GETTING **SCHOOLED** IN PASSIVE HOUSE

**a tale of TWO schools**
LEARNING OBJECTIVES

1. Identify the challenges that can be expected during the design, bid and construction phases of a passive house project.

2. Explain how energy modeling and the PHIUS (Passive House Institute US) review process can inform the evolution of the building envelope, building systems and project detailing.

3. Compare HVAC system options and describe the methods used for monitoring performance.

4. Explain the PHIUS certification process and identify the deliverables required beyond standard certification.

SOME PRIOR KNOWLEDGE HELPFUL
PRESENTERS

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BRIBURN
Principal / Architect

CHRIS BRILEY, CPHC, LEED AP
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MAINE COAST WALDORF HIGH SCHOOL
WAYNFLETE LOWER SCHOOL
CASE STUDIES

MAINE COAST WALDORF HIGH SCHOOL

WAYNFLETE LOWER SCHOOL
### PROJECT GOALS

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**Anthroposophic Design** – creating organic expressionistic designs that cultivate a sensory experience
**PROJECT FACTS**

**MAINE COAST WALDORF HIGH SCHOOL**

- **LOCATION:** FREEPORT, ME (RURAL)
- **SIZE:** 11,400 SF
- **OCCUPANTS:**
  - 80 STUDENTS (9-12)
  - 10 FACULTY
- **COST:**
  - $2,842,000 ($249 PSF AVG)
  - $3,332,000 ($292 PSF W/SITE)
- **DURATION:**
  - DESIGN 7 MONTHS
  - CONSTRUCTION 10 MONTHS (COO)
- **EUI:** 14.5 kBTU/ft² (MODELED)

**WAYNFLETE LOWER SCHOOL**

- **LOCATION:** PORTLAND, ME (URBAN)
- **SIZE:**
  - 28,000 SF NEW CONSTRUCTION
  - 7,100 SF RENOVATION
- **OCCUPANTS:**
  - 212 STUDENTS (EC - 5TH GRADE)
  - 24 FACULTY
- **COST:**
  - $8,600,000 ($245 PSF AVG)
  - $3,332,000 ($292 PSF W/SITE)
- **DURATION:**
  - DESIGN 48 MONTHS
  - CONSTRUCTION 18 MONTHS (COO)
- **EUI:** 12.6 kBTU/ft² YR (MODELED)
ACCOMPLISHMENTS

MAINE COAST WALDORF HIGH SCHOOL

PASSIVE HOUSE - PHIUS + 2015
- Healthy
- Comfortable
- Very Little Energy Needed

MAINE ADVANCED BUILDINGS CERTIFICATION
- At least 30% more energy efficient than minimum code requirements
- Maintenance and monitoring systems ensure building performs
- New Buildings Institute – Tier 2
- $0.25 / SF to architect ($2,788 total)
- $1.50 / SF to owner ($16,731 total)
ACCOMPLISHMENTS

WAYNFLETE LOWER SCHOOL

PASSIVE HOUSE US +2015 (PRE-CERTIFIED)
• Healthy
• Comfortable
• Very Little Energy Needed

EFFICIENCY MAINE PRESCRIPTIVE INCENTIVE PROGRAM
Heating and Cooling Solutions:
• variable refrigerant flow systems ($3 psf)

Lighting Solutions:
• LPD performance / DLC qualified LEDs (53% cost)
• Occupancy Sensors (33% cost)
WHAT’S PASSIVE HOUSE

HOW IS IT DIFFERENT?

PASSIVE HOUSE
1. Solar orientation
2. High insulation
3. High performance windows
4. Airtight enclosure
5. Balanced ventilation with heat recovery
Life Cycle Costs / Facilities Operations ➔ Good Business Sense
Energy Conservation ➔ Legacy of Sustainable Responsibility
Environmental Benefits
daylighting, natural light
quieter spaces
fresh air
comfortable, even temperatures
independent controls

Measurable Performance ➔ Teaching Tool
HOW WE GOT HERE

TEAM PLAYERS

STRATEGIC TEAM BUILDING

TOOLS TO GET STARTED
TEAM PLAYERS

MAINE COAST WALDORF HIGH SCHOOL

BARTLETT DESIGN

LOWELL SPECIFICATIONS, INC.
TEAM PLAYERS

WAYNFLETE LOWER SCHOOL

scott simons architects

Waynflete

Allied Engineering
Structural Mechanical Electrical

sustainability:

Woodard & Curran

Thornton Tomasetti

PML Project Management, Inc.

WR Wright-Ryan

Lowell Specifications, Inc.

ABA Advanced Building Analysis
STRATEGIC TEAM BUILDING

WHO / WHAT / WHEN

MCW

WFLS
TOOLS TO GET STARTED

SUCCESS IN ENERGY MODELING + NAVIGATING THE PHIUS PROCESS
TOOLS TO GET STARTED

SUCCESS IN ENERGY MODELING + NAVIGATING THE PHIUS PROCESS
TOOLS TO GET STARTED

SUCCESS IN ENERGY MODELING + NAVIGATING THE PHIUS PROCESS
DESIGN CONSIDERATIONS

- SITE / CONTEXT
- BUILDING DESIGN
- BUILDING ENVELOPE
- BUILDING SYSTEMS
- PERFORMANCE
DESIGN CONSIDERATIONS

SITE / CONTEXT

BUILDING DESIGN

BUILDING ENVELOPE

BUILDING SYSTEMS

PERFORMANCE
SITE / CONTEXT
BUILDING DESIGN
SITE / CONTEXT
BUILDING DESIGN
FLEXIBLE CLASSROOM LAYOUTS:

EXAMPLE A

1. Classroom habitat
2. Gathering space
3. Activity station
4. Play loft
5. Restrooms

EXAMPLE B
DESIGN CONSIDERATIONS

SITE / CONTEXT

BUILDING DESIGN

BUILDING ENVELOPE

BUILDING SYSTEMS

PERFORMANCE