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Analysis of the CHSRA's GHG Report

On July 1, 2013, the California High-Speed Rail Authority released its *Contribution of the High-Speed Rail Program to Reducing California's Greenhouse Gas Emission Levels* (June 2013).¹ It is meant to fulfill the mandate contained in SB 1029 (the Legislature's authorization of HSR bonds for the Central Valley project) to provide "a report on the 'net impact of the high-speed rail program on the state's greenhouse gas emissions.'"² However, the report fails to quantify the project's emissions and emissions reductions, thereby making an evaluation of the program's net impact impossible.

The report is obviously intended to counter the Legislative Analyst's budget report³ of April 2012, which concluded that the HSR project would result in a net increase in GHG emissions for the first 30 years of operations. Knocking down that report would open the door to funding HSR with cap and trade revenues. Interestingly, the CHSRA report never mentioned the LAO report and pretended it didn't exist. Someone must have concluded they couldn't win an argument on the merits.

Rather than dispute the LAO report, the CHSRA report claims to "detail[] the projected net greenhouse gas (GHG) emissions associated with the construction and operation of the high-speed rail system."⁴ However, the report offers no details of those emissions. If numbers were developed during the preparation of the report, they weren't included in the publication. This is a politicized promotional piece and not a science-based document. It is simply not credible and not responsive to the legislative mandate.

Update: The Governor's Budget Proposal

The Governor proposed that \$250 million in 2014-15 cap and trade revenues go to HSRA. He further requested that 33% of all cap and trade revenues starting with 2015-16 be continuously appropriated to HSRA.⁵ These many billions of dollars, if not well-spent by the HSR project, could threaten the effectiveness of the entire cap and trade program. Careful scrutiny of the HSR project's net GHG benefits is warranted.

Methodology

A disclosure on p. 17 invalidates the entire report: "The timeframe and activities analyzed and discussed in this report were for CP1 [the first phase of the current Merced-Bakersfield project]. As the project moves forward, direct GHG emissions calculations will be carried out for each subsequent construction package." The construction impacts of CP1 cannot be meaningfully analyzed in relation to the operational emissions

reductions calculations, because the latter pertains to the Initial Operating Section (IOS), which is ten times its length. No HSR operations are planned for CP1.

This is critical, because the report is actually comparing the emissions benefits of the IOS to the emissions costs of the one-tenth-as-long CP1. Completing the IOS would require funding the \$26 billion extension to the LA Basin, as well as building CP2, CP3, CP4 and CP5 [the remainder of the Merced-Bakersfield project]. Obviously, the net project emissions are going to be very different when the emissions arising from \$26+ billion of construction are added in.

Evaluating the HSR program's net impacts requires either the operational emissions reductions of CP1 or the construction emissions of the IOS. This report offers neither.

Summary of Findings

The following six so-called Findings are mere restatements of vague intentions, with no identified funding to implement them:

- Commitment to 100% renewable energy during operations
- Zero net greenhouse gas emissions during construction
- Supportive transit and land use for greater cumulative benefits for the state
- Plans to plant thousands of new trees across the Central Valley
- Cleaner school buses and water pumps in Central Valley communities
- Agricultural conservation measures aimed at reducing Central Valley sprawl and preserving valuable agricultural land⁶

In addition, the report offers no evidence in support of the following two so-called Findings:

- Zero net greenhouse gas emissions during construction⁷

There is no evidence to support this claim. No numbers whatsoever are offered for GHG mitigation activities. This is a classic "aspirational goal" rather than a finding on a plan to achieve one.

- Significant contributions to the State's goals embodied in AB 32 and SB 375⁸

There is no evidence to support this claim.

Not only is there no evidence to support the following three so-called Findings, they are actively misleading, as they are entirely dependent on CHSRA receiving an additional \$26 billion to build out the IOS to the Los Angeles Basin. In addition, they will mislead non-technical readers because they appear to be findings on the project's net emissions impacts. Because they exclude the construction emissions of both CP1 and the IOS, they represent only one side of the emissions ledger.

- Greenhouse gas savings from the first year of operations increasing to over 1 million tons of CO₂ per year within 10 years⁹
- Result in net GHG emissions diversions that, conservatively, are the equivalent of the GHG emissions created from the electricity used in 22,440 houses, or removing 31,000 passenger vehicles from the road.¹⁰

- Using methodologies consistent with state practice, an estimated 4 to 8 million metric tons of CO₂ saved by 2030, as if the state turned off a coal fired power plant¹¹

As discussed below, this last assertion is also misleading because the 8 years of operations are being compared to roughly one year of such a power plant's emissions.

GHG Emissions Sources for High-Speed Rail System

The diagram on page 9 is the only rendition of emissions category totals in the report. Amazingly, there is no corresponding table. The diagram comes closer to identifying the net impact than anything else in the report. However, its use of graphic symbols instead of conventional chart bars makes it impossible to interpret quantitatively. It is unclear from the diagram (or its associated text) whether the symbols have any quantitative significance, and if they do, whether emissions totals are represented by the height or by the area of the symbols. This makes the diagram both useless and deceptive: it obscures more than it discloses. Given the central importance of this data, choosing this indecipherable diagram for its portrayal can only be interpreted as an act of bad faith.

Operational Emissions Reductions

This project has had a long history of challenges to the technical validity of the HSR ridership model and litigation about the hidden changes that were made to it that advantaged Pacheco ridership while penalizing Altamont ridership. Ridership is the key input to an analysis of operational emissions reductions. As will be discussed later, the GHG reduction benefits of the HSR project are very dependent on ridership. With the controversy surrounding the ridership projections, this net emissions analysis rests on a shaky foundation.

The most striking part of this section is the meaningless apples-and-oranges comparison between the annual emissions of a coal-fired power plant and the emissions reductions from 8 years of HSR operations.¹² This is an attempt to invite positive identification with HSR by creating a "Coal Bad--HSR Good" dualism, a classic technique of promotion.

Construction Emissions

While the report uses standard methods to calculate the direct emissions resulting from construction, it entirely leaves out the emissions resulting from the acquisition of construction materials, and offers a weak justification that these emissions shouldn't be counted against the project:

Regarding the construction materials, for some it is possible to calculate the impacts over the material's life-cycle, from extraction through processing, use onsite, and disposal, and express those impacts in GHG emissions terms. Those GHG emissions are usually the reporting responsibility of the manufacturer, and in terms of a project GHG emissions

inventory, happen "upstream" and outside the boundary of the project.

For example, cement manufacturers in California are subject to ARB's Mandatory Reporting and Cap-and-Trade Regulations. These regulations require cement manufacturers to report their GHG emissions annually to ARB. The emissions from cement manufacturing count towards the statewide GHG emissions "cap." The GHG emissions covered under the "cap" are required to be reduced through emission controls or a limited amount (eight percent) may be offset through the purchase of ARB certified offset credits.¹³

The problem is that these emissions from construction materials constitute a very significant part of the project's overall emissions, because of the huge amount of concrete called for in the plans. This amount is large enough to increase the cement manufacturing sector's statewide emissions, which makes the "count it upstream" approach entirely inappropriate when evaluating the project's net impacts.

Perhaps recognizing this, the next paragraph of the report acknowledges the appropriateness of including the emissions from construction materials in its analysis, yet withholds the data on the flimsy excuse that the data is not "precise" enough:

However, the Authority considers it important to disclose the GHG emissions that occur outside of the project associated with materials used during construction. **These have not yet been quantified, due to the limitations of available information at this stage of project delivery.** While it is understood that the rail infrastructure will consist, largely of aggregate, concrete, steel, rails, and ballast; the **precise** source and supplier of those materials is not yet known. Additionally, the **precise** quantities are not available, given the nature of the design-build procurement process... (emphasis added)¹⁴

This is a masterful exercise in appearing to be fair-minded while simultaneously holding back damaging information. It is obvious that in the course of putting the project out to bid, the Authority prepared estimates of construction material quantities. These estimates were the basis for the calculation of the direct construction emissions. The materials' emissions must be **huge** for the Authority to need to bury them with this kind of double-talk.

The Legislative Analyst's April 2012 report¹⁵ relied on a 2010 pioneering study by Chester and Horvath entitled *Life-cycle assessment of high-speed rail: the case of California*.¹⁶ The study's 2012 update produced data that enabled this calculation: Infrastructure construction and operations contribute between 40% and 51% of the

CHSRA project's GHG emissions per person per kilometer travelled. This figure rises to near 100% of the emissions for the scenario with 100% renewable power, and falls to 32% when the train's capacity is nearly doubled.¹⁷ The paper found "CAHSR infrastructure construction effects are dominated by concrete use. Approximately 67% of CAHSR infrastructure emissions are the result of cement production for concrete use..."¹⁸

This is the smoking gun: Construction materials (as well as infrastructure construction, if one doesn't assume the success of the zero net GHG emissions program¹⁹) make up a highly significant percentage of the project's overall GHG emissions. Leaving them out so compromises the net impact analysis as to render it worthless.

The Chester and Horvath study calculated the project's payback period, the point at which the emissions reductions from the substitution of auto and air trips (measured as Vehicle Kilometers Traveled, or VKT) with HSR trips equals the HSR project's GHG emissions, including its cumulative prior emissions:

The payback sensitivity reveals several important considerations for transportation planners and air quality policy makers. The cumulative plum-colored lines for the high, medium and low forecast figures show that the **GHG payback will likely occur between 20 and 30 yr (D3) after groundbreaking**, and acidification potential after 20–40 yr. **However, payback is highly sensitive to reduced automobile travel.** The 5.8 billion auto VKT displaced dominate emissions changes in the corridor and the effects from reduced air travel and CAHSR are small. The reduced auto impacts are significantly affected or dominated by life-cycle components, in particular, avoided vehicle manufacturing, vehicle maintenance and gasoline production. (emphasis added.)²⁰

Chester and Horvath are thus warning that any slip in ridership from currently predicted levels would delay the GHG benefits of HSR even further.

Double Counting

When evaluating statewide benefits, it is important that GHG emissions reductions calculations represent only the project's own properties. The model that was used, on the other hand, "also reflects the GHG emissions benefits of ARB's recent rulemakings including on-road diesel fleet rules, Pavley Clean Car Standards, and the Low Carbon Fuel standard."²¹ This means that the report's emissions reduction calculations overstate the benefits accruing to the HSR project.

Offset Activities

The only way the CHSRA's GHG Report is able to claim a net beneficial GHG impact is by buying offsets in the form of environmental mitigations, including construction mitigations,²² and farmland protection.²³ The strategy of the Cap and Trade program is

to purchase GHG-reducing offsets at the lowest cost per ton. There's something very odd about committing Cap and Trade funds to a project that increases GHGs, which then has to buy GHG-reducing offsets. It would be dramatically less expensive on a per-ton basis to fund the GHG-reducing projects directly. Buying these same offsets as part of a CHSRA project package is inherently far more expensive.

Conclusion

The report offers no numbers capable of serving as a basis for the conclusion that "the high-speed rail program will have a positive impact on reducing the state's greenhouse gas emissions."²⁴ Instead, that conclusion "'feels right' without regard to evidence, logic, intellectual examination, or facts"--the Wikipedia definition of Stephen Colbert's 'truthiness'.

Endorsements

The uncritical endorsements of the report by agency heads expose the depth of its politicization. It simply is not credible that sophisticated agency heads and their staffs failed to spot the profound flaws identified above. Brian Kelly, now Secretary of the State Transportation Agency, "reviewed and approve[s]" the report.²⁵ Mary Nichols, Chair of the Air Resources Board, "believe[s] the analysis is reasonable..."²⁶ Instead of the comprehensive overview expected of someone of her subject matter expertise, she offered only superficial comments on the emissions reductions from mobility choices, and avoided construction emissions and offsets entirely. These two endorsements make it obvious that the Governor ordered his people to "make HSR funding happen" no matter what.

¹ hsr.ca.gov/docs/programs/green_practices/HSR_Reducing_CA_GHG_Emissions_2013.pdf

² p. 13. (Unless otherwise noted, all references are to the report accessible at the URL above.)

³ Legislative Analyst's Office, *Funding Requests for High-Speed Rail*, April 17, 2012, p. 8

⁴ p. 13.

⁵ Legislative Analyst's Office, *Cap-and-Trade Auction Revenue Expenditure Plan*, February 2014, p. 5

⁶ p. 6.

⁷ *Id.*

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*

¹² p. 11.

¹³ p. 14.

¹⁴ p. 14.

¹⁵ Legislative Analyst's Office, p. 8

¹⁶ Mikhail Chester and Arpad Horvath, *Life-cycle assessment of high-speed rail: the case of California*, Environmental Research Letters, January 2010.

¹⁷ Mikhail Chester and Arpad Horvath, *High-speed rail with emerging automobiles and aircraft can reduce environmental impacts in California's future*, Environmental Research Letters, July 2012, p. 5 [Interpolated from the chart data in Figure 1]

¹⁸ Chester and Horvath, 2012, p. 4.

¹⁹ pp. 13-15.

²⁰ Chester and Horvath, 2012, p. 9.

²¹ p. 19.

²² p. 13.

²³ p. 15.

²⁴ p. 20.

²⁵ p. 1.

²⁶ p. 5.