Essay

Power without Borders

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ABSTRACT

The "American Dream of the 21st Century" is a very laudable and idealistic piece. In similar vein, I have been working on a project for almost 37 years. To fight climate change, the Dirigo Energy Institute ("DEI") recommends a MASS policy of Mutual Assured Survival Systems using a tripod offense of Nuclear Power, Ocean Power, and Solar Power. Any leg can complement other regenerative options (geothermal, wind, hydro, biomass, etc.) such that each leg will have the potential to supply all the world's energy needs for all time in a cost effective and environmentally benign manner. In this essay, DEI's visions are described on the following: Dirigo Means "I Lead", Micro-City Enterprises, Micro-Farm Enterprises, Allied Modular Power Systems, Remote Island Waste Management, Power Breakwater Enterprises, and John's Peerless Products.

Key Words: climate change, new energy source, environment.

I. DIRIGO Means "I Lead"

> *I believe it is the duty of every man to act as though the fate of the world depends on them. Surely no one man can do it all. But, one man CAN make a difference.* Admiral H. G. Rickover

Introduction

My professional career started with a seven year tour of duty in the U. S. Navy, during which time I served in Admiral Rickover's nuclear powered submarine program. I saw the above quote on a 2009 calendar published by the United States Submarine Veterans organization and I liked what he had to say.

To initiate an investigation into the development of environmentally benign sources of energy, I incorporated the Dirigo (deer-uh-go, meaning "I Lead") Energy Institute, aka DEI, in July of 2007.

I am encouraging all to accept the Admiral's counsel and act as if the fate of the world depends on us. This leads to our overarching goal – research, develop, and demonstrate methods and procedures to meet the world's energy needs in a cost effective manner and then make this information available for use by all.

Success will mean that energy can be removed from the peace equation - a result that could very well be instrumental in the continued existence of civilization as we know it.

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We do not expect to be acting alone in this arena. In fact, we salute and applaud all others involved in this field. Their actions include, but are not limited to improving energy efficiency; investigating regenerative options such as geothermal, solar, biofuels, hydro, wind, waves, tides, and currents; improving fission nuclear power; developing wild cards such as polywell fusion, accelerator-driven heavy ion fusion, and blacklight power; and even using fossil sources such as fracked natural gas, sweet oil, and clean coal. The objective in all of this is to remove energy from the peace equation and not to be concerned with who gets the credit for doing so.

There is one other factor that might affect the equation – providing this energy in an environmentally benign manner.

In several billion years the sun will expand into a red giant and burn everything on this planet into a cinder. In the Academy Award winning documentary An Inconvenient Truth, co-recipient of the 2007 Nobel Peace Prize Al Gore implies that we are on a collision course to burn ourselves into a cinder much sooner than that. He maintains that an impending climate change has possible drastic consequences for the human race, perhaps within the next 50 years. James Hansen, with his book Storms of My Grandchildren, and Sir Richard Branson, with his Virgin Earth Challenge 25 million dollar prize for devising ways and means to avoid global warming, support Gore's position.

On the other side of the ledger Freeman Dyson, Professor Emeritus at the Institute of Advanced Study in Princeton, in Chapter 3 (Heretical Thoughts about Science and Society) of his book A Many Colored Glass, takes the position that the present state of research is not solid enough to classify climate change as a civilization terminating problem. This view is held by others such as The Global Warming Policy Foundation, an independent Think Tank in the UK directed by Benny Peiser.

Without getting into a discussion on the relative merits of the two sides of this argument, we are setting a course of action under which we will be relevant under either scenario.

In order for DEI to select an energy source for development, it must be available for all national governments to have access to it so as to provide power to their respective countries. This latter requirement led us to adopt as the DEI motto "Power Without Borders™", which I am using as the title for a book I am writing that expands on the information in this essay.

For a few brief words on the direction in which the world is heading, in 2006 Daniel Nocera of MIT wrote an article in Daedalus stating that in 2002 the world "… burned energy at a rate of 13.3 TW (terawatts) …" with a projection that "… if 9 billion people adopt the standard of living for a US resident…the world would need an astronomical 102 TW of energy in 2050." The challenge is to provide this power in a cost effective and environmentally benign manner.

MAD to MASS

Three independent nuclear warhead delivery systems - land (intercontinental ballistic missile silos), air (B-52 bombers), and sea (nuclear powered submarines with ballistic missile delivery systems) comprised a MAD policy of Mutual Assured Destruction. Any one of these three systems could independently discharge enough atomic weapons to destroy the enemy.

DEI recommends using this same methodology to formulate a MASS policy of Mutual Assured Survival Systems using a tripod offense of Solar Power, Nuclear Power, and Ocean Power. The design intent is to develop each leg such that it will have the ability to supply all the world's energy needs in a cost effective and environmentally benign manner.

DEI RD&D (research, development, demonstration) Projects

Fossil fuel, perhaps dominated by fracked natural gas, will probably be the major energy supplier for at least the rest of this century. This will undoubtedly cause increases in carbon dioxide concentrations, which should be no problem in the near term. We are now at less than 400 ppm (parts per million) concentration and research has shown that submariners can function effectively for three month periods at concentrations up to 8,000 ppm, astronauts for three years at 5,000 ppm, and controlled environment greenhouse farmers raise levels to as high as 2,000 ppm to facilitate plant growth. Burning fossil fuels will not approach these levels in the foreseeable future so the only potential problem is global warming.

Geothermal, biomass, wind generators, solar farms, ocean waves and tides, fission nuclear, ocean thermal energy conversion, solar satellites in geostationary orbit, and fusion nuclear are in various stages of development by many. If all national governments accept climate change as an immediate threat to the continued existence of civilization as we know it, then a global construction network coordinated by national governments can use Manhattan-type urgency and develop the above environmentally benign sources so as to solve the problem.

Unless and until global warming is demonstrated to all concerned to be civilization threatening, however, the course of action we will pursue is to work slowly but surely on our RD&D projects until the sources we develop are more cost effective than coal, oil, or natural gas. If we succeed, then, by the end of the century, the world's energy needs can be met in perpetuity by regenerative sources.

Planned initial DEI RD&D projects are:

1. A modular fission nuclear power plant built in a shipyard, its operation from a floating platform located along a navigable waterway, and a method for the final disposal of spent nuclear fuel/high level radioactive wastes. (Poor chance for general public support. If fission nuclear power is necessary to solve the global warming problem then most people, if they accept it at all, will do so reluctantly. Even if all nuclear power plants are shutdown tomorrow, however, the nuclear waste problem must be solved. The DEI proposed solution is as good as any and better than many so this aspect, at least, might meet with wide approval.)

2. An ocean thermal energy conversion plant surrounded by a floating earth based prototype of a Stanford Torus space settlement. (Good chance for general public support. Uniting these two options under one roof has never before been attempted.)

3. A solar power satellite in geostationary earth orbit. (Excellent chance for general public support. The development of this regenerative option as a practical power source would be a boon to the human race.)

4. A reduced size version of R. Buckminster Fuller's floating Triton City modified to include a four season controlled environment greenhouse. (Superb chance for general public support. What the world needs today is a sustainable living method affordable to the average wage earner and self-sufficient with respect to energy/food.)

All four are long term projects so there is plenty of time to seek support.

More information on each RD&D project follows.

1. Volume producing modular nuclear power plants in shipyards, **operating them on floating platforms along navigable waterways, and disposing of spent nuclear fuel/high level radioactive wastes:**

DEI will investigate volume producing standard modular nuclear power plants in shipyards followed by subsequent towing or movement by heavy lift ship to any location in the world accessible by a navigable waterway. There the plants will be operated in the floating condition for an extended time without refueling or maintenance after which the complete plant will be moved to a remote facility for periodic refueling, refurbishing, and eventual decommissioning.

If fusion nuclear power plants are used, radioactive waste disposal will not be a problem.

Types of fission nuclear power plants that can be investigated for use in this manner include, but are not limited to an integral fast reactor, the TerraPower plant promoted by Bill Gates, a Hyperion plant designed by Los Alamos National Laboratory, and MIT's design for a pebble bed reactor. The same navigable waterway used to relocate the plant will provide an easy route to dispose of radioactive wastes from plant operation.

Fuel can be derived in perpetuity from the four billion plus tons of uranium suspended in equilibrium in the ocean. Thus, an energy source for fission nuclear power plants will be accessible to all nations for all time.

For the final disposal of radioactive wastes, DEI will investigate a global solution to this global problem. The first order of business will be to maximize a Fail Safe objective by developing remote and uninhabited islands for the interim storage of all nuclear wastes. As to be discussed in chapter Six of the book I am writing, this will start with low level radioactive wastes and then expand into spent nuclear fuel (SNF) beginning with storage in the same manner in which it is now stored at shutdown sites.

The storage capacity can be increased by using:

1. Floating platforms in protected lagoons at the storage locations.
2. Some combination of double-hulled canisters and decommissioned submarine hulls to permit underwater storage in a natural or artificial lagoon at the site.

A plant can be developed and operated at the storage site to reprocess the SNF. The residue after reprocessing, or the SNF itself if no reprocessing is to occur, will be disposed of in an appropriate final repository.

In the United Stated the Waste Isolation Pilot Plant (WIPP), a burial ground for military radioactive wastes, is the only disposal method now in operation. For commercial nuclear wastes, deep geologic disposal such as at WIPP is the front runner for a final disposal method with deep bore holes a close second. This is OK for the United States but many nations with nuclear power in their energy supply portfolio simply do not have acceptable locations for deep geologic disposal.

The method DEI recommends is sub seabed disposal, both for nations without suitable sites and as a backup for nations investigating deep geologic disposal or boreholes within their borders.

Let me be quick to point out that sub seabed burial is not as "off the wall" as some might first believe it to be. It has been recommended in the past by professionals with impeccable credentials.

In her book *Trashing the Planet* the late Dixie Lee Ray, a former Chairman of the U.S. Atomic Energy Commission and Governor of the State of Washington, discussed immersing high level radioactive waste in glass, placing it in a torpedo shaped shell, and dropping it into one of the many geologically stable, remote, inactive, and non-life bearing locations on the ocean floor (so called "ocean deserts") as a suitable method to dispose of high level radioactive waste.

Bernard L. Cohen, former Professor of Physics at the University of Pittsburgh, had over 300 papers and articles published as well as six books. Dr. Cohen voiced approval of this method in a paper entitled *Ocean Dumping of High Level Waste - An Acceptable Solution We Can Guarantee* on page 162 in the Volume 47, January 1980 issue of Nuclear Technology.

But the biggest factor in favor of using this method so as to permit our nuclear wastes to Rest In Peace is Rip himself - Dr. Rip Anderson. He not only gave us WIPP but also 32N164W.

As discussed in *Power to Save the World* by Gwyneth Cravens, one of many possible locations for final disposal is the ocean desert at 32N164W. At this location, a bullet shaped canister holding nuclear wastes would fall by gravity through four miles of sea water in a marine desert that ends in a 300 foot clay seabed of peanut butter like consistency with quicksand like features. The falling effect buries the canister 100 feet into this seabed with no further action required. This location is in the central area of a tectonic plate that will remain stable for millions of years.

If each canister is separated by 100 yards, the 39,000 square mile area will hold over 12 million canisters, which is enough to hold all the nuclear wastes generated by all nations for centuries into the future.

IAEA-TECDOC-1413 of October 2004 entitled *Developing multinational radioactive waste repositories: Infrastructural framework and scenarios of cooperation* gives a position of the International Atomic Energy Agency that supports the feasibility of a DEI RD&D project to first develop remote island locations for the interim storage of SNF followed by possible reprocessing and subsequent final disposal of the SNF or residue after reprocessing.

Elements in this RD&D project might include, but not be limited to:

1. Identify remote uninhabited islands suitable for the interim storage of low level radioactive wastes, SNF, and high level radioactive wastes
2. Research the ability of breakwaters to create artificial lagoons as well as use underwater turbines, oscillating water columns, ocean waves, and wind generators so as to provide for local regenerative power
3. Develop floating platforms for placement in natural or artificial lagoons for storage of SNF and other radioactive wastes
4. Research the ability of double hulled SNF dry storage casks to provide for submerged storage
5. Investigate adapting hulls of decommissioned submarines to provide for submerged SNF storage
6. Develop an ability to transport SNF by air
7. Investigate reprocessing of SNF
8. Select and develop a location to serve as a final repository for nuclear wastes.

For a quick summary, the plan of action is to move nuclear wastes to a selected remote uninhabited island, investigate a floating plant capable of reprocessing the SNF on site, and dispose of radioactive waste materials at a permanent site that might include, but not be limited to sub seabed burial, in a deep geologic repository, or in bore holes.

All of these activities will be designed with fail safe features such that there will be no detrimental impact to the health and safety of the general public.

All national governments who have had, now have, or are planning to have nuclear power in their energy supply portfolio will be invited to participate.

2. Combining an ocean thermal energy conversion plant with an earth based prototype of a Stanford Torus space settlement:

The oceans are a vast renewable energy resource available 24 hours a day, seven days a week.

On an average day, 23 million square miles of tropical seas absorb solar energy (equal to about 250 billion barrels of oil) to create a temperature difference between the warm surface water and the cold deep water of 36°F or greater. If less than one-tenth of one percent of this stored energy is converted into electric power, it can supply all the world's electrical energy needs.

In one possible OTEC (ocean thermal energy conversion) generating process, warm sea water on the surface passes through a heat exchanger, vaporizing a low boiling point working fluid to drive a turbine, generating electricity. Cold deep sea water is then pumped up to condense the vapor, completing the cycle.

The OTEC process can use the cold seawater, rich in nutrients, to support the growth of shell fish, fin fish, and other food. Additional profit sources that can be derived from this process include cold water for refrigeration, drinking water, and extraction of useful products suspended in sea water.

The OTEC plant can get its products to market using methanol tankers and/or air transport. For example, a demonstration OTEC plant could be sited in close proximity to one of many islands near the equator in the Pacific Ocean such as Howland Island whose airport, outfitted in the late thirties for use by Amelia Earhart, could be upgraded to accept modern day planes transporting workers and products to and from the OTEC plant.

A floating housing development surrounding the OTEC plant can be patterned after a Stanford Torus space settlement. The design parameters to the nearest ten feet, derived from Page 89, Space Settlements, A Design Study, NASA SP-413 of 1977, are 5,910 feet outside diameter, 430 feet torus diameter, 50 feet diameter for each of six spokes to the hub, and a 430 feet diameter hub.

The design intent is for this development to accommodate 10,000 full time residents. The people living in or visiting this city might have no intrinsic interest in DEI but the earnings before taxes of the OTEC plant, the housing development, and of all businesses located therein will be tithed for non-profit purposes, starting with DEI.

3. A network of solar satellites in geostationary earth orbit:

In the September/October '89 issue of the *Humanist* magazine, the science fiction author Isaac Asimov presented a scenario in which a network of solar power satellites in geostationary earth orbit (GEO) would provide the world with safe, environmentally benign, perpetual, and cost effective energy. He suggested that this should be undertaken as a global mega engineering project to join all nations in the pursuit of a common goal.

For a potential show stopper to this project, a Department of Energy (DOE) study in the 1980s, although establishing that microwaves would not be a safety hazard for people or birds, determined that photovoltaic cell production and launch costs were financially prohibitive. Given the dramatic reduction in the cost of solar cells and the prospects of much less expensive launch methods (electromagnetic, laser, phased microwave) solar satellite power might now be competitive with coal, oil, and natural gas.

Placing a satellite in GEO, at just over 22,000 miles above the surface of the earth, means it will orbit the earth at the exact speed with which the earth rotates, to always remain in the same position above the equator. In this configuration, the satellite can use its photovoltaic cells to generate electricity 24/7, which can be transformed into microwaves or lasers, and transmitted to a receiver on earth. From this position, the microwaves or lasers are transformed into electricity and either sent to customers over an electrical grid or through use of an energy carrier such as hydrogen or methanol.

Now imagine that, instead of only one satellite, there are 1,000 equally spaced satellites in GEO. Given that GEO is 26,200 miles above the center of the earth this equates to a circumference of over 164,000 miles or one satellite at each 164 mile interval. If now, over time, each of the 1,000 satellite locations is expanded into a 100 gigawatt source, then the system will be producing 100 terawatts to provide the lion's share of the 102 terawatts needed to satisfy Nocera's 2050 projection to permit nine billion people to use energy at the same rate as an average American.

Required periodic maintenance can be provided by ten space settlements in GEO, with each accessible by a space elevator.

The full system could have a global headquarters to:

- contract for receiver and photovoltaic cell volume production
- contract for launch services
- coordinate robotic centers in space for satellite assembly
- operate and maintain the satellites
- research the use of asteroids or the moon as a source of raw materials for satellite construction
- build space elevators and space settlements.

Each of one thousand franchisees would be set up as an independent power producer to not only own, operate, and maintain assigned receivers but also sell the power generated to its customers. Global headquarters would be owned by many separate and independent entities (national governments, investment firms, and private investors) and each franchisee would be financed by private investors, utilities, and national governments serviced by the franchisee.

Energy from the solar satellites will be received on earth and then either converted to high voltage electricity for transmission over the grid or transformed into an energy carrier such as hydrogen or methanol for transportation to customers around the world. Modes of transportation might include tankers, barges, pipelines, rail cars, trucks, and service stations.

A completed network of solar satellites would realize the dream envisioned by Peter E. Glaser (invented the concept in 1968), Gerard K. O'Neill (recommended their volume production to fund space settlement construction), and Isaac Asimov (called for their implementation to promote world peace under an international construction program).

One more thought. Cost might not be a show stopper for solar satellite development but coronal mass ejection, or CME, could be. A CME similar in strength to the one in 1860 is sure to eventually appear on the scene so as to quickly destroy any solar cell directed towards it. Thankfully, CMEs are under continuous scientific observation such that at least an 18 hour notice will be forthcoming before their arrival. This provides ample opportunity for the satellite operators to protect the solar cells by acting like teenagers and turning the bare bottom of the satellite around and pointing it directly towards the sun in a planned procedure likely to be called "Mooning the Sun."

4. Reduced size version of R. Buckminster Fuller's floating Triton City:

In November of 1968 the Triton Foundation prepared *A Study of A PROTOTYPE FLOATING COMMUNITY* for the U.S. Department of Housing and Urban Development. The design was four acres in area, 20 stories high, elements (condos, classrooms, stores, offices, services) prefabricated on a modular basis, and provided living accommodations for five thousand people.

The U.S. Navy reviewed the design and estimated that it could be volume produced at a price that would make homes affordable to the average wage earner.

This project will revisit the design under a goal to provide a reduced size version that includes a four season controlled environment greenhouse along with insulation/renewable energy sources such that residents will be self sufficient with respect to energy and food.

This project will complement a business, Micro-City™ Enterprises, to be introduced in chapter Three of the proposed book.

Methanol as Foundation

As implied in the book *Beyond Oil and Gas: The Methanol Economy* by George A. Olah, Alain Goeppert, and G. K. Surya Prakash methanol is one way to get the power generated by OTEC plants and solar power satellites to market. Using the generated power to create hydrogen would be the first step but the next step would be to combine the hydrogen so generated with carbon dioxide to form methanol. The creation of methanol from fossil sources and a methanol distribution system is already a mature technology. A small RD&D project within the larger RD&D solar satellite and OTEC projects would be to take hydrogen from electrolysis and combine it with carbon dioxide to create methanol.

II. Micro-City Enterprises

> *"You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."* R. Buckminster Fuller

There will always be a market for affordable housing.

The objective of Micro-City Enterprises, or MCE for short, is to design small housing developments that are made affordable by volume producing standard designs for a floating or land based configuration and then placing them in urban, suburban, and country settings.

Long ago R. Buckminster Fuller offered one solution to the affordable housing problem – at least in principle. In November of 1968 he published *A Study of A PROTOTYPE FLOATING COMMUNITY*, known as a Triton City. Fuller demonstrated that, if volume produced in shipyards, this floating design will be affordable to those being paid a minimum wage.

The intent of MCE is to make developments such as this energy self sufficient through the use of techniques to include, but not be limited to insulation, below grade heat sources and sinks, solar, biomass, wind generators, ocean waves, and ocean currents.

Solar, wind, and biomass are available for use in both land based and floating configurations.

In addition, energy self sufficiency in a land based housing development can use regenerative energy such as geothermal by the simple expedient of building in close proximity to such a source.

As to be discussed in chapter Seven of the proposed book, a floating housing development can rest in calm waters created by a power breakwater and have its energy supplied by this very same power breakwater using ocean waves, winds, and currents as regenerative sources.

For food, an integral part of the housing development will consist of a Micro-Farm™, such as one of those discussed in the next chapter of the proposed book, that employs NASA developed CELSS (Closed Ecological Life Support System) concepts. It will be a four season controlled environment greenhouse that will adjust carbon dioxide levels, light type and intensity, organic nutrients delivered via a hydroponic and/or aeroponic process, temperature, and moisture content under a design objective to achieve maximum growth with minimum waste discharge to the environment for a product line selected by the homeowners. The greenhouse will sell products - not claimed by the homeowners - to walk in customers or retail outlets.

One housing development design, in the shape of a Mayan Pyramid, will have a greenhouse farm on the sun facing side complemented with condos on the other three sides. All homes will open outward to an exterior privacy patio and inward to a community center. The greenhouse will use terraced grow beds in a configuration starting at ground level and rising to a rooftop setting to provide products selected on a periodic basis by the homeowners.

Other design concepts are floating or land-based reduced size versions of three Buckminster Fuller designs (Tetrahedron City with 1,000,000 people, Old Man River City with 125,000, and Triton City with 5,000), an Arcosanti design, geodesic and Fly's Eye domes of several sizes, and various designs of energy efficient single and multiple family homes.

So as to obvert the necessity of owning an automobile, shared transportation will be available in each development. This will include both a leasing program for automobile short term use and a microbus making periodic trips from the development to grocery stores, shopping malls, an airport, a bus terminal, a train station, and entertainment venues.

The long term objective of this proposal is to build these Micro-Cities using ten standard design concepts. The overarching purpose is to volume produce each standard design such that the development is energy and food self-sufficient with wastes recycled to the extent practical. It should be mentioned that the designs will be standard in much the same way that the design of the human body is standard. There will inevitably be as much variety in different housing developments of the same design as there is variety in different human beings of the female or male design.

MCE will design many models of a Micro-City™ complex in a standard community setting with a total population in the 40 to 160 range.

An international marketing campaign will employ a cruise ship embarking on a world tour entitled *The Voyage of the Micro-City™ AEGIS*, where AEGIS is an acronym for Amalgamated Entertainment, Games & International Shopping.

An existing cruise ship will be refurbished in the form of a floating housing development to contain a greenhouse, penthouse and luxury staterooms, standard staterooms, crew quarters, a shopping section with retail outlets from world class companies, an entertainment section with state-of-the-art facilities, and a section featuring traditional carnival games and rides.

The tour, with stops in ports around the world, will attract people with a combination rock concert and carnival atmosphere (The circus is coming to town!).

The lion's share of the profits from the tour will be used to begin the construction of selected housing developments in the host country to provide health, housing, energy, food, clean air, and fresh water to shield (derived from the AEGIS name) the poor and homeless in the outlying areas from the effects of poverty through a life style traditionally inaccessible to them.

To summarize, the overarching purpose of this strategy is to seek energy and food self-sufficiency in a community with a nominal population in the 40 to 160 range. Key elements are:

- Volume produce standard community structures so as to create a lifestyle affordable to all
- Provide energy from regenerative sources
- Grow food in a CELSS environment that permits a four-season output
- Employ Fuller's concept of a Design Science Revolution to provide continuous product improvement in energy and food.
- Use *The Voyage of The Micro-City AEGIS* to market MCE on a global basis.

Each Micro-City will be organized as a franchisee of MCE. In an ideal form, standard operating procedures in these micro-cities organized on an international basis will permit easy homeowner transfer between cities so as to permit individual homeowners to find a home and community design suitable to their life style. As with the other business concepts, ten percent of the earnings before taxes not only from each franchisee but also from corporate MCE headquarters will be donated to non-profit causes, starting with DEI.

A Joint Venture team to develop this concept might consist of expertise in:

- Housing development design
- Greenhouse design
- Floating configuration design
- Floating energy sources
- Land based configuration design
- Land based energy sources
- Real estate
- Legal
- Marketing.

This Joint Venture team will produce the marketing materials that are expected to result in customers on a global basis.

Seed money will be required to incorporate MCE, open and outfit an office, and hire a nucleus group with the expertise necessary to define many model options and prepare a business plan sufficiently detailed to acquire the money necessary to expand the nucleus group so as to assemble a Joint Venture team, define many model options, select one model for a world tour, and prepare detailed drawings for the model and cost estimates for both the model and the tour.

More money will be needed to expand the staff, build the model, conduct the world tour, and get contracts for at least one development in each country in close proximity to each stop.

The next chapter in the proposed book will give more information on a greenhouse that will be an integral part of each Micro-City.

III. Micro-Farm Enterprises

A growing global population must eat so agriculture is trending towards large vertical farms in urban areas to feed the local population. It is easily possible to extrapolate this trend downwards so as to place greenhouses on less desirable land or on rooftops but it remains to be seen if this can be done in a cost effective manner.

Micro-Farm Enterprises (MFE) will investigate the profitability of this concept through a franchise company under which franchisees will use four season controlled environment greenhouses that recycle wastes using CELSS (Closed Ecological Life Support System) techniques to grow a product line that might consist of, but not be limited to vegetables, herbs, flowers, fish, fowl, rabbits, pigs, goats, and sheep; a reduced product line; or single crops such as lettuce, grapes, strawberries, tomatoes, cantaloupes, watermelons, or medicinal plants. Each greenhouse will sell its products to walk in customers and/or to retail outlets.

The greenhouse will optimize light, temperature, carbon dioxide (CO_2) enrichment, air moisture content, and soluble nutrient levels in conjunction with continuous planting and harvesting. Year-round operation will permit continuous growth of vegetables, herbs, fruit, flowers, fish, fowl, pigs, goats, and sheep. One crop of potential interest is grapes grown under controlled conditions that replicate the environment that existed during the years when award winning wines were produced.

Growing techniques will provide artificial light, CO_2, and soluble nutrients absorbed through roots and leaves. The system enhances growth by proportionally increasing light, heat, water, CO_2, and nutrients at specified times of the day.

A standard greenhouse in the northern hemisphere might have a tall northern wall with planting beds stacked upward toward the northern wall. From an end view, the greenhouse will appear similar to an A-Frame. In a standard layout the floor of the greenhouse will be terraced for vertical growing. The length of the greenhouse will be determined by the franchisee, sizing it to desired production levels.

Besides terraced beds, it will be possible to apply the verti-grow method that utilizes pots stacked one above the other. It will also be possible to build the terraces out of enclosed fish tanks, thus allowing fish to be raised (aquaponics) as another income stream.

The open space in the A-Frame interior might house elements including, but not limited to plumbing, pumps, aquaponics, mushroom beds, composting, water and nutrient storage, an insulated nursery, and a retail outlet. A company owned model will have classrooms in this section for instructing franchisees in the design and operation of the greenhouse.

Growing techniques might include:

- **Light:** Experience indicates that approximately 11-12 hours is optimal daylight length for most common food plants in temperate zones. Day length is adjusted with artificial sunlight such that plants receive the same amount of light from the fall equinox until spring equinox.
- **Carbon Dioxide Enrichment:** Normal atmospheric CO_2 concentration is at less than 400 ppm but experience indicates that some plants prefer up to 2000 ppm. A flame (propane or natural gas) can serve as a peaking CO_2 source with baseline CO_2 levels provided by decomposing compost or other natural sources.
- **Soluble Nutrients:** Organic nutrients can be passed through a soil-less growing medium comprised of perlite, pumice, vermiculite, and decomposing organic matter (potting soil). Soluble nutrients of organic compost can be applied to the underside of leaves as a fine mist during the light/CO_2 enrichment period.
- **Others:** Additional growing techniques under evaluation include, but are not limited to LED grow lights, water treatment systems, electrical and magnetic characteristics in plant cellular growth and development, audible and electromagnetic stimulation, and biofeedback.

The greenhouse will be designed to regulate temperature using thermostats, timers, and/or programmable controllers, all with the option for manual override. The energy management systems are operated with the intent of maintaining the desired greenhouse temperature and humidity with the minimum energy input.

NASA recycling concepts from CELSS to provide food for settlers of Mars will be iincorporated into the design of these greenhouses. With this feature added to micro-cities a sustainable life support system can be built to accommodate perhaps up to 10 billion people on this planet.

The MFE methods and features include:

- Continuous year-round growing and harvesting of high quality vegetables, herbs, fruit, flowers, fish, and fowl
- Ability to grow ‘designer’ fruits and vegetables
- Reduced need for pest control due to compost based nutrient application keeping soil borne insects and diseases out of the greenhouse biome
- Higher plant brix (sugar) levels, resulting in better taste and longer produce shelf life
- Maximized sunlight harvesting through use of tiered beds
- Integrating renewable energy systems to establish greenhouse energy self-sufficiency
- Significantly reduce shipping costs by raising food crops locally.

To start operations, MFE will develop company models for operation in a MFE franchise business network for placement on land unsuitable for conventional farming and on rooftops.

A marketing plan will employ *The Voyage of the Micro-City AEGIS* (Amalgamated Entertainment, Games & International Shopping) - a ship discussed in the previous section of this essay - that will be outfitted for travel on the high seas with built in greenhouses, restaurants, and motels containing entertainment, games, and shopping provisions. It will embark on a world tour with a commitment to use part of the profits to build a greenhouse in

each host country with provisions to grow food that will help to shield the poor and homeless in that country from the effects of poverty.

MFE will teach integrated farming and waste management techniques necessary for organic food growth in a micro-farm and also perform R&D into features such as insulation, below grade heat sources and sinks, wind generators, solar, and biomass designed to seek energy self sufficiency.

Experiments in carbon dioxide levels, light type and intensity, organic nutrients delivered via a hydroponic and/or aeroponic process, temperature, and greenhouse moisture content will be conducted under a design objective to achieve maximum plant growth.

Aquaponics and livestock interactions will be addressed under which air, water, and wastes are recycled so as to maintain a fresh air and clean water atmosphere.

Greenhouse dimensions will be selected such that an optimum mix of vegetables, fruits, and meats can provide all the food required for 100 to 200 people.

The design intent is to volume produce an economy model for the developing world and a standard model for the middle class with custom models built for the rich and famous such that basic life support needs can be met for all people on Earth.

The MFE top ten reasons to develop four season controlled environment greenhouses – listed in reverse order with apologies to David Letterman - are:

10. Prerequisite for extended trips to the Moon, Mars, and beyond
9. Reduces fossil fuel use through local food production
8. Conserves water
7. Recycles wastes to minimize release to the environment
6. No crop failures due to droughts, wind, rain, snow, hail, or global warming
5. Marginal farmland and urban rooftops used for food production
4. Nutrient rich food grown without artificial herbicides or pesticides
3. Land efficiency - one greenhouse acre equivalent to up to 30 outdoor acres
2. A continuous harvest 365 days a year (spring, summer, fall, and winter)
1. Promotes sustainable living

Seed money will be required to incorporate MFE, open and outfit an office, and hire a nucleus group with the expertise necessary to define a standard greenhouse and prepare a business plan sufficiently detailed to acquire the money necessary to expand the nucleus group so as to prepare detailed drawings and cost estimates to adapt the standard model for the world tour.

More money will be needed to expand the staff, build the prototype, conduct the world tour, and get contracts for at least one MFE franchisee in each country in close proximity to each stop.

IV. Allied Modular Power System

For quite some time I have been promoting the volume production of modular power plants in shipyards.

Between April 2, 1990 and August 22, 1991 I sent three unsuccessful submissions to the Department of Energy on this general concept as it relates to nuclear power plants.

The late Lawrence M. Lidsky, Professor of Nuclear Engineering at MIT, was instrumental in organizing an International Workshop on June 17-19, 1991 at MIT on a land based modular high temperature gas cooled reactor, or MHTGR as it was then called. I was in attendance and used the results of this workshop, as well as a concept sketch and description of a floating plant created for me by Dr. Lidsky, in a business plan that discussed volume producing the MHTGR in manufacturing facilities such as shipyards, towing the completed plants to sites excavated to accept them, and operating them in the floating condition. The business plan discussed a boundary condition under which it would be possible to volume produce the plants within the existing global shipbuilding infrastructure such that 10,000 plants could be built within 40 years.

There were too many unresolved licensing issues so all attempts to continue with business development at that time were halted but it was soon thereafter that I started the Dirigo Energy Institute. DEI received a bit of publicity through an article entitled "10,000 nukes in the sea" which appeared on page 9 of Maine Times, November 20, 1992. An excerpt from this article reads as follows:

> *The Dirigo Energy Institute, a nascent research and development group in Bath, believes the world's future energy needs can be met by floating nuclear reactors.*
>
> *Floating, gas-cooled nuclear power plants, argues Institute President Leon J. Neihouse, would be "safer and cheaper" than land-based, water-cooled nuclear power plants.*
>
> *Neihouse, who works for John J. McMullen and Associates, says sea-going reactors will be safer than land-based plants because they will be earthquake-proof and can be towed to remote sites for repair and refueling.*
>
> *Asked whether he anticipates public resistance in light of the ongoing debates over the disposal of nuclear waste, Neihouse says that's not the Institute's problem.*
>
> *"We are a research and design institute," says Neihouse. "The waste disposal problem isn't a technical problem, it's a political problem. Geologic burial methods have been proven and the plant itself can store 15 to 20 years worth of waste."*
>
> *Neihouse believes building nautical nukes is a natural defense conversion industry for U.S. shipyards in the post-Cold War era.*
>
> *"An ideal form of ten thousand generating sites, each holding one or more 200-megawatt plants, can be built in 40 years using the existing shipbuilding infrastructure," states a Dirigo Energy Institute press release.*

The same shipbuilding conditions exist today as in 1992 so there should be no insurmountable problems with volume producing modular nuclear power plants in shipyards except that the nuclear waste disposal problem, a subject discussed in the next chapter of this book, must first be solved.
That early version of DEI received more publicity through a Letter to the Editor that appeared in the Maine Coastal Journal of April 26, 1995. Excerpts from that letter are :

The National Research Council of the National Academy of Sciences recently compared nuclear dangers to others we constantly face. On a scale of relative danger they found cigarettes equals two thousand three hundred, cancer equals nine hundred eighty, being fifteen pounds overweight equals four hundred fifty, motor vehicle accidents equals one hundred eighty, air pollution equals eighty, firearms equals eleven, airplane crashes equals one, and effects of nuclear power equals point zero four. (See The Nuclear Energy Option by Bernard L. Cohen). In other words, those responsible for advising Congress on scientific matters believe air pollution to be two thousand times more dangerous than nuclear power.

In the emotional world in which we live, however, the logical course of action that will clean up the environment faster and save lives more quickly is for nuclear forces to concede to the anti-nuclear groups their Pyrrhic victory and then begin looking for alternate solutions to our energy problems. To start a dialogue along these lines, my personal top ten choices to develop energy sources, from bottom to top with apologies to David Letterman, are:

10. Nuclear. The tenacious opposition of the anti-nuclear movement is its Achilles' heel.
9. Oil. The little that's left should be reserved for non-energy related purposes.
8. Solar. Father Sun, our constant fair weather companion, deserts us during dark times.
7. Wind. When the doldrums set-in, set-up on Capitol Hill.
6. Hydro. It's a "Damn Sight" better than most others, but there aren't enough dam sites.
5. Coal. Enough to last for hundreds of years - after it has cleaned up its act.
4. Natural Gas. Very attractive - but Mother Earth might get hot under the collar.
3. Motion of the ocean. Tides, waves, and currents give "Mo Power to You."
2. Biomass. Garbage In, Joules Out.
1. Geothermal. Mother Earth will always be there for you.

In other words, there is no "one" solution to our energy problems. We will need small geographically dispersed plants and large central sites generating safe, environmentally benign, perpetual, and cost effective energy using a variety of mechanisms based on land, ocean, solar, and nuclear sources.

Leon J. Neihouse; The Dirigo Energy Institute, Inc.; Bath

I abandoned hope for nuclear power in the conditions as they then existed and became a Principal in American Modular Power Systems (AMPS). This business was incorporated to volume produce gas turbine power plants in shipyards and operate them in a franchise independent power producing network that would sign BOOM (build, own, operate, and maintain) contracts to provide electricity to customers. We tried for several years but could not find financing to proceed so we folded the company.

This new attempt to volume produce standard modular power plants in shipyards will have the same acronym but it will stand for Allied Modular Power Systems and be set up as a franchise network of independent power and water producers with, as before, the network operating under BOOM contracts to build, own, operate, and maintain power plants that sell electricity as a primary product and water as a secondary one.

Each franchisee will have a mission to fulfill a Power Purchase Agreement (PPA) held by corporate AMPS headquarters. For those customers requiring fresh water for drinking and/or agricultural purposes, AMPS corporate headquarters will satisfy the requirements of a Water Purchase Agreement (WPA) by designing, building and owning standard desalination plants to be operated and maintained by the franchisees.

AMPS will start by using natural gas as the energy source for gas turbine power plants. To the extent possible, they will be volume produced in shipyards and operated from floating platforms moored at generating sites on a coastline or along a navigable waterway.

If climate change should prove to be an intractable problem, the gas turbines can later be adapted to burn methanol derived from various environmentally benign sources (ocean thermal energy conversion plants, solar satellites in geostationary orbit, large fission or fusion nuclear power plants, etc). Alternatively, the entire gas turbine power plant can be replaced with a standard modular floating Generation IV fission or fusion nuclear power plant. After the nuclear waste problem is solved and when fission/fusion nuclear becomes more cost effective than gas turbines, this will be the natural flow of events.

The standard AMPS franchisee will operate and maintain a nominal 100 megawatt power plant as well as a desalination plant, if so requested by the customer. In its ideal form, AMPS will replicate this design at 10,000 locations and thus be in a position to generate one (1.0) terawatt of power.

To put this in perspective, the present total energy requirements for the world are in the 17 terawatt range. The balance of the power required will be provided by others, using conventional fossil (coal, oil or natural gas), fission or fusion nuclear, and many regenerative options (hydro, geothermal, biofuels, wind, solar, ocean thermal energy conversion, etc).

In the ideal form, a corporate AMPS headquarters will design, market and own the power and desalination plants; 10 construction offices will monitor and oversee the companies building the standard plants; and each of 100 offices will provide life cycle support to 100 assigned franchisees that operate and maintain the plants.

Each franchisee will pay corporate AMPS headquarters:

1. An initial franchise fee
2. A set amount for waste disposal
3. A set amount for plant decommissioning
4. A set amount for corporate support
5. Ten per cent of earnings before taxes.

Seed money is necessary to assemble a Joint Venture team to consist of AMPS and expertise in:

1. Breakwater design to create calm waters for the power plant
2. Gas turbine modular floating power plant design
3. Floating platform for power plant
4. Desalination plant design
5. Floating platform for desalination plant
6. Balance of plant for generating site
7. Marketing.

The intent of this team is to support an international franchise network of independent power producers specializing in the design, construction and operation of floating modular gas turbine power plants offering a desalination plant option.

This Joint Venture team will produce the marketing materials that are expected to result in AMPS signing PPAs and WPAs with customers on a global basis.

The intent is to sign PPAs/WPAs without identifying a specific power source. Thus, each franchisee can decide the point at which it might transfer from gas turbines to the modular nuclear power plants. It is expected that the time at which the transfer occurs will be driven by the profit expectations of the stockholders of the franchisee.

Suppliers might include, but not be limited to:

- Gas turbines: Pratt & Whitney, General Electric, Siemens and Rolls Royce.

- Shipyards: South Korea, China and Japan each have the infrastructure in place to volume produce standard floating gas turbine and desalination plants for subsequent transport by heavy lift ship to any site on the planet accessible by a navigable waterway. All developed countries have shipyards to volume produce standard plants for operation in their country.

Seed money will be needed to incorporate AMPS, open and outfit an office and hire a nucleus group with the expertise necessary to assemble a Joint Venture team and prepare a business plan sufficiently detailed to acquire the money necessary to continue with startup.

Subsequent steps will be to expand the staff with the expertise necessary to acquire concept sketches for floating power and desalination plants, cost estimates for the same, concept sketches and cost estimates for balance of plant at the operating site including a floating breakwater, cost estimates for franchisee startup expenses, pro forma financial statements to show profitability for franchisee and franchisor, acquire the first PPA/WPA to build, own, operate and maintain a power plant with a desalination capability and acquire financing to continue with AMPS startup.

Additional steps will be to further expand the staff, design and build a prototype power/desalination floating plant, outfit a generating site to accept the floating plant and acquire PPAs/WPAs for nine more power plants with a desalination option.

Finally, an initial public offering will provide the funds to continue in pursuit of the ideal form.

V. Remote Island Waste Management

As validated by the earthquake, tsunami, and meltdown in Japan, an untold number of unexpected events can occur with nuclear power plants. Among these are natural disasters (earthquakes and hurricanes), operator error (Chernobyl and Three Mile Island), and acts of sabotage.

One example of an event falling in the latter category would be to fly an airplane in Kamikaze fashion into a spent nuclear fuel (SNF) target of opportunity. This type of incident has yet to happen at a nuclear power plant but it has a well publicized history elsewhere. Witness the terrorists on 9/11 flying into the twin towers, a high school student into an office building in Florida, and a distraught tax payer into an IRS building in Texas. Filling the airplane with explosives would magnify the damage.

In that it is impossible to guarantee that there will be no unexpected events associated with SNF storage, a logical course of action is to place it in a location such that any and all incidents will not endanger the health and safety of the general public.

Real estate agents are fond of repeating the mantra "***Location, Location, Location***" when discussing the three most important characteristics to look for in purchasing a new home or business. An appropriate mantra might be "***Fail Safe, Fail Safe, Fail Safe***" as the three most important characteristics in finding locations to first store SNF and then provide for its final disposal.

When compared to other dangers, the effects of low level radioactive wastes are minimal but the general public does not understand radiation, they fear it inordinately, and they do not want radioactive wastes in their back yard. This set of circumstances leads to a persistent NIMBY (Not In My Back Yard) response in all locations in which attempts are made to store or provide for final disposal of any type of radioactive wastes. In that every place in the continental United States is in someone's back yard, remote and uninhabited islands might be better temporary storage locations for SNF.

It is technically possible to move the SNF residing at all shutdown nuclear facilities in the world to remote island locations. This course of action would, however, require access to funding, acceptance by the general public, concurrence by national governments, and the approval of the U.S. Nuclear Regulatory Commission and the International Atomic Energy Agency.

Even if all concerned should concur on this approach, project completion could easily be in the 20 to 40 year range so the first task will be to investigate one or more locations to hold only low level radioactive wastes and then offer this service to all national governments who find it of interest. Follow-up from a successful venture would expand the services offered to include SNF and high level radioactive wastes.

Thus, one possible solution is to use distance to provide for the fail safe storage of these wastes. One way to achieve this distance on an interim basis is to develop one or more remote and uninhabited island locations in the Pacific and/or Indian Oceans, where NIMBY is not a problem.

When President Obama cancelled Yucca Mountain he set up a Blue Ribbon Commission on America's Nuclear Future to recommend an alternate approach. In an attempt to introduce this method, I submitted 19 letters to the Commission.

These letters, along with well over 2,000 letters submitted by others to the Commission, are available for review on the web site at **http://brc.gov/**.

The majority of the people submitting these comments are strongly opposed to any radioactive wastes in their back yard. Let us hope that the Commission will be able to recommend a solution to this over 50 year quest to find a location for the interim storage and then permanent disposal of U.S. spent nuclear fuel and high level radioactive wastes.

I will propose an alternate path with Remote Island Waste Management, hereinafter referred to as RIWM, a company being investigated to use distance as the solution to radioactive waste interim storage and/or final disposal.

The mission of RIWM will be to develop a sufficient number of remote island locations so as to provide all national governments with the option to store and/or dispose of all of their radioactive wastes.

In that they offer very few barriers to entry, the initial concentration will be on low level radioactive wastes (Class A - 100 years of isolation required, Class B - 300 years of isolation required, and Class C – 500 years of isolation required). After remote island sites have been developed for this purpose, they will be expanded to include high level radioactive wastes and SNF – both types requiring final disposal to include hundreds of thousands of years of isolation.

The island type being sought for interim storage will have a lagoon (natural or artificial), an abandoned but still operational airfield for access (A private airfield is not an absolute necessity but it will facilitate the periodic crew exchange process.), and no human inhabitants. Most locations of this type are restricted to wildlife but RIWM will pursue standard operating procedures such that its presence will be a boon rather than a burden to these life forms.

There will be a trust fund set up to ensure money will be available to implement a decommissioning plan. One design requirement will include a provision similar to camping in any U.S. National Park - leave it as you found it.

Initial locations to be researched include, but are not limited to:

- Johnston Atoll
- Wake Island
- Midway Atoll
- Salomon Islands.

The first three are in the Pacific Ocean, U.S. owned, and with natural lagoons and existing airfields. The fourth is in the Indian Ocean, UK owned, with a natural lagoon and access from an airfield on Diego Garcia – also UK owned.

Many other island nations in the Pacific and Indian Oceans will be investigated to determine if they have uninhabited islands with natural lagoons and airfield access.

If an acceptable location with these criteria cannot be found, a backup position will be a remote, uninhabited island with airfield access and amenable to the creation of an artificial lagoon. One of many possible options would be the U.S. owned Jarvis Island in the Pacific Ocean with airfield access from the Republic of Kiribati's Kiritimati Island.

Seed money is necessary to incorporate RIWM, open and outfit an office and hire a nucleus group with the expertise necessary to prepare a business plan sufficiently detailed to acquire the money necessary to continue with startup and estimate the scope of storage requirements, determine how transport will be done, and evaluate functions such as manpower, logistics, warehousing, equipment, maintenance, food storage and service, etc.

Additional funding will be needed to expand the nucleus group with the personnel necessary to enlist members of a Joint Venture team to consist of RIWM and expertise in the following:

1. An architect-engineer for a breakwater to serve as a source of power to a selected location and create an artificial lagoon, if required, at that location.

2. An architect-engineer for a platform floating in a natural lagoon, or an artificial lagoon created by a breakwater, on which will be stored low level radioactive wastes and other hazardous materials.

3. An architect-engineer and constructor to outfit one or more selected locations to accept for extended interim storage low level radioactive wastes and other hazardous materials.

4. Company or companies to construct/manufacture breakwaters and floating platforms.

5. Company or companies to provide for transportation (truck, rail, ship, or air) for low level radioactive wastes and other hazardous materials from the country of origin to the remote island location.

6. Company or companies to sign contracts with hospital facilities, nuclear power plant owners, and others on a global basis for utilization of the services offered by RIWM.

7. Company or individuals to provide next level financing.

Additional tasks would be to acquire concept sketches for a floating power breakwater and floating waste storage platforms, cost estimates for the same, concept sketches and cost estimates for remote island outfitting, startup expenses, transport and storage rates needed for profitability, market research to determine what potential customers are paying now, pro forma financial statements to show profitability, acquire the first contract for interim storage of low level radioactive wastes, and acquire financing to continue with RIWM startup.

More funding will be needed to expand the staff, outfit a prototype remote island location for storage of low level radioactive wastes, and acquire contracts from nine more national governments for storage of their low level radioactive wastes.

An Initial Public Offering will provide the funds to expand into high level radioactive wastes and spent nuclear fuel.

VI. Power Breakwater Enterprises

The primary objective of Power Breakwater Enterprises, or PBE for short, is to create calm waters and off-grid electricity at coastlines around the world.

A breakwater, either fixed or floating, will not only create calm waters but also serve as a platform on which to hold the power process equipment needed by regenerative energy sources designed to extract power in some manner from ocean wind, waves, tides, and current.

Potential markets would include, but not be limited to support for a floating Micro-City™ to be discussed in chapter Three of the proposed book, providing for protection from the sea for the electrical generating and desalination barges of Allied Modular Power Systems to be discussed in chapter Five, and to serve as the power source for island locations including those used by Remote Island Waste Management to be discussed in Chapter Six.

In addition, PBE can use a floating power breakwater to surround an OTEC complex as outlined in the beginning of this essay.

One other option deserves a closer look. A heavy lift ship can move both a floating Power Breakwater™ and a floating Micro-City between, for example, Key West and a location on the Kennebec River in Bath, Maine so as to optimize exposure by the residents to ideal weather conditions in the winter and summer.

Alternatively, a Micro-City Bed & Breakfast could use this method to relocate between comparable locations so as to maximize occupancy rates on an annual basis.

Seed money is necessary to assemble a Joint Venture team that might consist of:

- Breakwater design
- Ocean wind energy source
- Ocean wave energy source
- Ocean tide energy source
- Volume production
- Marketing

This Joint Venture team will produce the materials that are expected to result in customers on a global basis**.**

Seed money will be used to incorporate PBE, open and outfit an office and hire a nucleus group with the expertise necessary to define many energy options for a breakwater and prepare a business plan sufficiently detailed to acquire the money necessary to continue with startup.

Additional financing will be required to expand the nucleus group with the expertise necessary to design and prepare detailed drawings and cost estimates for a prototype and a team of Joint Venture participants to support it.

More funding will then be needed to expand the staff, build Power Breakwater prototypes to support Joint Venture agreements with Micro-City Enterprises (a Snow Bird Bed & Breakfast moved by heavy lift ship between locations on a seasonal basis), a power source for Remote Island Waste Management, and a gas turbine/desalination plant for Allied Modular Power Systems.

VII. John's Peerless Products

The year was 1974. The place was Dardanelle, Arkansas. Suddenly, in an early December dark and stormy night, I had a lightning insight into a new way to organize a franchise business network.

A bell curve reflects an alignment in which, for a large group of people involved in the same activity, almost all are in a middle section with decreasing numbers on the right and left of the middle. My idea was to set up a franchise company that took advantage of the competitive nature of people to be number one and sprinkle that with a few incentives (pay, praise, and preferential advancement) such that employees and franchisees on the far right (the winners) would help those on the far left (the losers).

The reference to left and right has no political connotation. The bell curve under discussion simply portrays employees and franchisees on the right of center performing better than the average and those on the left below average.

If profits, customer satisfaction, and employee satisfaction are the three measured performance parameters, setting up this win-win competition to cause those on the left to increase their performance such that they move towards the right will shift the center of the bell curve to the right to ensure continuous employee and franchise improvement and lead inexorably to long term business success.

This basic concept evolved into an automatic control system for the large scale organization of small business which I called, at different times:

- Participative Management by Exception - the exceptionally good participate in the process by helping the exceptionally bad.
- The COIL Concept - where COIL is an acronym for Coalition of Independent Lilliputians.
- The Noel Notion - Noel, the opposite of my name, implies a Christmas atmosphere in which companies share information, the opposite of standard business practices.
- Internal Synergistic Competition - there is competition but it is internal to the franchise network and organized such that it becomes a win-win contest.
- The Theory of Business Relativity - rewards are given as a function of performance relative to the average.
- Relativistic Organizational Design - advancement and termination recommendations, based on performance relative to the average, are approved by the average performers.

I quickly became convinced that the best chance to test the theory would be to start a company that operated under this organizational theory from the beginning. One option open to me was to create some original products and build a business based on them. I started down this path but other priorities forced me to abandon the effort. Now, however, I have time available to try once more.

I recognize that, compared to the other ventures above, this is of a frivolous nature but its success would ensure money would be available for DEI, so I am including it as the sixth and final company in the mix.

This business will be named John's Peerless Products (JPP) and it will sell proprietary and other related products through channels of distribution to include a web site, a catalog, kiosks, standard retail outlets, and consignment retail outlets. JPP will have an irrevocable and perpetual requirement to donate ten percent (10%) of earnings before taxes for nonprofit uses, starting with DEI.

Seed money will be needed to incorporate JPP, open and outfit an office and hire a nucleus group with the expertise necessary to develop six products, commence sales over the web and prepare a business plan sufficiently detailed to acquire the money necessary to continue with startup.

This additional money will be used to expand the management team, develop more products, initiate a catalog operation, and build models for a kiosk, standard retail outlet, and consignment retail outlet. The latter will have an added feature of accepting the products from local independent new product developers on a consignment basis.

A private stock placement will next be sold to expand the management team, develop more proprietary products, open franchisee outlets, and conduct an advertising campaign throughout the United States. The intent of this mode of operation is to provide a continuous line of new products derived from an in-house new product department and the elevation of selected consignment products for distribution throughout the JPP network.

An initial public offering will next be sold to permit expanding outlets under a goal to have seven thousand (7,000) kiosks, seven hundred (700) standard outlets, and seventy (70) consignment outlets in the United States.

The benchmark for the standard outlets will be modeled after **Dick's Sporting Goods**, which is working on an expansion goal to have 800 outlets in operation

Dedication& Acknowledgments:

I hereby dedicate this essay to all past, present, and future members of the Dirigo Energy Institute, Inc.

I want to first thank the Officers (Tom Hall - Secretary and Brian Spaulding - Treasurer) and Advisors (John Bewick, Jim Ertner, LeRoy Fournier, and Clinton Crackel) of the Dirigo Energy Institute (DEI). Without their support, DEI would not exist and this essay would never have been written.

Next I need to thank Brian O'Connell for providing a substantial input into – Remote Island Waste Management. In March of 2009 I read a Letter to the Editor Mr. O'Connell submitted to the Brunswick, Maine Times Record on the cancellation of Yucca Mountain. I responded and we initiated a long series of over 140 email exchanges on this topic, which continues to this day.

For planned chapters Three and Four I used the results of research projects conducted during the Spring Semester of 2009 by groups of MBA students (Scott Firmin, Susannah Levy, Joseph Rank, Andrew Sangalang for chapter Three and Adrien Boudreau, Mariya Klevanets, Kim Clement, Patricia Shields for chapter Four) organized by Professor John J. Voyer from the University of Southern Maine.

The information in planned chapter Four is based on the Perpetual Harvest Greenhouse System of Chris Marron and the vertical farm work of Dr. Dickson Despommier.

Let me be quick to point out that, in spite of the above support, I accept full responsibility in this essay for poor use of the English language (spelling, punctuation, syntax, etc), sins of commission (things I said that I should not have said), and sins of omission (things I did not say that I should have said).

About the Author

Leon Neihouse was born in 1939. His initial education started in the parochial school system of Fort Smith, Arkansas, continued at the University of Dallas, and ended at the University of Wisconsin at Madison under a three year National Science Foundation Fellowship in Physics but he quit after two semesters.

He then joined the U.S. Navy, entered Officer Candidate School in Newport, Rhode Island, was accepted into the nuclear power program, attended Nuclear Power School in Bainbridge, Maryland; Nuclear Power Prototype in West Milton, New York; Submarine School in Groton, Connecticut; new construction on the USS Simon Bolivar (SSBN 641) in Newport News, Virginia; made three deterrent patrols operating out of Charleston, South Carolina during which time he qualified in Submarines and as Chief Engineer; and served two years in a staff position at nuclear power school in Mare Island, California to complete his active duty service in 1969. He was honorably discharged several years later from the U. S. Naval Reserves as a Lieutenant Commander.

After discharge from the Navy he worked three years for the Tennessee Valley Authority at Brown's Ferry in Athens, Alabama and four years for Combustion Engineering on the start up of Maine Yankee Atomic Power Plant in Wiscasset and Arkansas Nuclear One, Unit Two near Russellville.

He then went to work for John J. McMullen & Associates, later purchased by Alion Science & Technology, and was employed for over 30 years serving as a Project Manager supporting the U.S. Navy in their FFG (frigate), CG (cruiser), and DDG (destroyer) shipbuilding programs.