

A Summary of “Brighter Climate Futures”

**A Transformation through Clean Energy, Climate
Solutions, Expanded Ecosystems and
& A Good Life for All”**



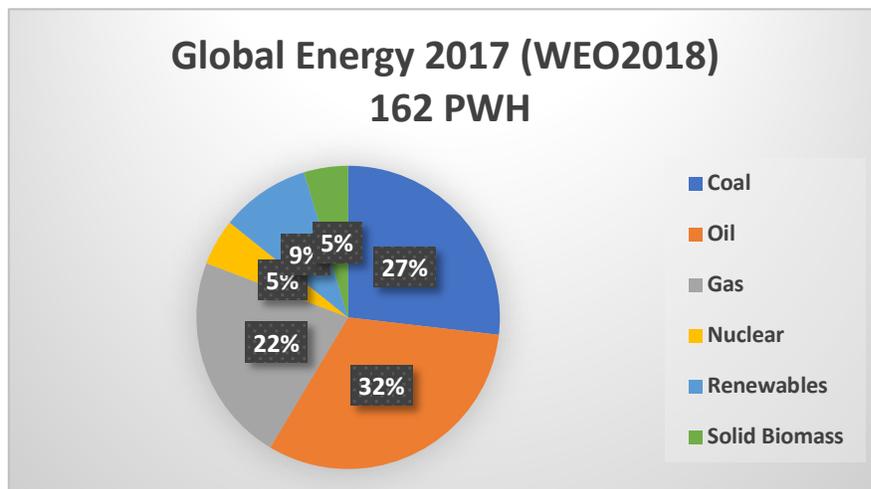
**A Summary of the Transformation Plan & Book
Dr. Hari Lamba**

Brighter Climate Futures – Global Energy, Climate & Ecosystem Transformation & Book
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Overall: This proposed transformation is better, more fully adequate and better designed to keep global average temperature rise below 1.5 degrees Celsius than any proposal or plan out there.

Problem – We have an excessive consumption of fossil fuels

Here is our situation today! We look at energy consumption for 2017.



Data from the International Energy Agency (IEA), World Energy Outlook 2018 (WEO2018) Report. 2017 Energy Consumption of 13,972 Mtoe (Millions of Tons of Oil Equivalent). Converted to electrical energy this is 162 PWH (Peta Watt Hours). 1 PWH is a Billion MWH (Mega Watt Hours, or 1,000 KWH – Kilo Watt Hours is energy unit that shows up on your electric bill!)

- Burning of fossil fuels gives us 81% of global energy we consume
- Coal: 27%, oil or petroleum: 32% and natural gas: 22%
- Burning these fuels gives us 87% of the carbon dioxide emissions (13% due to land use changes like deforestation) – gas going to our air, so that there is more and more of it in the atmosphere
- Solar and wind energy production and use have grown significantly but are yet a small percentage of the total.

Explaining Carbon Dioxide

Carbon Dioxide (CO₂) is a colorless odorless gas that you breathe out with each breath in small quantities, and which trees and plants breathe in and absorb in significant amounts to build their structure with carbon. **Carbon Dioxide is a**

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Greenhouse Gas – that is, it traps heat due to sunlight in the lower atmosphere (where we live and breathe), like a glass that traps heat in a greenhouse. Some carbon dioxide is good as it keeps the atmosphere of our Earth at a comfortable temperature. Too much is very bad as it is leading to global warming – a steady increase in the temperatures that is starting to cook us! We have to keep the global average temperature rise low so that it does not get too bad!

So What Do We Need to Do?

The basics is that we have to stop burning fossil fuels and emitting greenhouse gases to our air. We have to stop emitting other greenhouse gases like Methane and Nitrous Oxide – Some of them methane is also released when oil and gas are produced. If we stop deforestation, then we can stop releasing most of the rest of the carbon dioxide. The United Nations Intergovernmental Panel on Climate Change (IPCC) has told us that the global average temperature rise should not be more than 1.5 degrees Celsius in order to avoid the worst consequences of Climate Change. IPCC is the most credible organization in the world that involves most scientists in the world – do not listen to other climate deniers!

Setting the Goals

So, what should be the goals for the plan described herein, and in the book?
To meet the Greenhouse Gas (GHG) emissions reductions for a 1.5 Degree Celsius goal (Average global temperature rise not to exceed this), the three main greenhouse gases for which we need to reduce Emissions (1.5C Goals)* are:

Carbon Dioxide

- **Emissions from Fossil Fuels to be reduced 50% by 2030 and 100% (net) by 2050**
- **This transformation plan counts only 6% reduction in carbon dioxide emissions from forests, coastal ecosystems and agriculture changes – it allows 6% emissions from fossil fuels**

Methane – 50% reductions in emissions by 2050

Nitrous Oxide – 25% reductions in emissions by 2050

***AS PER IPCC (Intergovernmental Panel on Climate Change)**

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So what the transformation plan will give us?

1. Plenty of Renewable Energy for the world's energy needs (& US needs)
2. Effectively eliminating fossil fuel emissions by 2050 for a 1.5 C Plan
3. Big expansion of carbon sink ecosystems – forests, coastal & agricultural
4. Different from other global plans out there in that it is A-Z (comprehensive)
 - deals with the what, the when, and the how

The International Energy Agency (IEA - WEO2018 Report) has told us that if current policies continue (Business as Usual), that global energy use will grow to 252 PWH by 2050 (from 162 PWH) in 2017 – IEA numbers extended (or extrapolated) from their year 2040 numbers. They project that fossil fuel use will still be 78%, and if the world tries very hard by substituting with renewable energy, with what it calls a Sustainable Development Scenario, fossil fuel use will still be at about 49% - a sure recipe for Climate Failure!

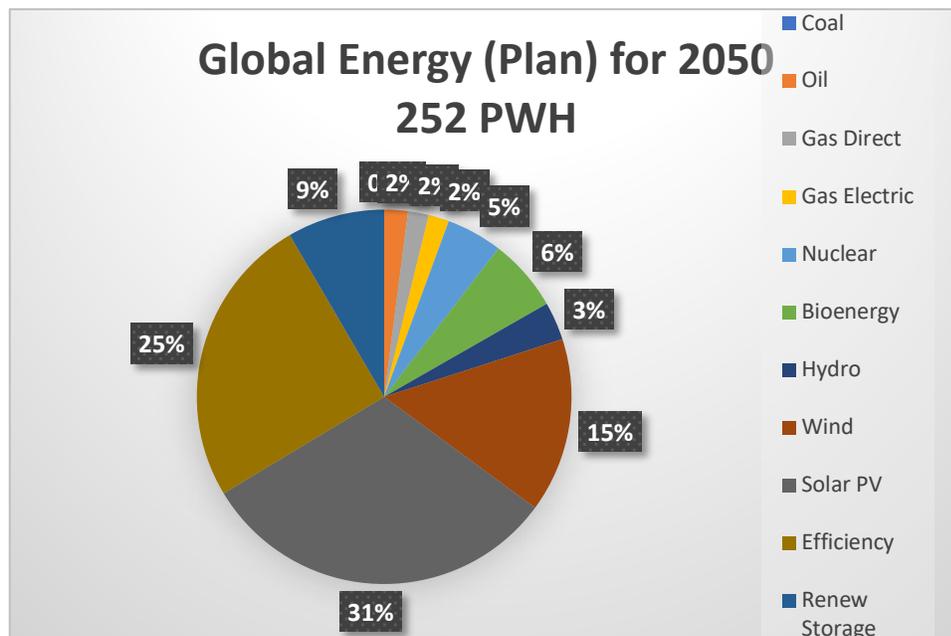
So what does the transformation plan proposed herein, give us? It gives us plenty of clean renewable energy, solves the climate problem & creates good living conditions for all – employment, ownership and consumption.

Here is a brief description of the proposed **Energy Transformation**

- The plan will meet the same 55% expansion in global energy needs by 2050, but will do it almost entirely without fossil fuels and mostly with a vast expansion of clean renewable energy fuels.
- A big expansion in Solar PV*, and a relatively big expansion in wind energy. These combined with a big expansion in energy efficiency (being able to do the same things but with less energy), and the production and use of non-carbon fuels that store large amounts of renewable energy. See below about these fuels – for now let us call these “Storage” fuels.
- The big challenge is that we need to be able to store renewable energy in large amounts, so that it can be used at all other times, like when the sun is not shining. Although there are other methods, two methods hold promise – batteries and “storage” fuels. The “storage” fuels are what as referred to as Renew Storage on the pie chart that follows.

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The global plan proposed for 2050



Plan: So coal is totally gone, and only small amounts of oil and natural gas remain (natural gas for direct use, and some natural gas for producing electricity). There is a vast expansion of Solar PV*, Wind, Energy Efficiency and Renew Storage.

*Solar PV (Photo-Voltaic, where Photo refers to the sun and Voltaic, is electric) is what is currently used by most solar systems that make electricity directly when the sun shines on them.

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Here are some facts why this strategy makes sense:

Solar Energy: Solar PV panels on less than 1% of Earth's total land area can produce ALL of world's energy (Calculation for 2017)

Efficiency of Fossil Fuels: A Dutch study of worldwide electric power plants showed important details of fossil fuel power plants.

- Coal: -----35% used ---- 65% wasted
- Oil: ----- 38% used -----62% wasted
- Natural Gas: 45% used ----- 55% wasted
- Fossil Fuels waste most of the energy they burn!!

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Greenhouse Gas Emissions: Besides all the high amounts of local pollution that you get (especially for Coal), fossil fuels are very high emitters of greenhouse gases.

- **For every million BTU (British Thermal Units) – a unit of Energy, on the average, the fuels emit the following amounts of carbon dioxide**
- **Coal (average): 210 Pounds (95 Kg)**
- **Gasoline/Diesel: 160 Pounds (73 Kg)**
- **Natural Gas: 117 Pounds (53 Kg)**

They all contribute big to global warming, but coal is clearly the worst!

Relative costs of different energies: Based on Wikipedia & US Energy Information Agency

These are costs for installing new electric power plants (on the average, as each one has different options), in US \$ per KW (Kilo Watt)

Oil/Gas:	\$ 1,000.
Coal:	\$ 3,500.
Nuclear:	\$ 6,000.
Onshore Wind:	\$ 1,600.
Solar PV (Fixed):	\$ 1,060.
Hydropower:	\$ 2,680.
Geothermal:	\$ 2,800.

Nuclear is very expensive (often subsidized by military nuclear weapons operations) and takes a long time to install. Then there is radioactive pollution, radioactive waste and security issues. Fuel and transportation costs for renewables are zero (Sunlight and wind are totally free, and are available right at the production site). Coal requires heavy trains and ships and diesel fuel for transportation. Oil takes a lot of energy to transport it to a refinery, refine it there and transport it to you.

Bottom Line

Once the power plant is installed, for renewable energy, the fuel is free! AND you do not have to go anywhere, dig and pollute anywhere, transport anything, and burn and pollute the air and water. Also, all parts of the Earth receive sunlight, so solar energy can be produced close to you! It needs much smaller electric transmission lines if it is distributed.

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Information on “Storage” Fuels – Hydrogen and Ammonia

There is a need to store renewable energy in large quantities in fuels that are transportable, energy dense and non-carbon, so that burning or using them does not release carbon dioxide or other greenhouse gases. Hydrogen is totally carbon free and burning it causes it to combine with oxygen in the air to give water. Burning ammonia (which contains both nitrogen and hydrogen) can give nitrous oxides, but these can be reduced in a manner similar to that of catalytic converters of cars. Ammonia is much easier to store and transport than hydrogen. Currently making them mainly uses natural gas, and results in carbon dioxide emissions of over 800 million metric tons – more than the average carbon dioxide emissions of Germany in a year. Both gases are produced and used in large quantities – hydrogen to refine oil and make ammonia, and ammonia as a fertilizer in agriculture. The world knows how to handle both of these gases in large quantities.

There are people around the world doing research on how to produce hydrogen by using electricity from solar energy to split water by (which is basically hydrogen oxide or H₂O) into hydrogen and oxygen, by a process called electrolysis. There are others who are using different ways of using electricity from solar energy to combine this hydrogen with nitrogen from the air (which is about 78% of the air you breathe) to produce ammonia. The research is coming along well and needs to be scaled up to good size demonstration units and then into larger production units. This process is called Research, Development, Demonstration and Deployment (RDD&D). The last part, deployment, is where an area or nation or world installs the infrastructure to produce (small to large factories), store, transport, supply and then use the fuel. Over a 30 year period, from 2021-2050, this should be easy to achieve in a cost effective manner, providing we do the RDD&D. Once we put in place ways to produce these non-carbon “Storage” fuels that can store large amounts of renewable energy (mainly solar), then the energy part of the proposed transformation becomes a practical reality. The book contains illustrations of the production of green hydrogen from renewable energy and their use either in electric power generation or use elsewhere.

Next - A Transformation to rejuvenate carbon sink ecosystems A massive expansion of forests, and land and coastal ecosystems

All soils, plants and trees are sinks as they absorb carbon dioxide from the air, but only if they are restored, protected and expanded. So, the transformation proposes a massive expansion of global forests by 1 Billion Hectares (2.5 billion acres), spread throughout the world in Boreal (cold areas), Temperate and Tropical forests. But done so as to rejuvenate other land ecosystems like savannahs, grasslands and wetlands (marshes).

Reforestation & Afforestation

Deforestation of all types is to be banned and logging through the use of clear cutting methods must be discouraged. The book has a photo that shows how bad clear cutting forests really is and

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how it worsens wildfires. The reforestation and afforestation means a net ADDITION of standing forest by 1 billion hectares in all regions of the world – in Boreal (cold areas), temperate and tropical regions, based on the following guidelines: (1) As much as 50% be permanent biodiverse forest that is not harvested, (2) Biodiversity of all types to be encouraged – e.g. trees, plants, wildlife, insects and birds, (3) Community and locally owned forests that provide products by extraction without cutting of the forests – fruit, and other products, (4) The rest can be plantation type forests that are harvested by the principles of sustainable forestry (no clear cutting), (5) All type of forests to be designed with breaks, thinning and wildfire defensible spaces so that wildfires are less intense and are easier to control, and (6) Agroforestry (forests and agricultural areas laid out together) and urban forestry to be encouraged with due regard to biodiversity as well as livelihoods.

Expansion of Coastal Ecosystems

The transformation also proposes a massive expansion of coastal ecosystems along the entire non-ice coastline of the whole world.

1. Simultaneous expansion of all existing coastal ecosystems in all continents except Antarctica by 2050. The estimate of the global length of coasts varies from 1.2 to 1.6 million Kilometers (0.75 to 1 million miles). **These can be mangrove swamps, salt marshes, and sea grasses, and other ocean ecosystems.**
2. **Along this ENTIRE length, the introduction, growth and management of coastal ecosystems from a few hundred meters (or yards) to as much as 10 kilometers (or about 6 miles) off shore along ALL coasts – about an average of 1 kilometer. This will give us about 1.2 to 1.6 million square kilometers (0.5 to 0.65 million square miles) of coastal ecosystems.**
3. PLAN proposes that this be on the following guidelines: (1) A majority of the ecosystems encourage plant and ocean life diversity, (2) Blue or ocean carbon as this is called absorbs more carbon by area than even tropical forests, (3) A significant part of activities should encourage species habitats that help fisheries, so that the livelihood of fishermen is supported and they thrive, (4) Commercial fish and ocean farming of all types is to be discouraged, except that which encourages biodiversity and is done without use of anti-biotics and fertilizer (like transformed agriculture).

The Transformation proposes Solar-Electric-Hydrogen Highways

Highways and Roadways: The global plan proposes direct electrification of the world's highways and roadways. Here, one can have solar panel systems with raised structures covering highways, or where the space along the highways is available, ground mounted solar systems. These will be combined with a battery system and “storage” fuel production and supply station. So, instead of going to a gas or petrol station, one would go to a solar-electric charging station and get one's electric car recharged, or refueled with hydrogen, if one has a fuel cell car. The book contains description of new Solar-Electric charging stations and illustrations of concepts.

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More Details of the Energy, Climate & Ecosystem Transformation

A transformation plan and strategy is presented that will keep the global average temperature rise below 1.5 degrees Celsius (1.5C) in a way that meets the world's *expanding energy needs*, reduces carbon emissions down to zero by 2050, rejuvenates and expands major carbon sink ecosystems like the world's forests, coastal ecosystems, and a transformed agriculture. The plan is both technically feasible and economically viable – means it can be implemented successfully, and the money to do it is well within the capacity of global society. The transformation will also produce a bountiful life for all, if the principles of energy democracy (local control and ownership), and a just transition (for fossil fuel workers) are adopted. **The bottom line is that a catastrophic future can be avoided, planet Earth will be much more beautiful with a rejuvenation of all life forms, and it will create a good life for all!**

The *Energy Transformation* that we are about to embark upon is unlike anything humanity has ever done. The plan proposed herein, on the website and in the book, will make it happen if the political, financial and technical resources are brought to bear on the issue with a sense of urgency and a “can do” attitude. This a transformation is of a type that has a high probability of success. The future after the transition will be much better than where we are now, and infinitely better than where we are headed.

Aims of the Proposed Transformation

1. **To get something like the transformation plan accepted and something like it implemented.**
2. Ensure that people understand that what is being proposed is technically feasible (it is practical) and economically viable (within capacity of global society and financially beneficial)
3. Show that we can have *plenty of clean renewable energy* for all our needs, use energy wisely and efficiently, and get rid of polluting fossil fuels that are causing climate change
4. Expand and rejuvenate our forest, coastal and agricultural ecosystems, so that they not only act as much bigger carbon sinks but also restore much of the Earth's beauty, and the natural health of its ecosystems and the diversity of life.
5. Put in place a year round global effort and organization to reduce the risk of climate related natural disasters, and be prepared to handle them before, during and after them.
6. **Show how we can practically implement the US Green New Deal**, and provide a practical way of implementing a *Global Green New Deal*

Summary List of the Transformation Plan

- **GOAL:** Global average temperature rise of no more than 1.5 Degrees Celsius (2.7 Degrees Fahrenheit)
- Plenty of clean renewable energy – even solar energy by itself is more than enough
- All fossil fuels replaced by renewable energy by 2050

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- Fossil fuel power plants replaced with SBH power plants (Solar plus Battery plus Hydrogen)
- Greenhouse Gas Emissions down (Carbon Dioxide emissions from fossil fuels effectively down to zero by 2050)
- Electrification of everything possible plus energy efficiency
- Massive expansion of the electric grid and its smartness.
- Non-carbon fuels like hydrogen and ammonia (“storage” fuels) that store renewable energy in large quantities and to power what cannot be electrified.
- Solar-electric-hydrogen highways for electric vehicles and those fueled by “storage” fuels
- Massive Expansion of Carbon Sinks
 - Beautiful forests, coastal ecosystems and a transformed regenerative agriculture – but in a way as to minimize wildfires and give employment
 - A big increase in the health, biodiversity and beauty of our Earth
- Disaster Risk Reduction (DRR) & advanced disaster management for climate related natural disasters (wildfires, hurricanes, tornadoes and floods)
- Adaptation to heat waves, floods and sea level rise
- **A four part Jobs and Economy strategy** that benefits maximum number of people
- **The US Green New Deal (GND) – How it can be practically implemented**
 - **Involving all and taking care of all**
- **A Just Transition** for all fossil fuel workers, companies, and nations as the world economy transitions to renewable energy
- **Energy Democracy** – that empowers and enables local democratic, and consumer and worker owned companies a significant part of the new energy opportunities
- Automatic funding through taxation of fossil fuel related activities
- Overcoming the fossil fuel forces and climate deniers that have fought against solutions
- A beautiful clean Earth with a good life for all
- Transformation of the Planet and the world economy for the better

Detailed Quantitative Plans – Global & National

- A detailed global energy, climate (emissions) and ecosystems plan – energy for expanding needs
- Similar detailed plans for the following nations
 - United States of America
 - Including a detailed plan for California
 - Practical implementation of the Green New Deal
 - China
 - India

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- European Union (of 28 nations)
- Summaries for other nations by category
- A detailed plan for strengthening of the existing global organization (UNFCCC – United Nations Framework Convention for Climate Change) to organize, fund, coordinate and implement the plan, globally

So What Can I Do?

1. Learn to reduce your own Carbon footprint. If you can afford the upfront investment (you will save money over time), get solar panels, electrify your house (substitute any natural gas appliances you use), drive an electric car, and insist on buying and using only the most energy efficient items.
2. Learn about and cooperate with all local people and organizations and build coalitions – organize effectively locally!
3. Distribute this document electronically or by printing it and urge people to support this transformation plan, and put pressure on local, state, national and global leaders *to accept and implement the plan or something like it – immediately. We only have 30 years (2021-2050) to make it all happen!*
4. *Order and read the book below so as to fully understand what needs to be done. Convince others to read the book and become active.*
5. Visit the following website and tell other people about it, and use it as a means of joining forces, educating yourself and others, and communicating with the author.
6. If you are in a position to do something, accept the plan, draft a plan according to it that locally suits you, coordinate with other nations and implement your plan.

Website: www.brighterclimatefutures.com

Facebook Page: Brighter Climate Futures

YouTube Videos: Type “Brighter Climate Futures”

See posts on Instagram, Twitter and LinkedIn

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About the Author

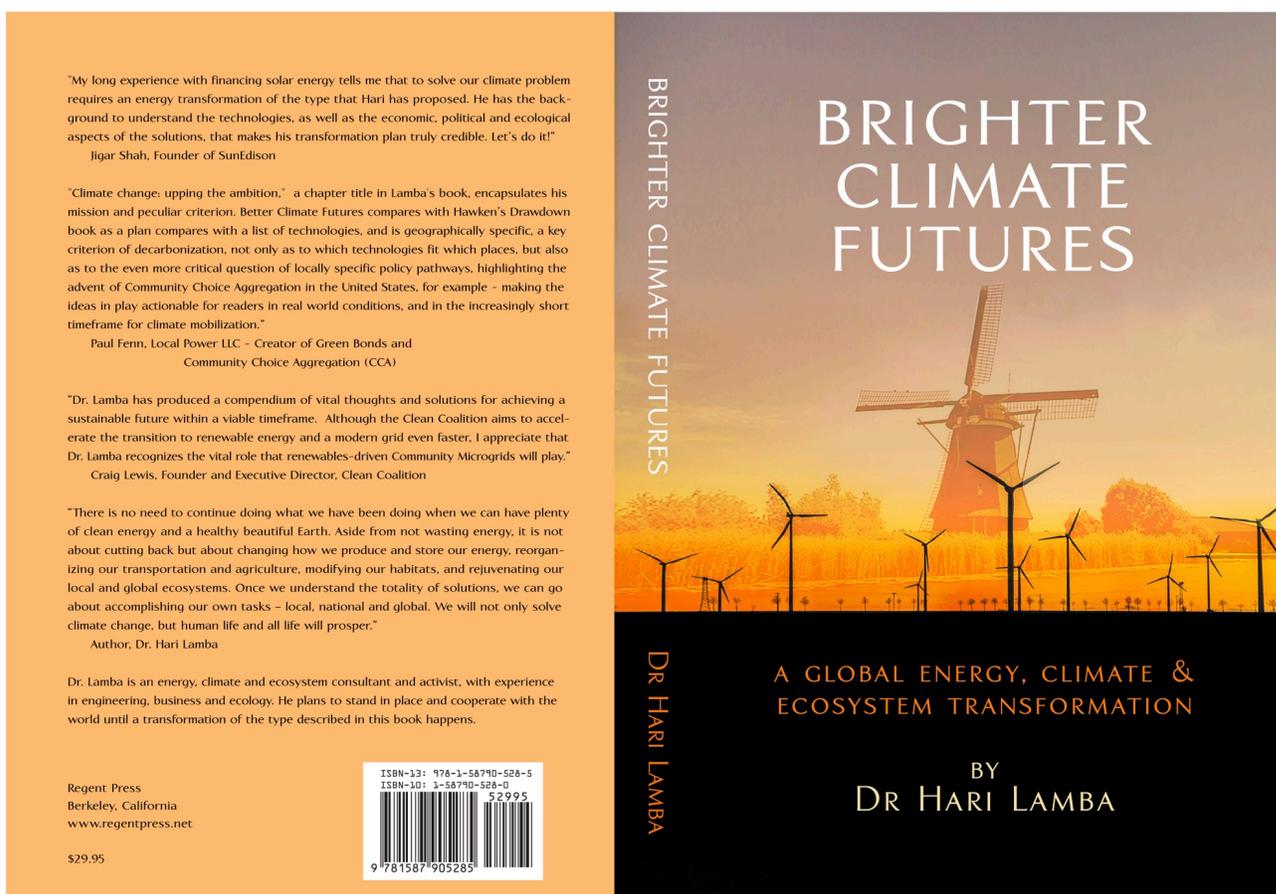
The author Dr. Hari Lamba, has experience in engineering, business and ecology. He has a Ph.D. in engineering with about 40 years of experience in industry. He was one of the founders of the Earth Summit Network, an informal organization formed in Chicago during 1991-92 to educate the local public about the Earth Summit, or the United Nations Conference on Environment and Development (UNCED) that was held in Rio de Janeiro, Brazil in 1992, where the original climate change treaty was signed. Since then he has been active in non-profit groups (like the Sierra Club), talking about and making presentations on climate change.

He aims to use the website, book and personal actions to cooperate with global organizations for the adoption of a global plan that is strong enough to limit the average temperature rise and to provide plenty of renewable energy. He will attempt to convince the major emitter and

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influential nations to increase their ambitions, implement their own enhanced plans, and to push for effective global organization and implementation of a global plan. He intends to inspire, educate and learn from everyone in the world that has good ideas, to cooperate with all the active people and movements, to add a global strategy to support their efforts and give them added strength to fight their struggles. He will support and strengthen US efforts for climate change solutions as urged by proposals such as the Green New Deal and any other meaningful climate change solutions proposed in the US.

A more detailed description of everything is in the following book. Reading the book will help you better understand the kind of transformation that is being proposed and kind of plan that the world should adopt.



You can order the book from Amazon, Barnes & Noble Bookstore (in US) or from the Publisher (Regent Press, Berkeley, California).

The time for hand wringing is over. We now need to plan, and implement the transformation from now till 2050 and beyond.

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