Effectiveness Evaluation of Aotearoa Climate-related reporting framework

Climate and Energy Finance Group
(CEFGroup)

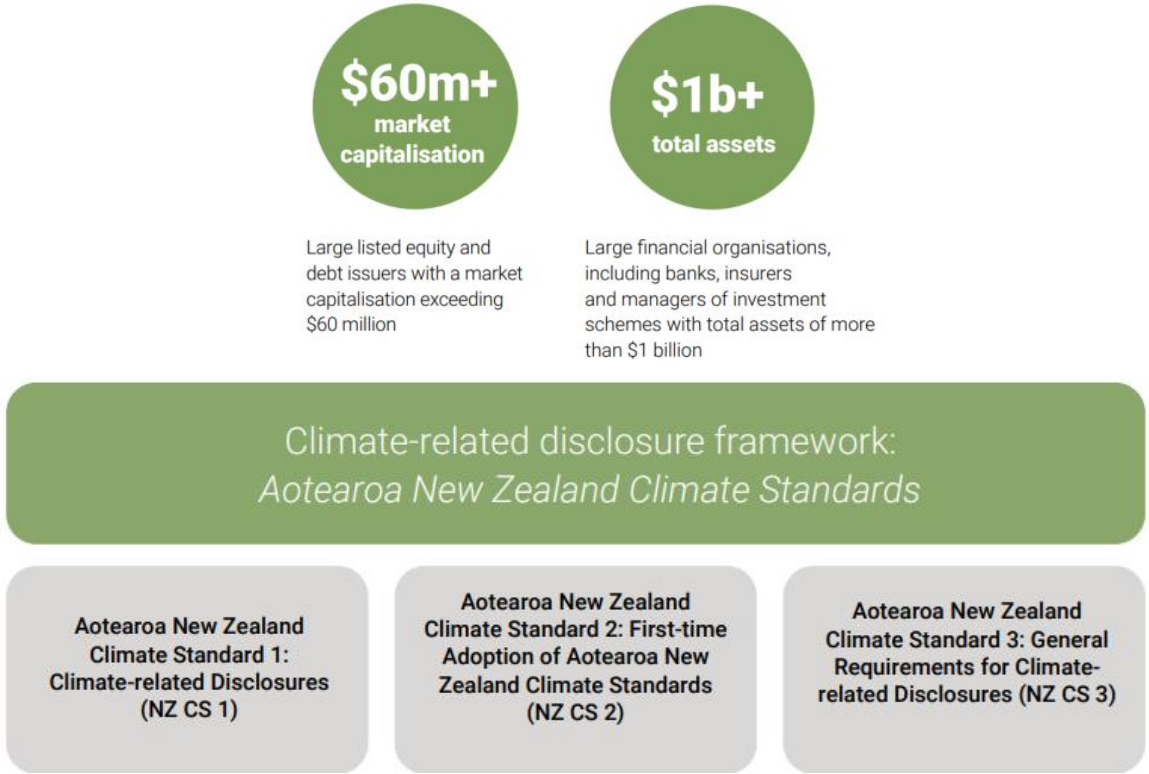
University of Otago
Te Whare Wānanga o Otāgo
New Zealand
Business School
Te Kura Pakihi

The Project

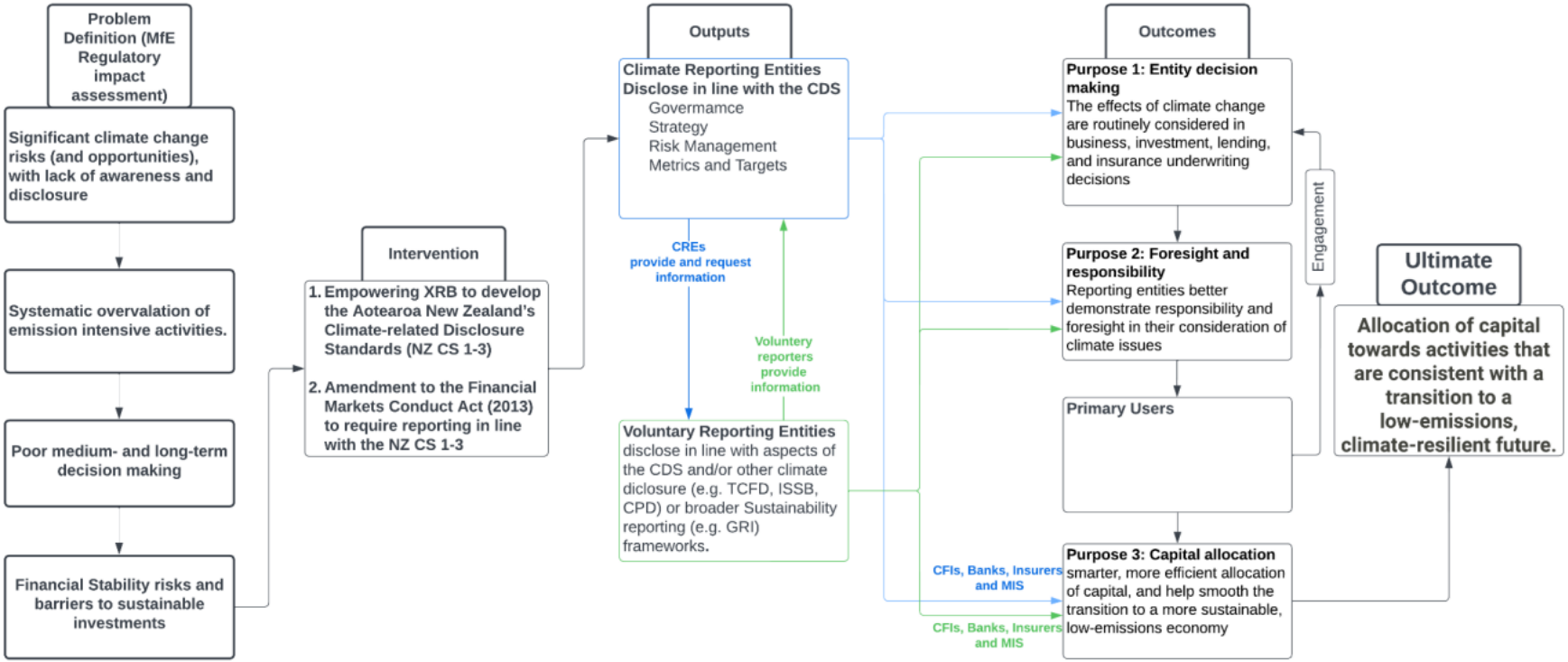
- This research project aims to assess the **effectiveness** of the Aotearoa New Zealand Climate-related Disclosure Framework (the Disclosure Framework) in **meeting its purposes**, which are:

    - **Purpose 1: Entity decision making**
      encourage entities to routinely consider the short, medium and long-term risks and opportunities that climate change presents
    - **Purpose 2: Foresight and responsibility**
      enable entities to show how they are considering those risks and opportunities
    - **Purpose 3: Capital Allocation**
      enable investors and other stakeholders to assess the merits of how entities are considering those risks and opportunities.

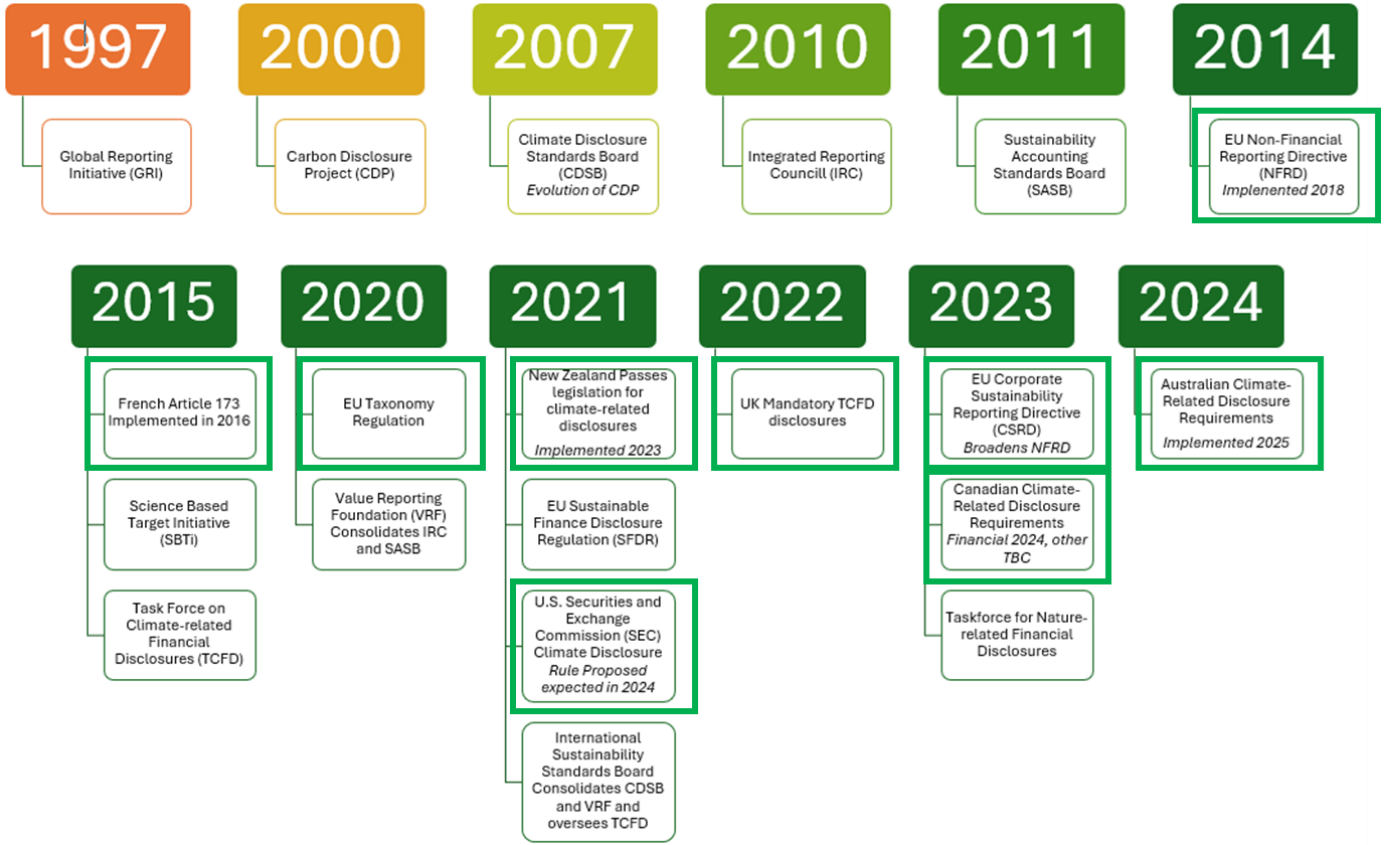
Aotearoa New Zealand Climate-related Dicsclosure Framework



Theory of change



Climate reporting Globally



Literature: Need for Mandatory Disclosure

Voluntary non-financial Disclosures:

- Lack of quality, comparability and consistency
- Strong evidence of ‘cheap talk’ and ‘cherry picking’
- Some evidence of greenwashing.

Investors:

- Investment funds may be overstating their portfolios’ climate, and broader sustainability-related performance.
- Climate-related data and information is scarce and unreliable, but in high demand.

Markets:

- Climate-related risks are being priced in financial markets (stocks, bonds and derivatives) and affecting access to and cost of capital
    - risks are likely still mispriced, due to the lack of reliable information.

Literature on effects of disclosure mandates

- Strong assurance and enforcement is essential.

- Mandatory non-financial disclosure rules
  - Improve Liquidity
  - May decrease subsequent firm carbon emissions and increase sustainability-related activities.
  - Improve quality and comparability of disclosures

Project Methodology

Primary Data

1. **Interviews** with CREs and Primary Users
    a. 20 Interviews in 2023
    b. 20 interviews in 2025
2. **Survey** of CREs and Primary Users
    a. 70 respondents December 2023-February 2024
    b. Next round July 2025
3. Analysis of Climate-related **Reporting**
    a. Voluntary non-financial disclosures by CREs 2015 - 2023 (FY)
    b. Mandatory climate-related disclosures by CREs 2023 (FY)

Secondary Data

1. **Financial performance** and market metrics
    a. BLOOMBERG, COMPUSTAT, Datastream etc
2. **Sustainability performance** data
    a. Emissions data, ESG scores, Climate Target data
    b. REFINTIV, BLOOMBERG, MSCI etc
3. Portfolio **Holdings** data for global investment funds
    a. *Global funds:* Ownership in CREs
    b. *New Zealand funds:* Capital allocation Manager of Investment Schemes

Interviews 2023 Results

Type of entity	Total entities
Corporate issuer	13
Registered bank or building society	1
Investment scheme manager	2
Crown financial institution	3
Insurer	1
Total	20

Interviews 2023 Results

- Participants were **well-versed** in climate risk disclosures
- Different views on the reporting journey:
  1. learning and humbling experience
  2. opportunity to be the best and show leadership
  3. being cautious and only doing the minimum expected

- Reasons for reporting early:
  - International peer disclosure,
  - Wider commitment to Sustainability
  - Aligning to associations such as the Climate Leaders Coalition,
  - Already experiencing climate change impacts to business processes,
  - First mover advantage
- Challenges in translating risks and scenarios to Company context
- Unsure of any known impact on decision-making or capital allocation.

Survey 2024 Sample

Organisation Type		
	Freq.	**%**
Investor	25	36%
Creditor	7	10%
Insurer	3	4%
Corporate	35	50%
Total	**70**	

Type of Entity	**Reporting Status**	**Freq.**	**%**
Climate Reporting Entity or Crown Financial Institution	Early reporter	29	41%
	Non-early reporter	26	37%
Voluntary Reporting Entity	Early reporter	2	3%
	Non-early reporter	7	10%
Primary User only	Non-early reporter	6	9%
Total		**70**	

Survey 2024 Results - Early Reporting Reasons

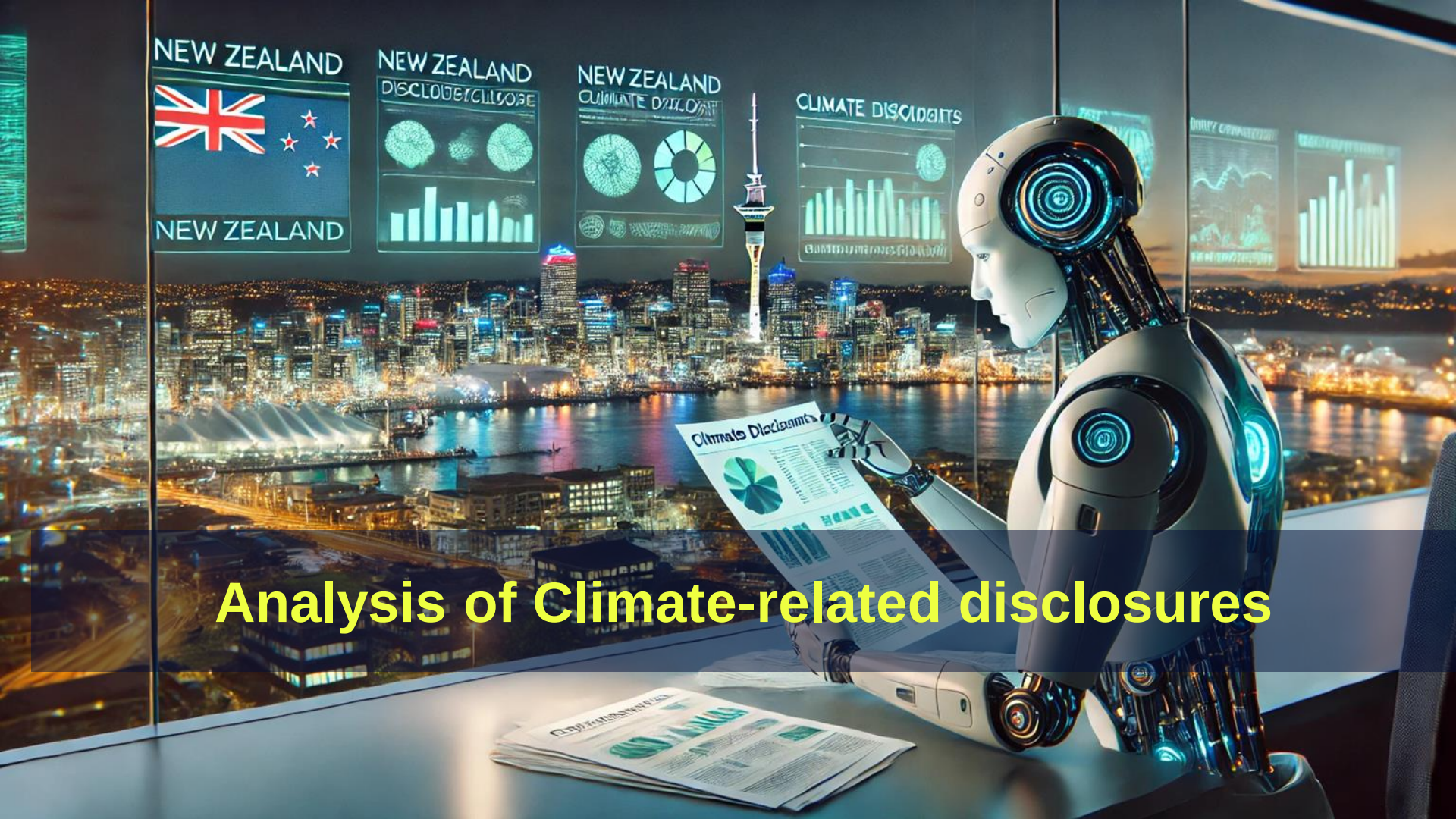
CRD Motivation	Non-Corporate		Corporate		Overall	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
To demonstrate corporate social responsibility and environmental stewardship	10	91%	18	90%	28	90%
To integrate climate risks and/or opportunities into our entity's strategy	10	91%	11	55%	21	68%
For potential reputation benefits	9	82%	10	50%	19	61%
To improve risk management	7	64%	10	50%	17	55%
To avoid the time pressure and high costs associated with late adoption	4	36%	11	55%	15	48%
To gain a competitive advantage	5	45%	8	40%	13	42%
Pressure from global sustainability or ESG initiatives (please specify)	2	18%	10	50%	12	39%
To attract capital inflows	3	27%	6	30%	9	29%
Pressure from industry peers or competitors	4	36%	2	10%	6	19%
To enhance employee motivation	2	18%	2	10%	4	13%
Pressure from users	2	18%	2	10%	4	13%
Concerns about potential legal action	1	9%	2	10%	3	10%
Other	1	9%	1	5%	2	6%
Total	**11**		**20**		**31**	

Survey 2024 Results - Importance of Climate Risks

Importance in Decision-Making	Early Reporter	Late Reporter	Diff. Early vs Late
Financial risk	4.7	4.2	0.43**
Climate-related physical risk	4.3	4.1	0.23
Climate-related transition risk	4.5	3.9	0.51***
Other environmental risk	3.9	3.6	0.27
Climate-related liability risk	3.8	3.7	0.11

Importance of CC in Decision-Making	Early Reporter	Late Reporter	Diff. Early vs Late
Past 5 years	3.8	3.2	0.59***
Last year	4.4	4.0	0.36*
Next year	4.5	4.2	0.27*
Next 5 years	4.7	4.6	0.14

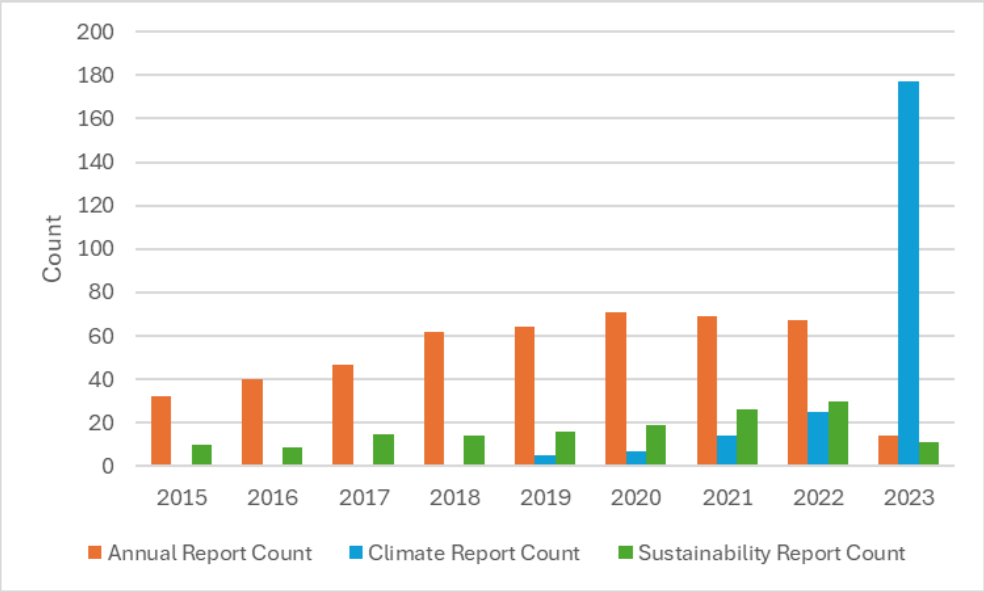
***Score out of 5



Analysis of Climate-related disclosures

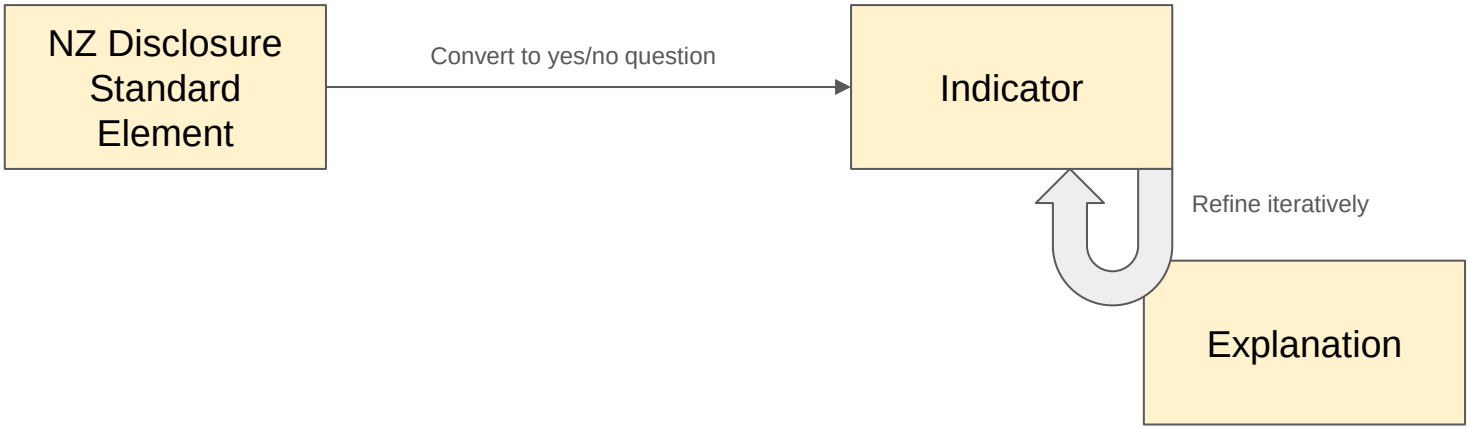
Textual Analysis with Large Language Models

- Collaboration with Professor Markus Leippold at the University of Zurich
- Use a Retrieval Augmented Generation (RAG) System to analyse compliance with NZCS 1 from **2015 to 2023** (FY)

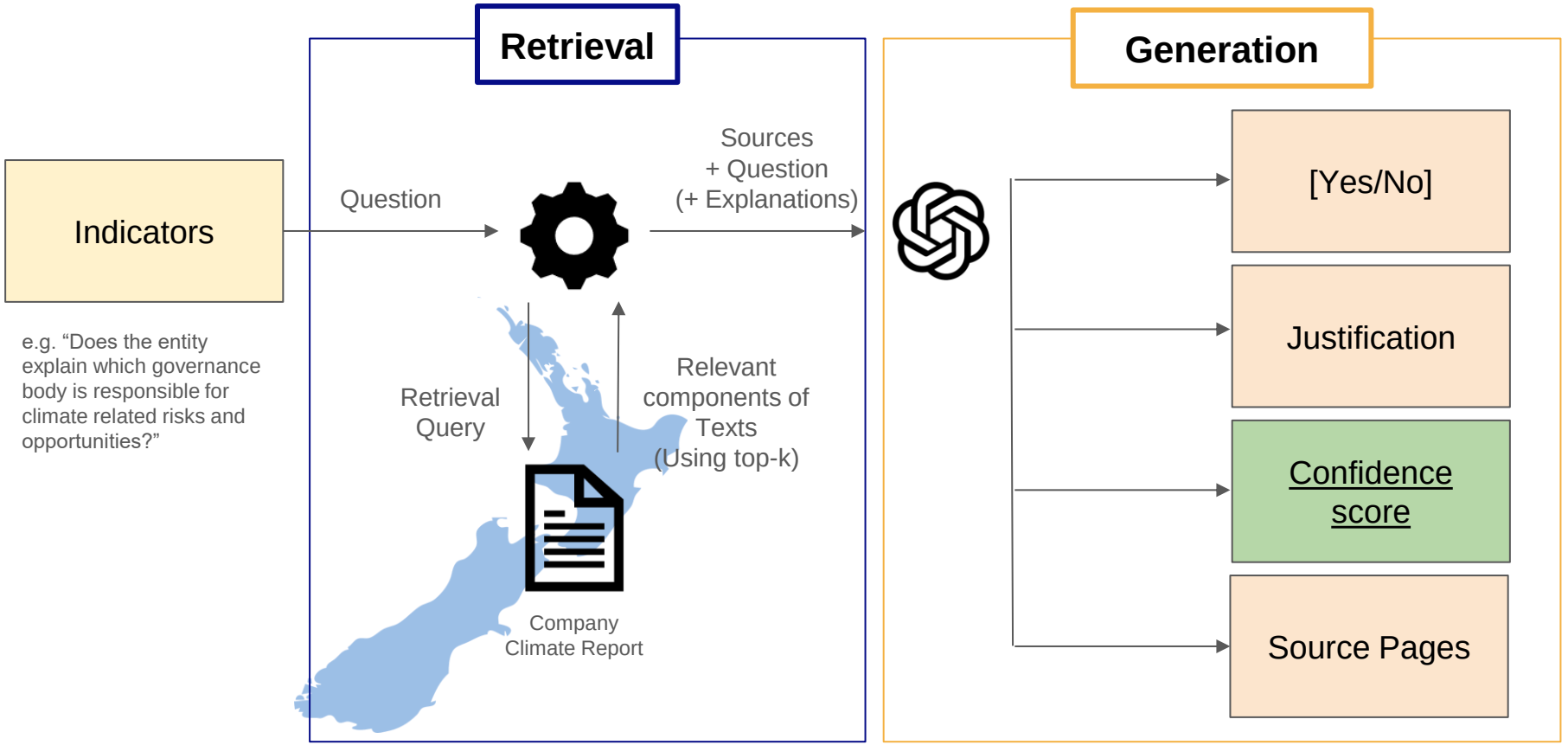


Methodology - Indicator Creation

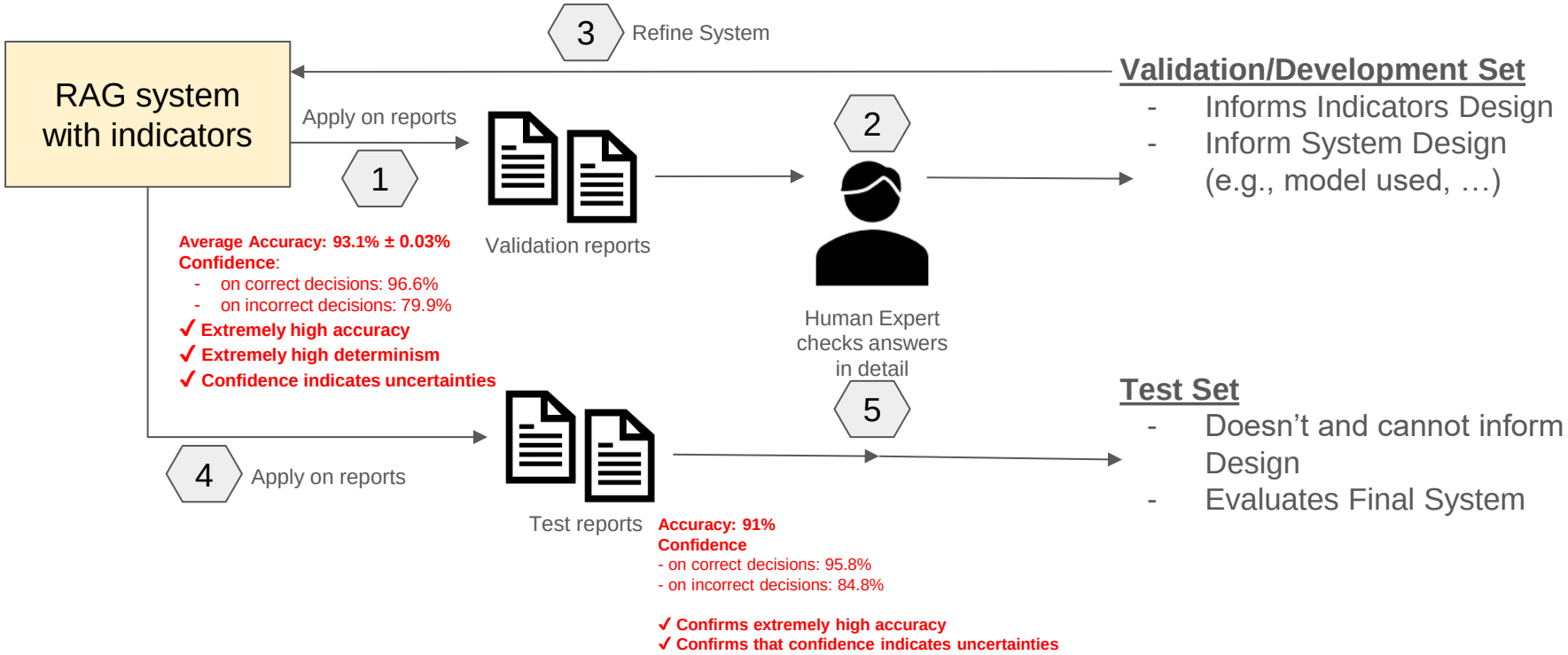
- NZ Climate Disclosure Standards are converted into 58 yes/no questions



Methodology - Retrieval Augmented Generation System



Model Accuracy - Validation and Test



Model Accuracy - Validation and Test

Evaluation Metrics
Accuracy: How many decisions are right?
Model confidence: How sure was the model with the decision?

On Validation Set

- Perform 5 runs to account for potential non-deterministic behaviour of LLMs
- **Average Accuracy: 93.1% ± 0.03%**
- 1.8% of indicators do vary at least one time among 5 runs
- Confidence
  - on correct decisions: 96.6%
  - on incorrect decisions: 79.9%

✓ **Extremely high accuracy**
✓ **Extremely high determinism**
✓ **Confidence indicates uncertainties**

On Test Set

- Perform 1 run to independently check performance (potentially overfitting on validation set)
- **Accuracy: 91%**
- Confidence
  - on correct decisions: 95.8%
  - on incorrect decisions: 84.8%

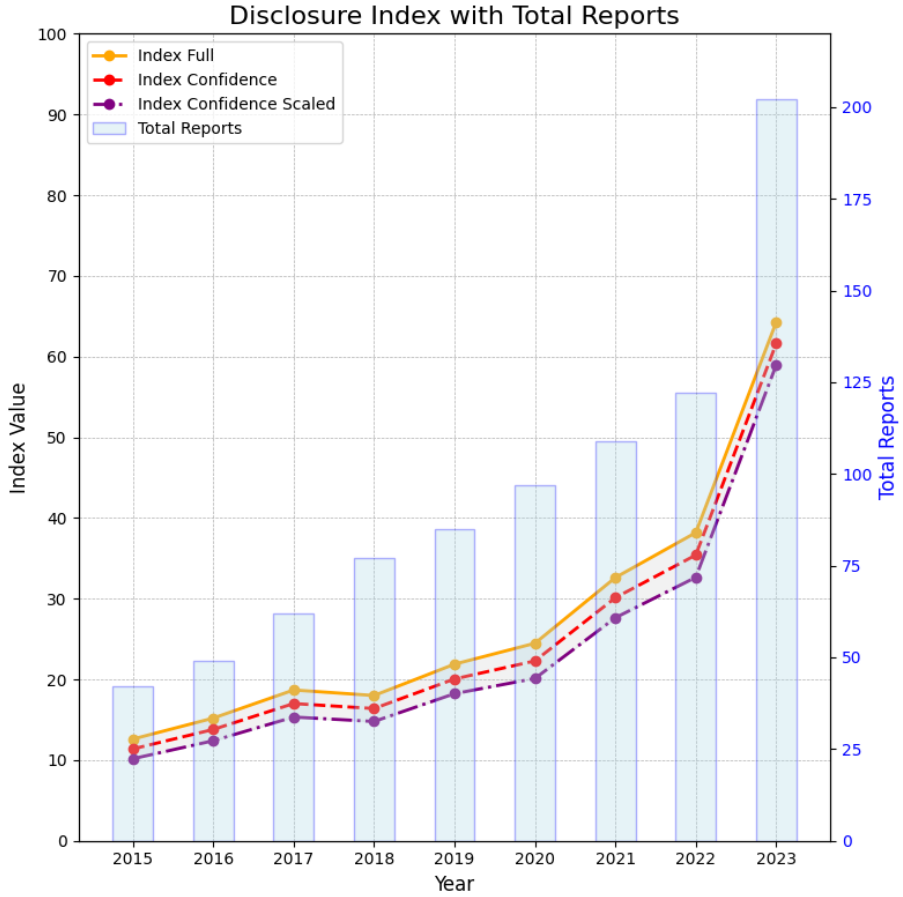
✓ **Confirms extremely high accuracy**
✓ **Confirms that confidence indicates uncertainties**

Results - Disclosure Index

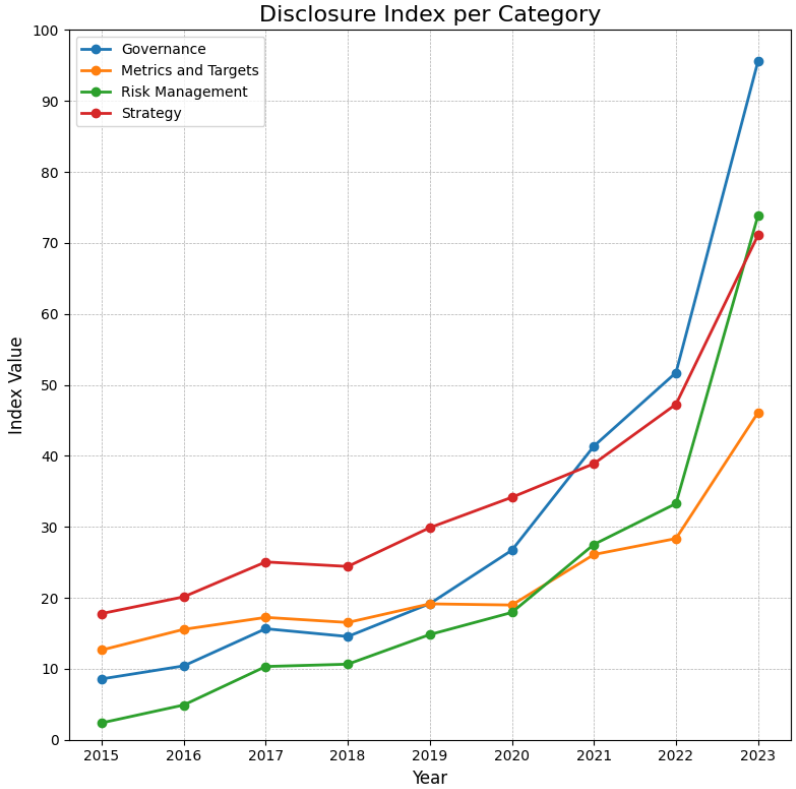
$$Disclosure\_Index = \frac{\#Yes}{Total\_Items}$$

$$Disclosure\_Index_{adj} = \frac{\#Yes}{Total\_Items \times Confidence\_Score}$$

	Mean	St. Dev	Min	Max	Count
Overall	34.62	26.07	0.00	93.10	845
Mandatory	64.28	15.00	1.72	93.10	202
2022	38.19	22.22	0.00	79.31	122
Voluntary	25.30	21.43	0.00	79.31	643



Results - Disclosure Index Category



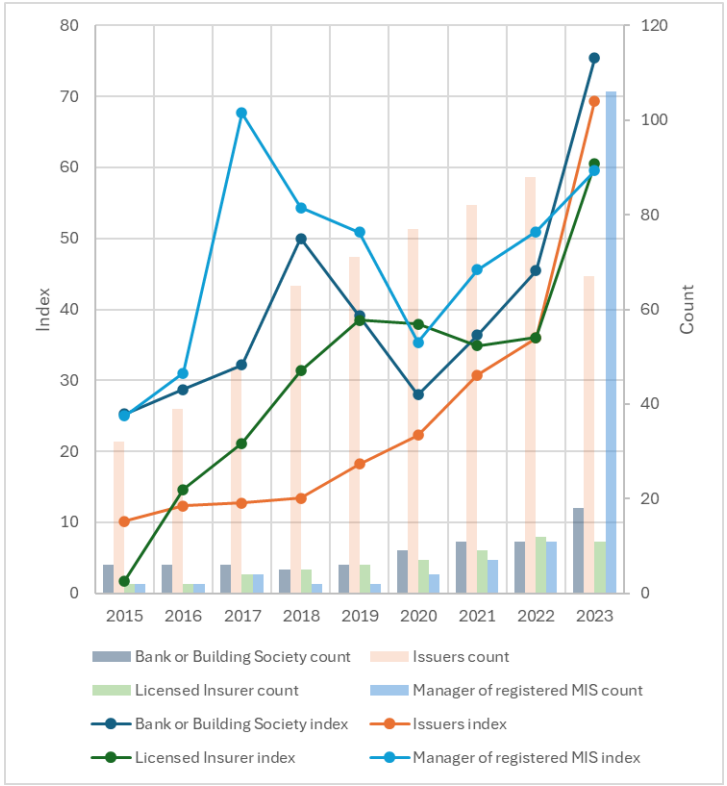
Category	N	Mandatory (188 reports) Mean	Mandatory (188 reports) StD	Voluntary (634 reports) Mean	Voluntary (634 reports) StD
Overall	59	66.91	20.54	24.95	20.97
Governance	10	95.96	6.59	27.44	33.52
Strategy	15	71.52	15.38	32.31	23.10
Risk Management	5	74.36	17.79	17.95	25.62
Metrics and Targets	29	46.06	21.77	20.62	19.32

Table 2: Comparison of Mandatory and Voluntary Reports by Category

#	Adoption Provision	Reports used N	Reports used %
1	Current Financial Impacts	139	72.77%
2	Anticipated Financial Impacts	141	73.82%
3	Transition Planning	111	58.12%
4	Scope 3 GHG Emissions	118	61.78%
5	Comparatives for Scope 3 GHG Emissions	64	33.51%
6	Comparatives for Metrics	163	85.34%
7	Analysis of Trends	141	73.82%

Table 3: Adoption Provisions by Reporters

Results - Disclosure Index by Entity Type



	Mandatory			Voluntary		
Entity Type	**Mean**	**St. Dev**	**Count**	**Mean**	**St. Dev**	**Count**
Bank or Building Society	75.38	9.40	18	35.89	21.86	60
Issuers	69.35	16.54	67	21.88	19.50	502
Licensed Insurer	60.50	15.08	11	32.28	24.53	47
Manager of registered MIS	59.58	12.70	106	47.46	22.62	34

Next steps - other analysis

Survey round 2 - 2025

Interviews round 2 - 2025

Continue updating report database and analysis

Comprehensive analysis

- Connect survey, textual analysis, holdings and emissions/ESG data
  - Multiple Least Squares Regression
  - Event study
  - Difference in Difference Experiments