

POST-ISSUANCE REPORTING IN THE GREEN BOND MARKET



Prepared by the Climate Bonds Initiative

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Introduction

This is Climate Bonds Initiative's second study on post-issuance reporting in the green bond market. By shedding more light on reporting practices, we aim to understand the level of adoption of reporting on the use of proceeds (UoP) and environmental impact metrics.

Post-issuance reporting on the use of proceeds is a core component of the Green Bond Principles (GBP) and the Green Loan Principles (GLP). It is also recommended that issuers report on the environmental impacts of the funded projects. Post-issuance disclosure provides transparency, ensures accountability and underpins the credibility of green bonds and loans. As the market has grown, so has investor interest in UoP and impact reporting to inform their decision-making process and analysis.

This report is based on a review of all green bonds issued prior to November 2017 and included in the Climate Bonds green bond database. It features analysis of bond allocations and impact reporting, introduces a scoring system for reporting metrics, identifies top performers and provides best practice examples. The first part, starting on p. 4, is dedicated to post-issuance UoP reporting; the second part, starting on p. 15, to impact reporting.

Research methodology

What is meant by "reporting"?

Post-issuance reporting includes all the **publicly available** information on a green bond's UoP and environmental impacts after the bond has closed. Information sources include bespoke green bond reports, annual reports, emissions reports, etc. We looked at all bonds, even when the allocations were provided at issuance.

In some cases – private placements, loans, some ABS issues, etc – reporting may be shared privately with investors. Non-public post-issuance reporting is not taken into consideration in our research and analysis. Attempts were made, however, to contact issuers when information was difficult to find, particularly when the issuer had committed to reporting. These attempts were only sometimes successful.

Bonds, issuers or amount?

The data was analysed relative to number of bonds, number of issuers, and amount. Throughout the report, unless otherwise stated, "amount" refers to the amount issued for outstanding bonds (in USD).

The report prioritises analysis based on the number of issuers as many issuers report collectively on all their deals and it appears that decisions on reporting and its scope are taken predominantly at issuer level. In addition, analysis by bond count skews results toward prolific bond issuers.

However, in some cases it was more appropriate to use the number of bonds, e.g. to analyse the level of reporting by the year the bond was issued. Further, issuers' disclosure can evolve over time, especially for impact reporting. Therefore, for impacts, we matched each bond with the relevant year's report and analysed the data based on the number of bonds.

The variable "amount issued" was used throughout, since volume is widely used as an indication of the size of the green bond market and it is less sensitive to individual bonds or issuers being outliers.

Which bonds are included?

The research includes all labelled green bonds issued prior to November 2017 and included in the Climate Bonds green bond database. It excludes bonds that matured before the end of 2018. Bonds issued by all development banks are included, unlike our previous report.

Private placements, ABS/MBS and other secured bonds are usually considered separately. For private placements there is no expectation – rather a hope – that issuers will provide post-issuance reporting. For debt secured on green assets (e.g. Fannie Mae's green MBS), the proceeds are allocated to the collateral pool in full at issuance, so the aim was to determine if issuers report on impacts.

Green loans are excluded. Of the six loans, only one had UoP reporting in place. All the debt of Contact Energy, which finances its geothermal business, is certified under the Climate Bonds Standard. Hence, the issuer is required to report.

The research does not capture reports issued from November 2018 onward. It is possible that some issuers did not report within 12 months of issuance but intend to report, or have since reported, within the two-year timeframe recommended by the Green Bond Principles.

What about missing information?

If post-issuance reporting did not detail how unallocated proceeds will be used, the unallocated amounts were assumed to be earmarked for investment across all eligible sectors in equal amounts. An

adjusted approach was employed for issuers reporting at programme level, mainly development banks. In the absence of bond-level data, we assumed that proceeds were spent in equal proportions for each of the issuer's bonds.

Green bonds used to finance energy efficiency projects fall in the sector to which the investment is applied (e.g. buildings). However, if identified as a standalone category (e.g. by EIB), it was assumed that allocations were made in equal proportions to sector investments.

What is new in this year's analysis?

The first part covers the availability of reporting analysed through different perspectives, which is broadly similar to the previous report. This is followed by an assessment of the quality of reporting. The quality is determined through a points system. The score is computed for each bond and averaged to create a single score per issuer. Multiple assessment metrics were used: from how easy it is to find reporting to the level of specificity of allocations disclosure. For more, see p. 9.

In the second part of the study, impact reporting is analysed in more depth. Although this practice is still relatively new, sometimes there is more than one impact report per bond; in these cases, only the most recent document has been used to gather the research data for analysis.

Climate Bonds Initiative

CBI is an investor-focused not-for-profit, promoting investment in the low-carbon economy. Climate Bonds undertakes advocacy and outreach to inform and stimulate the market, provides policy models and government advice, market data and analysis, and administers the international Climate Bonds Standard and Certification Scheme.

CBI's green bond database is based on alignment with the Climate Bonds Taxonomy, which excludes all fossil fuel power generation.

Climate Bonds Certification is a labelling scheme. Rigorous scientific criteria ensure that it is consistent with the 2°C warming limit of the Paris Agreement. Certification requires initial and ongoing third-party verification to ensure the assets meet the metrics of sector-specific criteria.

Executive summary

Key findings

- Two-thirds of issuers provide post-issuance use-of-proceeds (UoP) reporting, and more issuers report on UoP than on environmental impacts.
- Almost 50% of issuers report both allocations and impact metrics.
- 93% of bonds, where issuers committed to reporting at issuance, did in fact report. 33% of bonds, where there was no commitment, also reported.
- Larger issuers tend to report: the reporting percentage based on amount issued is considerably higher than by number of issuers.
- Deal size is predictive of UoP reporting: benchmark-size bonds of USD500m or more are more likely to have reporting.
- US Munis, which tend to issue smaller deals, tend to report less often.
- The reporting percentage is higher for deals with an external review post-issuance. When the external review is at issuance, e.g. SPO, the correlation is also positive but much weaker.
- Despite having the largest set of issuers reporting on UoP (52), the USA is not the country with most reporting by amount issued: China ranks higher. This is linked to the large number of bank issuers, which are required to report on green bonds quarterly.
- There are 338 bonds with unallocated proceeds of USD50bn in total, or 59% of their aggregated issuance and 18% of total issuance. 92 of them are non-reporting, and since it is not possible to confirm if proceeds have been allocated, we assumed they were not. Of the 338, 192 bonds (or 57%), accounting for USD27bn, were more than two years old as of October 2018, which suggests many issuers are slow to deploy funds.
- Analysis of actual allocated proceeds has identified a higher share of funding going into industry, waste and transport than expected. We compared these to estimates or disclosure at-issuance.

The purpose of this research is twofold. It pivots on assessing whether issuers are reporting, but also provides an update on the allocation of proceeds. CBI assesses UoP information at issuance, but the green bond database is updated if/as new information becomes available.

Almost half of issuers provide reporting on both allocations and impact

Reporting scope		UoP reporting	Impact reporting	Both	At least one
Number of issuers	Reporting	251	194	172	273
	Non-reporting	116	173	94	195
	% reporting	68%	53%	47%	74%
Number of bonds	Reporting	715	1,514	501	1,728
	Non-reporting	1,190	391	177	1,404
	% reporting	38%	79%	26%	91%
Amount issued (USDbn)	Reporting	223	219	186	257
	Non-reporting	58	62	25	95
	% reporting	79%	78%	66%	91%

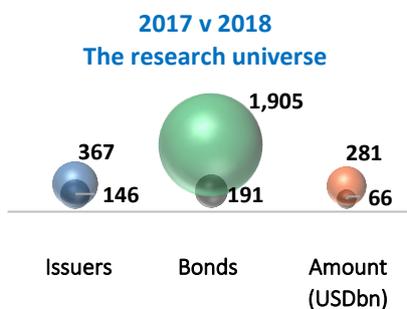
Note: The above figures include securitised bonds (ABS/MBS). However, as proceeds are allocated in full at issuance to collateral assets and almost all ABS are secured on green collateral, it is not expected that issuers will provide post-issuance UoP reporting. To avoid skewing non-reporting figures, ABS/MBS are excluded in subsequent analysis unless otherwise stated.

The research universe

This report covers 367 issuers and 1,905 bonds worth USD281bn issued prior to November 2017. A high-level summary of the research universe and the findings is provided in the table above.

The covered universe is considerably larger than in the previous report (146 issuers of 191 bonds worth USD66bn). That study analysed bonds issued up to April 2016.

The increase is mainly due to the longer period of analysis and issuance in the interim, including Fannie Mae's green MBS. However, it is also attributable to the inclusion of both national and supra-national (a.k.a. multi-lateral) development banks in the analysis.



Matured bonds as of December 2018 have been taken out of the research universe. Consequently, all amount figures show amount issued for outstanding bonds only.

About the findings

The percentage of reporting varies significantly between UoP and impacts, and depends on the metric used.

The lower UoP reporting percentage by bond count (38%), for instance, is largely driven by Fannie Mae, which issued over 900 green MBS and does not provide post-issuance UoP reporting (given that the deals specify the allocation of all proceeds at issuance). On the other hand, as the agency provides impact reporting, the proportion of bonds reporting on impacts is substantially higher in terms of bonds (79%) than issuers (53%).

Compared to the previous report – in which reporting was defined in the context of UoP only (not including impacts) – the share of reporting fell from 74% to 38% by bond count and from 88% to 79% by amount. However, this drop is once again driven by Fannie Mae, as it does not provide UoP reporting. Excluding Fannie Mae from current figures, the proportion of reporting would be 77% by bond count and 87% by amount, i.e. in line with previous findings.

Overall, issuers continue to provide reporting for most bonds. The amount covered by reporting has increased, partly due to the propensity of issuers of benchmark-sized deals to report. Financial institutions have high levels of reporting.

The largest green bond markets tend to have high levels of reporting



*Note: Reporting is classified as any form of post-issuance reporting, i.e. either reporting UoP or impacts or both.

The USA is – by far – the country with the highest number of bonds and issuers covered in this analysis. It ranks first by amount issued, as well as by amount reported. However, almost half of this (USD27bn of USD58bn) refers to reporting on impacts only, largely due to Fannie Mae (USD25bn). The USA, therefore, performs less well on UoP reporting.

China has the second largest green bond market, which is reflected in the number of bonds and issuers covered. Chinese issuers have one of the highest levels of reporting (93%). The financial regulator

(PBoC) requires financial institutions to report quarterly, while other issuers are required to report annually.

France shares broadly similar statistics to China. Of the captured USD39bn green bond universe, 92% has reporting in place. There are 22 issuers versus China's 53.

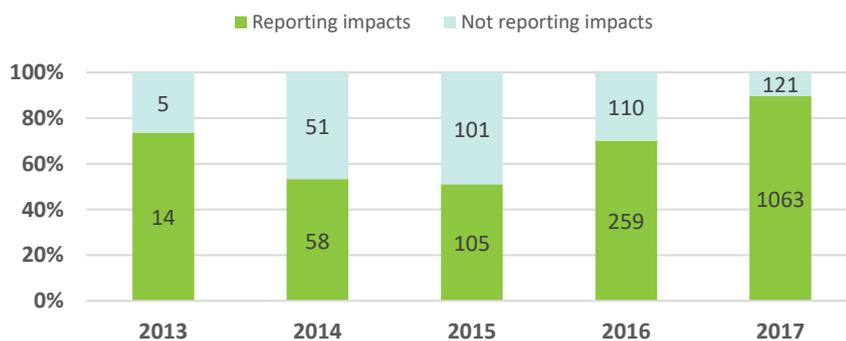
Meanwhile, multilateral development banks rank first by number and proportion of reporting bonds (192 out of 193), and fourth by reporting amount.

The next four largest markets covered by the analysis are in Europe. The proportion

of reporting issuers is high: 30 out of 32 in Sweden, 7 out of 9 in Germany and 6 out of 7 in the Netherlands. However, this does not necessarily translate to a high share of reporting by amount, e.g. 72% in the Netherlands.

The only other country with a reporting share below 80% is Canada. On the other hand, India has a high level of reporting (93% by amount), although four of its 14 issuers still do not report. Finally, Japan is the only large market with 100% reporting.

79% of bonds have some form of impact reporting in place



Impact reporting aims to provide insights into the environmental benefits of green bond financing. The objective is to quantify changes in the performance of an asset, project or portfolio with respect to a set of relevant indicators and benchmarks.

There is increasing investor demand for impact reporting. For example, investor roundtables convened by Handelsbanken in H2 2017 / H1 2018 found that investors use impact reporting to monitor progress and assess the positive and negative

externalities associated with their investments. We are currently conducting a survey of investors, and preliminary findings strongly support this notion.

Disclosure of impact metrics is, therefore, an important tool. It is gaining prominence in the market. Our research finds that 79% of bonds issued prior to November 2017 have impact reporting in place. The number of reporting bonds has grown steadily, with an average annual growth rate of 138% since 2010.

10 best practice reporting recommendations

1. Make information easy to find.
2. Provide comprehensive reporting.
3. Report regularly and consistently.
4. Display information clearly with graphics, benchmarks, comments.
5. Obtain post-issuance external reviews to confirm allocations and verify impact disclosure.
6. UoP: Disclose the funded projects, both at- and post-issuance.
7. Impacts: Disclose methodologies and specify if metrics are estimated or measured.
8. Impacts: Report absolute emissions reductions and relative to a specified benchmark level.
9. Impacts: Provide project-level reporting with bond and programme-level summaries.
10. Deliver on reporting commitment.

Analysis of post-issuance use-of-proceeds reporting

Bonds issued in 2013, 2016 and 2017 have particularly strong reporting credentials

Throughout this section, our analysis of reporting refers to use of proceeds only, unless stated otherwise.

Overall, 88% of the USD amount issued prior to November 2017 (excluding ABS and loans) has post-issuance UoP reporting. Around 70-80% of bonds for each vintage (year of issue) have UoP reporting. This covers 80-90% of the amount issued, and this level has been consistent since 2014.

Older vintages have not been included in the charts since the sample sets were too small to allow for any meaningful inference: under 20 bonds outstanding per year. In any case, the vast majority of issuance from those years does have reporting in place.

The market trend is in line with our expectations: at the very early stages of

the green bond market, issuance was driven by development banks which typically report on allocations. With the opening up of the market, the issuer base has widened to include some issuers with lower commitments to reporting.

The release of the Green Bond Principles (GBP) in 2013 has been instrumental in supporting the development of the market practice of reporting on allocations post-issuance. Going forward, we expect a further widening of the issuer base, but with reporting becoming commonplace.

We further note that the reporting proportion has been higher by amount issued compared to number of bonds every single year. This suggests that larger issuers are more likely to report.

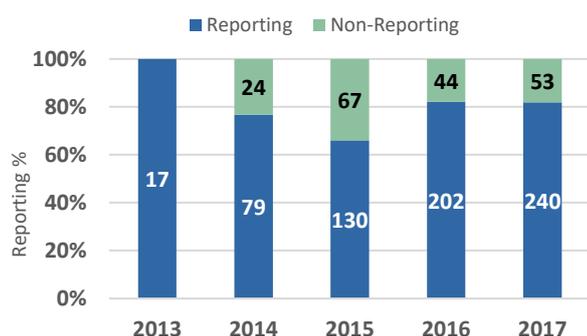
While not included in the charts, we also reviewed green securitisations. The share

of reporting for ABS/MBS is a modest 25% based on amount issued, driven by Fannie Mae. Excluding it, it would rise to 71%.

Since 86% of Fannie Mae issuance (which is included in our database) took place in 2016 and 2017, the reporting percentage dropped from 87% in 2015 to 8% for the 2017 vintage. Whilst excluding Fannie Mae would boost it to 47% in 2017, this is still well below the 87% for 2015.

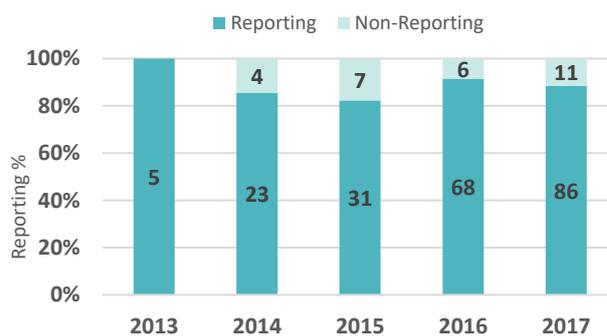
This coincides with increased green ABS issuance, suggesting that UoP reporting is less common for ABS/MBS, likely due to an understanding that UoP reporting is not strictly necessary for deals with green collateral. Among those reporting, the largest are Toyota and Renovate America. As Toyota's three Auto ABS were not secured on green collateral, reporting confirms that proceeds are indeed allocated to EV and hybrid vehicle sales.

Over 80% of recent bonds have reporting in place



Note: Number of reporting/non-reporting bonds by year of issue.

80-90% of issuance by amount has reporting



Note: Amount issued (USDbn) in that year with/without reporting.

Larger bonds tend to have reporting, but that's not the whole story

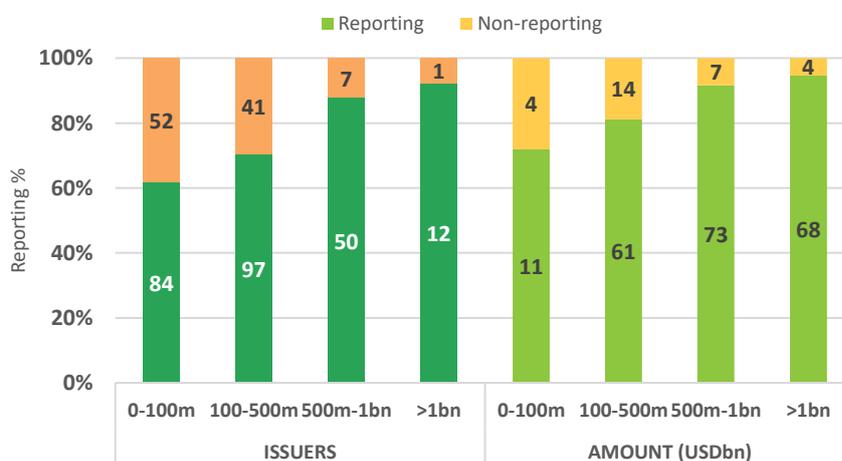
There is a positive correlation between bond size and the availability of reporting: issuers of larger bonds are more likely report.

This is true across number of issuers, number of bonds and amount. Also, across all bond size ranges, the reporting percentage based on amount is higher than based on issuers.

62% of entities that issued bonds up to USD100m report (72% by amount). For deals of USD1bn or more, the figure is 92% (95%). The most significant jump in the reporting percentage occurs when bonds reach benchmark size (USD500m or more).

Large deals tend to be from more experienced and larger issuers, such as financial institutions, and likely benefit from more comprehensive corporate-level monitoring and reporting systems.

62 of 70 benchmark-size bond issuers provide reporting



Note: Figures show the number of issuers by bond size bracket.

Note: Figures show the amount issued in USD by bond size bracket.

Banks are more accustomed to reporting; publicly supported debt is covered the most

Whilst 71% of issuers and 88% of the issued amount have post-issuance reporting in place, there are significant differences by issuer type.

Poland and France, the **sovereign** issuers in our dataset, both provide UoP reporting.

Most **development banks** and **financial corporates** report, while **government-backed entities** have the highest reporting percentage by amount.

Issuers from these categories tend to be larger organisations, usually repeat issuers, and generally have a more structured approach to applying the GBP guidelines on proceeds management and reporting. The opposite is true for non-financial corporates and local governments.

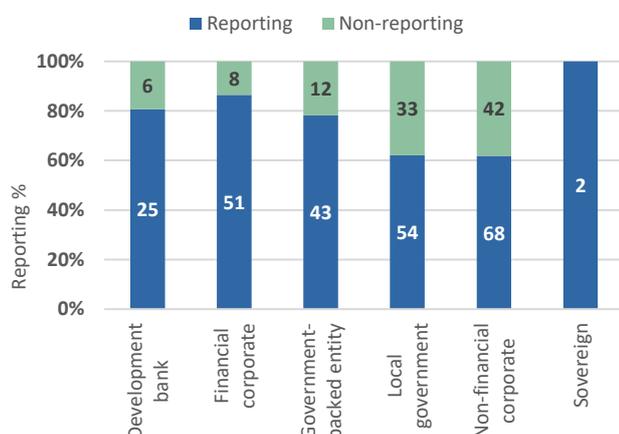
The lower incidence of reporting among **non-financial corporates** seems to be due to a wider issuer base, including many that had issued just one bond and did not provide post-issuance reporting.

Among **local governments**, inferences need to be weighed against US Municipal deals, which represent the largest segment of local government issuers. Despite frequent commitments to provide post-issuance information on allocations (usually in the bond prospectus), reporting is often lacking. This may be due to budget constraints, incorporation in budget reporting in a more generalised format at State, city or similar level, and/or to the fact that there is a decent proportion of refinancing, for which post-issuance reporting is typically less relevant.

For **green ABS/MBS** (not included in the charts), the reporting percentage is low. This is not surprising as issuers are required to disclose information on the collateral pool in the prospectus, and most pools comprise green collateral such as solar leases, loans, mortgages on low-carbon buildings and efficiency upgrades. Consequently, we do not expect them to provide post-issuance UoP reporting. In line with this assumption, only 35% of ABS/MBS issuers provide UoP reporting.

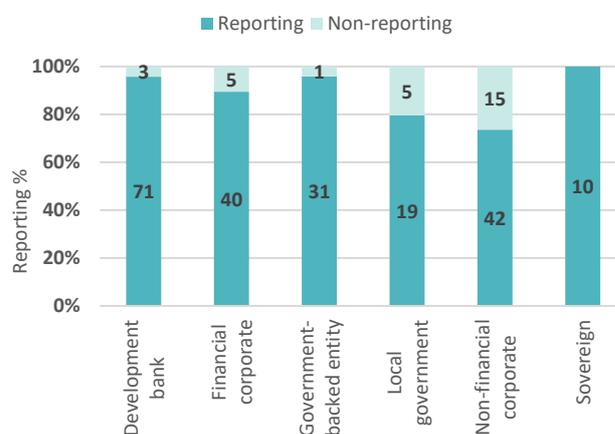
On the other hand, reporting is more likely from issuers with *non-green* collateral pools that have committed to invest the proceeds in green assets or projects. This is in line with the general approach for unsecured green bonds. Two examples are Toyota's Auto ABS and TGOOD's ABS.

The lowest reporting levels still hit 60%



Note: Figures show number of reporting/non-reporting issuers.

Government-backed entities report diligently



Note: Figures show amount (USDbn) with/without reporting.

Ratings

We looked for credit ratings from global agencies Moody's, S&P and Fitch for bonds in our data set. As rating information was not readily available across the board, we did not undertake in-depth analysis of reporting based on rating.

Indicatively – based on the cases where ratings are readily available – it appears that more of the investment grade issuers tend to publish post-issuance UoP reports than issuers of non-investment grade bonds. The difference is more pronounced for emerging market issuers. This would be in line with our observation that larger, more frequent issuers tend to be better at providing reports.

Post-issuance reviews are most correlated with reporting

Two categories of external reviews were defined in order to assess how external reviews and reporting correlate. For details on each type see Appendix 2.

- External reviews **at-issuance** include second-party opinions (SPOs), green bond ratings and Certification.
- External reviews **post-issuance** include audits, verification for Certified Climate Bonds and reviews by SPO providers or rating agencies.

We found that bonds for which there is no review are less likely to have post-issuance reporting. While this may not be surprising, the numbers might be: 35% by number of issuers and 37% by bond count.

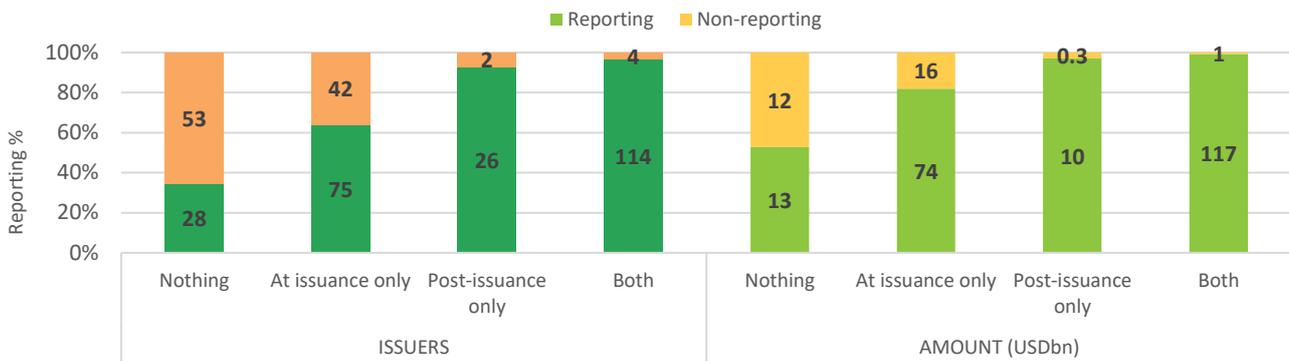
Based on the number of issuers, the probability of finding reporting almost doubles if the issuer received an external review at issuance (64%).

The highest proportion of reporting occurs when both at- and post-issuance reviews are available, with 97% by number of issuers, 96% by bond count, and 99% by amount issued. This share remains well above 90% when only a post-issuance review is available.

The analysis shows that the likelihood of reporting increases significantly with either type of external review, but the relationship is weaker for at-issuance external reviews. This suggests that SPOs and other at-issuance external reviews should not be interpreted as a guarantee of post-issuance reporting, but rather as a compliance check against the GBP.

A commitment to post-issuance external reviews, on the other hand, does seem to go hand-in-hand with post-issuance reporting. We consider this best practice.

External reviews and UoP reporting are positively correlated



It's not necessarily true that more developed regions are more likely to report

Europe and Asia-Pacific have the highest share of reporting issuers. Asia-Pacific also ranks top in terms of reporting by amount, just above Europe and Latin America.

The greater the number of bonds issued, the higher the likelihood of reporting.

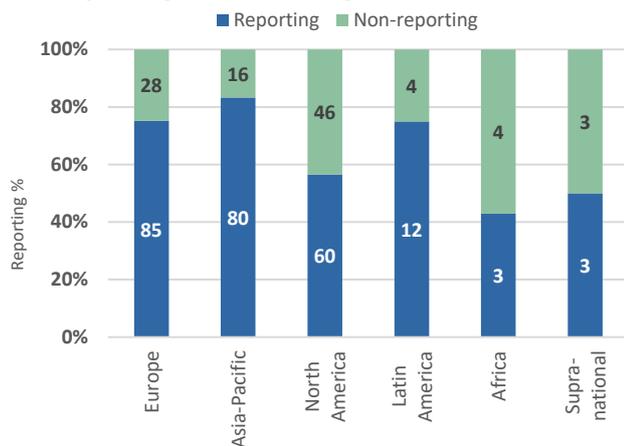
North America is the exception, mainly due to lack of reporting from US Munis. It has the second lowest reporting level.

In Latin America, four of the 16 issuers are not reporting, but they include smaller issuers: at USD600m, their aggregate volume is only a tenth of the total. As a result, Latin America has the third highest reporting percentage by amount.

Disclosure practices are not as common in Africa as in other markets. Consequently, Africa ranks last by both number of reporting bonds and by amount.

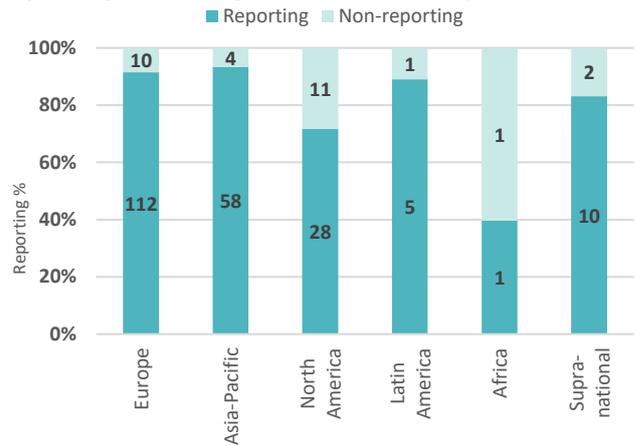
Reporting is available for almost all bonds issued by supranational banks. However, a third of issuers do not conform to this practice. This relates to smaller issuers, whose issuance volume has less of an impact on the share of issuance covered by UoP reporting. Notwithstanding this, it would be good to see best practice reporting from all multi-lateral banks as they often set the tone for new issuers in the regions where they work.

Non-reporting issuers are high in North America



Note: Figures show number of reporting/non-reporting issuers.

Reporting covers high volumes in Europe, Asia-Pacific



Note: Figures show amount (USDbn) with/without reporting.

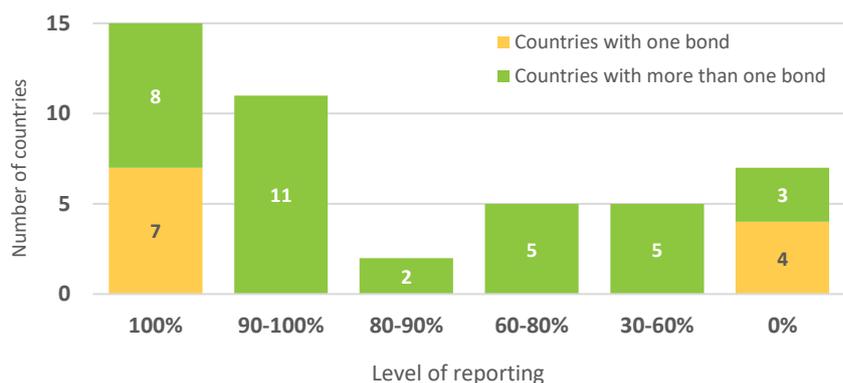
Countries with large green bonds markets tend to have reporting levels of 90% or more

The research dataset comprises bonds in 45 countries. Eleven of these have just one bond issued (e.g. Lithuania, Chile) and thus have either 0% or 100% reporting.

More than half the countries have reporting levels of 90% or more by amount. A large market with 100% reporting on outstanding bonds is Japan. The UK also boasts 100% reporting. See *Top reporters* chart below.

Most of the countries with large green bond markets fall in the 90-100% reporting level bracket. These are usually developed markets, with Sweden at 90%, France at 92%, Germany at 94%. At the higher end are Italy and Spain, both achieving 99%.

Over 90% of issuance is covered by UoP reporting in 26 out of 45 countries



Notably, only four countries with a green bond market larger than USD1bn have reporting below 90%: USA (71%), Canada (77%), Netherlands (69%) and India (63%).

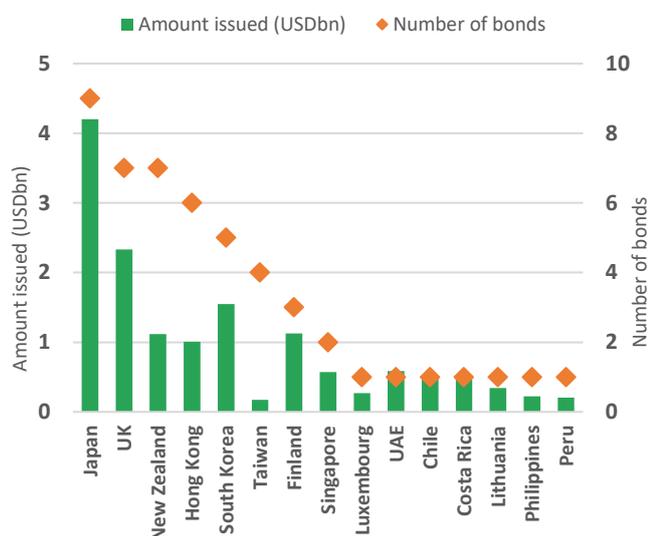
The distribution of countries by level of reporting is polarized at both ends, i.e. either very high or very low levels. Only

seven countries fall in the middle intervals, between 60% and 90%. The largest country in this bracket is the USA.

Between pages 9-13 we assess the **quality** of reporting through a scoring method, explained in more detail there. However, it is worth noting here that countries with

higher reporting levels also tend to score better in terms of the quality of reporting. Even so, there are several exceptions, most notably China, which achieved 96% reporting by amount, but has one of the lowest average scores. A summary of all countries ranked by quality score can be found in Appendix 3.

Top reporters are all from markets with <10 bonds



All countries, where all bonds have UoP reports, have less than ten green bonds issued. Most also have less than USD1bn in issuance.

Japan has the most bonds and highest amount in this group of countries. It is followed by the UK, which is mostly made up of one-time issuers (eight bonds and seven issuers).

As markets grow, it is likely that the dynamics will change. We expect reporting percentages to remain high, though, due to increasing investor demand for disclosure, both pre- and post-issuance.

Lowest reporting is also entirely from small markets

Country	Reporting % (by amount)	Non-reporting amount (USDbn)	Non-reporting bonds
South Africa	0%	0.86	3 out of 3
Malaysia	0%	0.29	2 out of 2
Vietnam	0%	0.03	2 out of 2
Estonia	0%	0.06	1 out of 1
Belgium	0%	0.05	1 out of 1
Slovenia	0%	0.01	1 out of 1
Ireland	0%	0.01	1 out of 1
Colombia	35%	0.22	2 out of 3
Switzerland	41%	0.08	1 out of 2
Argentina	49%	0.08	1 out of 2

Almost all countries with poor reporting levels have a small green bond market, below USD1bn. The largest of these is South Africa: none of the three bonds (USD860m) have reporting in place.

It is possible that in some cases, the issuer has not reported on the first anniversary of the bond but intends to do so within the two-year timeframe suggested by the GBP. Further, reporting may be available only privately to investors. Nonetheless, better disclosure is essential for investor confidence, particularly in emerging markets.

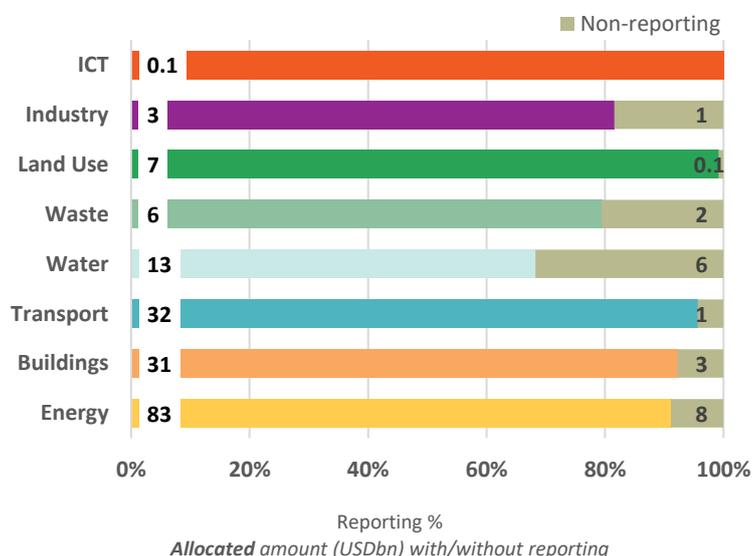
Uneven reporting percentages reveal varying market practices around UoP disclosure

Next, we look at the prevalence of reporting within each use-of proceeds sector under the Climate Bonds Taxonomy (see Appendix 1). We did not consider adaptation as a stand-alone UoP category. Amounts allocated to adaptation were split proportionally across funded sectors.

Transport has one of the highest reporting percentages at 96% by amount. However, the highest level (99%) is achieved by issuers that funded certified forestry and nature conservation. Energy has the largest amount for which there is post-issuance reporting (USD83bn).

Reporting related to the energy sector is consistently available, perhaps thanks to there being more established green bond issuers in the energy sector. This is not the case for all sectors. Driven mostly by NWB (Netherlands) and by US Muni bond reporting practices, the water sector has the lowest percentage of reporting (68%). Furthermore, the water, waste and industry sectors all have a reporting share below the overall average of 90%. This suggests uneven market practices among sectors, even after excluding ABS.

Most reporting by volume relates to energy



At-issuance versus post-issuance comparison

Actual allocations to replace at-issuance estimates

One of the reasons for researching post-issuance reporting is to determine the actual allocation of green bond proceeds. At issuance, Climate Bonds screens bonds to determine alignment to the Climate Bonds Taxonomy (see Appendix 1) and then assesses disclosure to identify or estimate allocations.

Since many issuers do not or cannot provide sufficient detail at issuance, allocations are often estimated. As new information becomes available, however, these are adjusted to reflect the actual use of proceeds.

Post-issuance disclosure confirms that funds were indeed allocated to assets aligned to CBI's Taxonomy. However, actual allocations to some sectors were a bit lower than anticipated at issuance whereas **industry** saw higher allocations.

For instance, Apple Inc has issued USD2.5bn of green bonds. The SPO stated that proceeds would go towards using greener materials, increasing the efficiency of supply chain processes and producing solar and wind power in order to save energy within its facilities. In the absence of a concrete split of allocations to each sector at issuance, Climate Bonds assumed a split between sectors, but primarily to energy and buildings.

The actual allocation, published in Apple's 2018 green bond report, shows that considerably less than estimated was spent in renewable energy (USD413m versus USD1.3bn) and noticeably more in industry (USD917m versus nil).

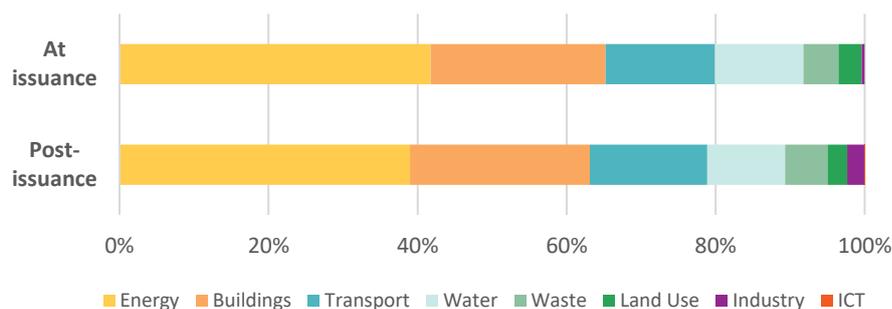
Unallocated amounts

Although most proceeds raised by the bonds in our dataset have been allocated, 18% remains unallocated. Most of this (75%) is due to issuers disclosing that some (or all) proceeds remain to be allocated. The rest is due to lack of reporting, in which case proceeds are considered unallocated (unless they were already allocated at issuance).

In the first case, issuers sometimes give more information about future allocations than was provided at issuance, so the overall use of proceeds may differ to what Climate Bonds estimated at issuance. It may also differ due to more sectors having been funded than was initially planned.

Looking at unallocated amounts only, the sector split is more fragmented, according to the disclosure available and estimates.

Industry features in post-issuance sector allocations



We also looked at the time since the bond was issued to determine if proceeds were allocated within two years of issuance. Half (53%) of unallocated proceeds relate to bonds issued before November 2016, and 80% of this relates to bonds with UoP reporting. This means that 8% of the total amount issued did not conform with the GBP on this point.

Most issuers delivered on reporting commitments

We compared post-issuance reporting to reporting commitments at issuance. Whilst providing post-issuance reporting is the single most important aspect of disclosure on a green bond's UoP and impacts, planning to do so and communicating this effectively at issuance is also important. This is especially relevant since there are several levels of reporting: none, UoP only, impacts only, and both UoP and impacts.

We found that 70% of issuers, accounting for 79% of amount, did as promised, i.e. the actual reporting action was as per the commitments made at issuance.

The rest either over-promised or over-delivered. Over-promising includes failing to report, but also committing to report on UoP and impacts but only reporting one of them. Under-promising, or over-delivering, is the opposite: delivering more than the initial commitment.

Interestingly, the share of over-promising falls significantly when looking at amount (7%) versus the number of issuers (13%), suggesting that larger issuers are more likely to report in line with their commitments than smaller ones.

The relationship between actual post-issuance reporting and commitments at issuance is one of the metrics used to assess the quality of reporting. In general, for a given level of reporting – ranging from none to both UoP and impacts – the best option is to have planned to report to that level and then do so. In other words, over- and under-promising to report should be avoided, although over-promising and under-delivering is, of course, worse. An issuer that committed to report on UoP but did not, demonstrates bad practice, more so than one that did not commit to anything but ended up reporting on UoP.

The other way to assess quality regarding commitments is to consider a given level of commitment. In this case, issuers should still strive to provide the best reporting possible even if it means under-promising. For example, if an issuer commits to report on UoP but then realises it is also able to report on impacts, it should do so. Such an issuer, therefore, scores higher than if it only disclosed the UoP.

These – and other – considerations are reflected in our quality scoring analysis, which forms the next section.

Reporting vs. Commitments



Quality scoring and ranking

Methodology

The dataset used for this report is built upon variables considered as important in evaluating UoP reporting and which we believe are crucial to track going forward. These mostly relate to ease of finding information and clarity, granularity at bond and at issuer level, and reliability.

This section also attempts to assess the quality of reporting provided by issuers. A value is assigned to each relevant variable based on what is reported by issuers. The overall sum gives a score for each bond, ranging from 0 to 25 points. When there are multiple bonds per issuer, an average is calculated for the issuer to avoid any skew of the results.

What are we including?

Most variables included in our research have been used to get an overall quality score for each *reporting* bond.

In our model, the most points are assigned to bonds that have post-issuance reporting both on the use of proceeds and on impacts, and which also committed to report at issuance. If the reports are not available but the issuer committed to report, then a penalizing system kicks in and less points are assigned than if there was no commitment at all.

Comparing at- and post-issuance scenarios is also relevant for the degree of project-level disclosure, which is the second most important variable. Here, bonds with specific projects disclosed both at issuance and post-issuance score higher than bonds with projects only disclosed at one stage, which in turn score higher than bonds with only broad project categories listed.

Another influential variable in the model captures whether the bond received reviews from second- or third-party entities. While external reviews released *at issuance* (e.g. SPOs) are important to verify compliance to the GBP, the scoring system assigns a higher score if *post-issuance* auditing is in place. On that note, auditing UoP reports has been noticed to increase investors' confidence, especially in emerging markets.

What are we not including?

Having more post-issuance reports available, or more frequent reporting, does not necessarily correlate with higher quality reporting. For instance, it is possible to have multiple reports per year with a lot of detail, from whence it is hard to retrieve information on the allocation of

proceeds. Therefore, the number and frequency of reports are not considered.

Variables considered crucial for best practice

Most of the included variables fall under three broad aspects of reporting: (1) ease of finding information, (2) granularity and (3) reliability. The most important one that falls outside of these is the availability of reporting and how that compares to commitment at issuance.

For these three crucial aspects, a few good practice examples are highlighted below. Note that this list of issuers is far from exhaustive, and simply intended to give some examples of "good reporting". Whilst our assessment largely follows objective evaluation criteria (e.g. amount of time needed to find information), it is also affected by subjective considerations. This is not necessarily a negative point, as subjective considerations may add value external to the evaluation criteria in place.

Ease of finding information and clarity

A key aspect of good reporting is providing information in a clear and easy to find way. Having a dedicated green bond webpage with all the relevant material, clear descriptions and links for the documents, and separate sections within Annual or Sustainability Reports make it much easier to access the required information.

Best practice

Southern Power (USA)

One of the best examples of this is Southern Power, a US-based non-financial corporate. From its homepage, two clicks are enough to be taken to the green bond page, which gives clear information on each of the green bonds issued. The individual projects funded are described in detail, with the corresponding allocation.

Lietuvos Energija (Lithuania)

Another good example is Lietuvos Energija, a government-backed entity and the first ever Lithuanian issuer. Apart from being easy to find, its green bond page clearly lays out the Green Bond Framework, SPO, assurance report and Investor Letter, as well as a simple table with useful and concise information on each project.

Other non-financial corporate issuers worth highlighting are EDF, Unibail-Rodamco and Iberdrola. Whilst these are well-established green bond issuers and good reporters overall, it is more difficult to find the green bond page and the description of each document is less clear, particularly in EDF's case. For example:

- **Unibail-Rodamco's** green bond page does not provide a link to the reporting, which can be found in its Annual Report.
- In **Iberdrola's** case, the documents are clearly listed but the information on UoP is within a 336-page Sustainability Report, with some in the middle of the document, but mostly in the Annex.

For public sector issuers, it is often quite cumbersome to find reporting on green bonds. However, two US Munis stood out from our research in a positive way: **King County** and **City of St Paul**.

Whilst reaching the green bond page could be simplified in both cases, using the search tool makes it straightforward. Once there, information on the UoP is shown clearly, either on the page itself (King County) or via Green Bond Reports (City of St. Paul). The only issue we encountered concerns City of St. Paul, since it requires users to create an account in order to access green bond information *via the Investor Relations page*, but not via the green bond page. In any case, both examples show that even if US Munis provide green bond reporting via the EMMA website, doing so also on their own websites can prove useful, making it easier to access the required information.

In Europe, **Stockholm Läns Landsting** stands out as a very good reporter among local governments. Accessing the dedicated green bond page is simple and several documents, as well as detailed descriptions of projects, are listed there.

One of the clearest examples of reporting from development banks is from Brazil's **BNDES**. Its green bond page and reports are clear, concise and easily found. Since BNDES has only issued one bond financing renewable energy, we hope it keeps up the standard of reporting if more bonds are issued to finance other activities. The only key thing missing at the moment is an explanation of the methodology for calculating CO₂ reduction impacts.

Granularity

Arguably the most important aspect of high-quality green bond reporting is the breadth and level of detail of information. The main features of granular reporting can broadly be divided into two areas: project versus portfolio level reporting for each bond; and bond versus programme level reporting when multiple bonds are issued, i.e. at issuer level. However, other features that fall outside of these areas are also mentioned in this section.

Project versus portfolio reporting

One of the best practice examples of bond reporting in this category is Icade.

Best practice

Icade (France)

Icade's Green Bond Report gives the allocation specific to each project, as well as several detailed project examples. Further, it explains how green finance fits within its activities and aspirations.

It discloses the proportion of refinancing within each project and is one of the few issuers to state how much of the unallocated proceeds are expected to be used for refinancing in the future.

In addition, Icade discloses the composition of its green bond investors by type, including green versus conventional, and by country. Investor disclosure is rare.

On that note, Lietuvos Energija and MTR – a Hong Kong government-backed entity – also provide a split of investors by type and geography (among a few others).

Two public sector issuers stood out as providing granular reporting, both local governments from Sweden:

- **Stockholm Läns Landsting** discloses the amount of financing going to each project, and within that the amount of *green bond* financing, as well as the sub-projects and corresponding categories met within each project. Since it has issued multiple bonds, it also details how each green bond was allocated to each project.
- The **City of Norrköping** also gives granular UoP disclosure, including the actual allocation per project as well as the total expected allocation, and an extensive description of each project, with the information clearly laid out.

Bond versus programme reporting

Most development banks report at programme level. While this provides less granularity compared to reports at bond level, it is a reasonable approach when the total amounts outstanding are large and/or when there are many bonds issued.

Bonds issued by banks have often been found to lack specific project disclosure. Limitations might derive from loan-level confidentiality agreements with borrowers and/or portfolio granularity, i.e. the number of bonds to report on (e.g. 64 of Credit Agricole CIB's green bonds are covered in our research dataset).

On the other hand, financial corporates are usually also large institutions and can rely on more comprehensive systems and greater resources dedicated to reporting. Consequently, they are often better able to provide reporting in a timely and granular manner.

German lender **Deutsche Kreditbank (DKB)** issued two green bonds in 2016 and 2017, and then a social bond. Reporting for the green bonds was delivered individually, ensuring more consistency and clarity compared to what would have been reported at programme level. Both impact metrics and allocation of proceeds for different asset pools have been analysed likewise. Further, geographical splits and construction progresses by project type are also available and disclosed concisely.

Similar arguments can be made for other financial corporates such as Bank of America. Reporting is clear and it includes all the information needed to understand the use of proceeds at a granular level. Bank of America overcomes any confidentiality limitations by not naming projects in the management attestation report, but it does disclose name of borrower and length of investment for each one, with even more information in the green bond webpage. The reports are not perfect, but they are definitely among the best practices in today's green bond market, especially within financial corporates (due to the restrictions described above).

Reliability and robustness

This variable is designed to capture post-issuance verification or auditing of the use of proceeds. Usually these are provided by a third party, but sometimes internally, which is less robust.

Our research reveals a dispersion in the quality and quantity of reviews. While quality does not vary considerably due to a certain degree of alignment between a somewhat small group of auditors, the combination of some documents and their presentation can make a difference.

Best practice

MTR (Hong Kong)

MTR provides a clear Green bond framework alongside a second party opinion confirming its compliance with the GBP. In the same document (2016 Green Bond Report) the issuer clearly defines the eligible asset pool, which includes only two earmarked projects.

Auditing included but was not limited to the earmarking of projects and relative amounts invested being in accordance with eligible investments, the use of unallocated proceeds and the estimated CO₂ emissions of the projects.

Treasury Corporation Victoria

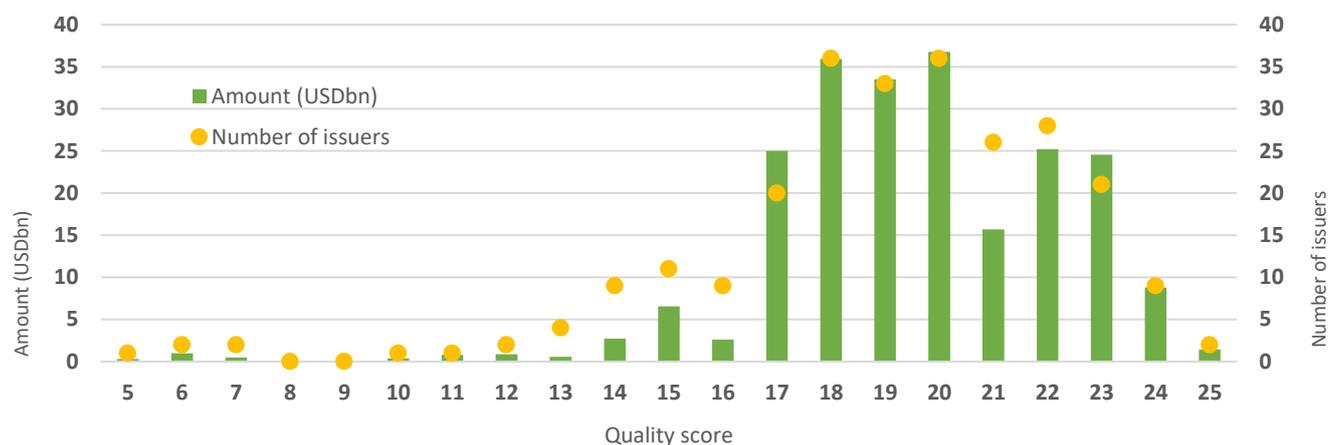
TCV, an Australian local government issuer, appointed DNV GL as a third-party verifier for its Certified Climate Bonds. It also obtained "reasonable assurance" letter from EY. The auditing process is briefly described in the appendix of TCV's annual report and it sheds light on what an assurance really entails.

Among the items checked there is the amount spent on each project, the register for eligible projects (by sample) and the alignment to the GBP.

Unibail-Rodamco

Unibail-Rodamco mandated EY to provide an assurance report. This process has been carried out not only for the latest bonds but also for those issued in 2014 and 2015. It included on-site visits for the largest assets. The methodology behind the assurance is clearly defined.

Issuers scored from 5 to 25 points for quality of UoP reporting, and most at the top end



Best reporters

The top 10 reporting issuers cover various regions and issuer types

The table below shows the top 10 reporting issuers. Issuers are scored on a scale of 0 to 25, 25 being the highest.

Issuer name	Country	Issuer type	Sector	Outstanding green bonds	Amount (USDm)	Points
Icade	France	Non-financial corporate	Property	1	716	25.0
SSE	UK	Non-financial corporate	Energy	1	716	25.0
BNDES	Brazil	Development bank	Financial	1	1,000	24.0
DBS Group	Singapore	Development bank	Financial	1	500	24.0
Lietuvos Energija	Lithuania	Government-backed entity	Energy	1	342	24.0
National Bank of Abu Dhabi	UAE	Government-backed entity	Financial	1	587	24.0
SNCF Reseau	France	Government-backed entity	Rail transport	3	2,914	24.0
Treasury Corp Victoria	Australia	Local government	Government	1	224	24.0
IREN	Italy	Non-financial corporate	Energy	1	587	24.0
District of Columbia Water	USA	Local government	Government	3	550	23.7

Europe is the leading region

The list of top 10 performers features at least one issuer from each region. Europe is the leading region, with five issuers.

The only country with more than one issuer in the Top 10 is France. This is not surprising given that France has one of the most established green bond markets in the world, the largest in Europe and third-largest globally. Article 173 of Energy Transition for Green Growth Law, which was introduced in 2015 and made climate-risk disclosure mandatory, is supportive of high-quality green bond reporting. French issuers tend to be high-quality reporters.

3 emerging market issuers in Top 10

High-scoring issuers from emerging markets are of particular importance in setting the tone domestically. Investors tend to associate emerging markets with data scarcity and poor disclosure, so

greater transparency in the green bond market can provide comfort to international investors and support their involvement in the domestic market.

It is heartening to note that three of the Top 10 are emerging markets issuers: BNDES, Lietuvos Energija and National Bank of Abu Dhabi.

7 public sector issuers

Three of the top 10 issuers by quality score are public-sector financial institutions, but there is diversity in issuer types. This is reassuring, and stresses the fact that all issuers can, and should, be good reporters.

Two non-financial corporates score the top marks

The top two issuers, Icade and SSE, are both non-financial corporates. It is also noteworthy that both are from Europe, the region with best reporting for this issuer type. We expect reporting among

non-financial corporates in other regions to improve and become more common.

Icade and SSE are the top scorers

Whilst the best practice examples discussed above focus on specific aspects of reporting, it is useful to understand why issuers such as Icade and SSE score so highly. These two issuers are especially interesting since they have very different approaches to reporting.

Icade produces an exhaustive 48-page Green Bond Report, which includes not only the allocation of proceeds and impact by project but also a split of how much is new financing versus refinancing. It describes how green bonds fit within its wider strategy, explains the methodology used to calculate impacts, gives project examples, and includes both the SPO and audit report in the appendices.

Top 3 issuers for UoP reporting, by issuer type

Issuer type	Issuer	Points	Issuer type	Issuer	Points
Financial corporate	BPCE Natixis (France)	23.0	Development bank	BNDES (Brazil)	24.0
	NAB (Australia)	22.5		DBS Group (Singapore)	24.0
	Société Générale (France)	22.5		Nafin (Mexico)	23.5
Non-financial corporate	Icade (France)	25.0	Government-backed entity	Lietuvos Energija (Lithuania)	24.0
	SSE (UK)	25.0		NBAD (UAE)	24.0
	IREN (Italy)	24.0		SNCF (France)	24.0
ABS / MBS	SPIC Ronghe (China)	23.0	Local Government	T. Corp Victoria (Australia)	24.0
	TGOOD (China)	21.0		DC Water (USA)	23.7
	Toyota Finance (USA)	19.0		2 issuers ¹	23.0

Notes: 1. Province of Québec (Canada), Queensland Treasury (Australia).

SSE, on the other hand, provides a simple two-page Green Bond Report. The main feature is a table with key information about each project. This includes the allocation of proceeds and several impacts, as well as broader information such as the current and forecast capex and the date they became fully operational. The SPO, independent assurance report, and methodology for calculating impacts are given via separate clearly labelled documents in its green bond webpage.

The differences in reporting are largely due to the nature of each issuer and the diversity of funded projects. Icade is property-focused but used the proceeds to also fund renewable energy and eco-mobility projects, whereas SSE only

refinanced onshore wind farms. It should, therefore, be expected that SSE is able to provide simpler reporting.

Reporting style is also a factor. Whilst good to have, the amount of information Icade has provided is not strictly necessary, or it can be provided via multiple reports.

In any case, both issuers score the maximum points because they:

1. Provided comprehensive reporting.
2. Made information easy to find and it is clearly displayed via separate reports.
3. Delivered on reporting commitments: both had committed to disclosing the UoP and impacts at issuance.

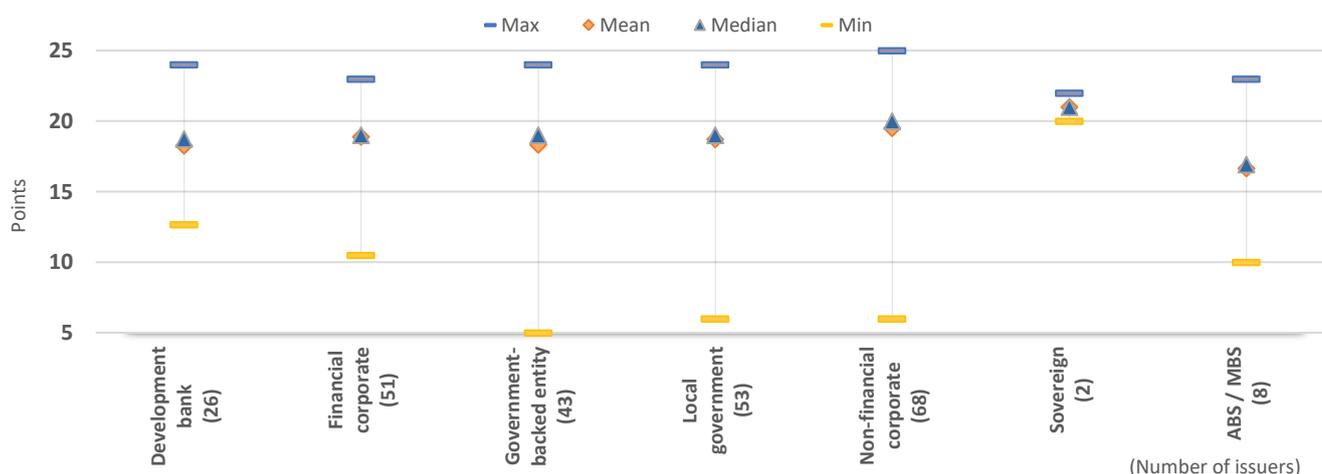
4. Disclosed the funded projects in detail, both at- and post-issuance.
5. Obtained external reviews: SPOs (at issuance) and audits (post-issuance).

Non-financial corporates and public sector issuers have many high-scorers

The table above identifies the top three issuers for six issuer type categories. Sovereigns have been excluded as there are only two issuers, France and Poland, with 22 and 20 points, respectively.

Clearly, all issuer types have at least one high-quality reporting issuer, although ABS/MBS is still a weaker category. As noted previously, UoP reporting is not expected for securitised bonds secured on green assets, but some issuers do report.

Sovereigns and development banks have the narrowest reporting quality range



Summary statistics for the quality scores show that the average and median scores are quite constant across most issuer types. On the flip side, the range of scores varies significantly, although the average tends to be closer to the top.

One might expect that categories with more issuers would have a wider range of scores, but this is not always the case. For instance, the financial corporate group has

more issuers than government-backed entities but a much smaller range.

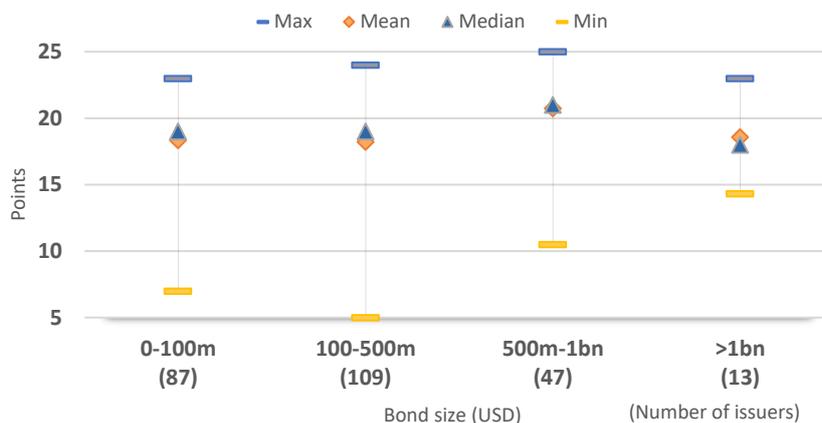
Overall, this suggests that whilst issuer type is not a key driver for the average quality of reporting, some groups – such as development banks and financial corporates – are less likely to have low-quality reporters. This conclusion is even more striking when looking at bond size, as explained below.

The issuer type with the highest mean score and narrowest range is sovereigns, albeit with only two issuers. Excluding them, the categories with the narrowest range and highest minimum scores are development banks and financial corporates. This again supports our hypothesis that larger, more sophisticated issuers are more likely to have established processes in place and greater resources for reporting.

The next-best category in terms of mean score is non-financial corporates, followed by government-backed entities. ABS/MBS issuers score the lowest of all issuer types on average. Their range of scores is also high despite the low number of issuers, reflecting a very diverse issuer base. It is worth noting that issuers with non-green collateral pools, such as Toyota and TGOOD, score much higher than those with green underlying assets, as reflected in the table of top reporters above.

In terms of bond size, the average and median scores are again fairly constant but there is a clear upward trend in the lowest and highest scores as bond size increases, with a particularly big jump in minimum scores when bonds reach benchmark size. As larger bonds are issued by larger and more experienced issuers, the bias is likely related to the availability and level of sophistication of their reporting systems.

Reporting quality is highest for bonds of USD500m-1bn



However, the top and mean scores for bonds of USD1bn or more are respectively 8% and 10% lower than for USD500m-1bn, the best-scoring size bracket. This may be due to the variety of projects financed by bigger deals or a loss of granularity with portfolio reporting.

The bracket with the most reporting issuers is USD100-500m, followed by the group of smaller bonds; these two also have the widest dispersion of reporting quality. This likely reflects the wide variety of issuers and experience.

Spotlight on Certified Climate Bonds

Certification gives an additional layer of assurance, provided by an Approved Verifier. The verifier confirms that the assets / projects the bond or bond programme finances, or will finance, are aligned with the Paris Agreement and keeping global warming under 2°C. As it assesses if the assets are on track to full decarbonisation by 2050, it is more rigorous than an external review which looks at climate benefits more broadly.

Methodology

Certification requires a post-issuance verification that the bond proceeds have been allocated, or are in the process of being allocated, via a report which is usually made public on CBI's website.

Impact reporting is not mandatory, but the criteria for Low Carbon Buildings and Low Carbon Transport do require reporting on performance indicators, such as CO₂ per tonne/km or per passenger/km for land transport. In any case, even if not strictly

necessary to report impacts, it is still best practice to do so and they are often covered in pre/post-issuance verification.

Issuers of Certified Climate Bonds uniformly report on UoP

70 bonds from 36 issuers, with issuance totalling USD22bn, are part of our dataset. This includes ABS/MBS. As this is a much smaller sample size than the full universe, we can only make some broad inferences.

Looking at amounts, the proportion of reporting on Certified Climate Bonds compared to the overall universe is:

- Significantly higher in terms of UoP: 98% versus 79%
- Lower for impacts: 67% versus 78%
- The same for both: 66% versus 66%

This is in line with Certification monitoring requirements. However, six bonds from four issuers lack UoP reporting. It is worth noting that the reporting percentage by amount is considerably higher than by

number of bonds or issuers, i.e. non-reporting Certified Climate Bonds are smaller than the reporting ones.

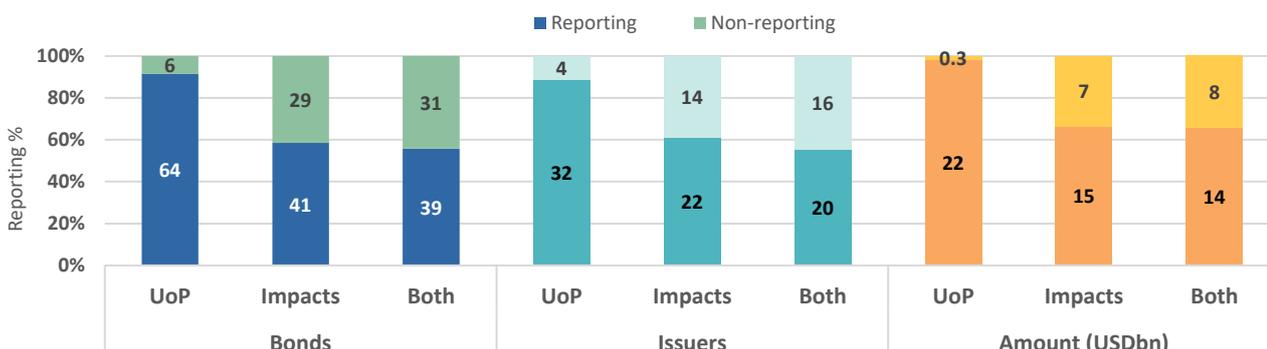
All **development bank, government-backed entity** and **ABS** issuers of Certified Climate Bonds report on allocations. Only 1 of 13 **non-financial corporates**, 2 of 8 **financial corporates** and 1 of 8 **local governments** failed to report.

Had green **loans** been included in the analysis, they would be weakest category with one out of three reporting. However, borrowers under loans are not expected to provide reports publicly.

All Certified **benchmark-size bonds** have **UoP reporting**. For deals up to USD100m, the reporting level is 81% (83% by their aggregated amount), while for deals of USD100-500m, it is 96% (99%).

The only regions with non-reporting Certified Climate Bonds are Asia-Pacific (5/38, or 2% by amount) and Africa (1/2, 40% by amount).

Reporting for Certified Climate Bonds is higher than in overall universe, but not 100%



Conclusions and best practice recommendations for UoP reporting

Despite this year's report going into more depth than the previous one, some of the conclusions remain the same. However, the added detail and much larger sample enable us to make more granular statements and recommendations.



Key findings on report availability

- Almost 80% of the green bond market reports UoP and two-thirds reports both UoP and impacts (by amount).
- These figures are higher than by number of issuers: 68% and 47%.
- The larger the issuer and bond size, and the greater the number of bonds issued, the higher the likelihood of reporting.
- Over half of countries have reporting levels above 90% based on amount, and these include most of the largest green bond markets.
- The number of issuers that over-promised on reporting is similar to those that under-promised and over-delivered, but the latter represent double the amount.

Ideally, 100% of the market would be reporting. The figures above show that some issuers are still not providing reporting, in line with the findings of our previous report. We hope this will drop to almost zero in the future.



Key findings on quality of reporting

Whilst the main objective is to report, quality also matters. We developed a scoring methodology, and found that the quality of reporting for reporting bonds falls within a wide range: between 5 and 25 points (0 – lowest possible, 25 – highest). However, almost half is in the 18- to 20-point range and a third above 20 points, suggesting that reporting is of a good standard in most cases.

The quality metrics were used to develop best practice guidelines (see right).

Wider considerations and recommendations

Both UoP and impact reporting for green bonds are widely regarded as being very important, not only from the perspective of investors and the financial industry, but also from the point of view of civil society.

Providing reporting is often viewed as cumbersome and expensive by issuers, so what can be done to increase the availability and quality of reporting, especially from smaller issuers?

Provide market guidelines, templates

Guidelines such as the GBP are frequently used at issuance to inform the content and structure of reporting: most frameworks are structured in line with the four principles of the GBP. However, this is less common at the post-issuance level, which adds to the wide variety of structures and content of post-issuance reporting.

Market guidelines, basic reporting templates or checklists could be utilised to make post-issuance reporting more uniform and simplify the process, particularly for smaller issuers that may lack the resources to develop systems.

Reduce the cost of reporting

The cost of reporting, including time and resources, can often be significant, especially for smaller issuers which tend to report less and with lower quality. Financial support mechanisms introduced by the public sector could be effective in supporting small green bond issuers. For example, grant schemes to cover the cost of external reviews could be extended to post-issuance reporting.

Reporting database

To increase investor access to reporting, a reporting library or database would be helpful to ensure that all reporting is in place, on time and easily accessible.

Possible hosts of a reporting library could include ICMA, Climate Bonds Initiative, exchanges and/or regulators.



Good reporting practice

1. **Provide post-issuance reporting in line with commitments** made at issuance. Even so, issuers should strive to report as much relevant information as possible regardless of previously made commitments.
2. **Provide clear and easily accessible information.** A dedicated green bond page that is easy to reach is a good start. Presenting information in a separate Green Bond Report or a bespoke section in annual or sustainability reports also helps.
3. **Provide granular yet concise information.** This includes listing individual projects, disclosing the amount spent and impacts for each one, and stating the proportion of refinancing (even if 0%). If some proceeds remain unallocated, giving information on their expected allocation is also useful.
4. **Provide bond-level information.** For repeat issuers, reporting UoP and impacts should be done at bond- rather than programme-level as much as possible, so that the information can be traced to a particular bond.
5. **Obtain and disclose external reviews** and especially post-issuance external verification (e.g. audit). This increases the reliability and robustness of reporting significantly.

Other best-practice features include:

- Report in a timely manner
- Less is more: one or two report documents are typically enough, more can be very confusing
- Less is more: frequent reporting is not necessarily better if quality suffers – it is better to issue one good report each year
- Report in English and local languages

Analysis of impact reporting

Introduction

Impact reporting aims to provide insights into the environmental effects of green bond financing. The objective is to quantify changes in the performance of an asset, project or portfolio of projects with respect to a set of relevant indicators.

Disclosure of impact metrics is gaining prominence in the market. Our research finds that 79% of bonds issued in or before November 2017 have some form of impact reporting in place. The number of bonds with associated reporting has grown steadily, with an average annual growth rate of 139% since 2010, when the first still outstanding bonds came to market.

Supranationals report on impact the most. For individual countries, the USA comes in first place with Fannie Mae included (third, if it is excluded). The next highest reporting level is observed in Sweden, possibly due to Swedish issuers' pivotal role in developing and adopting impact reporting frameworks. Other countries where impact reporting is common include China, Australia, Brazil and several other European countries.

The expansion of impact reporting also raises some concerns, particularly around lack of standards.

The metrics being applied are diverse:

our research indicates that issuers are using more than 50 different metrics for each of the top three use-of-proceeds sectors (energy, transport and buildings).

Context-specific factors are also often left out from impact calculations

for portfolios or programmes that span multiple geographies and/or industries. This makes comparison between instruments and reports difficult. Further, the lack of coherence is sometimes viewed as a barrier to implementing impact reporting in the first place.

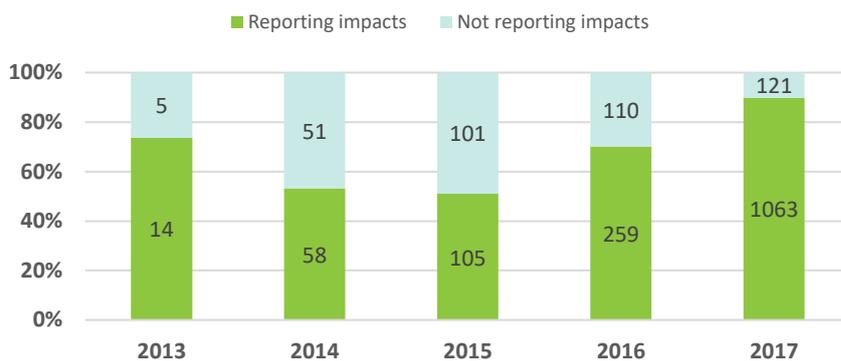
Attempts to provide clarity and consistency

to reporting have been underway for a couple of years.

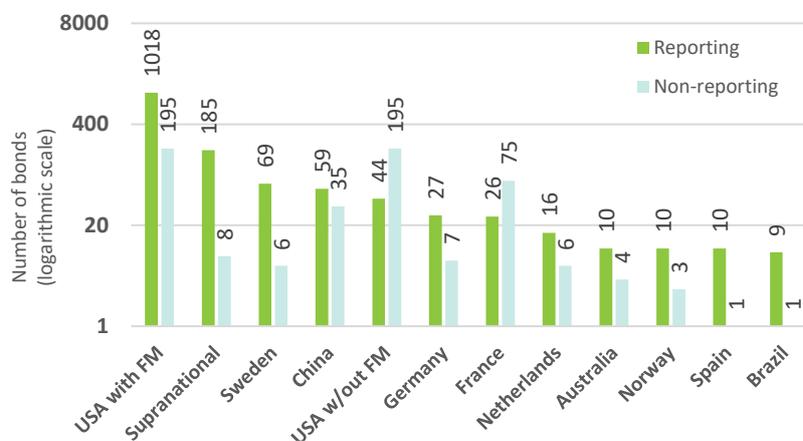
In 2015, a group of International Financial Institutions (IFIs) assembled to propose a harmonised approach to impact reporting with associated metrics for projects in the renewable energy sector and energy efficiency projects across industries (the IFI Harmonized Framework).

The following year, the International Capital Markets Association (ICMA)

79% of bonds have some form of impact reporting in place



Large green bond markets and adoption of frameworks guide top 10 impact reporting countries



Note: "FM" refers to Fannie Mae. This chart is presented on a logarithmic scale with a base of 10.

convened an Impact Reporting Working Group, which has since published a further three documents building on the IFIs' work. Similarly, these documents outline suggested impact reporting metrics for the water and wastewater, waste and resource efficiency and low-carbon transportation sectors.¹⁶

In addition, a group of Nordic public sector issuers has developed a comprehensive guidance document for impact reporting. The original Nordic Public Sector Issuers Position Paper on Green Bond Impact Reporting was published in October 2017 (the Position Paper). An updated version was released in January 2019.¹⁷ The paper is intended to be complementary to the work of the IFIs. It incorporates reporting on climate-related physical risk and the Sustainable Development Goals (SDGs).

Although initially geared towards public sector issuance, the framework laid out in the paper has been adopted by issuers in multiple sectors, including commercial banks and various corporate issuers, across the Nordics and elsewhere.

Green bond issuers identified sectors for which framework development should be prioritised in future in a consultation undertaken by ICMA in November 2018. The top three sectors included:

- agriculture/land use/forestry
- adaptation
- circular economy/resource efficiency

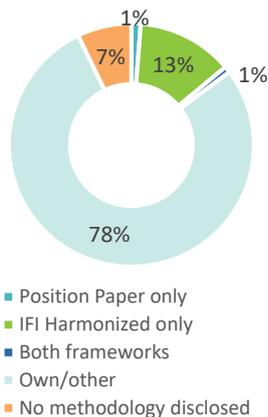
The existing harmonised frameworks were viewed in an overwhelmingly positive light: 91% of issuers that responded to the consultation found them useful. Most also stated that at present they did not require additional guidance in the application of the existing frameworks.

Despite the above, many stakeholders quoted impact reporting commitments as key barriers to further green bond issuance. CBI suspect the perception of difficulty and costliness relate to an initially steep learning curve, as was the case with corporate sustainability reporting, for instance. Similarly, this can be expected to flatten out over time as issuers gain reporting experience.

Reporting frameworks and principles

We reviewed and compared the existing reporting frameworks in terms of key aspects that influence reporting quality, including format, frequency, reporting period and level of detail, data (estimated or measured / actual), and suggested metrics and themes. The reporting metrics suggested in the IFI Harmonized Framework and the Nordic Public Sector Issuers Position Paper are summarised by sector in Appendix 4.

15% of issuers are using one or both frameworks



Framework adoption

Our research indicates that 93% of green bond impact reporting includes some form of methodology. Most reports employ the issuer's own methodology by way of providing a simple description of the relevant assumptions, such as CO₂ conversion factors used in calculations. It is less common for issuers to disclose the full calculations themselves. Others borrow elements from related frameworks, such as the GRI, the Natural Capital Protocol or the UNFCCC's Clean Development Mechanism methodology.

Approximately 13% of impact reporting is currently produced in accordance with the IFI Harmonized Framework. The corresponding figure for the Nordic Public Sector Issuers Position Paper is 1%. Another 1% uses a combination of the two. No information on methodology is disclosed in 7% of impact reporting.

As the two frameworks are new, we suspect that a larger share of green bond issuers will begin to utilise them going forward. CBI will continue to monitor changes in the uptake and report on the anticipated growth in future coverage of green bond post-issuance reporting.

IFI Harmonized Framework on impact reporting

The proposed harmonised impact reporting frameworks were developed by a technical working group comprising International Financial Institutions and an ICMA-led working group with varied membership, including financial institutions, green bond issuers, NGOs and academia. The proposed frameworks developed to date cover four sectors:

- Renewable energy and energy efficiency
- Sustainable water and wastewater management
- Waste management and resource efficiency, and
- Clean transportation.

The sector definitions stem from the GBPs. The original document from December 2015 includes a set of core principles and recommendations, which are applicable to all the subsequent framework documents. Additionally, each document provides a list of suggested indicators for projects in the given sector. Reporting summary templates are provided for project- and portfolio-level reporting.

Nordic Position Paper on green bond impact reporting

Another influential framework in the impact reporting space comes from Nordics. The Nordic Public Sector Issuers: Position Paper on Green Bond Impact Reporting (the Position Paper) was originally developed by a group of 10 public sector issuers from the region. The 2019 update added nine new members to the group. Nordic Investment Bank, SEB and Credit Agricole acted as advisors.

The second version covers the sectors that appear most frequently in the green bond frameworks of Nordic issuers, namely:

- Renewable energy
- Green buildings
- Energy efficiency
- Clean transportation
- Waste management
- Water and wastewater management
- Sustainable land use / environmental management, and
- Climate change adaptation.

In a similar format to the IFI Harmonized Framework, the Position Paper includes a comprehensive section on reporting principles followed by "project-category recommendations". The latter section outlines a list of suggested indicators for each category. The appendices of the Position Paper provide an Executive Summary template that issuers can utilise in their reporting, as well as an illustrative example of a full set of impact indicators in spreadsheet format.

An example on how issuers can map their portfolios of assets against the Sustainable Development Goals (SDGs) is also provided. It broadly follows the format of the mapping conducted by ICMA.¹⁸

Reporting principles

Frequency

Both the IFI Harmonized Framework and the Position Paper recommend an annual reporting frequency. The IFI Harmonized Framework makes no distinction between dynamic and static portfolios, the Position Paper recommends annual reporting for both. However, it is stated that for non-dynamic portfolios (e.g. refinancing), a simpler approach, such as confirming that no changes have been made since the previous report, may be adopted.

Case study

Alliander and TenneT Holding

These two Dutch energy transmission (grid) companies have taken a different approach to reporting. Alliander issued its debut bond in April 2016. In the impact report produced for the bond, the issuer states that it has decided to report on a one-off basis because the bond's proceeds were spent on refinancing purposes.¹⁹

TenneT issued its inaugural green bond in 2015, and to date has issued eight bonds totalling EUR5.5bn. The company produced its first green bond report including impact metrics in 2015. The commitment to annual reporting was made clear in the report, as it promises to "keep [stakeholders] informed of our progress each year, going forward."²⁰

Neither of these issuers has used existing impact reporting frameworks. Their reporting is nevertheless high quality with clearly disclosed assumptions and methodologies.

Framework		
Proceeds allocation and reporting	IFI Harmonized Framework Project-per-project <ul style="list-style-type: none"> Allocation made to individual projects Issuer's share of financing 	Nordic Public Sector Impact Reporting Position Paper Project-per-project <ul style="list-style-type: none"> All allocations where possible Aggregate to show total results
	Portfolio report based on project-by-project allocations <ul style="list-style-type: none"> Aggregate results, provide pro-rata share of issuer's financing 	Non-dynamic allocation <ul style="list-style-type: none"> Bond-level and aggregated (programme-level) results
	Portfolio report <ul style="list-style-type: none"> Proceeds allocated to a portfolio Aggregated results only 	Dynamic allocation <ul style="list-style-type: none"> Portfolio-level reporting Pro-rated calculations

Format

Although no explicit recommendation is made, both frameworks make references to separate impact reporting. The Position Paper also mentions that reporting could even take the form of a list of projects with associated indicators on the issuer website, which should be updated if any changes to the portfolio or disbursements are made. An example of this can be seen on the website of the Swedish real estate company **Wallenstam**.²¹

The Position Paper recommends disclosing the project information used in compiling the impact report as an online spreadsheet so that stakeholders and interested parties can easily access it. Out of the issuers in our dataset, we have only seen this adopted by Sweden's **Kommuninvest**.²⁸

In searching for impact reporting and associated data, we concluded that the clearest reporting was provided by issuers that published a single (separate) report in a format that remained consistent over time if reporting was periodic. Currently, our research finds a mix of information sources being used, including for example annual reports, investor letters and presentations, green bond reports, newsletters and website summaries.

Reporting period

Both frameworks recommend annual reporting, including explicit disclosure of the reporting period. A good example of this is Nordic commercial bank **Nordea**.²² Their Position Paper-aligned inaugural green bond report includes a section on methodology, which specifies the exact time period the report covers.

The Position Paper suggests that where applicable, data should be normalised to illustrate a representative year. This can mean, for example, accounting for weather effects on building efficiency or changes in generation capacity for energy

projects. This is an advanced point that we have yet to see applied in practice.

It is noted in both documents that including further information, such as lifetime perspectives on the impacts of projects or assets, is beneficial. The IFI Harmonized Framework cautions against simply multiplying the annual impact of a project with its economic lifetime (in years). Instead, ramping up and down periods should be accounted for. Additionally, the Position Paper outlines the Nordic issuers' commitment to report for the entire time that any green bond funds are outstanding.

Based on our research, the main aspect to provide clarity around this issue would be for issuers to disclose how long they plan to report environmental impacts for, and if that changes for any reason.

Project inclusion, reporting level and financing contribution

Both frameworks suggest that project inclusion/exclusion should be based on eligibility as outlined in the issuer's green bond framework criteria.

The IFI Harmonized Framework notes as well that issuers should be transparent where projects may be only partially eligible and adjust impact data accordingly so as not to exaggerate the effects.

It recommends basing impact reporting on amounts allocated to projects, whereas the Position Paper suggests using disbursed amounts as a basis for calculations to be conservative enough. Furthermore, it is noted in the Position Paper that all projects for which funds are outstanding should be included in the reporting, irrespective of the date of disbursement of the funds.

The documents have slightly different approaches to determining the required reporting level (see table above).

Challenges

Although the ambition for the level of reporting is high in both frameworks, there are certain issues that can pose challenges to achieving granularity for example at the project level. The Position Paper, for instance, acknowledges that issues such as confidentiality, competitive advantage, or simply a very large number of projects (such as with multilateral development banks) can prevent an issuer from disclosing individual project-level data.

We believe that project-level reporting should be the ambition going forward. One thing to note is that this should not be expected from all types of issuers to begin with. For example, issuers would have better access to data if they own the assets directly, whereas this can be harder for some types of issuers, e.g. banks.

A potential way to overcome some of the limitations could be to incorporate *ex-ante* impact reporting, i.e. expected levels, in pre-deal due diligence and disclosure. An example of this is Finland's **MuniFin**, which state in their reporting that expected impact reporting information is collated at the project appraisal stage.²³

Also, project-by-project disclosure is arguably more important for diversified portfolios as opposed to portfolios that consist of a single asset category, such as solar power plants.

Data and measurement

The two existing frameworks recommend diverging approaches regarding what data issuers should report on.

The IFI Harmonized Framework highlights *ex-ante* (expected) data as the superior alternative. The logic is that issuers have no certainty over the ultimate completion of projects under construction. Disclosing actual impacts *during construction* could be misleading, while expected data for a representative year may be more reliable.

The Position Paper not only lays out a commitment to using *ex-ante* data, but also a clear ambition to strive for using *ex-post* (actual) data. However, the IFI Harmonized Framework also notes that sampling *ex-post* verification of impacts may be useful in certain cases.

We note that comparison between the two is ultimately needed to assess real impacts and any performance gaps at the asset/project/portfolio level. This will be particularly important for investors that rely on information from impact reporting to assess the effects of their investments.

Regardless of the type of data used, issuers should always aim to provide a distinction between *ex-ante* and *ex-post* calculations and impacts in detail.

Suggested impact reporting metrics

To illustrate the differences in metrics recommended by the frameworks, we have compiled sector-specific summary tables. Please refer to these in Appendix 4.

Benchmarks

Both existing frameworks emphasise the importance of benchmarks. They recommend international, national or local codes and standards for each sector.

Many Swedish issuers have adopted the national standards approach for buildings. They employ local regulatory requirements as outlined in the BBR (*Boverkets Byggregler*), i.e. the Swedish Building Regulations.²⁴ The regulations determine the maximum allowed (and minimum recommended) energy intensity levels for new and existing commercial and residential buildings.

Other regions where we have seen this type of benchmark used include France, Germany, Spain, the Netherlands and China. Dutch issuer **Obvion** completed a green RMBS exclusively financing residential buildings in the Netherlands.²⁵

The firm outsourced the development of their impact assessment methodology to consultancy DWA, which used the Dutch average from regulations to develop a baseline for comparison to Obvion's portfolio and to estimate the deal's impact. The Wuppertal Institute conducted a similar study for **NRW Bank**.²⁶

Impact for every dollar?

Impact per unit of currency invested is a suitable measure to disclose for investors, as on the surface it provides a simple method of comparison of investment effectiveness. However, using this type of metric is less straightforward than might initially seem.

The IFI Harmonized Framework correctly notes that a comparison without normalisation runs the risk of disadvantaging smaller or less developed economies. One way to go around this could be to convert all currency to a common base (e.g. US dollar), and then adjust according to purchasing power, GDP per capita or a similar metric to get a more comparable result across geographies.

Should everyone use frameworks?

In short, no. Our research indicates that reporting does tend to be more common and better quality in issuer groups most closely associated with the frameworks. Nordic (public sector) issuers and IFIs are key examples of two such groups.

However, it is acceptable for issuers to choose to use their own methodologies. Depending on the capabilities of the entity in question, this might work to the benefit of both the issuer as well as the target audience. For example, the Swedish forestry corporate **Sveaskog** developed a noteworthy, sector-specific methodology, which is discussed in more detail as a sector best practice example on p. 25.²⁷

In the future we would like to see more attempts to bring uniformity to impact

reporting. A key area for this is the US, particularly municipal issuers. As the largest issuing nation of green bonds, the importance of this cannot be understated. At present, we find there is a vast range of reporting styles and content.

Developing a common approach is a key opportunity going forward.

Best practice

Kommuninvest

Kommuninvest is a Swedish local government financing agency. Four of its bonds are captured. It was one of the 10 Nordic public sector issuers responsible for developing the Position Paper in 2016 - 2017.

Kommuninvest's report is clear and comprehensive. It lays out the role of Swedish local governments in achieving the goals of the Paris Accord, includes an SDG mapping section, as well as executive summaries of the use of proceeds and the associated environmental impact.²⁸

All projects in all sectors are reported on individually. The location is disclosed, and a description provided.

Projects are assigned a classification based on their climate contribution of mitigation, adaptation and/or (general) environmental management (M/A/E).

The use of expected/actual data is specified for each project.

A methodology section is provided at the end where it is specified that some of the data relies on external parties and that reporting for certain sectors, including water, will be developed further in the future.

Best practice: Bank of China

Bank of China is a seasoned green bond issuer. It released a report in early 2018 covering the use of proceeds and climate impact of all the bonds it has issued so far. Although the deals were arranged through different branches including Luxembourg, New York, London and Paris, the report provides detailed information on all of them.²⁹

At year-end 2017, 92% of net proceeds had been utilised to fund 11 metro projects and two wind power generation projects. Environmental impacts were disclosed on a portfolio basis. It is common practice for bank issuers to only provide aggregated information due to confidentiality considerations.

The environmental impacts are calculated in themes. For example, the impacts of renewable energy projects refer to the UNFCCC CDM methodology ACM 0002 Grid-connected electricity generation from renewable sources (version 17.0).

For wastewater treatment projects, environmental impacts are calculated based on the capacity of treatment effectiveness, for which the issuer has provided very detailed calculations.

The impacts of clean transportation projects are calculated based on ACM0016 Mass rapid transit projects (version 4.0).

Programme-level reporting in place for most bonds; most report actual/measured data

This section explores our findings on the extent to which the reporting principles have been adopted in the market. The following section explores the reality of the different metrics issuers are using to quantify impacts in different sectors.

Bond or programme level?

Our research indicates that out of the 1,517 bonds with some form of impact reporting, 85% (1,284) report at programme level, and 14% at bond or at an even more granular level.

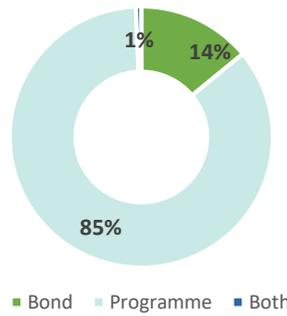
Only 1% have reporting that covers both bond and programme level. Examples include **China Development Bank** and **Swedish Export Credit**.

Expected or actual impacts?

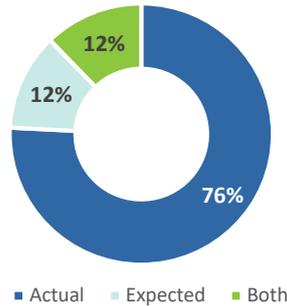
Our research illustrates that at present, most impact reporting is based on measured, i.e. actual data. Reports covering 76% of the bonds we analysed used actual data. A large part of this result is due to US MBS-issuer Fannie Mae. The institution reported on all its securities in one impact report based on metered energy consumption.³⁰ However, removing Fannie Mae from the dataset shows a much more even split. In this case, reports include expected and actual data at 34% and 31%, respectively. The remaining 35% of reporting incorporates a mix of both.

We find that it is often very difficult to tell whether the data used in a report is estimated or actual, and if a mix of both has been used. We would encourage issuers to disclose their data sources along with any assumptions, benchmarks and calculation methodologies clearly as part of their reporting.

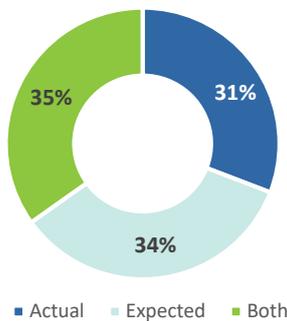
Programme-level reporting is in place for 85% of bonds



Most reporting is based on actual data ...



... but excluding Fannie Mae the split is even



Separate or integrated report?

The research for this report found that a majority (69%) of the bonds for which some form of impact reporting was found reported through an annual report. The rest (31%) produced a separate impact-focused document. These documents ranged significantly in layout and title and included green bond reports, green bond impact reports, environmental impact reports, green bond newsletters, and green bond investor letters.

The role of verification

Verification around the use of proceeds has become more common over the years. However, impact verification remains scarce. The assurance and verification we observed currently consists mostly of a short statement.

In **National Australia Bank's** report, the public verification statement produced by DNV GL lists the verifier's tasks as: "Verification of impact reporting claims and associated data where applicable; review and testing where possible of Impact Reporting Data".³¹

Moroccan bank **Banque Centrale Populaire** commissioned the UK-based Green Investment Bank to develop an impact reporting methodology for them and assure its quality. However, although the resulting document lists the data sources used, it does not explain the actual development process or results.³² Going forward, it would be useful to see more transparency from the assurer and subject matter expert with regards to what their process involves. Overall, verification is a key element to enhance the credibility of impact reporting in the future.

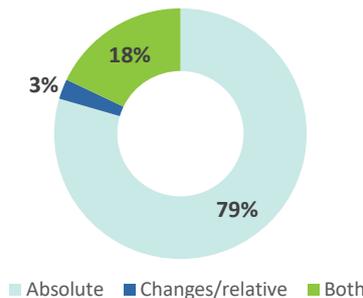
GHG reductions dominate, but issuers use a very wide range of impact indicators

As discussed, there is currently little standardisation in the market with regards to measuring impact. The findings of our review indicate that 79% of issuers are measuring impact on an absolute basis, whereas only 3% are contextualising changes relative to a pre-determined baseline or benchmark. 18% are disclosing some combination of the two.

Measuring in absolute terms is a good starting point. However, it provides little context for understanding the scale of the impacts themselves.

Further, we found more than 200 unique metrics being used in reporting. In the

Most issuers report impacts on absolute terms



following sections, frequently occurring metrics have been grouped according to the use-of-proceeds sector with which

they are associated. For sector definitions, please see the Taxonomy in Appendix 1.

Greenhouse gas (GHG) reductions

We treated GHG reductions as a distinct category, as they are the most common metrics in nearly every use-of-proceeds sector. More specifically, we recorded the metrics by sector (energy, transport, buildings, etc.) and grouped them into categories. We then built a dataset based on the frequency of occurrence of the metrics in each category. Finally, we calculated the proportional share of each category of the total GHG-related metrics used in each sector.

The only one left out was adaptation, as the results indicated that GHG metrics formed a very small part of the overall metrics used in describing the impact of adaptation projects. This is likely a result of the small number of adaptation projects funded by green bonds.

The results, based on the percentages, are summarised in the tree-map graph. A full list of metrics for each category is provided online.⁵⁴ It is worth noting that:

- CO₂ refers to metrics only measuring the carbon dioxide impact of assets, whereas GHG means a multitude of greenhouse gases measured and converted to CO₂ equivalent.
- Categories with the word “avoided” include both avoided and reduced emissions, as in most cases issuers did not distinguish between calculation mechanisms for the two.

The analysis indicates that, across sectors, the most common individual metric is CO₂ measured in tons, kilotons or megatons. Waste is the only sector where CO₂ avoided is used most frequently.

Similarly, GHG measured on its own in terms of relevant unit based on magnitude (t/kt/Mt) is prevalent. Greenhouse gas reductions are often expressed in relative terms, i.e. as a percentage change or a percentage of total emissions. Issuers tend to also report on GHG and/or CO₂ in relation to a monetary measure (e.g. GHG reduction in tons/USD invested).

Non-monetary measures appear more frequently in the transportation sector, where several reports include GHG emissions in tons/passenger mile.

More specific metrics also appear in the land use sector. Issuers in this sector routinely report on the amount of carbon

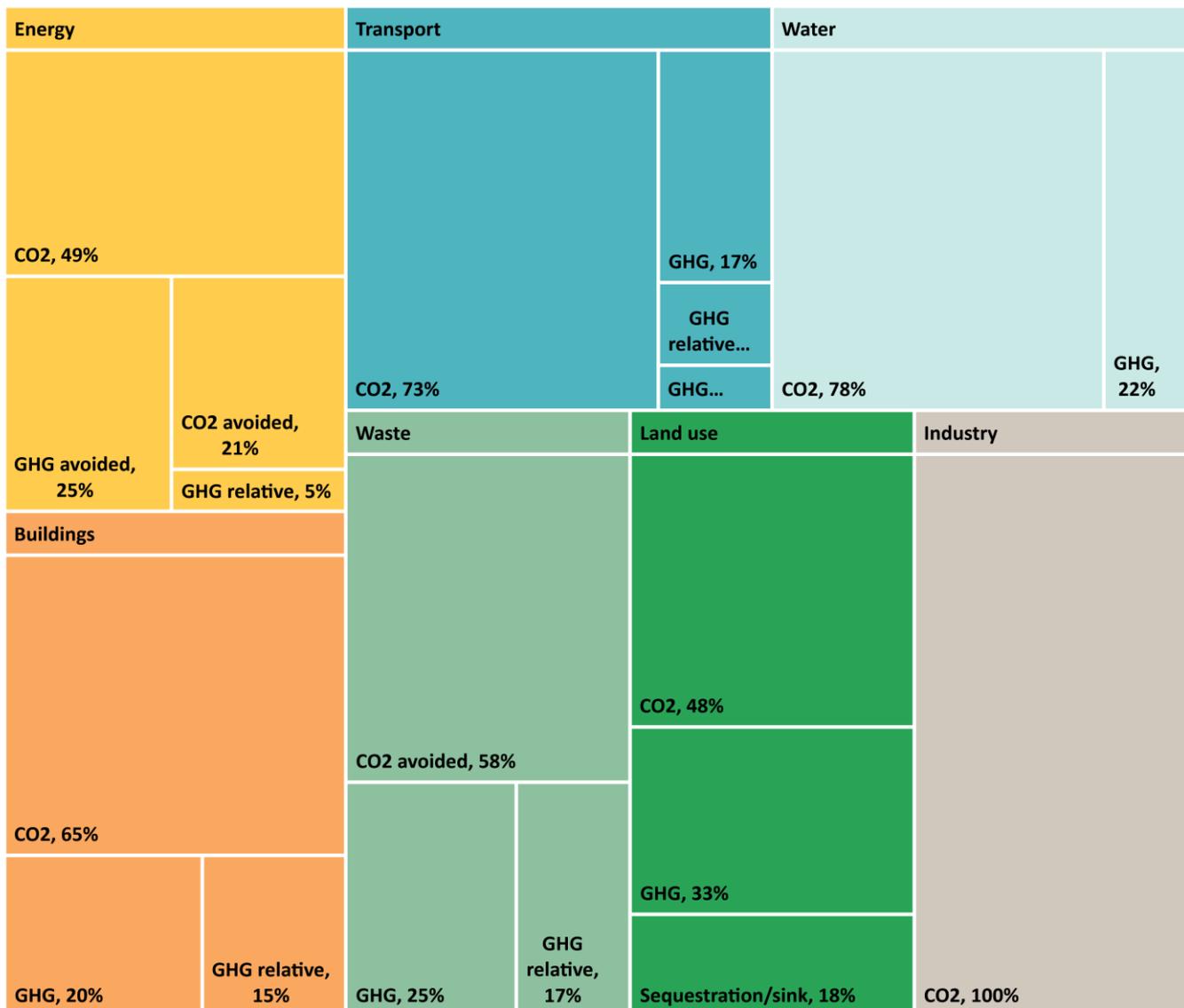
captured or sequestered through sinks, such as forests.

Finally, we looked at GHG metrics describing *annual* emissions, intensity or reductions separately. The table below shows the percentages of each sector’s metrics that represent an indicator on annual terms.

Sector	Incidence of annual GHG reporting
Industry	98%
Transport	55%
Waste	38%
Buildings	23%
Energy	21%
Water	11%
Land use	0%

GHG and CO₂ metrics vary across industries

■ Energy ■ Buildings ■ Transport ■ Water ■ Waste ■ Land use ■ Industry



In addition to GHG-related metrics, we reviewed reporting to understand which metrics issuers are used most frequently to report on projects. We recorded the metrics in each issuer's latest dated impact report in a standardised way. We then grouped these into categories that essentially represent a similar type of impact in terms of e.g. energy saving or pollutant reductions. The results of the top five most frequently used metrics categories for each sector are presented in a tree-map graph for each section.

Energy

The largest category of metrics in the energy sector relates to measuring **reductions in greenhouse gases**.

The second category relates to measuring **added generation capacity** as a result of green bond financing. To identify the total number of occurrences, we used "capacity" as the key search term and coupled it with the words "added", "increased" and "total".

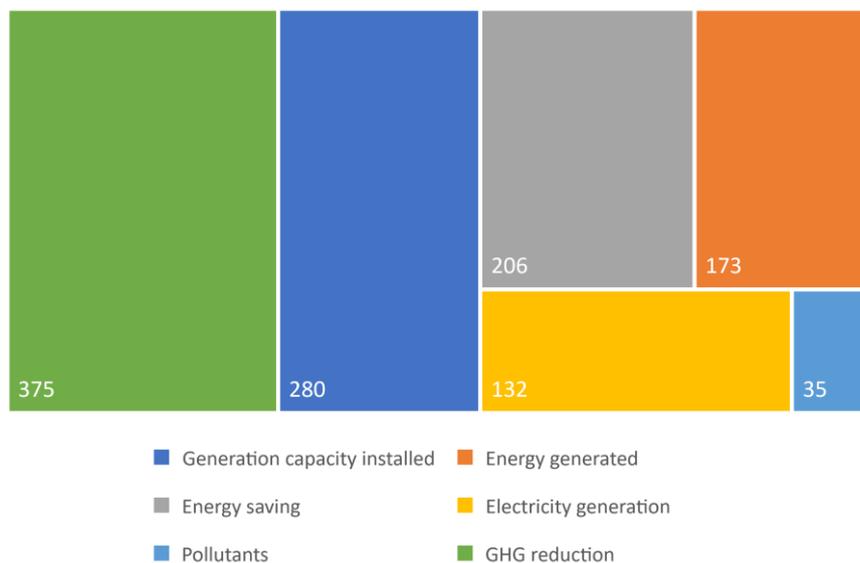
The third category relates to **energy generation**. Here we searched for terms including "output", "generation / generated" and "produced".

Issuers also frequently report on energy savings. Often there does not seem to be a distinction between energy savings, energy reduction and avoided energy use. The existing frameworks each have a slightly different approach to quantifying savings. The IFI Harmonized Framework highlights only "energy savings" as a key reporting indicator, whereas the Nordic Public Sector Issuers Position Paper calls for additional granularity by disaggregating energy saved, reduced and avoided. The argument put forth is that reduced energy use results from an absolute reduction in operative use, whereas avoided energy use indicates comparison to a reference scenario or baseline. Savings, then, can refer to the amount reduced or avoided, or the sum of these.

The Position Paper therefore recommends distinguishing between the two when energy savings are disclosed. Based on our observations, this approach is currently too complex for most issuers. Therefore, to examine how prevalent the use of energy savings metrics is, we grouped all three search terms together.

The remaining two categories in energy sector impact metrics refer to electricity generation and a reduction in ambient air pollutants. The former follows a similar logic to the broader energy generation category. For the latter, we included common terms representing air quality indicators, such as "PM 10 or 2.5" for particulate matter, "NO_x", "NO₂", "SO₂", "TCE", "dust" and "ash". Particle

Energy Sector Metrics



reductions often relate to replacing fossil-fuel based energy production with renewable sources, calculated either based on average grid emissions (for example in a country or a region), or at individual asset level.

An example of the latter is **Jefferson County**, whose green bond financed the retrofitting of a coal-fired power plant to a biomass-powered one.³⁵

Best practice:

Lietuvos Energija

This Lithuanian energy company issued a EUR300m green bond in July 2017. The company produced a separate impact report, in which it was explained that proceeds of the bond were used to finance renewable energy and energy efficiency in the sector, as well as some pollution control projects.³²

The issuer opted to quantify energy generation capacity and energy savings, as well as CO₂ reductions.

It incorporated the suggested core indicators of both the IFI Harmonized Framework and the Position Paper.

The report distinguishes between expected and actual greenhouse gas (GHG) savings.

Best practice

China Datang Renewables Energy

China Datang Renewable Energy disclosed use of proceeds and climate impact information in its annual bond report. Although the issuer did not release a separate green bond report, the information is detailed.³³

The metrics used to calculate the climate impact of four wind farms that had been financed include tons of coal equivalent reduced and tons of NO_x emission avoided.

The company used guidelines issued by local regulators to calculate the impacts, including "Methods and Parameters for Economic Evaluation of Construction Projects" (Third Edition) and "Methods for Compiling the Feasibility Study Report of Offshore Wind Farm Projects (Trial)" released by the NDRC and the Ministry of Housing and Urban-Rural Development.

Transport

As with energy, emission reductions dominate impact reporting in the transportation sector. The second most common group of metrics are those associated with energy savings.

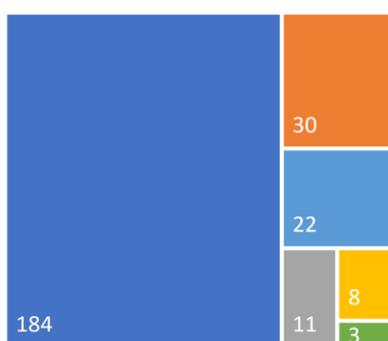
The rest of the top five categories are more specific to transport. Several reports included measurement of the number of vehicles (buses or trains) purchased with green bond funds – thus taking personal vehicles off the road – as well as the length of rail tracks whose construction was supported by green financing.

For example, **Republic of Poland**, the first sovereign issuer of a green bond, reported on the length of railway lines improved in kilometres and the number of railroad crossings improved.³⁶

Air quality is a key aspect to measure for transport projects, particularly where personal vehicles (which mostly still have internal combustion engines) are replaced with less polluting options and/or public transport options. It is also a core reporting indicator for transportation projects in the IFI Harmonized Framework.

Finally, electricity generation is a relevant metric for several low-carbon transport projects. **NRW Bank**, the development bank of North Rhine-Westphalia (Germany), used its green bond proceeds partly on the construction of a solar PV carport structure.³⁷ It includes 10 parking spaces and four charging stations, and the associated photovoltaic facility is expected to produce 34 MWh of electricity per year.

Transport Sector Metrics



- GHG reduction
- Energy saving
- Number of vehicles
- Length of rail tracks
- Air quality
- Electricity generation

Best practice

National Australia Bank

NAB issued its second Certified Climate Bond in March 2017. It opted to report on the numbers of trains that their 2017 green bond was partially used to finance. These are disaggregated to the level of individual projects.

Interestingly, the issuer did not disclose any associated CO₂ savings from the low-carbon transport projects. Instead, it is noted that: *“assumptions to estimate passenger numbers were not sufficiently robust for this calculation of avoided GHG emissions.”*³⁸

We consider this best practice with regards to transparency in impact reporting, as it avoids disclosing misleading results to stakeholders. NAB also obtained external verification of impact data from DNV GL.

Best practice

SNCF Reseau

This French state-owned railway operator issued its first green bond in October 2016.³⁹ The impact methodology employed has been assured by KPMG. SNCF has also sought out additional validation for its impact assessment from a specialist consulting firm called Carbone 4.

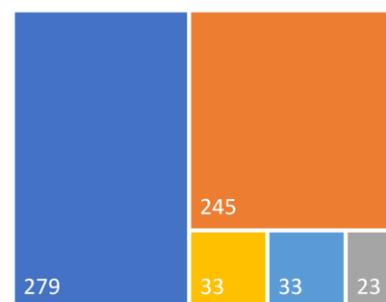
SNCF’s report is extensive and incorporates the broader context. An interesting section is titled “The climate benefits of rail in the fight against climate change”. This helps the reader to better understand the scale of the impact results that follow.

The reporting discloses the total CO₂ impact of the projects spread over the assets’ lifetime (determined to be 40 years). Based on two pillars (carbon avoided and carbon footprint), SNCF has developed a methodology to account for the carbon footprint of *each* project per dollar spent.

The disclosure of “years to carbon neutrality” is another interesting feature and shows a novel way of accounting for impact.

For the part of the bond, the length of railway lines improved was disclosed.

Buildings Sector Metrics



- GHG reduction
- Energy saving
- Waste & materials recycled
- Water saving
- Energy intensity

Buildings

Metrics for low-carbon buildings are dominated by the quantification of GHG emission reductions, closely followed by energy savings. For energy, we grouped together absolute savings and intensity measures. Reduced, avoided and saved energy are considered energy savings for the buildings sector as well.

A noteworthy aspect in this sector is that issuers frequently report intensity metrics. Although this is an industry convention, it is arguably less helpful in understanding the impact of green financing than, say, quantifying energy or CO₂ reductions.

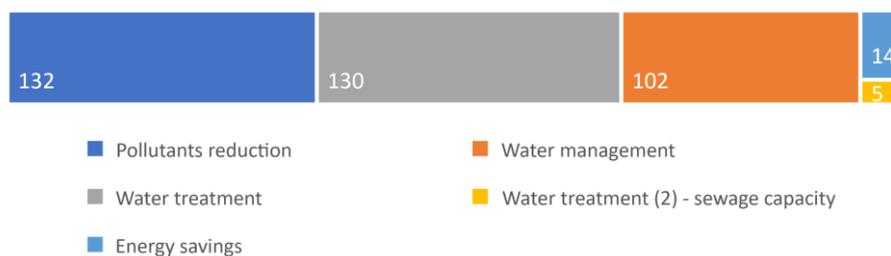
When using intensity figures to demonstrate impact, it is helpful to compare them to established benchmarks. Where possible, an illustration of improvements over time is very useful.

Veteran green bond issuer, Swedish property company **Vasakronan** has taken this approach. The company has produced graphs that demonstrate improvement in energy and water intensity, and Scope 1 and Scope 2 CO₂ emissions.⁴⁰ However, it has not been made clear if these pertain to the entire portfolio of properties that the company owns or only the buildings that have been financed through green bonds.

The report also presents a list of properties that have received funding through green bonds. This list includes only green building certification levels and (present) energy, water and emissions intensities of the properties with no baseline comparisons, although a reference to the Swedish Building Regulations is made.

Finally, issuers in the buildings sector reported on resource efficiency and waste. To understand the prevalence of indicators related to these, we searched for “waste” and “materials”. This yielded both absolute as well as intensity metrics. The indicators described both the use of materials (e.g. “the use of sustainable materials, %” and “materials used, kg/m²) as well as their disposal (e.g. “dry waste recycled, tonnes” and “materials disposal, %”).

Water Sector Metrics



Best practice

ICADE

French real estate firm ICADE issued a green bond in September 2017. The EUR600m bond was used to finance and re-finance low-carbon commercial properties in France. Projects to make the buildings more efficient included the installation of energy efficient heating, cooling and lighting equipment, roof-mounted solar PV panels, and the integration of electric vehicle charging stations.

This issuer did not use either of the existing frameworks. However, ICADE has created an exceptionally robust methodology that is publicly available on the company’s website.

A specialist consultancy was commissioned to develop the methodology, which relies on local regulatory requirements to define a baseline. In the methodology, a distinction has been made between actual (operational) and expected avoided emissions. These are determined by each building’s occupancy status.⁴¹

The data sources used at each stage of the process have been outlined.

The main quantified impact indicator is avoided CO₂ emissions. Generation capacity and annual energy production for the solar PV installations has also been disclosed.

In addition, the issuer has reported on the average energy savings arising from the energy efficient equipment as a percentage against the pre-determined baseline.

Indicators are reported at bond level.

Water

Impact indicators in the water sector revolve around the treatment and management of water resources and its quality. Issuers most frequently report on pollutant reductions.

Based on an initial screening, we included search terms such as “suspended solid (/SS)”, “pollutant”, “COD”, “BOD”, “TOC” and “TOD”, along with other chemical compounds that are used to monitor water quality, such as phosphates and ammonium/ammonia.

The second most frequently used category captured the quantity of treated water in m³ or population equivalent (PE). Some reports, such as those from **SPD Bank** and **Harbin Bank** in China, measured this on an absolute basis.

In others, the measurement was done on a time-period basis: for instance, the **National Bank of Abu Dhabi**⁴² and **Beijing Enterprises Water Group**⁴³ quantified water treatment on a per-day basis, and **MuniFin** on an annual basis.

The final two groupings of metrics are associated with energy savings and sewage capacity. Sewage capacity captures both the amount of sludge treated (in tonnes) as well as occasionally the length of new sewage network / tunnels built (in km). Energy savings are typically associated with making the water treatment facilities themselves more energy-efficient.

However, examples where energy is saved through other means include for instance **Nordic Investment Bank**.⁴⁴ NIB measured the amount of energy recovered from wastewater sludge via anaerobic digestion.

Best practice

DC Water

District of Columbia Water and Sewer Authority (DC Water) provides drinking water and wastewater services to the District of Columbia and some of its surrounding municipalities.

The US Muni is a four-time green bonds issuer. Its impact report outlines the features of the DC Clean Rivers Project, in which the green bond funds have been invested.⁴⁵

The project consists of sewage infrastructure improvements to control sewer overflow discharges into waterways in the area, which adversely affect water quality. Additionally, funds have been used to provide flood relief and mitigation.

The report does not utilise an existing reporting framework. Nevertheless, it succeeds in providing clarity around the project, its features and location, as well as three main environmental and social KPIs (water quality, climate resilience and quality of life). Key metrics are provided for each KPI.

Data sources and a brief explanation of the sampling methodology to test water quality have been provided.

The issuer has also calculated a pre-project baseline and expected post-project results, as well as quantifying the percentage reduction in water pollutants.

The data on water quality has been normalised using (actual) average rainfall, a practice that is in fact aligned with a recommendation in the Nordic Public Sector Issuers Position Paper on Impact Reporting.

Waste

Reporting for bonds financing projects in the waste sector focuses on waste processing, energy production, the reduction of waste and GHG emissions, and water pollutants. The main category of waste processing included a variety of metrics. Based on our review of issuers' impact reports, the indicators were mainly focused on ways to improve the efficiency of waste processing.

Specific search terms in this category included (waste) "processing / processed", "collection / collected", "recycling / recycled", "sorting / sorted", "(sustainable) disposal / disposed" and "diversion / diverted". We also searched for "capacity added" as several reports had used this as an indicator of waste processing improvements. Finally, an indicator only reported by the **World Bank** was the number of landfill sites closed, which was incorporated into this category.

To understand the disclosure of greenhouse gas emission reductions, we took the same approach as with other sectors. "CO₂(e)", "GHG" and "greenhouse gas" were all included in this category.

Methane is an extremely potent greenhouse gas that is closely associated with the waste sector, especially landfills, as decomposing waste generates methane emissions. We therefore included it in the GHG category. However, interestingly only one report from the **California Pollution Control Finance Authority** included methane as a separate indicator.⁴⁶

Best practice

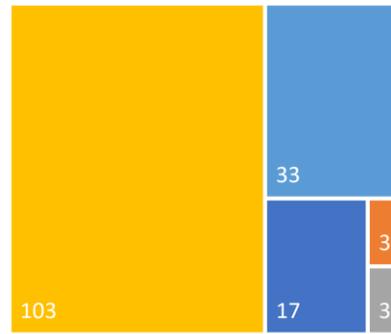
KBN

Kommunalbanken Norway (KBN) is a 13-time green bond issuer with four bonds currently outstanding. In their most recent Environmental Impact Report they describe the financed projects, which include 10 in waste management.⁴⁷

KBN has adopted the Nordic Public Sector Issuers Position Paper methodology throughout the report and all data is *ex-ante* (expected).

Although only one indicator for waste is disclosed (increased waste management capacity in tonnes), it is applied consistently across all projects. The report is also very clear and visually appealing.

Waste Sector Metrics



- Energy production
- Water pollutants
- Waste reduction
- Waste processing
- GHG reduction

Some reports quantified energy production from waste-to-energy facilities. Here, energy and electricity are included under the same umbrella as they seemed to be used interchangeably in reporting. Search terms were similar as under this metric category in the energy sector.

Waste reduction metrics focused on minimising waste. We searched for terms such as "avoided" and "reduction / reduced". These were present significantly less than metrics associated with improvements in waste processing.

Finally, a few bonds' proceeds were partially used in processing industrial waste, for example from the Brazilian pulp and paper company **Suzano Papel e Celulose**.⁴⁸ These types of projects would include metrics in what we called the "water pollutants" category, measuring, say, chemical/liquid oxygen use and the amount of effluent treated.

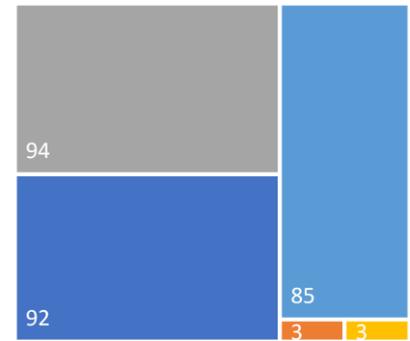
Industry

Issuers whose bonds finance projects in the industry sector reported mostly on energy, greenhouse gases, air pollution and water. The most common category of metrics relates to energy savings, reported either in absolute or annual terms.

A rare metric in the industry sector is energy generation. Only Brazilian paper company **Klabin**⁴⁹ reported on this and disclosed increased power generation figures in one of their factories. This metric is not included in energy savings.

For detail on GHG reductions, the second-largest category, please see pp. 19-20.

Industry Sector Metrics



- GHG reduction
- Gaseous pollutants
- Energy savings
- Water savings
- Water quality

The remaining three categories relate to air pollutants and water savings and quality. Air pollutants included NO_x, SO₂ and particulate matter (PM) in general. Water savings were reported in absolute terms in m³. The water quality metrics identified in the reports included a generic term for "water quality" as well as the industrial solvent TCE.

Best practice

World Bank

The World Bank has issued USD12.6bn worth of green bonds in the last 11 years. It was one of the IFIs involved in developing the IFI Harmonized Framework in 2015 and its iterations thereafter. The Bank's impact reporting is comprehensive and, as expected, follows the IFI methodology.⁵⁰

The Bank has financed several projects in the industry sector, including direct energy efficiency programmes in industrial companies. It has also established an intermediary loan scheme for medium and large-sized Chinese manufacturing companies to implement energy efficiency initiatives. The locations, details and main climate benefits of each project are disclosed.

The key quantifiable benefits for these projects include emissions avoided on an annual basis in CO₂e, and yearly energy savings in tonnes of oil equivalent.

Agriculture, land use and forestry

The agriculture, land use and forestry sectors are dominated by three categories of metrics. The first and largest of these covers projects where areas are protected or restored.

Based on our screening of issuers' reports, we searched for forest/area coupled with the words "renewable", "protect/ion/ed", "conserv/ation/ed", "restor/ation/ed", "certified", "rebuilt", "reforested" and "managed (sustainably)".

An additional metric included in this category is "new green spaces", which was used in impact reporting only by the **City of Paris**.⁵¹ This metric referred specifically to the development of green spaces in cities as a mechanism of climate change adaptation by way of reducing the heat island effect.

Another example of metrics in practice was in the **World Bank's** impact reporting. The issuer measured the size of rebuilt irrigation areas in disaster-affected areas, which was linked to qualitative improvements in crop productivity and resilience outcomes. All the metrics in the "area protected / restored" category were measured either in hectares or percentages.

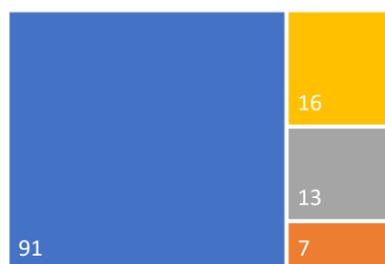
The CO₂ category of impact metrics is slightly different for issuers in the agriculture, land use and forestry sectors. The second-largest category of metrics was water saving. We searched for this in a straightforward manner, including only "water saved" and "conserved". These metrics were disclosed in the units of m³, tonnes/day or gallons.

An additional metric used only by the **World Bank** related to water quality. It described the reduced pollution and nutrient load of waterways (in tonnes/year) as a result of a livestock and crop production waste management project in China.

The main indicators relate to emissions avoided through carbon capture and sequestration. The latter is especially relevant in forestry, where the assets act as long-term carbon sinks. The carbon captured and/or sequestered tends to be measured in (mega/kilo) tonnes.

Emissions avoided is a more generic category and is used in several reports across sectors.

Agriculture/Land Use/Forestry Sector Metrics



- Area protected / restored
- CO2 sequestered / captured
- CO2 emissions avoided
- Water saving

Best practice

Sveaskog

This corporate issuer provides an excellent example of industry-specific methodology development.

It demonstrates in practice the issuer learning curve related to impact reporting. Sveaskog issued its first green bond in March 2016 but no reporting was disclosed. However, by the time of its second issuance in September 2017, the company had updated its Green Bond Framework. In March 2018, Sveaskog published the first impact report relating to the second bond.

The report lays out the forestry industry's role in climate change mitigation and explains the key factors in sustainable forest management.

The projects on which green bond funding has been spent are classified by activity area: R&D and acquisition of forest assets. Sustainable forest management activities are classified geographically by market area.

The methodology for the report is outlined clearly in an Annex. Calculation formulas are provided, and academic sources are quoted for the reference values used. Key environmental benefits based on these are disclosed on a project-by-project basis.

Adaptation Sector Metrics



- Restoration
- Area protected (from floods)
- CO2 emissions avoided

Adaptation

Adaptation comprises adaptation and resilience projects. Institutions that have raised funding for these types of projects are mostly development banks (e.g. **IFC**, **World Bank**) and commercial banks (e.g. **Harbin Bank**, **Bank of Luoyang** in China). Climate Bonds has convened an Adaptation and Resilience Expert Group to further the discussion and development of good practice across sectors.⁵³

Metrics that we found in this sector relate mostly to post-disaster restoration and rehabilitation. Flood protection is also a key issue. CO₂ metrics are less prevalent, but we expect these to become more common as investment into adaptation increases and reporting practices develop.

To identify projects, we used the following terms: "restoration/restored", "rehabilitation/rehabilitated" and "rebuilt". One such project involved restoring 152km of transmission lines to "disaster-resistant" standards in the Dominican Republic (**World Bank**). As part of the same project, 252MW of damaged hydropower facilities were rebuilt.

Flood protected areas were typically measured in hectares. However, **Bank of Luoyang** disclosed a metric that showed the reduction of flow rate as a result of installing a flood barrier.

Finally, **IFC** standardised the reporting indicators across all investment project categories. An example of an adaptation project involves renewable energy in Mozambique, which offers dual mitigation-adaptation benefits and underscores how closely related the two issues are:

*"Given expectations of more severe droughts and floods in the future, the Mocuba Solar project aligns closely with objectives set out by the Mozambican government Strategy for New and Renewable Energy Development primarily aimed at accelerating rural electrification and diversifying the country's energy generation portfolio away from hydropower."*⁵²

Conclusions and best practice recommendations for impact reporting

This year's research explored impact reporting in more detail, with a focus on the frameworks and metrics used by issuers. We found that greenhouse gas (GHG) emissions reductions are widely reported, issuers also use a range of other metrics and frameworks. This makes comparing environmental impact across bonds and issuers challenging even in a single sector. Encouragingly, most issuers report actual or measured data.



Key findings on impact reporting

More than three quarters of issuers provide some form of impact reporting.

However, there is little uniformity: more than 200 metrics are being reported.

Only 15% of reporting is produced in accordance with an established impact reporting framework: we considered the IFI Harmonized Framework or the Nordic Public Sector Issuers Position Paper.

Several issuers have developed sophisticated methodologies to measure impact that are specific to the industry or geographical context. Others have used calculation methodologies developed by other initiatives, such as the UNFCCC's Clean Development Mechanism or the Natural Capital Protocol.

The variety in reporting extends also to frequency and format. Issuers publish anywhere between a one-off report to quarterly reporting. Most reports are separate documents, but information is also available through dedicated webpages, annual reports, newsletters and investor presentations.

Most issuers report at programme level rather than at bond or project-level.

GHG and CO₂ metrics are most commonly reported. This applies across sectors and is typically reported as emissions reductions as a result of green bond funding. In the

land use sector, this is mostly measured as CO₂ sequestered or captured. GHG reductions are most often measured on an annual basis in the industry and transport sectors (over 50% of metrics).

Other common measured aspects include energy savings, energy generation capacity, water or waste treatment capacity and air pollutant reductions.

The buildings sector is the only one in which measuring intensities is more common than measuring absolute / relative reductions of, for example, GHGs, energy, water and waste.

Most of the data used for reporting is actual or measured data. A quarter of issuers reported either estimated data or both actual and estimated data.



Good reporting practice

According to ICMA, only half of investors currently find all the information they need in impact reports. In accordance with findings from this research, we summarise the key aspects that could improve the usefulness of impact reporting to interested parties and stakeholders.

1. **Format:** As with use-of-proceeds, impact reporting should, where possible, be made publicly available through a dedicated webpage. It is helpful for the reporting format to remain consistent over time. Ideally, information should be contained in one (separate) document. Visual representations of data and executive summaries are also helpful in understanding impacts.
2. **Frequency and duration:** Depending on the dynamism of an issuer's portfolio, it is beneficial for reporting to happen at regular intervals. The anticipated interval should be stated clearly in the first post-issuance report, and any changes to this should be made clear in subsequent reports.

For non-dynamic portfolios and/or refinancing projects, this can mean a one-off report with subsequent confirmations of status quo.

Where portfolios are dynamic, it would be helpful for issuers to report annually. Reporting for as long as any funds are outstanding is useful.

Where possible, issuers can attempt to incorporate project lifetime perspectives to reports.

3. **Reporting level:** Where possible, it is useful to report at the project level to provide granular information. If there are commercial or confidentiality considerations at play, portfolio-level reporting is a good approach. It is most helpful when issuers provide project-level reporting with bond / portfolio and programme-level summaries.

For portfolio reporting, issuers should provide sub-portfolio summaries by asset type, e.g. segment reporting for renewable energy versus say transport, so readers can draw conclusions at least at sector level.

4. **Methodology and assumptions:** Context permitting, it can be beneficial to adopt an existing framework or work with experts to develop an individual methodology. Regardless of the methods used, the calculations and assumptions should be disclosed as clearly as possible.

5. **Data:** Whether using expected or actual data, it is helpful where issuers make the distinction between these at project/asset level. Consistency in using one or the other or a set combination is preferable.
6. **Metrics:** Issuers can choose the metrics that are most relevant for them. The selection of metrics should be justified based on the projects or portfolios, as well as the availability of data. Attempting to quantify reductions in relation to an established benchmark or industry/company-specific baseline is best practice.
7. **Verification:** External verification can be very beneficial in adding a layer of transparency and credibility to impact reporting. Issuers should make sure that the verifier's engagement specifically covers impact data and methods. Where possible, the verifier should disclose details on their process of verification instead of providing a single statement of compliance.

The harmonisation of frameworks and impact metrics can make reports an even more valuable tool for investors, fostering confidence in the 'greenness' of investments and facilitating scale in green bond markets around the world.

Appendix 1: Climate Bonds Taxonomy



Climate Bonds Taxonomy

The Climate Bonds Taxonomy identifies the assets and projects needed to deliver a low carbon economy and gives GHG emissions screening criteria consistent with the 2-degree global warming target set by the COP 21 Paris Agreement. More information is available at <https://standard.climatebonds.net/taxonomy>.

ENERGY	TRANSPORT	WATER	BUILDINGS	LAND USE & MARINE RESOURCES	INDUSTRY	WASTE	ICT
Solar	Private transport	Water monitoring	Residential	Agriculture	Cement production	Preparation	Broadband networks
Wind	Public passenger transport	Water storage	Commercial	Commercial Forestry	Steel, iron & aluminium production	Reuse	Telecommuting software and service
Geothermal	Freight rail	Water treatment	Products & systems for efficiency	Ecosystem conservation & restoration	Glass production	Recycling	Data hubs
Bioenergy	Aviation	Water distribution	Urban development	Fisheries & aquaculture	Chemical production	Biological treatment	Power management
Hydropower	Water-borne	Flood defence		Supply chain management	Fuel production	Waste to energy	
Marine Renewables		Nature-based solutions				Landfill	
Transmission & distribution						Radioactive waste management	
Storage							

Certification Criteria approved
 Criteria under development
 Due to commence

Appendix 2: External reviews

Pre-issuance review	Scope	Providers
Assurance	Positive or negative assurance on compliance with the Green Bond Principles (GBP) or the Green Loan Principles (GLP)	EY, Deloitte, KPMG, etc
Second Party Opinion	Confirm compliance with GBP / GLP. Provide assessment of issuer's green bond framework, analysing the "greenness" of eligible assets	CICERO, Sustainalytics, DNV GL, Vigeo Eiris, ISS-Oekom, etc
Green bond rating	Rating agencies assess the bond's alignment with the Green Bond Principles and the integrity of its green credentials	Moody's, S&P, RAM (Malaysia), R&I (Japan)
Pre-issuance verification	Third party verification confirms that the use of proceeds adheres to the Climate Bonds Standard and sector specific criteria	Approved verifiers under the Climate Bonds Standard
Post-issuance review	Scope	Providers
Assurance or SPO	Assurance of allocation of proceeds to eligible green projects	Audit firms, ESG service providers, scientific experts
Impact report	Reporting that seeks to quantify the climate or environmental impact of a project/asset numerically	As above
Post-issuance verification	Assurance against the Climate Bonds Standard, including allocation of proceeds to eligible green projects and types of green projects	Approved verifiers

Appendix 3: Country ranking by UoP reporting quality score

The following table shows a country ranking for green bonds issued prior to November 2017. The ranking is based on the mean quality score (last column). Note that the reporting percentages refer to reporting on UoP (not on impacts).

Country	Number of bonds	Number of issuers	Amount issued (USDbn)	UoP reporting % (by amount issued)	Mean score (for reporting bonds)
UAE	1	1	0.59	100%	24.0
Lithuania	1	1	0.34	100%	24.0
Mexico	3	2	0.66	92%	23.5
Singapore	2	2	0.57	100%	23.5
Hong Kong	6	1	1.01	100%	23.0
Chile	1	1	0.50	100%	23.0
Italy	8	7	3.58	100%	22.6
Denmark	3	3	1.14	54%	22.5
New Zealand	7	1	1.12	100%	22.0
Austria	2	2	0.99	64%	22.0
Luxembourg	1	1	0.27	100%	22.0
Philippines	1	1	0.23	100%	22.0
Spain	11	3	6.92	99%	21.6
Latvia	3	2	0.14	83%	21.5
Finland	3	1	1.13	100%	21.0
Australia	12	10	3.68	95%	20.8
Morocco	3	3	0.32	53%	20.5
Poland	2	2	0.93	83%	20.0
Colombia	3	3	0.33	35%	20.0
Taiwan	4	4	0.17	100%	20.0
France	98	22	38.72	92%	19.8
Japan	9	6	4.20	100%	19.8
Sweden	75	32	9.48	90%	19.6
UK	7	6	2.33	100%	19.5
Norway	13	9	2.16	93%	19.4
Netherlands	19	6	11.67	69%	19.3
Canada	13	10	5.16	77%	19.3
Brazil	10	8	3.77	95%	19.0
South Korea	5	4	1.55	100%	18.3
Germany	33	9	22.07	94%	18.0
Supranational	193	10	35.84	94%	18.0
USA	203	94	33.12	71%	17.9
China	83	46	40.57	96%	17.4
Argentina	2	2	0.41	49%	17.0
Switzerland	2	2	0.13	41%	16.0
India	23	14	4.98	63%	14.4
Costa Rica	1	1	0.50	100%	14.0
Peru	1	1	0.20	100%	14.0
Ireland	1	1	0.01	0%	N/A
Slovenia	1	1	0.01	0%	N/A
Belgium	1	1	0.05	0%	N/A
Estonia	1	1	0.06	0%	N/A
Vietnam	2	2	0.03	0%	N/A
Malaysia	2	2	0.29	0%	N/A
South Africa	3	3	0.86	0%	N/A

Appendix 4: Suggested metrics for impact reporting

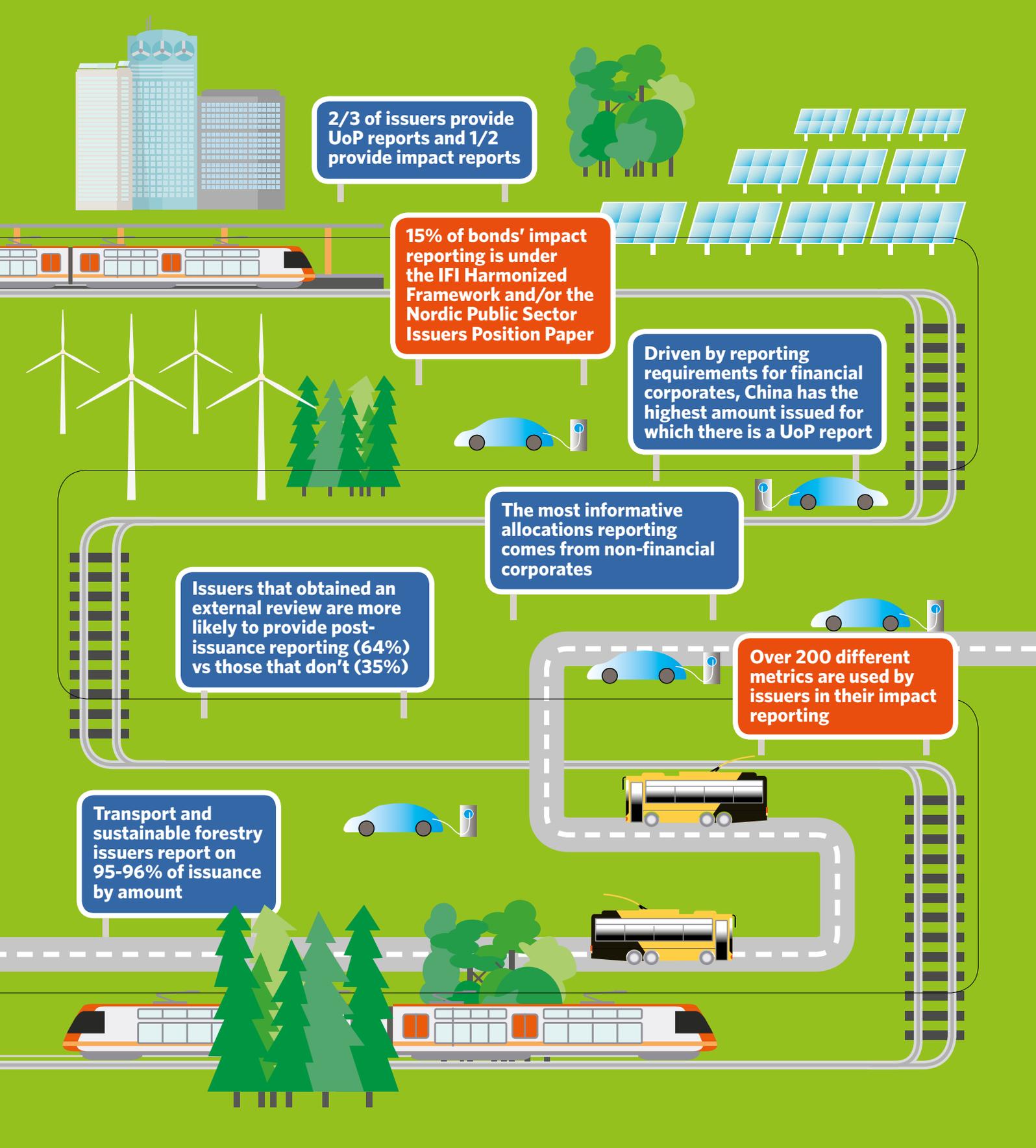
The IFI Harmonized Framework provides suggested reporting metrics for the energy, transport, water/wastewater and waste sectors. The Nordic Position Paper covers these and provides additional suggested reporting metrics for sustainable agriculture/land use and adaptation.

IFI Harmonized Framework	Nordic Public Sector Issuers Position Paper
ENERGY	
<p>Renewable energy</p> <ul style="list-style-type: none"> Annual GHG emissions reduced/avoided in tonnes of CO₂e Annual renewable energy generation in MWh/GWh (electricity) and GJ/TJ (other energy) Renewable energy plant capacity in MW Other Indicators, e.g. capacity of renewable energy plant(s) to be served by transmission systems (MW) Annual gross GHG emissions in tonnes of CO₂e <p>Energy efficiency</p> <ul style="list-style-type: none"> Annual energy savings in MWh/GWh (electricity), GJ/TJ (other) Annual GHG emissions reduced/avoided in tonnes of CO₂e Other Indicators: Annual gross GHG emissions from the project in tonnes of CO₂e 	<p>Renewable energy</p> <ul style="list-style-type: none"> Capacity of energy generation of plant (MW) Annual renewable energy generation in MWh or GWh Annual GHG emissions reduced/avoided, in tonnes of CO₂e <p>Energy efficiency</p> <ul style="list-style-type: none"> Annual energy reduced/avoided in MWh or GWh (electricity) and MWh or GWh (other energy savings) Annual GHG emissions reduced/avoided, in tonnes of CO₂e
TRANSPORT	
<ul style="list-style-type: none"> Passenger-kilometres (i.e. transport of one passenger over one km) and/or passengers; or tonne-kilometres (i.e. transport of one tonne over one km) and/or tonnes GHG emissions reduced/avoided in tCO₂e p.a. Reduction of air pollutants: particulate matter (PM), sulphur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), and non-methane volatile organic compounds (NMVOCs) 	<ul style="list-style-type: none"> Annual GHG emissions reduced/avoided, from cars and other vehicles, due to the investment (by comparison to average emissions by km for alternative transportation) Number of km of new train lines, bicycle lanes etc. created Passenger-kilometres in new means of transportation Estimated reduction in car use, car-km the project will replace Project's effect on increased resilience to climate change
BUILDINGS	
<ul style="list-style-type: none"> N/A (see: energy efficiency) 	<ul style="list-style-type: none"> Avoided kWh/m², or in percentage terms (%) below national building standards Annual energy avoided in MWh or GWh compared to the relevant building code (for new buildings) Annual energy reduced in MWh or GWh compared to the pre-investment situation (for refurbishments) Annual energy production on-site, in MWh or GWh Annual GHG emissions reduced/avoided, in tCO₂e
WATER	
<p>Sustainable water management – use sustainability & efficiency</p> <ul style="list-style-type: none"> Annual water savings: gross water use before and after the project in m³/a, reduction in water use in % Number of people with access to clean drinking water (or water in m³/a supplied for human consumption) through infrastructure supporting sustainable and efficient water use Number of people with access to improved sanitation facilities <p>Wastewater treatment (including sewage sludge)</p> <ul style="list-style-type: none"> Annual gross amount of wastewater treated, reused or avoided pre and post-project in m³/a and PE/a and as % Annual absolute amount of raw/untreated sewage sludge that is treated and disposed of (tonnes of dry solids p.a. and in %) Annual absolute amount sludge reused (t dry solids and %) 	<ul style="list-style-type: none"> Annual water savings Annual volume of wastewater treated or avoided Capacity of plants being built Number of meters of piping/conduit laid, upgraded, replaced Number of person equivalents of water or wastewater processed (identifying any increase resulting from investment) Reduction of emissions into the local environment (nitrogen and phosphorous, Biochemical Oxygen Demand, etc.) Expected annual amount of electricity, biogas or other energy production, along with avoided CO₂ emissions Health metrics (such as air and water quality) Biological metrics, e.g. biological diversity, wildlife Increased resilience to climate change
WASTE	
<p>Waste management projects – resource efficiency</p> <ul style="list-style-type: none"> Annual waste prevented, minimised, reused or recycled before and after the project in % of total waste and/or in tonnes (absolute) Where applicable, annual GHG emissions captured from waste management before and after the project in tCO₂e 	<ul style="list-style-type: none"> Estimate of the reduction in greenhouse gas emissions avoided as a result of the investment (see Appendix C for a methodology for district heating and waste treatment) Waste that is prevented, minimised, reused or recycled before and after the project in % of total waste and/or in absolute amount in tonnes per year

<p>Energy recovery from waste including waste-to-energy projects</p> <ul style="list-style-type: none"> • Annual energy generation from non-recyclable waste in waste to energy facilities in MWh/GWh (electricity), GJ/TJ (other) • Annual energy recovered from waste (minus any support fuel) in MWh/GWh/KJ of net energy generated • Annual GHG emissions from waste management before and after the project in tCO₂e <p>Pollution control, resource efficiency, recycling and other</p> <ul style="list-style-type: none"> • Annual absolute (gross) amount of waste that is separated and/or collected, and treated (including composted) or disposed of (in tonnes p.a. and in % of total waste) • Raw material per produced unit before and after (kg) • Added monetary value created using waste • Number of people / % of population with access to waste collection; area with improved regular waste collection service • Fractions of waste separated pre- and post-project • Absolute amount or % of non-separated waste pre- and post-project • Number of people or % of population with access to street sweeping; km of street with regular street sweeping service • Number of people or % of population provided with improved municipal waste treatment or disposal service • Number of people benefitting from selective collection of recyclables • Number of informal recyclers integrated into a formal system • Absolute or % reduction in local pollutants (water or air) • Tons of waste reduced • Products changed to increase waste reduction • Tons of secondary raw materials or compost produced 	<ul style="list-style-type: none"> • Annual absolute (gross) amount of waste that is separated and/ or collected and treated (including composted) or disposed of (in tonnes per year. and in % of total waste) • Number of metric tons processed in the facility • Material recovery rate, in % • Expected improvement in material recovery rate or other target for improved resource use • Number of households delivering to the facility • Energy produced (in case of biogas/waste-to-energy plant) • Energy saving attributable to the investment • Project's effect on increased resilience to climate change
LAND USE	
<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Surface area of the land converted (m² or km²) • Area under conservation or preservation • Area under certified land management (ideally with breakdown, FSC, PEFC, Rainforest Alliance) • Monitoring of chemical use • Biological diversity • Air quality • Annual energy savings and/or reduction in greenhouse gas emissions or other emissions (where relevant to project)
ADAPTATION	
<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Resilience-enhancing qualities of a project, preferably documented through quantitative indicators where feasible • Quantitative indicators can be complemented by qualitative descriptions of project characteristics and weather- and climate-related effects

ENDNOTES (for hyperlinks, see online version at <https://www.climatebonds.net/resources/reports>):

1. Southern Power, 2016. 2. Lietuvos Energija, 2017. 3. EDF, 2016. 4. Unibail-Rodamco, 2015. 5. Iberdrola, 2017. 6. King County, 2017. 7. City of St Paul, 2017. 8. Stockholm Läns Landstig, 2017. 9. BNDES, 2017. 10. Icade, 2017. 11. MTR, 2017. 12. City of Norrköping, 2016. 13. Deutsche Kreditbank, 2017. 14. Bank of America, 2016. 15. Treasury Corp Victoria, 2016. 16. ICMA Resource Centre: Impact Reporting, 2019. 17. Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting, 2019. 18. ICMA: Green and Social Bonds: A High-Level Mapping to the Sustainable Development Goals, 2016. 19. Alliander NV, 2016. 20. TenneT Holding B.V., 2015. 21. Wallenstam, 2016. 22. Nordea, 2018. 23. MuniFin, 2018. 24. Boverket, 2019. 25. DWA, 2018. 26. Wuppertal Institute, 2018. 27. Sveaskog, 2018. 28. Kommuninvest, 2017. 29. Bank of China, 2018. 30. Fannie Mae, 2018. 31. National Australia Bank (NAB), 2018. 32. Green Investment Group, 2017. 33. Lietuvos Energija, 2018. 34. China Datang Renewables, 2018. 35. Jefferson County Industrial Development Agency, 2015. 36. Republic of Poland, 2017. 37. NRW Bank, 2019. 38. NAB, 2018. 39. SNCF Réseau, 2017. 40. Vasakronan, 2018. 41. Icade, 2018. 42. National Bank of Abu Dhabi, 2018. 43. Beijing Enterprise Water Group, 2018. 44. Nordic Investment Bank, 2018. 45. District of Columbia Water and Sewer Authority, 2018. 46. California Pollution Control Authority, 2017. 47. Kommunalbanken Norway, 2018. 48. Suzano Papel e Celulose, 2018. 49. Klabin, 2018. 50. World Bank, 2018. 51. City of Paris, 2019. 52. IFC, 2018. 53. See <https://www.climatebonds.net/adaptation-and-resilience>. 54. See <https://www.climatebonds.net/resources/reports>: Post-issuance reporting in the green bond market. The report webpage will provide the list in the related links section.



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