Integrating sustainability analysis into future infrastructure planning: a case study on Snowy 2.0.

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Introduction

The inadequate reporting of the sustainability impacts of state infrastructure projects by infrastructure proponents is the result of inconsistencies in New South Wales (NSW) environmental assessment reporting requirements and guidelines. Best practice quantification of sustainability related impacts could be achieved by streamlining best practice approaches across all areas of infrastructure planning. The streamlining of best practice approaches will minimise discrepancies in reporting outcomes and will strengthen the ability of decision makers to make informed decisions, leading to a sustainable future for NSW and Australia. This paper identifies where NSW infrastructure planning frameworks and guidelines are siloed in their approach to quantifying the key environmental, social and economic impacts of major infrastructure projects, using Snowy 2.0 as a case study. Ambiguity and inconsistency in reporting requirements has resulted in the inadequate quantification of the greenhouse gas (GHG) emissions impacts of the Snowy 2.0 hydroelectric storage project by Snowy Hydro Ltd.

Proponent led impact assessment issues and opportunities

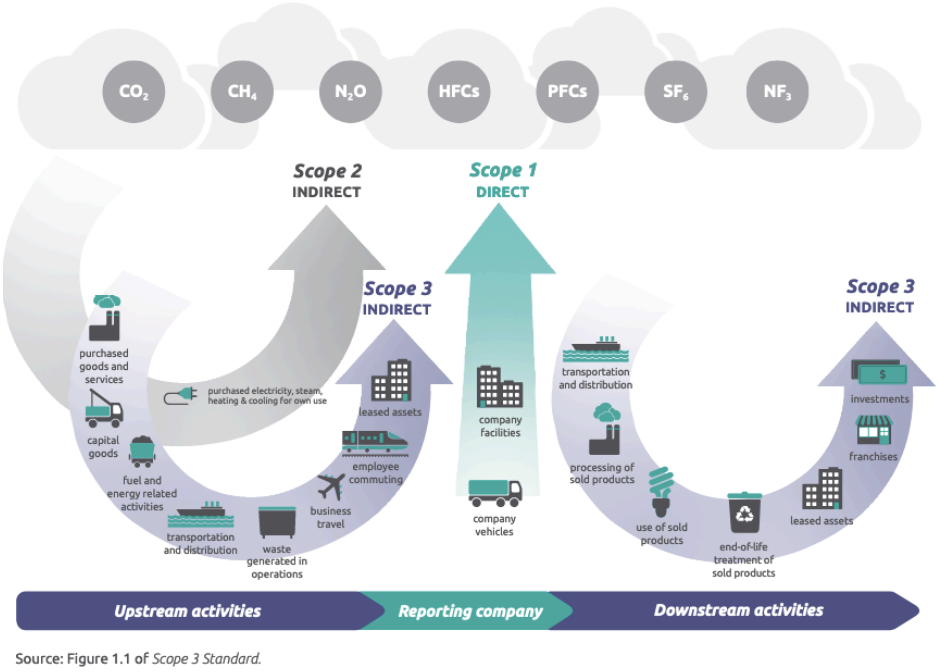
There are obvious opportunities for government agencies to reduce time spent assessing the impacts of major infrastructure projects by moving to a proponent led reporting process, however it is essential to ensure that these efficiency gains do not come at the expense of reduced environmental, social or economic outcomes. To ensure that best practice outcomes are achieved, rigorous assessment criteria must be maintained across all areas of state infrastructure development. Key deficiencies have been identified in the NSW Critical State Significant Infrastructure (CSSI) reporting requirements, especially in relation to the consideration of cumulative environmental, social and economic impacts. The Snowy 2.0 hydroelectric storage project is used as a case study to show where ambiguous CSSI environmental reporting requirements, combined with inadequate reporting from the proponent, have resulted in the

incomplete quantification of environmental impacts; GHG emissions have been used as an example.

Key Issues: Snowy 2.0

The Secretary's Environmental Assessment Requirements (SEARs) for the Snowy 2.0 Exploratory Works, Segment Factory and Main Works projects, provide no guidelines for the quantification of GHG emissions under the key issues category of 'Air Quality' (Department of Planning and Environment, 2019a, 2019b; Snowy Hydro Limited, 2018). The absence of GHG reporting guidelines under this key issue category (Department of Planning and Environment, 2015) has resulted in the inaccurate quantification of GHG emissions by the proponent.

Snowy Hydro Ltd uses the National Greenhouse Accounts Workbook for guidance on the quantification of GHG emissions (Department of Environment and Energy, 2018). This method is not a best practice approach to considering the GHG emissions of an infrastructure project. The NSW Sustainable Design Guidelines (Transport for NSW, 2014) correctly identifies best practice quantification of GHG emissions as comprehensively considering Scope 1, Scope 2 and Scope 3 emissions sources. *Figure 1* gives an overview of Scope 1, 2 and 3 emissions sources.



Source: Figure 1.1 of *Scope 3 Standard*.

Figure 1. Overview of Scope 1, 2 and 3 emissions sources (Greenhouse Gas Protocol).

Snowy Hydro Ltd have selectively identified some sources of Scope 3 GHG emissions in the Snowy 2.0 EIS documents, this approach omits a significant amount of GHG emissions embodied in the products and services that will be used to build Snowy 2.0. Best practice quantification of Scope 3 emissions considers all emissions sources in the supply chain of a project; this includes sources from extraction, processing and distribution of materials and related services being used for the project. Best practice reporting of all direct and indirect emissions sources is referred to as a footprint analysis. (Wiedmann T. & Minx J, 2008) define a footprint as "…a measure of the exclusive total amount of carbon dioxide emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product." Therefore, in the case of Snowy 2.0, a footprint report should identify direct and indirect emissions sources comprehensively, transparently and rigorously. Snowy Hydro Ltd have inadequately reported the footprint of the project by selectively reporting on direct and indirect GHG emissions sources. The GHG footprint of Snowy 2.0 should also consider and report estimated GHG emissions for the operation of the hydroelectric storage station, given that fossil fuel based electricity generation contributes a significant portion of energy to the National Electricity Market. GHG emissions from purchased electricity for pumping would be categorised as Scope 2 emissions and should be calculated based on the NSW emissions factor of 0.82 kg CO_{2e}/kWh.

In addition to failing to meet best practice GHG reporting requirements, Snowy Hydro Ltd have not adequately satisfied the SEARs in reporting the cumulative impacts of the Snowy 2.0 project. A cumulative GHG emissions total for the Exploratory Works, Main Works, Segment Factory, Transmission Lines and Operational Stage of the project has not been provided by Snowy Hydro Ltd in the EIS documents. A comprehensive breakdown of Scope 1, 2 and 3 emissions, in addition to providing a cumulative total for all Snowy 2.0 construction and operational project components would satisfy this requirement.

An estimate on the total direct and indirect GHG emissions for the Snowy 2.0 construction works is provided in *Table 1*, this estimate is calculated using the input output analysis method, similar to that used in the GHG Protocol project based calculation tool (GHG Protocol). A figure of $5.1 billion has been used based on a recently signed construction contract for Snowy 2.0 (IC, 2020); the emissions intensity

of the 'non-building construction' sector has been considered as this sector category covers tunnels, pipelines and electricity distribution projects (Australian Bureau of Statistics, 1993). Calculations of operational GHG emissions have not been considered in this estimate.

Reported GHG emissions for Snowy 2.0

	Included Scope 1 and 2	Included Scope 3	Total GHG emissions
Snowy 2.0 EIS documents	• Fuel • Electricity • Explosives • Vegetation clearing	• Fuel • Electricity (transmission losses only)	**2,700,000 Tonnes CO_2e**
Best practice GHG reporting	Those included in the Snowy 2.0 EIS + • Onsite sewerage treatment (emissions unknown for this calculation)	Materials and services (examples): • Concrete • Steel • Chemicals • Supply chain transport • Supply chain electricity use • Administration • Fly in/Fly out travel • Machinery/ plant equipment manufacture • Onsite accommodation infrastructure • Road infrastructure • Substations • Transmission Lines + All supply chain emissions sources.	**6,000,000 Tonnes CO_2e** Estimation based on emissions intensity of .733kt/$m for the 'non-building construction' industry which includes tunnel, pipeline and electricity distribution construction projects (Australian Bureau of Statistics, 1993), at a project cost of $5.1 billion.

Table 1. Comparison of GHG emissions reported in Snowy 2.0 EIS and best practice GHG reporting.

Assessment of the significance of impacts.

An assessment of impacts should be considered in the context of national commitments to the Paris Agreement (keeping global warming below 1.5 degrees) and in the context of NSW aspirational goals for 'net zero' emissions by 2050. Assessment of impacts should also consider the impact on local and national carbon sinks due to recent wildfires and the cumulative impacts of the project on severe drought conditions in the state and nationally. To effectively consider the significance of the GHG impacts of the project, the total project emissions should be considered in the context of state and national emissions, rather than an annual average figure (as reported in the EIS documents). Reporting total project emissions comprehensively and transparently will give decision makers the essential information needed to benchmark the project against other alternative infrastructure options. This is particularly important in the context of Snowy 2.0 where an understanding of the total GHG footprint should be considered against other potential energy storage options including batteries, alternative pumped hydroelectric projects and power to gas storage (Mostert, Ostrander, Bringezu, & Kneiske, 2018). Snowy Hydro Ltd dually fail to comprehensively and transparently assess the significance the cumulative impacts of the project and identify alternatives to the proposal, as required by the SEARs.

Recommendations for Snowy 2.0

A request should be made to Snowy Hydro Ltd for a more thorough and transparent GHG emissions assessment of the Snowy 2.0 project, using best practice sustainability analysis methods (tools identified below). Comprehensive consideration of Scope 1, 2 and 3 GHG emissions sources, including quantification of total direct and indirect emissions for all construction elements of the project should be reported, this will enable effective consideration of the significance of impacts. A transparent and itemised breakdown of the scope of consideration in the GHG emissions assessment should be provided. If any emissions sources are excluded from the scope of consideration, quantification of these emissions should be provided along with a robust justification for exclusion in the final calculation. The significance of GHG

impacts should be considered in the context of state and national emissions reduction targets.

Recommendations on streamlining best practice impact assessment

Integrating best practice sustainability assessment tools into the EIS reporting process can be easily achieved. A number of tools are available for the quantification and assessment of the sustainability related impacts of infrastructure projects, including but not limited to: the GHG protocol's calculation tools and the Infrastructure Sustainable Council of Australia's IS Rating Tool. A number of Australian universities have developed industry leading research tools that can quantify the GHG, water, employment, economic, land use and energy related footprints of infrastructure projects: AusIELab (Integrated Sustainability Analysis Team - University of Sydney) and AusLCI (University of NSW). Integrating a triple bottom line (environmental, social and economic) approach to EIS reporting and assessment is an opportunity for policy and decision makers to achieve a thorough understanding of resource use impacts; benchmark project impacts against other infrastructure opportunities; and enable world-leading infrastructure planning for a sustainable future.

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