Highlights of Great Sustainability Concepts as Applied to the Biofuels Micro Sector

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Table of Contents

Sustainability Definitions and Concepts

- **Sustainability** is the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time. Long-lived and healthy wetlands, oceans, and forests are examples of sustainable biological systems. For humans, sustainability is the potential for long-term maintenance of well being, which has environmental, economic, and social dimensions.
- In order for fuel convention or an institution to be sustainable it must first be able to get established.
- **Environment-** surroundings of an object
- An **economy** consists of the economic system of a country or other area, the labor, capital and land resources, and the economic agents that socially participate in the production, exchange, distribution, and consumption of goods and services of that area.
- Ecology is the scientific study of the relations that living organisms have with respect to each other.
- **Liebig's Law of the Minimum**, often simply called **Liebig's Law** or the **Law of the Minimum**, is a principle developed agricultural science by Carl Sprengel (1828) and later popularized by Justus von Liebig. It states that growth is controlle not by the total amount of resources available, but by the scarcest resource (limiting factor).
- Biology's Essential, Complimentary, or Abundantly Contained, Elements, in a rough descending order of molar concentration. Hydrogen, Oxygen, Carbon, Nitrogen, Potassium, Phosphorus, Calcium, Magnesium, Sulfur, Iron, Manganese, Copper, Zinc, Chloride, Sodium, Silicon, Boron, Molybdenum, Nickel, Cobalt.

More Sustainability Concepts

- Social-Political Sustainabilty
- Economic Sustainability
- Environmental Sustainability
- Agricultural Sustainability
- Energy Balance
- Parasitic Energy Loss
- Value of various Energy Forms

Criticisms of Biofuels

- There is no way to make them economically viable
- Ecologies are being annihilated
- Feedstocks are voracious consumers of Nitrogen
- Humans are starving as Machines get fueled
- 75 lbs of soil is lost for all of the farmed feedstock necessary to make every gallon of biofuel produced
- There is not enough dry land on the planet to grow enough biomass feedstock to replace

Sustainability Advocates GreatAdvocates a

- William McDonaugh
- John Jeavons
- Elaine Ingham
- Jeff Lowenfells
- Michael Melendrez

William McDonough

William Andrews McDonough is an American architect, founding principal of William McDonough + Partners, co-founder of cDonough Braungart Design Chemistry (MBDC) with German chemist Michael Braungart as well as co-author of 'Cradle to radle: Remaking the Way We Make Things also with Braungart.[1] McDonough's career is focused on designing environmentally ustainable buildings and transforming industrial manufacturing processes.

William spoke of the Atlantic Monthly Article Titled "1491" which became a book is about Pre-Columbian South America. made the case that before Columbus' arrival, South America was a garden.

Humans, apparently for millenia, have been walking around nipping things in the bud. **"By exhibiting our preferences e show those things that we intend. We intend to thrive. We intend to survive, and we intend to enjoy our uture."**

'Design is the first signal of human intention. What are our intentions? At this point in history our intentions have to be oked at, at the level of our species. Human beings dominate 99% of the Earth's surface. 99% of the large mammals in th orld are under human management. "So we see that we have the ability to effect the entire planet with our actions. Thes ecisions, these changes are of our own making."

The first question McDonough's design firm asks when starting a project is:

"How do we love all the children, of all species for all time?"

- **"Currently there are tragedies in the making. We see climate change. We see endocrine disruption. We see soil loss. We see diversity loss. We see plastics in the ocean. We see acidifications of the oceans."**

- In the Pacific Gyre, "**They found 6 times as much plastic as plankton.** It comes from the storm drains of the west coast of the United States."
- **"48% of all of the anthropogenic carbon, which is what comes from humans ends up i the ocean."** For millions of years, the historic ocean pH has been between 8.2 to 8.8. it is now 8.06 and will be 7.9 by the end of the century. **"That is acidic enough to demineralize the bottoms of the coral reefs."**

- **"We see heavy metal contamination, salination. We can't in this point in our history say they are not part of our plan. It is our plan, our intention because we have no othe plan, we have a de facto plan."**

- When delivering a speech to the Bush administration, a DOE employee asked: "**What do you think of clean nuclear power?**" McDonough responded, **"I love clean nuclear power. I'm particularly attracted to nuclear fusion. I think we should spend a trillion dollars capturing nuclear fusion immediately. And thank God we've already got our nuclear reactor exactly where we need it. 93,000,000 miles away. Its 8 minutes. Its wireless."**
- **"I think we recognize, all of our gardens are nuclear powered."**

- **"If we all went back to being hunter/gatherers the Earth could only Support 400 million people. We now have 6.9 billion people."**

- **"Over 500 human made chemicals are now persistent"** and many travel great distances and bioaccumulate in our fats.

- McDonough's **inspirational message** is that in order to **endure** we need to create a great **intention**. Then we must **create** a great plan! Lets put a great effort into our **design** in order to stave off what happens when we rely upon a **de facto plan**.

- "Our keynote speaker was tremendous. The best presentation I have ever heard. It left me sobbing in my seat. And I wasn't the only one moved to tears. William McDonough is truly the Hero for the Planet and we can save this world. Go now and read about him, his work www.mbdc.com, and get his book, Cradle to Cradle. His presentation was underwritten by Longwood Gardens. We may make it to the 22nd century after all. And I could totally relate to his working off his bad family karma of lumberjacks. And I told him so. Thank you Bill and thank you Longwood."

- Mary Ann Newcomer is a gardenwriter who belongs to the Garden Writer's Association and watched McDonough deliver the symposium's keynote speech in 2006 in Valley Forge Pennsylvania.

John Jeavons

- has developed a sustainable 8-step food-raising method known as "GROW BIOINTENSIVE." The method now enjoys widespread practice and development. Som of the most notable data points John has impressed are: Growing 1 pound of food causes a farmer to loose 12 lbs of soil. **Even organic farmers loose 8 lbs of soil.** In China, farmers loose upwards of 15 lbs of soil for every lb of food produced. Since it takes approximately 1000 years for Nature to make 1" of soil and approximately 10 times the amount soil is lost relative to a farmed quantity of food produced; Modern, Industrial, farming as we know it is not sustainable. Nor is farmed corn, soybeans, or canola sustainable the way it is produced for biofuels.

- An acre furrow slice is assumed to be the volume of soil in an acre of topsoil, it is considered to be 6" to 7" deep and to weigh 2 million lbs. In other words an acre of soil is good for approximately 166,666 lbs of food or roughly 24,000 gallons of liquid motor fuel. There are 22 billion acres of ecologically productive land and 7 billion people. A human eats about 80,000 lbs of food in a lifetime. Thus, we have enough soil for about 15 billion people in the next 6000 years, provided that no food is converted to biofuels. Once again, farming as we know it is not sustainable. Unlike conventional/industrial Agriculture, John Jeavons' growing techniques, teach growers how to grow soils, while growing food instead of destroying them.

Michio Kaku

- Has spoken on the radio about the **Kardashev Scale.**

- (加来 道雄 *Kaku Michio*?, born January 24, 1947) is an American physicist, the Henry Semat Professor of Theoretical Physics in the City College of New York of City University of New York, the co-founder of string field theory, and a "communicator" and "popularizer" of science. He has written several books on physics and related topics, he has made frequent appearances on radio, television, and film, and he writes extensive online blogs and articles.
- **Kardashev Scale**
- projections for human civilization ranging from years 1900 to 2030, based on data from the International Energy Agency World Energy Outlook.

- The **Kardashev scale** is a method of measuring an advanced civilization's level of technological advancement.

- The scale is only theoretical and in terms of an actual civilization highly speculative; however, it puts energy consumption of an entire civilization in a cosmic perspective.

- Energy is a static quantity and is denoted in joules. Power is a measure of energy transfer over time, and is denoted in watts (joules per second). The three levels of the Kardashev Scale can be quantified in units of power

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  - **Type I** — a civilization that is able to harness all of the power available on a single planet

Elaine Ingham

- Two Soil Food Web Workshop highlights

- 1) Since soil is formed as a result of the Physical, Chemical, and Biological weathering of its parent material (Bedrock). And soi ecological microbes have the capability of multiplying in population as fast as doubling every 20 minutes. There is no way that any humanly stewarded agricultural crop could uptake plant nutrients as fast as microbes could deliver them from the parent material provided that that all of the essential elements are sufficiently present in the farmed field's bedrock, the microbes are fe an exquisite diet, and afforded ideal soil ecological conditions.
- 2) Terrestrial Ecological Succession is looked at as an evolution with stages such as lichen on a new rock, primitive grasses, evolved grasses, bushes, deciduous forests, old growth conifer forests. As the ecology advances, its capability to yield biomas increases by orders of magnitude. An old Redwood forest yields an order of magnitude more biomass than a typical, humanly stewarded annual energy crop, such as corn, soybeans, or canola.
- Elaine is an American soil biology researcher and founder of *Soil Foodweb Inc*. She is recognized around the world as a leader soil microbiology and research of the soil food web. She is a key author of the USDA's *Soil Biology Primer*. In 2011, Ingham was named as The Rodale Institute's chief scientist.[1]

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Jeff Lowenfels

- is an attorney who went to Harvard Law School and is the:
- Author of **, "Teaming With Microbes: A Gardener's Guide to the Soil Food Web**
- Jeff is an extremely respected and popular, national, garden writer. He is a founding member and former President of the Garden Writers of America, a GWA Fellow and was inducted into the GWA Hall of Fame in 2005, the highest honor a garden writer can achieve.
- The book is now out in a Revised Edition after 6 printings in only 4 years. It is a best selling gardening book in the US, UK, New Zealand and Australia and has been translated into French and Korean.
- No one ever fertilizes the Redwoods. How did these trees live over 500 years and grow to 380 feet without industrial chemicals? Jeff Lowenfels will tell you and show you how to successfully use the very same natural principles to maintain your yard and grow your gardens. No more chemical fertilizers, pesticides and other nasty chemicals and a lot less work as Jeff shows you how to team with microbes.
- Jeff grew up as an indentured servant on his father's hobby farm in Scarsdale, New York. There he was forced to plant, weed, mow and pick fruits, flowers and vegetables on an 8 acre 'gentlemen's farm' replete with acres-wide vegetable gardens, a Versailles-style formal flower garden, a 100 tree fruit orchard and countless landscape shrubs, lawns and decorative beds.
- Over the 34 years Jeff has been writing garden columns and answering gardening questions. He is a

Micheal Melendrez

- Author of **Soil Ecology and the Soil Food Web** Original Copyright 1975 Michael created the expression Soil Food Web, owns companies named, Soil Secrets and Trees that Please. He is a leading expert on Humic Acids and Soil in General. Michael is someone who **actually, successfully, sustainably farms and out yeilds his GMO/Conventional Chemical Farming neighbors.** He utilizes beneficial mychorrhizal mutualistic fungi, compost that he make himself from several legumes and corn in a very carefully controlled in vessel composter. He cover crops, produces compost crops, makes compost, and puts 10% of his compost back on his land. Very few farmers are able to actually sustainably farm. Michael does it himself, demonstrates how to do it, and

Gasoline 112 k BTUs per gal. - Diesel 130 k - Biodiesel 118 k - Ammonia 53 k

(NH3)

Gasoline 6.1 lbs per gal. - Diesel 7.15 lbs per gal. - NH3 5.7 lbs per gal.

Has no carbon emissions i.e. less smog regulations.

Burns in internal combustion engines

Engines may run a 25:1 compression ratio which equates to a substantially greater combustion efficiency than diesel engines.

Requires no energy plantations i.e. (Sustainably Produceable)

Has been used to fuel vehicles since 1933

Less NH3 fertilizer + More NH3 fuel=Less Habitat destruction

Pyrolisis

complements of wikipedia

- is a thermochemical decomposition of organic material at elevated temperatures in the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 430 °C (800 °F). The word is coined from the Greek-derived elements *pyr* "fire" and *lysis* "separating".

- Pyrolysis is a special case of thermolysis, and is most commonly used for organic materials, being, therefore, one of the processes involved in charring. The pyrolysis of wood, which starts at 200–300 °C (390–570 °F),[1] occurs for example in fires or when vegetation comes into contact with lava in volcanic eruptions. In general, pyrolysis of organic substances produces gas and liquid products and leaves a solid residue richer in carbon content. Extreme pyrolysis, which leaves mostly carbon as the residue, is called carbonization.
- The process is used heavily in the chemical industry, for example, to produce charcoal, activated carbon, methanol, and other chemicals from wood, to convert ethylene dichloride into vinyl chloride to make PVC, to produce coke from coal, to convert biomass into syngas, to turn waste into safely disposable substances, and for transforming medium-weight hydrocarbons from oil into lighter ones like gasoline. These specialized uses of pyrolysis may be called various names, such as dry distillation, destructive distillation, or cracking.