

A framework for analysing & improving resilience at the neighbourhood scale

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Given the urgency and enormity of the climate change challenge, it is critical for adaptation work to occur at all scales – including the neighbourhood scale. Currently, adaptation or resilience work at this scale, let alone frameworks to guide this work, are not common. This research thus puts forward a comprehensive framework for analyzing and improving the resilience of a neighbourhood. The framework was refined by applying it to a proposed new neighbourhood development in Ontario, and was found to be straightforward and effective in generating useful recommendations.

Key elements of the framework:

1. identification of the future shocks and stresses to the neighbourhood
2. definition of the essential needs of the community
3. a series of clearly-defined resilience analyses

What is “resilience”?

We define “resilience” here as the capability of dealing with future shocks and stresses (all shocks and stresses, not just those related to climate change) and continuing to function; and we define “function” of a neighbourhood to be to meet the essential needs of the community.

It is both possible and imperative to initiate resilience work at the neighbourhood scale. Neighbourhoods do not have to wait for other scales to take action.

1. Identifying the future shocks and stresses to a neighbourhood:

Future shocks and stresses include those related and not related to climate change. It is important to consider all future shocks and stresses, rather than just a select few, to build overall resilience. A review of global future risks documents (e.g. World Economic Forum, Organisation for Economic Co-operation and Development (OECD), Canadian Army, IPCC) supplemented by regional and local research can yield a list of future shocks and stresses relevant to a neighbourhood.

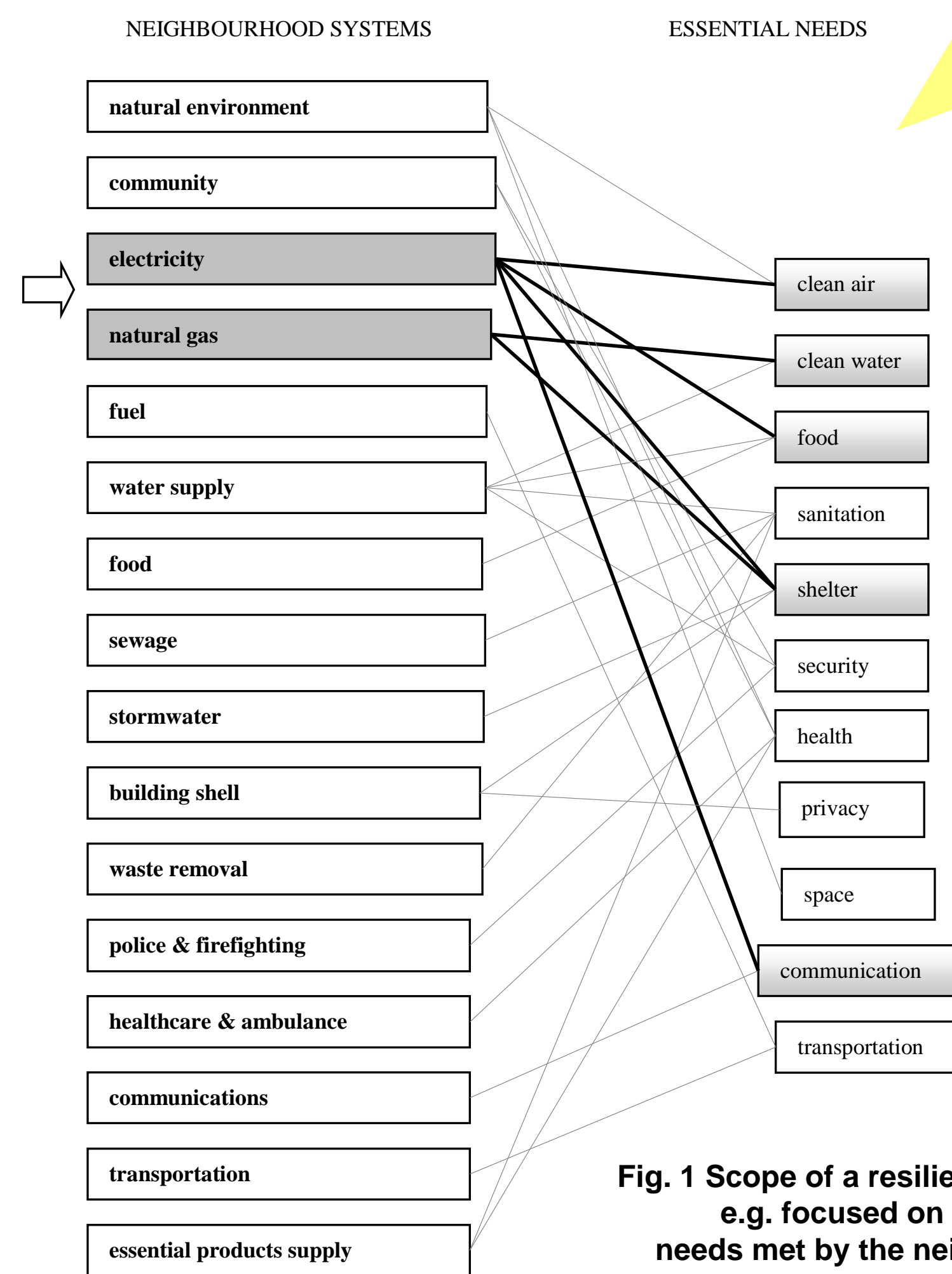
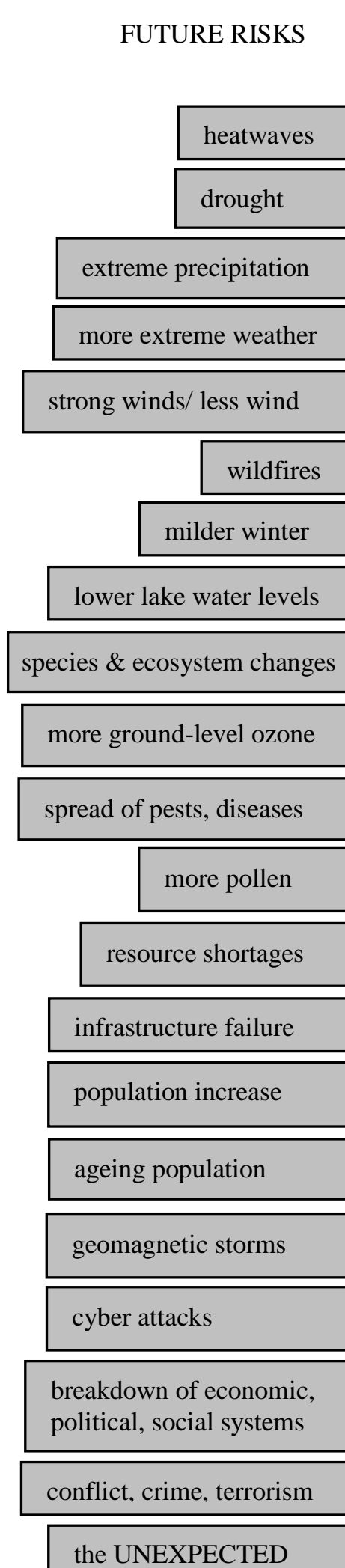


Fig. 1 Scope of a resilience analysis e.g. focused on the essential needs met by the neighbourhood energy system in the face of all future shocks/stresses

2. Defining the essential needs of a community:

Given the limited amount of financial resources, it is critical to separate “needs” from “wants” and to focus primarily on the former. To this end, it is important to define what the essential needs of a community are. Only with these essential needs defined, can it be assessed whether or not the essential needs can continue to be met in the face of future shocks and stresses, and hence whether or not a neighbourhood is resilient.

3. Resilience Analyses:

To analyze the resilience of a neighbourhood, a series of resilience analyses can be conducted of the neighbourhood, with each resilience analysis focusing on a particular neighbourhood system that meets certain essential needs (e.g., energy system). The scope of each resilience analysis needs to be clearly defined as to what future shocks and stresses it is considering and what essential needs it is covering. Once the series of resilience analyses is completed, all essential needs will have been tested against all future shocks and stresses.

Case Study Neighbourhood in Ontario

The framework was refined by applying it to a proposed 28 ha mixed-use neighbourhood in a city in Ontario. A resilience analysis of the proposed energy system was conducted. It was found that the proposed energy system already had a few resilient features (e.g., microgrid, low-energy buildings), but that there were many ways in which its resilience, and that of the neighbourhood should the energy system fail, could be improved (e.g., addition of natural gas back-up to homes).

Questions to ask in a resilience analysis:

1. What are the impacts of the future shocks/stresses on the neighbourhood system of focus (e.g., energy system)?
2. How can the impact be prevented or minimized?
3. If the impact can not be prevented, how can the be dealt with?
4. Should the neighbourhood system fail, can the essential needs normally satisfied by the system be met in some other way?
5. If not, what are some neighbourhood coping actions?
6. If there are no effective coping actions, are there ways to further ensure the system does not fail?

First step in a resilience analysis Draw the system!

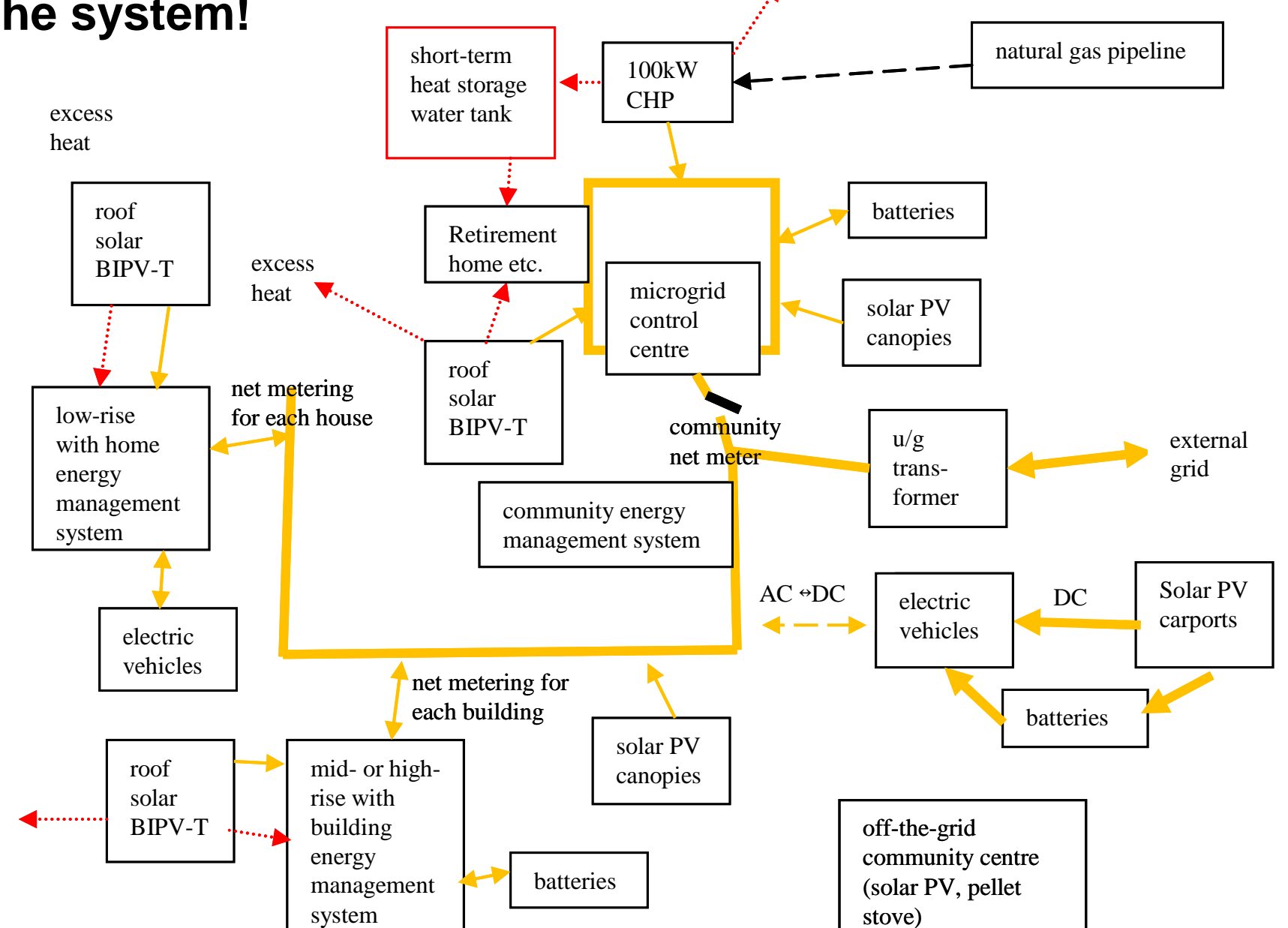


Fig. 2 Proposed energy system of case study neighbourhood

