Utility Scale Battery Energy Storage System Risk and Reward Causal Model

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Problem Statement

Utility Scale Battery Energy Storage Systems (BESS) are an important part of the transformation of the electric grid using Distributed Energy Resources that reduce Greenhouse Gas Emissions. They provide three important capabilities;

1. Reduced curtailment of electric from low cost renewable solar and wind resources which is important as supply is not time phased with demand in real time.

2. Responsiveness to demand peaks, driven by a growing electrification of transportation and buildings, and thus, reducing the use of fossil fuel “Peaker” generators.

3. Avoids capital investment for expensive generation and transmission/distribution projects.

Communities, however, have resistance to permit for Utility Scale BESS based upon the real and perception of fire hazard they have. The hazard and with distrust of the “system” to justify the societal costs and benefits create community “Outrage” that slows permitting, establishes moratoriums, and even bans.

This presentation examines the causal loops for BESS Risk and Reward and the need for communications to bringing the “Outrage” down to be commensurate with statistical risk and “Delight” up even with delayed and distributed rewards.

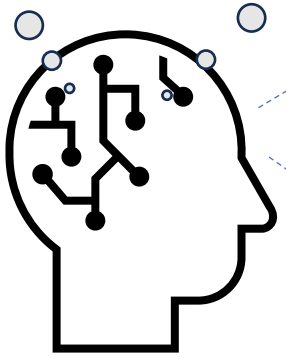
Technology Cost and Benefit

Reference: Dr Chauncey Starr, Social Benefit versus Technological Risk , Science Sept. 19th, 1969

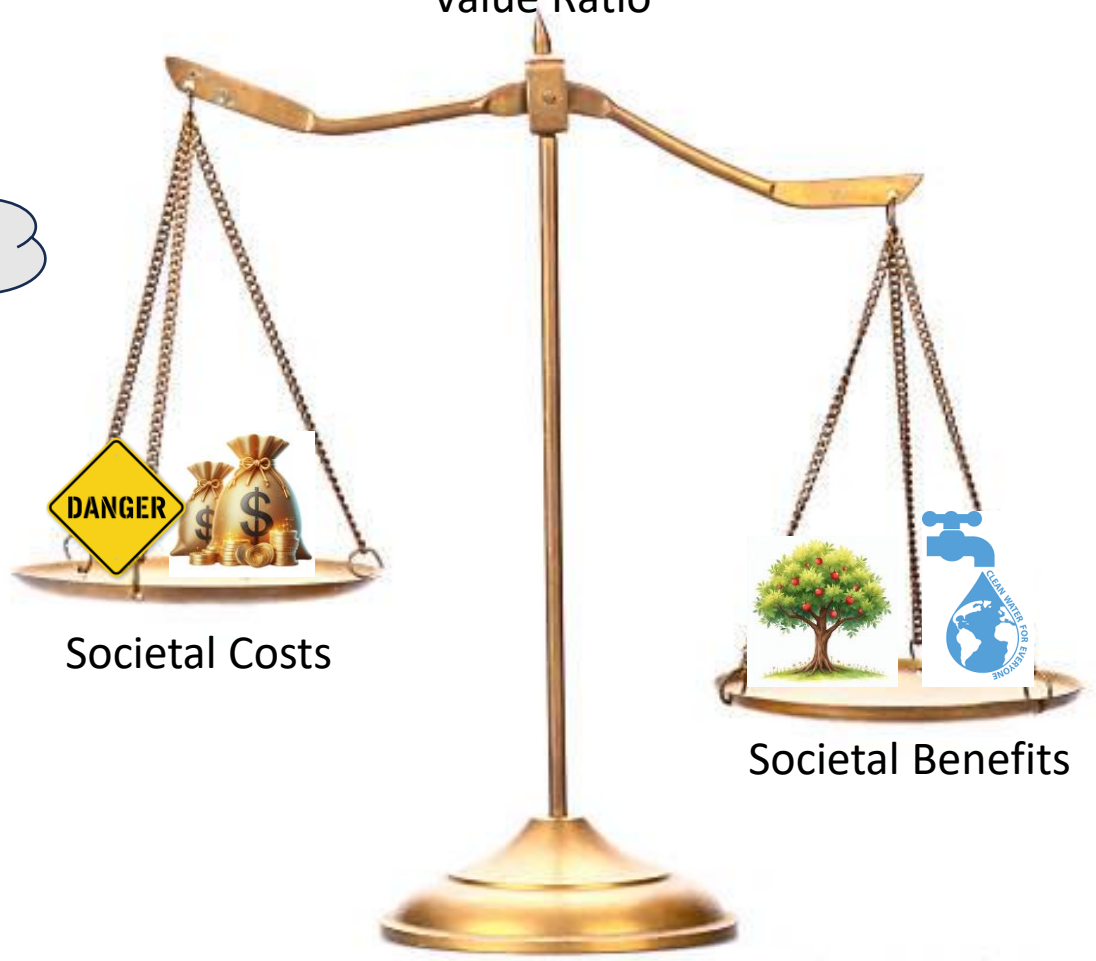
Individual, Community, Representative View

Trust?

Perceptions vs Facts



Value Ratio



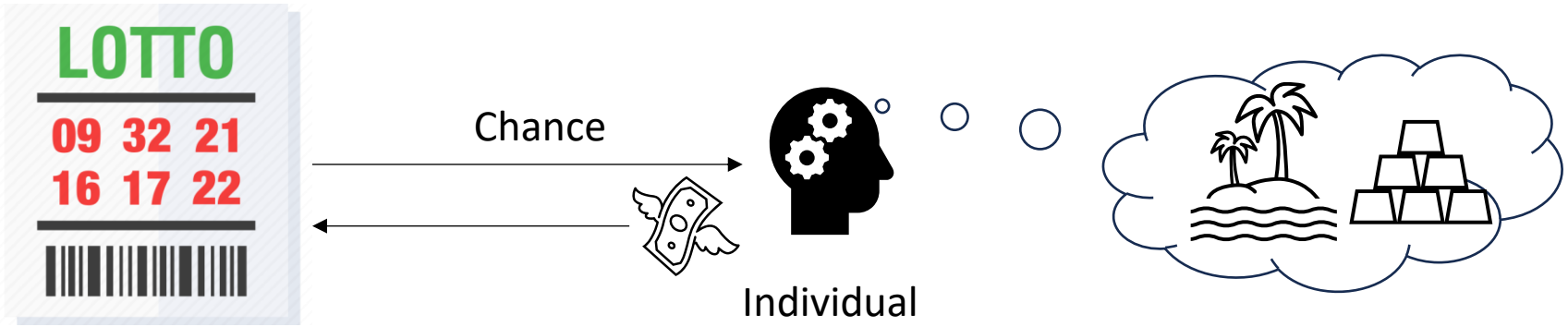
Societal Costs

Societal Benefits

Risk and Reward Functions

Risk = f(Hazards, Outrage)*

Reward = f(Benefits, Delight)#



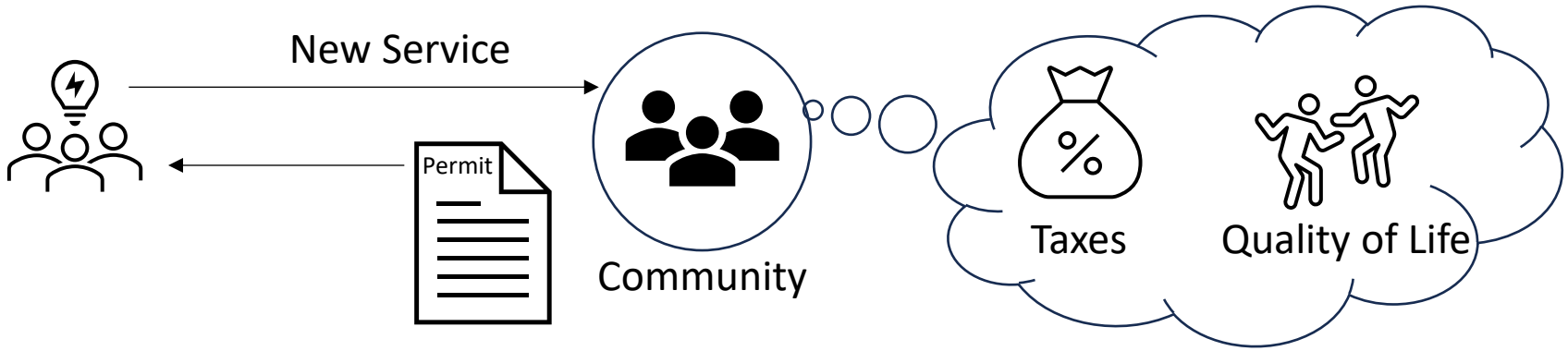
* Reference to https://www.psandman.com/index-OM.htm

Authors extension of the Dr. Sandman's Risk function to a Benefits function

Risk and Reward for Community

Risk = f(Hazards, Outrage)

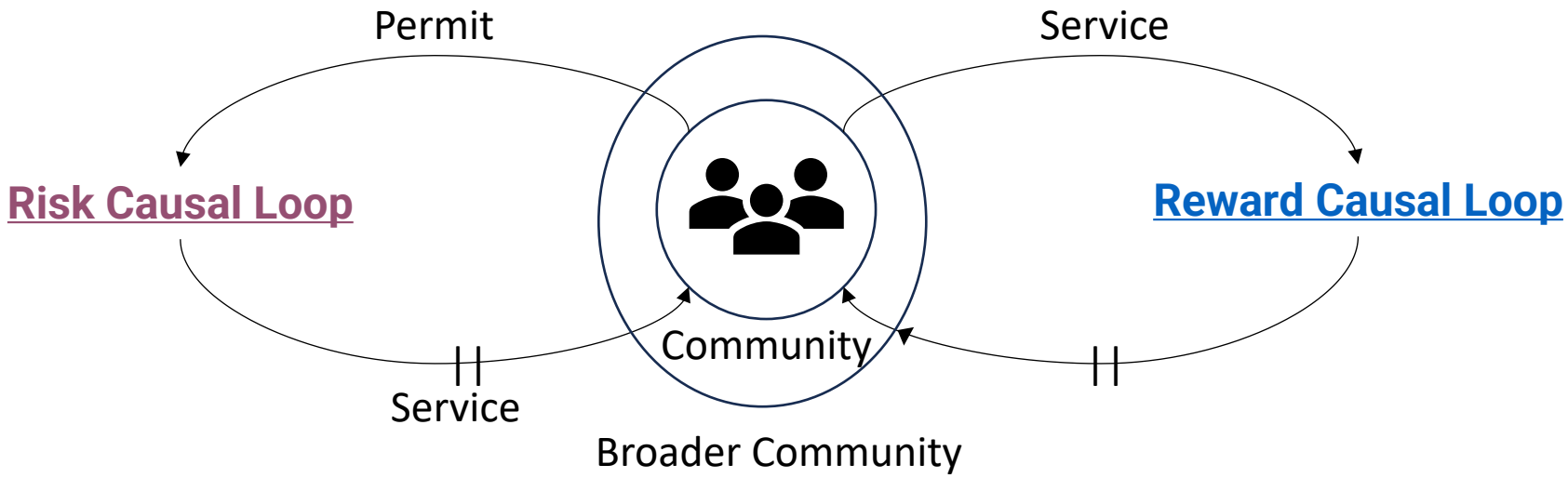
Reward = f(Benefits, Delight)



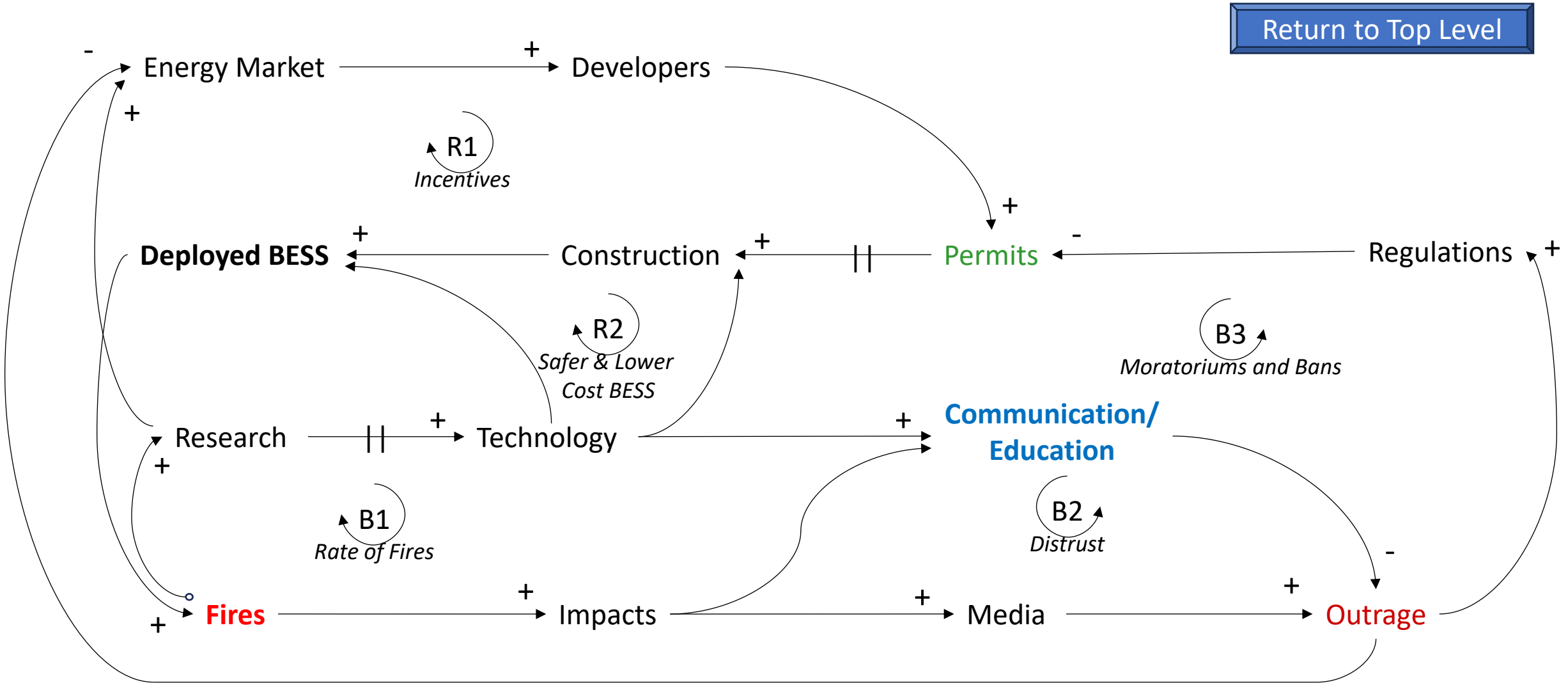
Q: Who represents the Community?
Q: Simple majority or unanimous agreement?

Utility Scale BESS Risk and Reward for Community

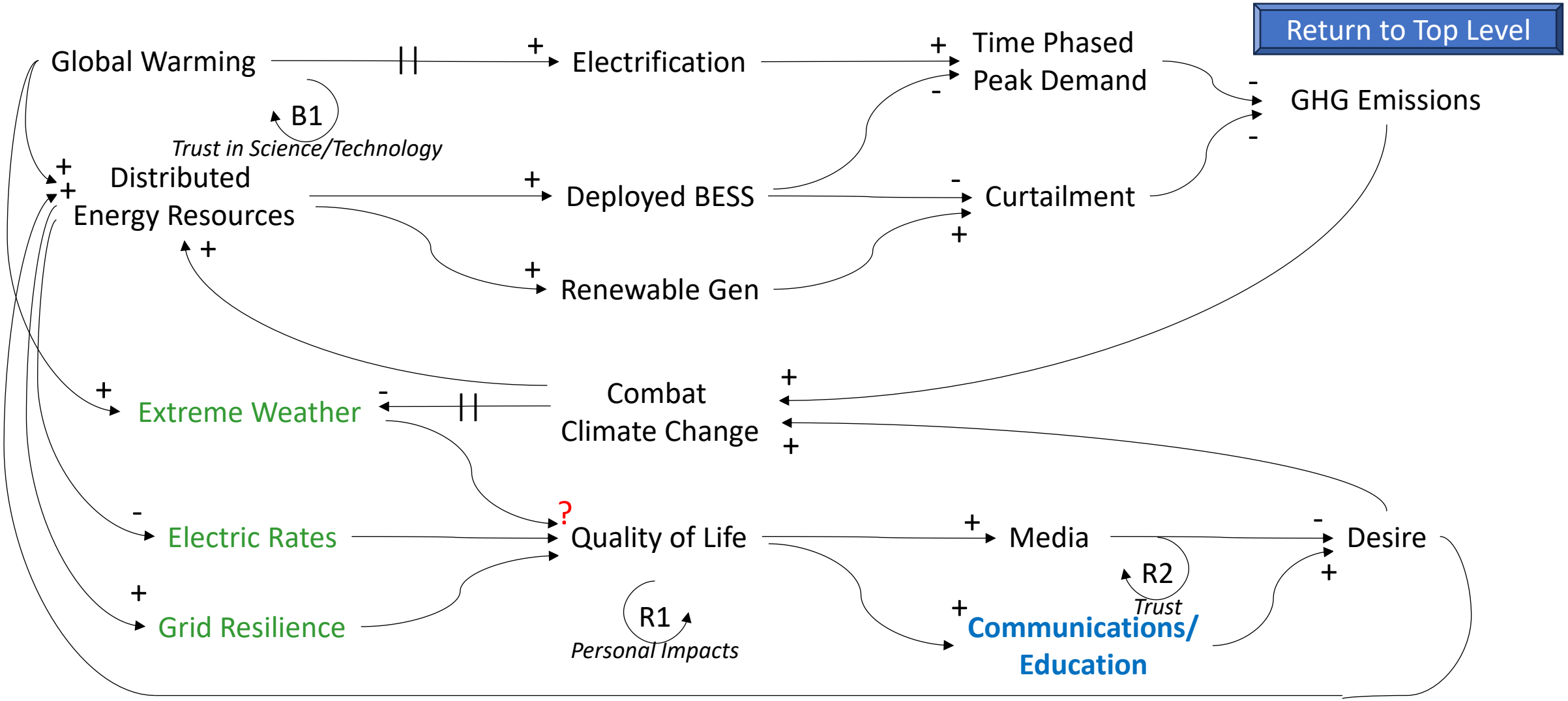
|| = delay



Risk Causal Loop for Utility Scale BESS



Reward Causal Loop for Utility Scale BESS



Closing Summary

1. A System Thinking perspective is needed to connect “Risk and Reward” and the underlying causal factors

2. Hazards, even when remote, are memorable when learned about from mass media, but even more so when they are personal experiences or local incidents.

3. Benefits that are based on avoidance of more extreme weather, or higher electric rates, may not be effective influences to create “Delight”. Causality is delayed and not readily connected to local actions for a global problem like climate change where the impacts are globally distributed.

4. Communication, via a presentation, of the Hazards and Benefits associated with Distributed Energy Resources, and specifically Utility Scale BESS, is needed to establish a more commensurate “Outrage” and “Delight” for community members and municipality representatives.

5. Care must be taken in the Communication to not hand wave away the real risks and the explanations must have clarity and be concise to develop a voluntary acceptance of risk. As we share the presentation prepared by the “Utility Scale BESS Safety Study Group” we will pay close attention to how it is received.

Community Presentation

The pages that follow were developed by a Utility Scale BESS Safety Study Group
For the Town of New Paltz NY to educate the Town Board, Planning Board, and General Public