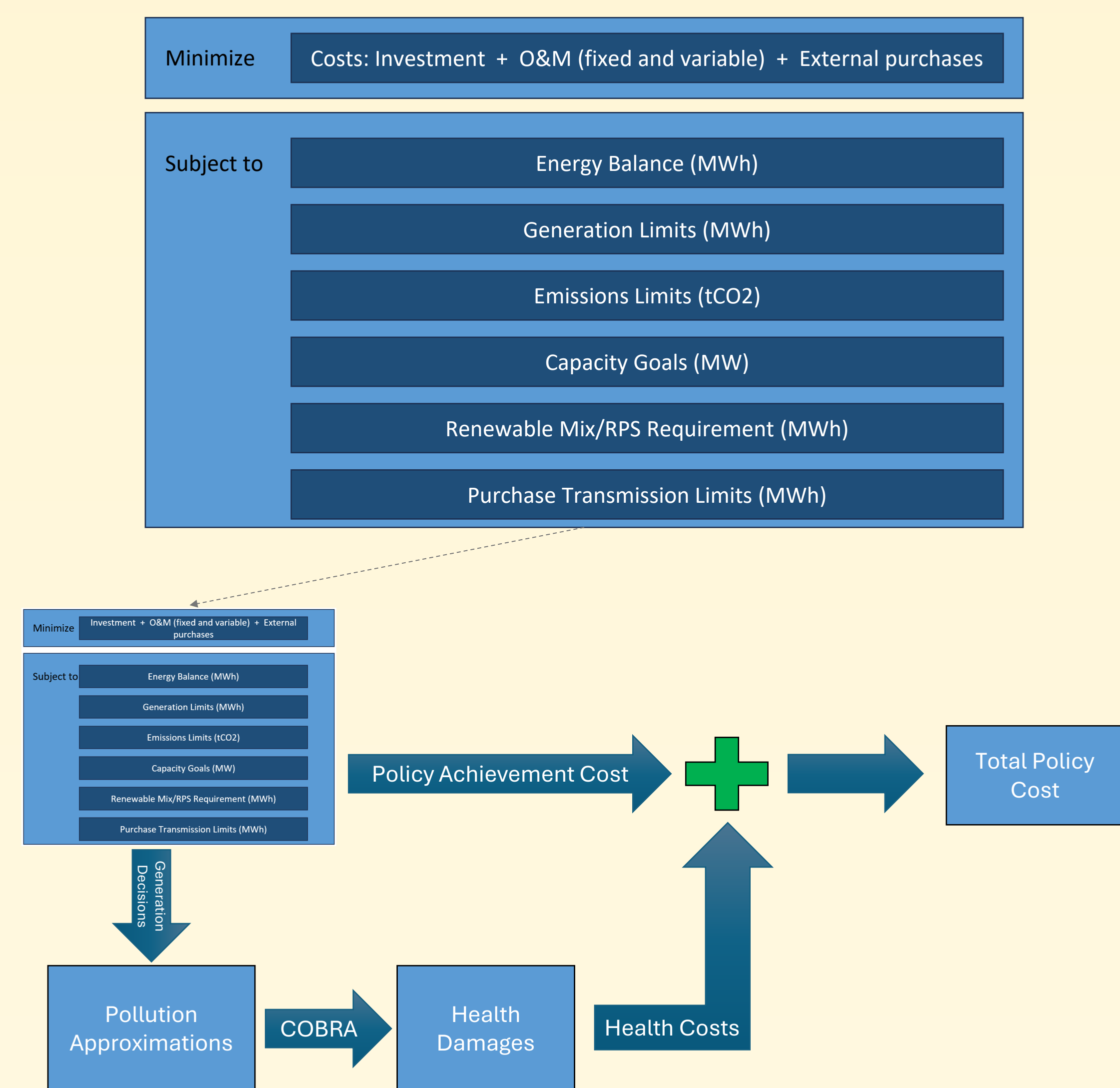


Research Summary

- Methodologies are created to support achievement of green energy policy at the municipal level.
- Project 1: A strategic Generation Expansion Planning (GEP) model is used in conjunction with a health damage screening tool (COBRA) to approximate health damages associated with various energy policies.
- Project 2: An electrical dispatch model is created for use in conjunction with the GEP model for testing grid reliability under stress-events in the context of a given achieved energy policy.
- The reliability framework is extended to evaluate the value of potential generating technologies

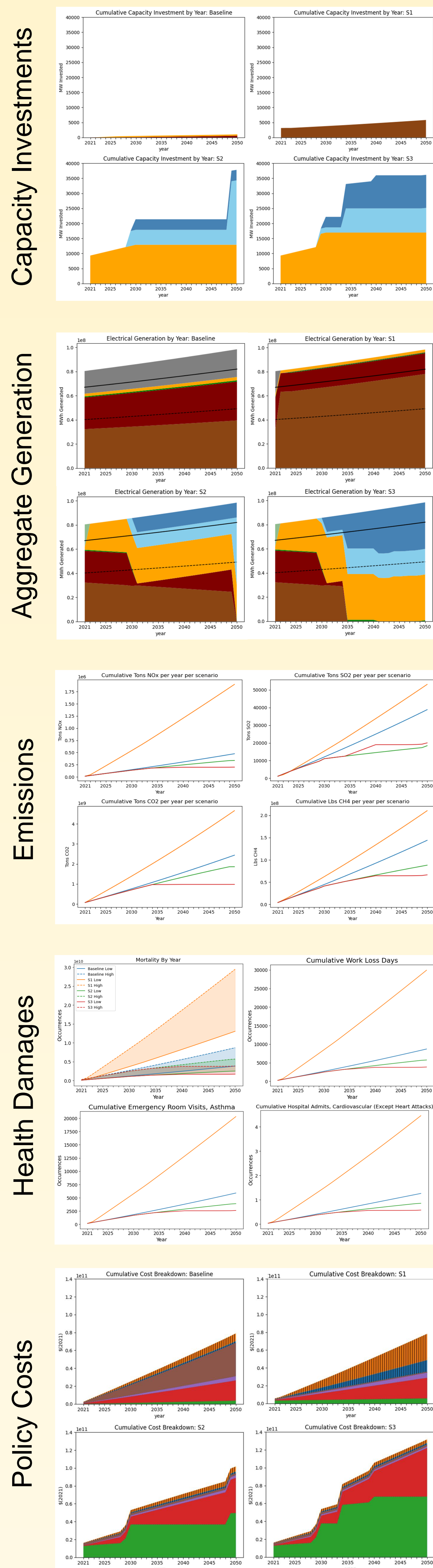
Methodology 1: Health Damages



Policies

- Scenario 0: Baseline**
 - Maintains municipality's current energy mix.
 - Calls for proportional expansion with demand.
- Scenario 1: Minimal Regulation**
 - No required policy.
- Scenario 2: Green Plan**
 - Cumulative minimum adoptions for Solar PV and Offshore Wind
 - Targets for Renewable Portfolio Standards (RPS)
- Scenario 3: Accelerated Green Plan**
 - Heightened adoption targets
 - Accelerated RPS targets

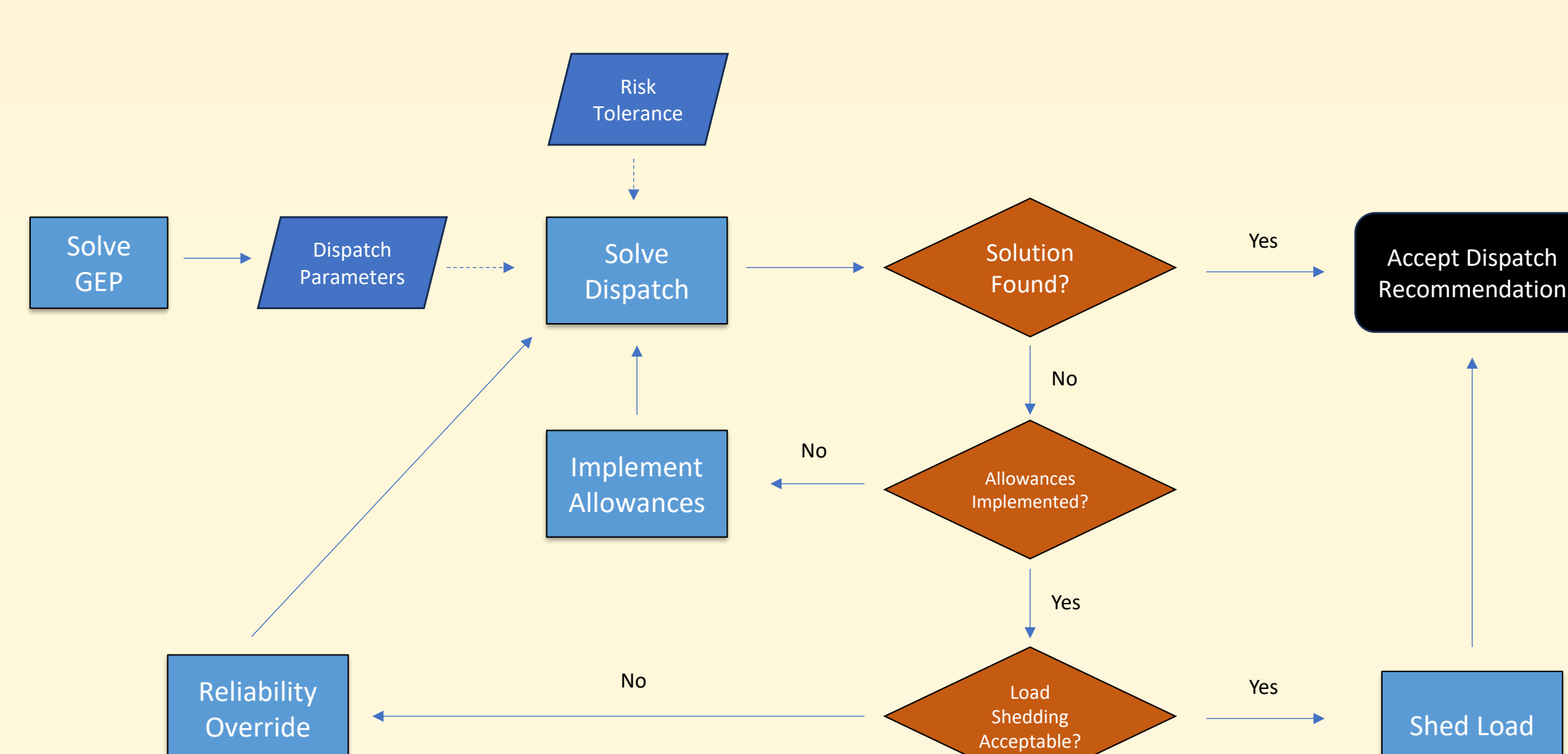
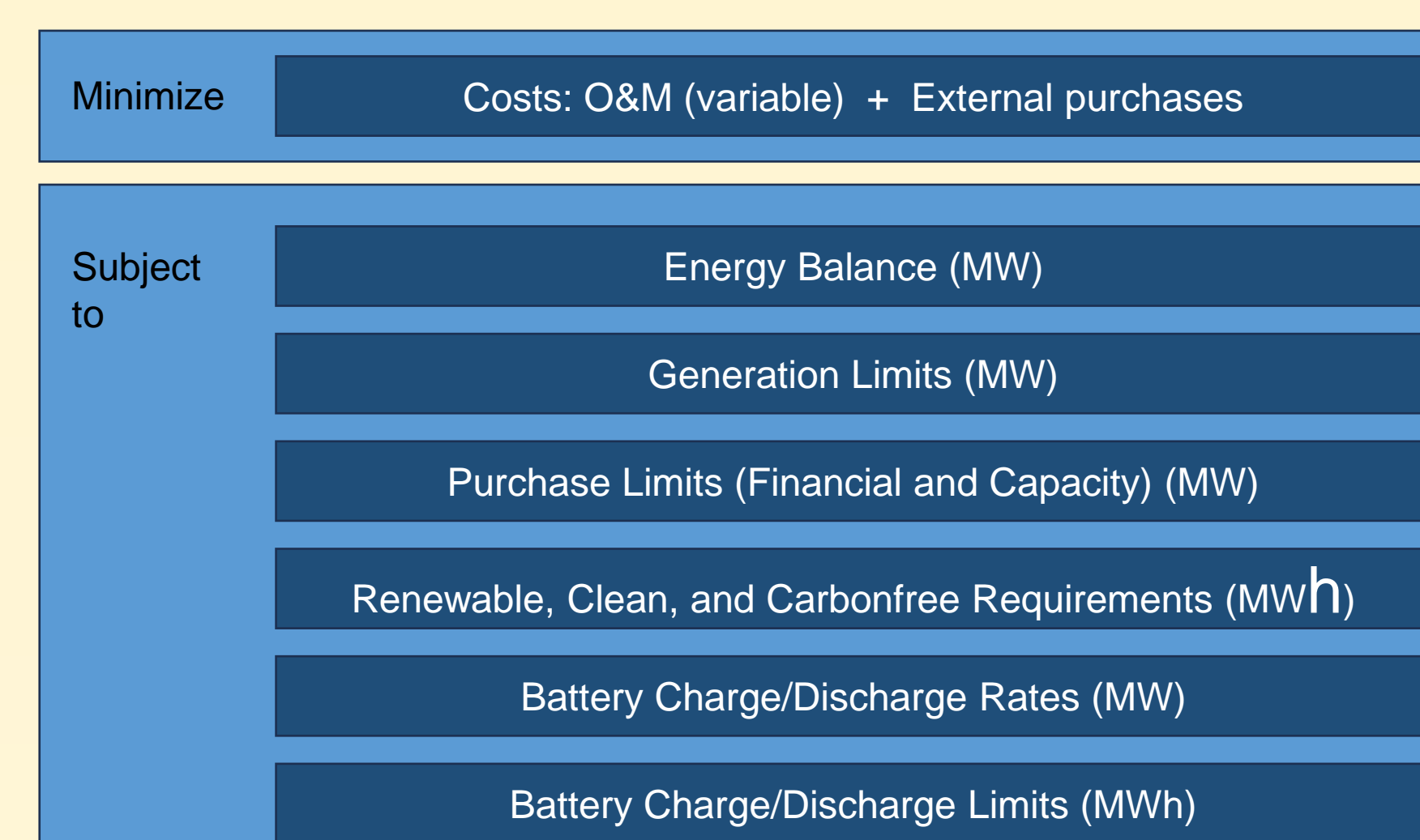
Policy Results



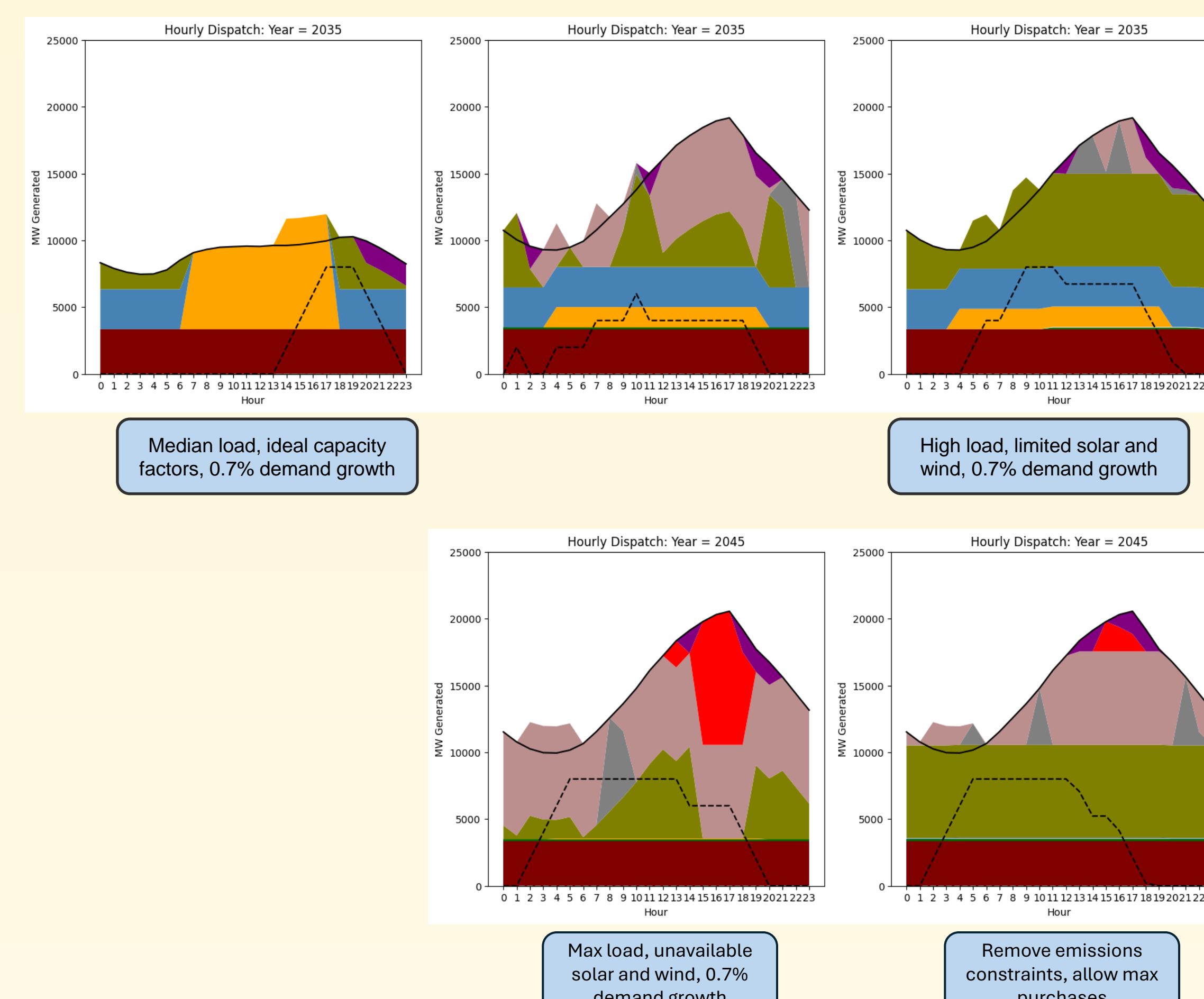
Key Takeaways: Project 1

- Substantial capacity investments are required for green energy policies.
- Health externalities have critical impacts on energy plan costs and social wellness.
- Scenario 2 and Scenario 3 underscore the imperative for a transition towards renewable energy sources.

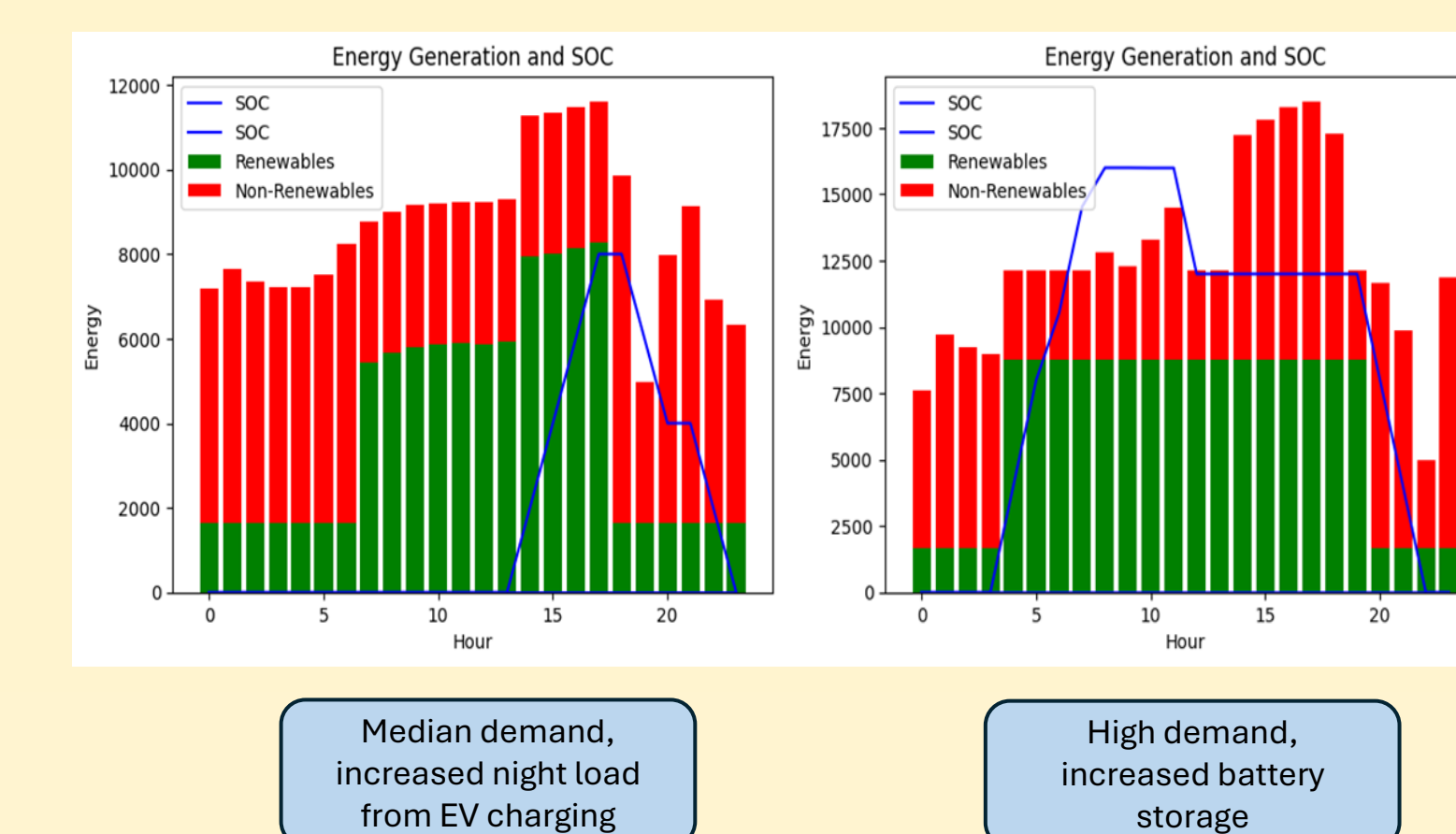
Methodology 2: Reliability Analysis



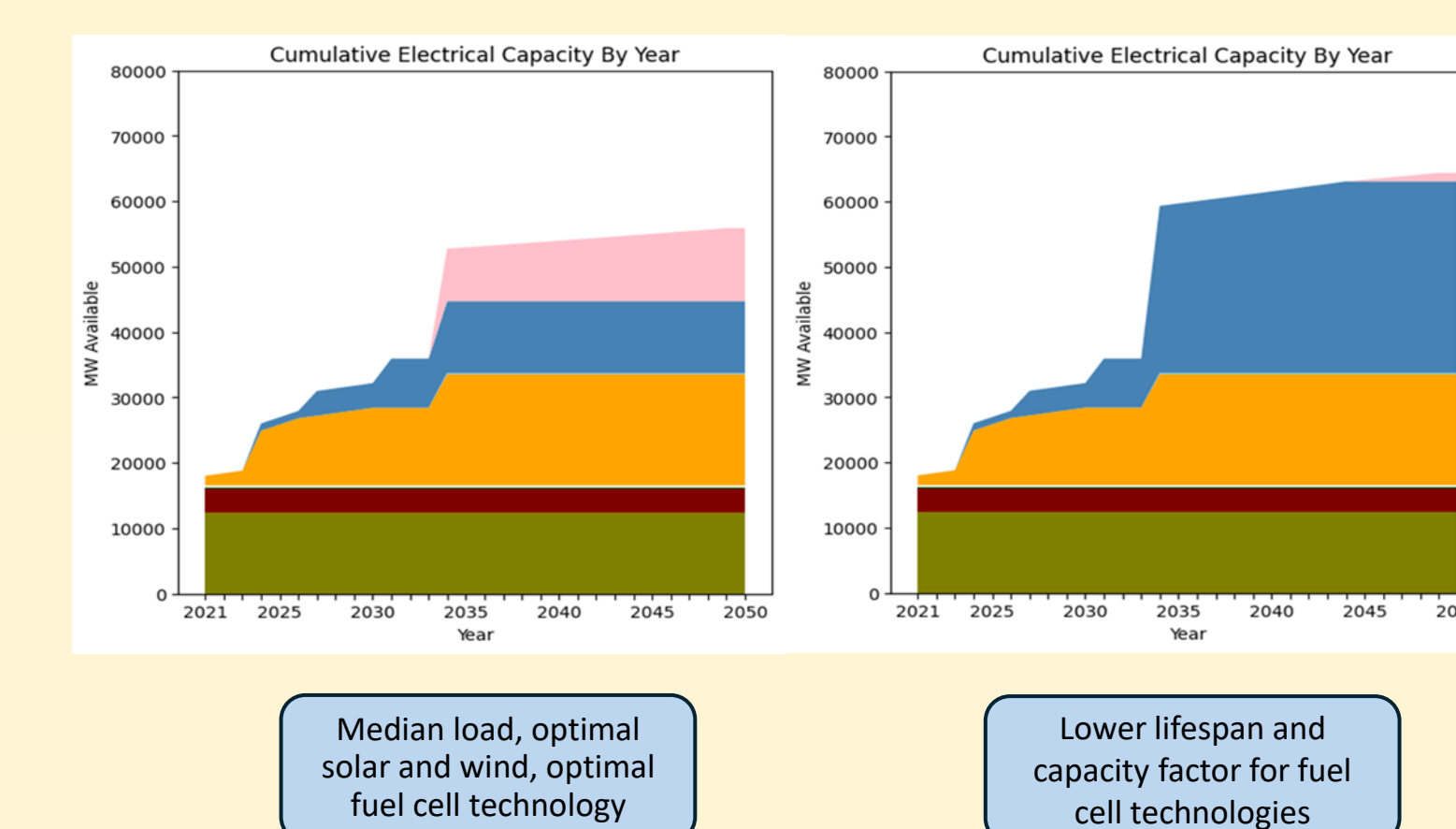
Demand Response



Storage Utilization



Fuel Cells



Key Takeaways: Project 2

- Achieving desired reliability levels may require external purchases or other emergency resources in some extreme scenarios.
- Exceptions for reliance on fossil fuels during severe demand may be necessary or at least highly cost effective.
- High grid reliability is reasonably achievable
- Expanded distributed battery utilization is necessarily more valuable in the presence of renewables exceeding expected demand
- Financially optimal fuel cell adoption scale is dependent on technological efficiency and longevity.

Ongoing Research

- We are currently investigating potential interregional impacts of heterogeneous energy mixes on human health damages due to the cross-border spread of air-pollution.
- We are also investigating the incorporation of health damages into active GEP decision making through the embedding of a trained neural network acting as a surrogate for the COBRA screening tool.