

E⁴ Scholars Network Vision

Objective: To build a community of scholars who are committed to broadening and deepening interdisciplinary examination of predicaments and responses emerging from intersections of pressing E⁴ (energy, ecology, economy, and equity) challenges.

Rationale: Faculty members at colleges and universities are well positioned to make substantial contributions to understanding and addressing grand societal challenges, in all three of their traditional roles in research/scholarship, teaching, and service/outreach. While there are significant barriers for individual faculty looking to make such contributions, these barriers can be lowered by bringing faculty from different disciplines and institutions together and enlarging the community of E⁴-cognizant scholars.

Aims: The E⁴ Scholars Network will have the following aims:

1. **Build and Grow a Network of E⁴-Cognizant Faculty:** The *sine qua non* of this program is the cultivation of a community of faculty who appreciate the complex nature of the E⁴ crises. This will require both finding faculty who have already come to understand these interlocking issues, and also shepherding the intellectual transition for faculty from realizing these are important problems to understanding the magnitude of the E⁴ issues and thinking systemically about them.
2. **Promote Research and Scholarship:** Considerable scholarly work is needed to fully understand the E⁴ crises, and much of this work transcends the traditional silos of academic disciplines. Additionally, and perhaps more importantly, considerable scholarship is needed to develop appropriate responses to the E⁴ issues, including envisioning and laying the groundwork for realistic scenarios that lie between techno-utopian and apocalyptic. The interdisciplinary community of E⁴ Scholars will catalyze new collaborative efforts in this space, complementing and expanding upon scholarship undertaken by scholars both inside and outside of the academy. The network may also aim to promote funding for scholarship in this space.
3. **Improve Undergraduate Education:** Few students who graduate from our colleges and universities are exposed to systems thinking, and even fewer are exposed to the E⁴ crises that will almost certainly shape their futures. The E⁴ Scholars Network will develop instructional resources that can be used by faculty at different institutional types to better educate students. These efforts may leverage existing work being done by related groups but would focus on E⁴ issues, energy literacy, systems thinking, and resilience.
4. **Reach Beyond the Campus:** Faculty can have an impact far beyond their campuses in a variety of ways, including K-12 outreach, continuing education or extension programs, service in professional organizations or on government advisory boards, engaging in community resilience efforts (including through experiential or service learning courses), and shaping the public discourse through op-eds, books, blogs, and media appearances. The E⁴ Scholars Network will develop resources to empower its members to perform meaningful outreach and service in order to promote a broader awareness of the E⁴ crises and related topics.

Foundational Principles:¹

1. The finite Earth is a closed system materially and an open system energetically.
2. Non-renewable natural resources such as fossil fuels and rock phosphate are finite.
3. The ability of Earth's ecosystems to assimilate pollution without consequences is finite.
4. Energy throughput is essential to all human activities, including the economy.
5. Growth of any physical quantity (including economic activity) must eventually cease.
6. Technology is not a substitute for energy, but rather a tool for employing energy.
7. Human combustion of fossil fuels is the primary cause of ongoing global climate change.
8. Humans are a part of nature, not apart from nature.
9. Today's human activities impact the quality of life of future generations, not only in creating problems but also in exhausting the resources necessary for the inevitable transition beyond carbon
10. The tacit, taken-for-granted, largely unconscious nature of human culture presents difficult problems for readjusting people's shared expectations, even as cultural models for behavior can change quickly under certain circumstances.
11. Social capital is central to resilience.
12. The fact that humanity has managed the technological world for generations does not guarantee future success, especially in the face of unprecedented pressures on our planetary system.

¹ Foundational Principles are assertions we consider to be self-evident, which do not require proof, even though many people do not think about them (and some people even actively obfuscate them).

Working Hypotheses:²

1. [Climate] We are already experiencing dangerous climate change, and it will likely get worse.
 - a. Current CO₂ levels exceed any in the past 800,000 years.
 - b. We have pushed the climate away from the stability of the Holocene (last 10,000 years) during which humankind developed agriculture and advanced civilizations.
 - c. Sea level rise will inundate many coastal areas, leading to mass migrations.
 - d. Extreme weather events will threaten agriculture, infrastructure, public health and safety.
 - e. It is critical that humanity eliminate virtually all CO₂ emissions and begin to remove CO₂ from the atmosphere, especially by methods that have a positive impact on the biosphere, such as reforestation and regenerative agriculture.

2. [Net energy] Industrial civilization is currently dependent on large and inexpensive flows of energy from resources/technologies with high energy return on energy invested (ERoEI).
 - a. The amount of (net) energy available flowing to society from fossil fuels is in, or very nearly in, decline.
 - b. Typically, energy sources with the highest ERoEI are harvested first.
 - c. World production of conventional crude oil plateaued ~2005 and is likely to decline.
 - d. Unconventional oil sources are much more expensive than conventional crude oil and have lower ERoEI, especially in the case of oil sands.
 - e. Though the price of oil and natural gas is low currently, these are exhaustible fuels that will, at some point, reach a supply constraint that will make them increasingly unaffordable (which may or may not be reflected in nominal pricing).
 - f. The ERoEI of coal is now below that for wind and equal or below that of solar PV. The ERoEI of oil and gas is variable, but the trend over time is downward. The ERoEI of renewables has increased rapidly in the past decade, providing favorable prospects for replacing at least some fossil energy with renewables. Many wind and PV developments are on par or better than most new unconventional oil development.
 - g. Fossil fuels are becoming more environmentally, energetically, and economically costly to develop, ushering in the end of abundant cheap energy.
 - h. It is critical that humanity adapt to using less energy (through both efficiency and curtailment) and to primarily utilizing renewable energy sources (which cannot be expected to serve as a drop-in replacement for fossil fuels).
 - i. A shift from conventional energy sources to renewables will require a vast energy investment for new infrastructure, which may be difficult in case of an energy shortage and would be easier to execute in advance of any energy crisis.

3. [Land use] Humanity's land use is destabilizing ecosystems and causing mass extinctions.
 - a. Modern chemical-industrial agriculture sterilizes and depletes soils, poisons the environment, robs habitat from wildlife, and releases soil carbon, all while being a tremendous net energy sink (agriculture was traditionally an energy *source*).
 - b. Clearing of forests and other natural habitat for ranching and farming is further reducing

² Working Hypotheses are assertions that are not self-evident, but we consider them to be almost certainly true, based on current evidence. Together with our Foundational Principles, they constitute the essence of our worldview. While we remain open to evidence that contradicts our Working Hypotheses, we do not consider it to be fruitful to spend time debating these assertions; rather we think we can make the biggest impact through a scholarly examination of the consequences of these hypotheses.

- earth's more complex ecosystems.
- c. Elimination of native species from managed landscapes reduces populations of beneficial insects, birds, and other flora and fauna.
 - d. Humanity ultimately depends on natural systems for its very survival, so it is critical that these trends in land use are quickly reversed.
4. [Economics] Our economic system was designed for an era of cheap abundant energy and continuous growth, and is ill-suited for an era of scarce energy and planetary limits.
- a. The current economic model is entirely based on economic growth, itself inexorably linked to increasing material consumption, which cannot be sustained in the long run due to energy scarcity and ecological limits.
 - b. The political economy has responded to these challenges in recent decades through a significant and unsustainable expansion of debt, which represents claims on presumed future resources that depend on future growth that threatens both current and future prosperity.
 - c. Relentless focus on short-term performance and growth blinds decision-makers to long-term challenges.
 - d. Our current economic model emphasizes means (income) over ends (happiness and quality of life).
 - e. Our economy is increasingly fragile to disturbances due to globalization, mechanization, and complex supply chains. Efficiency is typically pursued at the expense of resilience.
 - f. The free market may not be the best way of meeting basic human needs, such as water, food, and air quality.
 - g. While economic growth is often relied on as a cure for income inequality, the trend has been for growth to be accompanied by increased inequality.
5. [Addressing the predicament] There is no solution to these challenges, in the sense of actions that can preserve "business-as-usual." Technical know-how and technology itself are not silver bullets, and many of the appropriate responses are socio-cultural and could be considered paradigm shifts.
- a. Underlying many of our challenges are unspoken cultural values of continuous growth and progress (which in turn are tied to 4a and 4b), along with reductionist thinking and an anthropocentric worldview that places human needs above all else.
 - b. Humanity will need to reevaluate its place in the natural world, shifting from consumerism to conservation, and accepting planetary boundaries.
 - c. Despite a secular trend of increasing societal complexity since the Neolithic transition began 10,000 years ago, human history is marked by frequent collapse and reorganization of these societies. This suggests that societal complexity is difficult to sustain, for a variety of reasons including rigidity of systems and decreasing (and eventually negative) marginal return on investments in complexity. Our current global industrialized civilization is not immune to such factors.
 - d. It is essential that humanity reframe its values and decision-making processes to value resilience, sustainability, human rights, and true quality of life above traditional economic indicators.
 - e. It is completely possible, and indeed desirable, to make deep cultural, paradigm-shifting changes that could lead to a more resilient society with a higher quality of life.
 - f. Issues of collapse and change are now global in scale and, as such, unprecedented in human history.

Organizational Structure: The network will be guided by an Organizing Committee of 5-7 faculty from various disciplines and institutional types. The Organizing Committee will continuously work to identify faculty who are either already aware of E⁴ complexities, or interested in learning more about them. Such faculty will be identified through their interactions or association with other related organizations, nominations from current E⁴ Scholars, and expressions of interest solicited through a website. The Organizing Committee will select prospective Scholars and extend personal invitations to attend the next annual workshop. Prospective Scholars who complete the workshop and choose to commit to the objective of this program will then receive the designation of E⁴ Scholars.

Annual Workshop: While most of the work of the E⁴ Scholars will be conducted in smaller working groups by email, phone, and videoconference, an annual workshop is envisioned to cultivate new Scholars, share highlights of the work of the Scholars, and organize new collaborative efforts. One potential structure for such an annual workshop is outlined below.

The first part of the annual workshop could consist of a by-invitation-only event for prospective new Scholars, who will be expected to familiarize themselves with the E⁴ crises in advance (for example, by watching the Think Resilience video series from the Post Carbon Institute, or by readings such as the Community Resilience Reader). During this first part of the workshop, current E⁴ Scholars and invited speakers would lead discussions with prospective Scholars, using a combination of presentations, panel discussions, and Socratic dialogue. The objective is to guide prospective Scholars to a deeper integrative understanding and appreciation of the E⁴ crises, together with a realization that there are no *solutions* to our overall predicament that preserve business as usual, but only responses that minimize ill effects and put us on a different track. Participants who complete this part of the workshop and choose to commit to the objective of this program would then be designated E⁴ Scholars.

The second part of the annual workshop would be open to all new and existing E⁴ Scholars. It would consist of presentations on the work of Scholars, discussions about progress made on the four specific aims of the program, and breakout discussions to develop new projects and collaborations, including potential research opportunities, grant proposals, and rotator positions within funding agencies.

The logistics of the workshop are to be determined, but it would probably be about one day for each part. If it is an in-person (rather than online) workshop, one attractive possibility is to hold it on a college/university campus, utilizing dormitories for accommodations and classrooms and conference rooms as meeting rooms to keep costs low.