Energy and Systemic Production

Slow Food®

Food Policies and Sustainability

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With the contribution of

Compagnia di San Paolo

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Index

Slow Food and Biodiversity

Slow Food began to take an interest in biodiversity in 1996, when it focused its attention on:
• Wild species tied to traditional harvesting, processing techniques and customs;
• Domestic species, plant varieties, ecoptypes, native animal breeds and populations;
• Traditional processed products (bread, cheese, cured meats, wine and so on).

Since then many associations and organizations have approached biodiversity, generally concentrating their attention on wild species and devoting only marginal interest to domestic diversity (selected by man in the course of the centuries). Only rarely has the subject of food diversity—namely of processed products—been addressed. Processing is an important heritage of local communities. Its techniques were developed to preserve food (meat, milk, fruit, vegetables, leaves of flowers) and are the fruit of knowledge handed down from generation to generation. The work of artisans has created special food products capable of recounting local culture, freeing producers from seasonal cycles and market fluctuations. It is often only possible to protect local ecotypes and breeds by accompanying raw materials with a selection of processed foods.

In 1999, Slow Food launched its most important biodiversity production project: the Presidia.

The Presidia involve the main custodians of domestic biodiversity (small-scale farmers, shepherds, artisans). Their aim is to save native animal breeds, plant varieties and quality artisan food products by organizing producers, raising the profile of their places of origin, preserving traditional techniques and knowledge, promoting sustainable practices to maintain soil fertility, hydrographic ecosystems, traditional agrarian landscapes and excluding the use of synthetic chemicals, monocultures and intensive breeding.

The Presidia are founded on communities of producers prepared to collaborate and decide production rules and forms of product promotion together.

Slow Food promotes Presidium products by speaking about the producers, their knowledge, their land and their techniques. Through its network (event organization, the involvement of cooks and the organization of forms of direct marketing, such as farmers' markets and joint buying groups), it connects producers with consumers.

There are now 350 Presidia (200 in Italy and 150 in another 40 countries) involving 15,000 small producers. Economic and social research conducted by universities, such as the Bocconi in Milan, and many single students, graduate assistants and researchers have demonstrated the effectiveness of these projects.

The results can be measured in numbers (increased production, more producers, better prices), but also in environmental terms (more sustainable businesses) and social terms (better organization of producers, improved relations with institutions, higher self-esteem).

For more information on this project and Slow Food's activities to protect biodiversity: www.fondazioneslowfood.com.

2. ENERGY AND SYSTEMIC PRODUCTION

4. Preliminary remarks

On the planet in which we live, energy comes, abundantly and regularly, from the sun. In the last 200 years, however, we seem to have forgotten that this flow of energy follows precise, unchanging rules, which we have to obey if we wish to preserve the biochemical conditions necessary for the survival of the human species. These rules refer to entropy, the second law of thermodynamics, whereby the energy used to perform the process of conversion of matter becomes progressively less available, irreversibly losing part of its order and qualities and generating pollution.

In what way does nature transform matter through energy from the sun? Nature burns nothing, but works through thermochemical processes such as photosynthesis. Man instead has introduced a system of energy production based on combustion as opposed to thermochemical mechanisms, thereby accelerating entropic processes on the planet and risks for the health of humans and the ecosystem. In power stations, the processes of methane, coal, oil and nuclear combustion produce radioactive isotopes, in other cases carbon dioxide, nitrogen and sulfur oxides: all are based on limited resources.

International equilibria depend on the management of energy resources. Recently we have suffered the results of wrong economic choices and research strategies that have invested huge sums of money in fossil fuels as opposed to clean technologies.

If we had respected the law of entropy, flexible, efficient solutions would be available that everyone could afford, especially in the Global South, where solar rays are stronger. The time has come to make energy decisions centered round social and environmental values: a new humanism that, through suitable technological choices and reasonable policies, leads us to produce energy compatibly with ecosystems.

5. Overview

We live in an era in which the economy is founded on the unconditional use of resources, in which space seems to know no bounds and time no seasons.

The phase of expansion has ended in the rich countries where a saturation of demand is determining a boom in "substitution-in consumption". Needs are produced to ensure the continuity of production and man is merely the means to permit the metabolism of goods.

This "unreal economy"—which contrasts with the real one, rich in values inherent to human nature—leads to financial speculation, which eliminates the production phase and generates higher profit without the limits imposed by matter and energy.

If "product" and "production" are the fulcrum of a paradigm of values and behavior that influences the present system, then competition will force us to further delocalize production, to automate it, to create new "false needs", to "live in a society of workers without work".[14]

It is thus necessary to change the paradigm that assigns priority to real human needs and not to a product's exchange value. It is necessary to build a "real economy" that places at the heart of every decision-making process the needs of man in an ecological context of interdependencies, acting locally and making a number of subjects co-evolve in a given area: a real economy with a reduced use of matter and energy, in which waste becomes a resource (from output to input), low capital-intensive and sustainable from a sensory, environmental, social and economic point of view.

"The time has come for societies to move from the romance with nature to a pragmatic redesign of our economic system inspired by ecosystems".[15] Through this lens, we analyze the main complications of the present-day model of energy production from finite or renewable sources, in any case centralized in the hands of a few subjects who define the rules of this monopoly.
We need to develop an interrelated and holistic methodology—systemic design—joining economic, social, cultural and environmental demands to empower the relation between human beings and nature, production and the environment.[16]

14 Anders, 1956.

15 Pauli, 2010.

16 Bistagnino, 2009.

5.6.Oil

Though we do have more natural, less destructive models at our disposal, we continue to produce energy through combustion processes.[17]

The value of oil as a source of energy, transportable and easy to use as a base for many industrial chemical products, makes it one of the most important commodities in the world at the start of the 21st century.

Data supplied by the International Energy Agency in 2010 reveal the unsustainability of this model:
• From 1999 to 2010 the price of crude oil rose by more than 40 percent, from $18 to $80 a barrel;
• It is estimated that the maximum production peak will be reached in 2030 (the Hubbert peak);
• The turnover connected with oil use amounts to about 28 billion dollars with annual increases of 2.5 percent;
• New reserves discovered have been equal for many years to about ¼ of oil consumed, hence reserves are decreasing at an annual rate of 3/4, 28 billion barrels a year;
• Though the technology of oil extraction has improved, reserves are situated in areas that are increasingly difficult to reach and in ecologically delicate, "extreme" environments, such as sea beds and polar areas;
It is thus urgently necessary to structure our economies independently from oil because dependence on this resource has made the use of other alternative technologies expensive and not widespread.

5.7. Nuclear energy

Champions of nuclear energy claim it is a sustainable energy source that reduces carbon emissions and increases energy security by reducing oil-dependence. But the option this source represents is limited by unsolved problems:
• Relatively high costs ($2,000/kW);
• Ineffectiveness (inadequate for transition);
• Limited resources used;
• Security risks for the ecosystem resulting from the disposal of radioactive waste;
• Considering the entire nuclear fuel supply chain, nuclear energy is not a low carbon emission energy source.

The propaganda approach to energy wavers when we take into account the life cycle and the total entropic impact of the energy process, not only an isolated phase thereof.

5.8. Solar energy

Many technologies exist which are capable of capturing solar radiation and converting it into electricity. Nonetheless, in view of the lack of strategic regional planning and installations supplemented by human architectures, the development of solar technology may lead to:
• The removal of farming land, hence a reduction in the production of food commodities, especially at local level:
• The loss of the soil's permeability to rainwater;
• A decrease in biological activity due to the constant loss of solar radiation in areas shaded by panels;
• The acceleration of desertification which, in turn, generates an increase in phenomena of hydrological imbalance.

We would be wrong to think that farming land, which for centuries produced the energies we needed to live, can produce energy simply by annulling itself, forgetting it is alive and becoming a surface on which to place photovoltaic panels that drastically modify the aesthetic and architectural structure of the landscape.[18]

5.9. Wind energy

Wind energy is the product of the conversion of the wind's kinetic energy into other forms of energy (electrical or mechanical).

17 Consoli, 2010.

18 Petrini, 2010.

With this technology the land may be used for agriculture and livestock breeding but critical points do exist. They include:

• noise;
• visual impact;
• deforestation;
• danger for birds if plants are situated on migration routes, though research[19] shows that the number of birds killed by wind blades is negligible compared to that killed by traffic, hunting, electric cables, skyscrapers and so on.

5.10. Hydroelectric energy

This form exploits the conversion of the gravitational force of water falling from high altitudes into kinetic energy, which an alternator combined with a turbine transmutes into electricity.

The main problem of hydroelectric power stations is the maximum "capacity" of a region, since their construction involves an alteration of the area round the dam, which has to be evacuated to permit the flow of water.

Moreover:

• The food chains of many organisms are disturbed and this sometimes leads them to extinction;
• Water changes its physical characteristics since the average temperature increases and the oxygen content decreases, all of which creates unsustainable conditions for fish;
• Reservoirs of hydroelectric power stations in tropical regions may produce sizable amounts of methane from stagnant water.

5.11. Biofuels

Produced from biomass, biofuels may be used by autotraction, both blended with fossil fuels and, in some cases, in a pure state.

The process that connects agriculture to biofuel production is now globalized and is now referred to as "agroenergy".[20] Raw materials—mainly maize, soya and grain—are now being increasingly converted into bioethanol and biodiesel, which are produced in very poor places and consumed in very rich ones.

According to one section of the scientific community, the growing demand for first-generation biofuels should be considered one of the prime causes of the 2008-2009 food crisis, which was characterized by a sizable increase in the price of foodstuffs. These biofules also involve the recourse to monocultures, with a consequent loss of global biodiversity.

We are thus called upon not only to denounce this state of affairs, but also to promote any initiative that seeks to identify alternative models. Recently, to avoid using potential foodstuffs to produce fuel, second-generation biofuels (produced from crop residues and waste) and third- and fourth-generation fuels (produced from algae and thermochemical bioprocesses) are being tested, along with energy produced from waste timber through combustion, gasification and other clean processes.

5.12. Hydrogen

Albeit the most abundant element in the rest of the universe, on planet earth hydrogen in a free and molecular state is scarce and must therefore be produced at a very high cost. Hydrogen-based technologies are currently being perfected with an eye to research on the use of less noble raw materials and natural processes.[21]

At the moment, the most economic way of producing hydrogen requires the use of fossil fuels, such as oil, coal and methane. An alternative way does exist, however; it consists of biological production (hence the term "biohydrogen"), which exploits processes involving red bacteria, cyano bacteria and microalgae, and the use of energy from renewable sources.[22]

19 Langston and Pullan, 2003; Kingsley and Whittam, 2005.

20 Petrini, 2010.

21 Hasslberger, 2003.

22 Rifkin, 2010.

6. New approaches

6.1. A systemic approach to change our way of considering efficiency and technological innovation.

"In our society we face situations, analyse cause-effect phenomena, solve technical problems, study strategies "per spot", using a linear approach. This is not innovation."[23]

Innovation consists of the way we look at problems. We have to be aware that we are working within a system in which it is necessary to devote special care not only to products, but also to the system they are part of and in which they are created: a system made up of social, cultural and ethical values. On an industrial level, the process and the development of a logical, linear process and development affect the perception of reality insofar as they are based purely upon cause-and-effect relationships, which generate an enormous amount of waste. It is necessary to recover the cultural and practical capacity of outlining and planning the flow of materials and energy from one system to another. For example, the imbalance between food supply, excessive in the West, and the unsatisfied food demand in developing countries reveals an inefficient allocation of energy within the system, which translates into the problem of inequality in the distribution of food and waste. If, instead, we were to think of the food system as unique and not as separate, based on criteria such as food miles, the short supply chain, organic and fair production in a balanced, holistic way, we could create a situation in which the right amount of food is produced with the right amount of energy.[24]

It is thus necessary to redesign our industrial productivity and consumer habits through a systemic lens to:

- Reduce and optimize the flow of matter and energy from one system to the other;
- Plan an incessant metabolization of waste (output) with a view to converting it into resources (input);
- Consider all the constituent parts of an ecosystem and their interrelations;
- Allow the actors in all the development phases of the product/service to co-evolve;
- Encourage local development, the cultural dialogue between different sectors and the virtuous collaboration between productive processes, natural realms and communities.

From this viewpoint, the systemic production of energy would involve the creation of "energy communities" in parallel with "food communities", thanks to which producers and consumers (of energy and food) share small-scale productive processes distributed over local areas.

The main result is an exponential growth in the productive capacity of an area, thanks to which it is able to produce new goods, offer new services to citizens and increase the number of jobs. In this way, local economies can become self-sufficient in terms of energy, production and food procurement.

7. Guidelines

Decision makers assume a number of priorities to ensure energy and food security for growing populations, implementing an interdisciplinary approach that avoids creating a "fragmented" political agenda.[25]

These priorities can be summed up as:

- A local approach favoring the transversal participation of people from all sections of society, hence the various socio-economic groups present in each given area. On the basis of the opportunities offered by the local context and the real needs of an area, it is possible to create new energy and material opportunities, reducing the problems of adaptability created by "global" solutions and increasing popular participation: energy is a human right and, as such, has to be decentralized.
- A combination of different resources for the overall energy supply: solutions may vary from one region to another and according to the local context. The setting up of energy communities alongside food communities would give

23 Bistagnino, 2009.

24 Tecco and Fassio, 2008.

25 Wijkman, 2005.

a chance to farmers and anyone else acquainted with the dynamics of the sun, of water and of the earth to become the main players in the distribution of energy processes.

The plurality of sources may lead to autopoiesis, namely a dynamic equilibrium, tolerable by nature and capable of preserving its own independence. An energy system that does not depend on other countries and regions, but is based simply on what an area has at its disposal, is as strong as it is flexible and may be easily and rapidly modified as initial local conditions change.[26]

• A reduction in and an efficient use of material resources requiring systemic planning and coordination systems that allow a resource to perform multiple functions, reducing the need for further inputs and losses due to transpor. As in nature, what is not used by a system becomes a raw material for the development and survival of something else, so in production processes the waste from a system becomes an opportunity, creating new economic development and new jobs. To achieve this objective, governments must encourage "active investment" by the private sector, especially in eco-innovations and the transfer of green technologies.
• Making information more accessible and decentralizing it: thanks to global computer networks, knowledge about energy and the production of goods/services should create a synergic link between experts and local populations. A shared project helps to create awareness and increases the level of commitment of those who, besides protecting and enhancing cultural biodiversity, have helped e• Creation of a network of relations: more generally, it is important to consider all the factors that combine the system analyzed, including raw materials (resources) and energy, which are used and accumulated in the various phases of the life cycle of a product/service. Investment and consequential economic development must be distributed among the various members of the network since the total value of small interrelated realities is higher than the sum of single non-interacting elements.
• Development of new social and cultural values: the systemic approach questions the present industrial model which influences consumer choices negatively and proposes a new paradigm of the productive process that centers round man in a natural context, in which his real biological needs and ethical, cultural and social values emerge. Citizens consume energy and matter, sometimes in the form of social and collective intelligence.

8. Conclusions

The systemic approach generates the conceptual base and the analytical capacities to direct economic change. It becomes crucial to develop a multidisciplinary vision to give rise to a new culture of innovation inspired by the dynamic activity of nature, the system par excellence.

The connection of raw materials, energy, people and their knowledge generates sustainable ways of using and reusing resources.

We must move towards more conscious, more pleasurable and wiser consumption. We realize of course that like bacteria and oranges, like sharks and mangroves, like plumbers and their families, we are all links in a single energy network. It is up to each of us to do nothing that might diminish the beauty that surrounds us, nothing that can waste common health, nothing, in short, that might lower the level of "good, clean and fair" quality of the energy in circulation.[27]

26 Barbero, 2010.

27 Petrini, 2010

LIST OF ABBREVIATIONS AND ACRONYMS

CBD: Convention on Biological Diversity
CSA: Community Supported Agriculture
CSO: Civil Society Organization
FAO: Food and Agriculture Organization of the United Nations
GDP: Gross Domestic Product
IAASTD: International Assessment of Agricultural Knowledge, Science and Technology for Development
GI: Geographical Indications
GMO: Genetically Modified Organism
ITPGRFA: International Treaty on Plant Genetic Resources for Food and Agriculture
MFI: Microfinance institution
NGO: Non Governmental Organization
TRIPS: Trade-related aspects of intellectual property rights
UN: United Nations
UNESCO: United Nations Educational, Scientific and Cultural Organization
WTO: World Trade Organization

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