Thinking Forward: The Collaboration of Agriculture & Energy in the Green Movement

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Powering the future. It's the hope of green energy. The relationship between agriculture and energy systems was previously symbiotic. Sadly, the current views pit the two against each other, fighting over the limited commodities of Earth. There's only so much dirt to go around. This mode of modern thinking reduces agriculture to a secondary climate complication and elevates energy as the academic cause to champion. Priorities have changed and the agrarian sector bears the weight of the change. With every new policy, agriculturalists are expected to conform and continue to produce as if the new weight was never added. Hope becomes fear when we pit agriculture against energy production. Agriculture is the foundation of civilized existence and energy converts this sustenance to life. Competition should not determine which sector wins the fight. When the issue becomes food versus energy, we all lose.

Sustainable actions are about striking a balance between what people want and what they do. The best form of sustainability is the sensible one. Hydroelectricity was one of the first efforts to harness and harvest natural power with man-made structures. In 1882, the first hydroelectric project was in experimental stages. It powered a single lamp and then a few homes in Wisconsin. By 1940, dams like the Grand Coulee and Hoover water projects proved to hold energy potentials unparalleled by normal energy banks, such as coal or natural gas. Hydropower.org states, "Low-cost hydropower was seen as one of the best ways to meet the growing energy demand and was often tied to the development of energy-intensive industries, such as steelworks." (Hass, 2021) This is a key benefit of hydroelectric power. It can safely add energy to existing power supplies. It also allowed for the annual cultivation of previously unusable lands. By 2019, 58 million acres of U.S. farmland were in production. So thank you dams, for opening so much land

to be farmed. Hydroelectric power quietly contributes to 52% of American renewable energy sources. The Grand Coulee Dam alone produces 21 billion kilowatt hours per year. Hydropower is the best source of clean energy because the water's state is not altered in any way. Hydroelectricity is consistently able to supply the grid. It operates around the clock and as such, is a reliable source of clean energy. To realize the lofty clean energy goals of the U.S, it is imperative that we work with existing systems. Dams have brought life to the United States and dependable power to numerous industries. Without them, America's power banks would look vastly different.

Another smart source of clean energy is geothermal. Taking a page from the Icelandic book, this industry came to California in 1960. Geothermal energy taps into hot water beneath the Earth's surface and converts it to steam, which powers turbines that feed into generators and then power banks. Even though this infrastructure is costly and training is expensive, the plants quickly make up this expense in energy production. They produce tons of energy for pennies on the dollar. Mary Davis, a climate scientist, states,

> The fuel that powers geothermal plants is available 24 hours a day, 365 days a year, allowing it to serve as a primary power source…we can't rely on the sun to always shine or the wind to blow the same, day in and day out, in sync with high energy demands. That's a big reason why we have to continue to rely on fossil fuels, like coal or natural gas. These conventional energy sources serve as our primary energy sources on the electricity grid, due to the stability and consistency of the energy they provide. While wind and solar energy are unable to compete with these baseline sources, geothermal can. It can operate consistently at an

availability rate of over 90%. Its price does not fluctuate. It offers steady and clean energy without the volatility of fossil fuel energy practices. (Davis, 2017)

This competitive rate applies for many years, similar in longevity to hydropower. Geothermal plants operate at capacity year-round and can supply the grid consistently. In short, geothermal is another answer to future energy needs, without adding competition for agricultural resources.

A recent land competitor is wind and solar power. It's trendy right now to cash in on this green. The basis of wind energy is wind turning the turbines of the windmill and then a smaller electric generator, producing electricity. Wind turbines are most effective offshore, producing around 12 megawatts of electricity. On land, they produce only 2 megawatts, with a 1.3 million dollar cost to production average. Wind power isn't on par with other renewable sources of energy because it is unstable with fluctuating output. The grid is also unable to store this energy. The production is a deceptive average, made up of a few days of stability offset heavily with the shifting weeks in between. They are purported to have a lifespan of 20 years, but maintenance skyrockets as time goes by. Wind is unreliable and the turbines are more of a nicety than an energy solution.

Over 2,500 solar farms are in production today, with additional hundreds of thousands of cells atop homes as well. The key to this energy source is the sun, moving the internal electric field of the cell, causing electricity to flow. However, these cells only operate at 16% efficiency. The low production return is offset by the size options and durability of these cells. They last 30 years or more and continue to produce electricity on overcast days. It must be understood that wind and solar energy are not a replacement for traditional power generation. They are unable to completely supply the power grid

because their capacity is low and fluctuating. The grid requires steady, stable, and high-functioning power sources such as hydroelectric or geothermal options. Many acres of farm and ranch land have also been retired to wind and solar farms. Labeling this land use as farming sets the stage for contention. This is not an organic use of the land; rather it is a synthetic construction for human needs. Oftentimes, these sources of green energy are placed on hills within wind corridors or land with minimal organic use. Their potential is developmental and best accessed within regions of availability.

The green energy movement is a necessary progression of thought and action as we pass through this millennium. However, the race to innovate is dangerous without proper planning and a comprehensive, respectful view of existing systems. Cato scholar Ryan Bourne remarked,

> The Earth's natural resources are neither fully known nor fixed in any meaningful sense… and the ingenuity of humanity is unmatched in potential and problem-solving. What matters, then, is not the physical limits of our planet, but human freedom to experiment and reimagine the use of resources that we have. (Bourne, 2018)

Indeed, our future is dependent on wise investments in both agriculture and energy. People need food, water, and heat. When the farmers are encouraged to expand their stewardship from food and fiber to include energy, the traditional symbiotic relationship is renewed and the hope of green energy becomes reality. The point is to use our land in its best natural capacity. Let's apply the Golden Rule and treat Earth, agriculture, energy, and humanity with respect as we apply solutions and think forward. Respect is a

safeguard against fear and will provide the opportunity to dream abundantly. With respect, we all win.

References

Analysis, E. (2014). *Geothermal resources used to produce renewable electricity in western states*. U.S. Energy Information Administration. Retrieved January 23, 2022, from https://www.eia.gov/todayinenergy/detail.php?id=17871

Analysis, E. (Ed.). (2021). *Electricity explained*. Electricity in the U.S. Retrieved January 23, 2022, from https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php#:~:text=Hydropower%20plants%20produced%20about%207.3,from%20renewable%20energy%20in%202020.&text=Hydropower%20plants%20use%20flowing%20water,turbine%20connected%20to%20a%20generator

Blewett, D. (2021). *Wind turbine Cost*. Weather Guard. Retrieved January 23, 2022, from https://weatherguardwind.com/how-much-does-wind-turbine-cost-worth-it/

Bourne, R. (2018, December). *The Earth's Resources are Limited, But Human Ingenuity is Infinite*. Cato Institute. Retrieved August 2022, from https://www.cato.org/commentary/earths-resources-are-limited-human-ingenuity-infinite

Carelton, A. (2019). *The rise of wind energy in the U.S.* Arcadia blog. Retrieved January 23, 2022, from https://blog.arcadia.com/the-rise-of-wind-energy-in-the-u-s/

Davis, M. (2017). *Geothermal Energy Costs- breaking down its true price*. Understand Solar. Retrieved 2022, from https://understandsolar.com/geothermal-energy-costs/

Engine, B. (2017). *What are the most efficient forms of renewable energy*? Born to Engineer. Retrieved January 23, 2022, from https://www.borntoengineer.com/efficient-form-renewable-energy#:~:text=The%20most%20efficient%20forms%20of%20renewable%20energy%20geothermal%2C%20solar%2C%20wind,and%20wind%20power%20at%2018%25

Ficazzola, T. (2018). *What are the effects of weather on solar panels and their production*? SI Solar. Retrieved January 23, 2022, from https://www.sisolarco.com/effects-weather-solar-panels-production/

Gerke, W. (2021). *Where our energy comes from*. Geothermal. Retrieved January 20, 2022, from https://oregoncub.org/news/blog/where-our-energy-comes-from-geothermal/2353/#:~:text=The%20Neal%20Springs%20power%20plant,in%20eastern%20Oregon%20and%20Idaho

Hass, I. (Ed.). (2021). *A brief history of hydropower*. International Association of the Year-Hydropower Pro. Retrieved January 23, 2022, from https://www.hydropower.org/iha/discover-history-of-hydropower

M, M. (2020). *Why Isn't Geothermal Energy Used more?* Architreecture. Retrieved January 23, 2022, from https://architreecture.com/why-isnt-geothermal-energy-used-more-often/#:~:text=Geothermal%20energy%20isn%27t%20more,of%20earthquakes%20its%20installation%20brings

Power, E. (2021). *Benefits of hydropower*. Energy.Gov. Retrieved 2022, from https://www.energy.gov/eere/water/benefits-hydropower#:~:text=Hydropower%20provides%20benefits%20beyond%20electricity,to%20other%20sources%20of%20energy

Van der Voo, L. (2014). *Neal Hot Springs geothermal plant ready to switch on*. Portland Business Journal. Retrieved January 23, 2022, from https://www.bizjournals.com/portland/blog/sbo/2012/08/neal-hot-springs-geothermal-plant.html