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Renewable Energy & National Economic Wealth (RENEW) Program

The American People are struggling to survive in the current economic climate. Millions of jobs have been lost, including 2.1 million manufacturing jobs since 1998. The Federal budget deficit is estimated at \$1.4 trillion over the next 5 years, and the US trade deficit is removing \$500 Billion per year from the US economy. The Federal debt has rocketed to a staggering \$7 trillion (that's \$7,000,000,000,000). The American People are desperate for the booming economy of the 1990's to return and bring this nation back to that level of prosperity.

US National Security is in a sorry state. Our heavy dependence on foreign oil imports (500 million gallons imported EVERY day) leaves our economy completely vulnerable to disruptions in supply and fluctuating prices of oil from countries that are historically unstable (The Middle East, Colombia, Venezuela, etc).

The world is experiencing global climate change. As humans (led by the US) emit billions of tons of greenhouse gases (most notably carbon dioxide) into the atmosphere every year, we are changing our world in ways that may not be correctible. It is well documented that the temperature on Earth rose by one degree Fahrenheit in the last century, with an alarming amount of that growth occurring in the past twenty years. Many climate simulations predict that global warming will lead to hazardous situations like frequent droughts in the Midwest and Great Plains (the largest agricultural area in the US), drastically reduced snow pack in the Rocky Mountains (a large source of Western US fresh water), and melting of the polar ice caps. Studies estimate the melting ice caps will increase sea level by up to 2 meters during the rest of this century. A study conducted by the EPA estimates the economic damage of burning a single barrel of oil is \$11 to \$23 (\$0.26-0.55 per gallon)! This figure is the estimated costs associated with increased irrigation, crop losses, and moving farms, etc, as a result of global warming. Additionally, even the "cleanest" coal technology will incur a higher overall cost per unit of energy than petroleum.

Clearly something needs to change. What America needs is a complete, intelligent, and domestically-sustainable energy policy that will cause our economy to expand at a tremendous rate, and install the United States as the worldwide leaders in energy and technology exports.

How can this be done? With the "Renewable Energy and National Economic Wealth" (RENEW) program.

RENEW will accomplish the following goals:

- RENEW will save Americans \$55-85 Billion per year in energy costs AFTER taxes! This is \$450-700 per household per year.
- RENEW will create millions of jobs for Americans.
- RENEW will lower the cost of harnessing sustainable energy sources so that they become the norm rather than the exception.
- RENEW will lower the cost of generating electricity by 50% to 1.5 cent/kWh.
- RENEW will lower the cost of transportation expenses by over 50% to 2-3 cents per mile (from 5-8 cents per mile).
- RENEW will take America from being an import dependent nation to a thriving, exporting powerhouse.
- RENEW will increase annual Federal revenues by hundreds of billions of dollars as a result of the enormous boost to the economy. This will be done WITHOUT raising income taxes.
- RENEW will improve the quality of life for every American that enjoys the beauty of nature and dislikes the choking fumes emitted by gasoline and diesel engines.
- RENEW will accomplish all of these items in 10 years without using ANY income taxes!

Here's how RENEW works. RENEW will create a fund that strategically stimulates areas of the energy economy. These financial inputs will drastically lower the cost of sustainable energy, create large numbers of jobs, rapidly expand the economy, reduce dependence on the fragile power grid, eliminate dependence on foreign oil, and massively reduce emissions of greenhouse gases and other pollutants.

Specifically, RENEW will provide rebates to oil companies for enough renewable energy powered hydrogen generation devices to replace the diesel fuel used in "Combination Trucks" (the Department of Transportation term for the "big rigs" or "semis" that carry freight on the highways). These devices will be powered by renewable energy sources like photovoltaics (solar panels) and wind turbines and will be located very close to the gas stations, there will be almost zero cost to transport the hydrogen to the pumps. These large purchases will accomplish two very important goals.

- The large demand created by the purchases will force the solar and wind power industries to vastly expand their production capacity. Currently, global capacity is on the order of 8GW per year, so these orders will prompt a great deal of factory construction and job creation, which will be excellent for the economy.
- The large purchases will force these devices to be mass-produced. Mass production of this scale will drop the cost electricity generated from these devices from \$0.06/kWh to \$0.01/kWh, which is one-third the price of electricity produced by fossil fuels or nuclear reactors. This will solve the current "Chicken and Egg" problem for renewable energy (Solar panels and wind turbines are too expensive so very few are purchased, but since few are purchased, they remain expensive). Microchips were incredibly expensive until NASA and the Department of Defense purchased large amounts of them. Today, computing

power greater than what NASA had during the Apollo missions can be sitting on your desk for less than \$1000. The semiconductor industry has also created millions of jobs and trillions of dollars in revenue.

RENEW will also pay for the conversion of all 2.1 million of these “Combination Trucks” to hydrogen. The conversion will take place over a 10 year period.

RENEW will also fund the installation of hydrogen pumping and storage devices at 18,000 strategically located gas stations across the country. These installations and the hydrogen that RENEW generates will accomplish two very important goals.

- The hydrogen and compressed air facilities will allow consumers to fuel their hydrogen and compressed air powered passenger cars, SUVs, and pickup trucks. People will not purchase hydrogen or compressed air powered vehicles until they have a place to fuel them. This solves yet another “Chicken and Egg” problem (Without actions such as RENEW’s, no gas station will spend large amounts of their own money to install such facilities until there are customers near them with hydrogen or compressed air powered vehicles, but no one will buy a vehicle powered by these energy carriers until there is a gas station where they can refuel their vehicles).
- The very dirty exhaust from the diesel burning “Combination Trucks” will be eliminated. As anyone who has seen a diesel powered truck, bus, or generator in action, diesel fuel is by far the most polluting. These trucks average 65,000 miles per year per truck, and get only 5 MPG. With 2.1 million of these trucks in operation, that is a huge amount of pollution that will be eliminated.

RENEW will also provide rebates for utilities to install renewable energy generation devices in areas that receive high levels of renewable energy. RENEW will also fund the installation of high-voltage power lines that can send this VERY inexpensive energy from remote regions to the densely populated cities.

These actions will allow the US to completely eliminate dependence on foreign oil by the twentieth year of the program. Since the hydrogen and electricity will be generated from renewable energy sources, the overall emission of carbon dioxide and other pollutants will drastically decrease.

RENEW will NOT be funded through increasing income taxes or by burdening the Federal budget. Instead, RENEW will collect taxes on three of the items that cause the greatest amount of damage to the environment and hamper national security. The taxes for the first year are:

- \$4/ton of coal (1/5 of a cent per kWh)
- \$0.07/gallon of oil
- \$50 minus half of the EPA’s Miles Per Gallon rating of the vehicle being registered will be included in annual vehicle registrations. (For example, the tax on a 30MPG car’s annual registration will be \$35).

It is important to note that these taxes are not permanent. When a consumer's energy use switches from polluting to clean sources, the consumers will no longer pay any of these taxes. This ensures that only the people who are polluting the environment will have to pay a penalty. Note also that the taxes are LESS than the overall costs that the EPA study calculated, and MUCH less than the overall energy savings that RENEW will provide.

Other than these changes, how will RENEW impact specific groups like the oil companies?

RENEW's impact on Oil Companies:

- The oil companies will receive \$250 Billion in benefits from RENEW in rebates for equipment.
- RENEW only eliminates 8-14% of US oil consumption, all of which is imported.
- Future results may lead to complete elimination of the need for foreign oil use. Full domestic capacity will still be needed.
- The US will likely never completely stop using oil. Oil is used to make many non-fuel items.
- Oil companies own large portions of solar cell manufacturing companies, so a switch to renewable energy would actually benefit them.
- Cars converted from gasoline to hydrogen can still use gasoline (or diesel) if necessary.
- The conversion to hydrogen will happen eventually. This plan allows the oil companies to maintain their current level of income and puts them in control of hydrogen distribution, so jobs and revenue won't be lost. In fact, both jobs and revenue should actually increase.
- Oil companies will have the opportunity to expand into the electricity market and supply the entire world with an unlimited supply of hydrogen and electricity.
- Energy companies and other businesses will make large amounts of money, especially from overseas, if carbon credit trading systems are developed. At an estimated \$10-100/Ton CO₂, RENEW's long-term value is \$60-600 Billion per year.
- Oil companies will get a guaranteed profit with very small risk.
- The OIL companies will become ENERGY companies. They already have huge amounts of money to finance this transition and the supply infrastructure to supply hydrogen exclusively.
- They will avoid costly environmental sanctions of their polluting activities and there will be no costly cleanup from tanker spills.
- There will be no need for expensive oil tankers or costly offshore drilling rigs.
- Instead of having a very negative and dirty reputation, oil companies will have a brand new, clean and positive appearance.
- The world oil supply is estimated to run out in 50-100 years. Since oil is running out, oil companies will need to change their business model anyway.
- Domestic production of energy means reduced transportation expenses (no cross-Atlantic shipping for domestic use).

- Natural gas can be reformulated (turned) into hydrogen and the carbon dioxide re-injected into the gas well.

American Workers:

- RENEW creates many new jobs for scientists, engineers, manufacturers, construction workers, installers, distributors, sales reps, steel mill workers, etc.

Economy:

- RENEW creates many explosive growth opportunities, similar to the explosion of the computing and semiconductor industries.
- RENEW creates many jobs.
- When people are excited about their work (working for a cause they believe in), they are happier and are more productive.
- With no oil imports and huge energy and energy technology exports, the \$500 Billion annual trade deficit turns into a trade surplus.
- Businesses like steel mills that have had tough times lately will have large orders to fill. Steel mills will produce millions of towers for wind turbines to rest on. The towers are 150 feet tall and made entirely from steel. The millions of new hydrogen cars will also require a great deal of steel production.

Manufacturing Companies:

- The huge increase in demand for many new products will create a large and long-term source of revenue.

American People:

- Besides the creation of many new jobs, the American people will benefit from cleaner cities and streets.
- RENEW will create many investment opportunities.
- RENEW will bring the cost of energy down and keep it stable and immune to OPEC price-fixing.
- Better air quality means healthier people, cleaner streets, and a more beautiful world with less asthma, emphysema and lung problems. People who are sensitive to pollution will be able to spend more time enjoying the outdoors.
- A decentralized power source (such as each family and business producing some or all of their own power) helps prevent major blackouts like the August 2003 East coast outage that cost billions of dollars. This is important to national security. RENEW makes these devices affordable to consumers.

Car Companies:

- RENEW rebates will prompt people to buy new cars in record amounts, or buy conversion kits to convert their current cars to hydrogen.
- Efficient hydrogen cars and inexpensive hydrogen fuel cells already exist.
- RENEW will create easy new marketing campaigns to sell cars that will save the world and save people money.

Gas Stations:

- Gas stations only need to purchase new pumps and hydrogen tanks, which will be subsidized by RENEW.
- Gas stations can be their own suppliers by making their own hydrogen, so they won't have to pay the middlemen and the price-gougers.
- The hydrogen they do buy won't have the roller coaster pricing that gasoline has.
- There won't be any supply shortages that turn away customers because the gas station can make its own hydrogen.

Coal Industry:

- The workers won't get any more Black Lung Disease. The coal companies won't be subject to workers compensation lawsuits from the numerous physical ailments that coal mining causes.

Politicians:

- No voter is anti-environment. Approving RENEW will gain votes, while rejecting it will certainly decrease voter support.
- Every voter loves a booming economy and the politicians that they see as responsible for the boom.
- When the politicians retire they will be remembered in the history books for their help in saving the world.
- Every voter hates roller coaster energy prices.
- Lack of dependence on foreign countries gives the US a much better negotiating position in international negotiations.
- The Kyoto Accord gives European Union businesses the advantage over US businesses if we don't comply with the regulations and significantly reduce carbon dioxide emissions.
- This plan ensures energy stability. We won't be reliant on other countries, and won't be sending money and jobs to other countries.
- Politicians like to be at war with something. This would be a war against pollution and domestic instability, instead of a war against other countries that results in loss of human life.

Examples of other RENEW benefits:

- Steel mills will have more business than they can handle. Wind turbine towers are 150 feet tall and made from solid steel.
- The huge demand for hydrogen vehicles will be great for both steel mills and car manufacturers.
- Hydrogen fuel cells produce power with absolutely no emissions except 100% pure water.
- Designs for efficient hydrogen fuel cell SUVs with efficiency equivalent to 99 MPG of gasoline already exist.
- Using hydrogen fuel cells in automobiles is more efficient than gasoline. 40-60% efficiency for hydrogen, 25% for gas.
- Hydrogen can be generated in your own home using only electricity and water.

- The water used to generate hydrogen can be filtered wastewater or inexpensively processed seawater.
- Large wind farms can be placed at sea to generate hydrogen, which can be safely shipped to shore.
- Every state in the nation either receives a large amount of wind, a large amount of solar radiation, or both. Every state will profit from RENEW.
- Utilities can use their power almost 100% efficiently by using non-needed electricity to generate hydrogen. Today, utilities waste large amounts of electricity because they have to produce more than is consumed in case of demand spikes.
- Farmers could make extra money by installing wind turbines on their land since the turbines would only use ½ of one percent of their fields.
- Solar energy production peaks during peak demand hours, especially during the summer.

Additional Items:

- Utility net-metering should be Federally enforced. This will allow electricity consumers to “spin their electric meter backwards” when their renewable energy device is making more energy than they can use. Currently 36 states have net-metering laws.
- Federal standards to improve the efficiency of commercial air conditioners, residential furnaces, and distribution transformers could avoid the need to build 83 typical-size new power plants by 2020, and reduce transmission and distribution loads, while saving consumers \$22 billion, according to the American Council for an Energy Efficient Economy. The standards for residential central air conditioners that were repealed by the Bush Administration would have saved the energy equivalent of another 48 power plants. <http://www.aceee.org/>
- Wide-scale replacement of the US vehicle fleet is the perfect opportunity to create vehicles that are very efficient. This is a huge opportunity to greatly reduce the overall amount of energy that transportation consumes in this country. It would be a shame if this good fortune were allowed to pass by.

Results of RENEW Program

Year	1	2	3	4	5	6	7	8	9	10
Million Trucks Converted	0.10	0.30	0.50	0.70	0.95	1.20	1.45	1.70	1.90	2.10
Million Barrels oil saved	24	83	143	202	298	417	560	702	869	1060
Million kg Hydrogen Produced	1000	3500	6000	8500	12500	17500	23500	29500	36500	44500
Million kg Hydrogen Consumed By Trucks	1223	3670	6116	8562	11620	14678	17736	20794	23241	25687
Million Cars Converted (Estimated)	0	1	2	4	7	15	25	45	65	90
Billion kWh Generated By Renewable Energy (Estimated)	7	17	42	79	159	319	619	1069	1500	2000
Million Tons Coal Saved (Estimated)	3	8	19	35	71	142	275	475	667	889
Million Tons CO2 Avoided (Estimated)	18	54	106	171	298	520	901	1443	1974	2589
% Reduction from 2002 CO2 Emissions (Estimated)	0.31	0.93	1.83	2.95	5.13	8.96	15.54	24.87	34.04	44.65

RENEW Program Expenditures

All monetary figures are in millions of dollars

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	Item Expense	Total Expense	
First Year:			
Renewable, Hydrogen, and Vehicle Research		\$320	
+ Lightweight, Efficient, Hydrogen Fuel Cell Vehicle Research/Prototyping	\$10		
+ Low Cost, Strong, Lightweight, Advanced Materials Research	\$10		
+ Efficient and Low Cost Hydrogen Fuel Cell Research	\$100		
+ Photovoltaic and Wind Turbine Research	\$200		
Rebates		\$28,750	
+ Hydrogen Pumping & Storage Installation at Gas Station Rebates (\$500k)	\$2,000		4 K Gas Stations
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$20k)	\$4,000		0.1 M Trucks
+ Renewably Powered H2 Generation Systems 1B kg @ \$20/kg of Annual Output (>20y)	\$20,000		1000 M kg H2/yr
+ 500kV Power Lines from Large Renewable Energy Farms to Cities (1k miles @ \$1.25M/mile)	\$1,250		
+ Renewable Energy Generation Devices 3GW @ \$0.50/W	\$1,500		7 B kWh/yr estmt
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$29,100	
Previous Balance		\$0	
Tax Revenue		\$34,592	
Total Funds Available		\$34,592	
Ending Balance		\$5,492	

	Item Expense	Total Expense	
Second Year:			
Renewable, Hydrogen, and Vehicle Research		\$320	
+ Low Cost, Strong, Lightweight, Advanced Materials Research	\$10		
+ Lightweight, Efficient, Hydrogen Fuel Cell Vehicle Research/Prototyping	\$10		
+ Efficient and Low Cost Hydrogen Fuel Cell Research	\$100		
+ Photovoltaic/Wind Turbine Research	\$200		
Rebates		\$46,050	
+ Hydrogen Pumping & Storage Installation At Gas Station Rebates (\$450k)	\$1,800		4 K Gas Stations
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$20k)	\$4,000		0.2 M Trucks
+ Renewably Powered H2 Generation Systems 2.5B kg @ \$15/kg of Annual Output (>20y)	\$37,500		2500 M kg H2/yr
+ 500kV Power Lines from Large Renewable Energy Farms to Cities (1k miles @ \$1.25M/mile)	\$1,250		
+ Renewable Energy Generation Devices 5GW @ \$0.30/W	\$1,500		10 B kWh/yr estmt
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$46,400	
Previous Balance		\$5,492	
Tax Revenue		\$34,232	
Total Funds Available		\$39,724	
Ending Balance		(\$6,676)	

	Item Expense	Total Expense	
Third Year:			
Renewable, Hydrogen, and Vehicle Research		\$230	
+ Lightweight, Efficient, Hydrogen Fuel Cell Vehicle Research/Prototyping	\$10		
+ Hydrogen Powered Airplanes Research/Prototyping	\$100		
+ Efficient and Low Cost Hydrogen Fuel Cell Research	\$10		
+ Photovoltaic/Wind Turbine Research	\$100		
+ Carbon Dioxide into Carbon and Oxygen Research	\$10		
Rebates		\$32,750	
+ Hydrogen Pumping & Storage Installation At Gas Station Rebates (\$400k)	\$2,000		5 K Gas Stations
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$15k)	\$3,000		0.2 M Trucks
+ Renewably Powered H2 Generation Systems 2.5B kg @ \$10/kg of Annual Output (>20y)	\$25,000		2500 M kg H2/yr
+ 500kV Power Lines from Large Renewable Energy Farms to Cities (1k miles @ \$1.25M/mile)	\$1,250		
+ Renewable Energy Generation Devices 10GW @ \$0.15/W	\$1,500		25 B kWh/yr estmt
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$33,010	
Previous Balance		(\$6,676)	
Tax Revenue		\$33,745	
Total Funds Available		\$27,070	
Ending Balance		(\$5,940)	

	Item Expense	Total Expense	
Fourth Year:			
Renewable, Hydrogen, and Vehicle Research		\$50	
+ Hydrogen Powered Airplanes Research/Prototyping	\$20		
+ Efficient and Low Cost Hydrogen Fuel Cell Research	\$10		
+ Photovoltaic/Wind Turbine Research	\$20		
Rebates		\$26,500	
+ Hydrogen Pumping & Storage Installation At Gas Station Rebates (\$350k)	\$1,750		5 K Gas Stations
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$15k)	\$4,500		0.2 M Trucks
+ Renewably Powered H2 Generation Systems 2.5B kg @ \$7/kg of Annual Output (>20y)	\$17,500		2500 M kg H2/yr
+ 500kV Power Lines from Large Renewable Energy Farms to Cities (1k miles @ \$1.25M/mile)	\$1,250		
+ Renewable Energy Generation Devices 15GW @ \$0.10/W	\$1,500		37 B kWh/yr estmt
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$26,580	
Previous Balance		(\$5,940)	
Tax Revenue		\$33,202	
Total Funds Available		\$27,261	
Ending Balance		\$681	

	Item Expense	Total Expense	
Fifth Year:			
Rebates		\$30,750	0.25 M Trucks 4000 M kg H2/yr 80 B kWh/yr estmt
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$10k)	\$2,500		
+ Renewably Powered H2 Generation Systems 4B kg @ \$6/kg of Annual Output (>20y)	\$24,000		
+ 500kV Power Lines from Large Renewable Energy Farms to Cities (1k miles @ \$1.25M/mile)	\$1,250		
+ Renewable Energy Generation Devices 30GW @ \$0.10/W	\$3,000		
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$30,780	
Previous Balance		\$681	
Tax Revenue		\$32,444	
Total Funds Available		\$33,125	
Ending Balance		\$2,345	

	Item Expense	Total Expense	
Sixth Year:			
Rebates		\$30,500	0.25 M Trucks 5000 M kg H2/yr 160 B kWh/yr estmt
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$10k)	\$2,500		
+ Renewably Powered H2 Generation Systems 5B kg @ \$5/kg of Annual Output (>20y)	\$25,000		
+ Renewable Energy Generation Devices 60GW @ \$0.05/W	\$3,000		
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$30,530	
Previous Balance		\$2,345	
Tax Revenue		\$31,302	
Total Funds Available		\$33,647	
Ending Balance		\$3,117	

	Item Expense	Total Expense	
Seventh Year:			
Rebates		\$34,300	0.25 M Trucks 6000 M kg H2/yr 300 B kWh/yr estmt
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$10k)	\$2,500		
+ Renewably Powered H2 Generation Systems 6B kg @ \$4.50/kg of Annual Output (>20y)	\$27,000		
+ Renewable Energy Generation Devices 120GW @ \$0.04/W	\$4,800		
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$34,330	
Previous Balance		\$3,117	
Tax Revenue		\$29,789	
Total Funds Available		\$32,907	
Ending Balance		(\$1,423)	

	Item Expense	Total Expense	
Eighth Year:			
Rebates		\$32,500	0.25 M Trucks 6000 M kg H2/yr 450 B kWh/yr estmt
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$10k)	\$2,500		
+ Renewably Powered H2 Generation Systems 6B kg @ \$4/kg of Annual Output (>20y)	\$24,000		
+ Renewable Energy Generation Devices 200GW @ \$0.03/W	\$6,000		
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$32,530	
Previous Balance		(\$1,423)	
Tax Revenue		\$27,694	
Total Funds Available		\$26,271	
Ending Balance		(\$6,259)	

	Item Expense	Total Expense	
Ninth Year:			
Rebates		\$23,000	0.2 M Trucks 7000 M kg H2/yr
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$10k)	\$2,000		
+ Renewably Powered H2 Generation Systems 7B kg @ \$3/kg of Annual Output (>20y)	\$21,000		
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$23,030	
Previous Balance		(\$6,259)	
Tax Revenue		\$25,603	
Total Funds Available		\$19,344	
Ending Balance		(\$3,686)	

	Item Expense	Total Expense	
Tenth Year:			
Rebates		\$18,000	0.2 M Trucks 8000 M kg H2/yr
+ Truck Conversion to Hydrogen or new Hydrogen Purchase (\$10k)	\$2,000		
+ Renewably Powered H2 Generation Systems 8B kg @ \$2/kg of Annual Output (>20y)	\$16,000		
Program Administration, Marketing, Education, Publicity		\$30	
Total Planned Expenditures		\$18,030	
Previous Balance		(\$3,686)	
Tax Revenue		\$23,201	
Total Funds Available		\$19,515	
Ending Balance		\$1,485	

Renewable Energy & National Economic Wealth (RENEW)

Descriptions of Program Budget Items

1. Rebates

Renewably Powered Hydrogen Generation System Rebates

The backbone of the conversion to renewable fuels is the ability to directly capture the energy from the renewable sources (sun, wind, and ocean power). Producing hydrogen by burning fossil fuels is not only defeating the purpose, but it would in fact DOUBLE carbon dioxide emissions and cost MORE than oil. The hydrogen MUST be generated via renewable resources. Also, solar and wind devices installed at the hydrogen distribution point allow the hydrogen to be generated and pumped directly into cars in the same location, thereby eliminating ALL fuel transportation costs and increasing energy efficiency. It is important to note that having the hydrogen generated in 18,000 different locations across the nation from local renewable energy sources makes the nation's fuel system essentially immune to terrorist attack.

Electricity generated by solar and wind devices has been historically more expensive than that generated via burning fossil fuels. This is due to several factors:

- The federal government subsidizes fossil fuel energy costs. Billions of dollars in grants and tax exemptions are given to fossil fuel energy providers in order to keep energy costs low for the consumers. Billions and billions more are spent to ensure that this country has a constant supply of oil flowing into the country.
- The slightly higher expense of solar and wind generation technologies has hindered widespread purchasing of these items. This prevents the technologies from taking advantage of mass production and keeps their price high. Once under mass production, the cost per item of these devices will decrease enormously. The cost of solar generated electricity is expected to drop to one-half or one-third of the cost of fossil fuel generated electricity once large-scale mass production occurs. Similar results should be seen with wind energy.

In order to speed the solar and wind technologies over the financing hump and into mass production, RENEW will offer rebates for purchases of these devices. By offering rebates

for such large amounts of these systems, RENEW will enable to manufacturers to greatly increase their manufacturing capacity and the devices will be very inexpensive as a result of the mass production. The devices will power electrolysis of water, which will produce large amounts of pure hydrogen. This hydrogen will be used to replace diesel fuel in “Combination Trucks” (the Department of Transportation’s term for “big rigs” or “semis”). Since the hydrogen will be generated from inexpensive renewable energy sources, fuel costs will decrease, and emissions of carbon dioxide and other pollutants will decrease.

Truck Conversion to Hydrogen or new Hydrogen Purchase

This rebate will act as a discount for purchases of new “Combination Trucks” that are powered by hydrogen and conversions of existing trucks to hydrogen.

Hydrogen Pumping & Storage Installation At Gas Station Rebates

In order to allow the newly-converted “Combination Trucks” to refuel conveniently as they traverse the nation, it is imperative that gas stations are able to provide this service. The equipment will also allow consumers to fuel their passenger cars, SUVs, and pickup trucks that are fueled by hydrogen. This rebate will reimburse gas stations for their purchases of equipment to store and dispense hydrogen to consumers.

Renewable Energy Generation Devices

RENEW will provide rebates for purchases of devices that generate electricity from renewable energy sources. This will allow utilities to quickly take advantage these clean energy devices and lower their electricity generation costs. Unlike fossil fuel power plants, solar panels, wind turbines, and tidal power devices do not require the utility to purchase fuel. Hence the utility must pay for 10-30 years of electricity generation up front. These rebates, in addition to the lower cost/kWh, will allow utilities to adopt renewable energy into their generation portfolio and pass the savings on to the consumers.

500kV Power Lines from Large Renewable Energy Farms to Cities

The most inexpensive renewable energy sources are generally in regions where the climate has discouraged people from locating there. For example, people tend to avoid living in regions with average winds of 15-25MPH. These rebates will allow utilities to harness the power contained in these remote areas and send it to densely populated metropolitan areas. It is possible to send electricity from North Dakota (Very Windy) to Alabama (Low Wind), a distance of 1000 miles, while only losing 1% of the electricity generated by using 500kV power lines. These lines are expensive (\$1.25 Million/mile), so RENEW will pay for their installation, so that everyone in the US can take advantage of the nation’s abundance of clean and inexpensive renewable energy resources.

2. Research

Renewable, Hydrogen, and Vehicle Research

Mass production is not the only important component of price decrease. Research into these and other technologies is vital to continued growth in the new energy industry. The US currently spends less than one-fifth of Japan's expenditures on renewable energy research. If the US is to remain competitive in this vital and explosive new industry, considerable funding of domestic research programs is essential.

Low Cost, Strong, Lightweight, Advanced Carbon Manufacturing Research

One of the biggest energy losses in motor vehicles is the cost of propelling the heavy, metal body. Prototype vehicles like Rocky Mountain Institute's Hypercar uses a very strong and lightweight carbon vehicle shell to halve the shell's weight. Incidentally, this and other design innovations led to the hydrogen fuel cell powered Hypercar SUV's stunning 99 MPG of gas equivalent! Not only is it lighter, but the carbon shell is also five times stronger than a steel vehicle body. The drawback of this technology is that it is considerably more expensive. Research is needed to improve the manufacturing of this material and lower its cost. The efficiency gains from such a technology will be tremendous.

Lightweight, Efficient, Hydrogen Fuel Cell Vehicle Research/Prototyping

Hydrogen fuel cell powered vehicles are one of the key components in the conversion to a hydrogen economy. These funds will provide research in key areas of hydrogen-powered transport.

Efficient and Low Cost Hydrogen Fuel Cell Research

Hydrogen fuel cells are devices that are fed hydrogen and combine it with oxygen from the air to produce electricity and no emissions except 100% pure water. Not only will fuel cells take advantage of mass production, but technological innovations will also allow for incredible improvements in this essential technology. Fuel cells are the key ingredient in zero-emission, hydrogen-powered vehicles. Burning hydrogen in a combustion engine does produce a small amount of nitrogen oxides (one-fifth the amount of nitrogen oxides produced by burning gasoline), but a vehicle powered with a fuel cell produces ZERO emissions.

Hydrogen Powered Airplanes Research/Prototyping

Conversion of commercial jets to hydrogen will likely require new body designs. When combusted, hydrogen does release a small amount of nitrogen oxides (one-fifth of the amount released by combusting jet fuel) and that amount can be decreased with intelligent designs. Research funds will address these and other issues.

Photovoltaic and Wind Turbine Research

Mass production is not the only important component of price decrease. Research for solar and wind technologies is vital to continued growth in the new energy industry. The US currently spends less than one-fifth of Japan's expenditures on renewable energy research. If the US is to remain competitive in this vital and explosive new industry, considerable funding of domestic research programs is essential.

Carbon dioxide into Carbon and Oxygen Research

Since the dawn of the Industrial Age, man has increased the Earth's atmospheric carbon dioxide levels by 30%. Since it is unlikely that the world's inhabitants will completely stop carbon dioxide emissions anytime soon, it could be very beneficial to begin to undo the damage that we have done for over a century to our home planet. Other compounds (like water) can be split into their base elements. It would be a great asset if a process to separate carbon dioxide into carbon and oxygen that is environmentally clean could be developed.

3. Program Administration, Marketing, Education, Publicity

In addition to the financial support the program provides, it is imperative that the public be educated about the program and how it is designed to benefit them. The public needs to have one source for consistent and easily understandable information about the options available to them through the program. Currently, purchasing and installing wind and solar generation devices is a very complicated procedure and is too challenging to expect wide-scale adoption of these technologies at residences without greatly simplifying the process. This fully integrated campaign will provide a one-stop resource for interested participants.

RENEW Program Tax Revenue

Year	1	2	3	4	5	6	7	8	9	10
Tax on Oil										
\$Tax/Barrel Oil	\$2.94	\$2.94	\$2.94	\$2.94	\$2.94	\$2.94	\$2.94	\$2.94	\$2.94	\$2.94
Billions of Barrels/Year	7.28	7.22	7.16	7.10	7.00	6.88	6.74	6.60	6.43	6.24
Revenue From Oil Tax (\$B)	\$21.39	\$21.22	\$21.04	\$20.87	\$20.59	\$20.24	\$19.82	\$19.40	\$18.91	\$18.35
Tax on Coal										
\$Tax/Ton Coal	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00
Millions of Tons of Coal/Year	1000.00	992.44	981.33	964.89	929.33	858.22	724.89	524.89	333.33	111.11
Revenue From Coal Tax (\$B)	\$4.00	\$3.97	\$3.93	\$3.86	\$3.72	\$3.43	\$2.90	\$2.10	\$1.33	\$0.44
Vehicle Registration Fee										
Average MPG of Gas Vehicles	20.00	21.00	23.00	25.00	27.00	29.00	31.00	33.00	35.00	37.00
Millions of Gas Vehicles	230.00	229.00	228.00	226.00	223.00	215.00	205.00	185.00	165.00	140.00
Registration Tax Revenue (\$B)	\$9.20	\$9.05	\$8.78	\$8.48	\$8.14	\$7.63	\$7.07	\$6.20	\$5.36	\$4.41
Total Revenue (\$B)										
	\$34.59	\$34.23	\$33.75	\$33.20	\$32.44	\$31.30	\$29.79	\$27.69	\$25.60	\$23.20

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RENEW Program Estimated Solar Energy Cost Sheet

This Purchase (GW)	Total Purchased (GW)	\$/Watt	Percent Reduction in Price Due to Doubling Capacity	This Purchase Cost (\$Billions)	Total Cost (\$Billions)	Cents/kWh Given 25 year Panel Life	Cents/kWh Given 40 year Panel Life	Billions of kWh Generated
0.55	0.55	3.000		1.65	1.65	6.575	4.110	1.0
0.55	1.10	2.400	20	1.32	2.97	5.260	3.288	2.1
1.10	2.20	1.944	19	2.14	5.11	4.261	2.663	4.1
2.20	4.40	1.594	18	3.51	8.62	3.494	2.184	8.3
4.40	8.80	1.323	17	5.82	14.44	2.900	1.812	16.5
8.80	17.60	1.111	16	9.78	24.22	2.436	1.522	33.0
17.60	35.20	0.945	15	16.63	40.84	2.071	1.294	66.0
35.20	70.40	0.812	14	28.60	69.44	1.781	1.113	132.0
70.40	140.80	0.707	13	49.76	119.20	1.549	0.968	264.0
140.80	281.60	0.622	12	87.58	206.78	1.363	0.852	528.0
281.60	563.20	0.554	11	155.89	362.66	1.213	0.758	1,056.0
563.20	1,126.40	0.498	10	280.60	643.26	1.092	0.682	2,112.0
1,126.40	2,252.80	0.453	9	510.69	1,153.95	0.994	0.621	4,224.0

The data contained in this worksheet is based upon historical photovoltaic industry data where the price per Watt has decreased by 20% for every doubling of output capacity. 2003 global photovoltaic production was approximately 550MW.

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Renewable Energy & National Economic Wealth (RENEW)

Sources for Data Given in the RENEW Presentation

1. Millions of jobs have been moved overseas, for example 2.1 million manufacturing jobs have been lost since 1998. (US Bureau of Labor Statistics)
2. The US trade deficit removes \$500 Billion annually from the US economy. (CBS News)
3. The Federal government's estimated budget deficit for the next five years is \$1.4 Trillion. (Congressional Budget Office)
4. The Federal debt has ballooned to nearly \$7,000,000,000,000. (Bureau of the Public Debt)
5. Federal Reserve Interest Rates are at a 45-year low. (CBS News)
6. The US consumes 840 million gallons of oil EVERY day. (Energy Information Agency)
7. 60% of US oil consumption is imported, removing \$120 billion from the US economy each year. (Energy Information Agency)
8. The US emits 25% of the entire world's greenhouse gas emissions. (Energy Information Agency)
9. 99% of these emissions come from burning and processing coal, oil, and natural gas. (Energy Information Agency)
10. EPA estimates that the economic damage from burning a single gallon of gas is \$0.26-\$0.55, and a similar amount for coal and natural gas. This only covers expenses from irrigation, crops lost to drought, moving farms, etc. (Environmental Protection Agency)
11. Frequent droughts in the Midwest and Great Plains—a large source of the nation's food supply. (Environmental Protection Agency, Intergovernmental Panel on Climate Change)
12. Reduction in snow pack on the Rocky Mountains (perhaps 90%)—a large source of Western US fresh water. (Environmental Protection Agency)
13. The ocean will rise 2 meters by 2100. (Environmental Protection Agency, Intergovernmental Panel on Climate Change)
14. Semis use the most fuel and produce the most pollution. (US Dept of Transportation)
15. Semis are about 1% of vehicles on road, so the conversion is on a small scale. (US Dept of Transportation)
16. Oil companies own large portions of solar cell manufacturing companies, so a switch to renewable energy would actually benefit them. (Shell Solar, BP Solar, ChevronTexaco, etc)
17. Every state in the nation either receives a large amount of wind, a large amount of solar radiation, or both. Every state will profit from RENEW. (National Renewable Energy Laboratory)