

American Innovation and Invention, the Pathway to Sustainable Economic Recovery

James Jordan and James Powell¹

“The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift.” Albert Einstein

To achieve the optimal investment in the economy which meets the global climate change and oil depletion imperatives, we recommend a shift to electric transport — electric autos and commuter rail for local trips and a high-speed National Maglev Network for intercity highway freight and passengers. Electric transport is inevitable because of the scarcity of oil and the lack of a viable liquid substitute that will not increase the threat of global warming or threaten long-term food security. The U.S. can seize the opportunity created by the current deep economic



recession, the collapse of the domestic auto industry, and the shaky and unaffordable supply of imported oil to take the lead in promoting generation of electricity from renewable fuels including nuclear and assisting in the start-up of new electric transport industries.

If we begin now to make the shift to electric transport and non-fossil electric power generation, by mid-century the American economy could return to a positive trade balance and have plenty of jobs based on these new industries.

American manufactured electric transport systems and renewable and nuclear electric power generation systems deployed in North and South America, Europe, Russia, Japan, Korea, India, and China could eliminate the climate change and ocean acidification threats, and remove the threat to global food security posed by biofuels. A modest investment of only \$600 million dollars in a 2nd generation superconducting Maglev Test and Certification Facility out of the \$8.1 billion dollar high speed steel wheel rail initiative appropriated in the recently passed American Recovery and Reinvestment Act would put the American superconducting Maglev transport system for passengers and freight on a level playing field with the test facilities built by the Japanese and German governments. It is wrongheaded and dysfunctional to the economic future of the United States to invest public funds in imported transportation systems just because they are ready to go while depriving the American inventors of a superior transport system the needed investment required to demonstrate the U.S. invented system and have an opportunity to attract private capital.

In good times — or good-enough times — the political will to beat back dysfunctional trade and competitiveness policies simply doesn't exist. Their negative effects are too diffuse, and their benefits to the fortunate too concentrated. A crisis changes the dynamic. It's an opportunity to do things you could not do before. Trade, investment, and regulatory policies that foster innovation, inventiveness and competitiveness need to be reviewed and changed to benefit the

American people who create and produce the goods and form the foundation of a new sustainable American economy. Now may be the time.

We believe that President Obama senses the need to take on the challenge of rebuilding America by fostering industries based on making real things and restoring American leadership. He seems to understand that we must globally and domestically compete in manufactured goods and nutritious food based on our comparative natural resource advantages, ingenuity, and innovation and bring real added value to the global marketplace. The President knows that all that American entrepreneurs and workers need is a level playing field.

On several occasions before and after the election, President Obama has referred to Maglev systems in China and Japan as the kind of high speed rail system that we can build in America. What he probably does not know is the system he admires in Japan is based on the inventions of Drs. James Powell and Gordon Danby. And probably does not know the potential of their new 2nd generation supercomputing Maglev system for uniquely moving freight as well as passengers at 300 miles per hour in all weather, using a very energy efficient, all-electric 2nd generation superconducting Maglev. Independent engineering analyses and fabrication and testing of the major components indicate that this system is much less costly to construct and operate than 1st generation Maglev and steel-wheel systems operating in foreign countries. Maglev eliminates the rolling friction and the noisy and dangerous rail distortion generated by the anvil effect of high-speed steel wheel-on-steel rail high-speed rail systems like those operating in Europe and Japan. Steel wheel systems are a costly maintenance nightmare. As GAO recently reported all HSR systems require public subsidy to cover their construction and operating costs.² The new high speed but yet undemonstrated 2nd generation Maglev system can be built and operated without a public subsidy by uniquely carrying high revenue highway freight trucks in special roll-on, roll-off Maglev vehicles and operating in both a planar and monorail mode which uniquely gives the 2nd generation Maglev the capability to electronically switch and operate in a levitated mode on conventional railroad trackage.

The stimulus (American Recovery and Reinvestment Act) contained \$1.3 billion for Amtrak and \$8.1 billion for high-speed intercity rail projects. The Secretary of Transportation announced a plan for the allocation of this money on April 16th. President Obama said at the announcement ceremony, ***“What we need, then, is a smart transportation system equal to the needs of the 21st century. A system that reduces travel times and increases mobility. A system that reduces congestion and boosts productivity. A system that reduces destructive emissions and creates jobs.***

What we're talking about is a vision for high-speed rail in America. Imagine boarding a train in the center of a city. No racing to an airport and across a terminal, no delays, no sitting on the tarmac, no lost luggage, no taking off your shoes. (Laughter.) Imagine whisking through towns at speeds over 100 miles an hour, walking only a few steps to public transportation, and ending up just blocks from your destination. Imagine what a great project that would be to rebuild America.

Now, all of you know this is not some fanciful, pie-in-the-sky vision of the future. It is now. It is happening right now. It's been happening for decades. The problem is it's been happening elsewhere, not here.

In France, high-speed rail has pulled regions from isolation, ignited growth, remade quiet towns into thriving tourist destinations. In Spain, a high-speed line between Madrid and Seville is so successful that more people travel between those cities by rail than by car and airplane combined. China, where service began just two years ago, may have more miles of high-speed rail service than any other country just five years from now. And Japan, the nation that unveiled the first high-speed rail system, is already at work building the next: a line that will connect Tokyo with Osaka at speeds of over 300 miles per hour. So it's being done; it's just not being done here.

There's no reason why we can't do this. This is America. There's no reason why the future of travel should lie somewhere else beyond our borders. Building a new system of high-speed rail in America will be faster, cheaper and easier than building more freeways or adding to an already overburdened aviation system -- and everybody stands to benefit."

Given our economic situation and overwhelming trade deficit, we would be irrational to stop the developers of the American 2nd generation superconducting Maglev system from demonstrating its lower costs and higher performance because of opposition by the established competitive interest lobbies, mostly foreign manufacturers of high-speed rail equipment and domestic airlines, that are using the Congress and the Department of Transportation to stop demonstration of the Powell and Danby's 2nd generation Maglev system and prevent its deployment to form an urgently needed National Maglev Network.

President Obama's reference to Japan's 1st generation Maglev system, which is based on Drs. James Powell and Gordon Danby's original superconducting Maglev inventions, has carried many thousands of passengers at speeds up to 361 mph, the World Record. Even during a very long recession, Japan plans to build a 300 mile Maglev line between Tokyo and Osaka, to carry 100,000 passengers daily with a trip time of 1 hour.

In a recent article³ by Dr. Yoshiyuki Kasai, the Chairman of Japan Railways, the constructor of Japan's Maglev line and operator of the Maglev Test Facility at Yamanashi, recommends that ***"the most effective future train system for the United States would be a maglev transit line. If such a network was in place, people in New York would be able to participate in an early-morning meeting in Washington without the bother of having to go to and from airports at both ends. Likewise, transcontinental maglev services could supersede aviation networks."***

Dr. Kasai recognizes that Japan's steel wheel High Speed Rail (HSR) is a fully mature technology, and any advances in its technology will only be marginal. In contrast, Maglev technology is still evolving. The 1st generation German (i.e. China) and Japanese systems are still too expensive and limited in capability and revenue potential to be implemented in the U.S. Like HSR, they must be government subsidized. In effect they are like the pre-World War II DC-3 airplanes. If passenger air travel had remained at that level, instead of evolving to modern jet airliners, air travel today would be an oddity.

Realizing this Drs. Powell and Danby have continued their work on Maglev and have developed the advanced 2nd generation Maglev System. It has the following major advantages compared to 1st generation Maglev and HSR systems:



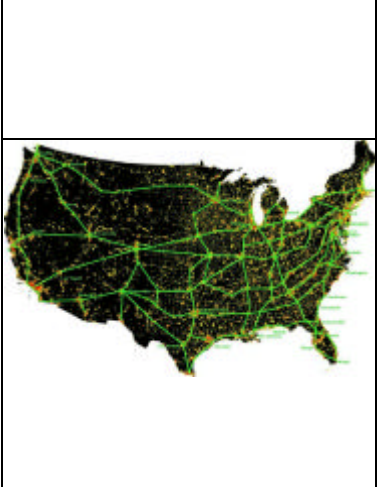
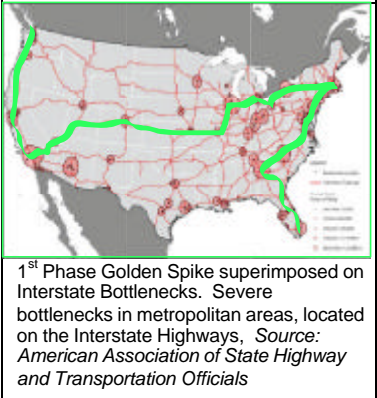
- Much lower construction cost and faster less disruptive construction, using mass produced, low cost prefabricated guideways.
- Very short payback time of construction cost, under 5 years, by transporting high revenue highway trucks as well as passengers.
- Does not require government funding and subsidy – can be privately financed.
- Can function as a 25,000-mile interconnected National Maglev Network, transporting people and goods at 300 mph to all cities in America, not just a few isolated cities.
- In combination with electric autos, can virtually eliminate the need for oil imports.
- Greatly reduces carbon dioxide emissions (today's U.S. transport emits as much carbon dioxide as our coal power plants).
- Can travel levitated along existing RR tracks to serve urban and suburban areas, by attaching very low cost thin panels that encapsulate aluminum loops to the RR cross-ties – no need for new expensive and disruptive infrastructure.
- Provides hundreds of thousands of new high tech jobs and many Billions of dollars of exports per year as a major new American industry (Using the GAO multiplier, we calculate that the Maglev Network would create 1.2 million jobs and as exports of Maglev equipment develops this number could double.)
- Greatly reduces adverse public health effects from auto & truck pollutants and micro particulates

Powell and Danby's Maglev organization, with only a few million dollars in Federal and State funds has successfully fabricated and tested full size prototypes of all of the components for the 2nd generation Maglev II systems. The next step is to assemble vehicles and test them at a Maglev Test Facility, which will require government funding. This is estimated to cost about 600 million dollars (about 11 hours of oil imports) to build the Test Facility and carry out operational testing as a public carrier. Once certified, the National Maglev Network would start construction.

The 6000 mile first phase of the Network, the Golden Spike Project, would connect Maglev routes running along the East (Maine to Miami) and West (Seattle to San Diego) Coasts with a transcontinental Maglev line through Chicago, Denver, and Las Vegas. If we can get started this year out of the Stimulus Funds, The Golden Spike would be fully operational by May 2019, the 150th Anniversary of Lincoln's Transcontinental Railroad. The full 25,000 mile National Maglev Network would be fully completed by 2030 AD. Total cost, to be privately financed, would be approximately 600 Billion dollars, about the cost of 1 year's worth of oil imports.

The alternative to the National Maglev Network? Ever scarcer and more expensive oil imports from unstable foreign sources, with an inevitable shift to synthetic fuels from coal and oil shale, which will double carbon dioxide emissions and be environmentally catastrophic. There will be no hope of achieving an 80% reduction in Carbon Dioxide emissions by 2050 AD.

National High Speed Superconducting Maglev Network

	<p style="text-align: center;">1st Generation Superconducting Maglev</p> <ul style="list-style-type: none"> • Invented by Powell and Danby in 1966 • U.S. did not develop – Japan did and built Powell & Danby’s 1st generation system • Successfully operating at Yamanashi, Japan – World Speed Record @ 361 mph, has carried well over 50,000 passengers • Japan Plans 300 mile route between Tokyo & Osaka with 100,000 passengers daily • Passenger only – high guideway cost (60 M\$/mile)
	<p style="text-align: center;">2nd Generation Superconducting Maglev</p> <ul style="list-style-type: none"> • Developed by Powell & Danby over last 12 years • Maglev 2000 Guideway can transport intercity trucks, freight containers & personal autos as well as passengers • Low-cost prefabricated guideway (22 M\$/mile; 2008 est.) can be rapidly erected at site by conventional cranes • Revenues from 3000 Trucks/Day on Maglev-2000 Route (1/5th of highway traffic = 180,000 passengers/day) • Levitated Maglev-2000 vehicles can travel on existing RR tracks in urban & suburban areas • Full-scale Maglev-2000 hardware (magnets, beams, etc.) has been manufactured & successfully tested
	<p style="text-align: center;">National Superconducting Maglev-2000 Network</p> <ul style="list-style-type: none"> • 25,000 mile network connects all major metropolitan areas in U.S.; 70% of U.S. population live with 15 miles of a maglev stations • Built on rights-of-way along U.S. Interstate Highways and railways • Construction payback time less than 5 years for 3000 trucks/day on routes – attractive for private investment • Cost of travel for passengers much less than by air, rail, and driving • Trucks can roll-on to Maglev-2000 vehicles and travel thousands of miles @ 300 mph to a Maglev station near their destination at less cost than by highway
 <p><small>1st Phase Golden Spike superimposed on Interstate Bottlenecks. Severe bottlenecks in metropolitan areas, located on the Interstate Highways. Source: American Association of State Highway and Transportation Officials</small></p>	<p style="text-align: center;">Golden Spike: 1st Phase of Nat'l Maglev Network</p> <ul style="list-style-type: none"> • 6150 miles of Maglev-2000 Network completed by May 19, 2019 (150th Anniversary of Transcontinental RR completion at Promontory, Utah) • E-W Route (San Diego – Las Vegas – Denver-Chicago – Albany – Boston) • N-S Routes (Seattle-San Diego & Boston – Miami) • Golden Spike project construction easier than Interstate Highway System, which built 10,000 miles in first 5 years & 20,000 miles in first 10 years

¹ James Jordan is the President of the Interstate Maglev Project (IMP). Dr. James Powell is the co-inventor with Dr. Gordon Danby of superconducting magnetic levitation transport technology. Their 1966 invention was developed by the Japanese and holds the World land speed record for transport at 361 mph. Their achievement has been recognized by their peers when they were honored with the Franklin Medal for Engineering in 2000. They are now developing Maglev II, a 2nd generation Maglev transport system, which is uniquely, suited for America's intercity transportation requirements for passengers and freight.

Compared to High Speed Rail systems like those in Europe and Japan, Maglev II is much more capable, faster (competitive with air travel), more convenient, more comfortable to ride, and much quieter, with much lower fares and much higher revenue earnings than passenger-only-rail, because it has the unique ability to carry high revenue earning roll-on, roll-off 18-wheel freight trucks and roll-on, roll-off personal cars. *The 2nd generation Maglev II system is the only high-speed ground transport system that can be privately financed, without massive government subsidies for construction and operation.* By carrying just 1/5th of the long distance truck traffic on a typical Interstate Highway, the route construction cost of the Maglev guideway can be paid back in less than 5 years, which will attract private investment to fund the 25,000-mile National Maglev Network proposed by the IMP. IMP has asked the Obama Administration to invest \$600 million dollars (= 11 hours of oil imports) in a Maglev Test and Certification Facility to demonstrate that this system is much more capable, more energy efficient and less costly than the European High Speed rail systems which the Congress appropriated \$8.1 billion in the recent American Recovery and Reinvestment Package.

² High Speed Passenger Rail: Future Development Will Depend on Addressing Financial and Other Challenges and Establishing a Clear Federal Role GAO-09-317, March 19, 2009

³ INSIGHTS INTO THE WORLD / High-speed railways gaining strategic importance Yoshiyuki Kasai / Special to The Yomiuri Shimbun