Climate Tech Research Labs $5 Million

For research of Air Capture in: Water Vapor and Carbon Capture

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Water, electricity, and carbon are focus of this Research Venture:

For example, water all over the world is becoming more difficult for ~2 billion people to get in undeveloped countries, refugee camps, the western USA and desert countries. We plan to demonstrate a proof of concept for several technologies that have the potential to change civilization while fighting the climate crisis. Kent Bingham was an associate who passed several years ago. His work in this field has set the foundation for this technology transition and is shown in his Oasis Machine Description from 5 years ago which is located at projectsummary.pdf (lloydgoff.com)

This Climate Tech company will be known as Bingham Labs. It will startup as a $5 million Joint Venture with a capital provider getting 50% ownership and getting repaid before the management team shares in their 50% of the profits. The first $500,000 needed to launch the company will be allocated to operating a muti facetted company including administration, office, overhead, fund raising and reserves. One option for the capital investor is how to structure each research venture of the company for losses, spinoffs, and profits. For example, should each research project be a separate entity such as a Special Project Vehicle (SPV) or something equivalent so that the remainder of the company is protected from any loses and future investors choose only the technology they are interested in. This would also give the company a way to expand. Or should everything be lumped together into one company?

Methodology Template: The first project will be to form a company and get a team built for research, for administration and marketing allocating an initial $500,000. The company will have three or more projects over the first two years that will share a three-step methodology: 1. Survey the existing research industry in each field and create a database of people and technology. 2. Collaborate with this industry on writing the specifications for a demonstration model. 3. Issue RFP for two or three companies to consult and assist with a demonstration model. As the research progresses beyond demonstrations, it will be exposed to additional capital for engineering into a manufacturable machine. Here are three research ventures that can contribute to the Climate Crisis. All that contribute will have access to share in the data the project generates until additional funding is added. More Climate Tech research projects can be added using the Special Project Vehicle funding arrangement as investors are found. We also plan to Compete for prize money - Elon Musk is offering $100 million for the

winner(s) of the best new carbon capture base on 3 conditions. There are others offering smaller prizes like foundations, and associations. We plan to also go after grants and DOE funding. The bill passed in August will revitalize Climate Tech. with $100s of Billions.

Management:

The Research Lab will be managed by Don Deptowicz who has an extensive background in technology projects. Don Deptowicz is a Results Oriented Senior Executive with an outstanding track record in engineering, program management and quality. He excels at being an inspirational and resourceful leader. He is known for innovative and creative thinking in the areas of both product and process designs involving advanced materials and coatings. He is an exceptionally skilled communicator, with the ability to build effective and productive working relationships across all levels of the organization and the value chain.

Don graduated from Purdue University and began his career in 1976 at UTC's Pratt & Whitney Engine Division in West Palm Beach, Florida. Here, he led fundamental changes in both product and manufacturing process technology, covering the full life cycle of Military Aerospace Propulsion Systems.

Don has over 46 years of experience in the aerospace, automotive and electronic industries. Prior to this, he was the Director of Technical Excellence for PCC Airfoils LLC, where he championed the collaborative effort across engine OEMs and casting suppliers in conjunction with the Air Force ManTech vision of Attaining Next Generation Agile Manufacturing.

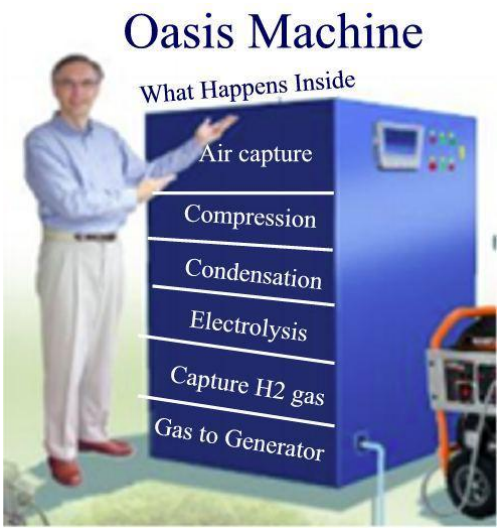
Lloyd Goff -has more than 50 years putting projects together for Real Estate development and/or Sales. Educated in Architecture at the University of New Mexico in 1965 and was the University of Colorado's first Gradate for a 1971 Master's Degree in Urban and Regional Planning. A design portfolio of more than 40 projects is available in his on-line Bio. Goff met Kent Bingham in 1995 and for over twenty years they collaborated on Skyways, the Oasis Machine and Pedestrian Villages until his passing in 2018. Goff was Kent's Business manager and will be responsible for the business affairs of the company included accounting, legal, staffing and marketing.

Daren Dozier is a computer information Technology Specialist. He builds web sites, works social media, and manages companies' computer networks. The Tech Industry has been his career path for over twenty years.

The First Project is an Oasis Machine Demo

Mission: To change the world by providing inexpensive water and electricity off grid anywhere.

This project will collaborate with existing companies in air capture that will explore our set of Performance Goals and build 2 to 3 scale-demonstrators to show much water we can get with our initial configurations. This has the potential to grow into a Multi-$Billion industry.



The Problem: is to avoid America from turning back into a dust bowl like the it did in the 1930s. This time the problem is much larger and these machines need to be everywhere. Which means they need to be off grid electricity by generating our own. To solve this is a specific configurations of electrode surfaces, coatings, and additives used in the Electrolysis of water to break it down into the cleanest Hydrogen and Oxygen possible for operating a generator. Previous research showed the quality of the hydrogen from etching and coating material was overly sensitive to a successful operation. Three metals stand out as catalysts for breaking the bond of hydrogen to Oxygen. They are chromium, manganese, and iron. Here is a new catalyst and a Japanese one. Cleaner Hydrogen is the goal. A new kind of water: When you rapidly heat and cool water, it weakens the hydrogen bonds so it can more easily be split into Oxygen and HYDROGEN… producing LOW-COST HYDROGEN FUEL!! You may wonder how much water vaper is in the atmosphere so an estimate of the water vapor in the air Globally-363 Trillion gallons. This research will also investigate the feasibility of electrolyzing water vapor before it is condensed into water.

A solution: An Oasis Machine requires a critical part needed to generate both power and water. Our goal will be to generate 1 to 2 KW and/or hundreds of gallons per day of water on top of each column for 72 columns per mile. Electricity from the grid is too expensive to operate this machine so it is necessary to generate our own electricity off grid using an Electrolyzer. In today's technology it is estimated that 1 gallon of water will produce .5 Kg of hydrogen.

(The molecular weight of water = 18g/mol, and 2g of each 18g is hydrogen atoms, then the answer is 2/18 of the total starting material. 1 imperial gallon weighs 4.54kg or so, depending upon temperature, 4.54kg x 2/18 = around 0.5kg of hydrogen to be had).

Our director of research Don Deptowicz has built an engine that is capable of utilizing hydrogen which can be scaled down to a utility

sized shoe box. This project will study and demonstrate how many hours of use and what size a small hydrogen motor will need to generate 6000 watts per day. For example, here is a small hydrogen motor about the size of an old computer. Here are the issues to deal with using hydrogen as a fuel.

New Aquarius Engine Generators from Israel runs on Hydrogen and could be used to generate electricity. A new technology Solar to hydrogen also looks promising. Here is a new Electrolyzer showing how compact they can be. Photocatalytic water splitting shows how sunlight can be used to split water. By many methods waters splitting can provide a new source of energy capable of changing civilization.

Case Studies:

The sustainment of humankind requires water for agricultural production and for cellular functions of which all organisms are comprised of.

A new Dust Bowl? Rivers and Lakes are drying up worldwide:

Hoover Dam and Lake Meade Down 70%
Water shortage at Hoover Dam causing concern

40 million People Rely on the Colorado River, and Now It's Drying Up UTube Video (wait for it)

California Farming and land is sinking

Rio Grande River Running dry
More on Rio Grande

Ogalla Aquifer Kansas to Texas Running Dry

Yangtze River China's Beating Heart
https://www.youtube.com/watch?v=PWnWE-wJIjc

Funding:

$500,000 First few months - Set up the company, legal work for a long-term financial structure such as SPV or IPO, organize the team, survey the industry and reserves.

$2,000,000 For two years-research and development of Oasis Machine with two or three configurations using differing components. First, we will hire someone to survey the emerging industry for talent, contacts, and technology. This will become a database for "State-of-the Art". Then we will look for consultants to help us create two maybe three demonstration models with different configurations. We will engage an experienced physicist to write the specification for a prototype, who is well known in this cottage industry of innovators. We know one who worked with Bingham and he wrote a book on using water for its energy.

$1,500,000 for one year- value engineering, testing for a prototype, cost/sales projections and market feasibility. Find manufacturing solutions. This is where we bring in the Beta Testers. This may be a group of companies that can use the technology in their business, or it could be professional lab companies that test products.

$1,000,000 for 9 months evaluating the marketplace, marketing materials, marketing team and negotiates with federal agencies for additional demonstration funds.

Research Budget for the First Year:

72,000	Administration	legal, accounting, reporting, budgeting and planning
120,000	Chief investigator	research, engineering, parts, consultants
35,750	Office manager	visitors, calendar, daily log, Services
124,000	Researchers (2)	technologies, other teams, publishing,
62,000	writers (2)	part time workers explain the technologies
44,000	Grant writer	applying for additional funds
32,900	CPA	accounting and reporting
43,500	Legal	attorney for contracts, research/reporting
48,000	Rent/Furnishings	small office for staff and technologies
5,750	Internet	various costs for team members
28,500	Web Site	team library and outside inquiry
4,500	Cell Phones (5)	latest tech in cell phones and plans
30,000	Computer Hub	equipment for our team and out side communications
45,000	Info tech manager	managing all the connections, video conferencing & data
11,250	Social media	watching what is happening elsewhere
34,500	email marketing	attracting worker and staying in touch with the industry
42,000	video production	capturing the new knowledge in a visual format
33,000	animation	visually explaining how things work
28,000	streaming video	regular discussions with the industry

37,000	conferences attend	watching other technology, meeting workers, exposure
52,500	travel	viewing other labs, meeting people, attending conferences
57,000	Procurement manager	finds, acquires chemicals, tools, machined parts
77,000	Spreadsheet analysis	costs to build various configurations, feasibility of operations
92,500	Hydrogen engines	builds several small utility engines
200,000	Demonstration Models	physicist, components, some engineering, testing
4,450	Insurance	office and equipment liability and casualty
32,868	Fees approx. 1.5%	taxes, city business and worker fees
1,397,968	**Total Spending per year for 2 years**	
213,082	Reserves	There are always unpredictable expenses

Some Water Economics

If we can get an Oasis Machines to pull 1,000 gallons of water per day from the air at an average 30% humidity, this would provide 365,000 gallons per year per machine. One acre foot equals 325,850 gallons. So, one machine could provide about 1-acre foot of water per year. In Colorado acre foot of water used to cost $15,000 per in 2010. Now with Municipal Water Districts becoming the highest bidders over farmers, the cost has soared up to $58,000 per a/c foot. The City of Greeley requires developers to buy water and donate it to the city or pay $31,000 per acre foot. The vast majority in other states, such as California, Nevada, New Mexico and Washington, don't have this feeding frenzy yet and sales are occurring at much lower prices to farmers more like $500 to $1,000 per a/c foot historically. But with everything drying up everywhere, water is going to become much more expensive. If an Oasis machine earned $5,000 per year and costs $50,000 that would be a 10% return. If the costs were $20,000 per machine that would be a $25% return on $5,000 revenue per year.

Cost of manufacturing is the big unknown at the moment. For example, at $10,000 per machine, it would cost $100 million for 10,000 machines spread out along 1000 miles of the river. But what if, the cost was $20,000 or higher. Can these cities or rivers afford not to use this new technology in a water starved world? Once an industry is established mass manufacturing should bring even high cost down to more reasonable costs. Assuming we can get 1 acre foot per year from each Oasis Machine, the market could be huge over the next 30 years such as 5 million machines in America alone. Major competitors will jump in because it is not so complicated and the technology will be badly needed. When successful, it can go anywhere, it can supply existing land uses and even start new communities. The main use we are after is a small Atmospheric Water Generator that can run anywhere off grid. Farmers use 85% of Americas water on crops and urban uses are only 15% for all the different needs. If it were bottled it could bring over $2 million per a/f. As the

world continues to dry out, water could become more expensive than gasoline and hydrogen could become its replacement.

Only 5 to 8% of the water vapor falls annually as rain or snow to restore all the rivers, lakes, aquifers on earth. And the water vapor is also renewed annually. So, there is plenty of water vapor to use without damaging the atmosphere. In addition, a warmer atmosphere stores more water which makes storms more intense.

The size of the market depends on Impacts an Oasis Machine can address:

Here are examples of why the market is so large. An extreme heatwave and drought has been roasting China for 70 days straight, something that "has no parallel in modern record-keeping in China, or elsewhere around the world for that matter." "Included among these terrible events are record-breaking heat waves in the Pacific Northwest of the United States and Canada, killing more than 100 people. One commentator believes this is not just a 1200 year drought, but the beginning of permanent aridification; With examples like the early onset of wildfires in the West; devastating droughts across many parts of the United States and major rivers drying up worldwide you have to wonder. . Lake Mead is near Las Vegas and supplies the water to Hoover Dam. The water level is down nearly 2/3 over the past 2 decades and if it drops by another 150 feet the electric generators will not have enough water to operate. Hoover Dam supplies over 2,000 megawatts to Los Angeles, Phoenix, and Las Vegas. This is enough to supply the needs of 8 million homes. Here is a scenario that could put a dent in the problem. The technology already exists today, but the costs are much higher as each machine is handmade. Manufacturing of much smaller units could bring the costs down to this level. There are many unknowns that research can resolve like power requirements and maintenance, but the gist is it appears an Oasis Machine can make a sizable dent in this the earth drying up for less money. Here are some Relevant links: Lake Mead

https://www.youtube.com/watch?v=NCBG_aVkv4s California is Sinking
https://www.youtube.com/watch?v=2kgLzSwL7kE Vanishing Groundwater
https://www.youtube.com/watch?v=RjsThobgq7Q

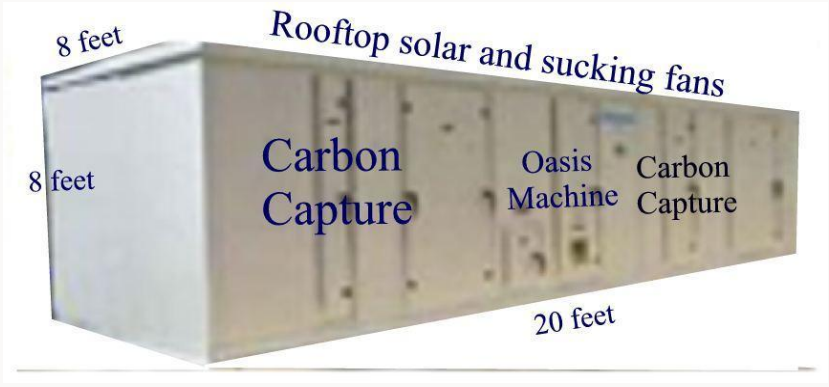
A Hydrogen Hub:

The Dept of Energy has opened applications with a $7 Billion budget to establish 10 regional Hydrogen research centers across America. Participants described the importance of public-private partnerships to reach the Energy Department's "1-1-1" goal of reducing the cost of clean hydrogen by 80% to $1 per one kilogram in one decade.

The Next Project is A Carbon Capture Demonstration Model:

When we have a demonstration model Oasis Machine, we will start looking at the Carbon Capture using the technology from the Oasis Machine. It may require additional funding, if the original $5 Million is used up. What is carbon Dioxide and how does it warm the

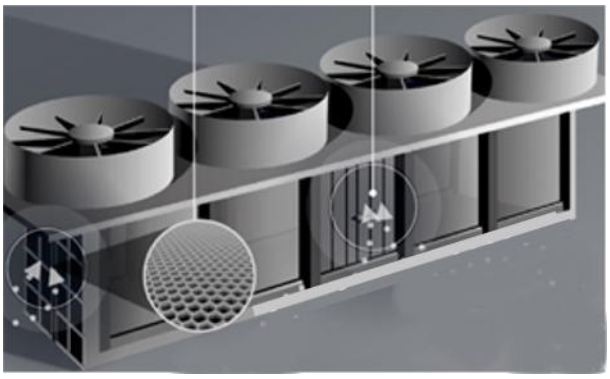
earth. A Carbon Capture Machine is a companion project that is dependent on the Oasis Machine for electricity and perhaps water. It is expected to be about a 20' size like a shipping container When we have a demonstration model Oasis Machine, we will start looking for the Carbon Capture technology. Goal is 1,000 tonnes per year per machine. See the 5 Best Ways to pull carbon from the air. There are emerging New technologies that can make air capture more feasible. The air passes over a sorbent filter that traps the carbon dioxide and heats up the filter to 212 degrees, which releases the trapped carbon dioxide. Here is an M.I.T. Solution and the US vision for carbon Capture. Most Carbon capture today is focused on smokestacks where the carbon is very dense in one place. But that is expensive $50 million or so per site and the plant doesn't remove the ambient carbon dispersed all over America in less density. Below is the industrial size for removing 1000 tonnes p/y. Is collaboration possible? Berkley Labs is working on a Carbon Capture absorbent. New materials are announced regularly like this textile filter that absorbs carbon.



Why Research Is Needed:

This research venture will follow the same template as the Oasis Machine with a survey of the industry and then an RFP among the industry to find the consulting talent the project needs. Building public confidence in air capture is a must. There's an increasing need for gas separation membranes. Some say with existing technologies, we would need to treat 1.25 million cubic meters of air to capture one tonne of CO2 per year. Better technology is needed. And that is the purpose of this research. Currently Carbon Capture is energy intensive when using the grid, that is why the oasis machine must come first to supply cheaper energy. If we could afford 5 million units placed along all our Interstate Highways, and if we can get to 1,000 tons per year each, then the goal of 5 billion tonnes per year of carbon could be attainable. Here is some computer modeling of Climate warming showing the need for such air capture. Even if we could stop all future emissions, there is still an estimated 400 billion tonnes over America that has accumulated for the past 125 years. Once diluted by atmosphere to 420 ppm, the volume of CO2 equivalent to a layer over the entire US land surface 1.8 m thick. This is the driver of today's climate change, and it must come out over the coming decades. It will cost $trillions but can investors make money on the technologies? This study will look into how. There are many new technologies for air capture. Here is a new sponge like material to capture the CO2. Here is one called mechanical trees. The Department of Energy is

offering funds and resources on Carbon Capture research. The US government has allocated $12 Billion for research and development in establishing a carbon industry. The big cash behind Carbon Removal. DOE also published the Carbon Negative Shot
The estimates online for CO2 in the American atmosphere is 400 billion metric tonnes. Thus, the need for massive CO2 removal. If each machine could capture 1000 tonnes per year, it would take 10 million of them spread out along the highways, farmlands, forests, and urban areas to generate 10 billion tonnes per year of carbon removal. By manufacturing small machines like this, the price can be reduced from the huge $50 million costs at power plants. Today's carbon price varies but the lowest is about $20 per tonne but estimates for the next 10 years go up to $100 per tonne. The research will also investigate the feasibility for revenues and costs to operate. Other questions like: How much energy does the machine require? How it stacks up against the competition will be investigated?



Can we engage the competition to collaborate on Climate Tech as a national enterprise? Global Thermostat has an air capture machine shown here that is very far along and similar to what we envision.

Elon Musk's $100 Million competition is for a machine with a minimum of 1000 tonne removal py. So, the industry thinks this size is possible. Iowa State announced a 1000 tonne Carbon Removal per year entry. The changes just keep coming. A Use of Funds Budget will be crafted when more information is available.

Two centuries of CO2 have toxified the atmosphere, if we don't get the CO2 out of the air sooner than30 years, mankind could be facing climate collapse. The bipartisan infrastructure bill President Biden signed into law last month provides $3.5 billion to create four regional direct air capture hubs with the capacity to capture and sequester at least 1 million tons of carbon annually. It also sets aside $100 million for a commercial direct air capture technology prize and $15 million for a pre-commercial competition.

The Third Project Is $1,000,000 to Develop CO2 Utilization Templates:
Following the format of the other two research ventures, the initial effort will be to survey the industry to find the "State of the Art" for Carbon Storage. "Where to put the carbon emissions is the big issue: Taking CO2 out of the air and using it to help plants grow could be THE GREENING OF AMERICA. Carbon Dioxide can be used for crops, forests, and

urban landscaping. For example, one tree absorbs one tonne of CO2 over 40 years. How much can an acre of corn, or vegetables absorb?

Higher concentrations of carbon dioxide make plants more productive because photosynthesis relies on using the sun's energy to synthesize sugar out of carbon dioxide and water. Plants and ecosystems use the sugar both as an energy source and as the basic building block for growth. When the concentration of carbon dioxide in the air outside a plant leaf goes up, it can be taken up faster, super-charging the rate of photosynthesis." Link to a Soils Science Revolution. Companies can calculate this. How does the carbon get into soil? Most of the CO2 still has to be collected for processing. Precision Agriculture is coming. New technology is promising with indoor farming, 1,500 times more yield but at a high price for electricity.

Transforming Carbon Dioxide Into Industrially Useful Materials. There are many uses for carbon that could turn CO2 into a tradable beneficial asset that can make money. Here are the top 10 with estimated pricing. Below are some more detailed examples to storing the carbon dioxide such as:

1. CO2 batteries New CO2 batteries promise to store energy effectively
2. Soils sequestration farming, large rocks, oil wells
3. Cement made with CO2 can be permanently stored in concrete (video)
4. Diamonds - Turning CO2 into diamonds
5. Fuels - CO2 can be sequestered in fuels.
6. Microprocessors - New carbon prospects for electronics
7. Vodka- Carbon can be used to make Vodka and other Spirits
8. Materials- there are many building materials which can use CO2 like drywall
9. Other Materials- CO2 can use many other materials which, here are 10
10. Spreading rock dust on farms: a tantalizing climate solution

This study will focus first on soils, which is the largest storage option and calculate the best way to get crops and landscaping to absorb carbon dioxide. Vertical farming is a leading candidate as it can produce many more crops per year than outdoor farming and it is not subject to the outdoor heat from climate change. However, it consumes a lot of electricity. Soil carbon sequestration can not only store CO2 in the soil but also enhance agricultural yields. The One Trillion Tree Initiative. Smaller projects can be home gardens. What could 5 million home garden sized landscaping sites do for sequestration? As in the other two research projects a collaboration is planned, but this time among 3 universities to set up carbon crop labs and each one receives a $100,000 stimulus to establish a lab for measuring the amounts of carbon dioxide various plants can absorb. Composting can help forests grow. The single most expensive part of growing a field crop is the fertilizer which has become very expensive. Someday farmers may be able to replace fertilizers with carbon that could be cheaper. This will require some pipeline to deliver it. "There are over 5,000 miles of existing CO_2 pipelines already in the U.S. that is owned by 29 companies" See Maps. There will be a big business in building pipelines to collect the

CO2 for processing. The industry with the most experience in pipelines is the Oil Industry. Exxon is getting into R&D with a $15 billion pledge. Companies are coming up with ways to calculate the carbon footprint of buildings.

Future Project Fiber Optic Transmission/Media Demonstrations:

The fourth research venture will be "Fiber and Media Demonstrations"- This research will follow the same template used on the other ventures for $1,000,000. Underneath the guideway there is room to hang 5 to 6 pipes about 3" in diameter. These pipes can carry fiber optic cables with 72 strands in each. The carrying capacity of some strands can be multiplexed equivalent to 5 to 10 single fiber optic strands. Thus, the combined number of channels could grow into the thousands. Fiber optic cables solves a massive problem by removing congestion over the wireless networks. Research shows that 90% of all the digital information in use today has been created in the past 10 years. This means that the cables will fill up no matter what is put on them. But our idea is to introduce the newer media. This growing capacity will allow for all the existing forms of media plus new ones like Virtual Reality, Augmented Reality, Apple fi and 5G which is 60 times faster than 4G and even Spatial computing Holograms. Thus, creating huge new economic growth. ATT is marketing fiber connections for $110 for residential up to $190 per month for commercial depending on the speed. This tells us today's market.

In urban areas the fiber will go into a vault for connections, testing and access. These vaults will be about 8' by 10' and located at columns nearest to stations. A simpler system will be to handoff the final mile to existing telecoms in the area and let then use their networks or add wireless to the destination. In this scenario the local Telcos will be the customer and they will provide the electronics such as coders and decoders that change the photons used in the fiber into digital signals for transmission on their networks.

Another scenario is to build out the full technology and go for retail users. Along the guideways wireless transmitters can distribute and collect the cell phone signals to an audience of user's livings within miles of each side. The end user will have control of this media through his cell phone. The cell phone can navigate this use of his traveling schedules, reservations, and deliveries. The fiber media construction cost (for the 50,000 miles Interstate backbone + another 50,000 miles in the cities) could include $500 Billion of the $3 Trillion Economic Model. In this scenario the fiber will support 50,000 to 100,000 publishers in video, virtual reality and even holograms paying a higher fee to an audience of millions using their cell phones for access. New VR applications in sports, education, engineering, medical, entertainment, architecture and travel will create huge new revenues. They have not been calculated yet but are thought to double the amounts of other profits.

“The number one tool the U.S. has to speed the energy transition around the world is Innovation"