Ellison Turpin
Assignment 06 - Green Building Analysis

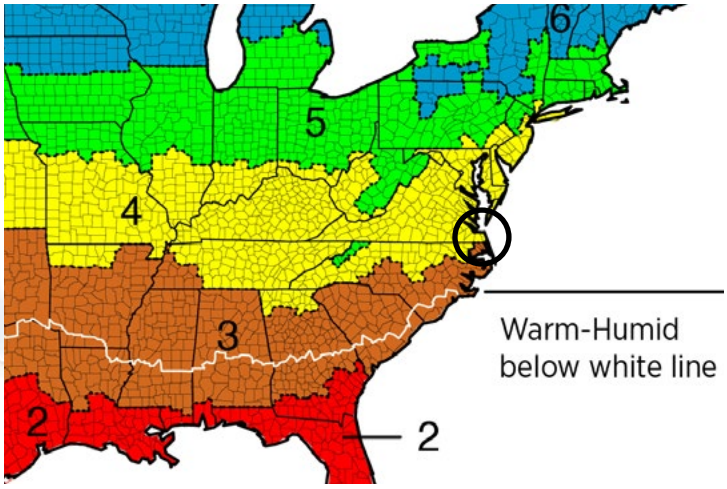
ARCH 631
Environmental Systems I

Brock Environmental Center
Virginia Beach, VA
2015

Owner: Chesapeake Bay Foundation
Architect: SmithGroupJJR
Area: 10,518 SF
Cost: $7.3 Million

Location: Virginia Beach, VA
IECC Climate Zone 4
Mixed Temperature and Humid

Jan	Ave High 49F Ave Low 34F	Apr	Ave High 67F Ave Low 48F	Jul	Ave High 87F Ave Low 72F	Oct	Ave High 71F Ave Low 56F
Feb	Ave High 53F Ave Low 35F	May	Ave High 75F Ave Low 57F	Aug	Ave High 86F Ave Low 71F	Nov	Ave High 62F Ave Low 45F
Mar	Ave High 59F Ave Low 40F	Jun	Ave High 84F Ave Low 67F	Sep	Ave High 81F Ave Low 66F	Dec	Ave High 53F Ave Low 37F



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Green Rating:
- LEED Platinum
Living Building Certified

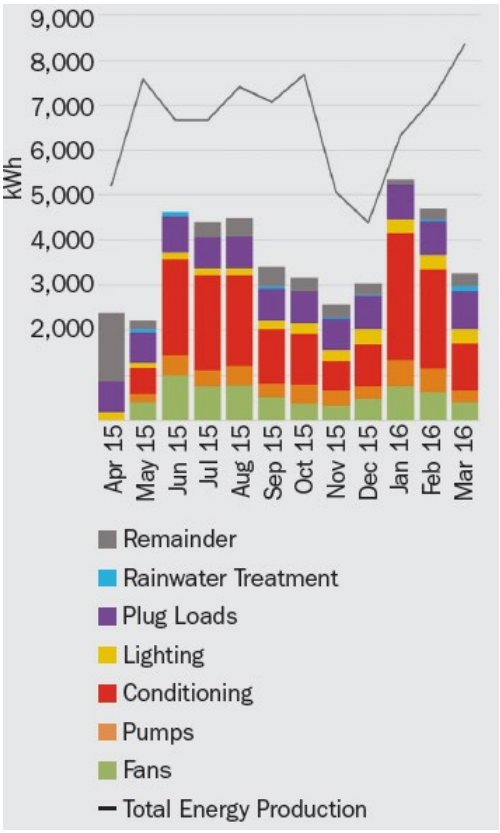
The Brock Environmental Center was designed to be Net-Zero following the Living Building Challenge's requirements. After 2 years of occupation, the building seems to have surpassed it's originally designed goals.

Design Features:

Net-Zero Water
- Composting Toliets
- Low-Flow Lavatories
- Low-Flow Appliances
- No Permanent Irrigation
- Two 1,650 Water Cisterns
- Filters allow the water to be used for both potable and non-potable uses

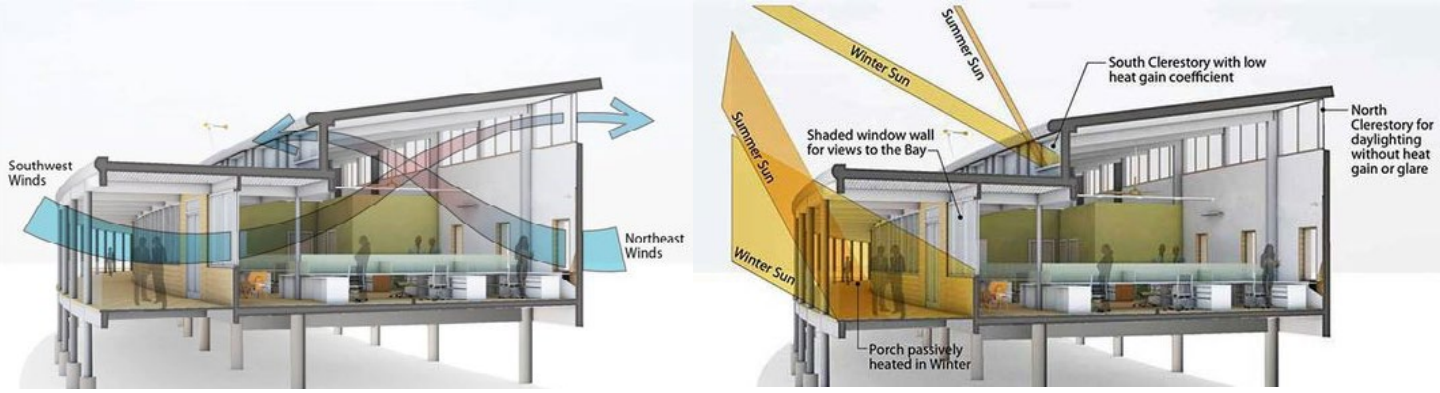
Net-Zero Energy
- Early energy modeling
- Natural Ventilation
  - Movable Windows and Walls
- Daylighting
- Geothermal Wells
- Photosensor dimming controls when the sun is out
- Two Wind-Turbines
- Photovoltaic Panels

Other Features:
- Motorized windows for night-flush
- Salvaged Materials



Heat Flow Equation:

Solar + Conduction + Ventilation + Infiltration + Evaporation + Internal Gains



Solar:
The exterior envelope has a 25% window-to-wall ratio to maximize daylighting and views without generating too much heat gain. The southern porch acts as a deep visor for the interior, preventing unwanted heat gain during the summer months.

Conduction:
"The exterior envelope was optimized (R-31 walls, R-50 roof, R-7 triple-glazed/argon-filled windows) to reduce heating demand." (http://www.hpbmagazine.org/Case-Studies/Brock-Environmental-Center-Virginia-Beach-Va/)

Ventilation:
Due to the location of the Brock Environmental Center at the intersection of the Atlantic Ocean and the Chesapeake Bay, the climate tends to be moderate with abundant natural breezes. The building is designed to capture the bi-directional breeze to allow for a constant movement of air. A set of clerestory windows line a slightly higher section to draw the hot air outside. Many of the windows and walls are operable to allow occupants to have more control over their surroundings.

Infiltration:
The building is mainly clad in sinker cypress wood with continuous air barries and insulation.

Evaporation:
The immediate adjacency to the Chesapeake Bay helps mitigate heat flow.

Internal Gains:
Interior lighting is set on photosensors that can brighten and dim the lights based on the sunlight outside. Additional occupancy sensors are used to turn off lights when no one is around.

What I'd change...

I would add additional outdoor spaces for the occupants to be able to engage with the environment a little more. The covered porch around the southern facade of the building begins to address this, but would be better if a covered "break room" of sorts could be provided.

It's an aesthetic choice, but I think the wind turbines disrupt the environment. I wonder if they could have been incorporated as part of the building structure instead.