# Towards Green Housing in Turkey

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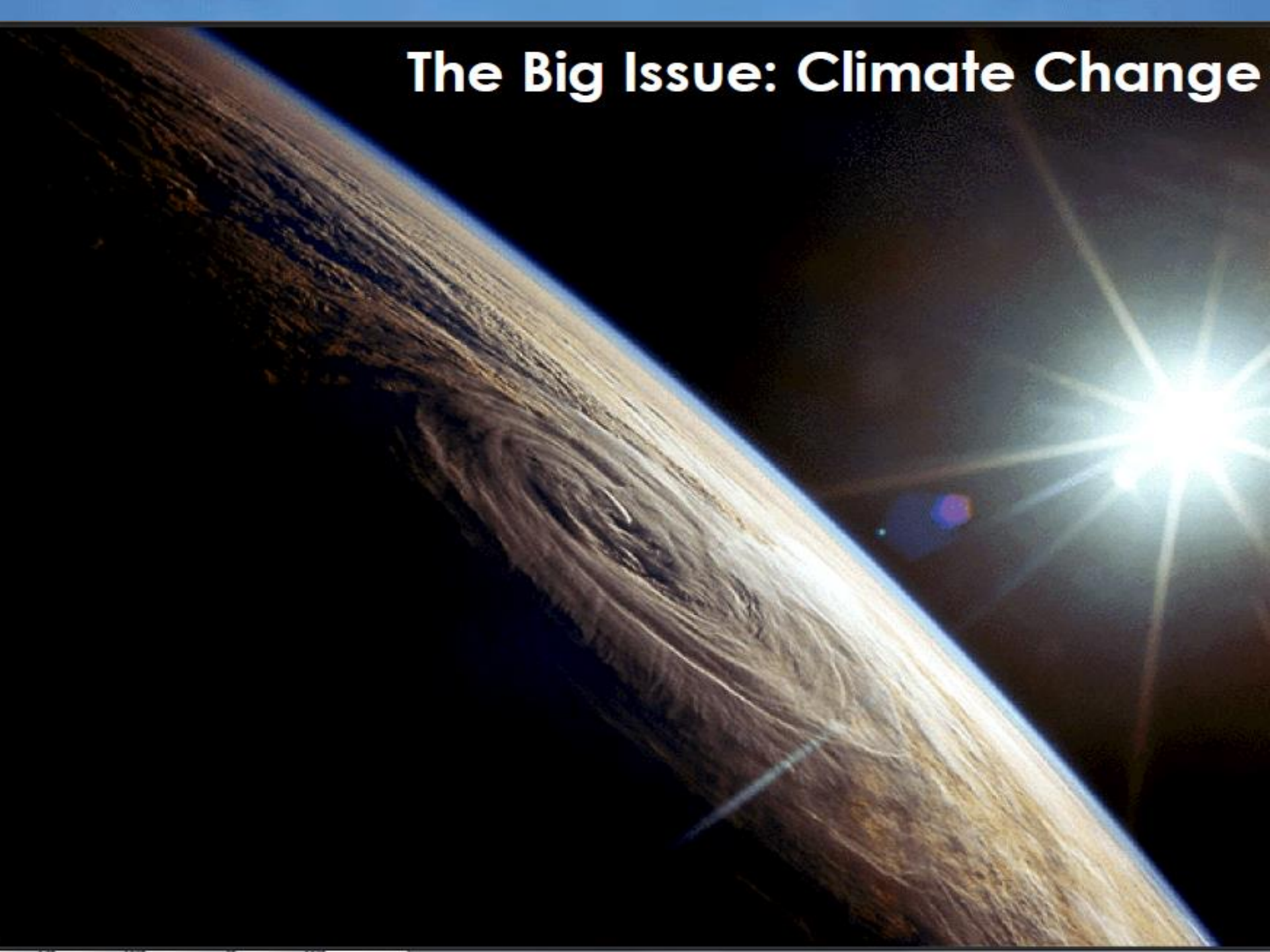
MARCH 2022

# Our Green Campus

**UCI has a long history of environmental and sustainability leadership dating back to the *Nobel prize-winning research of F. Sherwood Rowland* into the depletion of the ozone layer almost five decades ago.**

# The Big Issue: Climate Change



WORLD GREEN BUILDING COUNCIL


## Climate Change

We have roughly 3,650 days
To do something very drastic
about this climate change
problem or else hundreds of
thousands, millions of people,
our children, our grand children
will be displaced by catastrophes
that will occur.

Ira Magaziner
Director,
Clinton Climate Initiative


A continuing
Crime Against
our Children

- **The world faces a challenging situation in the development of housing, agricultural, food security, educational and infrastructure systems**


WELCOME

# Facts

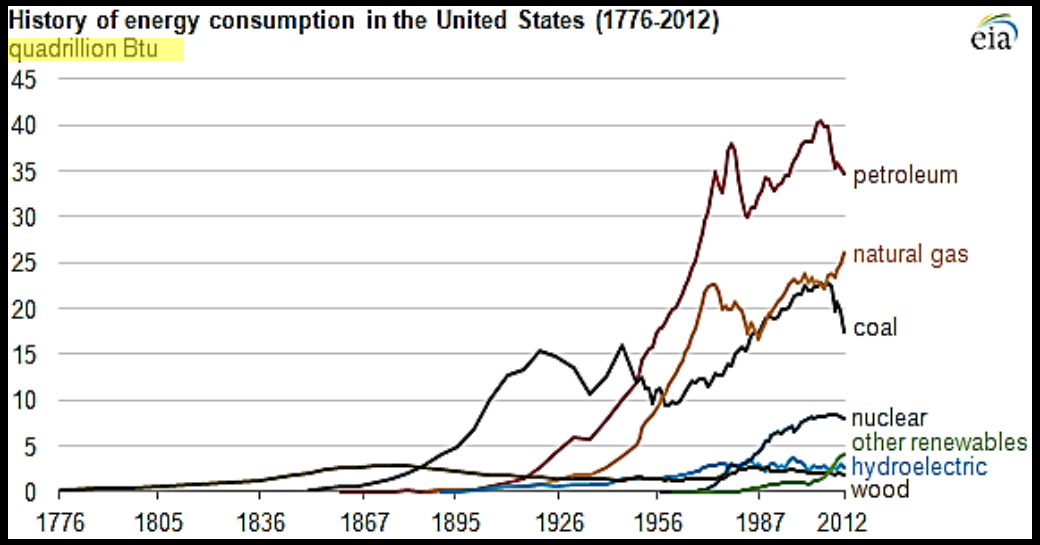
**IMPACT OF BUILDINGS ON ECONOMY, ENVIRONMENT & COMMUNITY**

- *40% of the world's energy and materials*
- *25% of the wood harvested*
- *17% of the water*

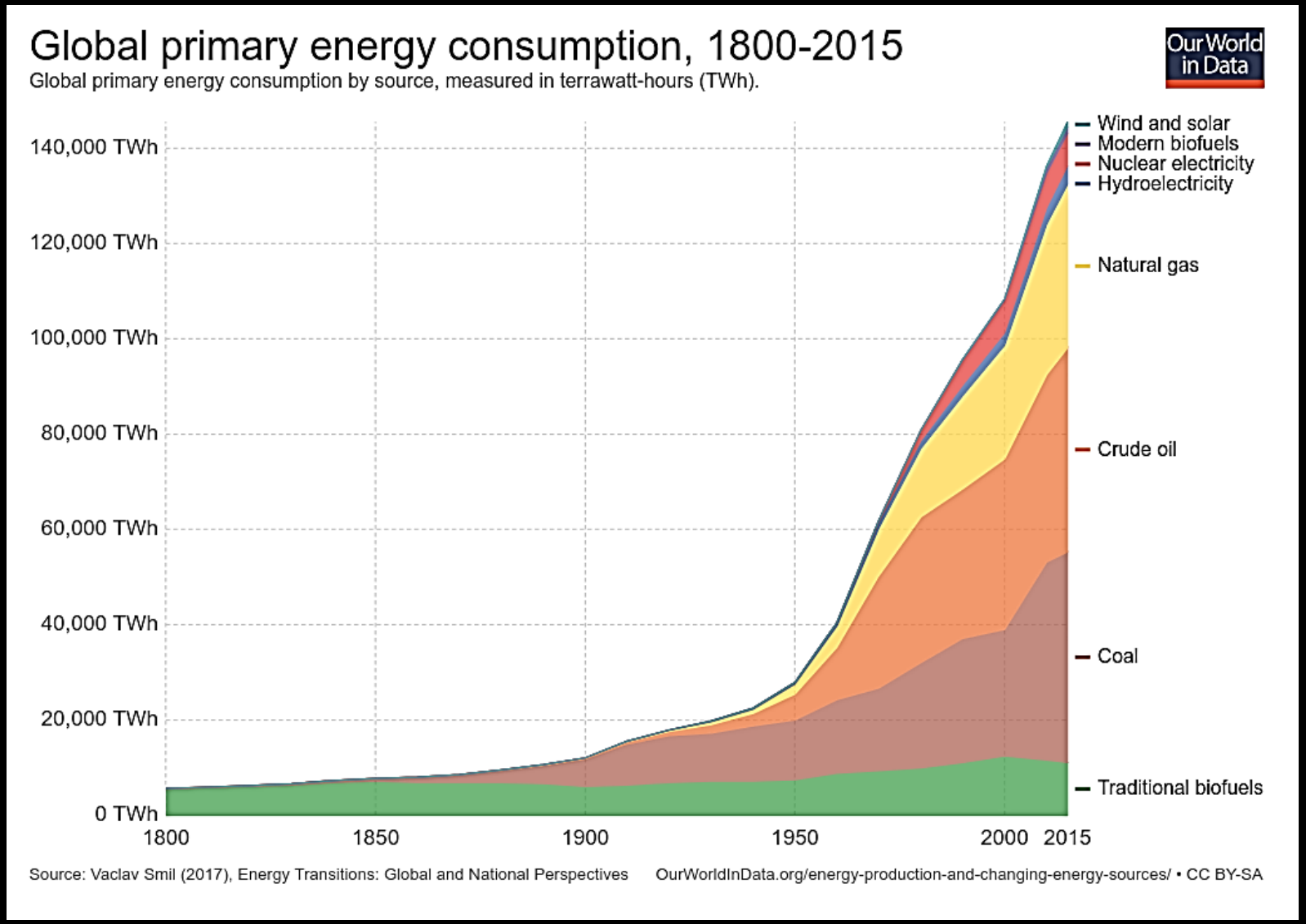
# Facts

*The primary energy consumption has grown during the last two decades (1984–2004) by 49% and CO2 emissions by 43%, with an average annual increase of 2% and 1.8% respectively.*

How much is a quadrillion??



# ENERGY CONSUMPTION BY CATOGRIES



# ENERGY DEMAND İN BUİLDİNGS

**In 2016, the United Nations Environment Program (UNEP) predicts that:**

- *The energy demand in buildings could increase by 50% by 2050, while global building footprint is expected to double by 2050*

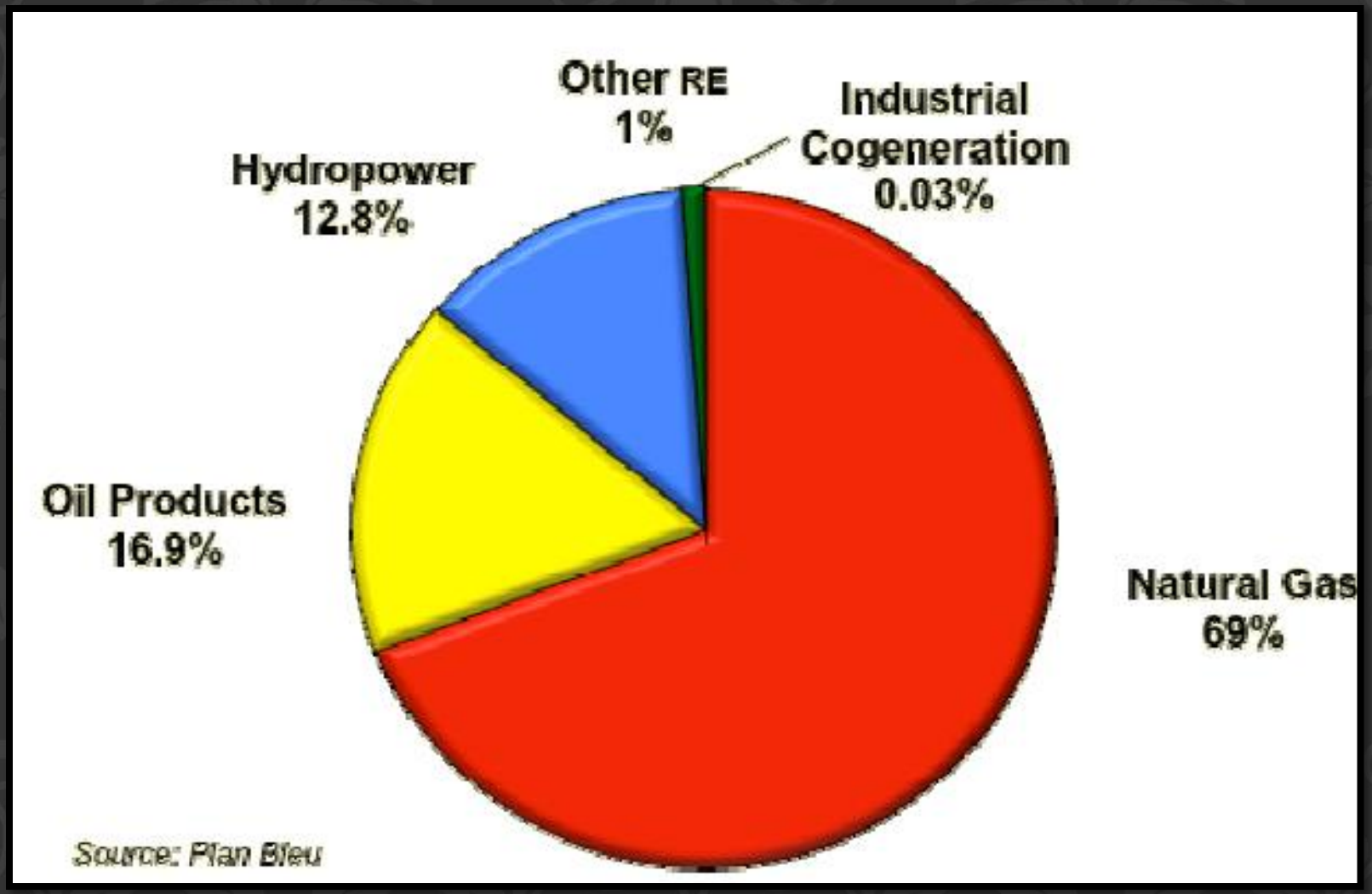
- *This will result in a major increase of energy demand and consequently a rapid rise of greenhouse gases (GHG) emissions for construction.*

**Table (1):** Building Floor Area Groth to 2050 By Region*

| Billion m2 | 2015 | 2030 | 2050 |
|---|---|---|---|
| North America | 38.1 | 47.1 | 56.9 |
| Western Europe | 29.8 | 34.3 | 36.9 |
| Eurasia | 9.8 | 13.1 | 14.9 |
| China | 57.2 | 79.3 | 84.6 |
| India | 15.8 | 32.1 | 57.6 |
| Japan and Korea | 9.8 | 10.9 | 11.1 |
| Southeast Asia | 15.6 | 23.8 | 32.3 |
| Australia and New Zealand | 2.1 | 2.7 | 3.4 |
| Latin America and Caribbean | 19.3 | 29.1 | 43.1 |
| Middle East | 8.0 | 12.7 | 18.3 |
| Africa | 18.0 | 30.4 | 56.0 |
| **World** | **223.4** | **31.54** | **415.2** |

**Source: UNEP Global Report (2016)*

# DISTRIBUTION OF ENERGY SOURCES



# Green Building Basics

# What is a Green Building?

Feel pleased when enter, enjoy every minute inside, and you regret leaving!"

# What is Green Design?

**Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants in five broad areas:**

- *Sustainable site planning,*
- *Safeguarding water and water efficiency,*
- *Energy efficiency and renewable energy,*
- *Conservation of materials and resources and*
- *Indoor environmental quality.*

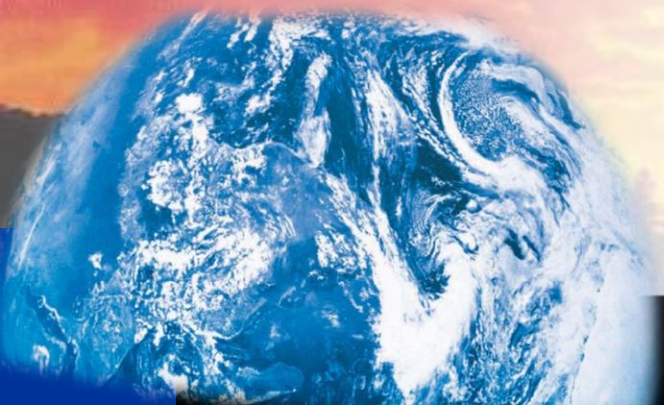
# RELATIONSHIP BETWEEN CONSUMED ENERGY AND IMPACT ON ENVIRONMENT

- It is important to recognize the *direct relationship* between *consumed energy and impact on environment*. In the construction industry, for example, adopting *green building approach* will result, in many cases, in producing an *efficient use of energy with less negative impact on our environment*.

- This direct *relationship* between energy and environment *must be verified in order to justify the adoption of the green code protocol.*

# Benefits of Green Design (Classified)

- **Environmental Benefits**
  - *Protect and preserve the natural environment*
- **Economic Benefits**
  - *Increase cost/benefit ratios*
- **Equity Benefits**
  - *Enhance occupant comfort, health and productivity*



# Residential Green

## The Benefits – *Environmental*:

- *Enhance and protect biodiversity and ecosystems,*
- *Improve air and water quality,*
- *Reduce waste streams, and*
- *Conserve and restore natural resources*

# Residential Green

## The Benefits – ***Economic:***

- Reduced operating costs
- Create, expand, and shape markets for green products and services
- Improve occupant productivity
- Optimize life-cycle economic performance

# Residential Green

## The Benefits – ***Social:***

- Enhanced occupant comfort and health
- Heighten customer satisfaction
- Minimize strain on local infrastructures
- Improve overall quality of life

# Residential Green

## *Does Green Cost More?*

- No matter style or budget, you can build Green by making informed choices
- Some Green options may cost more upfront, but significantly reduce operating & maintenance costs over time
- Other Green options cost the same as typical products, but perform better and are more environmentally friendly

# How Homes Become Green

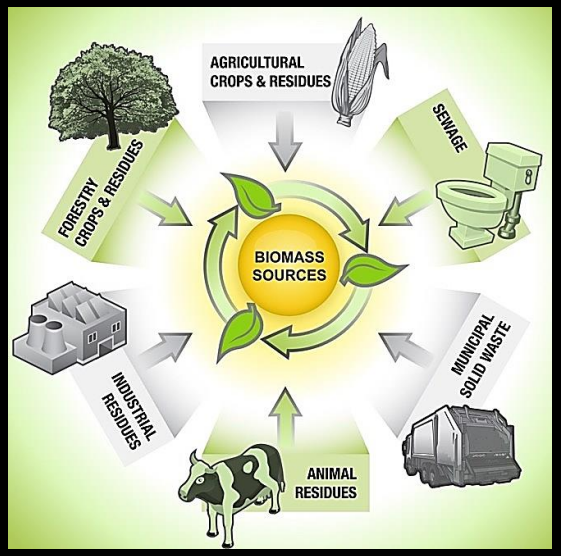
# Sustainable Energy Resources

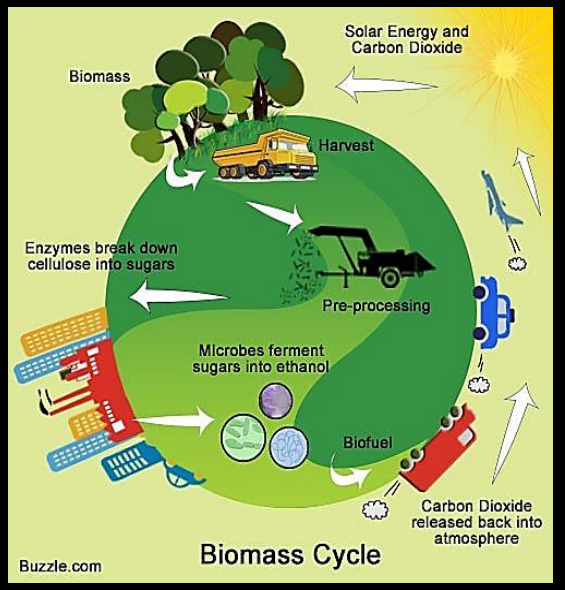
# WIND ENERGY

- Wind energy production already competes with fossil fuel energy production, its ecological and social advantages making it all the more attractive. Europe is a world leader in the use of wind energy.

# Biomass Energy Sources

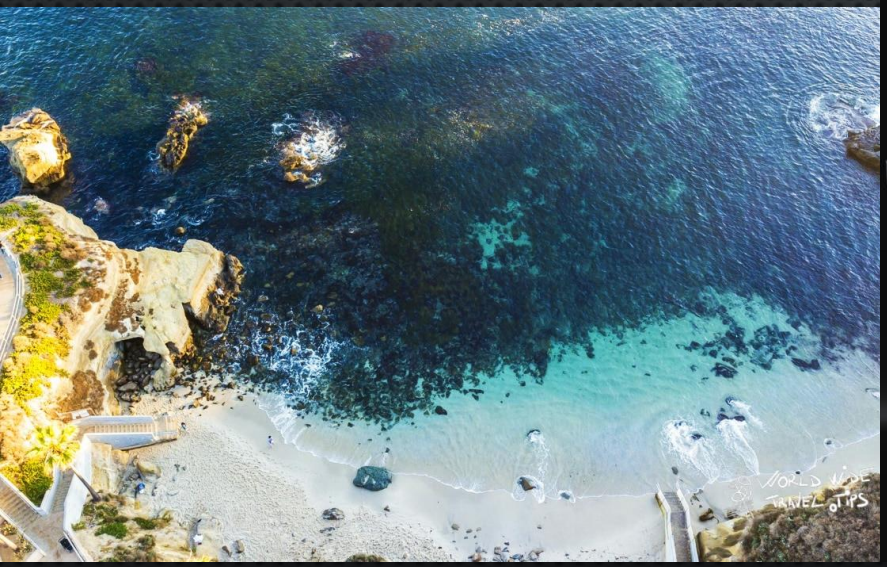
- **Biomass**, as a renewable energy source, refers to living and recently dead biological material that can be used as fuel or for industrial production.
- **Biomass** refers to plant matter grown to generate electricity or produce for example trash such as dead trees and branches, yard clippings and wood chips bio-fuel, and it also includes plant or animal matter used for production of fibers, chemicals or heat.
- **Biomass** may also include biodegradable wastes that can be burnt as fuel. It excludes organic material which has been transformed by geological processes into substances such as coal or petroleum.

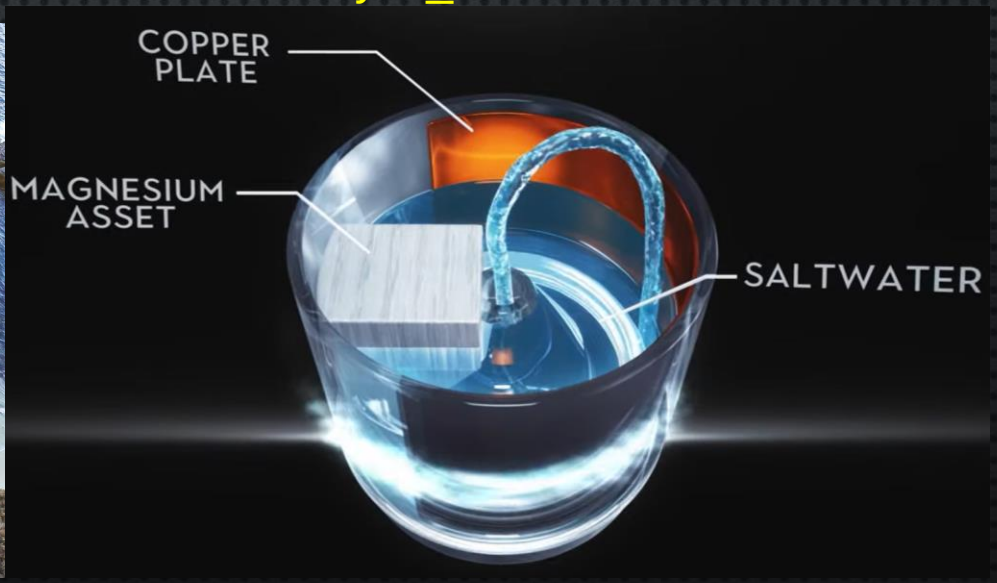


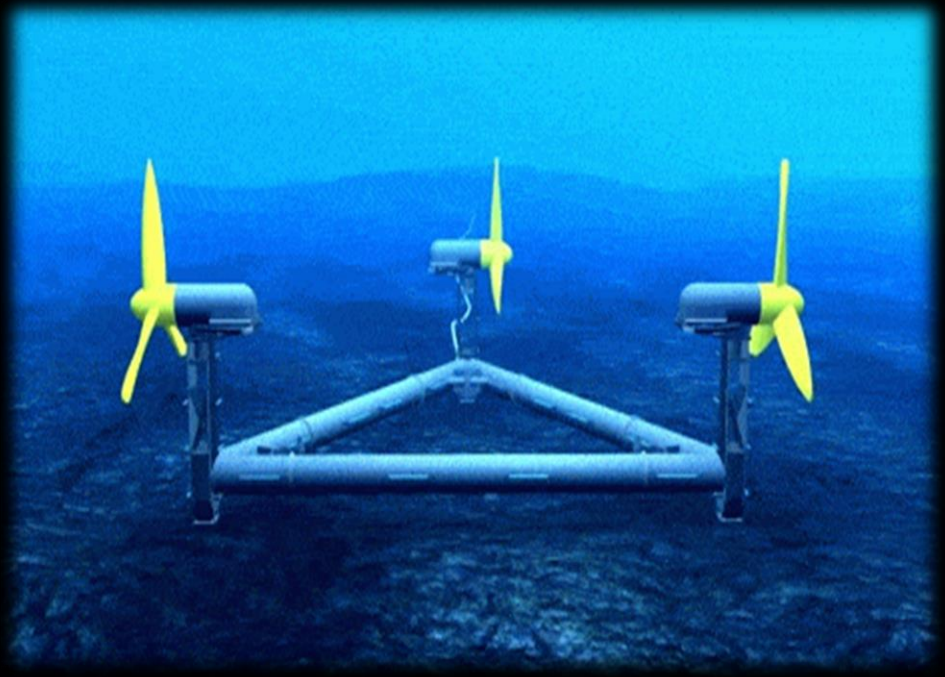

# Do you know that you can generate electricity from black sea water??

https://www.youtube.com/watch?v=sOycx_TV53A

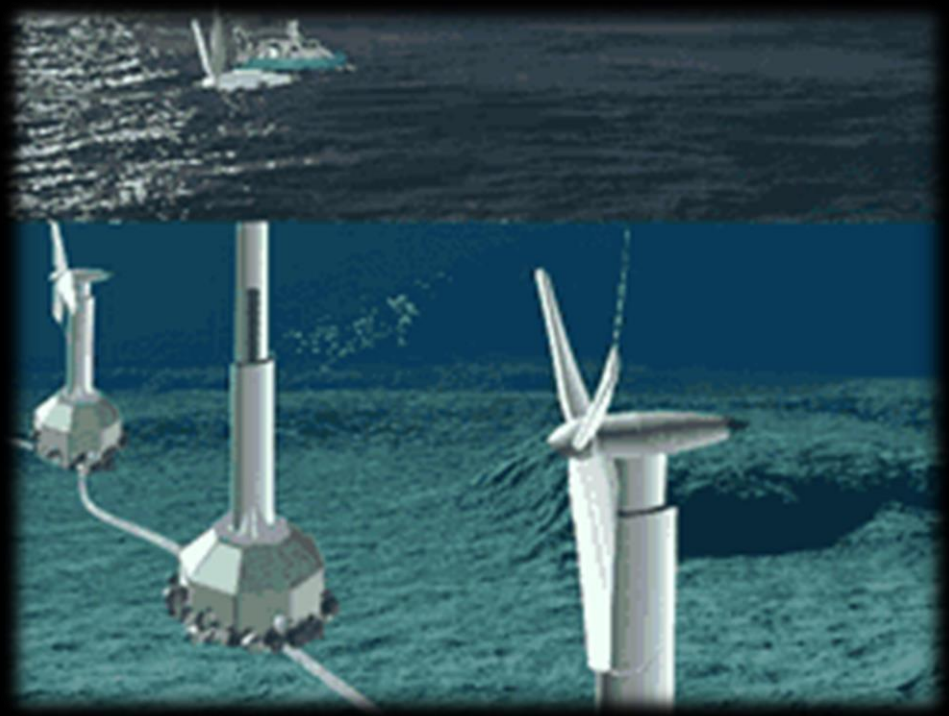




# TIDAL ENERGY

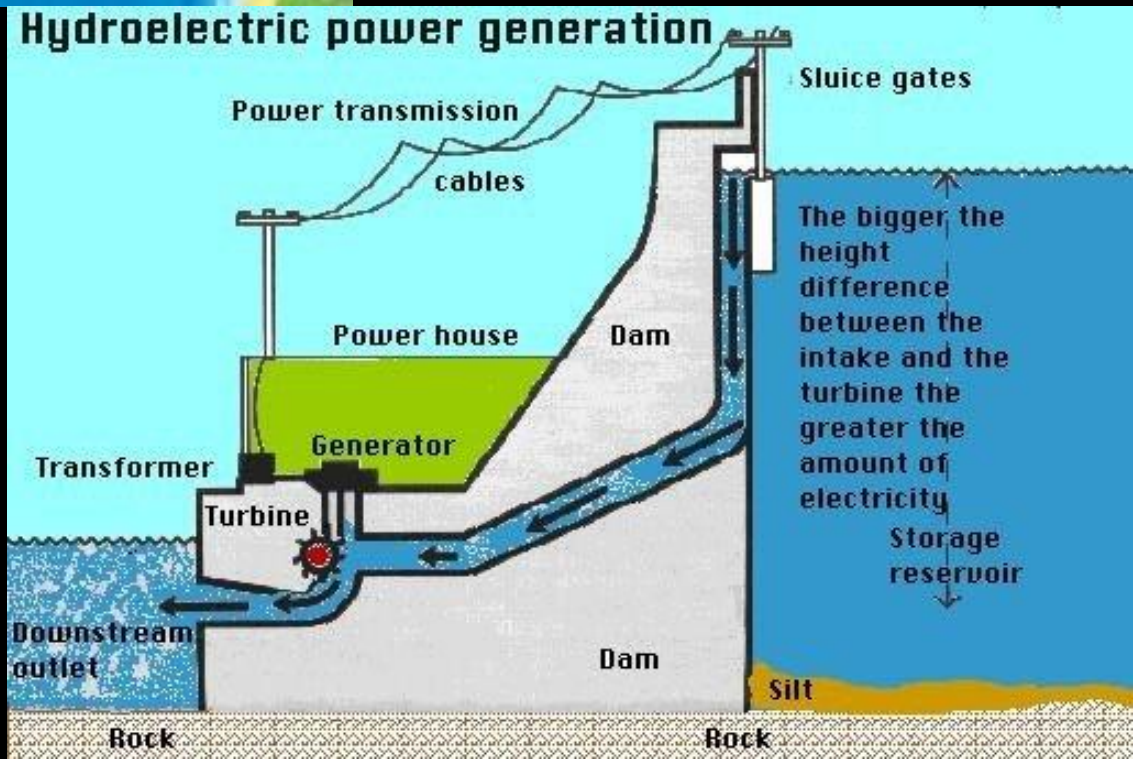


*Tidal energy is produced by the surge of ocean waters during the rise and fall of tides.*



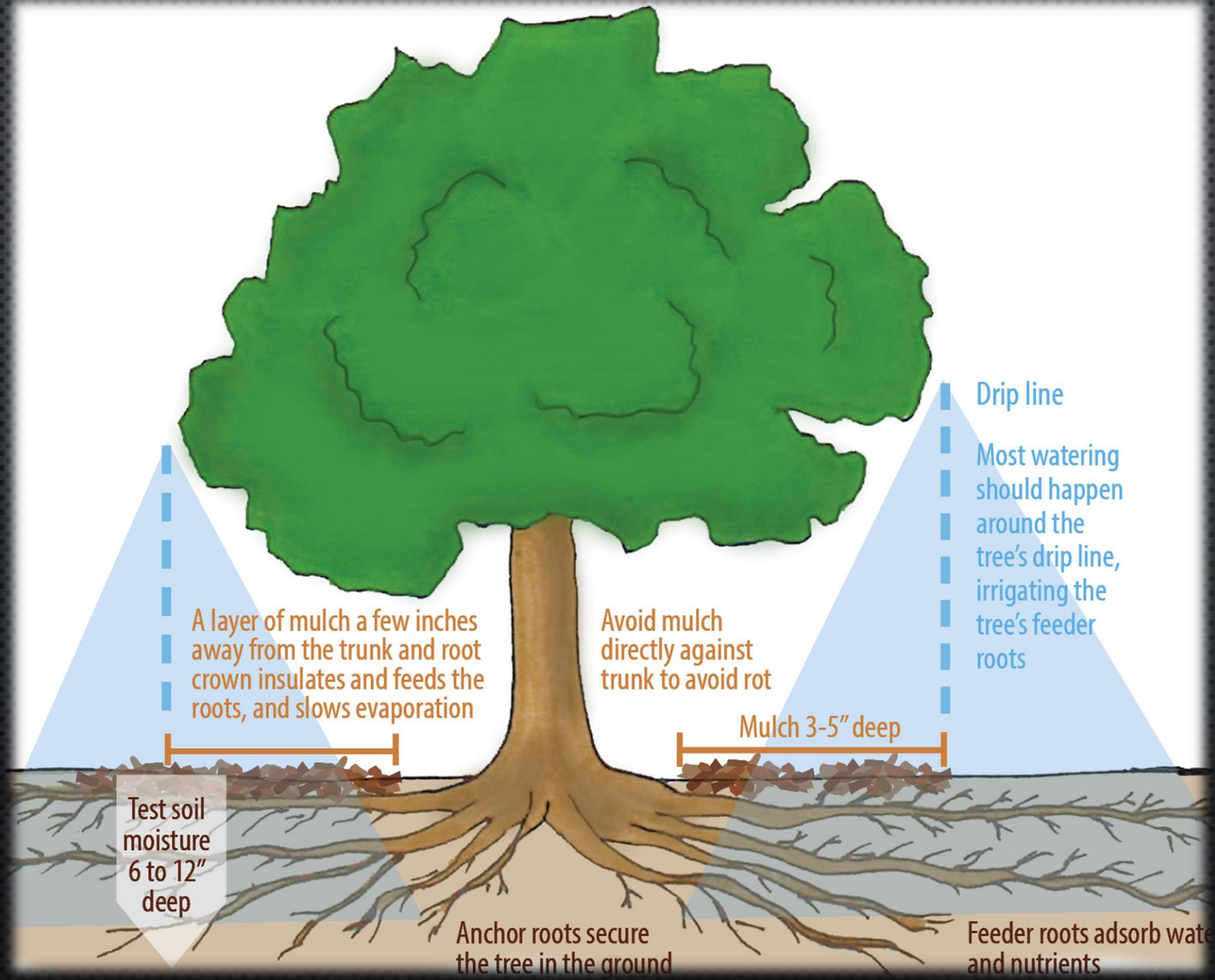
# HYDRO ENERGY

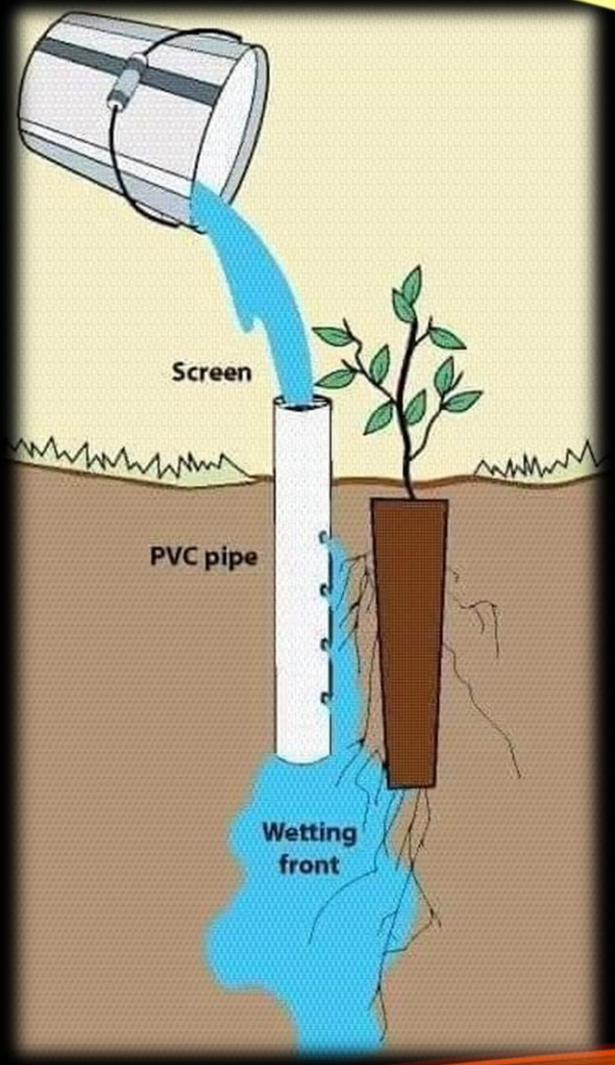
**Example:** **Built in 1935,** Hoover Dam generates, on average, **about 4 billion** kilowatt-hours of hydroelectric power each year for use in Nevada, Arizona, and California - enough to serve 1.3 million people.

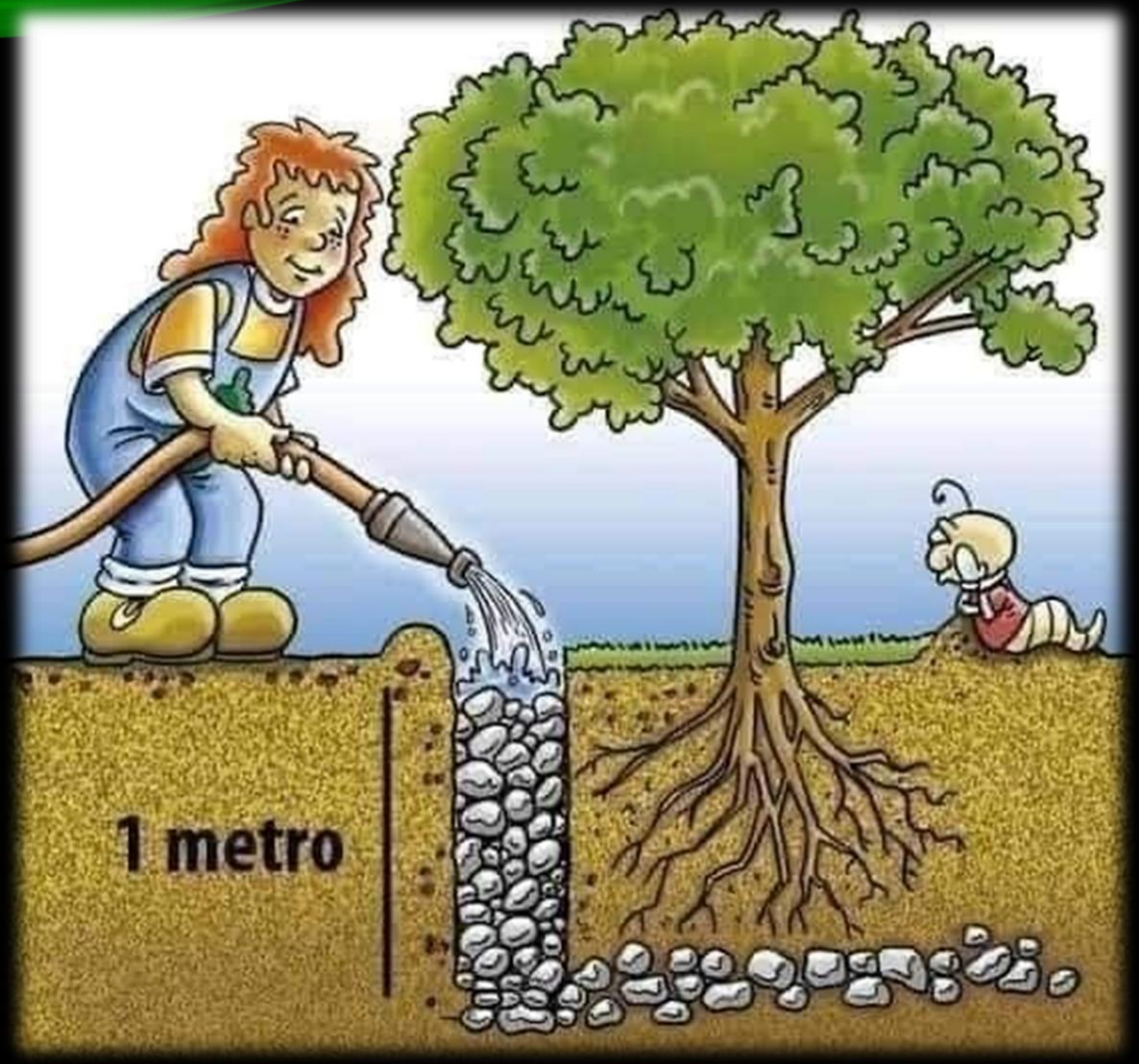


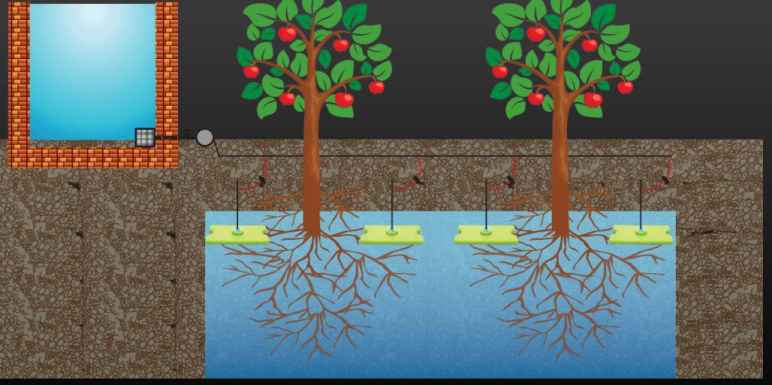

Water saving
in agriculture

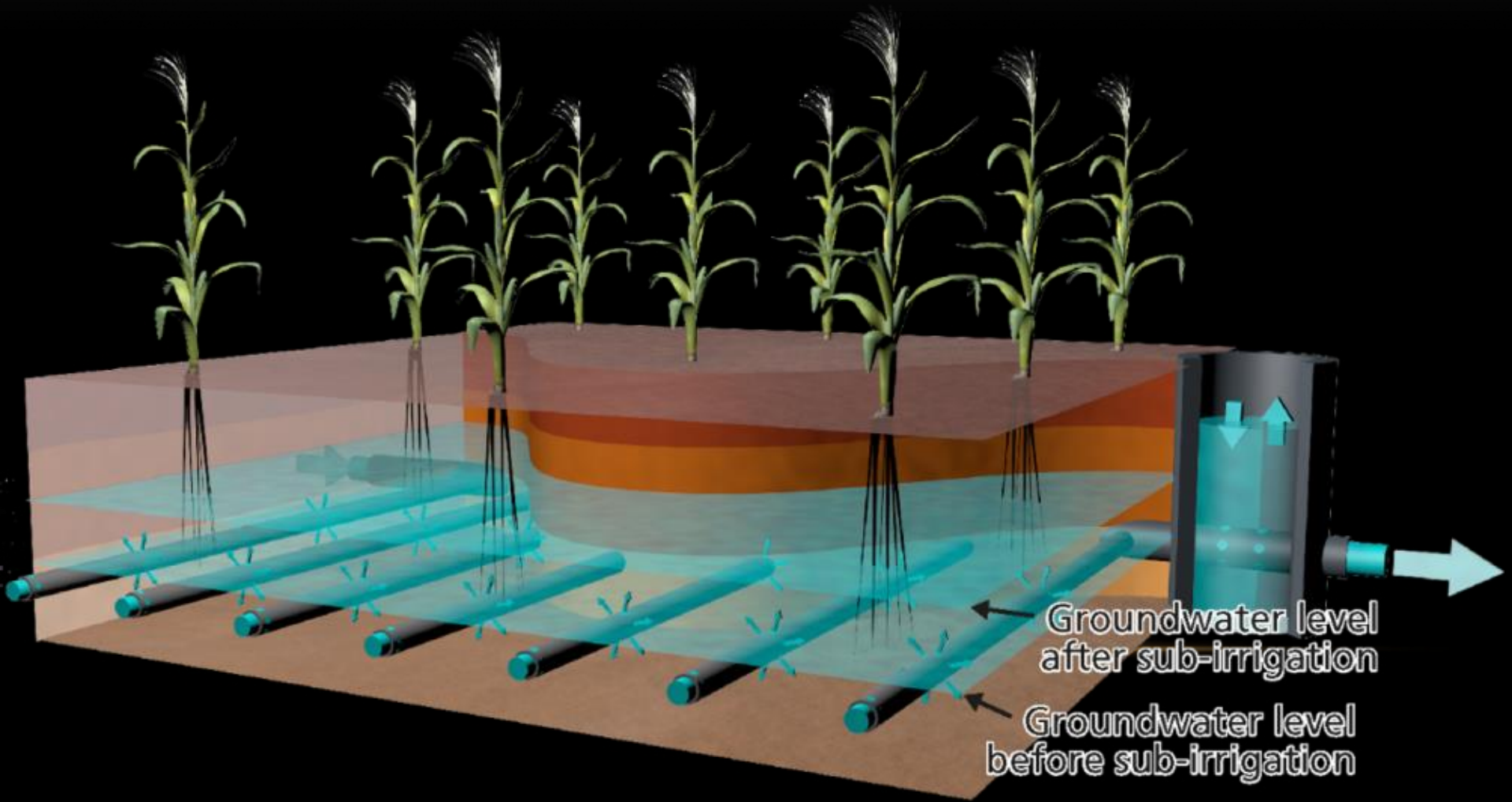

Contaminators:
• Sediments
• Nutrients
• Pathogens
• Salts
• Pesticides
• etc.
runoff


Drip line
Most watering should happen around the tree's drip line, irrigating the tree's feeder roots
A layer of mulch a few inches away from the trunk and root crown insulates and feeds the roots, and slows evaporation
Avoid mulch directly against trunk to avoid rot
Mulch 3-5" deep
Test soil moisture 6 to 12" deep
Anchor roots secure the tree in the ground
Feeder roots adsorb wate
and nutrients


Screen
PVC pipe
Wetting front

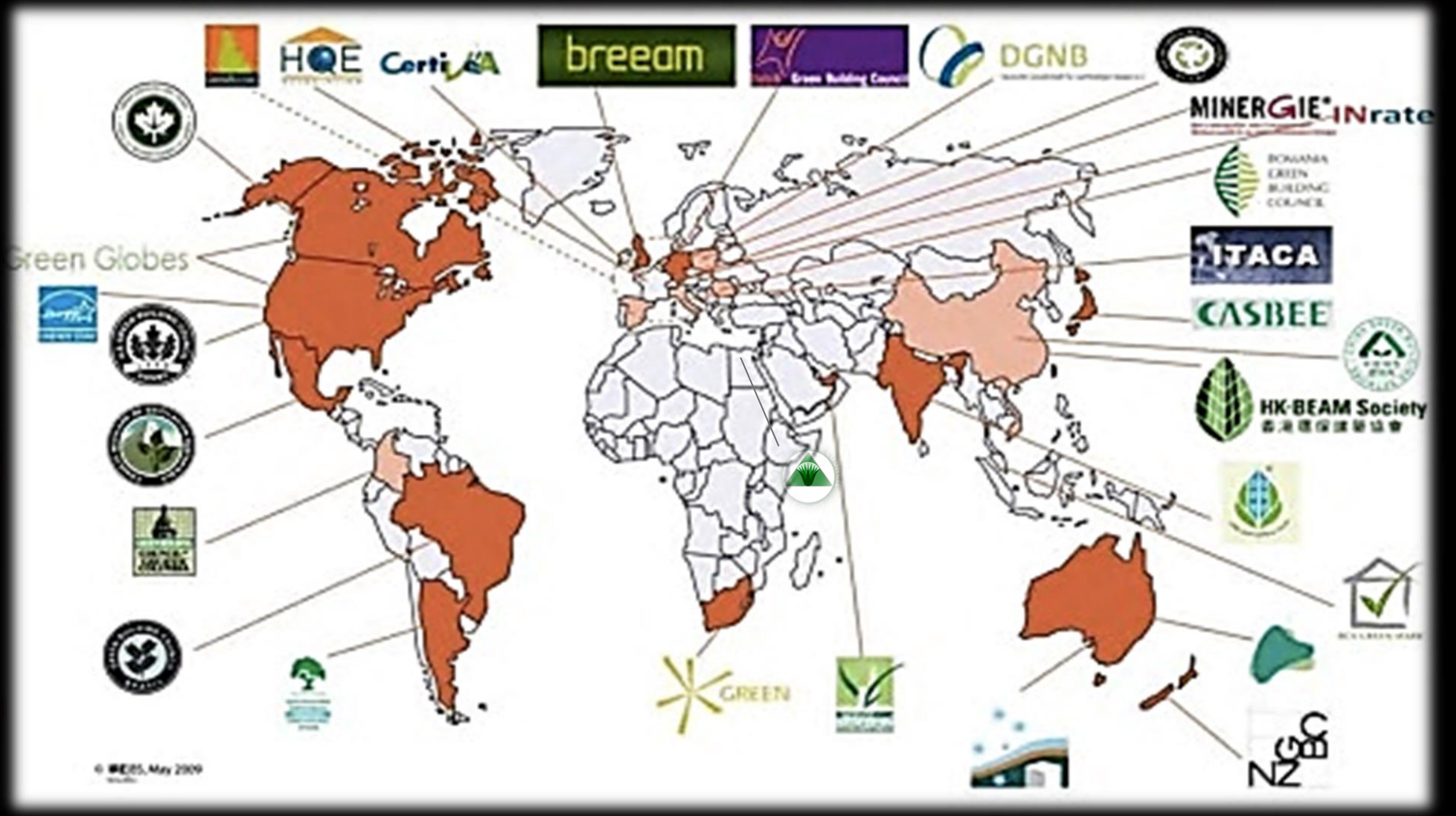

1 metro




Groundwater level
after sub-irrigation
Groundwater level
before sub-irrigation

# GREEN BUILDINGS RATING SYSTEMS

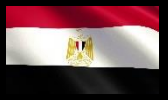
# GREEN BUILDINGS RATING SYSTEMS



# EXAMPLES OF INTERNATIONAL GREEN BUILDING RATING SYSTEMS

- Leadership in Energy & Environmental Design (LEED-US) 
  http://www.usgbc.org
- The Green Globe Rating System (United States) www.thegbi.org 
- Leadership in Energy & Environmental Design — (LEED-Canada)
  www.cagbc.ca 
- Green Star (Australia) www.gbcaus.org 
- Building Research Environment Assessment Method Consultancy (BREEAM) (UK) www.breeam.org 
- Building Environment Assessment Method- Hong Kong (HK-BEAM) www.hk-beam.org.hk 

# EXAMPLES OF INTERNATIONAL GREEN BUILDING RATING SYSTEMS

- Comprehensive Assessment System for Building Environment Efficiency (CASBEE) (Japan) www.ibec.or.jp 
- Green Pyramid Rating System (GPRS) www.egypt-gbc.org 
- LEED India www.igbc.in 
- Ecology, Energy Saving, Waste Reduction and Health (EEWH) (Taiwan) www.taiwangbc.org.tw 
- Green Zoom, Russia https://greenzoom.ru/ 
- ESTIDAMA, United Arab Emirates - https://www.upc.gov.ae/estidama 


Example of Green Buildings Technologies


GREEN PRODUCT
Reuse • Reduce • Recycle

# FT Formula Recycled Wood Waste Sandwich Panels System

# Palm Leaf

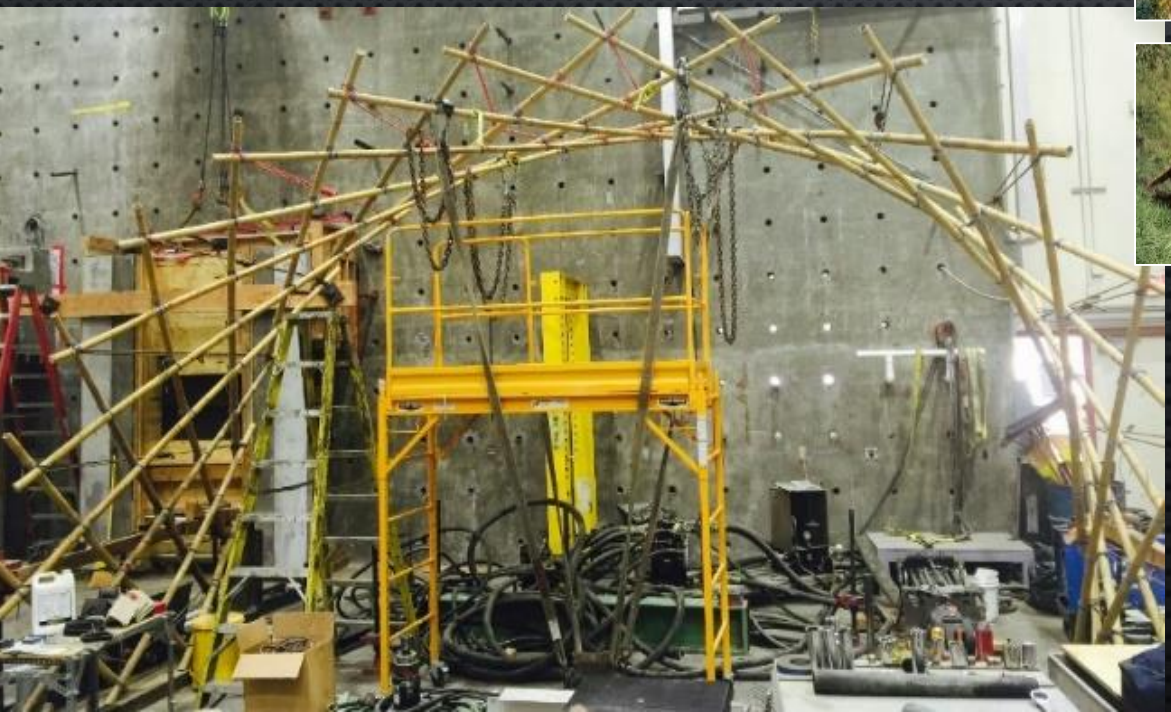
# جريد النخيل

Insulted Bricks

Wood Products

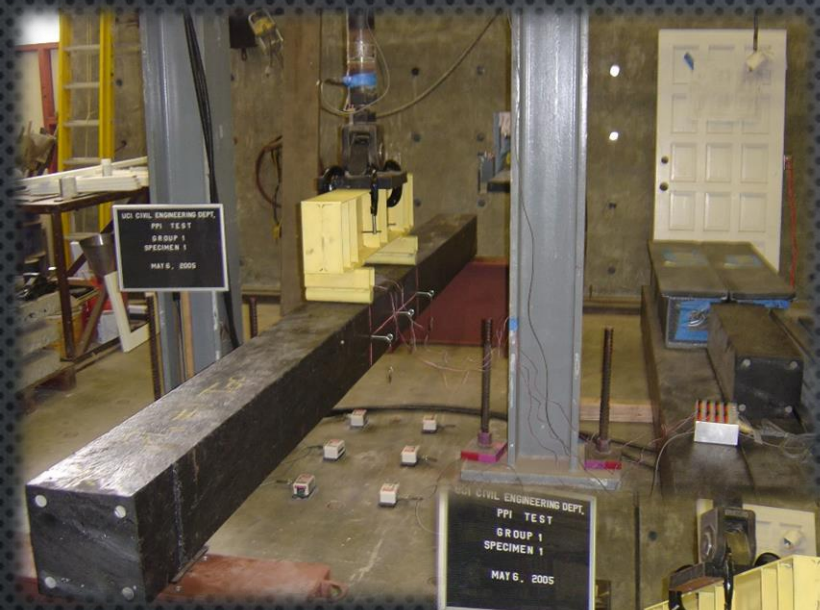
Roof Insulation

# Bamboo Structures



# FT Formula Recycled Wood Waste Sandwich Panels System

# Recycled Low-Density Polypropylene (LDPE) Hybrid Beams





# LDPE Hybrid Beams for Collision Protection of Bridge Piers & Columns (Oakland Bridge, San Diego Bridge, .._)

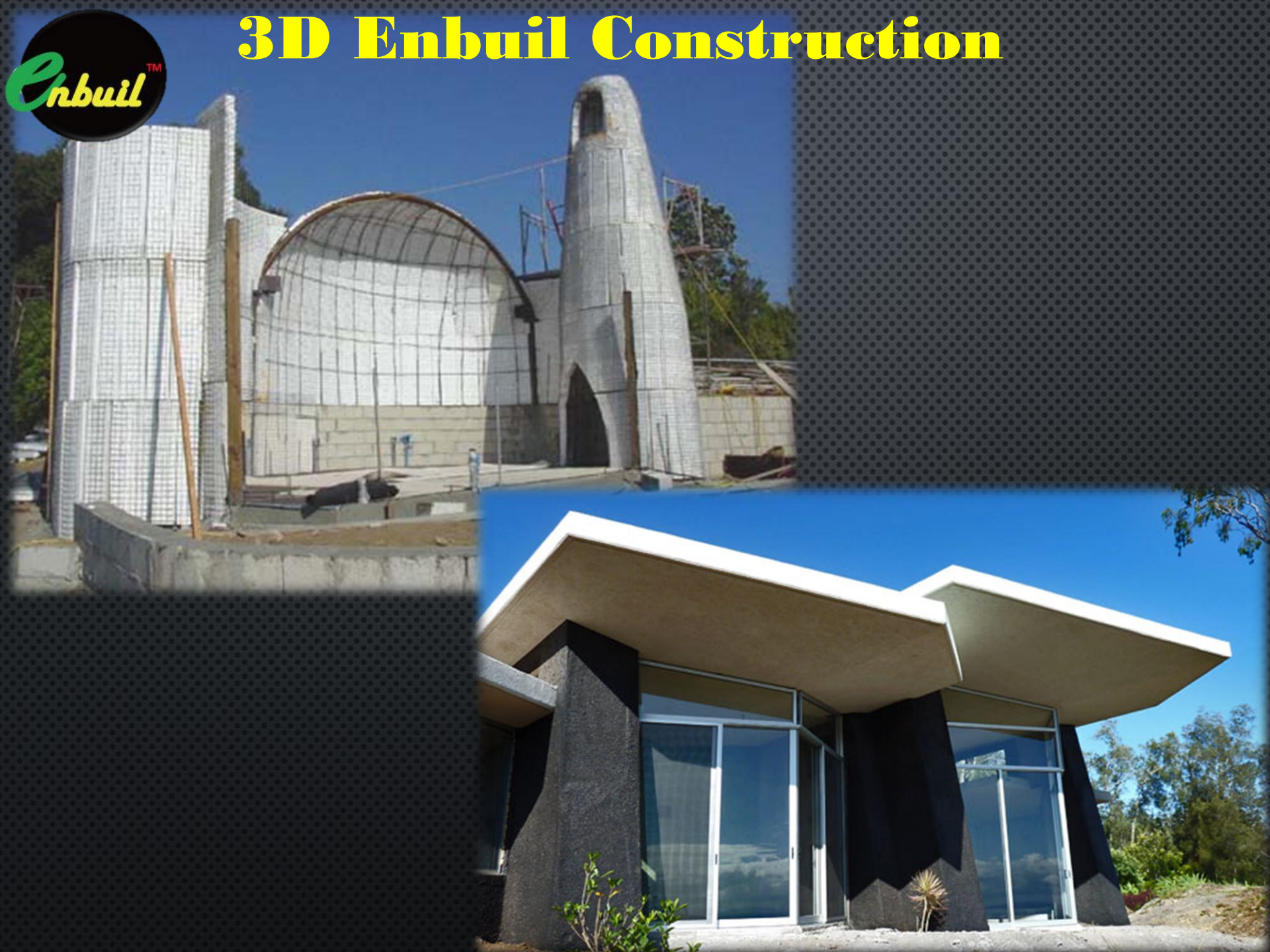
# Recycled High-Density Polypropylene (HDPE) Building System

Excessive water use kills thousands of fish in lake in northwestern Turkey

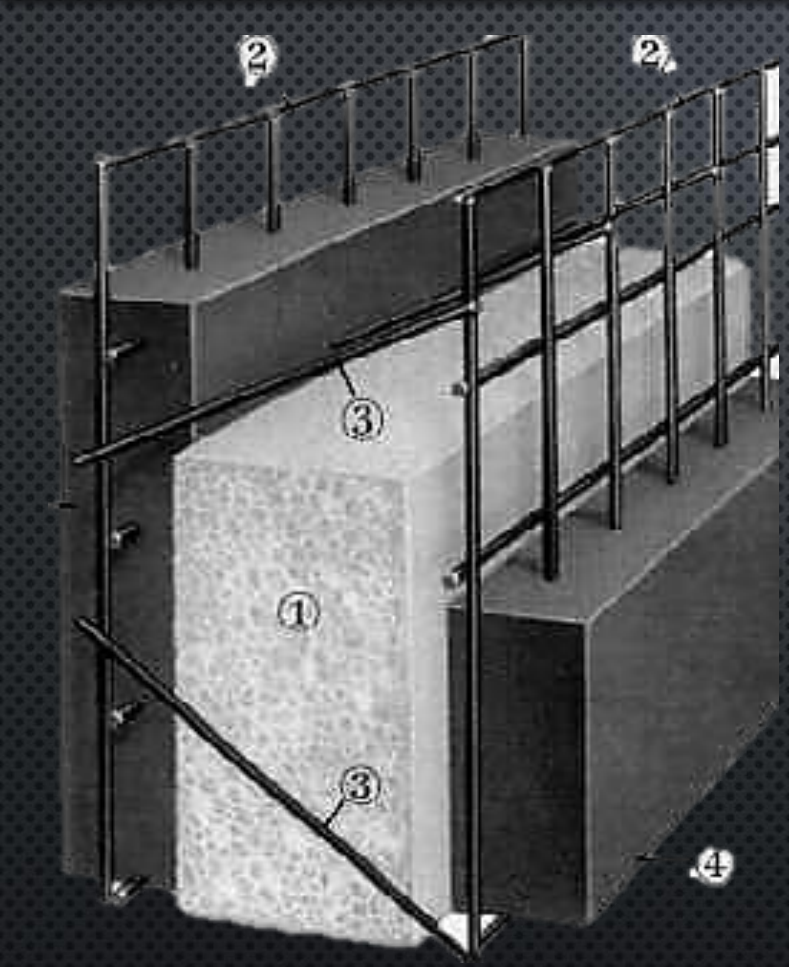

**Your Objective is: ZERO WASTE**

# TECH FOR IMPACT | ADB

# 3D Enbuil Construction



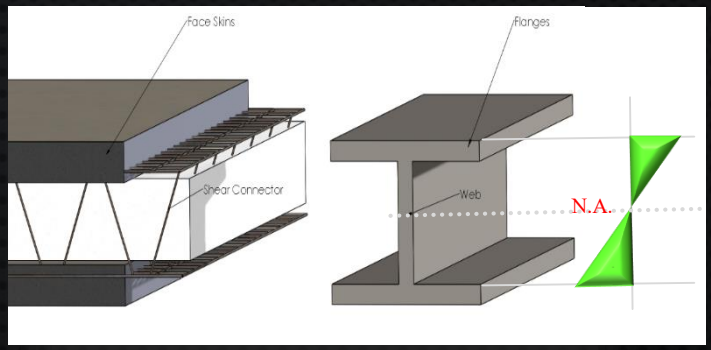
# Basic Components of the Construction Tridipanel Sandwich System



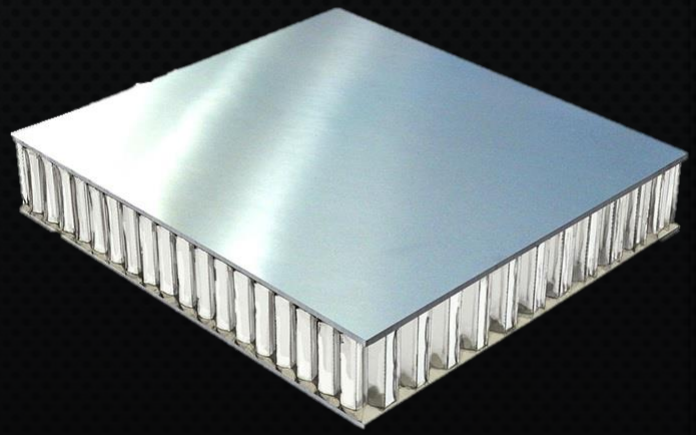

1. Expanded Polystyrene (EPS) foam core for insulation.
2. Wire mesh on outer sides of the EPS
3. Welded wire truss diagonals
4. Mortar or Concrete Shell.

# Introduction

- **THE IDEA OF SANDWICH PANELS CAME FROM ALLOCATING MATERIAL WHERE THERE IS A DEMAND, TO OPTIMIZE MEMBER'S CAPACITY. (*SIMILAR TO AN I-BEAM*).**

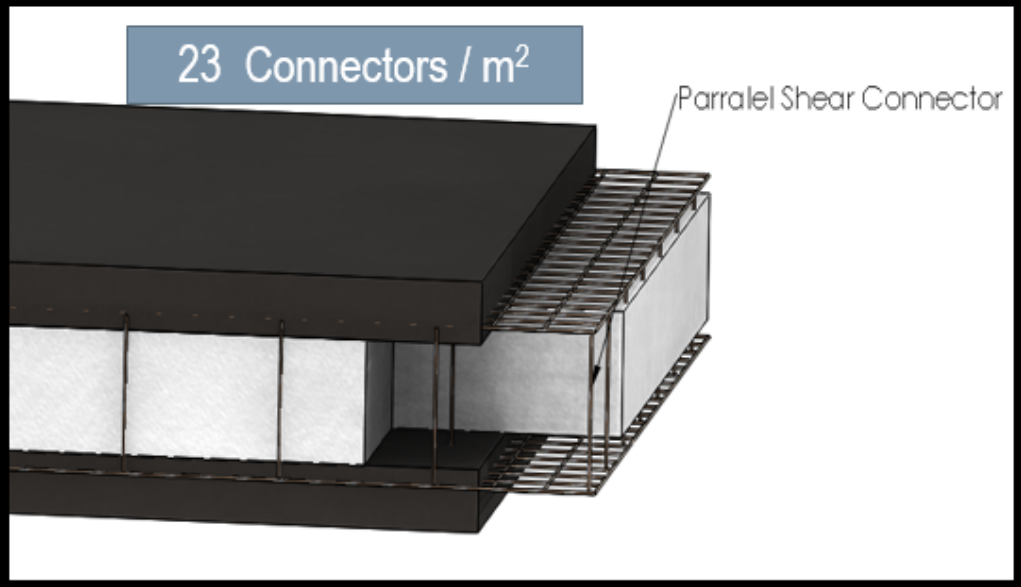



- **The concept of sandwich panels were developed years ago by the aerospace industry during the *2nd World War* for *light-weight aircraft applications that are:***
  - **Expensive and sophisticated (*Aluminum, carbon, metallic and composite face sheets and honeycomb cores*)**
  - **Criteria: *how much it cost to lift the weight into space***

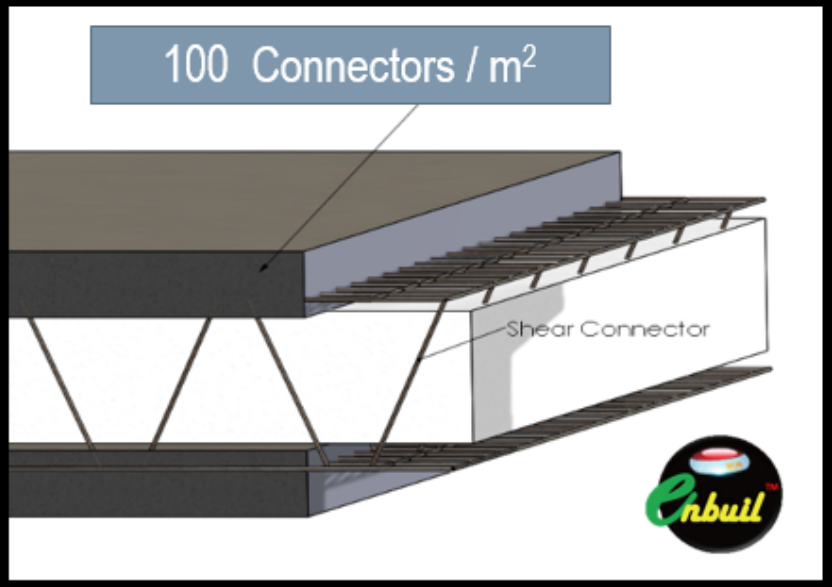


- **Sandwich panel in construction, has different objectives: *cost, energy, environmental aspects that are achieved in Enbuil system.***

# Sandwich Panels May Look Alike, but they Have Different Characteristics




FACE (MESH) REINFORCEMENTS
8 CM X 13 CM




FACE (MESH) REINFORCEMENTS
5 CM X 10 CM OR 5CM X 5 CM

# TRIDIPANEL-ENBUIL SYSTEM

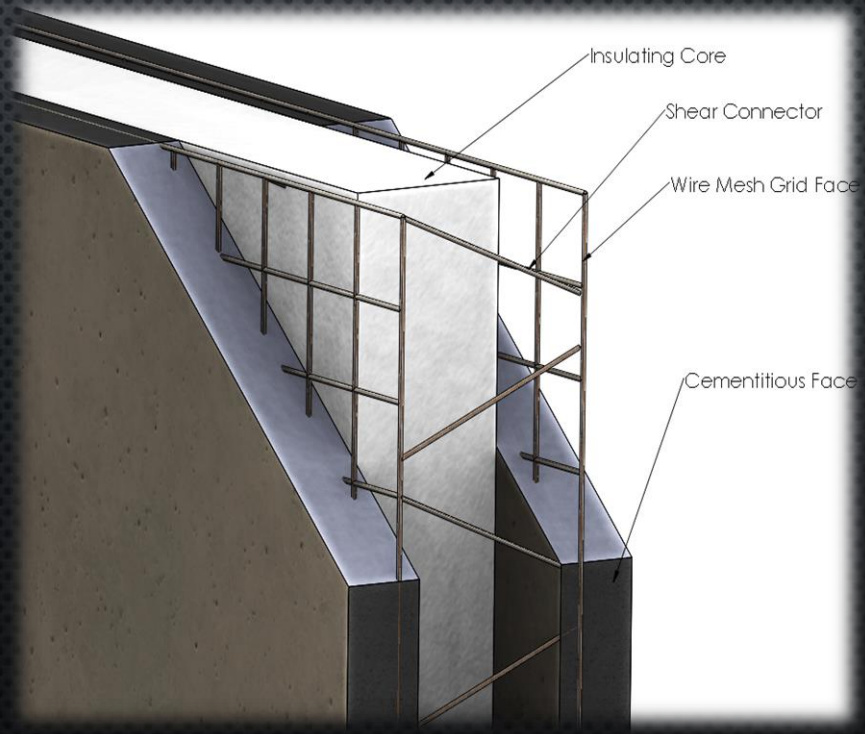
## THREE-DIMENSIONAL STRUCTURAL PANELS

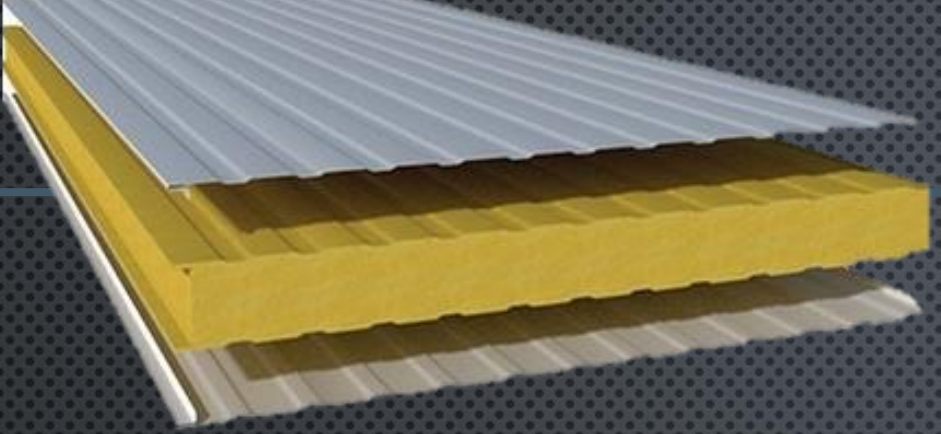
## Three-Dimensional Steel Structur Panel:

*A prefabricated Panel that consisting of three-dimensional steel wire trusses and a polystyrene insulation foam . Mortar placed in both side at field. The panels are used in the construction of exterior and interior bearing and nonbearing walls, roofs and floors of buildings of all type of construction.*

## Type Of Panels:

1. *Bearing Wall Panel*
2. *Non-Bearing Wall or Partition Panel*
3. *Fl[illegible] Panel*





# Mislabeling "Sandwich" Panels

- **Unfortunately, especially in Egypt, many engineers refers to the *Corrugated Roofing Sheet Insulating Panels* as "sandwich panels".**

- **It is true that it is composed of two corrugated thin metal sheets with a sandwich core of polyurethane foam or rockwall, and face sheets are bonded using very *weak* glue.**

- **The essential requirement of a *sandwich construction* is its *ability to transfer both horizontal and vertical shear.***

- **For this reason, and *due to the weakness and inhomogeneous distribution of the glue, these panels looks physically as sandwich panels*, but STRUCTURALLY ARE NOT. This is the addition of the low resistance of the glue line to moisture.**

HIGH STREIGHT STEEL

MODIFIED EXPANDED POLYSTYRENE

THREE-DIMENSIONAL STRUCTURE

STRUCTURAL MORTAR OR CONCRET

SELF - EXTINGUISHING
NON-TOXIC


5 cm to 15 cm

# LIGHT-WEIGHT FEATURE

# Benefits

- ✓*Easy and Fast Erection*
- ✓*Cost Effective & Affordable*
- ✓*Environmentally Friendly, No Lumber*
- ✓*Up to 3 hours Fire Resistance*
- ✓*Earthquake Resistant*
- ✓*Hurricane Resistant*
- ✓*Energy Efficient*
- ✓*Resistant to flood*
- ✓*Acoustical Efficiency*
- ✓*Flexibility of Design*
- ✓*Strongest Wall in the world*
- ✓*No Fungus*
- ✓*No Mold*

# LIGHT-WEIGHT FEATURE

Installing A 10-Meter (30-foot) Roof Panel Carried by One Person!

# Light-Weight Feature

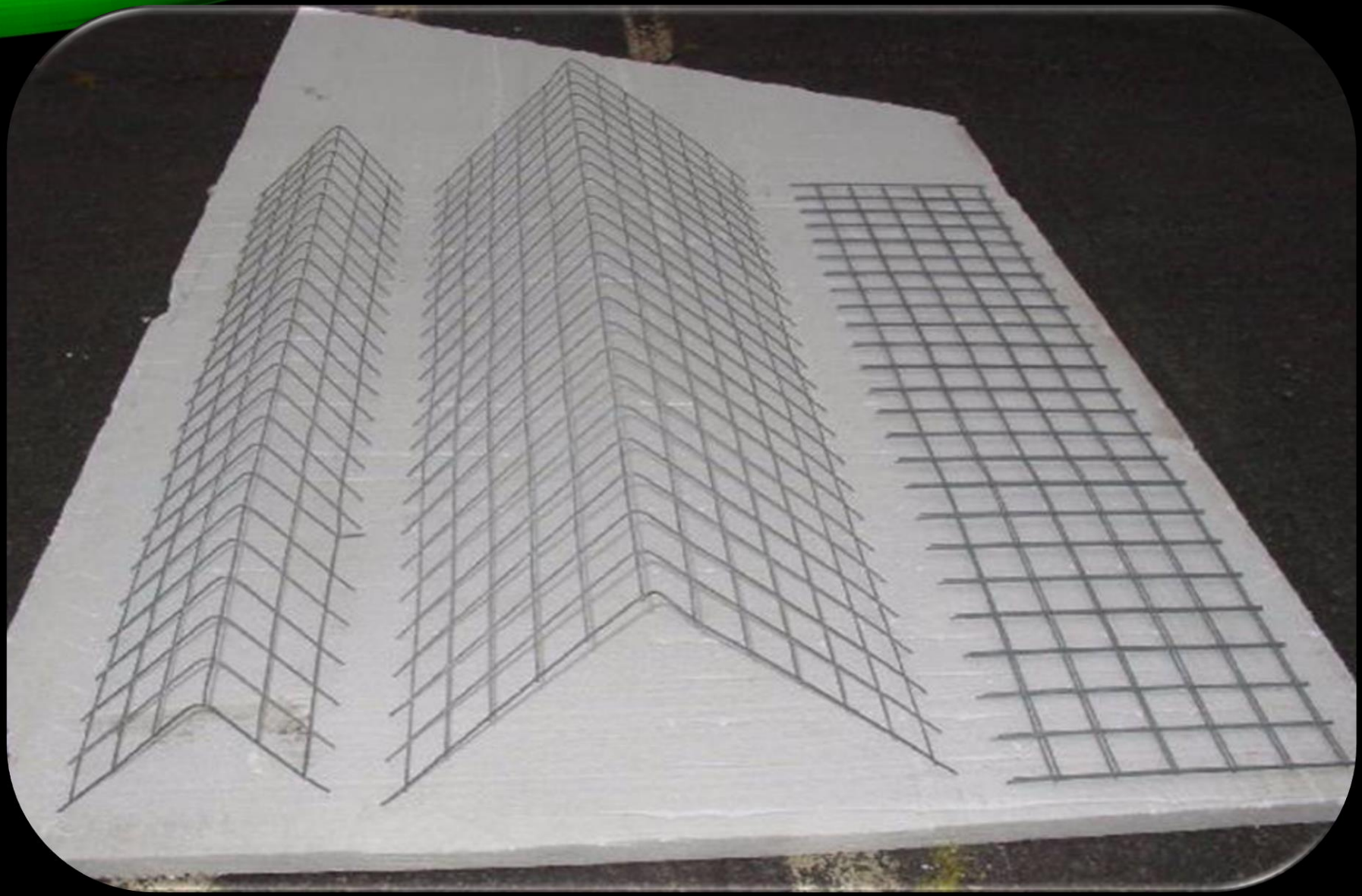
EASE AND RAPID INSTALLATION OF 3D SYSTEM


1,200 square Feet
Eco House Built in 11
Days (North Africa
Desert) 2018

# Low-Income Housing

# Low-Income Housing

# Wire Mesh, Corner Angles And Flat Mesh



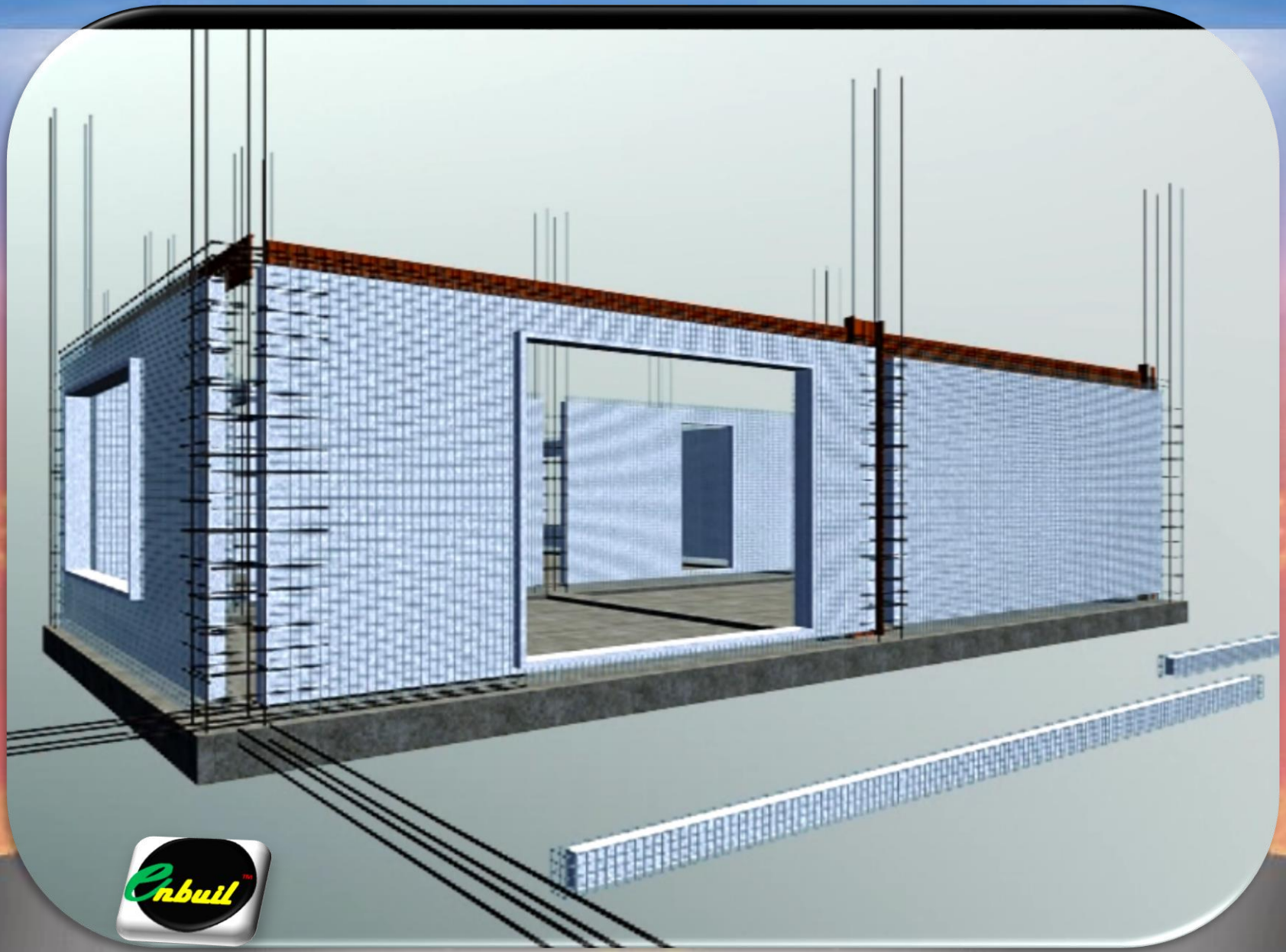

Corner Mesh Connection

# Simple, Inexpensive Construction Tools

# Plumbing & Electrical Wiring Installed Behind Wire Mesh

# 3D Enbuil Construction

# 3D Sandwich Construction


Enbuil


# 6-story Mixed Design

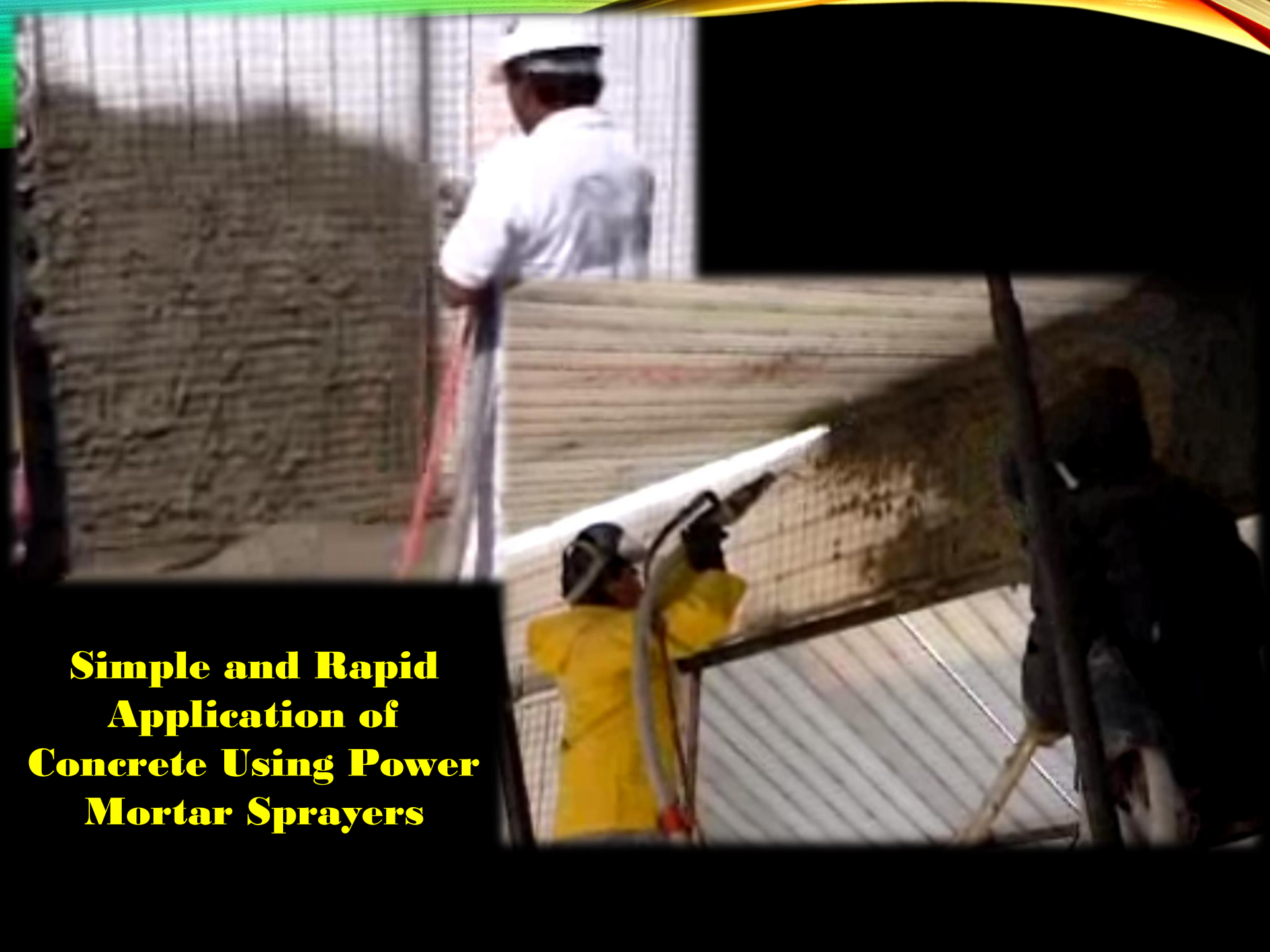
# THE RING UNDER CONSTRUCTION

# THE HI`ILANI ECOHOUSE - BIG ISLAND OF HAWAII

# THE HI`ILANI ECOHOUSE - BIG ISLAND OF HAWAII

# Eco Villages and Eco Resorts

*HUBBELL DOME HOME CALIFORNIA*



Simple and Rapid
Application of
Concrete Using Power
Mortar Sprayers

# BASEMENT WALLS

# Finishing Concrete Surfaces

# Fire Wall Applications in 12 Substations
# SEGAS LNG

# Fire Wall Applications with Height Up to 9 Meters and Fire Protection Up to 2 hours

## SEGAS LNG

# Fire Wall Applications in 12 Substations
# SEGAS LNG

# SPRAYING CONCRETE FACE LAYERS

# Fences Applications:

*Rapid, Easy, and Cost-Effective*

# Sea Wall @ Low-Tide

# Interior Wall Partitions Applications:

*Great market & Major saving**$$$***

# Sand Bags House

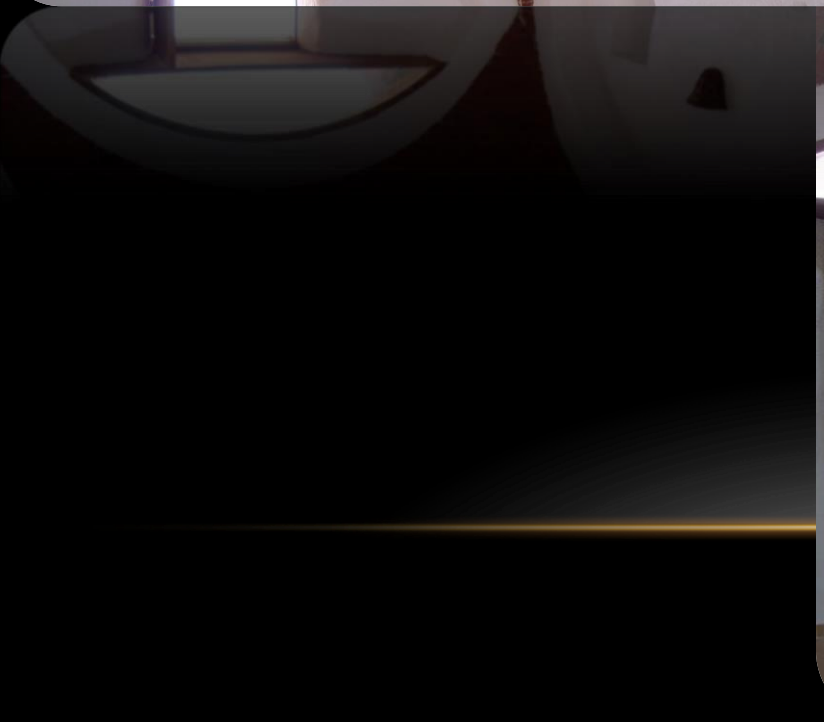
# Earth-Integrated Homes

# Earth-Integrated Homes

# Rice Straws House

# Rice Straws House

# Rice Straws House



# Rice Straws House

# Tips for Getting Greener

- Expand the use of Solar Heaters
- Expand the use of Solar Electricity
- Expand the use of Water recycling
- Make used motor oil and tire recycling mandatory by the city
- Provide incentives for following green
- Include the green concept in your school curriculum
- Educate public

# SUMMARY

- Green is a vibrant color & sometimes misunderstood
- To be Green, You have to acquire Green, To get a bigger Green return
- Take action now to reduce our collective CARBON Footprint


Thank you…
Prof. Ayman Mosallam