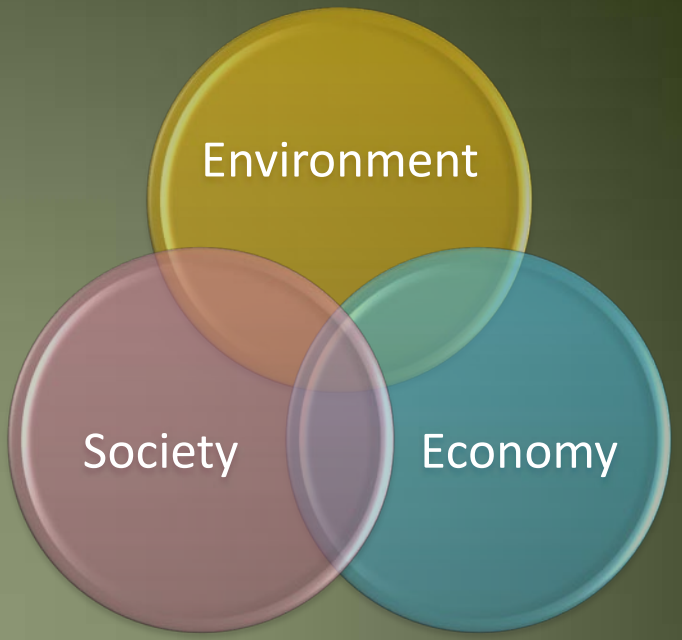
Sustainable Strategies with Concrete

Sustainability



Commonly used definition:

"…meets the needs of the present without compromising the ability of future generations to meet their own needs"

CONCRETE IS BY FAR THE MOST USED CONSTRUCTION MATERIAL IN THE WORLD

Examples of Concrete Positives/Negatives

- Advantages
  - Reaches all three tenants of sustainability (environment, society, economy)
  - Recycle/reuse, thermal mass contributes to reduced energy demand for HVAC, formable, affordable, …
- Disadvantages
  - CO_2 produced in the manufacture of cement
    - Primarily from release from limestone and fueling the kiln

Strategies

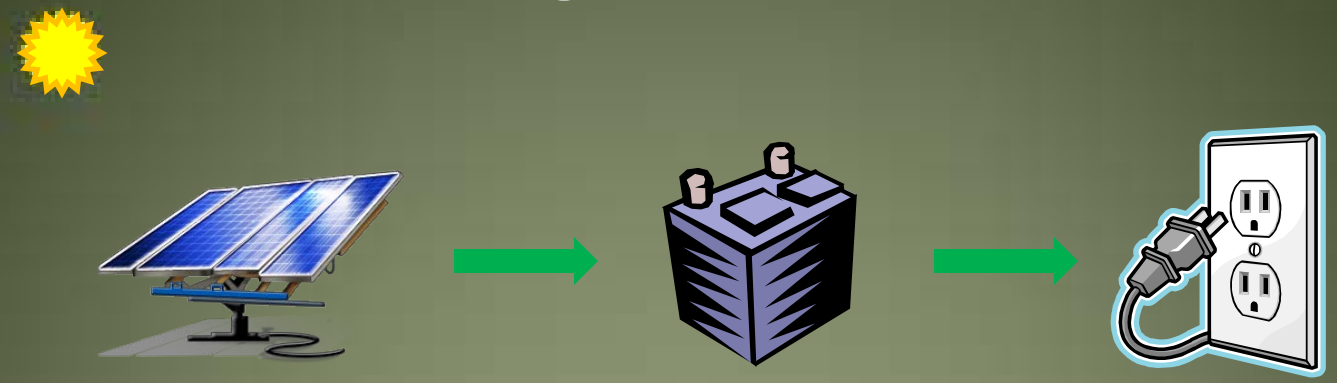
- Thermal Mass and Thermal Resistance
- Stormwater Management
- Economy
- Occupant comfort
- Longevity and Resilience
- Reduce/Reuse/Recycle

Thermal Mass

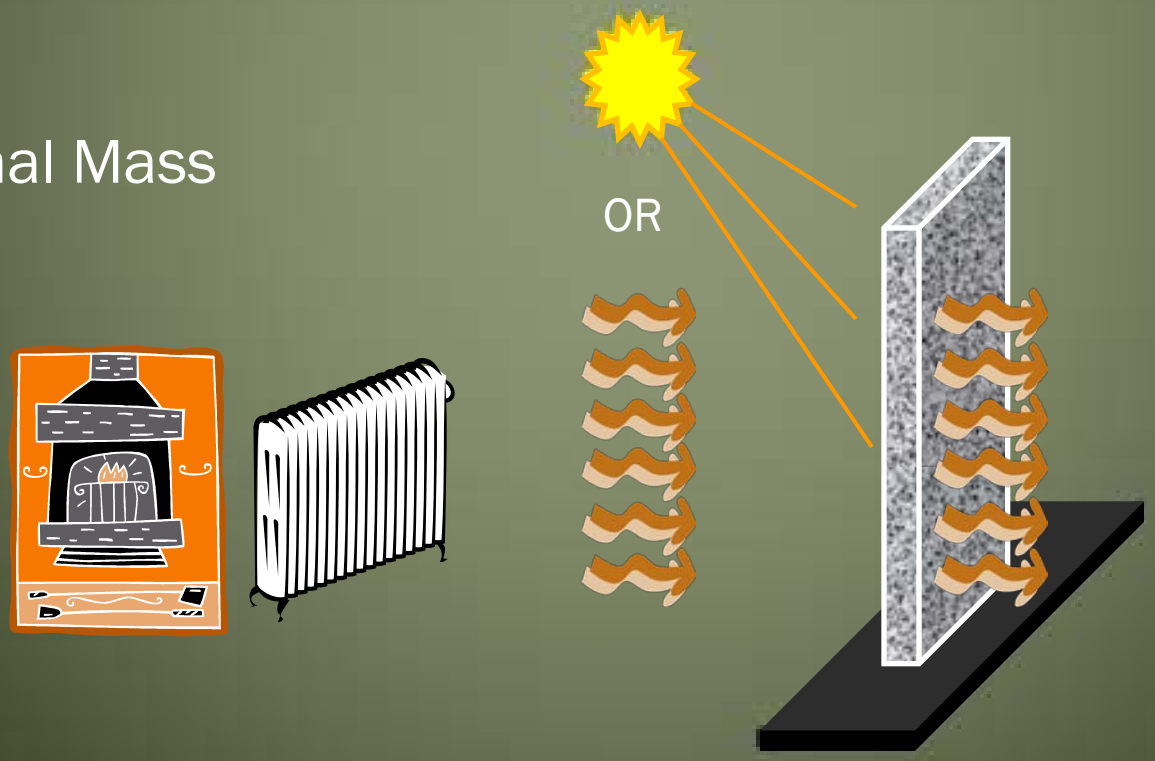
- Concrete has
  - High capacity to store heat
  - Slow transfer of heat
- Reduce temperature spikes
- Delay temperature effects to inside of building
- Reduced energy demand
- Effective with passive solar

from *The Sustainable Concrete Guide*

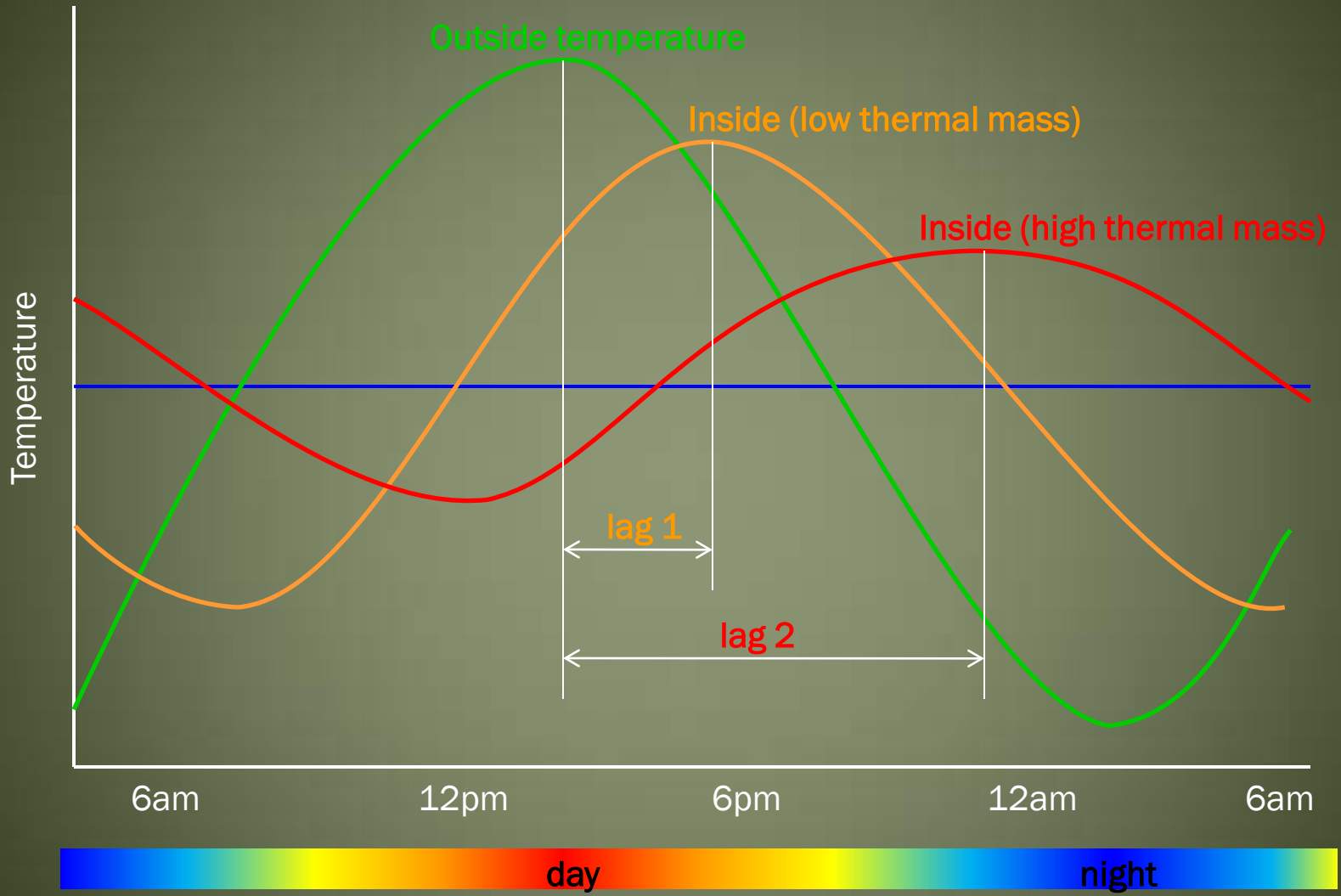
Solar Collection and Storage



Thermal Mass



from *The Sustainable Concrete Guide*

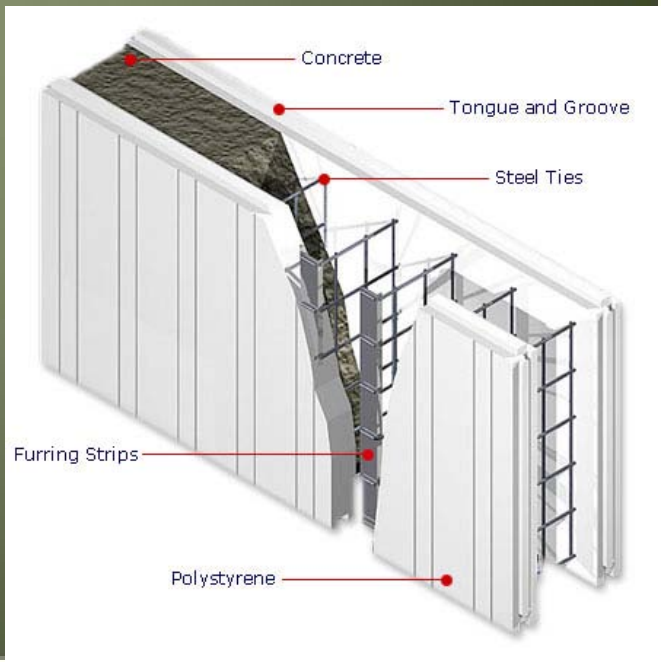


from *The Sustainable Concrete Guide*

Thermal Resistance

- Standard concrete generally does not have good insulating properties when used alone
  - Lightweight concrete has lower conductivity
  - Autoclaved Aerated Concrete (AAC)
- In conjunction with other materials
  - CMUs, cavity walls, precast sandwich panels, ICFs (insulating concrete forms)

From concrete.org (PCA)



Stormwater Management

- Pervious concrete
- Pavers
  - Grid, interlocking

Economy

- A long-time goal in the concrete industry

Occupant Comfort

- Indoor Air Quality
  - low VOCs with concrete as the finished surface
  - No mold growth or rot
- Daylighting
- Acoustics (transmission reduction)
- Occupant comfort
- Aesthetics
- Heat island decrease

from *The Sustainable Concrete Guide*

Longevity and Resilience

- Life cycle assessment (LCA) and cradle-to-grave (or cradle-to-cradle)
- Corrosion resistance / durability
- Low maintenance
- Robust for safety
- Adaptable to changing climate

Repair

- Large amount of existing inventory
- Small amount of money

= Focus on repair

Reduce/Reuse/Recycle

- Waste for kiln fuel
- Waste in concrete mix
- Crush concrete for reuse

Committee 130: Sustainability

- 130A: Materials
- 130B: Production/Transportation/Construction
- 130C: Structures in Service
- 130D: Rating Systems/Sustainability Tools
- 130E: Design/Specifications/Codes/Regulations
- 130F: Social Issues
- 130G: Education/Certification

Where does your committee fit?

- Longevity and resilience
- Repair
- Reduce, reuse, recycle
- Others?

- What is the best way for 130 to work with your committee?


from *The Sustainable Concrete Guide*
Questions?