding sustainable building certification program that consists of 20 imperatives, which must all be fulfilled following 12 months of operation in order to be certified. LEED is a voluntary U.S. Green Building Council (USGBC) certification process intended to encourage and guide the construction of green buildings. Skanska drew on its unique LBC and LEED experience in the USA, and worked closely with the other project partners to fulfil the ambitions of the demanding project. Pre-construction and planning took one year to identify innovative materials and state-of-the-art technologies that could be used to meet the project's demands.

## See more details about this project

<https://living-future.org/lbc/case-studies/the-chesapeake-bay-brock-environmental-center/#energy>

<http://www.cbf.org/about-cbf/locations/virginia/facilities/brock-environmental-center/dashboard.html?referrer=https://www.google.com/>

## Stakeholders

### Stakeholders

**Function :** Other consultancy agency

Skanska

Curtis Elswick, Senior Vice President Regional Executive at Skanska USA Building, Raleigh, North Carolina. [curtis.elswick@skanska.com](mailto:curtis.elswick@skanska.com)

<http://www.skanska.com>

Project Management on behalf of the client

**Function :** Designer

SmithGroupJJR

Greg Mella

<http://www.smithgroupjjr.com>

Architect & Engineer

**Function :** Contractor

Hourigan Construction

Chris Brandt

<http://www.houriganconstruction.com>

Contractor

**Function :** Other consultancy agency

Janet Harrison Architect

Janet Harrison

Green Building Consultant

### Contracting method

General Contractor

### Type of market

Table 'c21\_luxembourg.rex\_market\_type' doesn't exist

### Building users opinion

"At the Brock Center, we set out to show that a building can have remarkable benefits for both the environment and the community. Now it's a proven concept. All of us have the choice to be sustainable in how we build."

- Will Baker, Chesapeake Bay Foundation President

## Energy

### Energy consumption

Primary energy need : 44,60 kWhpe/m<sup>2</sup>.year

Primary energy need for standard building : 713,00 kWhpe/m<sup>2</sup>.year

Calculation method : Other

CEEB : 0.0001

Breakdown for energy consumption : The consumption figure includes the building's total electricity use (including occupant loads):

Heating - 16,915 kWh

Cooling - 0 kWh (passive cooling system)

Fans & pumps - 10,423 kWh

Lighting - 2,716 kWh

Plus loads & occupants equipment - 8,763 kWh

Other (including domestic hot water) - 5,787 kWh

## Envelope performance

Envelope U-Value : 0,10 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

The building envelope is designed to optimize energy efficiency with walls, roof and triple glazed windows with U-values of 0.03 W/m<sup>2</sup>K, 0.02 W/m<sup>2</sup>K and 0.14 W/m<sup>2</sup>K respectively.

## More information

The center generated 183% of its total energy needs in its first year of operation through energy efficiency, a 45 kW solar PV system, two 10kW wind turbines, and a geothermal heating/cooling system.

## Real final energy consumption

Final Energy : 44,60 kWhfe/m<sup>2</sup>.year

Year of the real energy consumption : 2 015

## Renewables & systems

### Systems

Heating system :

- Geothermal heat pump

Hot water system :

- Heat pump

Cooling system :

- Geothermal heat pump

Ventilation system :

- Natural ventilation
- Nocturnal ventilation
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Heat pump (geothermal)
- Micro wind

Renewable energy production : 100,00 %

PV solar system - 45 kW

Two 10 kW wind turbines

Solutions enhancing nature free gains :

Natural ventilation and nighttime cooling

## Environment

### Urban environment

The Brock Environmental Center is in a rural location adjacent to the Chesapeake Bay, which the Chesapeake Bay Foundation is tasked to protect and educate

visitors about.

Land plot area : 40 460,00 m<sup>2</sup>

Built-up area : 5,00 %

Green space : 95,00

## Products

### Product

Climate change resilience

Skanska and project partners

Skanska

<http://www.skanska.com>

Product category :

The center is situated by the coast to support the client's education program, and is designed to be resilient to the future risks associated with climate change. The building is set back 200 ft (60m) from the shore and sits 14 ft (4 m) above the sea level to protect against sea-level rise. The structure and windows are also designed to resist hurricane force winds.



The building is also equipped with zinc shingles and thick, galvanized-coated steel resistant to corrosion from salt spray.

One of CBF's objectives is climate resilience. This climate adaption to climate change is complementary to the Brock Environmental Center's approach to climate mitigation - for example through energy efficiency and renewable energy.

## Costs

### Construction and exploitation costs

Renewable energy systems cost : 400 000,00 €

Total cost of the building : 9 900 000 €

## Health and comfort

### Water management

Consumption of harvested rainwater : 70,70 m<sup>3</sup>

The building is net-zero water, and was the first public building in the USA to be legally allowed to use purified rainwater for human consumption, which required the facility to be certified as a water treatment plant. The state-of-the-art rainwater harvesting and filtration system consists of two 1,600 gallon (6,000 liter) rain cisterns and can supply the building through six weeks of drought. The building uses 90% less water than a typical office building of its size, and is equipped with waterless composting toilets, and water efficient bathroom fittings.

The wastewater from sinks and showers is collected and channeled to an infiltration garden that consists of native plants where natural processes clean and return it to the underground aquifer. Liquid from the seven composting toilets is collected free of charge by the City of Virginia Beach who process it into agricultural fertilizer, which they sell.

### Indoor Air quality

The building has been designed to use fresh air ventilation when outdoor conditions allow, and non-hazardous and low VOC substances have been used to promote good indoor air quality.

### Comfort

Health & comfort : Extensive glazing allows natural light into the narrow building and allow external views of the surrounding natural coastal environment.

Calculated indoor CO<sub>2</sub> concentration :

less than 1 ppm

## GHG emissions

**Methodology used :**

The building produces a surplus of approximately 35,000 kWh per year.

## Contest

### Reasons for participating in the competition(s)

# A pioneering energy positive, net-zero water and Living Building Challenge building

The Brock Environmental Center was one of the ten first buildings in the world to be fully certified to all seven petals of the very demanding Living Building Challenge (LBC), and is certified to Leadership in Energy and Environmental Design (LEED) Platinum. The center generates almost double its annual energy demand and uses rainwater to meet all its water needs. Materials were carefully selected to meet the LBC requirements, and the building is designed to promote healthy indoor environments. The center is also designed to be resilient to the future risks associated with climate change.

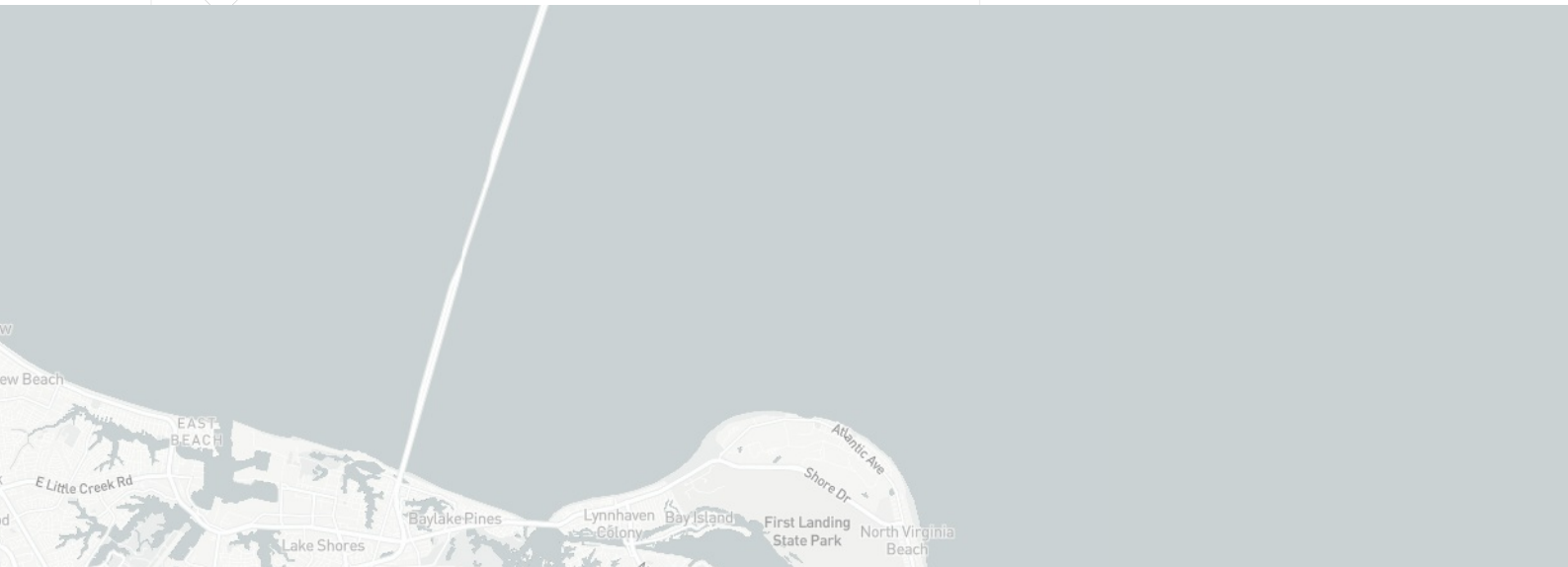
### Building candidate in the category

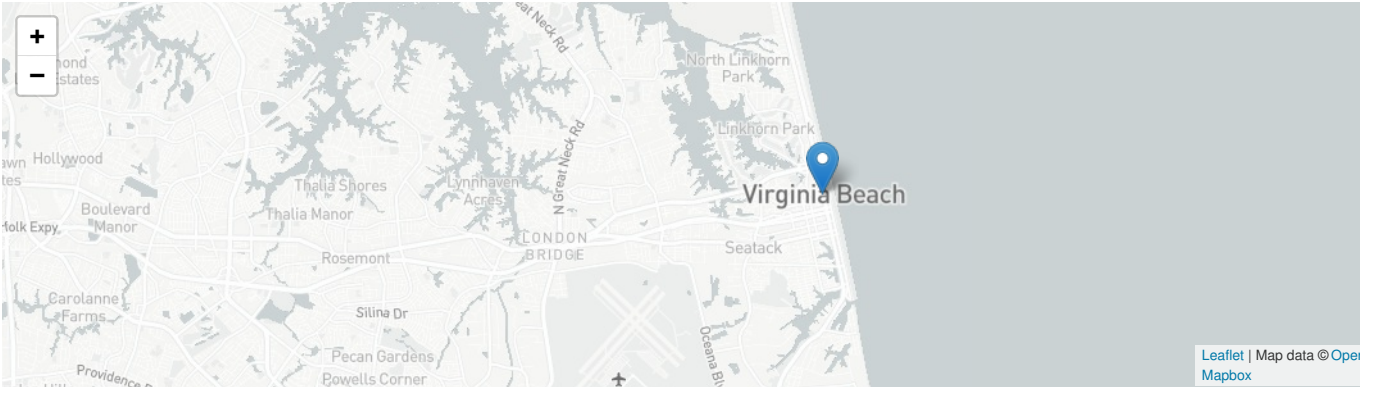


Energy & Temperate Climates



Low Carbon





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