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January 27, 2016

California Assembly Budget Subcommittee-3 Resources and Transportation

P.O. Box 942849, Room 2003

Sacramento, CA 94249-0050

916-319-2050

Attention: **Richard Bloom, Chair**

Regarding: **Paper-3: The Green Train**

Dear Assembly Budget Subcommittee-3 Members,

There must be more oversight applied to the California High-Speed Train Project.

The project has not been planned well enough to be successful and is grossly lacking the capital needed to overcome its deficiencies.

The California High-Speed Rail Authority and its Board have routinely misled the public and the Legislature in an effort to justify funding and the need for the project to proceed with construction.

We are submitting to you a well-cited analysis that focuses on the claims made by the Authority in its June 2013 report, ***Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels***.

One claim the Authority makes is that there will be "zero net greenhouse gas emissions during construction" and the second is a "commitment to 100% renewable energy during operations".

The analysis begins with the assertion that a new Supplemental High-Speed Train Program EIR/EIS is called for at this time to address in an open and transparent way the claims being made by the Authority about the train's "greenness".

In examining the first claim this analysis seeks to roughly estimate total Green House Gas (GHG) emissions, direct plus indirect, from the construction of the statewide high-speed rail system and concludes that the Authority's tree planting scheme to mitigate construction emissions would require more than 5 million trees, living in perpetuity, or roughly 1/6th of all the trees in Oregon's private and public forests.

On top of that, the Authority has never addressed the additional GHG impact they will cause through the elimination of hundred of thousands of fruit and nut trees they knowingly will be destroying through construction of their approved alignment in the Central Valley.

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As of December 2015, the Authority had not started its massive tree planting GHG reducing project or explained how it will keep its trees alive or when they will begin or finish its GHG commitment.

The analysis concludes that the Authority, without its own future operating profits capitalized in advance of construction activities, the Authority lacks any means to fund the GHG emission credit schemes mentioned in its report, however inadequate they plan may be.

The second part of the analysis discusses the likely possibility that the Authority's train will not initially run on 100% renewable energy as claimed, but will in fact run on power generated entirely from fossil fuels, including coal.

The analysis then lays out steps the Authority would need to undertake, namely funding the construction of nearly 500 Mega Watts of new solar generating capacity, at an additional cost of \$2.2 billion, during the construction period and out to the year 2030, to make its claim a reality. The analysis finally concludes that a 30 cent per Kilowatt Hour "green power" electrical surcharge might result in the train running on green power, as opposed to the Authority's 3 cent per Kilowatt offer.

We would gladly compare this analysis and against any documents that the Authority has produced to date on this subject.

Proper oversight of the Authority would prevent the Authority from manipulating the public and Legislature out of billions of dollars that could be more effectively used elsewhere to address GHG.

Sincerely,

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Attachment: Pushing Back on the California High-Speed Rail Authority's Myths About High-Speed Rail Paper-3: The Green Train

cc: Edmund Gerald Brown, Governor State of California
Toni G. Atkins, California Speaker or the Assembly
Media
Mark Powell
File

**Pushing Back on the California High-Speed Rail Authority's Myths
About High-Speed Rail**

Paper 3

The Green Train

by Mark R. Powell
December 8, 2015

Paper 3

The Green Train

Abstract

This paper focuses on claims made by the Rail Authority in its June 2013 report, *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*. One claim is that there will be “zero net greenhouse gas emissions during construction” and the second is a “commitment to 100% renewable energy during operations”.

This paper begins with the assertion that a new Supplemental HST Program EIR/EIS is called for at this time to address in an open and transparent way the claims being made about the train’s “greenness”.

In examining the first claim this paper seeks to roughly estimate total emissions (direct plus indirect) from the construction of the statewide high-speed rail system and concludes that the Authority’s tree planting scheme to mitigate construction emissions would require more than 5 million trees, living in perpetuity, or roughly 1/6th of all the trees in Oregon’s private and public forests. However, without its own future operating profits capitalized in advance of construction activities, the paper concludes that the Rail Authority lacks any means to fund the GHG emission credit schemes mentioned in its report, however inadequate they may be.

The second part of this paper discusses the likely possibility that the Authority’s train will not initially run on 100% renewable energy, but will in fact run on power generated entirely from fossil fuels, including coal. The paper then lays out steps the Authority would need to undertake, namely funding the construction of nearly 500 MW of new solar generating capacity at a cost of \$2.2 billion, during the construction period and out to the year 2030 to make its claim a reality and concludes that a 30 cent/kWh “green power” electrical surcharge, as opposed to the Authority’s 3 cent/kWh offer, might result in the train running on green power.

Pushing Back on the Authority's Myths About High-Speed Rail

California High-Speed Rail Authority Myth #3

This is a Green Train

According to the California High-Speed Rail Authority there will be “zero net greenhouse gas (GHG) emissions during construction” and the Authority is making a “commitment to (use) 100% renewable energy during operations”¹.

Introduction

The millions of tons of CO₂e (carbon dioxide equivalent) in GHG emissions that will result from its construction and the actual use of coal and other fossil fuels to power the trains' operation are currently being hidden from the public. The Authority's 2005 *Final Program EIR/EIS for the Proposed California High-Speed Train System* predated California's Global Warming Initiative (AB 32). As a result, this important aspect of the high-speed rail program was never studied in a thorough and transparent way. This has opened the door for the Authority to make wild claims about its project's “greenness” that to date have largely gone unchallenged by the legislature, the public, and the media. It is just one more reason why all work should be halted on this project until a new statewide supplemental EIR/EIS is conducted and the truth about the greenness of this project, or lack-there-of , can be brought to light.

Part I – Net Construction Emissions:

Construction Emissions

The Authority has provided only limited information regarding construction emissions. Its June 2013 report, *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels* (2013 Emissions Report), itemizes 30,107 metric tons CO₂e² of direct emissions “from off-road equipment used to build the infrastructure, GHG emissions from on-road vehicles transporting workers or material, and used load factors to account for the actual performance of equipment in the field”³ for the first 29 mile construction segment (Construction Package 1). However, this figure does not include indirect GHG emissions associated with the manufacture and transport to the construction site of construction materials, primarily concrete, steel, and ballast, because the precise quantities, sources, and suppliers are not known⁴. This is at best a flimsy excuse for failing to report indirect GHG emissions.

The final deadline for contractors to submit proposals for Construction Package 1 was January 18, 2013. On April 17, 2013 Tutor-Perini announced:

“Its joint venture's bid, valued at approximately \$985 million, was recently identified by the California High-Speed Rail Authority (Authority) as the ‘apparent best value’ for the design and construction of the initial Madera to Fresno segment of the California high-speed rail system. The Authority's Board of Directors is expected to approve the design-build contract for this project in the coming weeks.”⁵

It is not credible that a world class engineering firm would submit a \$985 million bid without first estimating the tons of concrete, steel, and ballast that would be required to construct the project. Furthermore, in preparing their in-house cost estimate of the project, Tutor-Perini

would have had to assume sources and suppliers of the construction materials so as to estimate their delivered cost. In choosing to not disclose this emission source, one that must have been known to Tutor-Perini ten weeks before the Authority issued its 2013 Emissions Report, Tutor-Perini and the Authority are hiding from the public the main source of GHG emissions associated with construction of the first 29 miles of their project. Worse yet, Item 2665-306-6043 of the Budget Act of 2012 demanded of the Authority that it shall prepare a report before June 30, 2013 that “provides an analysis of the net impact of the high-speed rail program on the state’s greenhouse gas emissions.”⁶ The plain language of the Budget Act requires the Authority to estimate total construction emissions from their entire project, direct and indirect emissions for both Phase 1 and 2. Yet the Authority publishes only “direct emissions” from the first 29 miles of Phase 1. The question of how much in the way of construction emissions is being hidden needs to be asked and answered.

No literature could be found giving the percentages of direct and indirect GHG emissions associated with the construction of high-speed rail systems throughout the world. However, a report prepared by the World Bank entitled *Introduction to Greenhouse Gas Emissions in Road Construction and Rehabilitation* concluded that the fabrication and transport of construction materials (i.e. indirect sources) accounted for approximately 90% of the GHG emissions associated with the construction of expressways and national roads.⁷ Were this relationship to hold for construction of high-speed rail with its massive steel reinforced concrete viaducts, then total emissions of GHG associated with the first 29 mile construction section would be 301,000 metric tons CO₂e or approximately 10,400 metric tons CO₂e/mile. This extrapolates out to 5.2 million metric tons CO₂e for the 500 mile long Phase 1 Blended system; an amount higher than what the Authority calculates as the cumulative GHG reduction due to operation of the system out to the year 2030⁸. When extrapolated out to 800 miles of construction to account for Phase 2, total construction emissions reach 8.3 million metric tons CO₂e or 275 times the number provided by the Authority in their 2013 Emissions Report.

Mitigating Construction Emissions

With regard to the first 29 miles of construction, the Authority plans to mitigate construction emissions with a “multi-faceted forestry program (that) will introduce enough trees into the region where construction is taking place to honor the Authority’s commitment to offset the direct GHG emissions associated with construction.”⁹ The Authority does not answer the question: How many trees is “enough”? However, the Authority does cite the California Air Resources Board, *Compliance Offset Protocol for Urban Forest Projects 2011*.

The cited protocol provides an example of the gross carbon sequestered by a 15.6m (51 foot) hackberry (*Celtis occidentalis*) tree; .477 metric tons of carbon¹⁰. Converting carbon to carbon dioxide yields 1.749 metric tons CO₂e. Therefore, the gross carbon sequestration of 17,200 fifty-one foot tall hackberry trees would be “enough trees” to sequester the 30,107 metric tons CO₂e of direct construction emissions calculated by the Authority for the first 29 miles of the system. However, 172,000 such trees would likely be needed to sequester total (direct plus indirect) construction emissions and 3 million such trees would be needed to sequester the total emissions along the 500 miles of construction for Phase 1 Blended. Of course more trees

would still be needed because against “gross sequestration” the protocol mandates that CO₂ emissions from motor vehicles related to tree planting, care, and monitoring as well as CO₂ emissions from equipment related to tree planting and care be subtracted from the amount of gross carbon sequestered. Lastly, more trees must be continually planted to account for the mortality of trees so that the Authority’s forest of 3 million 51 foot tall hackberry trees could live in perpetuity. The additional 300 miles of construction associated with Phase 2 raises to total to nearly 5 million such trees living in perpetuity, an amount equal to 1/6th of all the trees in all of Oregon’s privately and publicly owned forests.¹¹

Certainly the planting of trees is an absurd means to mitigate total construction emissions and so the Authority has other plans to augment its tree planting program. Its Voluntary Emissions Reduction Agreement with the San Joaquin Air Pollution Control District involves the Authority providing funds for the “replacement of fossil fuel burning irrigation pumps with electric pumps, and the replacement of, or retrofit of vehicles with more efficient engines (that) have a GHG emissions benefit”.¹² The number of engines to be replaced is of course not specified.

A larger question left unanswered involves the funds the Authority will use to pay for tree planting and engine replacement. Private industry must mitigate the environmental impact of a given project with the profits derived from that project. If mitigation makes the project unprofitable, then the project is not built. The Authority’s mitigation efforts must be treated in the same fashion. Therefore, the only legitimate funds spent on mitigation efforts would be those derived from its anticipated operating profits, capitalized and provided upfront by private investment; a source of funds that does not exist. Worse yet, the Authority seeks to spend funds on mitigation that are derived from Cap-and-Trade fees whose sole purpose in the first place is to provide funds for the very same type of projects (i.e. GHG reduction projects) that the Authority claims it will provide. There is no reason to pass these funds through the hands of the Authority and then allow the Authority to claim it has mitigated its GHG emissions...even if it could.

Part II – The Illusion of a Train Powered by Renewable Energy Sources

The Authority claims that it will purchase power for the operation of its trains from a “renewable power mix of 20 percent solar, 40 percent wind, 35 percent geothermal, and 5 percent biogas converted to electricity.”¹³ It claims it can assure this supply by paying a 3 cent/Kwh premium for “green power”. Again, this claim is absurd. Electric power generation accounts for 31% of all U.S. GHG emissions.¹⁴ Assuming the same ratio hold true in California, then California could today meet its GHG reduction goals mandated by its Global Warming Act by merely asking each person and business to pay a 3 cent/KWh “green power” premium. For an average household this would only amount to about \$20/month. Unfortunately, just paying more for power won’t make the power any greener.

Electric power, aside from a small amount contained in batteries, cannot be stored for future use. Transmission lines don’t store power. Rather, they nearly instantaneously move power from a generator to a user. Electric power is consumed at the moment it is generated. Perhaps

someday California's high-speed trains will be built and need electric power. On that day a new demand will be created instantaneously with the throwing of large circuit breakers and the starting up of high-speed train electric engines. At that exact moment the new demand must be met by a power provider. Some electric generator, idle at that moment, must come on line to meet the new demand. The generator coming on line may be a peaking power unit in California powered by natural gas or a coal burning power plant in Utah. The exact source is unknowable. But one thing is known. It will not be a wind or solar powered electric plant. Those plants are always running when wind or sunshine is available because they operate with almost no variable costs and because they are mandated to run whenever they can. Wind and solar sources will already be generating all the power they can produce when the train first requires power.

According to the Authority its trains will consume 253 million kWh during their first year of operation in 2022¹⁵ and this will ramp up to 1,204 million kWh by 2030 when Phase 1 Blended is in service. Solar generated electrical energy is the fastest growing new source of renewable energy in California¹⁶ and for that reason this paper will use solar generated electricity as a proxy for the Authority's "renewable sources".

The high-speed train's power requirements between 2022 and 2030 are best put in perspective by comparing the trains' usage to the generating capacity of a new utility scale solar generating plant. California Valley Solar Ranch, a single-axis photo-voltaic generating plant capable of generating 650 million kWh/year of electrical power built with a \$1.2 billion dollar federal loan guarantee, was started up in San Luis Obispo County in 2013.¹⁷ Nearly 40% of the capacity of a similar generating plant will be required by the Authority's trains in 2022 and nearly two such plants dedicated to the high-speed train system will be required by 2030 as the trains' need for power grows.

If the Authority is to make good on its claim that it will power its trains on 100% renewable electrical energy, then the Authority needs to be able to fund the construction of the necessary renewable power plants. A 3 cent/kWh premium for "green power" will not be enough. Again using the Authority's data, high-speed trains are projected to cumulatively consume 6,300 million kWh of electricity between the start of 2022 and the end of 2030. Using the example of California Valley Solar Ranch, \$2.2 billion (2010\$) must be raised in the form of a green premium so that the necessary solar generating capacity can be built. \$2.2 billion spread out over 6,300 million kWh equates to a green premium of 30 cents/kWh after adjusting downward by 5 cents/kWh to account for solar generated power's lower variable costs compared to fossil fuel sources. This is still 10 times the 3 cent/kWh green premium offered by the Authority. Worse yet, more than 20% of this solar generating capacity costing almost a half a billion dollars must be constructed before the first trains run and the capital for this generating capacity must come from private investment in the high-speed rail system. This is of course a source of funds that does not exist.

Conclusion

The Authority's contractors have a vested interest, perhaps even more of an interest than the Authority Board Members themselves, in keeping this project alive and the accompanying cash flow that fills their corporate coffers. The high-speed train has been their gravy-train for nearly 2 decades. It is time for the Authority to ask their contractors some hard questions. What are the estimated direct and indirect CO₂e construction emission that will result from one of the largest infrastructure programs undertaken in the United States? A program that according to the Authority's 2012 Revised Business Plan "includes installing potentially up to 2,200 miles of rail weighing 276,000 tons; 3.5 million square feet of buildings and facilities; 6,500 miles of electrical wires and cables; and approximately 190 grade separations. A significant portion of the project—approximately 190 miles—may be constructed on elevated structures or in tunnels."¹⁸ And this is merely the scope of Phase 1 Blended.

Additionally, the Authority's contractors need to spell out where all the green energy to power the train will be sourced and when ,or if, it will become available. The Authority's contractors understand commodity pricing and the economics of supply and demand. They understand that the significant electrical power demand of high-speed trains will result in an immediate incremental supply of new power and they know that incremental source cannot be green.

It's time the Authority's highly paid contractors told the Authority and all Californians the unpleasant truth about their dirty train.

attachments (1)

Endnotes

¹ *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 6

http://www.hsr.ca.gov/docs/programs/green_practices/HSR_Reducing_CA_GHG_Emissions_2013.pdf

² *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 13

³ *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 18

⁴ *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 14

⁵ Tutor-Perini press release dated April 17, 2013

<http://investors.tutorperini.com/press-releases/press-releases-details/2013/Tutor-Perini-Joint-Venture-Selected-for-985-Million-California-High-Speed-Rail-Design-Build-Contract/default.aspx>

⁶ SB 1029 Budget Act of 2012, SEC. 9

http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_1001-1050/sb_1029_bill_20120718_chaptered.pdf

⁷ Introduction to Greenhouse Gas Emissions in Road Construction and Rehabilitation - Executive Summary, page 13

<http://siteresources.worldbank.org/INTEAPASTAE/Resources/GHG-ExecSummary.pdf>

⁸ *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 11

⁹ *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 13

¹⁰ *Compliance Offset Protocol for Urban Forest Projects 2011*, Appendix B, page 35

<http://www.arb.ca.gov/regact/2010/capandtrade10/copurbanforestfin.pdf>

¹¹ Oregon Forest Facts & Figures 2015-16 published by the Oregon Forest Resources Institute, page 1

http://oregonforests.org/sites/default/files/publications/pdf/OFRI_FactsFigures_2015-16.pdf

¹² *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 15

¹³ *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels*, June 2013, page 10

¹⁴ EPA website: Sources of Greenhouse Gas Emissions

<http://www3.epa.gov/climatechange/ghgemissions/sources/electricity.html>

¹⁵ See Attachment 1 to this paper

¹⁶ California Energy Commission's Energy Almanac website

http://energyalmanac.ca.gov/electricity/electricity_generation.html

¹⁷ Energy.Gov Loan Programs Office, California Valley Solar Ranch

<http://energy.gov/lpo/california-valley-solar-ranch>

¹⁸ Revised 2012 Business Plan, page 3-3

http://www.hsr.ca.gov/docs/about/business_plans/BPlan_2012_rpt.pdf