Green Energy Applications for NewTown Developments

4 Typologies and their benefits, weaknesses, and future potentials

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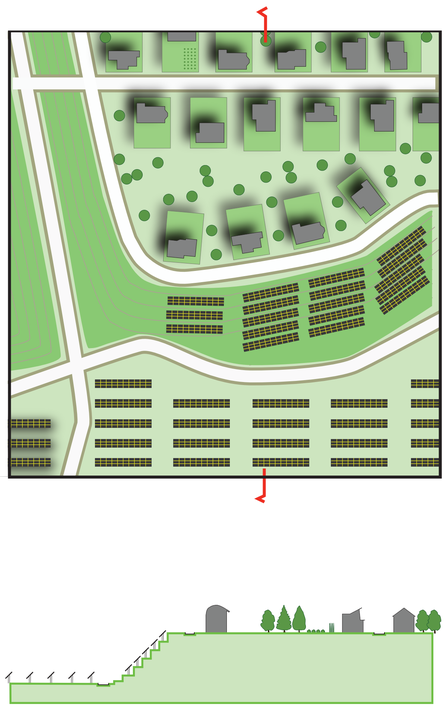
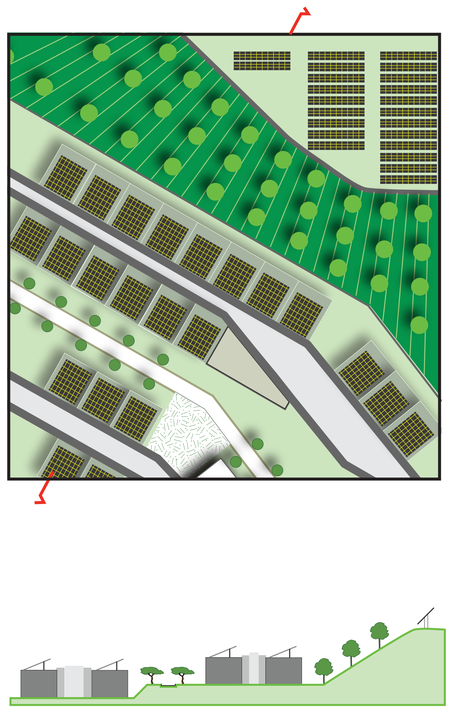
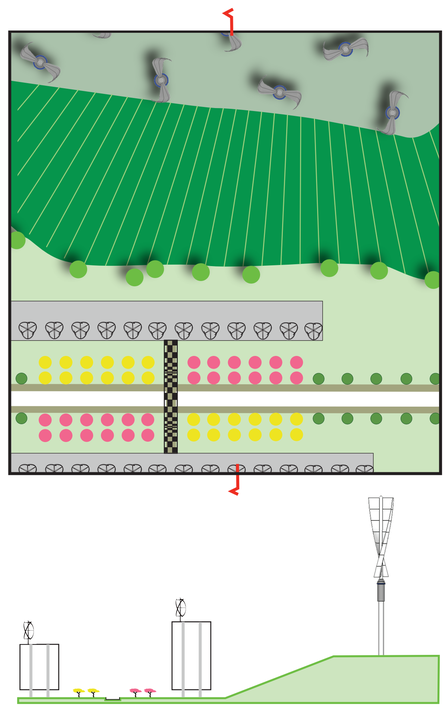
Goal: to examine various methods of integrating renewable energy sources into communities and landscapes that differ in topography.

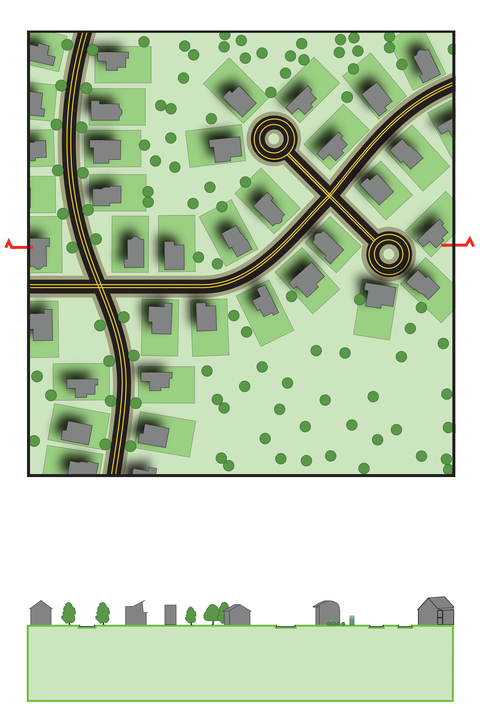
Benefits of renewable energy technologies:

- If designed properly, renewable energy can supply most or, at times, all of a community's power.
- Green energy frees communities of their dependence on fossil fuels, reducing their carbon footprint and total environmental impact.
- It provides energy consumers a return on investment for up-front costs in the form of reduced or no energy bills.









All typologies and sections at 1:1000 scale

Solar Farms

Pros: Placing a solar farm adjacent to a neighborhood or town can often provide enough electric energy to power a small community. Depending on the size of the farm, excess energy can sometimes be sold back to utilities creating shared income for community members . Solar farms also liberate community members from having to install photovoltaic panels on their individual homes, thereby alleviating any maintenance responsibilities associated with solar panels.

Another benefit of sun farms is that they are highly adaptable to landscape. They can be built on flat sites or into topography. Still, it is important that the photovolaic panels face south in order to maximize solar gain.

Cons: Solar farms are very expensive to construct and can require large plots of land. For these reasons, most solar farms are developed by governments or utilities. There are also distribution issues to consider in siting a solar farm. Energy is lost as it is distributed across power lines to the user. Best practices involve using the energy locally. Therfore, collective ownership of a solar farm represents a community's best means of reaping maximum benefit from a solar farm.

Best Usage: The best location for a solar farm are sites that possess significant south facing flatlands or slopes that are located at the edge of a community, town, or city. Building roofs also can serve as an optimal surface for a solar farm given that they also maximize solar gain.

Wind Power

Pros: In areas with high wind flow, turbines can generate large amounts of power. A 1 megawatt turbine with a capacity factor of 35% will produce about 3,066 MWh which averages to 0.35 MW.

New, smaller wind turbines can be placed on most flat building tops and landscapes that receive ample wind flow. They are quieter and more aesthetically pleasing that their larger counterparts.

Cons: The primary problem with wind power generation is that turbines can only produce power if they capture air currents. Unless a community is designed as a wind farm, it is unlikely that small, randomly placed wind turbines could provide enough power to take it off the energy grid. Given dependble wind flow, supplementing smaller turbines with their towering equivalents could support a small community. Using wind power on the local scale could require an additional energy souce such as solar power. Aside from the huge amounts of space they require, another problem with large wind turbines is that they are very noisy.

Best Usage: Windspeed and smoothness (laminar flow) is enhanced over unobstructed grazing land but impeded by neighboring rooftops, owing to ground-surface smoothness. Homes dotting the urban landscape increase the wind's 'working' ground level to the roof height of these homes. The effect of numerous rooftops impeding the wind flow increases turbulance and reduces the available energy delivered to the turbine. Rough airflow causes the turbine to work harder, causing the blades to yawn and accelerate.

Therefore, unobstructed open spaces at the urban fringe represent the best sites for wind power generation. Hilly sites that experience high wind flow represent another optimal locale for a turbine farm. These locales should operate as corridors which funnel wind to the turbines.

A renewable future?

We cannot absolutely know how humans will generate and receive their power in the future but renewable energy sources will certainly play a central role in helping us meet our energy needs. With technology advancing at an unprecedented rate, it is not too far-fetched to speculate that surfaces that currently contribute to environmental degradation could possibly supply the energy we use. What if photovoltaic technology was embedded into our road systems as displayed above? Could solar technology be perfected to such a degree that we could nullify the heat island effect created by concrete and power the cities of the future?