



## MULTI DIMENSION IMPACT ACCOUNTING (MDIA) THE IMPACT OF CARBON

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The industrialization of the global economy has been responsible for a massive improvement in standard of living over a period of about 200 years, maybe longer. The industrial revolution was largely about making manual labor more productive by using power derived from the burning of fossil fuels.

For a long time the relationship between cost, price and value was such that profits were made and quality of life was improved. By the middle of the 20th century, however, it started to become apparent that this relationship was changing with the value destruction associated with burning fuels getting out of control. Some pollution controls were put in place, but these measures are totally inadequate for the economy of the 21st century. Consider these data:

	USA	China	India	UK	France	Canada
Total carbon emissions (Million tons)	5,461	7,031	1,743	522	377	544
Carbon emissions per capita (tons)	17.2	5.3	1.4	8.5	6.1	16.4
GDP per capita. (\$)	49,965	6,091	1,489	38,514	39,772	52,219

Canada and the United States use a lot of energy per capita and therefore have very high carbon footprint per capita and have a high standard of living measured by GDP. China on the other hand has a low per capita consumption of energy and a quite low standard of living as measured by GDP, and India even lower carbon footprint per capita as well as lower standard of living. China and India must reasonably be expected to increase their consumption of energy and their production of carbon as they work towards a higher standard of living.

The UK and France have quite high standard of living and, compared to the USA and Canada, quite low carbon footprint per capita. Population density may have something to do with this.

	USA	China	India	UK	France	Canada
Carbon emissions per capita (tons)	17.2	5.3	1.4	8.5	6.1	16.4
Population density (#/square mile)	90	365	1010	679	303	9
% living in urban settings	82.4	50.6	31.3	79.6	85.8	80.7

I expected urbanization to be a significant factor in reducing carbon footprint, but the data suggest that this factor is having a big impact in the case of the USA and Canada.

My impression of industry in North America is that there have been behaviors over a long period of time based on the idea that labor is expensive and energy is cheap. Compared to many parts of the world where energy has been more expensive, industrial practices in North America have been profligate in the use of energy, but very careful about the use of people. US industry took a big hit in the 1970s with the first oil shock, and US manufacturing did not recover. The decline has been aggravated by high US labor costs now less subsidized by low cost energy.

Industrial energy profligacy is not enough to explain the ongoing high carbon footprint of the United States. This must be explained by the very low energy inefficiency of the built environment. Huge amounts of energy have to be consumed in order to keep US buildings comfortable, cool in the summer and warm in the winter. In this regard the built environment in Canada is much more efficient than in the United States.

The challenge that has to be faced is how to have a much improved standard of living in developing countries and emerging markets without having the energy consumption and carbon pollution associated with the US model for personal prosperity. The following table sets out the dilemma. Were these countries to be as energy inefficient as the USA then the world would more than double its carbon emissions.

	World	USA	China	India	UK	France	Canada
Carbon total (billion tons)	29.88	5.46	7.03	1.7	.52	.38	.54
Reflecting this per capita carbon		17.2	5.3	1.4	8.5	6.1	16.4
If US energy profile is replicated		17.2	17.2	17.2	17.2	17.2	17.2
The carbon totals will be (billion tons)	66.10	5.46	22.81	20.89	1.05	1.07	0.57
If France energy profile is replicated		6.1	6.1	6.1	6.1	6.1	6.1
The carbon totals will be (billion tons)	32.64	1.94	8.09	7.41	0.37	0.38	0.20

Such an outcome would be a climate change disaster. The strategic direction has to be changed so that there is a massive efforts in the old rich countries to use fossil based energy in a better way. The consumption driven prosperity associated with the United States and advocated by policy makers everywhere looks dramatically unsustainable and therefore unachievable. On the other hand, the accomplishments of France would be more appropriate, where the energy strategy has embraced non-polluting nuclear electric power generation for the last 40 years .

In order to achieve any sort of massive change there has to be a workable system of metrics that associates decisions with all the associated impacts on the broader performance of society as a whole and specific impact on various aspects of the planet's resources and the environment.

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