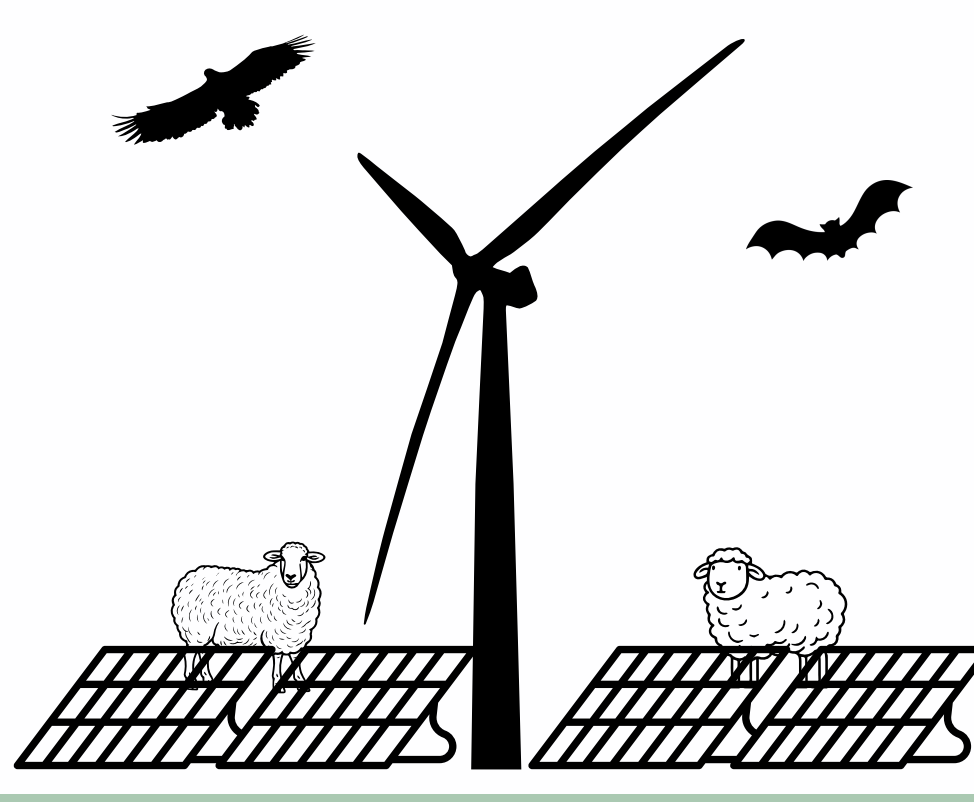


Biodiversity Reporting Practices and Corporate Governance in the Renewable Energy Sector in Canada

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INTRODUCTION

- Renewable energy expansion** is integral to combating climate change, aligning with the goal of **Paris Agreement** to limit global warming to 1.5°C, with **170 out of 188 signatories** mentioning renewable energy in their Nationally Determined Contributions (1).
- Both public and private sectors have to **triple the global renewable energy capacity** (currently at about 3200 GW, of which about 1000 GW are wind, 1000 GW solar, and 1200 GW hydropower) to at least **11,000 gigawatts** and **double the rate of improvement in energy efficiency** by 2030 (2).
- However, this expansion **poses risks to biodiversity**, potentially impacting ecosystems and species through habitat loss, disruption or fragmentation, bird and bat collision with facilities, and change of migratory routes (3).
- Biodiversity reporting** in the **renewable energy sector is lacking**, with disclosures often **vague and insufficiently quantitative**, indicating a gap between biodiversity impact and mitigation efforts (4, 5).
- The **Global Reporting Initiative (GRI)** offers standards for voluntary biodiversity reporting, including **indicators** such as biodiversity management, impacts on operational sites, significant impacts of activities/products/services on biodiversity, habitats protected or restored, and species affected by operations (6).

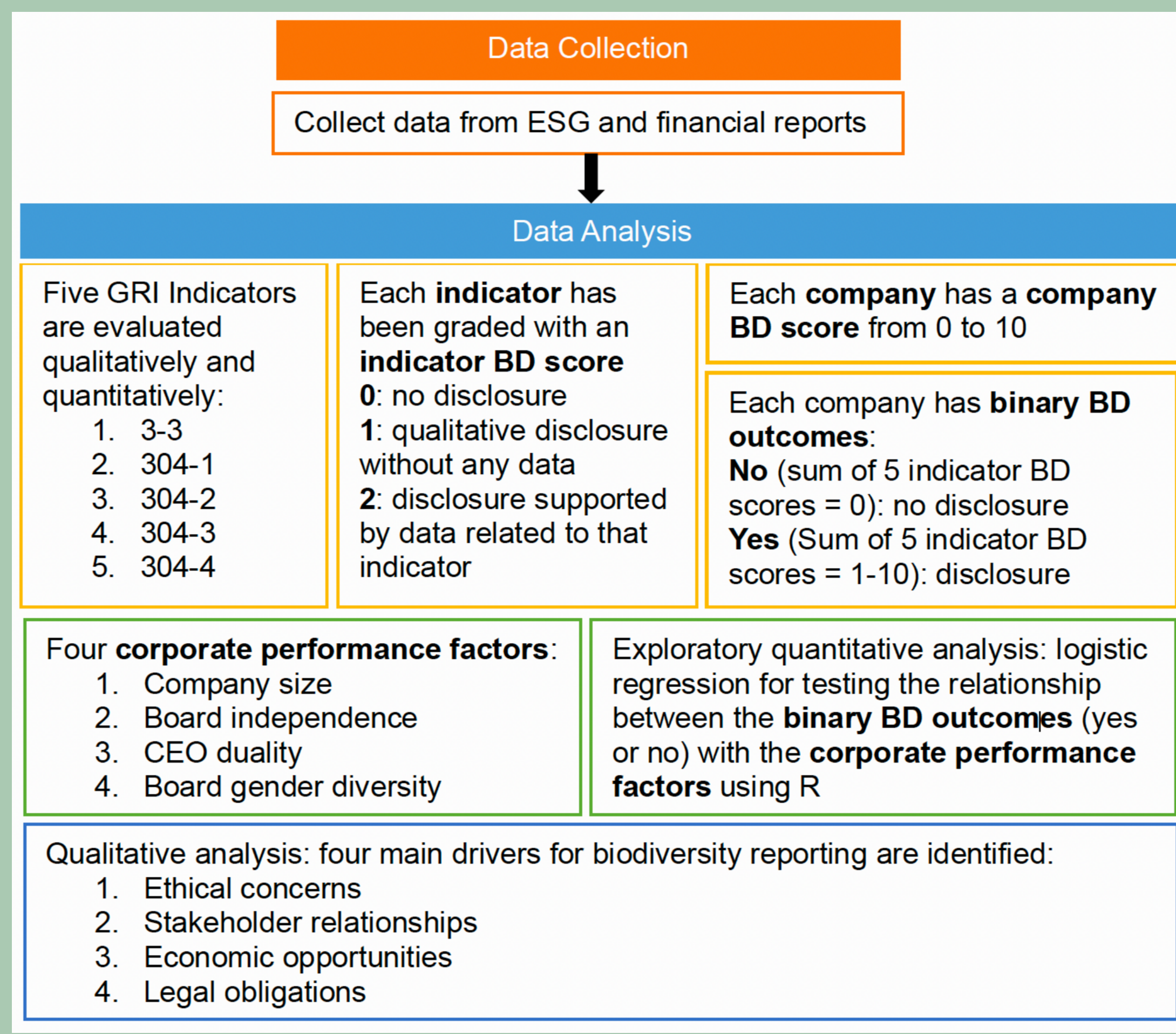
Table 1 GRI Biodiversity-related disclosure indicators

GRI Indicator	Disclosure
3-3	Biodiversity management
304-1	Operational sites owned, leased, or managed, in or adjacent to protected areas and areas of high biodiversity value outside protected areas
304-2	Significant impacts of activities, products and services on biodiversity
304-3	Habitats protected or restored
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations

RESEARCH OBJECTIVES

- Assessing the extent of corporate biodiversity disclosures of renewable energy companies in Canada
- Examining the relationship with biodiversity disclosure and corporate performance factors (company size and corporate governance mechanisms)
- Understanding motivations behind corporate biodiversity commitments

METHODOLOGY



Binary BD = $\frac{1}{1 + e^{-(\beta_0 + \beta_1 SIZE + \beta_2 BoardInde + \beta_3 Duality + \beta_4 Females + \beta_5 Profit + \beta_6 Lev)}}$

Binary BD = Binary biodiversity disclosure

Independent variables:
 SIZE = Natural logarithm of total asset (\$)
 BoardInde = Proportion of independent directors on the board
 Duality = CEO and Chairman of the board being the same (0 or 1)
 Females = Proportion of females on the board

Control variables:
 Profit = Profitability, measured by annual rate of return on total assets
 Lev = Leverage, measured by total debt divided by total assets

RESULTS & DISCUSSION

Table 2 Number of companies disclosing each GRI indicator and the corresponding biodiversity disclosure (BD) score

	3-3	304-1	304-2	304-3	304-4	Average
Number of companies disclosing each indicator (n=40)	20	14	17	18	6	15
Percentage of companies disclosing each indicator (n=40)	50%	35%	42.5%	45%	15%	37.5%
BD score (out of 80)	28	22	29	30	10	23.8
BD score in percentage	35%	27.5%	36.3%	37.5%	12.5%	29.75%

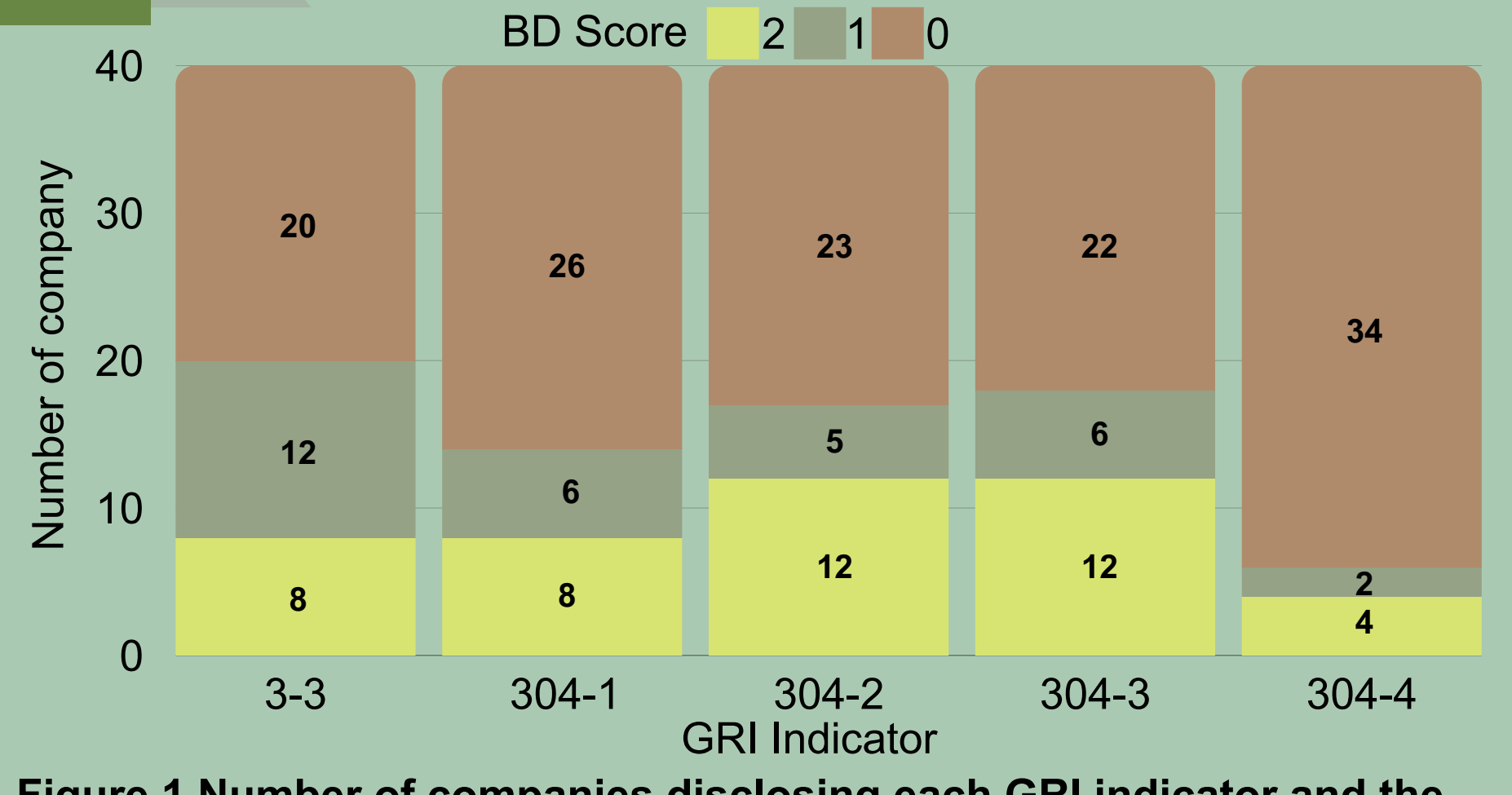


Figure 1 Number of companies disclosing each GRI indicator and the corresponding BD score

Binary BD = $\frac{1}{1 + e^{-(\beta_0 + \beta_1 SIZE + \beta_2 BoardInde + \beta_3 Duality + \beta_4 Females + \beta_5 Profit + \beta_6 Lev)}}$

Hypothesis 1 (supported): Company size is positively associated with the corporate biodiversity disclosure outcome.
 Hypothesis 2 (not supported): Board independence is positively associated with the corporate biodiversity disclosure outcome.
 Hypothesis 3 (supported): CEO duality is negatively associated with the corporate biodiversity disclosure outcome.
 Hypothesis 4 (not supported): Board gender diversity is positively associated with the corporate biodiversity disclosure outcome.

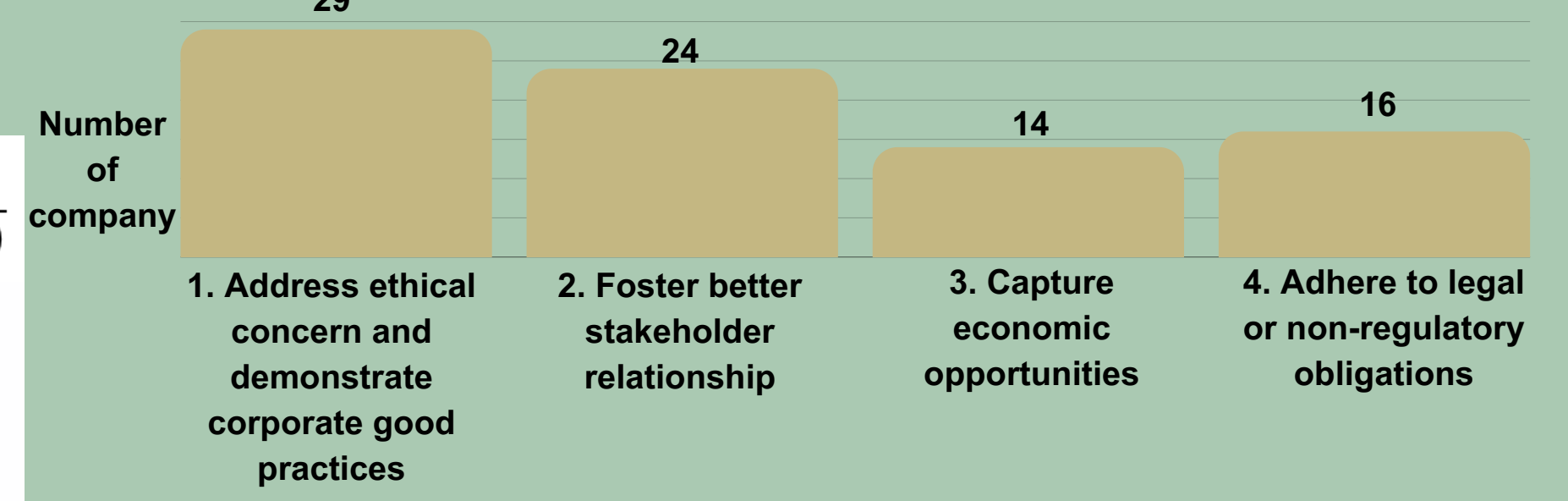


Figure 2 Drivers of Corporate Biodiversity Commitment in Renewable Energy Sector

- Biodiversity reporting in Canada's renewable energy sector is lacking, with only **50%** of the companies considering biodiversity a material issue.
- Companies often provide **vague descriptions** with **limited quantitative data** and **scientific evidence**, scoring low on biodiversity disclosure quality.
- Most disclose **high-level policies** and commitments **without detailed action plans or effectiveness monitoring**. For example, companies adopted a mitigation hierarchy and digitalization with an aim of generating **positive net natural capital** without a clear definition and metric.
- Companies mentioned the following biodiversity actions but their effectiveness is rarely quantified.
 - Wind turbines**: painting the blades in red to increase visibility, placing shapes of predator eyes, using acoustic bat deterrent system
 - Solar farm**: sheep and goat grazing for vegetation management, holes are drilled in fences to allow animal passage
 - Hydroelectric power plants**: fish barrier, ladder systems and elevated fences for drainage systems to enable river passage for migratory species
 - General**: placing artificial platforms & nest boxes on utility poles
- Mitigation hierarchy principles are inconsistently applied, with **few companies justifying** their operational sites' **proximity to high biodiversity areas** or reporting **reversibility of impacts**.
- Larger companies** tend to **disclose more biodiversity information**, supported by marginally significant result (p-value=0.0619).
- CEO duality** may hinder biodiversity disclosure due to reduced accountability to stakeholders.
- Board gender diversity** does not significantly influence biodiversity disclosure, contrary to previous expectations.
- Companies claimed that **ethical concerns** and **stakeholder pressure** drive biodiversity disclosure more than financial incentives.
- Companies can develop biodiversity disclosures by incorporating **quantifiable performance metrics** and **baseline data** to track progress over time, such as bird and bat mortality rate improved, species abundance, species richness and diversity index after habitat conversion, protection or restoration, patency, length and connection strength of ecological corridor (7)
- Justification and **scientific evidence** should be provided for **unavoidable biodiversity impacts**.
- Mainstreaming biodiversity** across all aspects of their operations, embedding biodiversity goals and **science-based targets** into corporate governance structures, risk management frameworks, upstream and downstream value chain activities.
- Active stakeholder engagement should be advocated along different stages of energy project lifecycles.

CONCLUSIONS

- Biodiversity reporting in Canada's renewable energy sector reveals a **gap between recognition and depth of disclosure**.
- Larger companies** tend to disclose more, hinting at a positive relationship between **company size** and biodiversity reporting.
- Motivations** for biodiversity commitment vary, with **ethical concerns** and **stakeholder relationships** playing a key role while impact of board independence and gender diversity on disclosure is inconclusive.
- Standardized** reporting requirements and **quantifiable performance indicators** are recommended.
- Clear metrics and meaningful **stakeholder engagement along project lifecycle stages** are crucial for demonstrating commitment.

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