



Daylighting and the National Building Code of the Philippines

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Presentation

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- An evaluation of the readiness of the National Building Code for energy efficiency applications
- DOE Initiative on Daylighting
 - Daylighting Teaching Module
 - Public-Private Partnership
- Daylighting - Thinking Out of the Box

The National Building Code of the Philippines

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Timeline

- August 26, 1972: Republic Act No. 6541, “*An Act to Ordain and Institute a National Building Code of the Philippines*”.
- **February 19, 1977: Presidential Decree No. 1096**, the New Building Code was adopted, revising RA 6541.
- 1977-1979: Ministry of Public Works, Transportation and Communications (now DPWH) issued various Memorandum Orders, which were then compiled by the DPWH and approved as the “*Implementing Rules and Regulations of PD1096*”.
- October 29, 2004: Approval of the “*Revised Implementing Rules Regulations of the National Building Code of Philippines (PD1096)*”, which took effect on April 30, 2005.

The National Building Code of the Philippines

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Section 102, 1977 National Building Code

Declaration of Policy

“It is hereby declared to be the *policy of the State to safeguard life, health, property, and public welfare, consistent with the principles of sound environmental management and control*; and to this end, make it the purpose of this Code to provide for all buildings and structures, a framework of *minimum standards and requirements* to regulate and control their location, site, design quality of materials, construction, use, occupancy, and maintenance.”

The National Building Code of the Philippines

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1. ENERGY EFFICIENCY, RENEWABLE ENERGY AND ATMOSPHERE

- **Section 1301. Electrical Regulation**

- All electrical systems equipment and installation mentioned in this Code shall conform to the provisions of the Philippine Electrical Code, as adopted by the board of Electrical Engineering pursuant to Republic Act No. 184 otherwise known as the Electrical Engineering Law.

2. SITE CONSERVATION AND SUSTAINABLE LAND USE PLANNING

- **Section 105. Site Requirements**

- The land or site upon which will be constructed any building or structure, or any ancillary or auxiliary facility thereto, shall be sanitary, hygienic or safe. In the case of sites or buildings intended for use as human habitation or abode, the same shall be at a safe distance, as determined by competent authorities, from streams or bodies of water and/or sources of air considered to be polluted; from a volcano or volcanic site and/or any other building considered to be a potential source of fire or explosion.

The National Building Code of the Philippines

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3. WATER CONSERVATION AND EFFICIENCY

- **Section 902. Water Supply System**

- xxx (d) The design, construction and operation of independent waterworks, systems of private housing subdivisions or industrial estates shall be governed by existing laws relating to local waterworks system.
- (e) The water piping installations inside buildings and premises shall conform to the provisions of the National Plumbing Code of the Philippines.

- **Section 903. Wastewater Disposal System**

- xxx (c) Sanitary and industrial plumbing installations inside buildings and premises shall conform to the provisions of the National Plumbing Code.

- **Section 904. Storm Drainage System**

- (a) Rain water drainage shall not discharge to the sanitary sewer system.
xxx

The National Building Code of the Philippines

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4. CONSERVATION OF MATERIALS AND RESOURCES

- **Section 1201 General Requirements.**
- Buildings proposed for construction shall comply with all the regulations and specifications herein set forth governing quality, characteristics and properties of materials, methods of design and construction, type of occupancy and classification. All other matters relative to the structural design of all buildings and other structures not provided for in this Chapter shall conform with the provisions of the National Structural Code of Buildings, as adopted and promulgated by the Board of Civil Engineering pursuant to the Republic Act Number 544, as amended, other wise known as the "Civil Engineering Law"

The National Building Code of the Philippines

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5. INDOOR ENVIRONMENTAL QUALITY AND HUMAN HEALTH.

- **Section 801. General Requirements of Light and Ventilation**
 - (a) Subject to the provisions of the Civil Code of the Philippines on Easement of Light and View and to the provisions of this part of the Code, every building shall be designed, constructed, and equipped to provide adequate light and ventilation. xxx
- **Section 906. Noise Pollution Control**
 - 1. Industrial establishments shall be provided with positive noise abatement devices to tone down the noise level of equipment and machineries to acceptable limits set down by the Department of Labor and the National Pollution Control Commission.
 - 2. Noise as unwanted sound both in quality and intensity and excessive vibration whose sources in building/structure construction shall conform to acceptable limits of the required emission standards of DENR.

The National Building Code of the Philippines

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INDOOR ENVIRONMENTAL QUALITY AND HUMAN HEALTH.

- **Civil Code of the Philippines on Easement of Light and View - pertains to prohibition to make an opening through the party wall**

The National Building Code of the Philippines

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INDOOR ENVIRONMENTAL QUALITY AND HUMAN HEALTH.

- **Section 801. General Requirements of Light and Ventilation**
- For rooms not provided with artificial ventilation system, window/windows shall be equal to 10% of the area of the room with a total free area of openings equal to at least 10% of the floor area of the room, provided that such opening shall not be less than 1.00 sq. Meter.

Daylighting and the National Building Code

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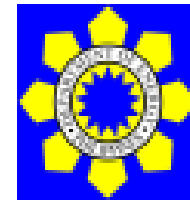
“You can't expect to meet the challenges of today with yesterday's tools and expect to be in business tomorrow.”

-Unknown-

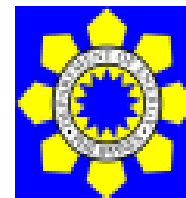
DOE's Daylighting Initiatives

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- Philippine Efficient Lighting Market Transformation Project(PELMATP)



- Philippine Energy Efficiency Project (PEEP)



Philippine
Efficient
Lighting
Market
Transformation
Project
(PELMATP)



Teaching Module

- Introduction
- Daylighting Design of Interiors
 - D.1 Daylighting Availability
 - D.2 General Daylight Delivery Systems
 - D.3 Daylight Control Methods
- Interaction with Electric Lighting
- Daylighting Analysis

Introduction: Why daylighting?

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- Historical
- Aesthetics
- Color Quality of Daylight
- Energy Issues
 - Minimize direct solar gain during summer months
 - Distribution of daylight within the building
- Psychological Benefit
- Physical Benefit
- Other Benefits

Daylighting Design of Interiors

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D.1 Daylighting Availability

- Solar position
- Standard skies
- Other variables
- Reflected ground light

Daylighting Design of Interiors

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D.2 General Daylight Delivery Systems

- Skylights
- Windows
- Light Shelves
- Monitors
- Clerestories

Daylighting Design of Interiors

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D.3 Daylight Control Measures

- Overhangs
- Louvers
- Fenestration materials
- Specialty fenestration
- Interior controls

Daylighting Analysis

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Analysis Methods

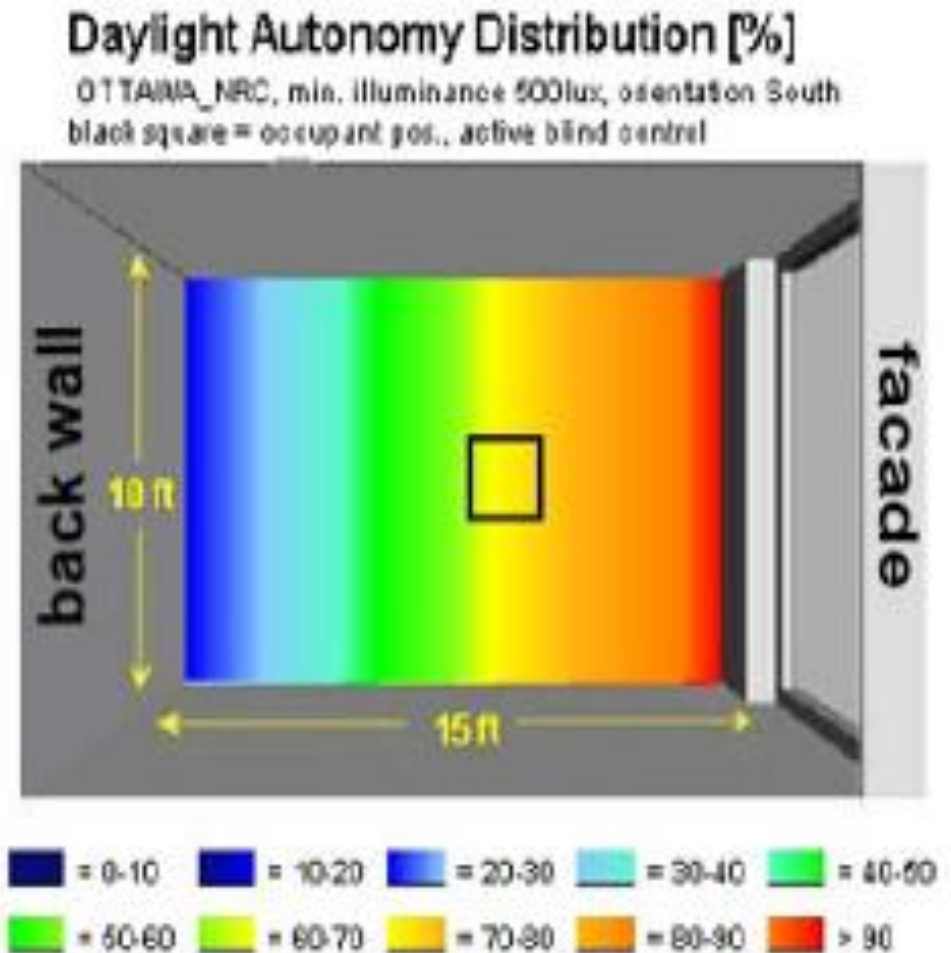
- Lumen Method for Toplighting(skylights)
- Lumen Method for Sidelighting (window walls)
- Daylight Factor Method(overcast skies)

Daylighting Analysis

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Software tools

Lightswitch Wizard
(www.buildwiz.com)



Daylighting Analysis

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Software tools

Sustainability Toolkit
(www.iesve.com)

LEED NC 2.2 credit 8.1

Daylight simulation model data:

Project file: c:\documents-1\rooms-1\area\locale-1\comp\sample-1\SampleShed.dgn
 Calculated at: 12 February 2007, 13:41
 Sky model: CIE Clear Sky on 21 Mar at 17:00
 Location: Boston, Massachusetts (42.41°N, 71.25°W)
 Working plane height: 10 inches
 Desk size: 5 feet
 Illuminance threshold = 200.000 lux

Fluorescent rooms for daylighting

| Room ID | Room name | Floor area (sq ft) | Minimum Illumination (lux) | Working plane area > threshold (sq ft) |
|------------|--------------------|--------------------|----------------------------|--|
| 00-0001-00 | 10 Office | 16.829 | 75.287 | 4.234 |
| 00-0001-01 | 11 Office | 23.815 | 556.034 | 29.390 |
| 00-0001-02 | 12 Office | 24.152 | 153.427 | 15.534 |
| 00-0001-11 | 13 Office | 26.880 | 20.338 | 5.585 |
| 00-0001-14 | 14 Office | 25.505 | 149.591 | 14.219 |
| 00-0001-2A | 16 Office | 23.040 | 487.508 | 23.040 |
| 00-0001-2B | 17 Office | 23.040 | 429.542 | 23.040 |
| 00-0001-60 | 18 Office | 23.040 | 503.828 | 23.040 |
| 00-0001-72 | 23 Lounge | 46.327 | 73.871 | 20.516 |
| 00-0001-78 | 26 Office | 36.418 | 187.850 | 29.538 |
| 00-0001-79 | 27 Office | 17.961 | 100.814 | 5.492 |
| 00-0001-7E | 28 Office | 18.180 | 94.838 | 5.387 |
| 00-0001-91 | 29 Office | 28.305 | 190.506 | 16.219 |
| 00-0001-93 | 3 Office | 23.040 | 193.122 | 20.582 |
| 00-0001-87 | 31 Conference Room | 36.472 | 376.435 | 36.472 |
| 00-0001-8A | 32 Office | 23.040 | 326.642 | 23.040 |
| 00-0001-8C | 33 Office | 23.040 | 505.428 | 23.040 |
| 00-0001-76 | 4 Office | 23.040 | 563.817 | 23.040 |
| 00-0001-7B | 5 Office | 23.040 | 402.122 | 23.040 |
| 00-0001-9C | 6 Office | 26.153 | 251.013 | 17.394 |
| 00-0001-9F | 7 Office | 28.700 | 141.084 | 15.475 |
| 00-0001-32 | 8 Office new | 26.193 | 487.282 | 20.513 |
| 00-0001-34 | 9 Office | 17.451 | 85.544 | 3.905 |

LEED NC 2.2 EQ credit 8.1 day light each classroom (PASS)

A pass requires 75% or more of the total area to be over the threshold.

The Sustainability Toolkit performs daylighting analysis with results displayed in a graphic form (inset) or in a format required for LEED submittal.

Daylighting: Public-Private Partnership on Voluntary Standard

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**Philippine
Energy
Efficiency
Project (PEEP)**



**Philippine Green
Building Council**



**BUILDING FOR ECOLOGICALLY
RESPONSIVE DESIGN
EXCELLENCE
(BERDE)**

BERDE Green Building Rating System

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Energy Point 3 (EN-PT-3): Natural Ventilation

- Take advantage of natural/passive means of ventilation inside the building by using the natural flow of external air where appropriate

Indoor Environmental Quality Point 1(EQ-PT-1) External View and Daylighting

- Connect the building occupants with the outdoor environment with good levels of daylight for building users

BERDE for Operations (EQ-RQ-1)

- Collect anonymous responses about thermal comfort, acoustics, indoor air quality, lighting levels building cleanliness and other occupant comfort issues.

Other Government Initiatives

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- House Bill 6397: Green Building Act of 2009
- Quezon City Green Building Ordinance of 2009

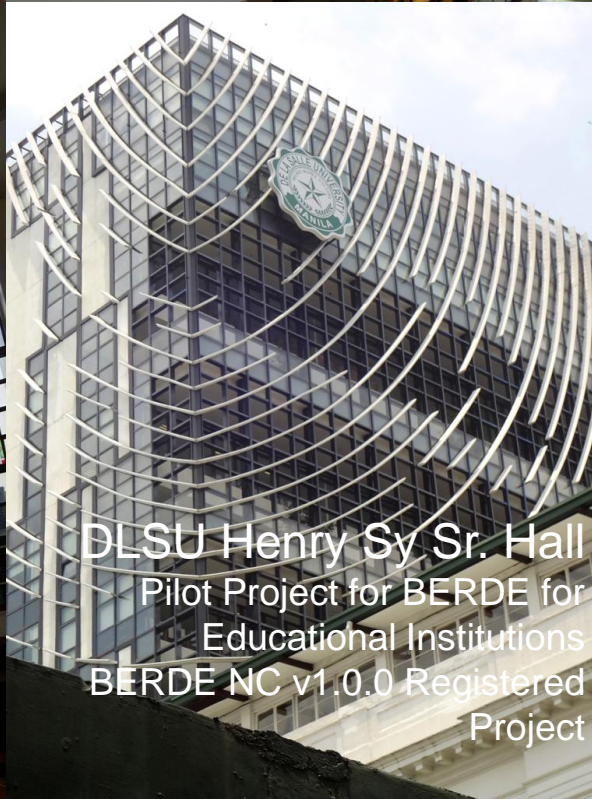
Issuance/Standards

- Guidelines for Energy Conserving Design of Buildings(DOE)
- Manual of Practice on Efficient Lighting(DOE)
- Occupational Safety and Health Standards (DOLE)



Ayala Tower One
Pilot Project for BERDE
for Existing Buildings

Clerestory windows of
Glorietta Mall, Makati
City



DLSU Henry Sy Sr. Hall
Pilot Project for BERDE for
Educational Institutions
BERDE NC v1.0.0 Registered
Project



Daylighting

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Thinking Out of the Box



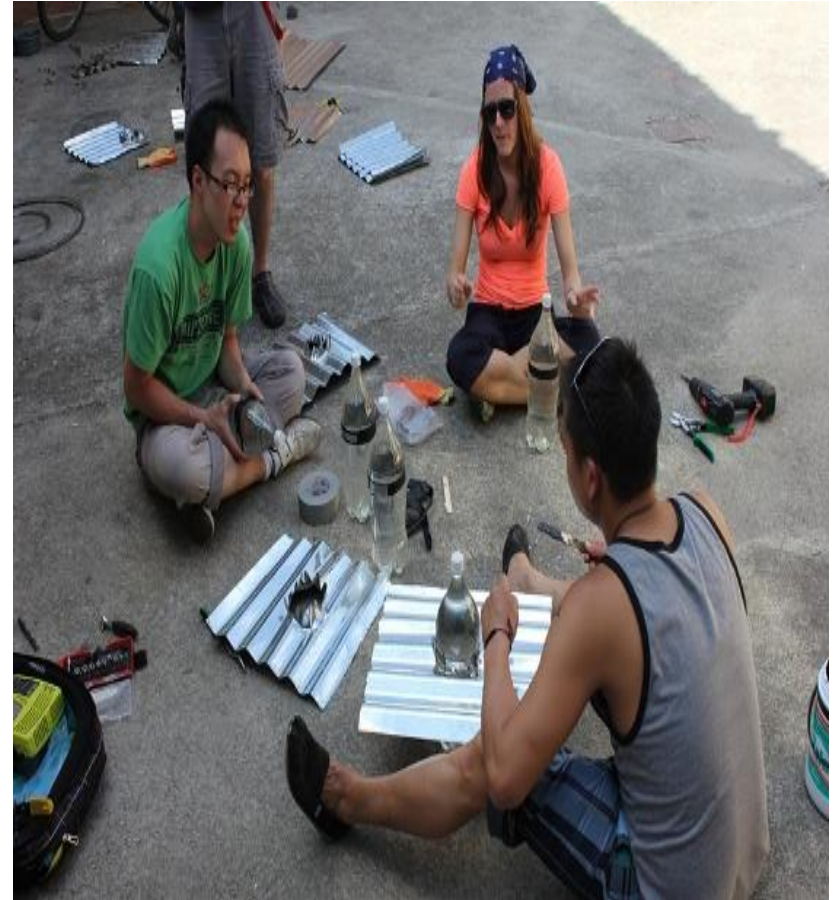
Liter of Light

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Liter of Light

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Seventh *lites.asia* workshop – Jakarta, Indonesia, 22-23 April 2013

Liter of Light

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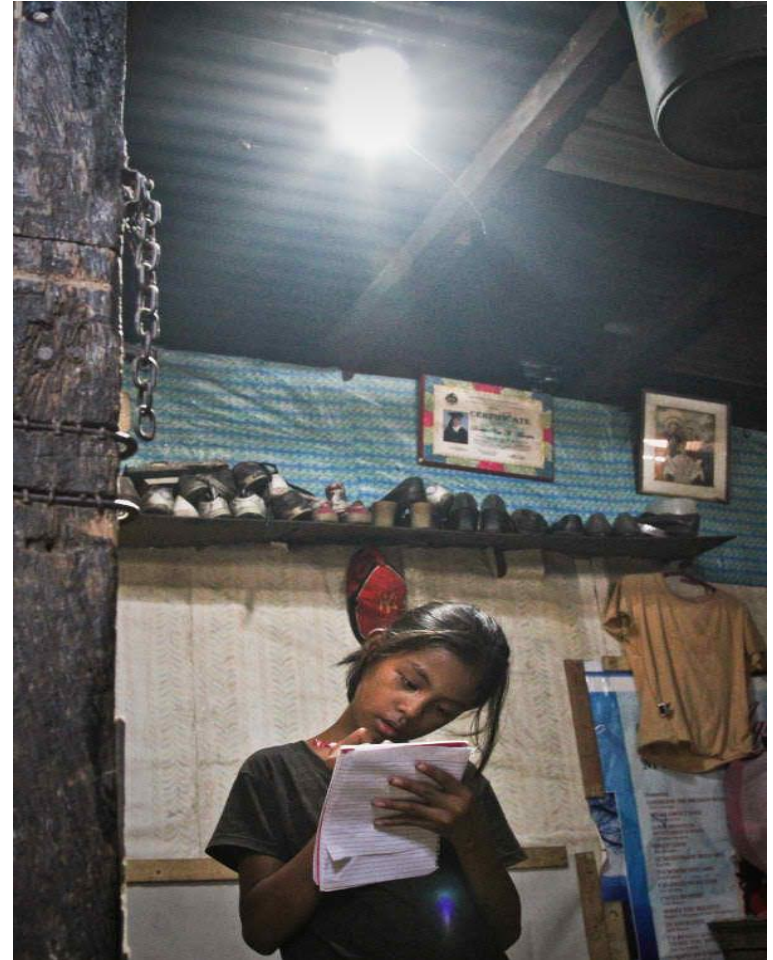
MyShelter Foundation: Lighting up homes with a plastic bottle and some chlorine

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Liter of Light

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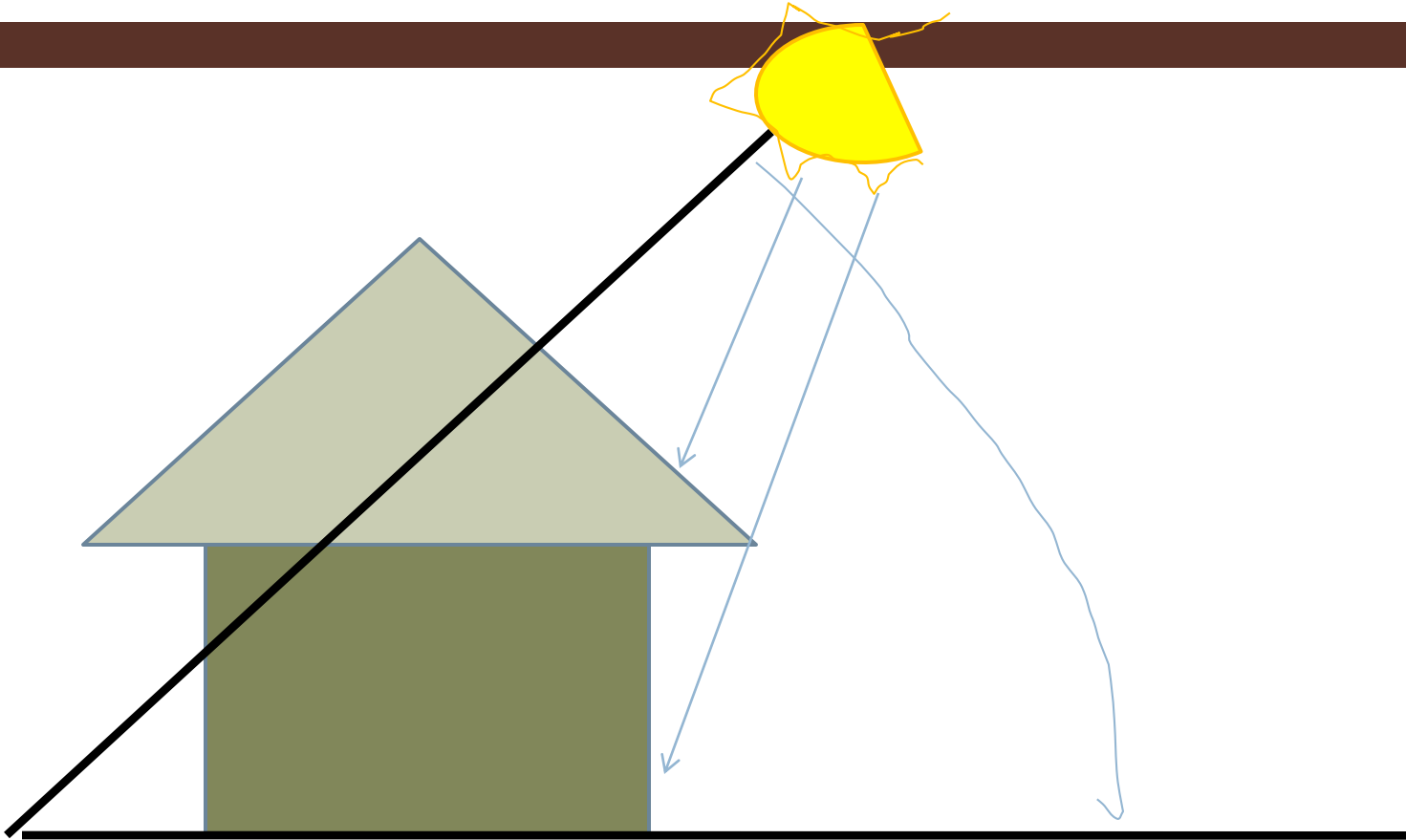
SOLAR BOTTLE LIGHT is a good source of daylight--
up to 55 watts

Obstacles don't have to stop you. If you run into a wall, don't turn around and give up. Figure out how to climb it, go through it, or work around it.

-Michael Jordan

THANK YOU!

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