Long Island Climate Resilience Index (LI-CRI)

Work Unit 3.4
Development of metrics to quantify impacts of infrastructure investment to address community vulnerabilities

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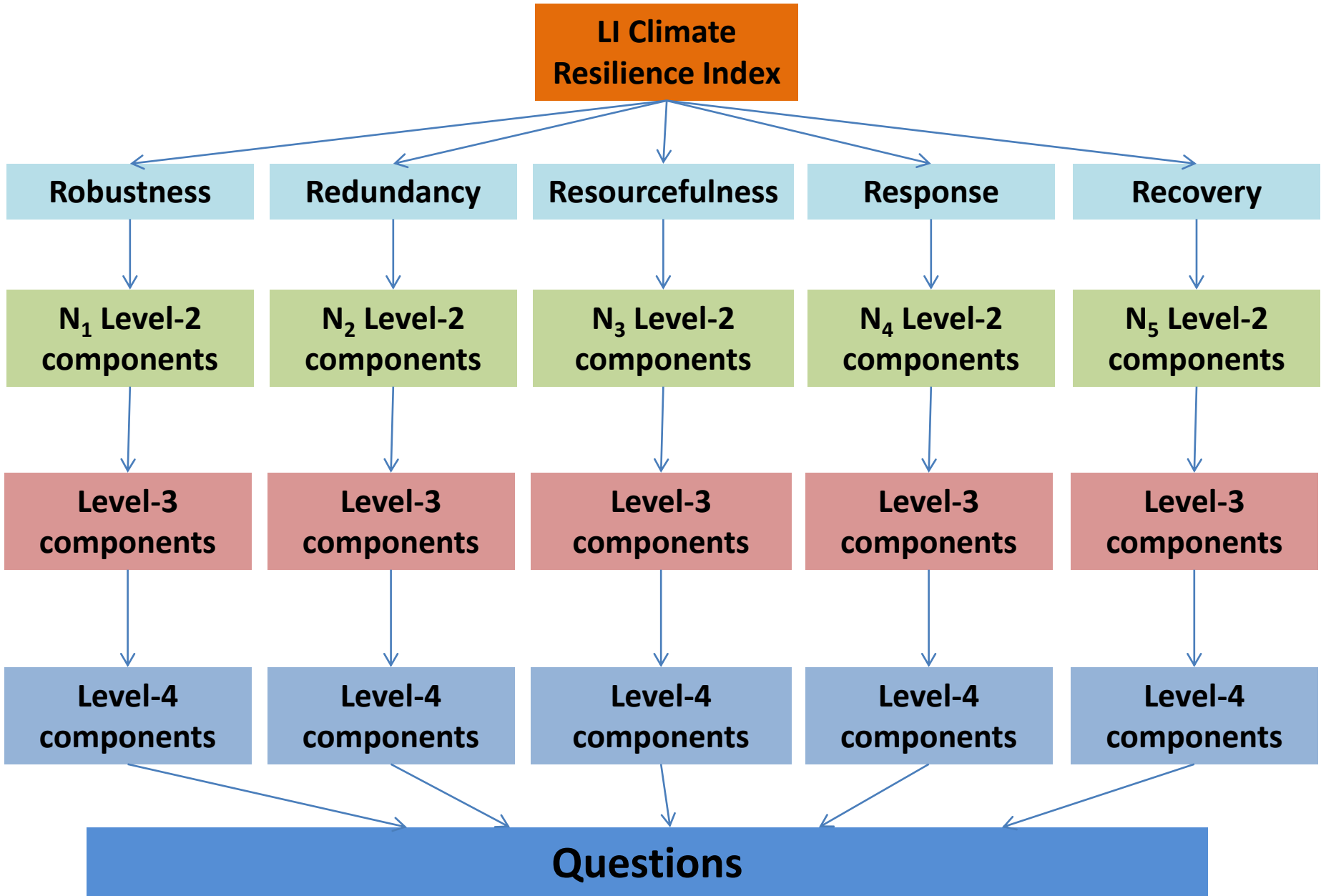New York Energy Policy Institute
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LI CRI: Objective and Five Components

- Our objective is to develop Long Island Climate Resilience Index (LI CRI)
  - to measure and monitor Long Island's resilience to climate extremes;
  - to evaluate the impacts of infrastructure investment on the resilience/vulnerability;
  - and for policy-makers to better engage the public.
- Five Components
  - Robustness: ability to absorb & withstand disturbances & crises
  - Redundancy: excess capacity & back-up systems, which enables the maintenance of core functionality in the event of disturbances
  - Resourcefulness: ability to adapt to crises, respond flexibly and—when possible—transform a negative impact into a positive.
  - Response: ability to mobilize quickly in the face of crises.
  - Recovery: ability to regain a degree of normality after a crisis or event, including the ability of a system to be flexible and adaptable and to evolve to deal with the new or changed circumstances after the manifestation of the risk

Extreme Climate Events & Sub-systems

- Risks: Extreme climate events
  - Temperature extreme: heat waves, cold waves, and # of days exceeding various temp thresholds
  - Extreme precipitation
  - Drought and wet periods
  - Tropical storms: hurricane
  - U.S. Climate Extreme Index (regional version 2011)
- Five subsystems
  - **Infrastructure: critical infrastructure (communication, energy, transport, water & health)**
  - Economic: goods & service, labor, finance, productivity
  - Environmental: natural resources, urbanization & ecological system
  - Governance: institution, government, leadership, policies
  - Social: human capital, health, the community, individual
  - **Phase I: test the index framework with one subsystem: infrastructure**
  - Phase II: expand to the other four subsystems

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                    │   LI Climate    │
                    │ Resilience Index│
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  Robustness    Redundancy    Resourcefulness    Response    Recovery

 $N_1$ Level-2  $N_2$ Level-2   $N_3$ Level-2   $N_4$ Level-2  $N_5$ Level-2
 components     components      components      components     components

  Level-3       Level-3         Level-3         Level-3        Level-3
  components     components      components      components     components

  Level-4       Level-4         Level-4         Level-4        Level-4
  components     components      components      components     components

                         Questions
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Example: Level 1 Recovery

Recovery time

Restoration agreements
(MOU/MOA with entities other than emergency responders, procedures/equipments in support of restoration)

Significant asset/area recovery
(time for returning to full operations after the loss of SAA, + the need for specialized materials or equipment)

Resources recovery
(time of full resumption of operations once external service is restored)

Information Sharing
(info sharing process with external org)

Restoration Resource Agreement
(e.g., priority plan for restoration in case of loss of resource supply)

- Time to recover
- Specialization materials

- Time before full resumption of operation

- MOU/MOA existence
- MOU/MOA activation
- After action reporting

- Provider priority plan for restoration

Briefing materials, data collection, calculation

- Preparing briefing materials on extreme climate events, including U.S. Climate Extreme Index (2011 regional version)

- Developing Google survey tool for data collection
  - Survey key facility personnel (operations manager, utility manager)

- LI CRI is based on decision analysis and multi-attribute utility theory (MAUT), and is defined by the aggregation of several indices characterizing the components and subcomponents

- **Δ LI CRI = f (investments in infrastructure)**