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Review article

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The Next Economics: Circular Economics

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Abstract

The "disconnection" between the everyday of life of business activity is what inspired me to seek different understandings of the situations that actors' experience in their daily business lives. The discussions and debate are directly at the heart or core of what western industrialized capitalism has become today. Through the creation of Qualitative Economics (QE), I have done an in-depth analysis; discovered experiences; and conducted investigations of the philosophical and historical roots of science. Above all, I worked at a large research laboratory (Lawrence Livermore National Laboratory) for almost a decade and learned was science is and its practice. I found that "economics is not a science". This is the reason why my book on Circular Economics (CE) needs to become a series of books and also a peer-reviewed journal. People, organizations, companies and governments will be able to provide the financing for new technologies, systems and creative products that are economical and hence viable for the general public to acquire for their own use. This is circular economics at work. Therefore, the dependence on linear supply-demand which does not work, can be put aside and even used in other ways related to circular economics. As this paper will show, CE is being applied around the world starting in the European Union (EU) January 2015 and now in China (July 2018). Other countries are also enacting CE. NOT in the USA except in some areas mostly through small businesses but now even large corporations who have made CE a key part of their Sustainability Programs.

Keywords: Economics, Science, Linguistics, Green, Smart, Theory, Practice, Cases, Climate Future

Introduction

There are nine (9) books out and more coming with a title similar to Circular Economics (CE) with sub-titles too. As Amazon and other sources note, the book topic is new being a different perspective of economics. However, none of the other books goes into much detail as to what CE is about, does and should do. The book on Circular Economics (Clark, 2020) is for academic and educational people since economics needs to become a science. The CE is perfect for Sustainability programs, degrees and certificates. And would even start a new definition for MBA and DBA programs using circular economics in comparison to the conventional linear economics. Circular Economics is very different from conventional linear economics.

The Circular Economy seeks to rebuild capital, whether it is financial, manufactured, human, social or natural in large part to reduce and reverse climate change. To get started, the world is round and not flat. Work on circular economics had started due to a report by the Ellen MacArthur Foundation and others including Clark with co-authors (2008, 2014 and 2015) demonstrates what is noted below.

From Ellen MacArthur Foundation

The world and local communities should not just be "resilient" to climate change. Instead we all need to stop it for the future of our families and the earth. The CE strategy ensures enhanced flows of goods and services that reuse products rather then, waste them and pollute the planet. Topics that the CE book by Clark covers and explores are:

- Economics needs to change from the Linear Traditional Supply / Demand theory since the business world never really worked that way. There are many cases in point range from Apple Computer to Tesla cars.

- Economics is circular as many new ideas are NOT due to "demand" but to creative and new ways to look as problems.

- The solutions today in technology and science need to stop climate change are what circular economics is about and does for everyone including businesses and governments.

- The EU enacted Circular Economics (2015) that made dramatic changes in businesses which led to other creative solutions ranging from sustainable communities to new businesses, investments and creating companies in a variety of areas.

- Millennials get CE today. The need for circular economics is from a growing demand by students around the world. China is starting (2018); now the USA needs to do so too. The academic education community must do so.

- Circular Economics is needed in the USA where it is only marginally understood or known.

The 9 books related to the topic of CE have few actual cases. And none are reviewing and providing the difference of Circular Economics from neo-classical linear economics. Clark does just that in his book on CE. To understand CE, there needs to be a review of the economic history and how it is changing now. There must be examples and cases that exist --- and even some (many) areas that do not exist now.

In other books that Clark has done which provide the circular economics in action. There are several noted in the references for this paper.

Background and Focus

One key organization involved early in crediting Circular Economics was the Cradle To Cradle (or as C2C) that started in San Francisco (around the turn of the 21st Century), whose co-founder and past chair was William McDonough. Bill is not as involved in C2C, since he is more into global design and architecture areas out of his office in The Netherlands. Now C2C has sent up a certification drafted program criteria for v4 standard development at Cradle To Cradle which created and then put into action Cradle to Cradle Certified Product Standard.

When Clark was on the C2C Energy Advisory Board, he began their discussion and research work on QE that was a key basis for CE. At Conferences and meetings around the world, Clark was acknowledged and thanked for his work in QE. Even more interesting then was that the GreenBiz organization was founded in Oakland, California by Joel Makover whom Clark also helped at the turn of the 21st Century and works now at applying CE to new, small and even large companies.

The point is that with these people and their organizations all want Clark to do the Circular Economics book as everyone one of them and their staff noted that there are NO academic books out on CE. Yet there needs to be, as CE must be a key part of the education and university programs related to economics. CE is also Cross-Disciplinary as it provides significant information and details on what economics needs to be for the future. The point is that all of this is very important and relevant information as the first Conference in the USA held on CE (June 2019) in Minneapolis, Minnesota which was created and managed by GreenBiz. There will be others after the world wide Covid-19 pandemic is under control. The focus is on CE as it applies to businesses of all kinds around the USA and even globally.

Even more important, is that Clark's book on Circular Economics Cases due to his attendance at the First Conference on CE. Then in July 2019, Clark taught a 2-week course on CE at the University of International Relations (UIR) in Beijing, China. Every July for the last 6 years, Clark taught at UIR on USA and China policies, problems and solutions. In July 2019 year, Clark had the largest class attendance of 39 students. Only one was trained in economics. The students work in groups and do papers and projects as a team. The result in 2019 was that the CE book by Clark was just beginning and he needed Circular Economics in the book. There were three group projects on CE which were significant and important for China. Clark has these 3 Cases on China in the CE book. And due to global pandemic, Clark is not teaching at the University of International Relations.

Circular Economics in Action

Clark's latest book (co-authored by Professor Michael Fast, PhD) is titled: Qualitative and Quantitative Economics (Q2E): How to make Economics into a Science (Nova Press, Fall 2019). Clark and Fast had published several peer reviewed papers on Qualitative Economics since it was a topic that they both focused on since the early1990s when Clark was a Fulbright Fellow at AAlborg University (AAU) in AAlborg, Denmark. Then after Clark had been a Visiting Professor at AAU in 1999, his 3-year term ended short (late 2000) since he was asked to serve 1 of 5 Energy Advisor for California Governor Gray in Sacramento, CA. That service ended in October 2003 when Governor Davis was "recalled'. Over 4,000 people lost their jobs but Clark was asked to stay on by the senior environmental staff of the new Governor Schwarzenegger.

Q2E discusses the various philosophical traditions that contribute to the understanding of business everyday reality today: positivist and rationalist traditions, known as part of the objectivist paradigm. We purposely pay attention to philosophical arguments that are counter to the current traditional economic paradigm prevalent in American and European business programs, schools, textbooks, and administrations. However, these positivist and rationalist traditions are not underlying Asian and transitional economies. Nor are the predominant economic paradigms today used in practice in most businesses. All of this (and more below) is why we sub-titled the Q2E book as: Making Economics into a Science.

Most of economists today talk, write and promote "market forc-

es", "stock markets" and "tariffs" plus more, yet are rarely defined beyond statistics and numbers through the linear economics paradigm. And certainly, they are not even defined globally. That is why Clark did the book on The Next Economics (Springer Press, 2013) which is based on his research but far more due to his work as the Energy Advisor to California Governor Davis at the turn of the 21st Century.

Clark saw the need to look at economics, not in a linear way but in other ways such as economics needs to be both qualitative and quantitative in order to be a science. And as will be discussed more here "circular" since the economics makes more sense in proving uses of waste than the economics of new companies, programs and even waste along with lack of reuse. Clark and Fast wrote their first book titled Qualitative Economics (Coxmoor Press, 2004) and then updated to a 2nd Edition in 2019 for Springer Press Qualitative Economics subtitled "Toward a Science of Economics".

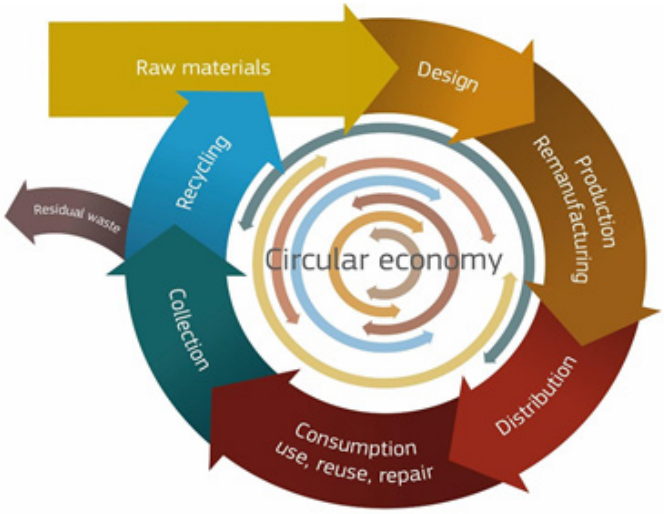
Economics is the case of a "disconnection" between the everyday of life of business activity that inspired us to seek different understandings of the situations that actors' experience in their daily business lives. As Professor Dan Kammen PhD in Physics notes in 2006 that renewable energy is important for the world and its future economics needs to do in order for people who consume, use and create "green" renewable energy. Therefore, the CE book discuses and thus hits directly at the core of what western linear capitalism is or is not today through an overview analysis of the philosophical and historical roots of science.

Clark's papers on The New Normal in Economics in which Circular Economics (CE) starts off with discussions and cases of the various philosophical traditions that contribute to the understanding of business in everyday reality day by day: positivist and rationalist traditions, known as part of the objectivist paradigm. Attention is purposely pay attention to philosophical arguments that are counter to the current economic paradigm prevalent in American and European business programs, schools, textbooks, and administrations. Curiously enough, however, these positivist and rationalist traditions are not underlying Asian and transitional economies. Nor are the predominant economic paradigms today used in practice in most businesses.

Instead, in Asia much of their economic and business traditions are based on different paradigms and traditions. While actual business practices globally are neither locked into a specific rigid model or follow one set pattern of economic actions. There are Chapters and Sections that give some cases of actual business economics and also on The Next Economics with an overview of how Asian economics works, especially in the People's Republic of China (PRC) today, with Green Development and soon to be enacted Circular Economics.

Clark's book on The Next Economics showed the need for economics to be a significant factor as an overview of UN IPCC Report (2001) in New York Times (October 2018) stopping Climate Change and Economies of externalities, sources of funding and investments as well as qualitative data that defines numbers, words and information. Clark has other books that reflect the need for technologies but also the economics of them. What used to be a high cost for solar panels has now been reduced dramatically. However, there needs to be plans and goals that take the costs and make them more viable, smaller and easier to get for public and private buildings, complexes and even individual homes at the same price for everyone.

CE is due to the enacted by the EU Commission (Brussels) in January 15, 2015. Below is the conceptual diagram that illustrates Circular Economics in a simplified way as displayed below by the EU Commission:



Commission Staff Working Document:
Report on Critical Raw Materials and the Circular Economy

The Circular Economics book references other books by Clark that have gone into a lot of detail which shows how economics is not linear as it needs to be circular. The theoretical framework that Clark has for defining Qualitative Economics (in his books) comes from Noam Chomsky, PhD in linguistics. Clark took classes for one of his MA degrees in Anthropology and Linguistics which is where he learned from Noam Chomsky first book Syntactic Structures what needs to be done to make the social "sciences" into a science which is both quantitative info with qualitative definitions for meaning of numbers, data and statistics.

In the early 1970s, Clark while studying linguistics, connected directly with Professor Noam Chomsky via mail and telephone. Chomsky recommended that Clark "go west" to University of California, Berkeley where he studied law and anthropology, but decided not to do law and instead got my PhD there at CAL. Clark learned how to be a QE (which he invented) due to law and linguists where the need was to ask questions, find meaning of words and get definitions. Clark saw then and after his PhD what science was in practice when he was asked to be the first Manager of Energy Technology Transfer at the Lawrence Livermore National Laboratory (LLNL) in Northern California. Clark "earned" another PhD at LLNL by what science was: both quantitative and qualitative (Q^2E).

Clark teaches the need to understand definitions in language which are needed in economics for numbers, data and statistics that cited Noam Chomsky Reflections on Language 1975. In short, linguistic theory is put into practice to show how "surface" (words and language) are defined as "deep" structures that get into the meaning, understanding and application. of languages, sentences and paragraphs etc. What Chomsky did in linguistics was make it into a science. That is what Clark is doing in economics through Circular Economics. A key example is this graph from Chomsky's work in

1975 and also now what Clark does:

Linguistic Transformation Theory
(N. Chomsky 1975)
T **Surface Structures** (Phonetic- Everyday Language)
R <----------Language Discourse ----------->
A Universal Grammar ^
N Syntax |
S Data (methodology: interactive/qualitative)
F Empirical (actual use of language) |
O |
R Deep Structures (Semantics – |
M meaning to words/sentences) |
A |
T Generative |
I Phrase Markers |
O Rules (principles that form language): |
N Appropriateness etc. |
S Lexicon v
<----------Definitions (understanding) ---------->

All of these interests for Clark motivated him to work on the solutions for climate change through technologies (such as the LLNL was doing) but also getting involved with groups that saw the need for changing economics (and its related areas such as finance, investment and accounting etc.). The work of science is primarily with people in groups who are focused on creating a hypothesis that needs to be examined in theory and then practice, which can be observed, discussed (even debated) through notes in papers (qualitative) and also with numbers, data and statistics (quantitative).

Circular Economics is The Next Economics

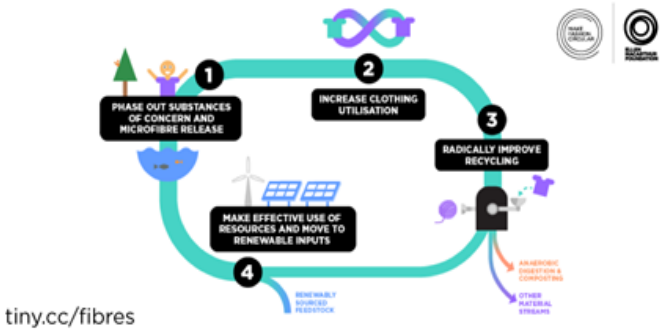
The basic need is for a Circular Economics book will define and constantly monitor economics on all levels. The starting points have already taken place as noted below with some economic policy organizations. However, the key area is for the academic universities around the world need to move away from linear into circular economics. This is critical as now there are no academic books on CE. Clark's book will do that but now there also is needed academic papers on CE such as The Ellen MacArthur Foundation has "teamed" up with Clark for his CE book so that they are working together now and in the future. Recently (late August 2019), the Education Director for the Ellen MacArthur Foundation got hold of Clark to coordinate an Educational Program that would be part of colleges and universities curriculum. There will be a meeting on this topic soon in the USA which I know the book on CE would be great to have (or ready to be) published.

There are Cases of Circular Economics such as Apple and Google which are in the CE book due to presentations that were given by both companies separately by their Directors of Sustainability at the GreenBiz Circularity Conference in Minneapolis, MN in mid-June 2019. That connection with CE and Sustainability is good and one that Clark has been doing for over a decade now. However, there are some cases from cities that combine Circular economics and Sustainability.

For example, CE also has Cases from the medical profession whereby doctors go into other professions and even businesses related to their medical backgrounds and work, but now into new areas where they can apply their medical education, work and experiences. As the MacArthur Foundation points out plastics can be reused (that is recycled) from their use for cups, bottles etc. into products such as fashion industry with clothing. Their report was on the new textile economy: Redesigning fashion's future. From Circular economics there are identifications in the fashion industry's current take-make-dispose model as the root cause of its environmental problems and economic value loss. Every second, the equivalent of one garbage truck of textiles is landfilled or burned. An estimated USD Q$500 billion value is lost every year due to clothing being barely worn and rarely recycled. If nothing changes, by 2050 the fashion industry will use up a quarter of the world's carbon budget.

Washing clothes releases half a million tonnes of plastic micro-fibres into the ocean every year, equivalent to more than 50 billion plastic bottles.

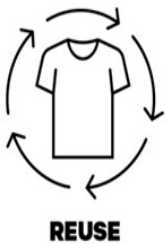
This report lays out a vision for a system that not only puts a stop to these damaging trends, but also summons the creative power of the fashion industry to develop a new textiles economy which is circular as noted below. In such a circular economic system, clothes are designed to last longer and be worn more. New business models allow clothes to be rented, resold, or recycled more easily. And no toxic substances or pollutants are released when clothes are produced and used.



A great and proven case is Good Fashion located in Netherlands, as the reuse of plastics is not only possible, it is within reach. What the fashion industry lacks are the resources, tools and incentives to put it into relentless practice. In addition to their Innovation Platform, which focuses on scaling sustainable innovations, the Good Fashion Movement to help people envision a world where all fashion is good. Key to all of this movement is Experience: an innovative, one-of-a-kind museum designed to educate, empower and equip visitors to embrace Good Fashion thinking into their lives.

There was never a linear demand for clothes as shown below or

others. The use of plastics to make these dresses for women was creative and also a good "reuse" of a plastics that were traditionally dumped in trash, the oceans and other places. The world has changed in not only fashion but other areas reusing products from batteries to electronics (televisions, computers and cell phones) plus more.



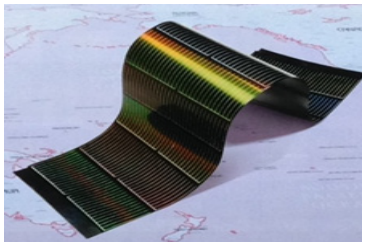
Once the products are reused, they can then be reused again and again when worn out or outdated. New products will be made. The environment is protected as well as the creation of new jobs, businesses and industries that are local.

Consider another case in point by Bruce Hector MD (Medical Doctor) who left his practice in a major hospital in Southern California (SC) in order to start a chain of 15 on-site medical centers that were located in 15 locations around SC. But that was NOT his only action being circular as he sold that Business and then created a new one titled Earth Accounting (EA) because he felt that people needed to read labels or bar code on products in order to know their health, value and environmental impact. The results for Dr. Hector were incredible, but NOT all profitable. In fact, now he is back supporting his medical centers since the new owner who was a decade younger than him, passed away due to a heart attack. While Hector did next was to get involved in other businesses related to EA.

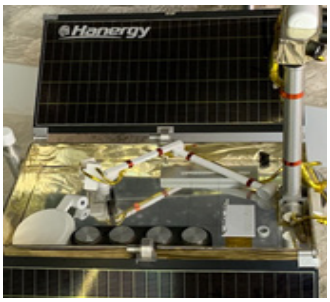
There are many other cases, especially in the EU and China which are noted in some detail in
Circular Economics . One significant case of Circular Economics has been enacted by which is China's largest renewable energy (hydro, wind and solar) company. Hanergy Headquarters and Research Center are located in Beijing for almost a decade have produced thin-film solar for roofs and Hanergy all solar powered cars and also used to produce and make clothing products and other CE products.

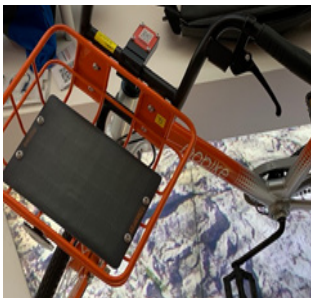
Further and even more dramatic use of circular economics occurred on July 2, 2015, when Hanergy Group (Beijing, China) launched all solar powered cars (July 2, 2016) and one (1) bus which . The Hanergy all-solar powered car needs to be produced as over 300 all all-solar powered buses are now operating in China. A company in Netherlanders created a in 2019 an all solar powered car too that they titled Lightyear. While the company has not gotten funded, it still created and produced a film of Lightyear solar car driving.

The pictures below show the thin-film solar produced by Hanergy on its corporate roofs
in Beijing. And applied to other areas their corporate facilities including walking streets and back packs, solar power for bikes and communities.



Clark and his students from University of International Relations in front of Hanergy Group Headquarters in Beijing





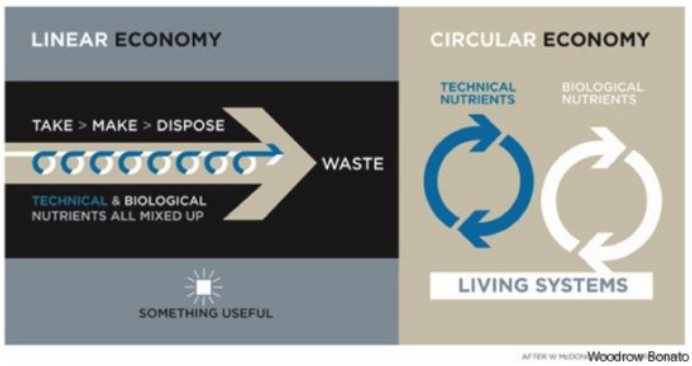
Above are other applications of Hanergy thin-film solar that are applications of Circular Economics whereby one product (transportation vehicles) can be applied to other areas for products. This is good for both the company (Hanergy) and also the environment to use "waste" as by-products for other areas that reduce climate change. Another Chinese company (Ningbo TS Lighting import and export co., ltd, 2019) took thin-film solar and put them on flashlights to get power from the sun as well as not use batteries or electric power from buildings. The flashlight and other technologies are included with a safety pin, strap to hold it; a screw on bottom with the white power cord if needed and more. There are more cases from the EU, China and other countries in the Clark's book on Circular Economics.

Circular Economics in Detail

Climate change is real and becoming more and more damaging to people, communities, cities and nations around the world. New "green" (e.g. solar, wind, geothermal, water and other) resources use new technologies to address climate change, waste issues and increasingly scarce resources. In order to reduce and reverse these climate problems, there is the global need for saving fresh air; providing green environmental resources; and restoring the climate for future generations.

The economics of climate is rarely discussed or recognized for being a key factor to stopping climate change as well as financing the "green planet' where everyone lives today. We need to "think outside of the box" about what and how we can change every perspective of our daily lives. Economics is the key factor: affordability, paying people, defining the numbers and data and finance planning for today and tomorrow. Circular Economics is The Next Economics.

Conventional Neoclassical Linear Economics to Circular Economics



What is critical to understand and apply from this book is how economics needs to become a science. To do that economics needs to be both Quantitative (which it is primarily today and for over the last 3-4 decades) to also being Qualitative.

The world needs this new economic model of Circular Economics. That is the reason why Clark and Fast updated their book that was published in 2008 on Qualitative Economics and now recently updated for Springer Press (2017). Now resources pressure is faced in every part of the world and that will never decrease in the future. Low resource efficiency can lead to a turnover of a big business, which is also what the traditional economic model does not account for or do.

The world is now in a Green Industrial Revolution as Clark and Cooke wrote about in their books 2015 in English and earlier 2014 in Mandarin as Green Development including others on how to be Smart Green Healthy Cities as well as states, regions, nations, continents, and even space such as the moon, Mars and more. The international organizations as the Paris Accord (2015) and enacted following the Group of 20 nations (G20) Summit in Hangzhou, China on September 3-5, 2016. Now due to the global pandemic is the new economic model which needs to be built and enacted which is both qualitative and quantitative, hence scientific. The B20/G20 held meetings (despite the USA withdrawing in Spring 2017) after that every year which resulted in the G20 Action Plan on the 2030 Agenda for Sustainable Development that recognizes the global importance of stopping climate change.

Another Circular Economics case in point is packaging as noted below:

In July 18, 2019, Forbes highlighted how people can recover post-consumer materials for re-use into recycled cups, bowls, food grade packaging and more. Today due to climate change and the need for economics to become a science, we must treat economic activities like a science, studying the meaning and definitions of numbers, data and even events.

Forbes points out that over 50 billion single-use containers (e.g. coffee, tea and water) end up in landfills every year. These waste materials can be redone and made into new environmentally friendly products. Keep in mind that for bottles and cans, most are now sold in USA for $.05 to $.10 per bottle more so that people will be encouraged to "recycle" them and get money back from shopping centers, companies and suppliers.

The same is true for electronics ranging from computers and cell phones.

Circular economics is the new practical theory of thoughts, methods and actions for the near-time technologies due to the new CE economic model can adopt to make limited resources to be used in more sufficient ways. The main difference between the classical Adam Smith economic model and circular economy are consequences of products and how they are used over time.

Companies that adopt circular economic model are designed in a product manufacturing way that after consumer's consumption, the waste can be collected, recycled, remanufactured (or repaired) and then re-invested into the consumer market. Therefore, less waste will be produced and thus this model can use all the resources in the most efficient ways and do the least harm to the local and global environments. Circular Economics can bring more opportunities into industries.

Case in point comes from the United State Business Council for Sustainable Development who have started "The Materials Marketplace" to be an award-winning regional and national platform that connects businesses to develop and support reuse and recycling business opportunities that:

"Through our platform, traditional and non-traditional industrial waste streams are matched with new product and revenue opportunities, ultimately enabling the culture shift to a circular, closed-loop economy. In addition to diverting waste from landfills, these recovery activities generate significant cost savings, energy savings, and create new jobs and business opportunities."

Unlike the EU where Circular Economics was enacted in January 2015, the USA does not know much about CE, especially in academic university world. Only a few people in government, academics and even businesses know what Circular Economics is about and how to enact it. However, we need to change this immediately because resources are decreasing day by day as the population grows. The book raises public awareness of adopting a more efficient way of operation. How and what can industry do to make their business profitable in the long run? What government can do to help industry grow? What our next generation should know to achieve a long run sustainability? Circular Economics provides the answers.

This model is used in the EU and has been around in some areas of Western Hemisphere, but needs to be done from government policies, laws and funding. China is now doing that with the EU when they signed a Memorandum of Understanding (MOU) in July 2018 to do just that. There are other cases of Circular Economics being done in Japan, Korea and other Asian nations.

See below the example of how the materials marketplace can and does work:

From United State Business Council for Sustainable Development (2018)

Based on the "supply – demand" the traditional economics does not provide for reuse and creation of new businesses and opportunities. Research methodologies include traditional research methods finding data, citations and reports. Case in point is to follow the work of Mr. Danilo Bonato MBA with his company ReMedia in Milan, Italy. ReMedia is a good example since it takes media technology products such as television sets, computers, iPhones etc. and produces or supplies other companies with parts to build other products.

Why does the world need Circular Economics? Consider one of many cases where Circular Economics has been enacted and expanded in the EU, China and soon to the USA. The example of the Ellen MacArthur Foundation where plastics are "reused" and made into other products ranging from clothing fashion into materials as building and transportation walls plus more. This graphic demonstration from the shows how products can be reused and made into new products that are both good for the environment and make economic sense since the waste is remade into a new product. The saving of raw materials and reuse of other products is an important way to provide funding and marketing for new products that come from older products.

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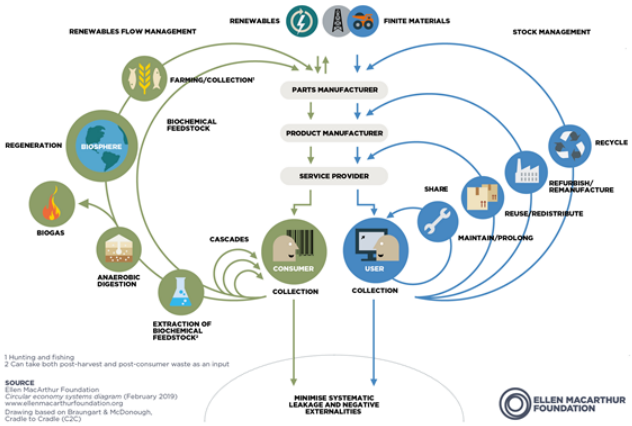
While the science of chemistry is important, the issue is to be able to recycle and reuse the plastic that is made and used for bottles, packaging and more. Now, the plastic can be gathered from reusable products that provide a resource from which to make new products.

Moreover, collection systems are still too expensive and inefficient which does not help industrial companies to abandon the traditional production systems based on the linear (flat economic) transformation of materials into products and their disposal once they are consumed.



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Therefore, the Commission is considering the possibility of introducing further simplifications to promote increased efficiency of collection systems through the circular economy paradigm. Hence by integrating these systems with the upstream industries that make use of recycled components and raw materials from products entering, the end of their life stage can be profitably met as well as protecting the environment.

The enactment of Circular Economics is a strong key methodology that has been proven in ALL fields of academic research, study and plans. As noted below from the Stockholm Resilience Center that are important (9 of them) boundaries that have been crossed which impact others in a circular manner. The solutions to climate changes are circular for technologies, public policies, health and especially economics. The time to move into this area for ALL nations is now !!!!!

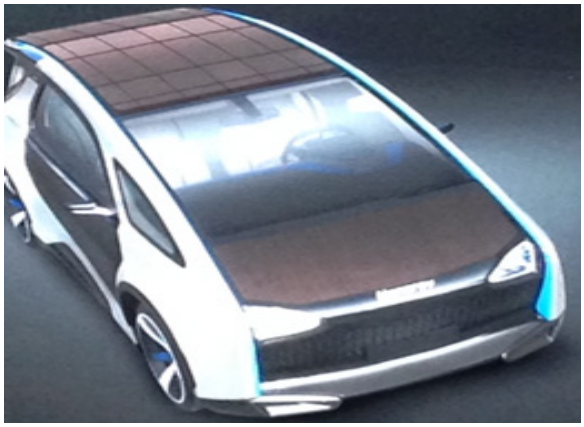
Circular Economics: The Case of all Solar Powered Cars

Since 2013, the sales volume of new energy vehicles in China has been maintaining steady growth. At the 2016 Beijing International Automotive Exhibition, automakers launched 147 new energy vehicles as they combine the potential increments of new energy vehicles market with the structural adjustment of products. 112 out of the 147 new vehicles were released by domestic car enterprises, which, in number, have occupied a leading place, obviously surpassing Europe, the US, Japan and Korea.

Now Tesla electric cars sales have gone up considerably in California and China. Yet the problem still exists: where do EV cars charge their cars? And what is the source of energy for these recharging places? Most recharging energy comes from natural gas and in China coal.

The all solar cars have brought about a positive effect on China's being the world's largest new energy vehicle market. The development momentum of new energy vehicles cannot be neglected. As the Hanergy Group (HG) Research Institute Building shows with Clark's students in July 2018, the entire building is covered with thin film solar which is one of the areas that HG focuses on aside from hydro-electric dams and related renewable energy technologies.

After visiting the Exhibition, people will find that new energy vehicles are mainly driven by charging posts, gas-electric hybrid and hydrogen. In China, electricity generation chiefly depends on coals. Therefore, though those new energy vehicles like Tesla may not cause pollution during driving, the electricity they utilize, normally results in pollution due to the power generation source. Below are two of the three Hanergy all-solar powered cars:



However, relying on high-performance gallium arsenide and solar-powered thin-film technologies to produce electricity such as all solar-powered vehicles which will be released by Hanergy will get rid of the dependence on fixed charging facilities and realize the zero-consumption of fossil energy and the zero-emission of pollutants.

The entire Hanergy building complex has all thin-film solar that provides 43% of its power everyday (and storage) for night-time and cloudy or rainy days. Clark has taken his students to the Hanergy Research Building on its all solar walk and see the all-solar powered cares.

Hanergy launched the strategy of its mobile energy in February 2015 for cars and buses. By virtue of its leading thin-film solar power technology, Hanergy made comprehensive efforts in the fields of BIPV, household PV power generation, agricultural appli-

cation, distributed power station, "mobile energy", ground-mounted PV power station, etc. Meanwhile, Hanergy also made overall arrangement in the fields of the civilian market of mobile energy, new energy vehicles, solar powered air vehicles, etc.

On July 2, 2016, with further technical breakthroughs, the all solar-powered vehicles were released by Hanergy to the public (globally too) for over 4,000 people to see and even some drive the cars. At its news conference, Hanergy released four wholly solar-powered vehicles of four different styles and a solar powered bus. Being different from the traditional electric vehicles, these four totally solar-powered vehicles, combine the world's most efficient GaAs thin-film solar-powered chips, with creative body designs.

Then in October 2016, the all solar-powered concept car developed by Hanergy made its debut during the National Week of Mass Innovation and Entrepreneurship. On the first day of that week, after learning knowledge about relevant technology and design in detail, Premier Li Keqiang and the Vice Premier Zhang Gaoli gave Hanergy all solar-powered vehicles much recognition and encouragement.

Conclusion

As the world is round, so is Circular Economics which shows what happens in one part of the world travels or moves to other global areas due to wind, rain, ocean water and earthquakes. The Circular Economy is global and therefore brings together local concerns to create opportunities for social integration and cohesion. Circular Economics even finds answers to the drastic fanatics to provide people with viable, safe and strong future for their families and children.

The paradigm transition towards a Circular Economy is the answer to some of the main challenges of our time. It can help to preserve resources that are increasingly scarce and subject to greater than ever, environmental pressure. To start with, Circular Economics has already increased Europe's economy and competitiveness, by generating new business opportunities as well as innovative, more efficient and new ways of producing, consuming and creating new products. The chart below shows how the circular economy works. And has been working in different countries and communities already.

Furthermore, it is recognized, at least in principle, that the only alternative to ensure a viable safe future for new generations of European citizens (and refugees) is that of a rapid transition to an industrial system that is based on the circular economy paradigm providing economic, family and cultural support for everyone. Businesses and governments need to rethink production cycles so as to eliminate the concept of waste, through optimized models for the reuse of products, disassembly and recycling of goods.

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