# Representative account or greenwashing? Voluntary sustainability reports in Australia's mining/metals and financial services industries


## Abstract

Why are more and more companies voluntarily issuing costly, potentially exposing standalone sustainability reports on environmentally and socially problematic issues? Using legitimacy theory, this study analyses ways companies seek to strategically enhance legitimacy by leaning towards either "representative" reporting of both favourable *and unfavourable* information *especially in an industry's highest-impact domains*; or "greenwashing" (including whitewashing non-environmental issues), which downplays unfavourables and high-impact domains and highlights favourable but less relevant points. Content analysis compared Global Reporting Initiatives (GRI) reports from 2011 to 2019 by Australian financial services companies (107 reports) and mining and metals companies (122) . Specifically, to critique reporting *quality* in fine grain, it disaggregated results into levels (from omission to full quantitative treatment) of disclosure of good/bad/neutral-news indicators and violation-related/non-violation-related ones, and identified highest-impact domains. Neither industry's reporting was very representative. Relatively though, mining and metals leant towards representation: fuller disclosure on environmental aspects (its highest-impact domain), including unfavourables: bad and violation-related indicators. Financial services companies only led in disclosing neutral social indicators, not bad or violation-related ones, so leant towards greenwashing. Results also suggest that after the GRI clarifing materiality principle in 2016, financial services disclosure quality dropped further by de-emphasising environmental without lifting social disclosures, while mining and metals' stayed unchanged. The results confirm and better specify widely-indicated reporting weaknesses, contributing to content analysis methodology and legitimacy theory. This arms guideline-setters, investors and other stakeholders to better evaluate/design reports and might encourage firms to voluntarily improve disclosures.



***Keywords:*** *sustainability reporting strategy, greenwashing, Global Reporting Initiative (GRI), legitimacy theory, mining and metals, financial services.*

## 1. Introduction

Companies are increasingly issuing voluntary standalone sustainability reports, costing money and potentially disclosing weaknesses. What motivates this? An answer in a nutshell, besides somewhat-unlikely selfless honesty, is strategy: a competitive advantage of reputational value accrues from providing – and/or being seen to provide – frank information on tough issues (Karaman et al., 2020; Radhouane et al., 2020). This article explores that nutshell answer further.

Sustainability reporting covers not only environmental but also social weaknesses: on customer privacy, companies' values and culture, anti-bribery and corruption policies, cyber risks and gender equality. The question of companies' strategic motivations and methods in disclosing indicators in environmental and social domains alike, and the way reports reveal or conceal companies' true social and environmental performance, is crucial to company stakeholders who read the reports. Stakeholders like investors, consumers, environmental/social NGOs and potentially governments (Deegan, 2019) generally cannot directly observe company (mis)behaviour. They suffer from asymmetric information. Yet those same stakeholders hold some promising power to reward perceived good or socially/environmentally high-performing corporations (Mahoney et al., 2013) with benefits including privileged investment opportunities (Berthelot et al., 2012), cheaper capital (Bachoo et al., 2013), and favourable customer behaviour (Marin et al., 2009). Conversely, they wield a degree of threatening power to punish perceived bad perfomers. This promise and threat – which the present study elides to just threat – both fleshes out and complicates the nutshell reputational answer above. Since companies use sustainability reporting and sustainability itself strategically (Higgins & Coffey, 2016), the lack of mandated disclosure information makes it harder for stakeholders to overcome asymmetric information and tell which reporters are truly good (Gugerty, 2009). This opens opportunities for manipulation. Managers might be especially tempted to manipulate content when corporate legitimacy comes under threat for social or environmental shortcomings (Beske et al., 2020; Lokuwaduge & Heenetigala, 2017; Melloni et al., 2017).

Legitimacy theory, one of the most established explanations employed in the sustainability literature for firms' motivations and strategies behind voluntary sustainability reports, predicates the influence of social and political pressure, or threats to legitimacy (Clarkson et al., 2008) of the kinds just noted. This theory mostly features in studies explaining companies' reactions to pressures to disclose (e.g. Beske et al., 2020; 2019; Rodrigues & Mendes, 2018). It suggests management is motivated to legitimise otherwise potentially suspect aspects of company operations (Deegan et al., 2002) rather than simply disinterestedly righting information asymmetries out of selfless honesty.

Consistent with legitimacy theory, this study aims to understand whether voluntary standalone sustainability reports offer what it calls a relatively "representative" view of not only flattering but particularly unflattering and high-impact performance indicators or whether, to borrow a term common in the environmental literature and extend it to the social domain too, they are more a means of "greenwashing": accentuating the positive and eliminating, downplaying or obfuscating the negative. A more representative strategy could be seen as a "fair" means of earning or keeping legitimacy and greenwashing as a devious or "foul" means – but both are still within legitimacy theory. To elaborate, representative reporting strategy will be defined as presenting a transparent and rounded picture of performance on undesirable/unfavourable or vulnerability-exposing indicators, not just desirables/favourables, and concentrating on the highest-impact or more concerning "domain(s)", namely (in the present study) social or environmental, for their line of operations. Greenwashing will mean the opposite. The study cautiously frames reporting strategy in companies sampled as "leaning towards" representative/greenwashing: relative, with no cut-off point and without claiming to pronounce the last word in this complex area. The definitions will be operationalised in the Method and Results sections by specific measures in the content analysis. These notably categorise GRI indicators into desirables within each domain that are inherently "good news" (or at least "neutral news") and "non-violation related"; and undesirable indicators that are "bad news" or "violation-related", and then quantifying disclosure on each category.

Note that representativeness does not necessarily entail good performance. As a rule firms with truly good environmental and social records should be more likely to issue sustainability reports at all (Clarkson et al., 2008; Karaman et al., 2020) and to do so more representatively than poor performers. Yet conversely a company that leans towards representative reporting might be not a proud good performer but an honest poor performer. Sustainability performance and reporting quality are distinct. However, representativeness – honesty – is a virtue in itself and may gives reason for trusting a company's commitment.

Higgins et al. (2015) propose that strategic *differentiation* from competitors can also be a key driver of reporting practices. A starting point for this study is that industries facing different pressures on their legitimacy – the way industries like mining and metals (MM) are pressured on environmental issues because they cause obvious impact on the environment, whereas in financial services (FS) social practices incur the greater visibility follow different reporting strategies. Specifically, the first focus in this study is Australian mining and metal (MM) companies. More and more MM companies internationally are publishing sustainability reports and research into that reporting is called for (Aznar-Sánchez et al., 2019). Debate surrounds the relationship between the volume and the representativeness of disclosure in this industry (Lee, 2017). As a revealing inter-industry comparator

for MM, Australia's financial services (FS) sector is examined. Moreover, despite FS's public visibility on social issues like customer privacy and cyber risks its sustainability reporting is comparatively under-researched, leaving a gap.

This study considered Australian MM and FS companies that had voluntarily issued standalone sustainability reports over 2011–2019 using the internationally pioneering and predominant Global Reporting Initiative (GRI) guidelines, which also ensure comparability. Thes author also control for the clarifications in connection with the Materiality principle in the GRI frameworks by running comparisons between reports pre and post the transition. Materiality is conceptually linked to scrutiny/threat and to highest-impact domain and unfavourable indicators, making a third concept that could ideally align with these as will be discussed. Results suggest neither industry's reporting over nine years was very representative. With that major rider though, MM leant more towards representative reporting than FS on environmental indicators (notably unfavourables) yet the expected converse did not hold: FS did not significantly surpass MM in social domain reporting, even though FS reported on social indicators slightly more than it did on environmental ones. Interestingly, the results post the GRI materiality criterion indicate weaker disclosure in FS by de-emphasising environmental without lifting social disclosures, while MM's stayed almost the same.

Besides addressing the gap on FS reporting and adding to previous studies on Australian corporate sustainability disclosures and the considerable literature on MM internationally, much of it critical of selective reporting (Ranängen & Lindman, 2018), the research makes several contributions. The refined and novel form of content analysis used both represents a main contribution to methodology and enables its other contributions. While the content analysis method is common in studies assessing sustainability reports, thie present study takes it further by its manner of focusing on what might loosely be called quality, although it has quantitative aspects (four numbered disclosure levels) as well as a qualitative ones (focusing on disclosures in highest-impact domains, and establishing the division into good/bad/neutral-news indicators and violation-related/non-violation-related indicators). The methods here variously answer calls for considering the type of sustainability performance indicators reported in determining the reporting strategy (Mahoney et al., 2013), and for tailoring theoretical perspectives to the type of sustainability disclosure (Van Der Laan, 2009). Moreover, while disclosure quality and extent measures have been used in content analyses in sustainability reporting, to the knowledge of the author they have not previously served, in the same depth, to compare companies' sustainability reports over a period, let alone a period whose two halves allow comparisons between two protocols, namely GRI pre- and post-materiality transition.

The research further expands and contributes to the corpus on legitimacy theory by tracking how representative and greenwashing reporting strategies both advance legitimacy, by foul means and fair respectively. Although future work will be needed to address limitations, the study can also help us understand how well or poorly in practice domains and indicators of greatest impact align with threats from stakeholder scrutiny and with materiality. As practical applications, the research will arm guideline setters, regulators, investors, watchdogs and other stakeholders in Australia and beyond to better understand reporting strategies and evaluate and compare sustainability reports within or across MM, FS and potentially also other industries and domains other than social and environmental. It should directly affects reports' value and relevance (Eccles et al., 2012) and could inform diligent managers about the most pertinent disclosures and reporting methods (Unerman & Zappettini, 2014).

The next section reviews literature and articulates the study's theoretical lens. Section 3 then explains the research method and content analysis procedures, while Sections 4 and 5 respectively present and discuss the results, the latter also detailing the contributions and applications, and noting limitations and future research avenues.

## 2. Literature review and theoretical perspectives

### *2.1 Literature on sustainability reporting and content analysis*

Sustainability has become a major societal concern (Burritt & Schaltegger, 2010) and consequently enters management decisions (Elena Windolph et al., 2014), accounting (Gray, 2010) and reporting practices (Guidry & Patten, 2010). Sustainability reporting is gaining popularity (KPMG, 2017). Since sustainability reporting is mostly voluntary, various studies investigate reasons companies choose to disclose (e.g. Bini et al., 2018; Clarkson et al., 2008; De Villiers & Alexander, 2014; Ranängen & Lindman, 2018). Motivations for, and strategies of, disclosure ought to colour how stakeholders interpret reports and inform future guidance or regulations on reporting (Deegan, 2019).

Many studies evaluate corporate reporting motivations by analysing what firms report (Parker, 2005). Content analysis is a common method for assessing the extent or quality of the disclosure (Joseph & Taplin, 2011) and features in previous studies (e.g. Bini et al., 2018; De Villiers & Alexander, 2014; Hooks & Van Staden, 2011; Khalid Sharif et al., 2019; Mahoney et al., 2013; Ranängen & Lindman, 2018). To statistically analyse reports, content analysis quantifies the extent of disclosure with numerical values (Joseph & Taplin, 2011) usable by future researchers (Denscombe, 2014). Content analysis methods are normally either extent-based (essentially quantity/number of indicators reported) or quality-based but not necessarily both, although the terminology varies widely in this field. Quality-based content analysis interrogates the nature and relevance of items disclosed (Hooks & Van Staden, 2011) as well as levels of disclosure . Because reports can bury bad news under copious

glossy irrelevancies, studying exclusively the level of disclosure (let alone the number of words or pages) can be misleading (Hooks & Van Staden, 2011); clearly, type of item disclosed at a certain level matters too (Junior et al., 2014; Lee, 2017). Thorne et al. (2014) also suggest that adding quality of sustainability reporting compared to pure quantity (number of indicators reported) influences stakeholders' perceptions more. Disclosure indices, particularly the GRI, are considered practical and valid research tools (Botosan, 1997) for both quality and quantity of disclosure and are used extensively in the sustainability reporting literature (e.g. Lee, 2017; Rodrigues & Mendes, 2018).

Meanwhile, growing interest in industry-specific sustainability reporting concentrates on companies from high environmental impact industries (e.g., Bini et al., 2018; De Villiers & Alexander, 2014; Dong & Burritt, 2010). In sustainability reporting of UK mining companies, Bini et al. (2018) detected a selective and soft approach which skipped key issues or only treated them in a general manner. De Villiers and Alexander (2014) studied the content of sustainability reports issued in 2007 by 18 Australian and another 18 South African mining companies. They compared the number of sentences on different categories and their tone (positive, negative or neutral), whether the information was reported using financial, quantitative, specific or declarative measures, and location (financial report, rest of annual report, website). Statistically, no significantly higher level of reporting of bad news emerged among Australian vis-à-vis South African companies. Dong and Burritt (2010) investigated both the quality and quantity of social and environmental disclosures of the 25 Australian oil and gas companies listed in the Australian Stock Exchange 300 index in 2006. Disclosure proved relatively poor, mostly declarative in quality and positive in tone.

Fewer studies investigate the level of disclosures in FS. Among this minority, and unlike previous studies, both Dissanayake et al. (2016) and Wijesinghe (2012) noted banks had better levels of sustainability reporting than companies in high environmental impact industries. Higgins et al. (2015) identified all Australian companies that had produced sustainability reports over 1995–2008. Sustainability reporting had deepened in a few high-impact industries (mostly MM), while a sprinkling of companies across wide-ranging, environmentally low-impact industries including FS also published sustainability reports. Accompanying manager interviews revealed sustainability reporting's strategic value. Because, nevertheless, few Australian companies actually issued reports, the researchers suggested strategic differentiation from non-issuers might be a key driver. They recommended future studies look for institutional fields such as industry differences that may shape sustainability reporting practice.

In summary, one way of understanding companies' strategy of reporting is through analysing the content of their disclosure. This study focuses on the quality of disclosure, emphasising different types

of indicator disclosed (good/bad/neutral "direction" of news and (non-)violation-related) and the level of coverage of each type.

### *2.2 Legitimacy theory, and greenwashing vs representation*

This study applies legitimacy theory, which has been used widely in the sustainability literature to explain reasons for voluntary reporting. From a company's perspective, sustainability reporting motivations are well-associated with legitimacy theory (Deegan, 2014). As Deegan and Unerman (2011) put it, legitimacy theory predicates a social contract with the company. The contract imposes numerous expectations on company behaviour (Deegan, 2002) and deems legitimate those companies apparently operating within social norms (Deegan, 2019). Legitimacy thus becomes a key, manipulable resource for survival and growth (Roberts, 1992).

Voluntary disclosures whereby managers communicate with stakeholders are a strategy for gaining and maintaining legitimacy (Radhouane et al., 2020). The literature concludes voluntary reporting is driven by strategic considerations (Radhouane et al., 2018) and argues managers can misuse reports to mask poor sustainability performance (Deegan, 2019; Rudkin et al., 2019). Certainly, voluntary reporting can shape stakeholder perceptions (Radhouane et al., 2020) by strategic selection (Hahn & Lülfs, 2014; Romero et al., 2019) – reporting more positive information (Bini et al., 2018) and ignoring or so-called greenwashing negative and potentially harmful performance (Khalid Sharif et al., 2019). Greenwashing tries to convince stakeholders by manipulating content (Beske et al., 2020; Bini et al., 2018; Hahn & Lülfs, 2014; Melloni et al., 2017) or selectively disclosing favourable performance (Torelli et al., 2020). Just as sustainability reporting comprehends social aspects, greenwashing, a play on "whitewashing", extends for the purposes of this study to glossing over social as well as environmental failings and certainly legitimacy theory has been applied to both (e.g. Lokuwaduge and Heenetigala, 2017). The definitions below could be extended in the same way to the social domain, as this paper does for convenience, since the principle is the same.

While greenwashing, both in reports and in other communications, has gained currency in the academic literature (Lyon and Montgomery, 2015), there is no universally accepted definition of the term (Torelli et al., 2020). Many scholars (e.g. Roulet and Touboul, 2015; Seele and Gatti, 2017) follow the Oxford English Dictionary, which defines greenwashing as "disinformation disseminated by an organisation so as to present an environmentally responsible public image". According to Lyon and Montgomery (2015, p.226), "the word greenwash is used to cover any communication that misleads people into adopting overly positive beliefs about an organization's environmental performance, practices, or products". Despite the lack of universality, the thrust of definitions of greenwashing is consistent, and it is in the detailed methods of measuring them that nuances lie.

Melloni et al. (2017) identified two greenwashing strategies in sustainability reporting: focusing on positives, and what they called softer reporting and lower information volume for negatives. Greenwashing companies misrepresent themselves as good corporate citizens (Greer & Bruno, 1998), selectively disclosing or disclosing more forthcomingly positive social and environmental performance and eliding the violation-related and the negative (also suggested by Torelli et al., 2020). Previous studies looked at greenwashing as a strategy at two main levels; company level and product. Product level greenwashing refers to advertising the environmental characteristics of a specific product or service in a deceptive, inaccurate way (Delmas and Burbano, 2011). At the company level, Torelli et al. (2020) describe (environmental) greenwashing as the selective disclosure of good environmental actions while concealing the negative ones. Wong et al. (2014) call it a strategy of engaging in symbolic communication of environmental (and social here) issues without addressing the substantial ones. Like other works on reporting rather than product advertising, the current study looks at the company level and its definitions are consistent with both the latter sources.

Much research has applied legitimacy theory to sustainability reporting. In Lokuwaduge and Heenetigala's (2017) study, Australian-listed MM companies ignored or downplayed environmental, social and governance (ESG) indicators that could detract from legitimacy. In the US, Hahn and Lülfs (2014) reported that most of 19 Dow Jones and 21 DAX companies sampled had manipulated the presentation of information to skew readers' perceptions. Analysing the Integrated Reporting Framework of 2013, Melloni et al. (2017) also uncovered a manipulative strategy with unbalanced reporting and syntactically less readable disclosures of any information which might undermine company legitimacy. And several companies in Bangladesh breaching labour laws conveniently omitted reporting that pertinent fact to duck negative publicity or restrictions on their activities (Belal & Cooper, 2011), reinforcing Mahoney et al.'s (2013) observation that greenwashing is often a sin of omission.

Legitimacy theory offers a relatively simple explanation for different social and environmental disclosure practices (Deegan, 2019). Specifically, companies disclose less or nothing if the perceived threat to legitimacy from reporting a given event (say, a chemical spill), or society's expectations of a company, are trifling (Momin & Parker, 2013). Therefore, manipulation can range from deliberately lower-level coverage than appropriate, whether it be of financial or non-financial information, to highlighting selective types of information: overplaying positive and neutral, non- violation-related types versus negative and violation-related ones. Again, precise terminology in the literature, such as "violation-related" or "type", for how content analysis is calibrated to the theoretical lens, varies, but the thrust is clear enough. The details of this study's terminology and measuring greenwashing versus representative strategy follow in the next section

## 3. Method

### *3.1 Sample selection*

This study selected for content analysis the 16 Australian companies in mining and metals and 12 in financial services which had published voluntary, standalone sustainability reports (122 from MM, 107 from FS[1]) using the Global Reporting Initiative (GRI) protocols over 2011–2019[2]. The GRI was chosen because it is a pioneering independent body for reporting environmental and social impacts, now used in over a hundred countries[3], making it the most widely employed protocol (Pedersen, 2015). Australia's mining and metals (MM) industry was chosen both as internationally significant and because of the Australian mining boom since about 2005. Given its line of operation (Gorman & Dzombak, 2018), the industry must respond to the growing critiques of social and especially environmental sustainability (Lodhia & Hess, 2014; Rodrigues & Mendes, 2018) and educate stakeholders about its sustainability efforts (Aznar-Sánchez et al., 2019). The financial services industry companies were chosen for comparison for MM because they come from the same country and FS is one of the largest sectors in the Australian economy (Australian Government, 2019).

All 28 sample companies were medium to large by the GRI definition[4]. Since larger companies can be expected to report more than smaller ones, the study had a built-in control for this potential influence on sustainability reporting, making results comparable.

In 2016, GRI updated the G4-Guidelines to what are simply called the GRI Standards and several clarifications were made in connection with the Materiality principle. Materiality principle states that a company's sustainability report should cover relevant aspects which are referred to those topics "*that may reasonably be considered important for reflecting the organization's economic, environmental and social impacts, or influencing the decisions of stakeholders*"[5]. Therefore, this study looks at a period of reporting before the transition (2011–2015), and afterwards (2016-2019), giving a substantial period up to the present and letting us see if the materiality principle updates influenced disclosure quality of these companies. Comparisons were possible because the actual indicators stayed the same.

### *3.2 Content analysis and coding*

Van Der Laan (2009) stresses the explanatory power of theoretical perspectives tailored to the type of sustainability disclosure. Accordingly, this study argues that analysing not only the overall level of

[1] Some of the sample companies missed sustainability reports for some years within the study period.
[2] The 2011 start date was selected because very few of the sample companies doing sustainability reporting used the GRI guidelines before then.
[3] https://www.globalreporting.org
[4] GRI follows the EU definitions of size. See https://database.globalreporting.org/about-this-site (last access, December 2020).
[5] https://www.globalreporting.org/how-to-use-the-gri-standards/questions-and-answers/materiality-and-topic-boundary/ (last access, December 2020).

coverage but the type of indicators (negative/bad, positive/good, and neutral directions; violation-related/non-violation-related), and the level of coverage of different types, can reveal whether a voluntary report issuer seeks primarily to legitimise its social and environmental performance improperly through greenwashing or to be representative. The type of indicator includes both direction, violation-related issues and the level of coverage together constitute a proxy for quality. Regardless of actual performance, if a company leans towards a representative strategy, it should cover not only good or neutral and non-violation-related areas but more particularly bad and violation-related ones, and the latter especially at a high level, meaning fuller and more forthcoming treatment. Following legitimacy theory, it is expected that good performers will report bad and violation-related indicators (as well as good/neutral and non-violation-related ones) to advertise their strong performance. But a representative company could alternatively be an honest poor performer. Conceivably as an exception to the general rule that good performers also report more representatively (Clarkson et al., 2008; Karaman et al., 2020), a firm might volunteer positives but stay silent on its clean record in bad news and violation-related indicators simply because there were no unfavourable results to tell, whereas another firm with the same uneven reporting might be suppressing unflattering information. However, the risk of misreading silence as guilt seems small because the former company has every incentive to declare proudly (for instance) "we incurred no fines".

This study considers all the GRI general environmental and social indicators because all apply to multiple industries, enabling cross-sectional comparisons. The intention was not to compare or rank individual companies but to treat each industry as a whole and compare between the two industries and against the maximum possible scores. The basic method of content analysis was tailored as follows. First, the indicators were categorised in two ways – by what was called news direction and by whether they were violation-related. Then, within the reports, the level of disclosure of each was assessed on a four-point scale. To reduce subjectivity, all three categorisations were conducted by the author and one other researcher and results compared. In reliability testing Krippendorf's alpha was above 0.8, which demonstrates strong interrater reliability (Krippendorff, 2009); no statistically significant differences in categorisation appeared.

***Insert Table I here.***

*News direction and violation-related status of indicators*: Thus each of the 34 environmental and 48 social indicators in the GRI general standards was assigned both an inherent direction and an inherent categorisation as either violation-related or non-violation-related. Possible directions were good, bad or neutral, meaning that moving towards more of a certain activity was a bad thing, a good thing or neither. Thus for instance EN1 "Materials used by weight or volume" was categorised as a bad-news

indicator because using more materials is environmentally negative: it stamps a heavier production footprint. Violation required some set standard, for instance, a law or regulation. For a company to consume more materials does not violate any laws or other standards – it simply costs the company more money. Hence EN1 is bad but not violation-related. Contrast EN13 "Habitats protected or restored". Clearly once again this is not violation-related, but more habitats protected/restored is a good thing, so the indicator's direction is good, or positive. Any indicator with neither clearly good nor bad direction was categorised as neutral. An example of a violation-related (and bad) indicator is HR8, which refers to the total number of incidents of violations involving rights of indigenous peoples and actions taken. Applying this logic produced the categorisations shown in Table I. Note in particular that 23 of the 34 environmental indicators and coincidentally also 23 of the 48 social indicators emerged as bad/negative, and nine environmental and 26 social indicators as violation-related.

*Level of disclosure of indicators:* Next, within the actual reports of the sample companies, the author and the other researcher quantified the level to which each GRI indicator (pre-categorised as good/bad/neutral, and as violations-related/non-violation-related) had been disclosed. Four levels were possible: 0 = not reported, 1 = reported generally, 2 = reported using qualitative terms and 3 = reported using quantitative measures. "General" description scores low because it is often vague. For example, one report said "*As part of our mandatory induction process, our people undertake training on the [company's] Code of Business Conduct, which includes our position on anti-corruption*", which reaches only a general level of disclosure of social indicator (SO3): *percentage of employees trained in organisation's anti-corruption policies.* An example of qualitative reporting was: *"In FY2014, we engaged in a number of product stewardship initiatives…"* where the number is unspecified but the timeframe is (2014 here). One disclosure that reached quantitative level with respect to indicator EN15 (direct greenhouse gas (GHG) emissions (scope 1)) was "GHG – Scope 1 was 22.7 millions of tonnes CO2-e in 2014", which gives hard, relevant numbers. Note that "high-level" reporting here thus means very forthcoming and specific and quantitative measures, rather than denoting an overview.

The resulting fine-grained, multidimensional approach fulfilled the aim of this study to understand and categorise the sustainability reporting strategies, and meets recommendations (Hooks & Van Staden, 2011) for non-binary content analysis.

Regardless of actual performance, leaning towards a representative strategy involves reporting more widely across news and violation-related categories, especially disclosing bad-news and/or violation-related indicators at a higher level, and doing so in the domain of greater concern/impact: environmental for MM and social for FS. Greenwashing strategy involves a lower level of coverage of

negative and violation-related areas compared to positive/neutral or non-violation-related ones regardless of the total number of reported indicators. Classic greenwashing would feature reports drenched in high-level positives and non- violation-related issues with low-level reporting of bad or violation-related ones. Note that representative and greenwashing tendencies are both relative: no absolute thresholds applied.

## 4. Results

Table II displays the scores of each industry both aggregated and in various disaggregations. All numbers are averaged across the respective industry and across the nine sample years, weighting all companies equally. The single numbers in the very top row collapse environmental and social results into one and do not break them down by level, good/bad-news direction or being Violation-related. The results in that row thus become binary: an indicator was either reported or not. Hence the maximum that could be reported is 82, being 34 plus 48. Panel A splits these numbers into environmental domain and social domain scores calculated by adding up the disclosure quality level scores of those two domains. The maxima in parentheses from now on represent the total indicators multiplied by a maximum disclosure level of three. Panel B disaggregates by domain and Panel C disaggregates, further, by not only domain but level. Panels D and E continue to distinguish environmental from social but disaggregate these in two different ways: whether each indicator was good or bad news (more of it is better or worse respectively) or neutral (neither) in Panel D and whether the indicator was violation-related or not in Panel E. Maxima again represent total indicators in each category times three, three being the maximum level of reporting for each.

***Insert Table II here.***

As Panel A in Table II shows, the aggregated figures for both industries were well below the maximum. This portrays in coarse fashion a general deficit of disclosure in both industrieson the study's measures. Notably, it also reveals a statistically significant inter-industry difference between the aggregated average number of indicators reported by MM and FS (48.86 vs 26.08). That is, MM companies, on average, reported almost twice as many indicators as FS companies.

Panel B drills down further. It shows firstly that the MM surpassed FS in environmental reporting by a large and highly significant amount (42.99 vs 24.94, $p<0.01$), and secondly that MM reported environmental better than social indicators. The greater focus on environmental indicators by MM than FS inter-industry are expected from MM's line of operations: there is a lot to say about environmental impacts for MM and as an obvious vulnerability they will attract scrutiny. However, the expected inter-industry converse did not hold: FS was not superior to MM on social indicators (actually slightly lower at 35.44 vs 36.31, though the difference fell short of statistical significance).

Panel C shows disclosures at each level. Interestingly, results suggest both industries far prefer to report indicators either quantitatively or not at all. On average, taking those two rows, FS omitted a third more environmental indicators than MM (25 versus 19 in rounded terms, with highly significant $p<0.01$). And with equal significance MM surpassed FS in quantitative discolosures by over 75% (in rounded figures 14 versus 8). These results are expected given MM's exposure on environmental matters. However, the pattern of social reporting was very similar: FS did not significantly surpass MM, whereas the expected converse would have predicted it to.

Regarding Panel D, the coincidentally equal number of 23 environmental and coincidentally and 23 social GRI indicators that count as bad give maxima of 69 if all are reported quantitatively. A generally more representative strategy under this study's model would report more of the bad indicators and would do so using higher levels (many quantitative measures) but would also cover good and neutral indicators at an adequate level simply because the GRI inquires about them. In actuality, on average MM led FS's reporting of bad-news environmental indicators by over 75% (32.5 versus 18) with high statistical significance. However, once again the converse did not apply: FS companies in fact exhibited lower disclosure than MM of bad social indicators (11.99 vs 15.68), and this was statistically significant ($p<0.05$), even though FS had a statistically significant lead in reporting neutral social indicators ($p<0.1$). Thus what is surprising is not that FS fell behind MM in coverage of bad and violation-related environmental indictors, or indeed in any environmental coverage, but that it did not lead in social reporting.

A generally more representative strategy would also report violation-related indicators at high levels. Panel E shows MM companies reported a statistically significantly higher level of both violation-related and not violation-related environmental indicators than did FS, so were more representative in this way. This would be expected. Socially though, FS companies' expected lead in the level of reporting non-violation-related indicators eventuated (18.5 vs 16.4) but was not statistically significant and they actually showed a lag (19.94 versus 16.96), though not reaching statistical significance, in violation-related ones.

Overall, and taking the period 2011–2019 as a whole, the sample MM companies on average reported more representatively than FS on environmental indicators, using quantitative measures in more indicators and higher levels generally on bad and violation-related messages. Moreover, MM companies held their own vis-à-vis FS in social aspects, with a similar quality of disclosure and indeed significantly more focus on bad social indicators . Although falling far short of maximum levels across all types, MM did not merely focus on good or non-violation-related areas. It can be concluded that the MM sample's reporting strategy leant toward representativeness more than FS on both

environmental and social indicators. By contrast, FS sample companies featured greater disclosure of good, neutral and non-violation-related social indicators while ignoring most bad and violation-related indicators. Therefore, it is concluded the FS sample leant toward greenwashing even in the social domain which should be its main concern.

### *4.1. Sustainability disclosure pre/post-transition from G4-guidelines to GRI standards*

As discussed, GRI moved from G4 to what are simply called GRI standards in 2016. Even though the indicators stayed the same, there were several clarification made with the materiality in the new standards. The study controlled for this change and compared disclosure levels of the sample companies pre-and post-transition to detect any effect on disclosure strategy. Tables III and IV compare disclosure levels pre- and post-transition for FS and MM respectively.

Table III portrays FS pre- and post-transition. Panel A shows no overall increase combining the two domains. Panel B shows that post-transition disclosure of environmental indicators overall fell substantially (28.82 vs 19.6) and significantly ($p<0.01$). In Panel C, the number of unreported environmental indicators climbed from around 23 to around 27 with high statistical significance ($p<0.01$) and the number of indicators disclosed using quantitative measures fell, from around 9 to around 6, also significantly ($p<0.05$). Panels D and E record significant drops in disclosing good and bad and both violation-related and non-violation-related indicators in the environmental domain. While the level of disclosure of bad and violation-related social indicators fell, these changes were statistically insignificant. Therefore, it can be concluded that the new clarification in the materiality principle did not make FS companies lean more towards representativeness on what this study considers that industry's major domain of due concern, namely the social. By contrast, the reduction in quality of environmental disclosure can be simply explained by FS companies not considering the environment impacts of their operations to be significant nor affect the decisions of stakeholders to disclose, which is in keeping with this study's expectation for domain emphasis.

Table IV portrays MM. Panel A post-transition shows a statistically insignificant decrease overall combining the two domains, as for FS. In Panel B environmental disclosure dropped slightly but insignificantly post-transition. The only statistically significant change in environmental reporting in Panels C and D was unimportant: a decrease in the already-small number reported qualitatively. Therefore, the transition did not improve the environmental reporting strategy of MM companies either. In the social domain, though, these companies did raise levels of disclosure for good and neutral indicators ($p <0.05$). This can be explained by looking at the materiality assessments of these companies. For instance, in the 2018 sustainability reports of one of the MM companies, material

issues highlighted included diversity, employee safety, human rights and supporting local communities. These are all part of the social domain and mostly can be categorised as good and neutral areas.

## 5. Discussion, contributions and conclusions

### *5.1 General discussion and contributions to literature*

Sustainability is a watchword of our era, and pressures to claim sustainable environmental and social performance will only grow. But since sustainability reporting is costly (especially in standalone format) and risks exposing deficiencies, the question arises why companies would do it voluntarily. The study aims to understand reporting motivation and strategy – whether leaning towards representative or greenwashing using legitimacy theory. The research defines more representative reports as highlighting the company's highest-impact domains and disclosing indicators that are inherently undesirable or unfavourable, not just favourable ones. Rather than volume in pages or number of indicators, the method concentrates on quality. Disaggregating quality into both areas reported (the direction of news as good, bad or neutral; and whether indicators were violation-related or not) and their numbered levels of disclosure gives meaning to what constitutes favourable and unfavourable indicators and more, or less, candid coverage of them. This technique was used to parse voluntary standalone sustainability reports issued over 2011–2019 by 28 Australian companies from the mining and metals and financial services industries which had used the GRI framework. Further, this research compared disclosure strategies before and after the GRI transition from G4 to GRI standards to see if the materiality concept clarifications in GRI standards changed reporting strategy. Harnessing content analysis to legitimacy theory unearths deeper answers on just how firms lean towards greenwashing or representative strategies, and this study contributes methodologically to content analysis too as a way of advancing the reporting literature.

The big picture in the results is that both industries' disclosure quality was low compared with the maxima possible, especially for bad news or violation-related indicators (lower levels are acceptable for good/neutral and non-violation-related) and particularly in the domains that should be concerns for the industry (namely environmental for MM and social for FS). Therefore the sample companies' overall reporting strategy cannot be considered highly representative. As regards MM, this fleshes out findings of previous studies that mining companies had taken a soft approach to reporting environmental issues by ignoring bad news. Although exhorting companies to achieve the maxima in their vulnerable domains and bad/violation-related indicators would be an unachievable counsel of perfection (and for instance sometimes indicators might in fact be more usefully amenable to careful qualitative than quantitative levels of disclosure), the overall low quality of reporting results also

emphasises the challenge remaining to embed greater value into Australian companies' sustainability disclosures for achievable improvements.

Even once the big picture is acknowledged as underwhelming, inter-industry comparisons are still revealing of strategy. In line with legitimacy theory, research has established that companies tend to heed influential stakeholders and react to their scrutiny with more meaningful and representative disclosure strategies, whereas less powerful stakeholders' concerns pass unnoticed or elicit only short, symbolic disclosures (De Villiers & Alexander, 2014; Radhouane et al., 2020). Hence, in principle, it is expected that areas in each industry that are more vulnerable to scrutiny not only should be portrayed more representatively than the less-scrutinised areas, but would be because in the former areas firms should be less likely to get away with greenwashing. In other words, one hopes that true high-impact domains will align with most-scrutinised areas. Moreover, both should ideally in turn align with materiality. Focus on vulnerable domains and sub-domain aspects is also the emphasis on materiality in the GRI. However, GRI largely leaves it up to each firm to decide which areas are material as having significant impact and(or) influence the stakeholders' assessments substantively.

Overall, across 2011–2019, expectations based on the study's industry-wide domains of due concern were borne out only for MM, where companies on average employed a relatively representative strategy regarding environmental factors. However, the converse expectation was not borne out for FS, which recorded lower disclosure on bad and violation-related social indicators. The lead by MM in frank negative disclosure is consistent with suggestions such as that by Radhouane et al. (2020) that voluntary disclosure could strategically help gain and maintain legitimacy. The results suggest that FS companies sampled try to misuse sustainability reporting to greenwash as they disclosed more good/neutral news and non-violation-related social indicators and at higher levels. One reason why results on FS reporting diverge from some previous studies, such as Dissanayake et al. (2016) and Wijesinghe (2012), may be the differences in considering the mere volume of reporting compared to the present study's in-depth content analysis.

Empirical context – attitudes and realities located in time and space – inform impact, scrutiny and materiality, and they may help explain the more representative strategy taken by Australian MM than by FS companies on their respective weak points. Notably, actual degrees of threat to each industry from scrutiny were not accounted for in this research. Environmental pressures and threats at large may well have been over 2011–2019 (and still be) higher than social ones in Australia. The World Business Council for Sustainable Development (WBCSD, 2018) found that environmental issues are the commonest focus of reporting in Australia, at least partially characterising over 80% of reports. Thus environmentally concerned stakeholders might well be far stronger than social ones in Australia,

and indeed the Greenpeace website list of countries where the environmental concern is high includes Australia[6]. Moreover, the *zeitgeist* inside and outside Australia has arguably prioritised environmental sustainability, and common parlance often equates sustainability as a whole to environmental. Thus the results may be detecting and reflecting broad opinion trends.

Nevertheless, despite the more intense focus on environmental issues, pressures are also mounting on Australian and overseas companies to explicitly disclose social indicators such as their companies' values and culture, anti-bribery and corruption policies, cyber risks and gender equality (WBCSD, 2018) and customer privacy. Presuming it is happening to MM as well as to FS, this growing pressure could also help explain why MM companies closely rivalled or even outdid FS firms in their social disclosures. Alternatively, when environmental consciousness dominates, industries with known high environmental impact might conceivably come under scrutiny for *everything*, or develop a culture of relative disclosure for everything, social as well as environmental. Interestingly, Lodhia and Hess (2014) and Rodrigues and Mendes (2018) stated that the Australian MM industry must respond to the growing critiques of both social and environmental sustainability. There is also a chance that "sustainability" reporting by its very name still elicits primarily environmental information.

The similar social and environmental scrutiny can also be further highlighted by comparing the disclosure patterns of the sample companies before and after applying the materiality assessments by these companies. While there was an insignificant drop in the level of disclosure of the environmental aspect among MM companies, the environmental material issues stayed the same for these companies with improvement in good and neutral social reporting. While the environmental scrutiny still exists, sustainability reports of these companies revealed more social aspects were considered as material issues among the MM companies. Also, as environmental performance may not be considered as an important issue for FS companies, given their line of operation, the GRI transition that let companies choose to report material issues may result in the drop in the environmental disclosure among these companies. Yet it did not apparently boost absolute disclosure of social indicators. Thus it seems that adding materiality swung FS's relative domain emphasis towards the social but only by lowering the environmental. One might counter that if materiality did not seem to improve the state of reporting, this could be because previous reports already built in materiality implicitly; and if so there would not have been much left to add. But just as materiality and highest-impact area should ideally align, the argument that companies were incorporating enough on material issues would be subject to the same rebuttal: that overall results for environment in MM and more especially for social domain in FS fell well short of maxima on the unfavourables. Hence materiality

[6] Greenpeace. https://www.greenpeace.org/global/ (last accessed on July 2020).

might be necessary but not sufficient, and even when it delivers one half of representativeness, ie prioritising highest-impact domains it might not deliver the other: foregrounding unfavourables.

Certainly materiality seems important, if it is actually followed. Factors for determining materiality include whether the information influences the decisions of users and whether therefore omitting or misstating information, as well as the overall context of quantitative and qualitative information, can affect a user's decision (Eccles et al., 2012). Hence, identifying a company's strategy through recognizing, selecting and prioritizing the indicators that represent most significant sustainability impacts is beneficial and serves the purpose of materiality assessment (as also suggested by Calabrese et al., 2016). This study contributes to the impact of the materiality assessments by comparing the disclosure of the sample companies prior to and after the concept was clarified.

This research makes several contributions to the sustainability reporting literature and addresses gaps. One partial gap, or absence from certain studies, is that acknowledged by Mahoney et al. (2013), who only considered those companies with and without sustainability reporting and ignored variations in reporting quality. This study's use of content analysis based on GRIs and coding of them, of course, examines the types of information disclosed as well as at what level, thus also responding to calls from, for instance, Ranängen and Lindman (2018) and Thorne et al. (2014). And to the knowledge of the author, disclosure quality and extent measure in content analyses of sustainability reporting studies have not compared companies' sustainability reports over a period. This study also contributes by an inter-industry comparison and one that supplements the limited literature so far on social reporting by FS companies. Interestingly, that limited coverage seems to mirror the lower popular and stakeholder awareness or concern. b

### *5.2 Practical applications*

Subject to limitations below and further research needed, practical applications flow for both external and internal stakeholders. The specifics of the content analysis and the definitions of representative and greenwashing as operationalised can be directly applied by agencies that set reporting standards/guidelines when choosing what to ask or force firms to disclose and how. Regulators and policymakers can scrutinise existing reports to better judge coverage and perhaps apply this to audits or choose how to evaluate and reward/punish underlying performance insofar as it can be inferred. Such actors might also mandate or offer standards of their own informed by findings of studies like this. Specifics of the method might also be relevant to sophisticated, well-resourced readers like institutional investors and watchdogs or NGOs. The previous and following subsections note that, if supported by further studies, the results can also inform the question of incorporating materiality. The more general thrust should at least alert less-resourced readers such as private investors and the

public (and employees as internal stakeholders) as to how much to trust reporting. The findings underscore Lyon and Maxwell's (2011) important point that, in the absence of mandatory reporting, stakeholders must be vigilant and willing to punish poor sustainability reporting. As of December 2020, sustainability reporting remains voluntary in Australia.

### *5.3 Limitations and future research*

While the study by no means claims to pronounce the last word and has certain limitations, future research avenues as follow could address some of the limitations. First, like all research evaluating information disclosure, the categorisations of the GRI indicators required subjective interpretation. However, the study mitigated this by comparing the author's and a fellow researcher's categorisations; the reliability test shows strong interrater reliability of data. Second, the study examined only one industry with high environmental impact and one with high public visibility for socially problematic behaviour, and at one place. Legitimacy theory is not limited to a country or period and, having covered 229 reports over nine years, the results are likely indicative even if not conclusive. But ultimately, only future investigations of these and other industries in Australia and other countries facing environmental or social threats to legitimacy can test generalisability and the reporting strategies, especially regarding bad, violation-related indicators. Australian MM comes off as relatively representative in this study, but only by comparison to Australian FS, so adding other industries (or countries) enables a better understanding of the reporting strategy of these industries. Particularly worthy of study would be whether the materiality concept clarification in GRI standards after 2014 had any positive influences on the reporting strategies of other industries. Future researchers could do so. Third, to add to research already conducted by guideline setters, it would be useful anyhow to ask reporting companies' perspectives and map their reporting strategy against their stated areas of concern using the present framework. Finally, and importantly, actual performance in social, environmental, governance and other domains is sustainability's ultimate concern, and reporting will only ever be a proxy for that "ground truth". Investigating actual performance exceeded scope but it has been noted that a representative reporter can be either a proud good or an honest weak performer. Future study could also try to uncover actual performance and determine links between performance and reporting strategy. If feasible – and it may demand almost forensic methods to supplement what is in the public record and testimony of watchdogs, whistleblowers and so on – that would be very revealing and might allow inferences from the particular companies so investigated to the vast majority, on which such costly and invasive research cannot be conducted.

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**Table I: Categorising GRI environmental and social indicators**

| GRI indicator categories | Total number | Direction of news | | | Violation-related | |
|---|---|---|---|---|---|---|
| | | Good | Bad | Neutral | Violation-related | Non-violation-related |
| **Environmental (EN)** | 34 | 10 | 23 | 1 | 9 | 25 |
| **Social (SO)** | 48 | 19 | 23 | 6 | 26 | 22 |

**Table II: Content analyses of Australian financial services and mining and metals sustainability reports for 2011–2019: level of disclosure, news direction and violation status**

| Content analysis | Financial services companies | | | Mining and metals companies | | | T-test | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. dev | n | Mean | Std. Dev | n | t-stat | p-value |
| **Panel A: Total number of indicators reported across the two domains (Max 82)** | 26.0841 | 16.10995 | 107 | 48.8607 | 24.09633 | 122 | **-8.286** | **0.000*** ** |
| **Panel B: Environmental and social domain scores weighted for level** | | | | | | | | |
| Environmental disclosure score (max 102) † | 24.9439 | 17.24016 | 107 | 42.9918 | 20.32037 | 122 | **-7.193** | **0.000*** ** |
| Social disclosure score (max 144) | 35.4393 | 22.41553 | 107 | 36.3115 | 23.06408 | 122 | -0.29 | 0.772 |
| **Panel C: Disclosures at each level** | | | | | | | | |
| ***Environmental disclosures at each level (34 indicators)*** | | | | | | | | |
| Not reported | 25.1776 | 6.17483 | 107 | 18.7049 | 7.43977 | 122 | **7.105** | **0.000*** ** |
| Reported in general terms | 0.5794 | 0.99088 | 107 | 1.1311 | 1.64116 | 122 | **-3.027** | **0.003*** ** |
| Reported in qualitative terms | 0.3645 | 0.7447 | 107 | 0.6311 | 1.18671 | 122 | **-2.004** | **0.046** ** |
| Reported in quantitative terms | 7.8785 | 5.40739 | 107 | 13.5328 | 6.27758 | 122 | **-7.251** | **0.000*** ** |
| ***Social disclosures at each level (48 indicators)*** | | | | | | | | |
| Not reported | 33.9626 | 9.11967 | 107 | 33.877 | 9.23036 | 122 | 0.07 | 0.944 |
| Reported in general terms | 2.8879 | 2.90844 | 107 | 2.5246 | 3.09148 | 122 | 0.916 | 0.361 |
| Reported in qualitative terms | 0.8972 | 1.38001 | 107 | 1.0082 | 1.61346 | 122 | -0.561 | 0.575 |
| Reported in quantitative terms | 10.2523 | 6.52006 | 107 | 10.5902 | 6.83423 | 122 | -0.382 | 0.702 |
| **Panel D: News direction of indicator** | | | | | | | | |
| ***Environmental*** | | | | | | | | |
| Good (max 30) | 6.7103 | 5.71659 | 107 | 9.4672 | 6.36907 | 122 | **-3.452** | **0.001*** ** |
| Bad (max 69) | 18.0093 | 12.21775 | 107 | 32.5082 | 13.96527 | 122 | **-8.38** | **0.000*** ** |
| Neutral (max 3) | 0.2243 | 0.67724 | 107 | 1.0164 | 1.25957 | 122 | **-5.809** | **0.000*** ** |
| ***Social*** | | | | | | | | |
| Good (max 57) | 14.6916 | 8.92359 | 107 | 12.8197 | 9.39757 | 122 | 1.545 | 0.124 |
| Bad (max 69) | 11.9907 | 11.75577 | 107 | 15.6885 | 11.94829 | 122 | **-2.357** | **0.019** ** |
| Neutral (max 18) | 8.757 | 4.10669 | 107 | 7.8033 | 4.60083 | 122 | **1.657** | **0.099*** |
| **Panel E: Whether the indicator relates to a violation** | | | | | | | | |
| ***Environmental*** | | | | | | | | |
| Violation-related (max 27) | 1.9252 | 3.4139 | 107 | 7.9836 | 4.76728 | 122 | **-10.917** | **0.000** ** |
| Not-violation related (max 75) | 23.0187 | 14.98489 | 107 | 35.0082 | 16.72307 | 122 | **-5.722** | **0.000** ** |
| ***Social*** | | | | | | | | |
| Violation-related (max 78) | 16.9626 | 13.21372 | 107 | 19.9426 | 14.04909 | 122 | -1.646 | 0.101 |
| Non-violation-related (max 66) | 18.4766 | 10.6118 | 107 | 16.3689 | 10.55501 | 122 | 1.503 | 0.134 |

*****p-value <= 0.01**
**** p-value <= 0.05**
*** p-value < 0.1**

† From this row down, the maximum possible score in each category is calculated by multiplying the maximum possible disclosure score for each indicator (3) by the total number of indicators in each category. The maximum possible score in the top row is simply the sum of 34 environmental indicators plus 48 social indicators.

**Table III: Content analysis of Australian financial services sustainability reports pre- and post- Materiality assessments: level of disclosure, news direction and violation-status**

| Content analysis | Before adding the materiality assessments | | | After adding the materiality assessments | | | T-test | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. dev | n | Mean | Std. Dev | n | t-stat | p-value |
| **Panel A: Total number of indicators reported across the two domains (Max 82)** | 28.1613 | 18.43748 | 62 | 23.2222 | 11.8108 | 45 | 1.576 | 0.118 |
| **Panel B: Environmental and social domain scores weighted for level** | | | | | | | | |
| Environmental disclosure score (max 102) † | 28.8226 | 17.82108 | 62 | 19.6 | 15.01121 | 45 | **2.898** | **0.005*** ** |
| Social disclosure score (max 144) | 36.0484 | 24.85659 | 62 | 34.6 | 18.7791 | 45 | 0.329 | 0.743 |
| **Panel C: Disclosures at each level** | | | | | | | | |
| ***Environmental disclosures at each level (34 indicators)*** | | | | | | | | |
| Not reported | 23.6613 | 6.49071 | 62 | 27.2667 | 5.074 | 45 | **-3.223** | **0.002*** ** |
| Reported in general terms | 0.8387 | 1.16216 | 62 | 0.2222 | 0.51737 | 45 | **3.324** | **0.001*** ** |
| Reported in qualitative terms | 0.5161 | 0.8443 | 62 | 0.1556 | 0.5203 | 45 | **2.535** | **0.013** ** |
| Reported in quantitative terms | 8.9839 | 5.46372 | 62 | 6.3556 | 4.99616 | 45 | **2.582** | **0.011** ** |
| ***Social disclosures at each level (48 indicators)*** | | | | | | | | |
| Not reported | 33.3871 | 10.27388 | 62 | 34.7556 | 7.27435 | 45 | -0.765 | 0.446 |
| Reported in general terms | 3.3065 | 3.31212 | 62 | 2.3111 | 2.14075 | 45 | **1.765** | **0.08*** |
| Reported in qualitative terms | 1.1774 | 1.63491 | 62 | 0.5111 | 0.78689 | 45 | **2.527** | **0.013** ** |
| Reported in quantitative terms | 10.129 | 7.04432 | 62 | 10.4222 | 5.79376 | 45 | -0.229 | 0.82 |
| **Panel D: News direction of indicator** | | | | | | | | |
| ***Environmental*** | | | | | | | | |
| Good (max 30) | 7.7419 | 6.19607 | 62 | 5.2889 | 4.68374 | 45 | **2.332** | **0.022** ** |
| Bad (max 69) | 20.8065 | 12.47665 | 62 | 14.1556 | 10.84384 | 45 | **2.938** | **0.004*** ** |
| Neutral (max 3) | 0.2742 | 0.72811 | 62 | 0.1556 | 0.60135 | 45 | 0.921 | 0.359 |
| ***Social*** | | | | | | | | |
| Good (max 57) | 14.5806 | 8.96724 | 62 | 14.8444 | 8.96193 | 45 | -0.15 | 0.881 |
| Bad (max 69) | 12.9677 | 13.63574 | 62 | 10.6444 | 8.48302 | 45 | 1.009 | 0.315 |
| Neutral (max 18) | 8.5 | 4.4381 | 62 | 9.1111 | 3.61953 | 45 | -0.758 | 0.45 |
| **Panel E: Whether the indicator relates to a violation** | | | | | | | | |
| ***Environmental*** | | | | | | | | |
| Violation-related (max 27) | 3.0161 | 4.0791 | 62 | 0.4222 | 1.01105 | 45 | **4.169** | **0.000*** ** |
| Non-violation related (max 75) | 25.8065 | 14.6151 | 62 | 19.1778 | 14.79141 | 45 | **2.3** | **0.024*** ** |
| ***Social*** | | | | | | | | |
| Violation-related (max 78) | 17.9194 | 15.54085 | 62 | 15.6444 | 9.09584 | 45 | 0.878 | 0.382 |
| Non- violation-related (max 66) | 18.129 | 10.71001 | 62 | 18.9556 | 10.57647 | 45 | -0.396 | 0.693 |

*****p-value <= 0.01**
**** p-value <= 0.05**
*** p-value < 0.1**

† From this row down, the maximum possible score in each category is calculated by multiplying the maximum possible disclosure score for each indicator (3) by the total number of indicators in each category. The maximum possible score in the top row is simply the sum of 34 environmental indicators plus 48 social indicators.

**Table IV: Content analysis of Australian mining and metals sustainability reports pre- and post-Materiality assessments: level of disclosure, news direction and violation status**

| Content analysis | Before adding the materiality assessments | | | After adding the materiality assessments | | | T-test | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. dev | n | Mean | Std. Dev | n | t-stat | p-value |
| **Panel A: Total number of indicators reported across the two domains (Max 82)** | 50.1029 | 24.20012 | 68 | 47.2963 | 24.09935 | 54 | 0.638 | 0.525 |
| **Panel B: Environmental and social domain scores weighted for level** | | | | | | | | |
| Environmental disclosure score (max 102) † | 44.75 | 17.15372 | 68 | 40.7778 | 23.7015 | 54 | 1.073 | 0.285 |
| Social disclosure score (max 144) | 35.9265 | 26.22709 | 68 | 36.7963 | 18.55983 | 54 | -0.206 | 0.837 |
| **Panel C: Disclosures at each level** | | | | | | | | |
| ***Environmental disclosures at each level (34 indicators)*** | | | | | | | | |
| Not reported | 18 | 6.45998 | 68 | 19.5926 | 8.49532 | 54 | -1.176 | 0.242 |
| Reported in general terms | 1.1765 | 1.53507 | 68 | 1.0741 | 1.77883 | 54 | 0.335 | 0.738 |
| Reported in qualitative terms | 0.8971 | 1.43662 | 68 | 0.2963 | 0.63334 | 54 | **2.858** | **0.005*****|
| Reported in quantitative terms | 13.9265 | 5.02328 | 68 | 13.037 | 7.59087 | 54 | 0.776 | 0.439 |
| ***Social disclosures at each level (48 indicators)*** | | | | | | | | |
| Not reported | 33.9412 | 10.35761 | 68 | 33.7963 | 7.67348 | 54 | 0.086 | 0.932 |
| Reported in general terms | 2.5588 | 3.30257 | 68 | 2.4815 | 2.83336 | 54 | 0.139 | 0.89 |
| Reported in qualitative terms | 1.1324 | 1.84394 | 68 | 0.8519 | 1.26502 | 54 | 0.953 | 0.342 |
| Reported in quantitative terms | 10.3676 | 7.78231 | 68 | 10.8704 | 5.47049 | 54 | -0.402 | 0.688 |
| **Panel D: News direction of indicator** | | | | | | | | |
| ***Environmental*** | | | | | | | | |
| Good (max 30) | 9.9853 | 6.14135 | 68 | 8.8148 | 6.64483 | 54 | 0.999 | 0.32 |
| Bad (max 69) | 33.6324 | 11.07627 | 68 | 31.0926 | 16.92633 | 54 | 0.998 | 0.32 |
| Neutral (max 3) | 1.1324 | 1.2685 | 68 | 0.8704 | 1.24455 | 54 | 1.143 | 0.256 |
| ***Social*** | | | | | | | | |
| Good (max 57) | 11.5294 | 9.98577 | 68 | 14.4444 | 8.41083 | 54 | **-1.715** | **0.089*** |
| Bad (max 69) | 17.2647 | 13.43266 | 68 | 13.7037 | 9.51985 | 54 | 1.647 | 0.102 |
| Neutral (max 18) | 7.1324 | 4.86812 | 68 | 8.6481 | 4.13068 | 54 | **-1.86** | **0.065*** |
| **Panel E: Whether the indicator relates to a violation** | | | | | | | | |
| ***Environmental*** | | | | | | | | |
| Violation-related (max 27) | 7.7941 | 4.99719 | 68 | 8.2222 | 4.49598 | 54 | -0.497 | 0.62 |
| Not-violation related (max 75) | 36.9559 | 13.67254 | 68 | 32.5556 | 19.7777 | 54 | 1.45 | 0.15 |
| ***Social*** | | | | | | | | |
| Violation-related (max 78) | 17.9194 | 15.54085 | 62 | 15.6444 | 9.09584 | 45 | 0.878 | 0.382 |
| Non-violation-related (max 66) | 18.129 | 10.71001 | 62 | 18.9556 | 10.57647 | 45 | -0.396 | 0.693 |

*****p-value <= 0.01**
**** p-value <= 0.05**
*** p-value < 0.1**

† From this row down, the maximum possible score in each category is calculated by multiplying the maximum possible disclosure score for each indicator (3) by the total number of indicators in each category. The maximum possible score in the top row is simply the sum of 34 environmental indicators plus 48 social indicators.