NPI Review Steering Committee

Submitted online: NPI@environment.gov.a

10 August 2018

Review of the National Pollutant Inventory

The Australian Energy Council (the Energy Council) welcomes the opportunity to make a submission to the NPI Review Steering Committee (the Committee) to its *Review of the National Pollutant Inventory* discussion paper.

The Energy Council is the industry body representing 21 electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. These businesses collectively generate the vast majority of electricity in Australia and sell gas and electricity to over 10 million homes and businesses.

The Energy Council welcomes discussion on ways to improve the NPI both for our members who are significant reporters, for researchers who use the data, for government and for the benefit of the general public. We believe improvements could make the NPI work more effectively for all stakeholders.

Data should be presented in context with interpretation and analysis

The data available through the NPI provides a useful source of information for academics, policymakers, and the community. The NPI influences not just its immediate users but a broader discussion between responsible environmental management and important industrial activities. Balanced presentation is therefore critical to ensure that the data is not misused or misrepresented.

We agree with the discussion paper's sentiment (p. 36) that "the original goal of the NPI to balance the data from industrial sources by presenting it alongside data from non-industrial or diffuse sources may have been diluted." To this end, we believe the NPI could be presented with greater context around other emissions sources, greater explanation for certain variations in data and information or research on the relationship between emissions and exposure. This will enable the NPI to more effectively achieve its goals as outlined in the NPI legislation (see p. 2 of attachment).

The Energy Council would also encourage a better use of resources allowing a greater focus on the quality of the information provided, including supporting contextual information such as analysis of the data and refinement of estimation techniques. If there are specific pollution issues associated with a facility during a given year, there are other reporting and communication mechanisms in place, which provide early and regular updates to regulators and the community on performance.

Following discussion between Energy Council members regarding the NPI Review Discussion Papers, members agreed it would be helpful to engage consultants ERM[1] to consolidate views and provide additional advice on current shortcomings in the method and presentation of the NPI and ways it could be improved.

[1] Commissioned with the support of the following Australian Energy Council members: Alinta Energy, CS Energy, Delta Electricity, Energy Australia, Origin Energy, Stanwell Energy, Synergy

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We believe the submission prepared by ERM, highlights some current shortcomings and recommends options with respect to how the NPI could be improved in order to achieve better environmental outcomes and a better conversation around environmental management and industry.

We look forward to further engagement with the NPI Review Steering Committee.

Any questions about our submission should be addressed to Oliver Williams at Oliver.Williams@energycouncil.com.au or by telephone on (03) 9205 3111.

Yours sincerely,

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Dear Oliver

Response to the NPI Consolation Paper

ERM was engaged by Australian Energy Council to provide a response to the National Pollutant Inventory (NPI) Consultation Paper. It is expected that the Australian Energy Council will incorporate the responses provided in this document into its Consolation Paper submission.

Based on our discussions with the Australian Energy Council, the following letter discusses the following topics:

- Are the NPI objectives being met?
- How accurate is the submitted data?
- Methods to reduce reporting burden.
- Improvement options for the NPI.

Sincerely

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Partner
CAQP

Are the NPI objectives being met?

The NPI was established in 1998 through federal legislation as the *National Environment Protection (National Pollutant Inventory) Measure 1998*.

The NPI legislation describes the NPI's goals as:

> *Part 6 (2) National environment protection goals*
>
> *The national environment protection goals established by this Measure are to:*
>
> *(a) collect a broad base of information on emissions and transfers of substances on the reporting list, and*
>
> *(b) disseminate the information collected to all sectors of the community in a useful, accessible and understandable form.*

The legislated goal can be considered very broad and difficult to define. The Discussion Paper defines the NPI's outcomes and goals through an examination of which the NPI:

- enhances environmental quality
- increases public and industry understanding of the types and quantities of substances emitted into the environment and transferred as waste
- encourages industry to use cleaner production techniques to reduce emissions and waste
- tracks environmental progress
- meets community right-to-know obligations
- assists governments in identifying priorities for environmental decision-making.

This submission mainly discusses the 'increases public and industry understanding of the types and quantities of substances emitted into the environment and transferred as waste'.

As the Consultation Paper notes, the NPI data is used for a variety of purposes by the community, industry and government.

The following are investigations to understand if the NPI is providing an accurate understanding of emission sources.

Australian $PM_{2.5}$ Emissions

Reviewing the 2017/18 $PM_{2.5}$ emission inventory, the NPI data indicates that 100% of the country's emissions originate from industry (27% from power generation). The inventory contains no data on emissions from diffuse sources, such as motor vehicles (a known dominant source of

$PM_{2.5}$ emissions) or from household activities. The inventory also does not include any biogenic or natural $PM_{2.5}$ emissions.

Alternatively, CSIRO cites that only 10% of $PM_{2.5}$ emissions are man-made sources and 90% are from biogenic and natural sources[1]. This means that the public and industry are being lead to believe that power generation is responsible for 27% of the total $PM_{2.5}$ emissions, when in reality is could be less than 2.7%, based on the CSIRO citation.

The NPI data are thus an unrealistic and misleading representation of fine particulate matter emissions. This is concerning as it is a government resource and fine particulate matter is one of the most commonly studied and reported emissions in Australia. This implies that the sources for other substances may also be poorly represented in the NPI data. Namely, diffuse and biogenic/natural source contributions are being under represented.

Further, emissions from $PM_{2.5}$ were included in the NPI NEPM legislation in the 2008 variation. That variation required only the reporting of $PM_{2.5}$ emissions from combustion sources. Other sources of $PM_{2.5}$, such as the mechanical generation of emissions from material handling and movement are not captured in the NPI data.

The variation does not stipulate why only combustion sources are included in NPI. There is no scientific basis for this and emissions of $PM_{2.5}$ from other sources are not being reporting due to this.

Additionally, the diffuse emission inventories have not been updated to reflect this variation, which means no diffuse sources are documented emitting $PM_{2.5}$. Diffuse sources, such as motor vehicle emissions, wood burning heating, domestic garden and recreation equipment, hazard reduction burnes and bushfires all represent significant sources of $PM_{2.5}$ emissions in the atmosphere.

Emissions do not equal exposure

The *Sydney Particle Characterisation Study*[2] included a 15-year summary of the emission impacts measured at four monitoring stations. This concluded that the heavy industry (combusting fuels) contributed between 10 -23% of the concentrations measured.

The NPI implies that 67% of the NSW $PM_{2.5}$ emissions are from the studies defined heavy industry (22% from power generation) however monitoring data indicate the impacts from these types of sources are between 10-23%. This nuance of emissions versus ground level concentrations, which are the impact that actually relate to human health and well-being, is not being clearly articulated within the NPI data in its current form.

[1] https://research.csiro.au/static/airquality/smoke-and-fire/
[2] ANSTO (2016) *Sydney Particle Characterisation Study – $PM_{2.5}$ Source Apportionment in the Sydney Region between 2000 to 2014.* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Air/sydney-particle-characterisation-study-ansto-epa.pdf

The average individual may view the NPI data and assume that the reported amount of emissions from power generation would indicate that these operations would be a significant contributor to ground level measurement, especially in the absence of the other significant diffuse and biogenic sources. While this is not shown within the monitoring data, this point is also relevant since much of thermal power emissions are released as elevated point sources with the intention that ground level exposure to said emissions is minimised through dillution. Emission sources in urban locations, such as motor vehicles and of other diffuse do not have dilution step prior to exposure.

Something the NPI does not cover in sufficient detail that the annual emissions do not equate to direct human exposure. This is particularly relevant to the thermal power industry where emissions generally occur from elevated point sources. The NPI ranking of emission sources is misleading if used to identify which industries may be of most concern to human health. Most industrial, and particularly power generation, operations are located in removed rural locations from population centres.

This issue was a conclusion when the NSW EPA performed the Lake Macquarie – Wyong Air Quality Data review, and found[3]:

> "In response to a request from the community, the EPA reviewed air quality in the Lake Macquarie and Wyong region between 2013 and 2016 and found it was consistently good to very good, even though the main sources of air emissions in the Lake Macquarie-Wyong area are from electricity generation plants, with other sources including coal mining, residential wood heating, quarrying, motor vehicles and recreational boats."

The NPI data has been referenced in several instances by different pressure groups inappropriately, which has ultimately misrepresented power generation industry's impacts. In these instances, the NPI has not corrected the interpretation of the data or defended the validity of the data provided by the industry.

Considering the NPI uses resources to validate the submitted report, it would be expected that they would support instances where the data is valid and robust when the data is misinterpreted or misused in the public domain.

As example, in April 2018 The Guardian released an article that implied that coal fired power stations are a significantly higher source or air emissions than actually reported[4]. The article states that coal fired power stations contribute 49% of oxide of nitrogen emission and 54% of sulfur dioxide emissions in Australia. Review of the NPI inventory shows that all power generators produce less than 26% of the reported oxide of nitrogen emission and 51% of the reported sulfur dioxide emissions. This misrepresentation of the NPI data should be addressed by the NPI. Further, the article again implies that the increase from one source of emissions will cause a direct increase to ground level concentrations, which is a scientifically unfounded implication.

[3] https://www.epa.nsw.gov.au/your-environment/air/regional-air-quality/lake-macquarie-wyong-air-quality

[4] https://www.theguardian.com/australia-news/2018/apr/03/coal-fired-power-stations-caused-surge-in-airborne-mercury-pollution-study-finds

Again, the NPI should be on the forefront to ensure that the data is correctly interpreted for public consumption.

It is also important to understand that smaller, less regulated industries and diffuse emission sources may be located within the population centres. To understand the actual impacts from an emission source, both the quantum of emissions and their proximity to receptors need to be considered. This additional contextual information would be instructive to both the community and other stakeholders and the NPI to ensure the data is used responsibly. This change to the NPI would also assist in achieving the NPI goal of providing useful data to advise future policy.

Diffuse Emission Sources

The NPI NEPM legislation requires the States and Territories to prepare their diffuse emission inventories. Diffuse sources include mobile sources (motor vehicles, ships, aircraft), non-industrial sources (e.g. household activities, domestic wood-fired heaters, bushfires, windblown dust, etc.) and commercial sector sources (e.g. small printers or bakeries).

These emissions were originally estimated for the 1998/99 reporting year and then updated as described in the Discussion Paper (pg. 56).

It appears the States and Territories have sporadically updated the diffuse emissions at different times for different jurisdictions. This can cause confusion when trying to use the data for comparisons of the annual emissions inventory. Diffuse sources, such as bushfires and windblown dust, can change significantly from year to year.

Without updated annual emissions, the aggregated emission inventory does not represent a complete picture. This is a significant limitation when trying to make conclusions from the dataset.

The Discussion Paper notes that the commonwealth updated the motor vehicle emission in 2010, but it is unclear if these emissions are present when searching the NPI data. In any event, changes in the Australian vehicle fleet emission profile (based on vehicle types on the road and emission control technology in use) over the past eight years means that this information is significantly out-dated.

As noted in the Discussion Paper (pg. 57), the NPI Data Portal sources tab lists all diffuse sources as being reported in the year 1999, regardless if they were updated. Further interrogation of the data in the summary tab adds more confusion as many dates are provided with multiple years of emissions. This is very confusing and not user friendly.

NPI Exempted facilities

The facilities that are required to report to NPI must meet the following NPI reporting thresholds:

- ANSIC code is listed on the NPI webpage (http://www.npi.gov.au/reporting/industry-reporting-materials/anzsic-code-list)

- Commonwealth has published the industry emission estimation manual.
- Triggers Category 1, 2a, 2b or 3 for reporting.
- Is not an exempt facility under Clause 9 of the NPI PEM legislation
    - Mobile emissions outside of the facility boundary
    - Petrol retail facility
    - Dry cleaning facility
    - Scrap metal handling facility not engaged in reprocessing batteries or smelting
    - Agricultural production facility

The limitations around a stated ANSIC codes, availability of Commonwealth published materials and the exempted facilities inherently limit the accuracy of the reported emissions inventory.

It is understood that the facilities listed for exemption emit NPI substances, but are not required to report as it may be too much of a regulatory burden to the industry and they are a sufficiently low risk to the environment.

While the intention may be good, it is inherently flawed as significant emissions of public concern can come from such sources, many of which are located with the large population centres. For example, emission sources like petrol stations and dry cleaners exist in urban environments and may represent a large portion of the urban public exposure, as opposed to regionally located industries.

Of most concern to the power industry is the exemption of agricultural production. Significant pressure is put on the thermal power industry regarding both coarse and fine particulate matter emissions, including secondary aerosols and sulfur emissions.

For example, the *Sydney Particle Composition Study* cites that secondary sulfates are from fuel combustion, but does not discuss the role of ammonia emissions in its generation.

To enable the formation of secondary sulfates, two moles of ammonia is required for every mole of SO_2, or 1.9 times more mass of SO_2 relative to ammonia.

The other commonly discussed secondary particle is secondary nitrates. To enable the formation of secondary nitrates, one moles of ammonia is required for every mole of NOx (as NO_2), or 3.5 times more mass of NOx relative to ammonia.

The current NPI inventory indicates that the Australian ammonia emissions are 98,000 tonnes per annum while SO_2 emissions were 10 times greater at 960,000 tonnes per annum and NOx emissions were 14 times greater at 1,380,000 tonnes per annum. This indicates that the method to reduce secondary sulfate is to reduce ammonia emissions (i.e. the limiting precursor to secondary sulfate and nitrate formation).

Agriculture is a significant contributor to regional ammonia emissions inventories. Without this source in the NPI inventory, the relationship between ammonia and SO_2 to form secondary sulfate is not well articulated and thus may be misconstrued.

How accurate is the submitted data?

The accuracy of the NPI data is based on several variables:

- Accuracy of emission estimation methodologies.
- Consistency of estimation methods use.
- Accuracy of activity data used by facilities.

Accuracy of emission estimation methodology.

The NPI emission estimation manuals (EETMs) are commonly based on international literature and Australian studies of emission sources. As noted in the Discussion Paper (pg 53), the NPI emission estimation manuals are updated periodically, but not on a regular basis. The updates have resulted in varying degrees of changes in the emissions estimates.

One of the updates noted in the Discussion Paper was the update to the Fossil Fuel Electricity Generation. This update resulted in a modification of the mercury emissions, which is thought to better represent the emissions from Australian coal fired power generation. Several power stations have used stack testing data to show that the previous mercury emission factor was more appropriate for their facility. The NPI teams reviewed the evidence and allowed the use of the previous emissions factor as appropriate.

It is noted that the power industry has received significant pressure to report metals emissions from coal and natural gas combustion in internal combustion engines. The current Fossil Fuel Electricity Generation does not include emission factors for this emission source. Regardless, the industry was significantly pressured to report these emissions and was encouraged to use emission factors for other sources, such as natural gas combustion in boilers or natural combustion in turbines. This is an irresponsible demand from the NPI as the generation of metals in combustion emissions depends upon the combustion method, use of lubricating oils and materials of the combustion devices.

Perhaps more concerning is that the Fossil Fuel Electricity Generation manual identifies the accuracy of the emission estimation factors. The accuracy is defined on an A to E rating (A – Excellent, B – Above Average, C – Average, D – Below Average, E – Poor) following the methodology form the US EPA AP-42 *Compilation of Emission Factors – Introduction* (https://www3.epa.gov/ttnchie1/ap42/c00s00.pdf). This figure below shows varying methods for estimating emission and their A – E accuracy rating against the general costs.

The NPI recommended that natural gas combustion in internal combustion engines use emission factors that were rated E more commonly than not. This means that the NPI regulators were essentially encouraging the power industry to use poor accuracy emission factors for an emission source that they were not defined for. This activity may have resulted in inaccurate metals emission estimates for numerous facilities.

Furthermore, while industry is required to provide to justify the changes in emissions and indicate of the level of uncertainty in relation to the each of the emission estimates reported, this information is not articulated well in the public database, thus allowing the data to be misinterpreted or misrepresented.

Consistency of estimation methods used by facilities.

With the variety of methods available, facilities doing similar activities may be reporting their emissions differently. These differences make it difficult to compare one facility to another directly.

For example, there are significant differences in the accuracy of periodic stack testing data versus continuous emission monitoring data versus the NPI manual emission factors. This type of accuracy difference is difficult to overcome, unless all facilities are instructed to report using the same methods, which may prove too prescriptive.

The NSW EPA *Review of Coal Fired Power Stations Air Emissions and Monitoring*[5] reviewed the emission estimation methods used at the NSW power stations. The review found that the methods used for reporting varied from station to station. The recommendations from the review was for the EPA to implement consistent emission estimation techniques for all power stations for all emissions from the stacks. This may be a method that results in directly comparable emissions between all power stations, but it directly contradicts the NPI legislation. Prior to recommending such action, the practicality should be investigated by the Commonwealth and include the consideration that some power station may be have better representation of emission using different estimation methods.

Accuracy of activity data used by facilities.

The accuracy of the activity data directly influences the accuracy of the emission estimates. The NPI is not intended to require sites to collect additional data other than what is required to run their operations. As such, some activity data may be estimated only for the NPI purposes. This can result in reduced accuracy of emission estimates, especially when these sources are aggregated with other atmospheric point or fugitive sources.

[5] https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/18p0700-review-of-coal-fired-power-stations.pdf?la=en

Methods to reduce the reporting burden

There are two main methods to reduce the reporting burden on industry:

1. Streamline all required environmental reporting (i.e. licences and NPI).
2. Reduce the frequency of NPI reporting.

Streamline reporting

The NPI reports emissions based on a financial year. Reporting required for environmental approvals. These reporting requirements can be different the NPI requirements, both in terms of reported data and the reporting period (i.e. calendar year). The reported data are often available for public information. Not only does this increase the reporting burden of the industry, it also can cause confusion within the public about the differences in the reporting data.

Streamlining licence reporting requirements will both decrease the burden of reporting as well as increase the public understand and trust in the reported data. This type of initiative has been recommended by the NSW EPA[6] and it is important the other States and Territories understand the value of these recommendations. More importantly, this recommendation should be implemented across Australia.

Reduce reporting frequency

A method to reduce the reporting burden is reduce the reporting frequency. The reduction of the reporting frequency will not reduce the validity of the NPI database as most industry perform regular operations on a year in and year out basis. The slight variations in emission between years is normal and will not cause any reduction of meaning if reported biannually.

Improvement options for the NPI

Our recommended improvement options include:

- Update the NPI database to a consistent base year for all diffuse emission sources.
- Highly variable diffuse emission sources (i.e. bushfires and windblown dust) should be updated annually for the most accurate context of the emissions inventory.

[6] https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/18p0700-review-of-coal-fired-power-stations.pdf?la=en

- Update the NPI website to include context between emissions and exposure to assist the public in understanding their risks. If possible, linking the NPI website with the ambient concentrations data for each state, may help explain the differences between emissions and exposure.
- $PM_{2.5}$ emissions should be modified to include all sources and not just combustion sources.
- $PM_{2.5}$ emissions should be updated to include all diffuse emission sources.
- Update emission estimation technique manuals on a regular basis, with priority given to those industries that identify a significant need. The updates should involve a stakeholder group (including industry, consultant and researchers) to prioritise what should be updated in the manuals. The manuals should be updated with all available site-specific emission estimation data.
- Update emission estimation technique manuals based on empirical data collected for Australian industry activities.
- Provide more resources for the NPI regulators. The Discussion Paper (pg. 60) demonstrates that the program is well underfunded compared to international programs. The funding for the program should not be sourced from the industries as they already bare the majority of the cost burden for reporting emissions. The funding should be sourced from the federal budget.
- Reduce frequency of reporting. Industry reporting should be in line with State and Territory emission reporting.
- Increase communication between the NPI and environmental approvals regulators. The increased communication could result in streamlining reporting requirements
- Update the NPI online reporting system. The system is very laborious and takes a long time to save changes. The system also asks the same validation questions year on year. If the system could be 'smarter' and learn from repetitive answers to the validation questions, this could reduce the burden of reporting.