

Optimizing Cross-Sector Sustainable Energy Deployment

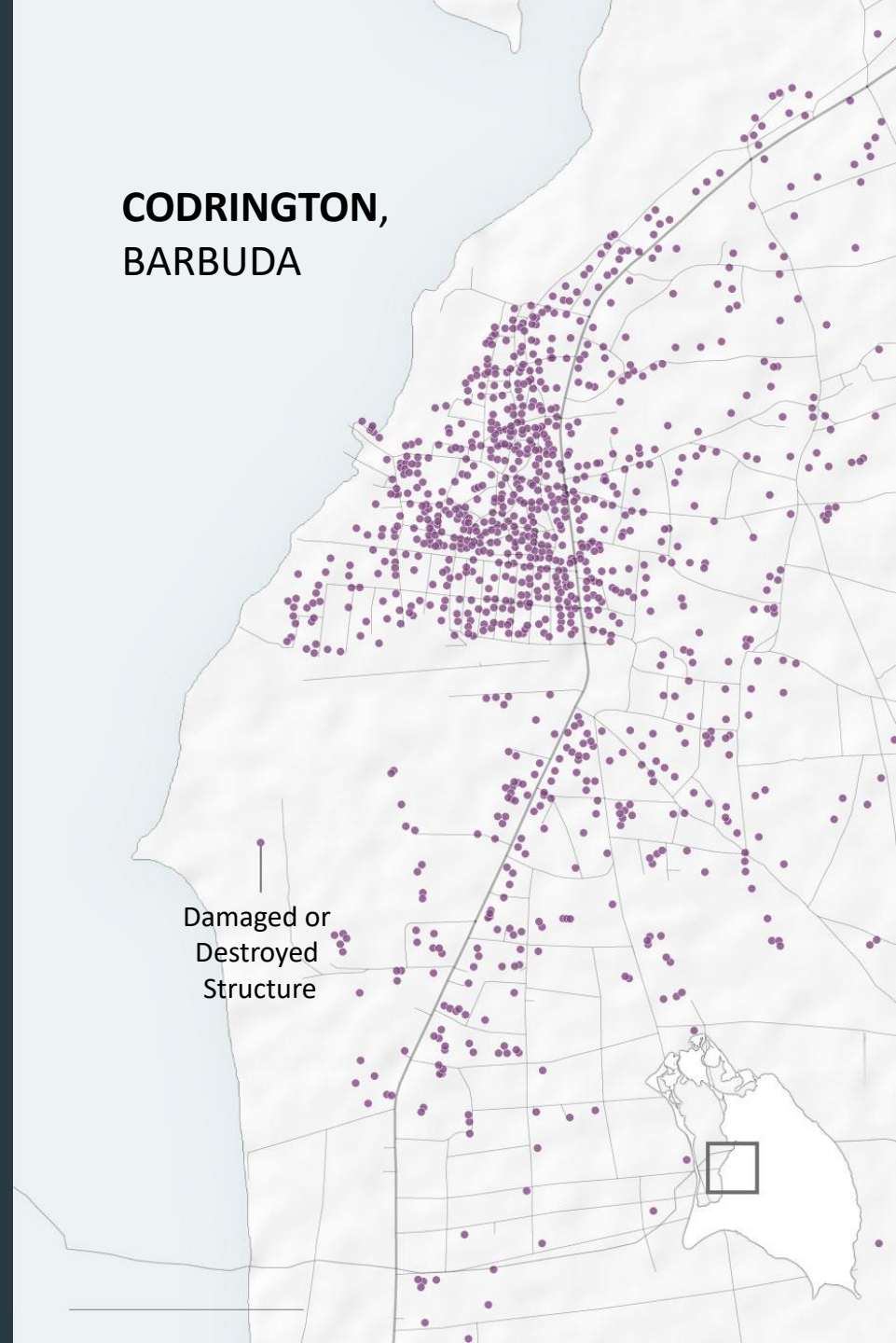
National Academies of Sciences, Engineering, Medicine
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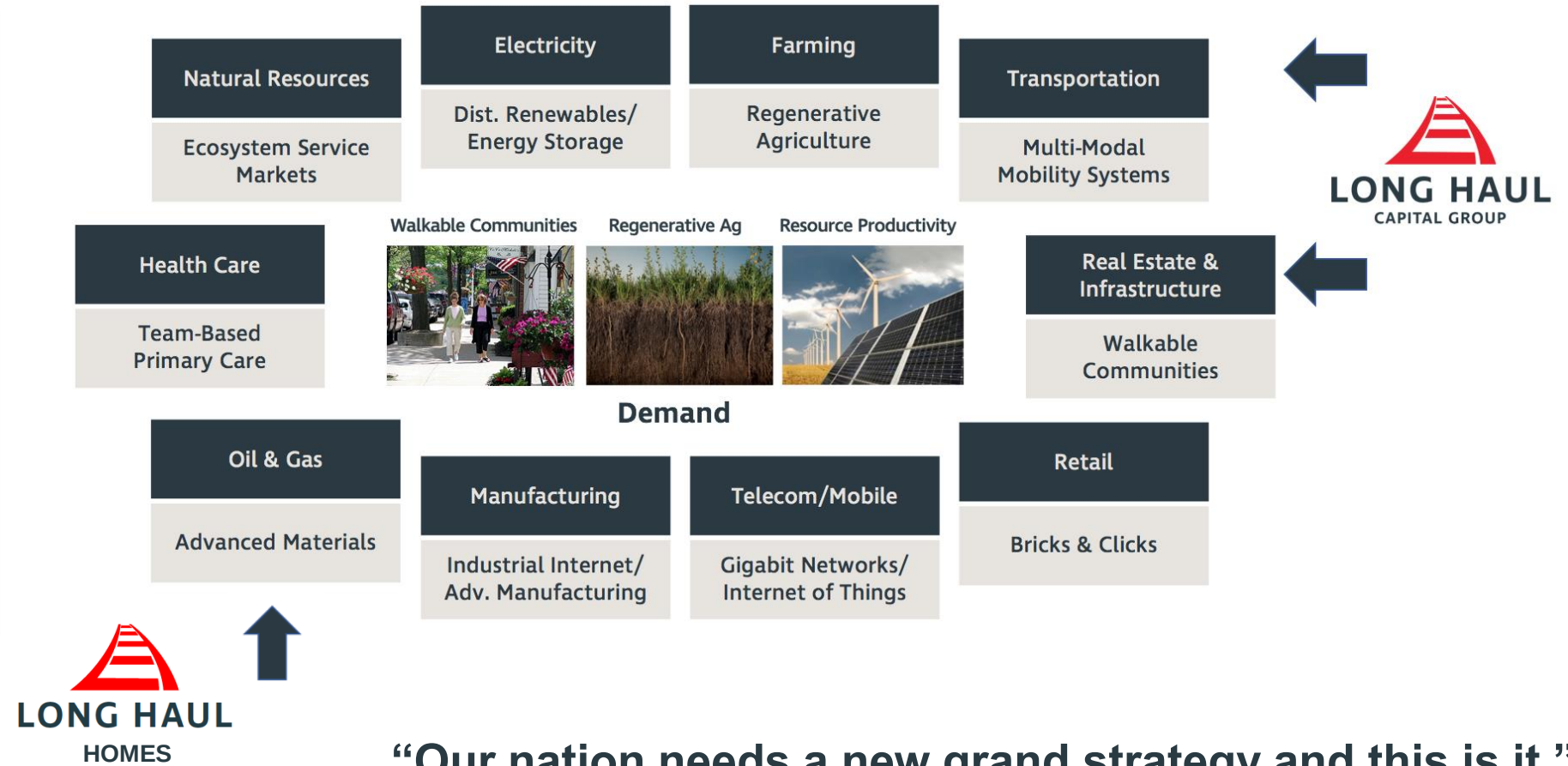
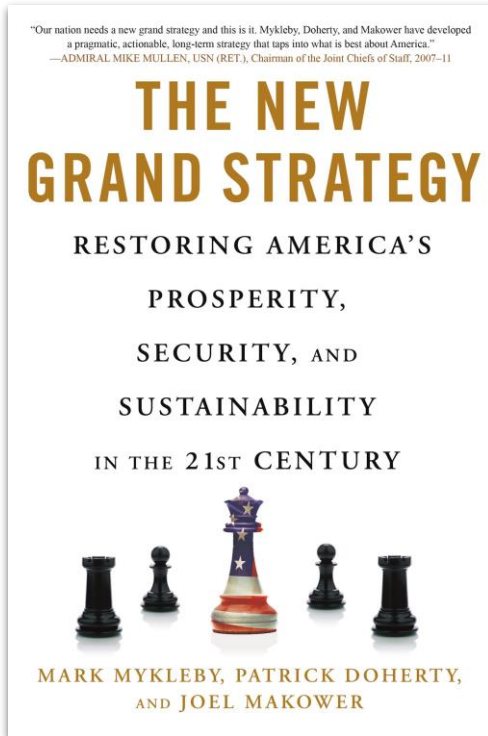


**CODRINGTON,
BARBUDA**

Damaged or
Destroyed
Structure



Background: Investing for Strategic Impact



"Our nation needs a new grand strategy and this is it."

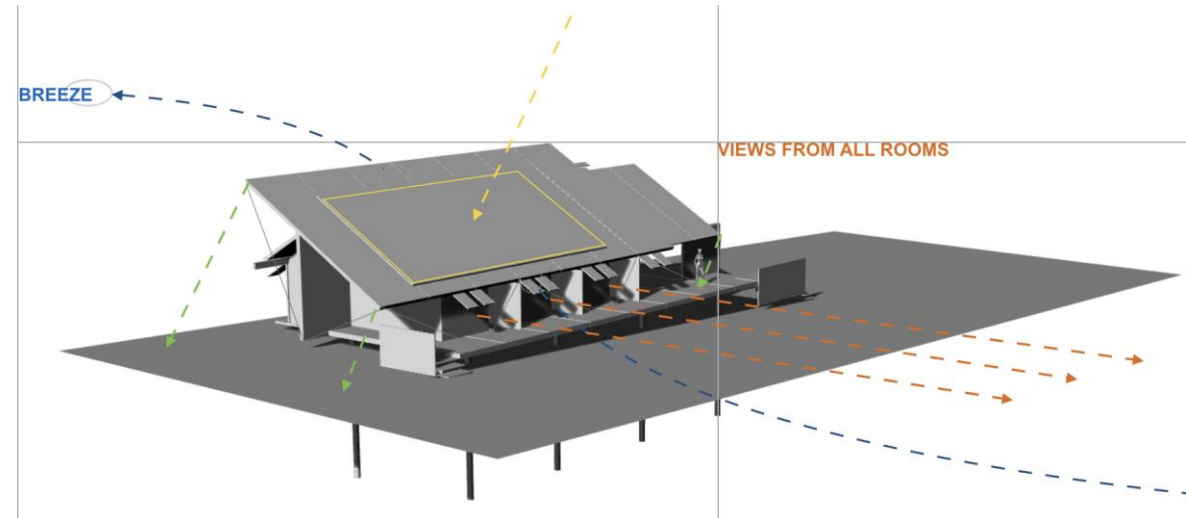
Admiral Mike Mullen, (USN-Ret), Former Chairman of the Joint Chiefs of Staff

Two Ad-Hoc Post-Hurricane Efforts

Marshall Plan for the Caribbean/ Caribbean Climate Smart Plan



Build Better Project



Marshall Plan: **What We Proposed**

Integrate rebuilding across five sectors

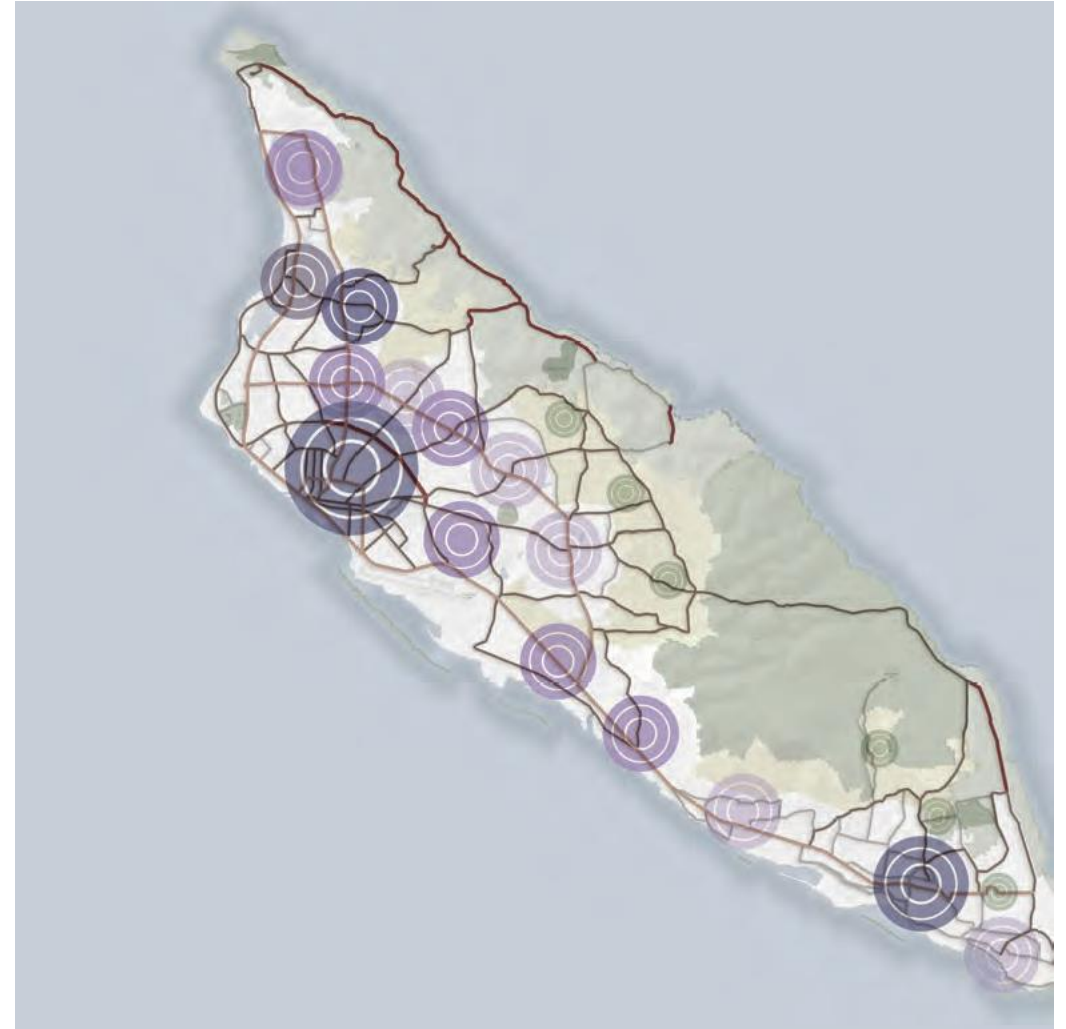
- Energy
- Housing
- Transportation
- Water
- Food

Leap-frog to future system now

- Renewable/Distributed/Storage
- Better housing materials
- New transportation patterns
- Greenhouse food production
- Distributed Water/Wastewater

Core Concepts

- Participatory planning
- Import substitution
- Resilience and redundancy
- Financed from savings of expected insured losses



Marshall Plan: **What We Signed 12 Dec 2018**

A new development paradigm for the planet that:

- (a) Builds durable ecosystems, resilient households, cohesive communities and competitive economies;
- (b) advances the adoption of cleaner and cheaper energy solutions;
- (c) values natural capital, sustainable livelihoods, social justice and sustainable and inclusive socio-economic growth; and
- (d) builds human capital.



We agree to catalyse urgent action on:

- (i) community shelter and housing
- (ii) renewable energy and energy efficiency;
- (iii) tourism, coastal resilience and the blue economy;
- (iv) physical infrastructure;
- (v) government systems and security;
- (vi) food security, water and climate smart agriculture; and
- (vii) building human capacity for regeneration and a resilient future.

Build Better



Long Haul Homes

- Function: Project Management
- Patrick Doherty, President
- Col. Mark "Puck" Mykleby, (USMC-Ret)
- Michael Peters, LEED AP, EcoDistrict AP

DECOIHaus

- Function: Architectural Design
- MIT Prof. Mark Goulthorpe, AIA

AXIAMaterials

- Function: Panel Manufacturing
- Justin Jin, CEO

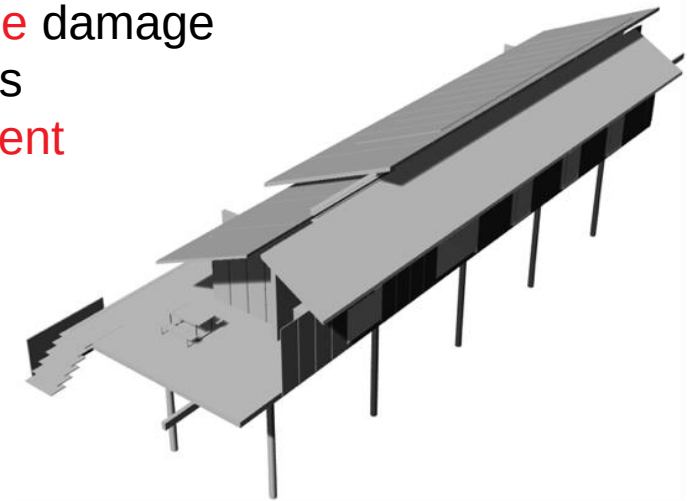
Waterfront Composite Solutions

- Function: Structural Engineer
- Mark Bishop, Principal



Our Purpose: Build Better

- To protect the **most vulnerable**
- To rapidly restore the residences of **islanders**
- To minimize **future hurricane** damage
- To **reduce carbon** emissions
- To generate local **employment**



Build Better Project: TASK &

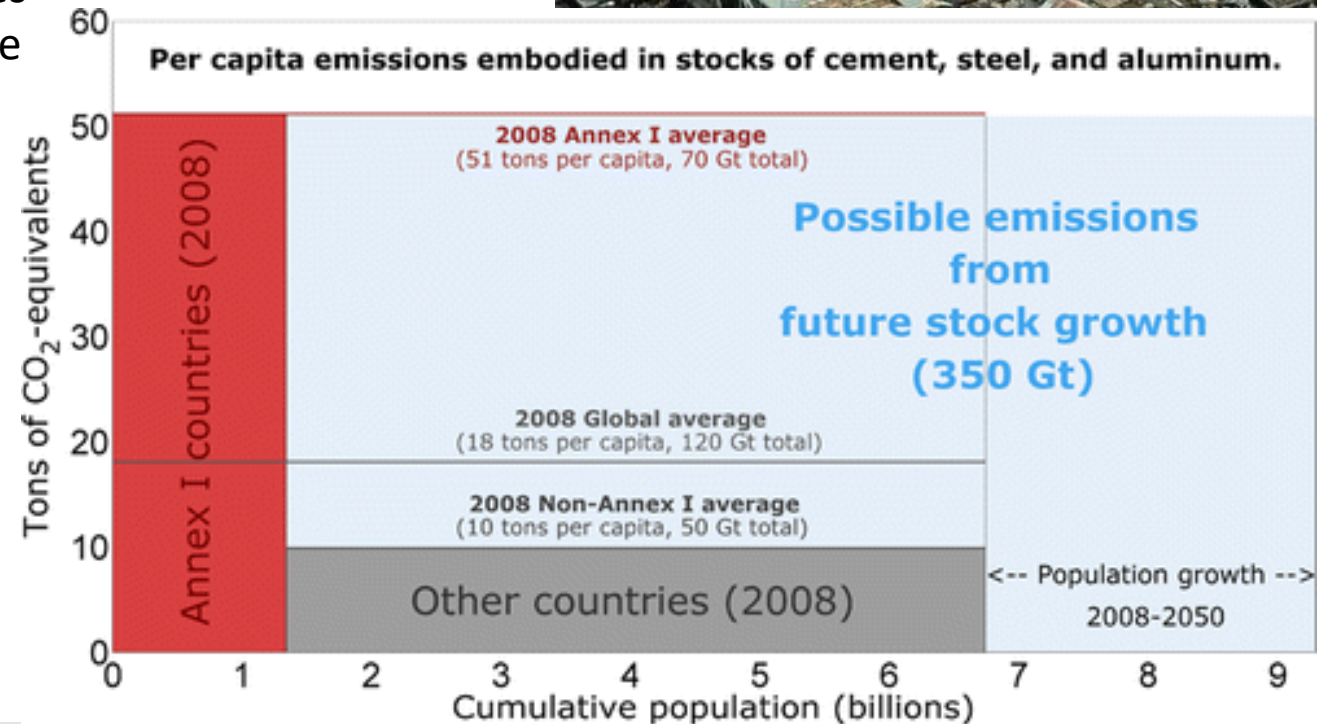
• PURPOSE

• Task: Rebuild residential housing after 2018 Hurricane Season

- **What:** Polymeric Glass Fiber Composite Homes
- **Where:** BVI & Barbuda first → Scale across affected region
- **Stronger:** Higher Hurricane Resistance
- **Greener:** Net Zero Energy Ready; Integration w/ RMI Rebuilding Caribbean
- **Faster:** 115 homes/mo. & 7 day max construction times
- **Smarter:** Work with stakeholders to design in resilience

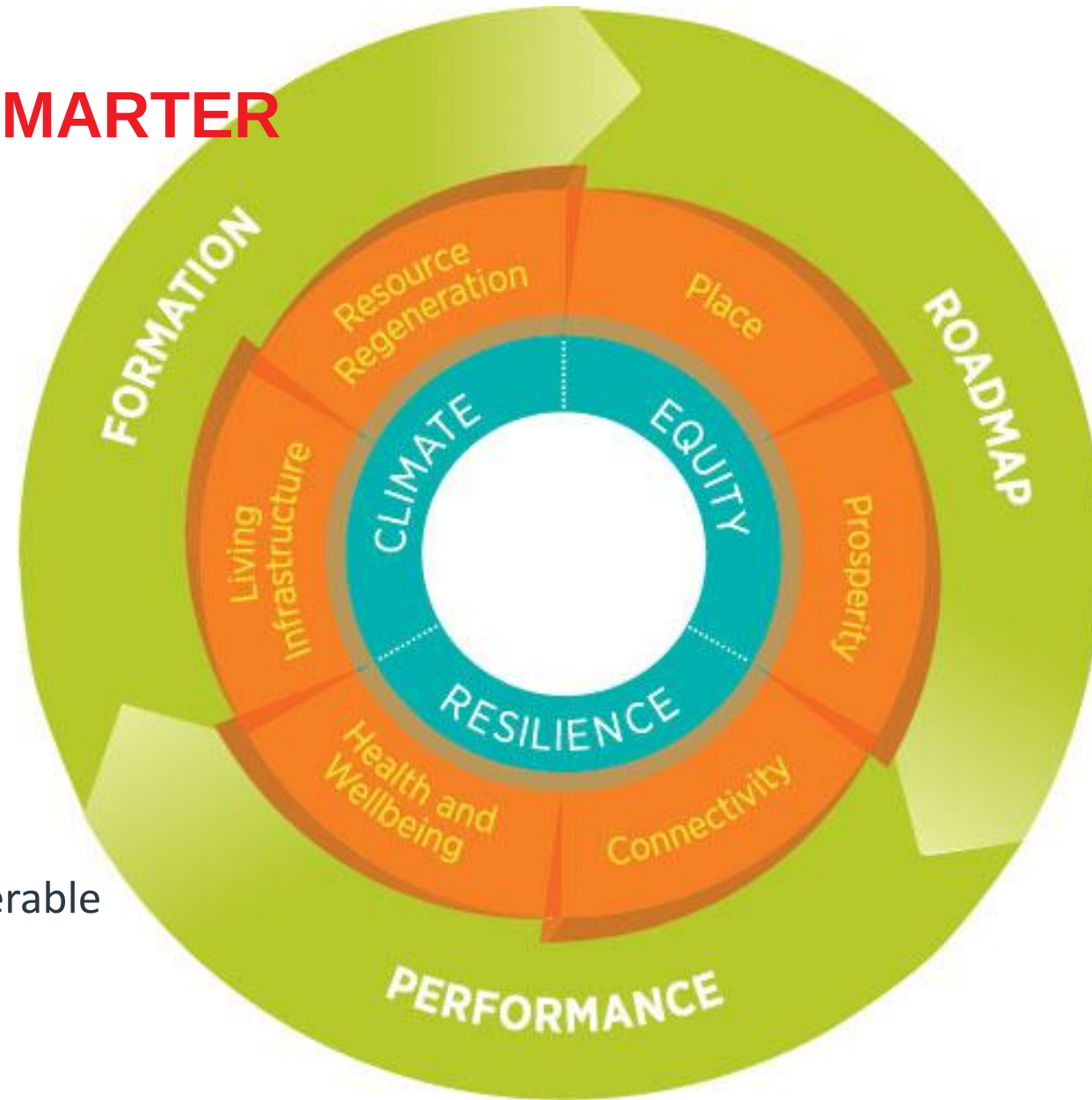
• Purpose: Build Better

- To protect the **most vulnerable** during rebuilding
- To rapidly restore the residences of **islanders**
- To minimize **future hurricane** damage
- To **reduce carbon** emissions from the housing sector
- To generate local **employment**



Build Better Project: **SMARTER**

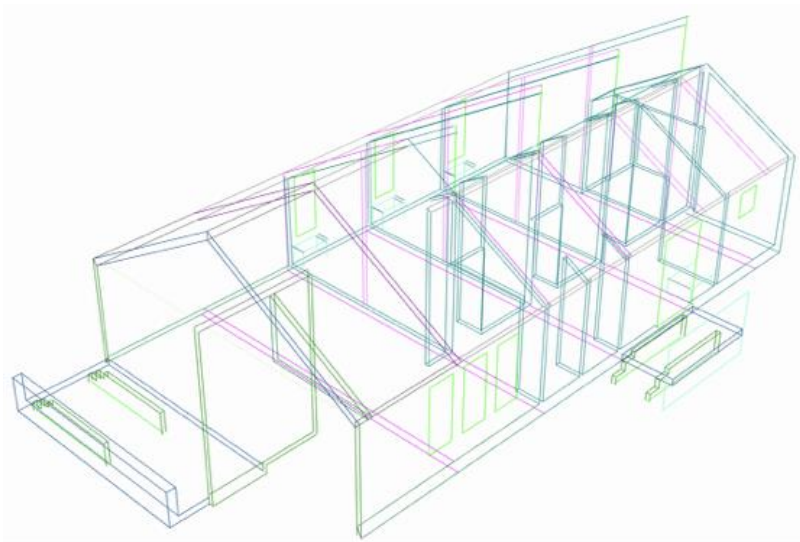
- **Participatory community planning**
 - Modified EcoDistrict protocol
 - Community design charrettes
 - Ensures equity and inclusion
 - Integration with RMI Rebuilding the Caribbean
- **Homeowner-driven design process**
 - Range of size & floorplan options
 - Local “architectural vernacular” elements
 - Off-the-shelf units available for airlift for most vulnerable



Composite SLPs: Hurricane Strength



- High performance composite boats move at Category 5 speeds through water, which is 800x more dense.
- Our joints and anchor attachments are over-specified for 200 mph wind loads.
- By distributing the load across a large area, composite panels will never face more than 1/5th of their fatigue strength.

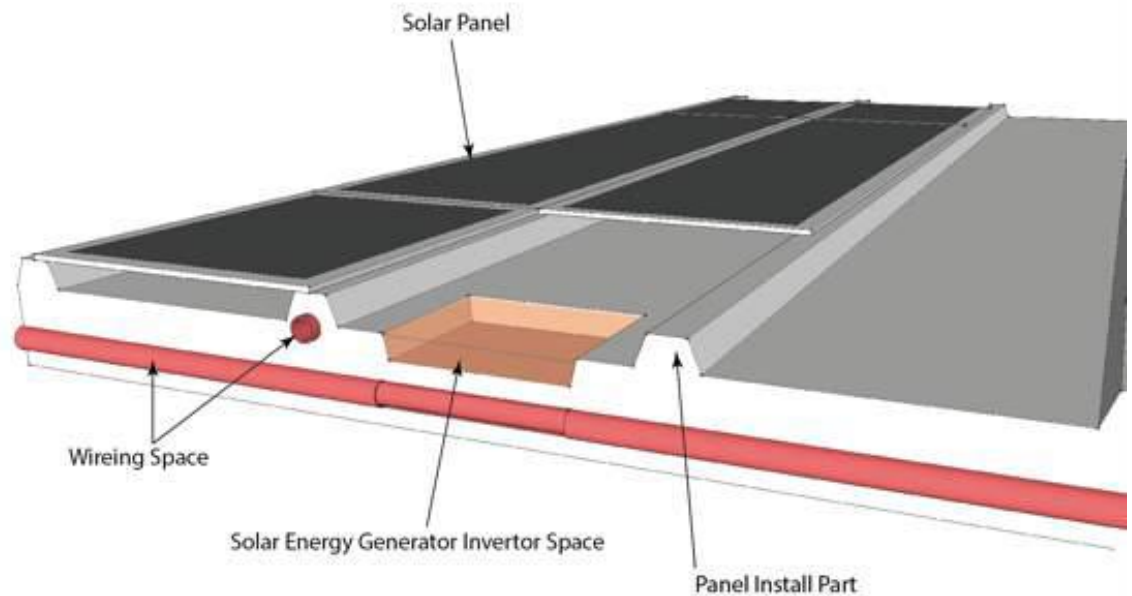


4" thick composite panel (composite skin thickness 0.03", FR EPS 1.89")



Composite SIPs: GREENER

- Net Zero Energy/Passive House Certification
- Rooftop Solar Ready
- R25-50 Insulated Walls
- No Thermal Bridge
- Insulated Windows & Doors
- All Recyclable Panels
- No VOCs
- Approx. \$370/occupant/year energy savings (Barbuda)



0%
LESS
dust & noise



99%
DRY
process



1 week
QUICK
construction

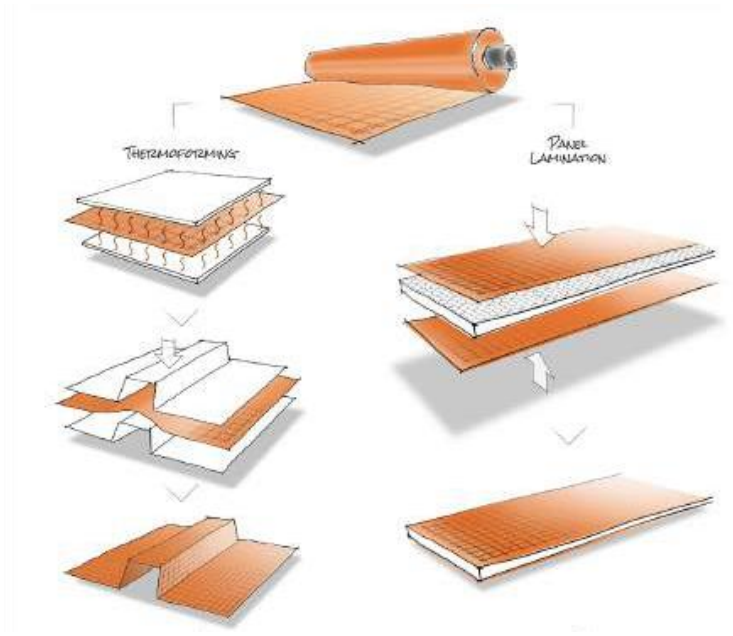


100%
ALL
recyclable

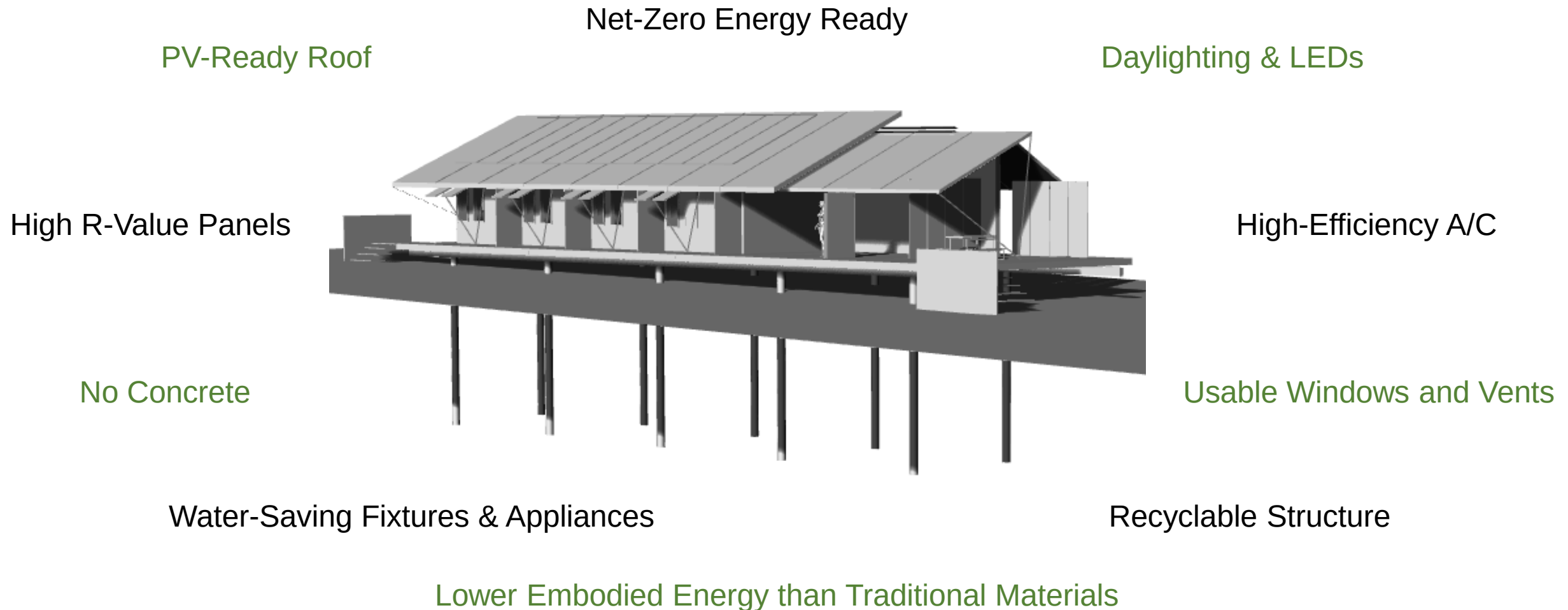


Composite SLPs: **FASTER**

- 115 homes/mo current max capacity; 550 homes/mo in 2018; +price drop
- Shipped flat-packed by container to nearest port
- On-site construction time < 7 days



Composite Homes: **Living Lightly on Our Planet**



Thank You

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