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Willow pond: A decentralized low-carbon future scenario



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ABSTRACT

This paper describes Willow Pond, a future residential community that is moving toward self-sufficiency. Driven by volatile food prices and supplies, volatile energy prices and supplies, economic globalization, frustration with politics, and technological convergence, the residents of Willow Pond introduced a self-sufficient structure. Home systems feature photovoltaic skins, fuel cells, and artificially intelligent home management. Local manufacturing systems feature only recyclable, reusable, and renewable materials; additive manufacturing; and sprawl farms. Willow Pond also boasts electric vehicles, immersive telecommunications, largely closed-loop water systems, redesigned community spaces, and central energy storage. Residential self-sufficiency challenges include shifting from a cash- to collaboration-based economy; managing community size to maximize efficiency; balancing technological versus human capital; and dealing with self-sufficiency versus traditional jobs, among others.

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1. Introduction

This is a story about a plausible future world in which the Willow Pond community becomes self-sufficient and sustainable. Built during the 1990s, the original Willow Pond had all the characteristics of a typical United States sprawl residential development: single family homes situated on approximately one-quarter to one-half acre of land; two-car garages; lawns in the front and back; invasive ornamentals dominating the landscaping; no sidewalks; a confusing layout of streets and cul-de-sacs; and no commercial establishments. The name, Willow Pond, was completely fictional in that the subdivision had neither willow trees nor a pond. The current residents keep the name to remind them of the faux persona of the development's past.

Willow Pond of the future has become more self-sufficient and sustainable. Residents increased the energy efficiency of their homes through deep retrofits and energy-efficient appliances and lights. Residents have also altered their behaviors to reduce their ecological footprints. For example, they program their thermostats to manage their heating, venting, and air-conditioning (HVAC) systems; they carpool and telecommute when possible; and most household waste is recycled.

They have taken advantage of trends in energy efficiency and use and disposal of materials in other sectors of the economy, especially transportation, commercial, industrial. Despite these small steps, the residents saw that current levels of consumption of energy and natural resources could not be sustained into the 22nd century. Thus, they began to recreate their community as a self-managed, decentralized community with a small ecological footprint.

After reviewing the literature about scenarios, we detail the relevant trends and supporting technologies that might enable this Willow Pond community of 2050. We then describe the redesigned homes, yards, communities, and commercial sector that could emerge. We conclude with a discussion of barriers they must still overcome.

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2. Literature review

Our scenario describes a plausible future world [1]. We are driven to consider this plausible future world by the challenges inherent in our likely future given our current future and our inherent obligations to future generations [2]. In other words, we must think about the future so we can plan appropriately and change our current behavior as necessary.

For each scenario, we can consider the reactions necessary given the plausible future presented. We also can assess how indicative each scenario is, where “indicativeness” conveys how much of the entire space of human futures each scenario represents.

For example, a scenario that encompasses a large chain of unusual and highly unlikely events could be assumed to represent only a small number of the trillions of potential human futures. On the other hand, a scenario could describe plausible potential future worlds that are relatively insensitive to changes in key parameters [3].

The primary strength of scenarios is that well-crafted scenarios describe the ways in which our future will unfold if we maintain our current choices or will show us new futures that are possible with new choices. They have significant applied, practical value and serve varied interests. Herman Kahn, credited with inventing this approach, asserted that the purpose of scenarios was to highlight causal processes and decision points [4]. Another strength is that the stories depicted in the scenarios, the narratives, are easy to communicate to the general public. This last advantage may relate to the primary weakness of scenarios, if it is even a weakness, which is that scenario approaches do not appear to have wide acceptance in the academic community.

Schwartz [1] details the key steps to developing a scenario: (1) Begin with the relevant decision to be addressed, then describe the environment. (2) List the key factors influencing that decision, such as the environment, governance, and neighbors. (3) List the relevant trends, such as increasing prices of food and supplies. (4) Present the key factors and relevant trends by importance and uncertainty. (5) If writing multiple scenarios, choose the ways in which each will differ. (6) Add more details, such as descriptions of daily life. (7) Add implications, such as environmental implications or political implications. (8) Note the causal processes and select the leading indicators (i.e., decision points) to monitor along the way.

According to Schwartz [1], modern humans live with three main plots that should be considered in scenarios: (1) Winners and losers in which resources are scarce and only one group can get what they want or need. (2) Challenge and response in which there are a series of tests. (3) Evolution in which individuals or society grow or decline slowly yet steadily. Other common plots include revolution in which there is a sudden change; cycles because things occur in cycles; infinite possibility in which the world will “expand and improve, infinitely” [1]; the Lone Ranger in which an independent hero anticipates victory; and “My Generation” influenced by the culture and demographics of a generation. Our decentralized scenario depends upon a sudden change, but then unfolds as an evolution into both aspects of a post-industrial society: (1) technological, affluent, and service-based; or (2) decentralized and ecologically conscious [5].

Decentralized scenarios are descriptions of alternative, plausible future worlds in which governance is closer to the citizens. As compared to a hierarchical structure, the decentralized concept emphasizes relationships between people with similar amounts of power.

The primary strength of decentralized scenarios is that they allow us to see the future of communities and governance with less hierarchy and decisions made closer to everyday life. Another strength is that this type of future is easy to imagine, and many would choose to live like this if they could. The primary weakness of this type of scenario is that it is so different from the current type of governance that most label it foreign and implausible.

3. Relevant trends

Willow Pond of yesteryear was completely unsustainable. It did not produce any food (other than a random tomato or cucumber); generate any energy; or manufacture any products that could be of any value to its residents. Its water was piped in from the outside. It did not recycle any of its waste. Residents generally did not work from their homes or in the neighborhood. They rarely took walks in the neighborhood; no destinations outside of the development were within walking or biking distance. In summary, the old Willow Pond had an enormous ecological footprint, which was typical of American subdivisions of that time period.

Fortunately, a new and distinctive path toward sustainability has emerged in the residential sector. This path is characterized by community/household-based sustainable self-sufficiency made possible by the convergence of advanced technologies that support decentralized production. The current residents of Willow Pond are on this path to establishing a truly sustainable community that is largely independent of the regional, national and international economies.² As one resident put it: “*We are going back to the future of the United States, to a life that values in grand Jeffersonian-style self-sufficient agricultural communities. We are not Luddites, though. We are making use of the most sophisticated technologies imaginable.*”

² Willow Pond residents share a desire for some land and the privacy of single-family detached homes. Residents of urban core self-sufficient communities are quite different.

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