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Shipping and the Anthropocene: Globalization, the Great Acceleration and the humble Shipping  
Container

**Section I: Introduction**

If there is a fundamental fact about the world today, it is that planes move people and containers move goods. Container shipping, in fact, accounted for 90% of global trade in 2007.<sup>1</sup> Shipping emits somewhere around 15% of global CO<sub>2</sub> emissions<sup>2</sup>. Yet, the story of containerized shipping and carbon emissions is a complex one. Yet, the global network of trade is intrinsically linked to both containerized and global shipping patterns. This network is, at a level, hundreds of years old. However, the modern story of containerized shipping begins in 1956.

This day coincides with another trend - the Great Acceleration. The Great Acceleration is the massive uptake in resource usage and emissions beginning in 1950. This paper will attempt to contextualize the rise of global shipping networks as a key part of the Great Acceleration. It's not just the 15% of emissions that are key, but it's also the other factors - what industries and therefore emissions are enabled by the network. This paper will contextualize global shipping as a key driver of Great Acceleration.<sup>3</sup>

Finally, the present era of the Anthropocene and the threat of climate change presents a fundamental threat to this shipping regime. How can the modern economy, with its dependencies on freight shipping and planes, wean itself off carbon transport? This paper will present three opinions of the future. The first, the futurist camp, believes 3D printing and other technologies will alleviate the need for massive shipping infrastructures. The second, exemplified by Bill McKibben and the like, see a dramatic, terrible future ahead because of said

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<sup>1</sup>By weight. John Vidal. "CO<sub>2</sub> Output from Shipping Twice as Much as Airlines." *The Guardian*, March 7, 2007. <http://www.theguardian.com/environment/2007/mar/03/travelsenvironmentalimpact.transportintheuk>.

<sup>2</sup>Eyring, V., et al. "Transport Impacts on Atmosphere and Climate: Shipping." *Atmospheric Environment* (n.d.). [http://www.geos.ed.ac.uk/~dstevens/publications/eyring\\_ae09.pdf](http://www.geos.ed.ac.uk/~dstevens/publications/eyring_ae09.pdf).

<sup>3</sup> The idea of globalization is going to be key here.

climate change and suggest that the network must be dismantled. Finally, there is the quasi-cornucopian position of the industry itself.

## **Section II: Containerized Shipping and the Great Acceleration**

Throughout human history water-based shipping been a key driver of trade.<sup>4</sup> This paper will concern itself with the movement of two types of goods. One, multi-modal bulk shipping using containers moves of the world's finished goods and many of the bulk materials. The second, oil supertankers move most of the world's oil from oil field to refinery. These two methods account for the vast majority of carbon emissions from shipping. Not only that, they also account for a lot of the economic growth that propelled the Great Acceleration.

The story of containerized shipping begins April 26th, 1956 when fifty-eight aluminum truck bodies were lifted onto the Ideal-X in Newark, NJ. Five days later, the ship arrived in Houston, where cranes lifted the truck-bodies onto waiting trucks.<sup>5</sup> How did this small project over 100 billions tons of goods being shipped annually?<sup>6</sup> “The container is the core of a highly automated system for moving goods from anywhere, to anywhere, with a minimum of cost and complication along the way”<sup>7</sup> writes Marc Levinson in *The Box: How the shipping container made the world smaller and the world economy bigger*, his landmark history of the shipping container. In 1950, before the advent of the shipping container, global breakbulk shipping had become a choke point on trade, thanks to the advent of trucking as a faster method of moving goods around the United States. Break bulk shipping would not revert to civilian control in until 1947, and shipping levels would not match pre-war levels until far after.

However, the containerization of the Port of Elizabeth/Newark helped catapult containerized shipping, and shortly thereafter, the big 3 West Coast container-ports (Los Angeles, Oakland,

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<sup>4</sup> Just look at the Ancient Mediterranean.

<sup>5</sup> Levinson, Marc. *The Box : How the Shipping Container Made the World Smaller and the World Economy Bigger*. Princeton, N.J.: Princeton University Press. 1.

<sup>6</sup> World Shipping Council. “Linear Trade Statistics.” *World Shipping Council*, n.d. <http://www.worldshipping.org/about-the-industry/global-trade/trade-statistics>.

<sup>7</sup> Levinson, Marc. *The Box : How the Shipping Container Made the World Smaller and the World Economy Bigger*. Princeton, N.J.: Princeton University Press. 2.

and Seattle) began retrofitting in order to handle containerized goods. Demand from the US military<sup>8</sup> and Japanese government led to the creation a few Pacific container-ports. Finally, the arrival of just-in-time manufacturing and supply chain processes required containerships to function. Countries in developing economies, especially China, would build what have become the world's largest ports. This story, obviously, is a quick hits history of container shipping, however, *The Box* presents an excellent history of the how and the why that has been intentionally neglected in the name of space here.

It is also useful to acknowledge the usage of tankers to transport oil. One of the reason's oil supplanted and replaced coal was the ability to ship it easily. Nowadays, there is a vast network of supertankers that move oil from well to market. In fact, several of the world's largest ships are tankers, and supertankers have allowed carbon fuel to power economic growth with a far lower price than moving coal.

The network that was created - the global network of shipping lanes would be one of the most powerful drivers of economic growth and globalization. The reason China became the world's manufacturing center was dependent on the ability to ship goods over a long distance without a particularly high cost . An Economist review of the box puts it succinctly, "Without the container, there would be no globalisation."<sup>9</sup> Many pundits and thinkers have placed the rationale for globalization on either planes or the internet or a economic process of growth and specialization. Rather it is ability to move goods cheaply that allows specialization and globalization that go hand in hand. For example, the World Bank estimated that if Peru were as effective at port management as Australia, that alone would increase its foreign trade by 25%.<sup>10</sup>

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<sup>8</sup> They built an entire container-port in Vietnam and kept the containerized shipping companies in business and growing during the Vietnam war.

<sup>9</sup>"The World in a Box." *The Economist*, March 16, 2006. <http://www.economist.com/node/5624791>.

<sup>10</sup> Levinson, Marc. *The Box : How the Shipping Container Made the World Smaller and the World Economy Bigger*. Princeton, N.J.: Princeton University Press. 272.

Shanghai and Shenzhen went from carrying less than 6 million TEUs <sup>11</sup> in 1990 to over 30 million in 2003. <sup>12</sup> The globalization of China, Malaysia, Taiwan, Vietnam can get directly placed on the hands of the containership.

Yet, this is a resource dependent project - cheap container shipping needs (relatively) cheap oil. <sup>13</sup> The entire global project has relied on the ability to move goods with essentially no cost. The fuel and carbon costs of shipping are barely factored into the global network that has been created. While economists would often like to argue that is it a natural process for globalization and specialization to go hand in hand, it is infact cheap oil and no carbon costs, essentially. The problem in losing the access to resources that is needed for the industry will be discussed in more detail in the later sections.

The Great Acceleration, that is, the massive uptake in environmental degradation and fossil fuel usage that started in 1950, is fundamentally linked to container shipping. They are both stories of globalization. Crutzen, et al, define the Great Acceleration when the rate of change of human modification of climate had a notable sharp update. This can roughly be defined as 1950 onwards, most the boom World War II. The put it out there as a candidate to mark the start of the anthropocene, actually. The Cruzen paper successfully identifies the Great Acceleration with when the “the world moved towards a system built around neo-liberal economic principles, characterized by more open trade and capital flows”. <sup>14</sup> This open trade lived on the back of containerized shipping.

Any attempt to understand the Great Acceleration must also include how globalization increase consumption. This is the second key part of the thesis of how container shipping drove up carbon emissions. Obviously, China’s growth has been enabled by the usage of deepwater

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<sup>11</sup> TEUs are unit of measurement in the container trade. Each one is a equivalent to one 20-foot container, hence twenty-foot equivalent unit.

<sup>12</sup> Levinson, Marc. *The Box : How the Shipping Container Made the World Smaller and the World Economy Bigger*. Princeton, N.J.: Princeton University Press. 273.

<sup>13</sup> Shipping on a boat or train is far more efficient than moving by truck or personal transport.

<sup>14</sup>Paul Crutzen, Will Steffen and John McNeill. “The Anthropocene: Conceptual and Historical Perspectives” (n.d.).

container ports in Shenzhen and Shanghai, without the ability to move more than 30 million TEUs a year, the products that China exports would not make it to America or other developed nations. Yet, the 2nd wave of carbon costs in this process is that now, China's consumption of energy has to increase in order to feed its factories and its people. The factories carbon would be equivalent to carbon in first world nations, however, cheap labor in industrializing nations allows industrialized nations to purchase more goods, leading to more carbon usage. Add the jobs and net growth added in this process means that the per capita consumption in both countries continues grow. This is the resource paradox that has plagued every global climate negotiation, which is that, so far, in recorded history, countries need carbon to industrialize. However, while it is currently argued quite widely that development follows an available supply of cheap labor, any additional costs from shipping will offset any gains in cheap labor. Thus, the containership is still a key agent of globalization.

Furthermore, it is actually the availability of shipping infrastructure that enables this growth. The World Bank, for example, actively attempts to develop port infrastructures as part of the World Development Indicators series of measurements. One of the reasons a country can join the industrializing world is by upgrading its port infrastructure, and the low cost labor driven development will follow.

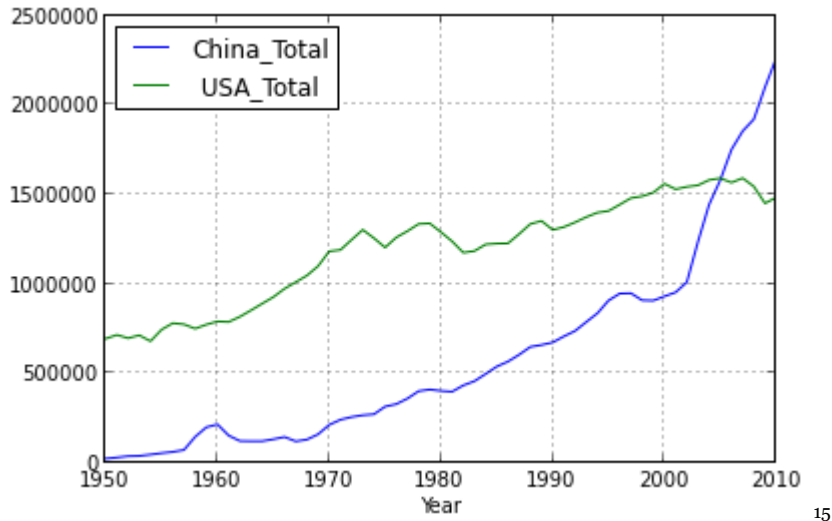


Figure 1 shows the amount of carbon emitted by the United States and China per year. In *Transport Impacts on atmosphere and Climate* [Figure 5]<sup>16</sup> there is a graph of global shipping volume and CO<sub>2</sub> emissions. Between Figure 1 and Figure 5 in *Transport Impacts on atmosphere and climate*, you can see the correlation with Crutzen *et al.* graphs describing the great acceleration. Containerized shipping is a key part of the great acceleration. How much of this carbon growth has been caused by demand from Western countries. One could easily construct a notion of ‘ghost’ manufacturing based on using containerized shipping. However, how much of that demand is not only offsetting carbon usage in a developed country, but extra allowed but exploiting labor cost differentials?

Making shipping green is a complex project- harmed by the exploitation of limited legal authority over the seas by ship operators. This point is made vividly clear in Maya Jasnoff’s story of travelling on a container ship from Hong Kong to England.<sup>17</sup> There is essentially no legal accountability for shipping companies who are always pushing to lower costs. Any hope of the

<sup>15</sup>Figure 1: USA and Chinese CO<sub>2</sub> Emissions by Year, 1950-2010. Data from Carbon Dioxide Information Analysis Center. “Fossil-Fuel CO<sub>2</sub> Emissions by Nation,” n.d. [http://cdiac.ornl.gov/trends/emis/tre\\_coun.html](http://cdiac.ornl.gov/trends/emis/tre_coun.html). Code to generate plots available at <https://github.com/hunterowens/anthropocene>

<sup>16</sup>Eyring, V., et al. “Transport Impacts on Atmosphere and Climate: Shipping.” *Atmospheric Environment* (n.d.). [http://www.geos.ed.ac.uk/~dstevens/publications/eyring\\_ae09.pdf](http://www.geos.ed.ac.uk/~dstevens/publications/eyring_ae09.pdf).

<sup>17</sup> Maya Jasnoff. “A Passage from Hong Kong.” *New York Review of Books*, n.d. <http://www.nybooks.com/articles/archives/2014/apr/03/passage-hong-kong/?page=1>.

getting the shipping industry to become greener will need either global political activity or an economic incentive to do so for the companies.

Fundamentally, the Great Acceleration and global shipping are linked. Now, what happens to shipping volume as the cost of carbon grows.<sup>18</sup> Should it become impossible to ship goods across the world at relatively low cost, what happens to the world economy? The next few sections of the paper will attempt to document the potential processes and outcomes foreseen by several stakeholders in this debate.

### **Section III: The Green's Future**

So, now that the key nature of containerized shipping to the world economy and the coming potential crisis regarding resource use has documented, it will be interesting to examine the response of various stakeholders in this debate. One such example is the Green and/or carbon consciousness movement, exemplified by Bill McKibben and other scientists/environmentalists. This group is concerned with sustainability and other metrics, along with a desire to immediately reduce carbon usage in order to prevent the worst effects of climate change. Bill McKibben exemplifies this worldview in his book *Eaarth*, as does James Hansen in his book, *Storms of my Grandchildren*. McKibben is the founder of 350.org, an organization that works on political action to reduce climate change. The key concern of both men is that the processes in which humanity has begun by emitting carbon into the atmosphere endangers the greater 'civilization'. It is important to note that, despite both of their concerns with sustainability, that neither of them is a geoengineer. However, the entire movement (roughly, the scientist-greens within the environmentalist banner) has debates about the potential option of geoengineering. So, what exactly does this group propose in order to combat climate change.

The book that this section will use as a case study is the aforementioned *Eaarth*, by Bill McKibben. In it, McKibben makes the argument that relative peace and stability of the holocene

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<sup>18</sup> There is a brief idea of what would happen as

earth climate has been disrupted and that we are dealing with a fundamentally new climate calculus. This new calculus is one where freak is the normal operating motus for weather patterns and that the fundamental of the climate we are used to is disrupted. However, he does, correctly, separate out modernity from humanity, writing “however, something else created *modernity*, the world that most of us reading this book inhabit. That something was the sudden ability, beginning in the early eighteenth century, of cheap fossil fuel.”<sup>19</sup> He also notes that each barrel of oil yields as much energy as twenty five thousand hours of human manual labor - not the perfect comparison, but does actually, foretold his eventual argument about adaptation. McKibben makes the argument for the first half of the book that some amount of climate change is inevitable and will fundamentally alter the project of modernity.

The second half, however, is an argument that essentially governs much of the green philosophy. He argues that fundamentally, we need to restore locality - in farming, in governance and in manufacturing. This reflects some of the bias McKibben sees in his small Vermont hometown. The adaptation involves the process of de-globalization and de-internationalization. In his mind, local communities are more resilient. Instead of monoculture, he wishes to practice crop rotation. He is in favor of moving back to more ‘sustainable’ methods of agriculture and such. Notability, he pushes back on industrial agriculture, citing the case of Kip Cullers (World Record Holder, most soybeans per acre) as a reason to move away from monoculture. The argument about sustainable local agriculture is one that is heard from a lot of ‘greens’ type figures.

However, can it feed the world? McKibben seems to think so, writing about how even the monoculture proposes that it needs to improve to feed more people in a world of ever changing climate, he thinks that agriculture needs to go both local and sustainable. Citing the example of the town of Harwick, VT and a large composting project there he writes “So: Compost. Seed.

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<sup>19</sup>McKibben, Bill. *Eaarth : Making a Life on a Tough New Planet*. 1st ed. New York: Times Books, 2010. 27.



Greenhouses. Train cars to New York. Maybe you don't need Kip Cullers after all.”<sup>20</sup> Yet, he then acknowledges the problems that the localization proponents typically have, which is cost of goods (in developed countries) and such. So, rather than try and say that local, organic farming can supplant the typical economic and social order, he flips the equation. McKibben creates a new green argument is saying that we need to upend the economic development paradigm and extoll the virtues of farming. He wishes to have people move away from cities and back into rural countryside. We need to have more people farming, not less.

Now, the big question here is whether we can maintain current standards of living and de-urbanization. Now, data is somewhat sparse on the issue, but feeding seven billion people with potentially less efficient agriculture is difficult. There is certainly some level of viability in the proposal, as Foley, et al's, paper, *Solutions for a Cultivated Planet*<sup>21</sup> lays out how there is a potential viable future in feeding 7 billion people without expanding agriculture's farmed acres. A lot of the the changes that will need to be made are in the area of closing the yield gaps, along with shifting diets (ie, less meat) and reducing food waste. The UN's Food and Agriculture Organization's report on how a policy oriented approaches to implement this changes would look like, but suffice to say, it is a pretty big political lift to do so.

Yet, should the green's succeed with the goal to revolutionize agriculture, a few things will be true: One, more people will move back to rural areas. This requires combating a 200 year process of continued urbanization. Many more people will need to be employed in agriculture. McKibben uses a post Great-Recession frame as a way of combating the current situation of structural unemployment in America, but agricultural work is hard and undesirable. For

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<sup>20</sup> McKibben, Bill. *Eaarth : Making a Life on a Tough New Planet*. 1st ed. New York: Times Books, 2010. 163-4.

<sup>21</sup> Foley, Jonathan A., Navin Ramankutty, Kate A. Brauman, Emily S. Cassidy, James S. Gerber, Matt Johnston, Nathaniel D. Mueller, et al. "Solutions for a Cultivated Planet." *Nature* 478, no. 7369 (October 20, 2011): 337-342.

example, an attempt to connect Alabama residents with farm jobs failed spectacularly.<sup>22</sup>

Second, the cost of food would rise because the cost of labor in order to create the food would rise. It would be the end of cheap meat, certainly. Is this something Americans would choose to do? More so, would the entire world adopt to this? This argument is one of the problems with the changes in agriculture that greens typically advocate for. The low growth society is one that is nearly politically unfeasible.

However, unfortunately for the purposes of this paper, McKibben does not spend much time on the future of manufacturing. What we do get is quite illustrative however. Again, sustainable is the key metric in which this system is judged. McKibben uses a frame of replacing the physical goods<sup>23</sup> with virtual goods, that is, the internet is going to replace some of the demand for things. We've seen a bit of this with teenagers asking for cell phones instead of cars and the decrease in total miles driven. However, again, for McKibben's future to happen, we will have to go backwards. We'll need to purchase more expensive, theoretically higher quality things. People will own less stuff. There is a moralistic tone to the arguments of this greens, pushing back on the consumer capitalism that was fueled by the carbon boom. How does a country operate in a zero or low growth economy?

The answer to the globalization problem in the previous section to the green movement and McKibben is simply, end it. There is a long process of de-globalization ahead for McKibben and his ilk.

#### **Section IV: Technological Change: 3D Printing & Objects as Information**

The next potential future worth examining is fundamentally, a futurist position. That is what do writers and 'thinkers'<sup>24</sup> think about the future of this. Notable, is the position of Elon Musk, founder of SpaceX and Telsa Motors, and the closest thing to a zeitgeist in technology and

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<sup>22</sup>Stephen Clark. "Alabama Tries to Connect Jobless Residents With Farm Jobs, Finds Few Employers Willing to Hire." *Fox News*, n.d. <http://www.foxnews.com/politics/2011/10/27/alabama-tries-to-connect-jobless-residents-with-farm-jobs-finds-few-employers/>.

<sup>23</sup> That are shipped via containers

<sup>24</sup> Used in a semi-pejorative sense

futurism right now. Another work worth examining is writer Bruce Sterling's *The HyperSurface of this Decade*, a short story published in IconEye Magazine. Both of these men think that 3D printing and a whole host of other technologies are going to innovated our way of these crises. They represent the futurist camp, certainly.

What is the intergenerational ethic of these writers? Namely, rather than the stewardship ethic of Hansen and McKibben has faded, replaced by an ever present march of technological change, moving closer and closer to the future. No longer should we care if we're using a ton of carbon fuel as long as we're doing significant research into Solar and other renewable fuels, which is similar to McKibben and Hansen. It is worth noting that Musk, especially, has it as a stated goal to get humanity to Mars by the end of his lifetime. This is similar to Ray Kurzweil's thoughts on the singularity. They believe the technology they are working on is going to solve any problems that are created by this carbon society.

The primary technology that these writers pin replacing the massive globalized factory network with is 3D printing. The epitome of this particular genre is Sterling's hypersurface of the decade, where he writes "As yet, I possess no stove, no toilet, no bathtub and and no bed. In fact, there are no physical objects in my flat whatsoever, except for my two roll-aboard suitcases, this Taiwanese netbook, and one metric tonne of natural ABS plastic on a giant wooden cable reel. The cable reel doubles as the coffee table on which I write this informative blogpost."<sup>25</sup> Sterling is rebuilding his entire apartment- for him "Possessions are over. They are data! Data which sometimes manifests itself as my possessions." Later in this section, the feasibility of this future will be examined, but for now, it is easier to take it as is.

In the Musk/Sterling future, the need for a global logistics network has been replaced by the data network, that is, the internet carries around our possessions as data and then we use 3D printers and other local fabrication technologies to built them. It is a fundamentally different

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<sup>25</sup> Sterling, Bruce. "The Hypersurface of This Decade." *Icon*, June 2010. <http://www.iconeye.com/read-previous-issues/icon-080-%7C-february-2010/bruce-sterling-the-hypersurface-of-this-decade>.

future, where objects become information. It is the future of *Wired* magazine, of optimism, of technological change. The need for a fast network of containerships to carry around the world's possessions ends, because we produce everything locally, yet we will still leave in a globalized world. This is a perversion of the green's future, where their Rusk-ian roots are challenged and instead, stuff is designed globally produce locally.

However, it is not necessarily true that this future will reduce carbon emissions. 3D printers require energy and the filament can be oil based. What is worth considering for the purposes of this paper, rather than the actual validity of fast changing technologies, is the amount that a green ethos pervades the futurist community? The community is somewhat concerned with sustainability as evidenced by their futurist position. Furthermore, Elon Musk is the co-owner of SolarCity, a solar power firm. Many people find the technologists as some of the most 'false' greens and people prone to greenwashing out there, but rather, there is a deep concern for the future. However, they wish to innovate out of the problem, rather than return to old sustainable methods. This paragraph does at some level, put the two camps in opposition, which is not necessarily true, but does provide a nice comparison in which to make about potential futures.

So, how much does sustainability factor in the rhetoric of those or are major proponents of 3D printing? It's certainly not far from the minds of various industry players minds.<sup>26</sup> Sustainability is clearly a key factor, but not the driving factor in advent of 3D printers. They would rather, however, focus on making the technology cheaper and more accessible. More and more, they are using carbon-fuel based filaments and really don't care about the relative lack of energy efficient.

So, the next question to ask is the one that has been put off, which is is this a feasible future? Obviously, much of the ideology in this camp reads of far science fiction and Von

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<sup>26</sup> John Licta. "Could 3D Printing Revolutionize the Solar Industry?" *The Guardian*, n.d. <http://www.theguardian.com/environment/blog/2013/feb/22/3d-printing-solar-energy-industry>.

Neumann machines. However, the technology has been advancing steadily and in fact, is coming close to being able to produce several key goods. It can however, be argued that we are hitting an inflection point where 3D printing becomes viable. So, in this world of viable 3D printing, we no longer need this long supply chains. If we are managed to free the bonds of energy and carbon cost, this future could be a viable response to the anthropocene. However, it probably will not come soon enough, as evidences in the migration from one technology to another type issues. The viability of the futurists future is questionable. <sup>27</sup>

### **Section V: The Industry Perspective**

The last two sections have been examining the global economy without the impacts of containerized shipping. This section will be slightly different, as it will look out how players inside the global shipping industry view the future in an era of expensive carbon. The shipping industry maintains a trade group, the World Shipping Council, that released a report on the nature of globalization shipping. Obviously, the World Shipping Council has a vest interest in shipping and the discrepancies between their numbers and the results from Eyring et al will be discussed. However, it is useful to look at these reports because it indicates what the industry things, rather than what is object 'truth'. From this, it becomes clear that the shipping industry views their industry as one of the safest and most profitable in the era of expensive carbon and climate change.

The fundamental truth about oceanic shipping- per ton-mile, there is nearly nothing cheaper (in terms of carbon cost) that is available at the moment. <sup>28</sup> In fact, the World Shipping Council's report writes "A ton of goods can be shipped from the Port of Melbourne, Australia to the Port of Long Beach, U.S.A, a distance of 12,770 kilometers (7,935 miles) while generating fewer CO<sub>2</sub> emissions than are generated when transporting the same cargo in the U.S. by truck

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<sup>27</sup> Isn't that always the problem with futurists?

<sup>28</sup> The one thing that is: Electrified rail power by renewables. Considering this is basically a non-starter, chuckling is allowed.

from Dallas to Long Beach, a distance of 2,307 kilometers (1,442 miles).”<sup>29</sup> This is true, and is a huge advantage of shipping. It allows people to move goods a far distance at a very low carbon cost. In fact, containerized shipping only makes up 2.5% of global carbon emissions according to the industry reports, while Erying et al. pegs total global shipping at 15%. Regardless, containerized shipping is pretty cheap from a carbon perspective. However, it is not cheap in an era of expensive diesel, which the report fails to talk about.

However, it is also worth considering what role shipping has played in the creation of the Anthropocene aside from just using diesel fuel. They (along with planes) move all sorts of things, sometimes unintentionally, around the world. More than a few outbreaks of invasive species can be traced back to containerized shipping, including (famously) the Zebra Mussel. The understanding of a single world ecosystem, or at least, that all ecosystems would come into contact with all others, regardless of geographic distance, is a unique byproduct of the global shipping agenda. The Anthropocene implies an ecological era changed by human activity, and we are changing the fossil record pretty significantly with this. Shipping is a bigger part of the Anthropocene than the industry would like to think that it is.

There are other ecological impacts of shipping that the industry considers a potential problem. Namely, ballast and vessel discharges can have immediate negative impacts on the proximate ecosystem. To that, the industry has attempt to create a more green shipping industry on the professional level. However, the nature of the business and how ‘flags’ are used as a way of skirting regulations still means that many shippers are running on less clean ships and using unsafe practices. The most effective method to reduce the impacts of shipping so far has been the higher cost of diesel, which drives old, inefficient ships off the water and replaces them with newer, larger ships that have more effective environmental abatement mechanisms. Market mechanisms will be more effective than governmental.

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<sup>29</sup>World Shipping Council. “Environmental Impacts of Shipping,” n.d. <http://www.worldshipping.org/industry-issues/environment>.

If one wanted to regulate global shipping it would require an international agreement, in fact. Due to the trend of using non-ports of call in lightly regulated nations to place a ship's flag in and international treaties about the laws of the sea, it will be nigh impossible to have one country reduce the environmental impact of shipping. A global agreement would be the only way to ensure that shipping becomes more environmentally friendly. The industry is fundamentally non-concerned with the issue.

What about the nature of ports, Panamax and Malaccamax<sup>30</sup> ships with rising sea levels? The industry report as whole fails to really consider the impacts that a changing climate has on the industry, rather, it focuses on the potential upsides of global warming. The big upside, for the industry, is the year-round opening of the North and Northwest passages, which would allow for far quicker travel between Asia and Europe and between the Atlantic and Pacific. These fabled routes have long been a fascination of the shipping industry, going all the way back to the age of exploration. Low-level ports, such as Newark/Elizabeth are now in danger of being sunk should sea levels rise more than 10 or so feet. Not mentioned, the risks associated with Climate change for the global logistics industry seem vastly understated. In fact, one could argue that this is an industry in denial of climate change.

Yet, the industry has predicted several pieces of investment in the upside to climate change (namely, the opening of the passages above Eurasia and America). So, what does the industry think about climate change? Based on the report by the World Shipping Council and remarks by executives, the industry views Climate Change as something mild that will open new opportunities, rather than apocalyptic. It is at large, attempting a 'greenwashing', for example, with the creation of Energy Efficiency Design Index (EEDI), which is essentially a LEED building council certification for ships. The world shipping council is in favor of arguing that

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<sup>30</sup> The Strait of Malacca, between Malaysia and Singapore is 25 meters deep. The largest VLCs will eventually require

shipping is a green industry. For what it is, that is true, however, it still is not green to ship goods halfway around the world, but better to do it by ship than by plane.

The final question worth considering in this section is the divergent estimates about how much shipping contributes to CO<sub>2</sub> emissions. Rather, most of this divergence is part of 'what constitutes shipping', with Eyring et al considering it to be a far larger thing than it is. Rather, it becomes clear that both groups believe shipping to be a key part of CO<sub>2</sub> emitting infrastructure.

## **Section VI: Conclusion**

So far, this paper has attempted to document a series of changes wrought by climate change to a particular industry. Oceanic Shipping, as a whole, is around 15% of global carbon emissions. This is a huge sector - however, changing it requires breaking down the sector into the various sub sectors- ie, Containerized, Oil, Breakbulk, etc. This means that addressing shipping as a whole is essentially impossible. However, the nature of containerized shipping as an agent of globalization promotes it as a prime candidate for study.

Containerized shipping drives globalization, which, in turn, creates more carbon-usage heavy consumers. A reform of how the system works is required in order to preserve the nature of what it provides. Containerized shipping allows for economic growth, cheap goods and international supply chains that affect nearly every company and consumer around the developed world. This paper has laid out by the futurists and environmentalists proposals for gradually replacing this massive infrastructure. The futurist believes we will innovate our way out of this dilemma, turning to localized manufacturing technologies such as 3D printing to replace the global supply chain. However, the viability of this is questionable, at best at this time. Environmentalists take a weaker critique, suggesting the mantra of buy locally, think globally. Rather, they believe all goods in the global supply chain are 'cheap' and by turning to 'quality' local goods, a person will have less but enjoy it more. Yet, this cheap/quality dilemma is abjectly false. Rather, we see that the green future would require consuming substantially less in terms of goods.



The industry response to these pressures may be the most interesting thing- while containerized shipping is in fact, pretty efficient, it enables things that otherwise would be cost-prohibitive. The industry is split between optimists, who believe that new shipping routes will be opened by a warming climate and melting polar regions, and pessimists, who believe that the cost of fuel will make long routes unsustainable.

The reason why this topic, despite the boring idea, is somewhat interesting is the question of logistics in an anthropocene - we've gradually begun to depend on increasingly interconnected global networks to provide goods and services to us. Think back to John Maynard Keynes example of any sort of good to be order by mail and delivered to a london household nearly 100 years ago. He wrote "The inhabitant of London could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he might see fit, and reasonably expect their early delivery upon his doorstep" in his book, *The Economic Consequences of the Peace*.<sup>31</sup> Is that not a proto-Amazon or proto-Walmart (or the appropriate international analogy)? However, these networks stray even deeper than mega-retailers, essentially all goods pass through them. Since then, the world has become even more globalized and even more internationalized. Rather, this networks have been getting denser and denser - containerized shipping is a key part of the Great Acceleration post-war boom. Without these networks, modern civilization cannot exist as is. The future will be determined by our ability to put systems into place that replace this.

The Anthropocene raises the questions on whether humanity has reached a limit in terms of resource exploitation and such. In order to stave off catastrophic climate change, humanity will have to use less carbon fuels, especially crude oil derived products. In this new era, how does the industry react? More importantly, how dependent is society on the goods and services that these modes of transport enable?

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<sup>31</sup> Keynes, John Maynard. *The Economic Consequences of the Peace*. New York: Harcourt, Brace and Howe.

This paper has attempted to place a section of the global logistics industry in the context of the anthropocene. The Great Acceleration, important as a marker in the consumption of natural resources, also can serve as a hallmark of what exactly humanity is doing.

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