

SUMMARY OF POSSIBLE RESEARCH TOPICS

1. **SUSTAINABLE BUILDINGS¹**

Definitions and Metrics

- What is a sustainable (EEE) building and how can we measure this performance throughout the building lifecycle? — Beyond LEEDS!

Barriers

- What are the legal, economic, political, institutional, behavioral, and technological barriers that inhibit building owners and professionals from designing for and achieving these goals?

Materials

- Manufacturing: What are materials that can be manufactured to minimize their negative environmental, social and economic impact, while maximizing value?
- Use: Which of these materials can help make and operate buildings that minimize their negative environmental, social and economic impact, while maximizing their value?
- Disposal: Which of these materials can be most effectively returned to the natural and technical waste streams?

(For example, materials that have low embodied energy and support operational energy efficiency while also providing good jobs during manufacture, good indoor air quality and human comfort during occupancy, and that result in waste streams during manufacture and disposal that are valuable to other systems).

Tools

- What are tools that can help AEC professionals and owners to better simulate, analyze, and visualize the many criteria of sustainable buildings,
- What are tools that help AEC professionals understand the interrelationships between these criteria and conduct tradeoffs.

Processes

- What are design processes that help designers and owners integrate the concerns of all the project stakeholders, and understand and maximize the multidisciplinary, lifecycle performance of their designs?
- What are sustainable construction processes, and how to integrate these concerns into the design process?
- How to operate sustainable buildings?

Showcase Buildings

- What are some signature cases that help us understand and communicate the benefits of more sustainable buildings and the processes needed to achieve them — Examples: Green Dorm, Biological Field Station, Green Museums, with exhibits highlighting sustainable technologies, and the processes and tools used to achieve them...

¹ *Note: During the exercise, we identified Topics we are currently working on, and tTopics we hope to work on in the coming years. One clear observation was the lack of concentrated focus on energy issues in our current work, and a desire to focus more on these issues in the future.*

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2. *SUSTAINABLE INFRASTRUCTURE*

Governance Structures

- What kinds of governance structures and enlightened community partnerships will reduce the level of public opposition and allow infrastructure projects to be completed on time and be politically and socially viable in the future?
- Behavior Change related to infrastructure projects:
 - Infrastructure projects involve more than the physical project, they also must consider community buy-in and behavioral aspects and changes.
 - How can infrastructure design incorporate user's needs and preferences?
 - What kinds of changing societal values or economic incentives motivate people to change behaviors?

Breaking up the “Natural Monopoly” of Centralized Infrastructure

- Centralized vs. Decentralized Infrastructure Solutions
 - What are the tradeoffs?
 - Efficiency of large scale provision —with higher distribution costs — for centralized provision vs.
 - Market competition, lower distribution costs and lower vulnerability to natural and hazards and deliberate attempts at disruption for distributed provision
- What are the variances across different types of infrastructure?
 - What are the benefits and comparative advantages of the different types?
 - How do they vary?
- What technological breakthroughs (c.f. cellular networks for wireless telecommunication) will be required to enable economical provision of more distributed infrastructure for water treatment, power generation, sewage treatments, etc.?

3. *SUSTAINABLE CITIES*

- How do we define sustainable cities along a continuum of land use (Urban, Suburban, Rural, etc.) to understand them over time?
- What does this mean in a wider context?
- What are the interconnections between cities, regions and states/nations?
- How do they influence and impact each other?
- What are the connections between the urban and non-urban areas with respect to consumption, etc.?
- What policies affect the sustainability of urban areas?
- How do urban areas supply economic and social opportunities?
- What do the growth of cities and the expansion of urban areas mean on a local, regional and global scale?
- How will the expansion of cities impact the agriculture natural systems?
- How can we conduct a multi-scale analysis?

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4. *SUSTAINABLE REGULATORY & FISCAL POLICY*

Carbon Markets:

- How do carbon markets and the financial incentives created by climate policy at the national, state, and international level affect local private actions and ecosystem service provision?
- Where should incentives be applied?
- How can we most effectively influence private actors?
- What are the indirect impacts of these new policies?

Water Distribution and Management

- How can we influence people to consider water use (both direct and indirect) in their everyday decisions?
 - For example, can we subsidize crops that are less water intensive?
 - Can we provide incentives for more efficient water use distribution and water management systems?

Ecosystems/natural systems

- How are ecosystems, natural systems, rural systems and farms interconnected?
- How do we define a natural system?
- How do we create economically viable farms?
- Will managing this process prevent urban sprawl?
- How do we manage the rural/urban interface?

Coastal Development and Ecosystems

- What will be the economic and social influences of climate change and their impacts on coastal ecosystems?
- What will current land policy mean for development?
- What policies should we be considering?
- How do we translate and communicate this information to influence decision makers? How do we attach value to ecosystem services?