Name: Linda Church Ciocci, Executive Director
Organization: National Hydropower Association

The Climate Registry:
Electrical Power Sector Protocol
Public Comment Draft

The Climate Registry

PUBLIC COMMENT OF

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On February 23, 2009, The Climate Registry (TCR) issued a draft Electric Power Sector Protocol (EPSP) for public comment. The EPSP was developed to provide additional clarification for members of the electric sector that choose to voluntarily report greenhouse gas (GHG) emissions pursuant to TCR's General Reporting Protocol (GRP).

The National Hydropower Association (NHA) is pleased to participate in The Climate Registry's public comment process on the draft EPSP for reporting greenhouse gases. As representatives of America's largest renewable energy resource, we in the hydropower industry are committed to the growth and operation of clean energy resources, and we respect the work TCR and other organizations are doing in this area.

These comments were developed in consultation with member companies from across the United States and Canada. NHA's membership consists of more than 150 organizations including public utilities, investor owned utilities, independent power producers, project developers, equipment manufacturers, environmental and engineering consultants and attorneys. NHA directs the TCR to individual member companies' comments for additional details and discussion of issues beyond reservoir emissions.

NHA is committed to learning more about issues like reservoir emissions. But, NHA believes that additional research is needed before either dismissing this issue or establishing policies on it. As a result, NHA recommends that TCR remove references to reporting reservoir emissions at this time.

NHA concerns with the EPSP reservoir emissions methodology

1. Need for further review within the TCR – NHA and our member companies are disturbed that the unexpected requirement of electric sector entities to report to the TCR hydropower reservoir emissions was not vetted in the General Reporting Protocol or, to our knowledge, in public meetings of the TCR prior to release of the EPSP draft. The inclusion of hydropower reservoirs as a fugitive emission source is a significant proposed change to the TCR's protocols and deserves a thorough public vetting and analysis.

Without this discussion, including reservoir emissions accounting would appear to be premature at best and, at worst, is counterproductive to efforts encouraging development of climate-friendly renewable resources, such as incremental and new hydropower projects. NHA recommends that the TCR reconsider its decision to include reservoir emissions under the EPSP.

There also remains no international consensus on methodologies for measuring possible reservoir emissions. In fact, the United Nation's Intergovernmental Panel on Climate Change (IPCC) has postponed the creation of a working group on this issue because the state of the science does not provide for a clear way forward. At its meeting in Helsinki in May 2008, the IPCC stated the following:

'While it was agreed that more guidance will be needed at some stage, currently scientific investigations and consideration of these emissions is underway. Therefore, the IPCC will need to wait for at least 2-3 years for sufficient scientific knowledge to emerge in this field before it can realistically consider any further developments.'

2. More recent studies call into question the validity of the TCR methodology for estimating possible reservoir emissions – The TCR bases the decision to include reservoir emissions in the EPSP, and determines a default reservoir emissions factor, on one study (St. Louis et al. 2001). Since the 2001 study, additional significant scientific research has been conducted on this issue. NHA encourages the TCR to review these new studies and believes that any change to the EPSP that would include reservoir emissions must include, and be based on, an analysis of the whole of the scientific literature. Attached to these comments (see: Additional Feedback section) NHA has included scientific papers published since 2001 for the TCR's review.

Beyond the need to review additional studies, it appears these papers may contradict earlier suppositions on the extent of the impact of reservoir emissions, or at a minimum, suggest the situation is more complex. For example, some of these studies reached the following conclusions:

- Overall, hydropower emits very small amounts of GHG per unit of energy produced (e.g. Tremblay et al. 2005, Tremblay et al. 2008)

- GHG emissions from boreal and semi-arid reservoirs are very small and comparable to natural lakes (e.g. Tremblay et al. 2005, Therrien et al. 2005, LeDrew et al 2007, Tremblay et al. 2007, Tremblay & Bastien 2009, Bastien et al. 2009a,b, Demarty et al. 2009)

- 10 years after impoundment, CO_2 emissions from reservoirs worldwide are equal to 0 (e.g. Tremblay et al. 2005, IPCC 2006, Duchemin et al. 2006a). The number of years may even be lower based on current research underway in Quebec (results to be published in 2010).

3. A fair accounting of reservoir emissions must consider the "net" effect, and the amount of possible GHG emissions from multi-purpose reservoirs should not be allotted solely to hydropower generation – As the recent studies cited above indicate, determining emissions from reservoirs is a complex calculation. Specifically, the TCR protocol does not appear to take into consideration that amount of emissions that occurs naturally.

NHA believes that a methodology that relies only on gross emissions from a reservoir will overestimate those possible emissions that are a result of the reservoir's use for hydropower purposes. Since natural lakes, rivers and wetlands may emit greenhouse gases as well, these emissions should be accounted for in the net change due to the hydropower impoundment – at any point in time or over time. Otherwise, the methodology would unfairly ascribe GHG emissions from the natural carbon cycle to reservoir owners and operators.

In addition, reservoirs are built, operated and managed for a variety of uses. In fact, in the U.S. only approximately 3 percent of dams are used for hydropower generation. Of those projects, the reservoirs also provide for other uses, such as drinking water, irrigation, flood control, navigation, and recreation activities. NHA believes the hydropower industry alone should not

bear the whole burden of potential reservoir emissions, particularly as the reservoirs are being utilized for multiple public benefits.

Lastly, the EPSP protocol specifies its methodology as one for "Estimating Fugitive Emissions from Hydro-Power Reservoirs." As just noted, if this is an issue, it is one for reservoirs on the whole, whether they are built for hydropower production, other industrial purposes, recreation, or for drinking water purposes. As such, if the TCR moves forward on including reservoir emissions under the EPSP, this larger context should be recognized.

4. Inclusion of potential reservoir emissions as "direct emissions" is not appropriate – NHA believes the TCR should reconsider the inclusion of reservoir emissions under the EPSP at all; but, in particular, the categorization of reservoir emissions as "fugitive emissions" sources that entities must report as a component of their "Scope 1" or direct emissions. This result could trigger significant unanticipated consequences as the federal and state governments develop climate change programs and regulations.

Other Scope 1 emissions include those from stationary combustion, SF6 from high voltage equipment, HFCs from power generation air intake chillers, methane emissions from coal piles, and process emissions. The possibility of treating hydropower as a producer of emissions in the same manner as fossil fuel generation is extremely concerning and illogical, potentially resulting in a chilling effect on the development of hydropower resources that ultimately would reduce overall GHG emissions in the U.S. and throughout North America. Many states are looking to the TCR to establish guidance for state regulatory and reporting policy. The EPSP must not inadvertently set bad precedent based on incomplete science.

Additionally, the EPSP incorporates emissions from other renewable energy resources under Scope 3 emissions – such as upstream emissions from solar panels, life cycle emissions from biofuels. There is no mention of changes in land use associated with these other renewable resources that could also have an emissions impact. Finally, inclusion of emissions related to other renewable technologies in Scope 3, while including reservoir emissions in Scope 1, unfairly equates hydropower with fossil fuel emitters rather than accounting for hydropower in the same category as other renewable energy resources.

Factors for determining possible reservoir emissions

The science behind reservoir emissions is still emerging. NHA does not believe the method of measurement as adopted by the EPSP protocol accounts for all factors contributing to a reservoir's potential emissions. In particular, NHA is concerned about the scientific validity of estimating reservoir emissions, if any, based purely on the size of the reservoir – as the EPSP proposes for its Tier B methodology.

TCR acknowledges on page 103 of the EPSP that "As the body of literature grows, the Registry may modify the Tier B methodology to take into account other factors such as climate zone, soil type, vegetation and/or age of reservoir." NHA believes these are critical factors that should be better understood before reservoir emissions are subject to the EPSP at all. Using surface area only as a determinant is not appropriate nor scientifically defensible.

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The following is a list of factors identified in the scientific literature, and by industry members, that any reservoir emissions methodology should include. (The items in this list should not be considered exhaustive.)

- Reservoir age
- Reservoir surface area/depth ratio
- Uncleared vegetation flooded when the reservoir is first filled
- Oxygen concentrations, particularly in the reservoir hypolimnion
- Vegetation that grows on the "drawdown" land temporarily exposed when the reservoir levels are lowered
- Land use changes upstream of the reservoir
- Organic matter washed into the reservoir from the upstream watershed
- Planktonic algae and rooted aquatic plants which grow, die, and decompose in the reservoir
- Water temperature
- Water pH

At this stage of scientific understanding surrounding the above factors, it is unclear whether individual reservoirs will constitute sources of GHG emissions or carbon sinks – a real possibility that has received little attention. NHA is concerned that the methods set forth in the EPSP would result in entities vastly over-estimating the amount of emissions that are directly attributable to reservoirs. More work needs to be done before TCR, or others, can ensure that reservoir emissions reporting is accurate and verifiable.

Conclusion

NHA respectfully requests that the TCR remove references on reporting reservoir emissions from the EPSP. NHA and the hydropower industry believe possible emissions from reservoirs is an important issue meriting continued study. However, additional work is needed to determine the scope of the issue, identify appropriate sampling protocols, and outline needed areas of further research. Therefore, reservoir emissions should not be included in the EPSP reporting at this time.

If included at all, NHA strongly recommends reservoir emissions be categorized under Scope 3, which provides consistent treatment with that of other renewable energy technologies. If and when scientific methods become acceptable, and to the extent they are material, reporting entities can then begin to account for the contributions of their specific and unique reservoirs.

Once again, the National Hydropower Association appreciates the opportunity to comment on the TCR proposal. We look forward to working with the TCR on this issue in the future.

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Additional feedback not falling under any of the above sections

COMMENT(S):

The following is a list of recently published scientific studies recommended by NHA members for TCR review before any final decision is made on the inclusion of reservoir emissions under the protocol.

Bastien, J., A. Tremblay and A. Scanlon, 2009a. CO_2 and CH_4 fluxes from Tasmanian aquatic systems, Australia. Verh. Internat. Verein. Limnol. Vol. 30, Part 6, p. 854-857

Bastien, J., A. Tremblay and L. LeDrew, 2009b. Greenhouse Gases Fluxes from Smallwood Reservoir and natural water bodies in Labrador, Newfoundland, Canada. Verh. Internat. Verein. Limnol. Vol 30, Part 6, p. 858-861.

Demarty, M, J. Bastien and A. Tremblay, 2009. Carbon dioxide and methane annual emissions from two boreal reservoirs and nearby lakes in Quebec, Canada, Biogeosciences Discuss., 6, 2939-2963.

Duchemin, E., J. T. Huttunen, A. Tremblay, R. Delmas and C. F. Silveira Menezes, 2006a (Lead authors). Appendix 2 - Possible approach for estimating CO_2 emissions from lands converted to permanently flooded lands. Basis for future methodological development. *In* Eggletion, H.S., L. Buendia, K. Iwa, T. Ngara and K. Tanabe (eds.), 2006. Intergovernmental Panel on Climate Change (IPCC), National Greenhouse Gas Inventories Guidelines, Vol. 4 – Agriculture, Forestry and Other Land Use, IGES, Kanagawa, Japan, pp. AP2.1-AP2.9.

Duchemin, E., J. T. Huttunen, A. Tremblay, R. Delmas and C. F. Silveira Menezes, 2006b (Lead authors). Appendix 3 – CH_4 Emissions from Flooded lands: Basis for future *In* Eggletion, H.S., L. Buendia, K. Iwa, T. Ngara and K. Tanabe (eds.), 2006. Intergovernmental Panel on Climate Change (IPCC), National Greenhouse Gas Inventories Guidelines, Vol. 4 – Agriculture, Forestry and Other Land Use, IGES, Kanagawa, Japan, pp. AP3.1-AP3.8.

LeDrew, L., J. Bastien and A. Tremblay, 2007. Baseline Greenhouse Gas Emissions for the Lower Churchill River Hydroelectric Generation Project in Labrador. Proceedings of the annual meeting of the Canadian Dam Association, 22-27 September, St-John's, NewFoundland, Canada.

Therrien, J., A. Tremblay and R. Jacques, 2005. CO_2 Emissions From Semi-arid Reservoirs and Natural Aquatic Ecosystems. *In* Tremblay, A., L. Varfalvy, C. Roehm and M. Garneau (Eds.). Greenhouse Gas Emissions: Fluxes and Processes**,** Hydroelectric Reservoirs and Natural Environments. Environmental Science Series, Springer, Berlin, Heidelberg, New York, pp. 233-250.

Tremblay, A., L. Varfalvy, C. Roehm and M. Garneau, (Eds.), 2005. Greenhouse Gas Emissions: Fluxes and Processes**,** Hydroelectric Reservoirs and Natural Environments. Environmental

Science Series, Springer, Berlin, Heidelberg, New York, 732 pages.

Tremblay, A. & J. Bastien, 2009. Greenhouse Gases Fluxes from a New Reservoir and Natural Water Bodies in Québec, Canada. Verh. Internat. Verein. Limnol. Vol 30, Part 6, p. 866-869.

Tremblay, A., L. Varfalvy and M. Lambert, 2008. Greenhouse Gases from Boreal Hydroelectric Reservoirs: 15 years of data? Proceedings of 15th International Seminar on Hydropower Plants, HydroPower Plants in the Context of the Climate Change, 26-28 November, Conference Center Laxenburg, Vienna, Austria. Pages 453-362.

Tremblay, A., J. Therrien, B. Hamlin, E. Wichmann and L. LeDrew, 2005. GHG Emissions from Boreal Reservoirs and Natural Aquatic Ecosystems. *In* Tremblay, A., L. Varfalvy, C. Roehm and M. Garneau (Eds.). Greenhouse Gas Emissions: Fluxes and Processes**,** Hydroelectric Reservoirs and Natural Environments. Environmental Science Series, Springer, Berlin, Heidelberg, New York, pp. 209-231.