State of California

Air Resources Board

"Scoping Next Steps for Evaluating the Potential Role of Sector-Based Offset Credits under the California Cap-and-Trade Program, Including from Jurisdictional 'Reducing Emissions from Deforestation and Forest Degradation' Programs"

COMMENTS

Just for fun, let's suppose that one day a certain office in one of the many government buildings in Sacramento produces a State of California Staff White Paper to help the state decide what steps to take next to evaluate the possible role of a time machine industry in the development and growth of the state's economy.

The title of this imaginary White Paper specifies that time machine manufacture only has a "potential" role in California's economy. At the time of its release, no official decision has been made whether or not to go forward with the time machine project. Despite this *pro forma* reserve, however, the White Paper never allows itself to get bogged down in doubts about whether a time machine could actually work. Displaying a commendable and timely "Yes we can!" attitude throughout, it instead dwells on the benefits the project could bring assuming it were feasible.

Economy-wide cost savings are of course one key incentive for going ahead with the idea. Travellers to the future would be able to bring back finished blueprints for all sorts of devices and products yet to be developed, making possible enormous R&D savings. By the same token, inconvenient economic crises afflicting present-day California could be prevented by qualified time travelers twiddling with the past events that led up to them. Indeed, whole sections of the White Paper are devoted to detailing such benefits (pp. 8, 11-12, 40) and describing various threats faced by California citizens and enterprises that could be met in part through the innovation of time travel (pp. 9-11).

Nor does the White Paper neglect to mention the ways that the time machine project would help sustain Califonia's leadership in creating models for the development of such high-concept industries worldwide (pp. 12-13). The White Paper also lists a number of added co-benefits or positive externalities that can be expected to be associated the development of a temporal

displacement industry (pp. 13-15). These include favorable effects on biodiversity (retrieving the lost DNA of extinct species for cloning so that today's biomes can be replenished), as well as the possibility of temporarily exporting convicted criminals to the future to relieve overcrowding in California's prisons.

Far from just enumerating the benefits of time travel, however, the White Paper also pays attention to the nuts and bolts of time machine development. Sensitive to both the economic importance of global supply chains and the advantages of close engagement with other governments in addressing the need for time travel, it explores the benefits of linking California's prospective time machine sector with those being developed in other jurisdictions. It notes potential for further cooperation between California and Indonesia, Ivory Coast, Nigeria, Peru, Spain, Norway and Quebec, as well as various US states (pp. 17-21), and cites already-existing memoranda of understanding with Chiapas, Mexico and Acre, Brazil. Acre's technical capabilities and enabling legal environment with respect to time-machine development are singled out for particular approbation (pp. 42-45). The White Paper also emphasizes how far technical developments in time travel have proceeded, spelling out some of the latest advances in cosmology, string theory, wormholes, and overall understanding of the space-time continuum, in the application of which California's universities play a leading role (pp. 18-22).

In accordance with California's emphasis on stakeholder participation, the process of review and consultation of which the White Paper forms a part places great importance on inviting testimony from a wide variety of experts, as well as representatives of groups who have previously been affected by the infrastructure associated with the temporal displacement sector. However, in keeping with its overall positive, can-do spirit, the policy team did not regard considerations about the impossibility of time travel to fall within the remit of the inquiry represented by the White Paper. None of the experts consulted, therefore, was polled explicitly about whether a time-machine construction project could actually be carried out. Most of those giving testimony were content with this omission and were happy simply to give their views about what their field contributes, or could contribute, to any effort to develop time travel. A few experts did depart from this format, stating that in their judgment the project would be unwise or a waste of state revenues and should be abandoned. However, these stakeholders were gently urged to rephrase their protests in terms of how best to overcome difficulties and safeguard the time machine project against the repercussions of certain inevitable problems that would arise in its implementation.

Thus the White Paper features, on pp. 40-41, a table with three columns headed "Issue", "Additional Work", and "Reason" (excerpts below).

Issue	Additional Work	Reason
Getting from singularity or wormhole theory to a working physical transport mechanism of modest size	Assess how researchers in other jurisdictions have addressed the issue; evaluate what counts as acceptable size	A time machine must be suitable in size and fittings for human passengers
Ensuring that temporal displacement mechanisms are sufficiently accurate to deposit passengers at pre-specified dates	Determine satisfactory methodology for manufacturing and calibrating time-travel equipment to internationally-recognized standards	Efficient economic exploitation of information-exchange across temporal regions necessitates robust accuracy in passenger placement
Time-travellers accidentally killing their own ancestors	Coordinate training programs for time-travellers; research and institute insurance measures	Safeguards are essential to ensure against the sudden disappearance of the present

Safeguards for passenger survival and health	Select optimal mechanisms for protection against disruptions in space-time continuum; ensure the continuation of health safeguards with a monitoring, reporting, and verification system	Economic benefits depend on the presence of humans able to to select suitable future technologies for transfer to the present; human rights concerns are also important

Under “Issue” appear entries such as “Getting from singularity or wormhole theory to a working physical transport mechanism of modest size”. Since there is no column headed “Whether the Issue Calls into Question the Time Machine Development Project”, the table proceeds directly to practical means for addressing the issue in question (“Additional Work”). Similarly, since there is no column entitled “Reason (If Any) for *Not* Doing Additional Work”, the table proceeds directly from there to a column justifying the additional work.

For convenience, all testimony and references used in the White Paper are fitted into this general framework. This has a notably streamlining effect on conventional scientific reasoning. Instead of considering *whether* time travel technology has a role in fostering California's economic growth, the White Paper simply reinterprets scientific findings to support the assumption that it *must* do so. Instead of considering *whether* time travel is possible, the White Paper can simply *assume* that it is, using the procedures of *petitio principii* to optimize science's efficiency in arriving at the necessary conclusions.

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The White Paper on “Scoping Next Steps for Evaluating the Potential Role of Sector-Based Offset Credits under the California Cap-and-Trade Program” released on 19 October is, of course, completely different from our White Paper on time travel. For one thing, although imaginative, it's not imaginary.

Yet the two are similar enough that the evaluation of one can serve as a guide to the evaluation of the other. In particular, the overall approach to science that the two White Papers take is structurally identical.

The imaginary White Paper on the potential role of time machines in the California economy is organized around the assumption that human time travel is possible. Accordingly, the paper is unwilling to countenance inconvenient science. The real White Paper on the role of sector-based offset credits in California climate policy is equally tightly organized around the assumption that such credits are capable of contributing to climate mitigation. Equally, it ignores, glosses over, or denies the science that contradicts that assumption.

Let me take two examples. The first is the way that the White Paper is compelled to deny basic facts that we know about the nature of uncertainty, in particular the distinction between history and counterfactual history. The second is the way that the White Paper is forced repeatedly to ignore the basic climatic difference between carbon emissions of fossil origin and carbon emissions of biotic origin. Either one of these scientific errors, both of which are committed throughout the White Paper, is sufficient to invalidate the paper's underlying assumption that sector-based offsets can help mitigate climate change.

Uncertainty first. Like project-based offsets, the sector-based offsets treated in the White Paper require the setting of a “reference level” or baseline of emissions. In the case of sector-based

offsets, this baseline takes the form of an “emissions reduction target for the particular sector within the boundary of the jurisdiction” issuing the offset (p. 1). It is against the “Business-As-Usual” reductions specified by this baseline that “real, measurable and long-term” *additional* reductions must be proved to have occurred through the jurisdiction's “own efforts” if credits are to be granted and sold (p. 24). Sector-based offsets thus require that the consequences of the events of counterfactual history be calculable with a certainty and precision commensurate with those attaching to the events of actual history. To put it another way, the emissions levels actually achieved under the jurisdiction's regulation can, in principle, be specified in a single more or less precise number. So can the reductions achieved beyond this level. But in order to attribute the difference between the two numbers to the jurisdiction's additional “own efforts”, it must be shown that without those efforts, a precisely specifiable level of reductions would not have taken place. That means being able to calculate numerically the difference between what did happen and what would have happened had conditions been different. As the White Paper itself puts it, because an emission reduction from a REDD program is 'additional' only if it would not have happened in the absence of the project or program, it must be determined whether the forest in question “was or is actually *destined for deforestation*” (p. 35). This “destiny” can be calculated, according to the REDD Offset Working Group from which the White Paper takes many of its cues, simply by extrapolating the “10-year historic average emissions due to deforestation” in a given forest area into the future (p. 24) – even though the White Paper itself hints, on p. 31, that there exist incentives to maximize credit production not only by falsifying such numbers, but also by making special, destructive interventions in forests themselves, opening the notion of such estimates to further ridicule.

The term “destined”, in short, inadvertently betrays the unscientific nature of the REDD premise. The well-known FAO forester Jack Westoby put this sort of pseudo-science in its place more than 25 years ago when he noted that projecting then-prevalent US heroin-consumption trends into the future yielded the conclusion that “every man, woman and child in the US will be a junkie by 2020”. Because of the “certainty equivalence” that sector-based as well as other offsets must posit between counterfactual and real history, all offset credits are necessarily scientifically bogus. To mix them with the allowances granted or auctioned under cap and trade proper is to guarantee that the hybrid that results will be unable even to achieve verifiable emissions goals, to say nothing of climate goals. What is perhaps even worse, incidentally, is that while sector offset economics requires that participating technicians pretend to be able to calculate destiny, it is only the destiny of farmers, forest dwellers and others who lie outside the circle of REDD credit-generators (project operators or partner jurisdictions (p. 25)). The latter must methodologically be treated as, by contrast, in possession of self-determination – making this pseudo-science not only pseudo but also inherently colonialist in nature. A detailed discussion of this issue, however, will have to be excluded from this particular Comment.

Second, the supposed climatic “equivalence” between carbon dioxide emissions from fossil sources and carbon dioxide emissions from biotic sources. On p. 24, the White Paper notes that measurements of carbon uptake from forest growth are “complicated” by the diversity of carbon pools within tropical forests, for example, “above-ground biomass (i.e., tree trunks, etc.) versus below-ground carbon pools (i.e., roots and soil carbon).” What the paper neglects to mention is that there is also a difference between the pools of carbon more or less locked underground in coal, oil and gas and above-ground carbon pools such as those of forests and grasslands. While the carbon dioxide emissions from fossil fuels are chemically identical to those from burning or damaged forests, they are not climatically identical. Industrial emissions add permanently to the above-ground carbon pool circulating among forests, grasslands, the air and the surface layers of the oceans; biotic emissions do not. Furthermore, the prevention of fossil-based emissions has different

knock-on effects from the prevention of emissions from biotic sources, and these differences will result in different impacts on long-term emissions trajectories and thus on global warming. With careful policy design, the prevention of fossil-based emissions can be organized in aggregate ways that contribute to a permanent shift away from fossil fuels, while, as many have pointed out, the prevention of biotic emissions is likely only to delay this necessary transition. The White Paper's persistent lumping together of the carbon dioxide from fossil fuel combustion with the carbon dioxide from deforestation and forest degradation is therefore incorrect from the point of view of climatology. The fact that this scientific mistake is repeated in the very term "REDD" that the White Paper has inherited from the United Nations and other organizations is no excuse given the high stakes involved as well as the capability of the California scientific community advising ARB to make its own independent judgments.

The confusion between fossil emissions and biotic emissions by itself invalidates the White Paper's arguments that the inclusion of sector-based REDD credits would be a climatically positive addition to California's cap and trade program. To take just three brief examples:

- On pp. 9-11, the White Paper states that "reducing emissions from tropical deforestation also reduces impacts of global climate change on California". The implication is that because REDD offsets reduce "emissions", they will also reduce the impacts of climate change on California. But both the premise and the inference are false. First, REDD offsets do not reduce global molecule emissions even in those cases where a REDD project succeeds in reducing emissions from local forests. The credits from a REDD project that are sold to California greenhouse gas polluters would be designed to allow exemptions from laws that would otherwise prevent those polluters' emission of an equal number of carbon dioxide molecules; that is the *raison d'etre* for REDD credits. To put it another way, the boundaries of a sector-based REDD offset program are not the boundaries of the jurisdiction that administers the program. Rather, they extend across the globe to California and include the fossil-based industries located there. Hence even in principle REDD offsets cannot reduce the impacts of climate change on California. In fact, they would be likely to worsen those impacts due both to the fact that prevention of biotic emissions cannot "compensate" for fossil emissions in climatic terms and to the fact that the lack of equivalence between counterfactual history and actual history makes the necessary measurements impossible. Second, it is misleading to say that REDD projects even reduce "emissions", even in local forest areas where they manage to be "successful". This is because any emissions from forests that REDD projects happened to prevent are different in nature from the emissions from California industries. Hence, again, the claim that the White Paper makes throughout that jurisdictional, sector-based offset credits are a cost-effective means of making greenhouse gas emissions "reductions" is unacceptable from a scientific point of view.

- On p. 4, the White Paper cites estimates that emissions solely from tropical deforestation and forest degradation account for 11-14 per cent of global greenhouse gas emissions. While these molecular figures may well be correct, they do not imply that tropical deforestation and forest degradation are responsible for 11-14 per cent of global warming. That would only be the case if fossil emissions were equivalent to biotic emissions in terms of climate history, which they are not. It is thus unscientific to use such numbers to attempt to reduce the share of responsibility for climate change that falls on the extractors and users of fossil fuels.

- On pp. 39-40, the White Paper claims, in response to stakeholder concerns, that "polluters' obligations to reduce emissions will not be diminished by the potential inclusion of a REDD

program”. This is a confusion based, again, on the failure to distinguish fossil and biotic emissions. By paying for pollution rights generated by sector-based REDD offset programs, California industries would indeed be able to evade otherwise legally-binding obligations to reduce fossil-based emissions; that's the reason they would buy them. Yet even in the unlikely circumstance that these offset credits represented lowered biotic emissions, they would not represent lowered fossil emissions, which are, climatically speaking, a very different and far more serious thing. California polluters, who are responsible for so much social and environmental damage within the state, would therefore indeed find themselves under less obligation to address both fossil-emissions and climate-change issues.

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