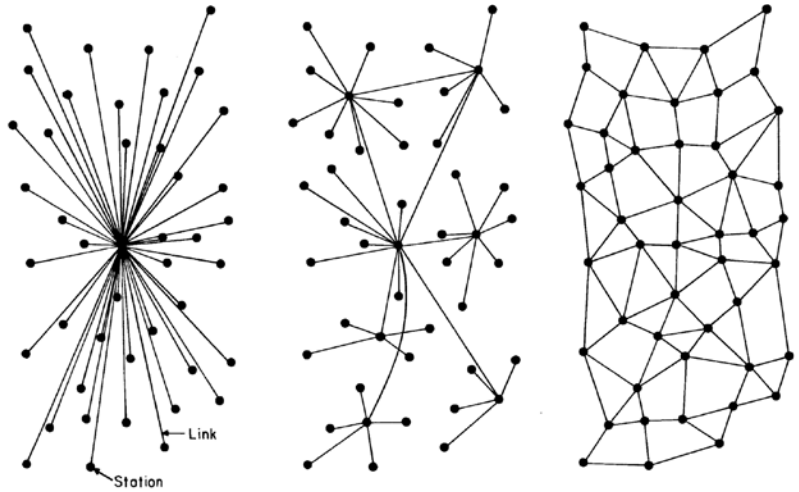
resilience & decentralization

Sustainability is not only about efficiency and wise use of resources—that is, throughput through a given system—; it is also about the structure of that system. In his seminal book *Soft Energy Paths*, physicist Amory Lovins argues that systems are most efficient when matched in scale and distribution to end-use needs. Lovins was primarily concerned with the energy system, but the principles he outlines are universal. But perhaps more intriguing than the technical argument that Lovins advances is the socio-political argument: that matching scale and distribution to end uses—which, in our present-day hyper-centralized society, tends to mean some degree of decentralization—is also more equitable, egalitarian, and resilient.

The latter point is of particular importance. Whereas centralized systems are more vulnerable to fluctuations, less able to adapt to changing conditions, and often imply large capital investment in both the system itself and its supporting infrastructure, decentralized or distributed systems tend to be more flexible, able to adapt to local conditions, and can take advantage of mass production and modularity to be cheap and accessible. Because of these attributes, they often not only operate more efficiently, but also reduce embodied energy. Indeed, resilience is emerging as an importance theme in the sustainability debate.



Paul Baran made a similar link between resilience and decentralization in the 1960s. Baran, working for the Rand Corp. and the U.S. Air Force, researched communication networks that could withstand a catastrophic "enemy attack." He created a taxonomy to describe different types of systems—distributed, decentralized, and centralized—and advocated for distributed systems because of their resilience.

The social aspects of decentralization are also worth noting. Lovins argues that large, centralized systems are, by necessity, controlled by expert specialists and organizations that can leverage the requisite capital; as such, they are divorced from democratic decision-making processes. Centralized system also tend to centralize costs and benefits, which often accrue to different parties at opposite ends of the system: costs accure "downstream;" benefits go to those who control the systems that are "too big to fail." Thus these systems become engines of inequality.

These observations are consistent with those made by anthropologist Vernon Scarborough, who theorizes about two types of social trajectories: one characterized by increasing hierarchy, large-scale capital investments, environmental change, and ultimately collapse; the other characterized by local decision-making, incremental change, and long-term sustainability.

When speaking in generalities, it is best to be wary. Decentralization is not a panacea and should not be approach ideologically. As Lovins notes, the principle task is to correctly match solutions with end use needs. But we must look carefully at the structure of the systems we are designing if we hope to create a sustainable society.