

Ecological Pathways

by

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China faces a number of common global challenges in moving toward an ecological future.

The elements leading toward an ecological world will differ in their manifestations across nations and cultures and will represent an expression of common themes with national variations.

What are these elements and themes? What is the ecological pathway forward?

Ecological Pathways for the 21st Century

Clearly, industrial business and pollution as usual is unsustainable. If we continue on the high pollution path we face a world afflicted by climate change, crop failure, famine, rising sea levels, acidifying oceans, collapsing fisheries, epidemics, mass migration of the desperate, resource wars, civil wars, and failed states. The fundamental choice is the successful pursuit of ecological civilization, or a trajectory leading to collapse and ruin.

The fundamental challenge is making the continued pursuit of economic growth mean ecological improvement in the 21st century.

What is essential for ourselves and for future generations is not “limits to growth” per se, but an end to polluting, depleting and ecologically destructive growth. The goal is transformation of economic growth into a proactive force for ecological improvement that will mean an end to global poverty in a sustainable global ecological civilization.

We must create wealth and eliminate poverty at the same time we pursue zero waste-zero pollution sustainable production of all goods and services guided by an industrial ecology where all outputs ultimately become inputs in a system powered by efficient renewable energy.

Ecological Transformation as Business Strategy for Sustainable Growth

Ecological transformation is best approached, not primarily as a rulebook for limitation, but as a long-term business strategy for sustainable economic growth and predominance in expanding global markets. An ecological civilization as a business strategy means the embrace of ecologically sound high growth areas to supplant and replace the high polluting behavior and products of industrial business as usual.

The question of how to guide our progress in pursuing an ecological future is: Does economic growth mean ecological improvement, and an increase in the health of natural capital, not further ecological destruction?

The increase in money value or output tells us nothing of the state of ecological well being. Increasing output that reduces pollution, depletion and ecological damage while increasing income and wealth is the way forward. Industrial growth under business as usual has been a zero sum game, trading ecological destruction for profit. Ecological growth must mean both increased income and improving ecological health. Replacing a high polluting fossil fuel energy system with an efficient renewable energy system is a prime example of highly profitable ecological path.

This is a 21st century economy where ecosystems, habitat, and natural capital are both protected and restored, where efficiency, particularly second law of thermodynamic efficiency, increases by a factor of five or ten or more.

This is a civilization dematerializing production, trading in information, powered by efficient renewable resources, and transforming production to information flows and customized 3-D printing using non-toxic, organic, and reusable inputs. Customized, ecological production will encompass all aspects of our lives using, for example, 3-D printers to produce both the most mundane objects and customized human organs designed for individuals.

An Ecological System is a Sustainable Growth System

An ecological system is a sustainable growth system, guided by ecological market rules and price signals that internalize so-called pollution externalities and use the price system to send signals for sustainability through ecological taxation regimes such as an ecological value added tax. Sustainable goods and services become cheaper, more profitable and gain market share. Unsustainable goods and services become more expensive, less profitable, and lose market share.

It is the price system, guided by new market rules and ecological consumption taxation that will influence consumption, production, investment decisions that will make smart business mean ecological business. The trillions of dollars of polluting and self-destructive infrastructure must be replaced by trillions of dollars of the tools for sustainability. The trillions of dollars of unsustainable income from polluting, depleting and destructive processes and energy must be replaced by trillions of dollars of sustainable income.

The very good news is that as the costs of renewable resources and sustainable goods and services are rapidly decreasing at the same time the costs and consequences

of unsustainable goods and services are rapidly increasing. An ecological tax system sending price signals for sustainability can help tip the balance rapidly toward sustainability and profitable ecological growth.

Information is already the high profit center of the 21st century as digitized information rendered as software, entertainment, books, financial tools, knowledge in many many formats, products, services, social and business relations within the context of a global cyberspace. This is a 21st century world where the n+1 ecological costs of growth tend toward zero in renewable powered global cyberspace.

There are indeed, ecological consequences for building the renewable energy and internet infrastructure for 1.3 billion Chinese. But the consequences of this enormous investment and profitable growth is sustainable, and the ecological costs of sharing a PDF file with the 2 billionth person is in practical terms zero after the 1,999,999,999th.

The biggest challenges we face are political and economic, not technical. Given requisite political decisions, and appropriate market rules to send price signals for sustainability, a transformation to ecological means for the pursuit of ecological ends can happen with stunning rapidity.

Within twenty years dramatic progress can be made. Within forty years we can fundamentally change the prospects for the future. Can, of course, does not mean will. Each of us has a part to play, according to our interests and ability in this epochal transformation.

A Chinese path forward will vary in details from the challenges faced by the United States or by India, but must deal with common challenges that encompass almost all aspects of our lives, encompassing, but not limited to, energy, industry, agriculture, fishing and aquaculture, forestry, ecological health of habitats and biodiversity.

The role of government is crucial in shaping the market price system, market rules and ecological taxation, as well as exerting enormous influence through its investment

and policy decisions. It is the government of China that can help lead the world in manifesting the transformation from industrial business as usual to an ecological future characterized by sustainable economic growth.

This brief article suggests that China has identified a basic path forward based on a transformation of economic growth to a force leading to ecological improvement, and that this model has broad international applicability to be modified to reflect local conditions.

This article is informed by my work as Director of the Chinese International Working Groups (CIWG) developing plans and proposals for ecological transformation. The CIWG was organized following the May 2013 World Cultural Forum conference in Hangzhou which culminated in the approval of the Hangzhou Declaration on building an ecological civilization. ⁱ

The Ecological Challenge

Life on earth has withstood and survived periodic mass extinctions. This ability must be understood as the most important expression of sustainability in action, the ability of life to respond to all influences and co-evolve with the ecosphere to help create and then maintain conditions optimally beneficial for the survival of the ecosphere as home for life. Sustainability certainly does not privilege any species, including our own. There are any number of worst cases nightmares brought about through industrial excess that can be predicated upon rising temperatures, acid oceans, rising sea levels, melting permafrost and methane hydrates and release of huge amounts of methane a most potent greenhouse gas, and collapse ocean thermo-saline circulation.

The process of sustainability now is fundamentally influenced by human action and human intention in the ecosphere. The desire to build an ecological civilization is a

profoundly important expression of sustainability in the 21st century. Much as humanity, through industrial technology, has accelerated the pace of ecological damage and change, the healing response to industrial excess represents crucial turning point in collective human conduct. China has the opportunity to lead the way forward to an ecological civilization.

China's Ecological Way

China's policy is clear in broad outline. The Hangzhou Declaration embraced humanity's common pursuit of an ecological future and the cultural, political and technical means to facilitate this transformation.

China has pursued an aggressive policy of export led economic growth in the context of becoming the world's factory and global leader in a broad range of productive activities, most lately in photovoltaic and wind manufacture. At the same time that China has emerged as a leading polluter as a consequence of economic growth. As the transformation toward ecological means and ends is underway, the ecological clock is ticking and China must confront the common global problem of building the road toward an ecological future as we travel. There are political, cultural, economic, and technological challenges of enormous complexity.

An Ecological Pathway is Technological and Market Driven

The trajectory of Chinese development is to continue to embrace technological means at the heart of making economic growth mean ecological improvement. Economic growth and ecological betterment are understood not to be at odds, but must become essential attributes of all future economic and productive activity.

Replacing a mega-polluting coal and oil based energy system with an efficient

renewably powered Super-Grid on a continental scale is a good example of economic growth meaning ecological improvement. Such a system would ultimately replace coal and natural gas generation, power electric vehicles that would eliminate gasoline, heat and cool buildings, and power factories.

Similarly, a polluting production system can be replaced by an industrial ecology where the outputs of one process become the inputs for another in a zero waste, zero pollution production system and where the overall efficiency throughout an economy increases five to ten fold.

Every aspect of life by country to city, from farm to forest to sea must be guided by ecological norms and new ecological regulation and market rules that send price signals for sustainability throughout the economy. Ecological consumption taxes can make all goods and services that are sustainable cost less, gain market share and become more profitable. At the same time what is unsustainable will cost more, loss market share, and become less and less profitable.

Two Key Steps for China

I want to highlight two crucial initiatives that China can take to help decisively establish the basis for both slowing the pace of ecological pillage and to establish the basis for an ecological future.

An East Asia Supergrid

First is the complete and urgent transition from fossil fuels to efficient renewable resources. A continental scale efficient renewable power grid is capable of completing replacing all fossil fuel and nuclear energy resources. In twenty to forty years, renewable electricity can replace all coal, oil and natural gas providing heat, light, and

motive power for industry, homes, and vehicles.

On a continental scale by using High Voltage Direct Current (HVDC) transmission renewable energy can be transmitted from where it is generated to where it is needed 8,760 hours a year. Locally, renewable energy is often intermittent and sometimes highly variable. But networked on a continental scale renewable energy is reliable. When the wind is calm in the west, for example, it is blowing in the east. The HVDC network will be interfaced with city sized DC micro-grids taking advantage of local distributed generation and energy storage. Storage will include large scale resources such as hydro as well as a plethora of small scale storage including the batteries of millions of electric vehicles in Vehicle to Grid (V2G) and Vehicle to Home (V2H) configurations being charged from the grid and supplying power in peak load times.

China is already building a number of HVDC lines, generally designed to move large scale renewable power from solar and wind to the high load and high pollution cities of the north and coast. Unfortunately, at present, these are configured more as point to point transmission and not designed as a network to facilitate easy movement of large amounts of renewable power. What is needed is a commitment to a continental HVDC network supported by very large transmission nodes capable of moving very large amounts of renewable power. Nodes of this capacity can be designed using underground transmission such as El-Pipes, which offers very large transmission capacity within a pipeline structure, capable of multiple points of entry and exit and facilitating the creation of city scale micro-grids.

The China International Working Group (CIWG) has developed a proposal for approaching the development in stages of an East Asian Supergrid that is under consideration and is available on our website www.ciwg.net.ⁱⁱ

Ecological Consumption Taxation

China is particularly well suited for adoption of an ecological tax system. More than one-third of China's tax revenues are already raised through a value added tax.ⁱⁱⁱ An ecological value added tax (EVAT) will increase the rate of taxation for unsustainable goods and services and decrease the rate of taxation for sustainable good and services. The goal is to use the market to send ecological price signals throughout supply chains and influencing production, consumption and investment decisions. The CIWG will present in the future a proposal for phasing in a comprehensive ecological value added tax.

Conclusion: Failure to Act Decisively nNow is to Court Collapse Late

China, as does all humanity, faces a basic choice in the 21st century. We can attempt to continue business and pollution as usual, and face the uncertain and harrowing consequences, or pursue with vigor an ecological path. The time for choice is now.

Ecological planning and action must be comprehensive and encompass not only industry, but, as we have seen, agriculture, forestry, fishing, aquaculture—all aspects of humanity's interactions with the all embracing ecosphere. All are at risk and all to varying degrees culpable and responsible.

Building an ecological civilization while ecological insult still continues is a solution to a dynamic, interactive puzzle and constantly evolving puzzle, subject not just to linear change, but to chaotic dynamics and sudden change in far from equilibrium conditions that cannot be accurately predicted.

A recent study in *Nature*^{iv} estimated the timing for severe effects of climate change that varied wildly depending not only on the pace of total human carbon

emissions, but, crucially on global location. And sadly, it is the the global South and the global poor least responsible for climate change emissions that will suffer the most and the soonest from its consequences. We are playing for more time.

Immediate action to reduce carbon and pursue ecological ends will mute and postpone the worst consequences of global climate change and ecological insult and provide the time, space, resources to respond to and mitigate problems while we continue to pursue ecological and sustainable pathways.

Leadership at the highest levels is essential particularly because the shape of things to come is both non-linear and irreversible. Failure to act decisively is to court collapse. Yesterday, on Nov. 4, I picked ripe tomatoes from my garden, already two weeks past the expected frost. When does an extended growing season become drought and crop failure for the billions without irrigation or sufficient water resources? We cannot predict when. We can only act now to save ourselves later.

i World Cultural Forum (2013). “The Hangzhou Declaration”. Hangzhou China, May 19, 2013. Online: <http://www.ciwg.net/hangzhou-declaration.html>. Viewed Nov. 5, 2013.

ii Roger Faulkner, Jennifer Wells, Roy Morrison (2013). “A China-East Asia Efficient Renewable Supergrid”. China International Working Groups. Online: <http://www.ciwg.net/files/74235701.pdf>. Viewed Nov. 5, 2013.

iii Robert Smith (2012). *A look inside China’s VAT system*. Ernst & Young. Indirect Tax Division. OnLine: [http://www.ey.com/Publication/vwLUAssets/China_VAT_system_en/\\$FILE/China_VAT_system_en.pdf](http://www.ey.com/Publication/vwLUAssets/China_VAT_system_en/$FILE/China_VAT_system_en.pdf). Viewed Nov. 5, 2013.

iv Camilo Mora, Abby G. Frazier, Ryan J. Longman, Rachel S. Dacks, Maya M. Walton, Eric J. Tong, Joseph J. Sanchez, Lauren R. Kaiser, Yuko O. Stender, James M. Anderson, Christine M. Ambrosino, Iria Fernandez-Silva, Louise M. Giuseffi, Thomas Giambelluca (2013). “The projected timing of climate departure from recent variability.” *Nature*. 502, 183-187. Oct. 10. 2013. Online: <http://www.nature.com/nature/journal/v502/n7470/full/nature12540.html>. Viewed: Nov. 5, 2013.