

The Green Bond



Christopher R. Kaminker, PhD
Head of Research, Climate & Sustainable Finance; Senior Advisor, Large Corporates & Financial Institutions
christopher.kaminker@seb.se
[SEB Green Bonds Website](#)

Executive Summary

The green bond market kicked off the New Year with both dynamism and endurance. The market seemed revitalised following a brief holiday, where the momentum generated by a record-breaking November broke through a weaker December to set an annual issuance record of **USD 183 bn**.

January set a periodic market record with **USD 17.2 bn** lifting the market up by 17% YoY. Supranationals were first out of the gates, followed quickly by a torrent of corporates, financials, municipalities and securitisations, with American, Canadian and European issuers all coming to market with benchmarks in USD and EUR. At the time of this writing, the drive had continued into the first week of February, with almost **USD 25 bn** YTD, on a trajectory consistent with our scenarios for 2019 potential (USD 210-240bn).

The first months of 2019 brought the long-awaited arrival of the telecommunications sector to the green bond market, helping corporates to claim **65%** of green bond issuance YTD, up from 53% in 2018 and 47% in 2017.

The bullish view that we hold for prospects this year, as well as in the medium term, applies not just to green bonds but for a wide range of sustainability-themed capital markets solutions. After setting records in 2018 with the emergence of **USD 57 bn+** of **social and sustainability bonds** and **sustainability-linked loans**, the first months of 2019 featured issuance of all types of sustainable debt instruments, taking such issuance (including green bonds) to **USD 31 bn YTD**.

Another development over the course of the last year is the **diversification of financial structures** used by green bond issuers. Most of the market has come in the form senior unsecured (with some secured) bonds, but when inspecting the other types of structures, beyond the increasingly common securitisation and U.S. municipal revenue and general obligations bonds, a microcosm of other structures has emerged.

Hybrids continued to be popular in 2019 with European utilities and SBAB launched the first Swedish green **covered bond** backed by residential mortgages.

16 jurisdictions featured green bond issuance in the first months of the year, compared to 12 in 2018 YoY (and 45 in total during 2018). YTD, activity in the top 4 countries (**U.S., France, Canada and Spain**) were all up by double and triple digits, and **Swedish** issuance surged by over 400% to USD 1.3 bn equiv.

In terms of currencies, **EUR** remained popular in 2018, especially with sovereigns and corporates, although their share fell successively each quarter of the year as issuance picked up in **USD** and **CNY**. However, **EUR** returned with vigour in 1Q19 accounting for over **half of issuance YTD**. CAD, AUD, and SEK also proved popular currencies to target for issuers raising green capital. The Swedish Krona set another record in January with **66% of all (SEK)** bond issuance coming in **green** format. New **Green Bond Relative Value and Pricing Analysis** available via SEB Research Portal.

SEB Climate & Sustainable Finance Review

Guest contributors welcomed in this edition:

CICERO: Preliminary comments on the proposed EU Taxonomy;

Kommuninvest & Nordic Public Sector Issuers: Update to green bonds impact reporting guide;

CDP: Business benefits of setting Science-Based Targets;

S&P Global Ratings: The year of ESG and Sustainable Finance;

SBAB: Sweden's first green covered bond backed with residential mortgages;

SEB's Elizabeth Nørgaard Mathiesen: A new narrative: markets will propel energy revolution

Letter to the Reader

"We are pleased to confirm a strong start to the green bond market in 2019 and even more pleased to say that our own pipelines suggest this momentum is here to stay.

With Green Finance starting to make inroads into the world of mainstream Finance the need to harmonize the market is becoming an urge."

(Continues, pg. 2)

Christopher Flensburg
Head of Climate & Sustainable Finance, SEB



Letter to the Reader (full text):

We are pleased to confirm a strong start to the green bond market in 2019 and even more pleased to say that our own pipelines suggest this momentum is here to stay.

With Green Finance starting to make inroads into the world of mainstream Finance the need to harmonise the market is becoming an urge.

The game plan taken forward by the European Commission with their Technical Expert Group (TEG) is on a good path, with efforts to create clear definitions facing some initial issues but the progress is warmly welcomed!

The foundation seems to be well thought through but the desire to tell right from wrong by defining strict inclusion criteria needs more work. Whenever one is defining borders on behalf of others it segregates rather than includes. The strength of Green Finance (as we know it today) is the inclusive nature which is protected by clear commitments and high transparency.

Following this system it is fairly easy for any stakeholder, whether this being a public entity or an investor, to define the criteria under which they are willing to support the market. It is our recommendation to the TEG to 1) define a clear objective for the Taxonomy, and 2) to look carefully into how the definitions will impact the market before launching it. Since we are a financial institution and not an environmental specialist, we have requested, and with gratitude been permitted, to share CICERO's initial comments on the draft Taxonomy.

In our work across assets one label we often encounter, especially in loans, is Science Based Targets and we have the honour to include an article by CDP (one of the founders) to explain their thoughts around Science Based Targets and thereby give our readers another validation tool.

We also have a comment from S&P on their inclusion of ESG in their ratings reports. We still expect to see much more coming in this direction from the ratings agencies and observe heightened attention from their side. We think this is one of the areas that could fundamentally change the nature of the discourse during 2019/2020.

Enjoy your reading,

Christopher Flensburg

Head of Climate & Sustainable Finance, SEB



Christopher R. Kaminker, PhD
 Head of Research, Climate & Sustainable Finance; Senior Advisor, Large Corporates & Financial Institutions
 SEB

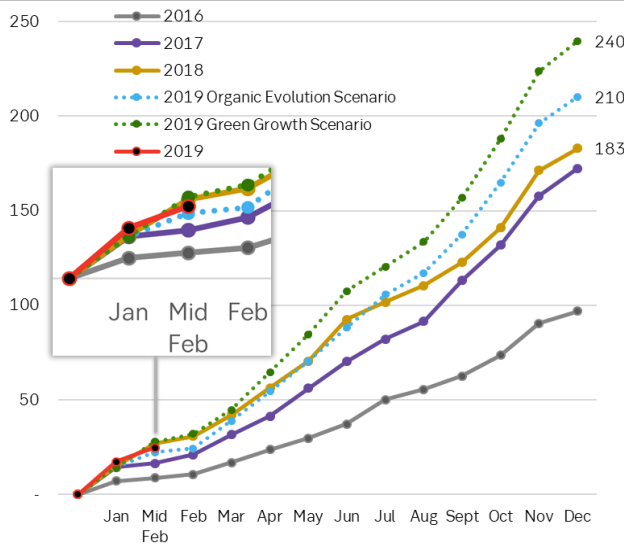
1. Green Bond Market Review and 2019 Outlook

The green bond market kicked off the new year with both dynamism and endurance. The market seemed revitalised following a brief holiday, where the momentum generated by a record-breaking November broke through a weaker December to set an annual issuance record of USD 183 billion (Figure 1). Even though a handful of green bond deals came to market in early 2019 that had been deferred due to severe market turbulence throughout 4Q18, there were multiple instances where green bonds proved themselves as stable and reliable funding tools during bouts of economic and market volatility, especially in October and November. This protective feature will prove valuable in the year ahead as many of the macroeconomic hazards that arose in 2018 – including slowing global economic growth and trade tensions – look set to endure and weigh on global capital markets.

January set a periodic market record with USD 17.2 billion lifting the market up by 17% Year-over-Year (YoY). Supranationals (EBRD) were first out of the gates, followed quickly by a torrent of corporates, municipalities and securitisations, with American, Canadian and European issuers all coming to market with benchmarks in USD and EUR. At the time of this writing, the drive had continued into the first week of February, with almost USD 25 billion of cumulative issuance Year-to-Date (YTD)¹; only slightly below last year's total (which had been boosted by three sovereigns, compared to a single tap from Agence France Trésor this year).

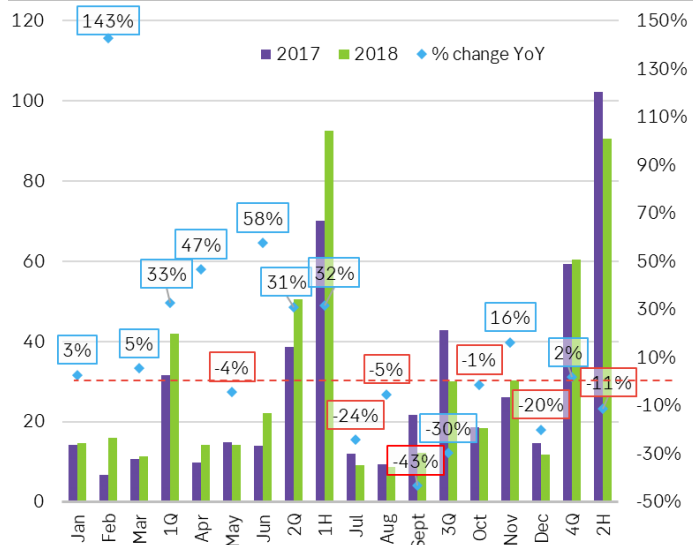
As seen in the detailing of Figure 1, the market's fulcrum also found itself in the middle of our two scenarios for 2019 issuance. Our [December Edition](#) can be referred to for the particulars of these scenarios, but in a nutshell, our reference-case “**Organic Evolution**” scenario sees the green bond market continuing its now familiar quest of organically evolving in response to increasing investor demand across geographies and sectors to reach **USD 210 billion**.

Figure 1. Cumulative annual green bond issuance & scenarios



Source: SEB analysis based on Bloomberg and SEB data

Figure 2. Green bond issuance (USD Bn) and % change YoY



Source: SEB analysis based on Bloomberg and SEB data

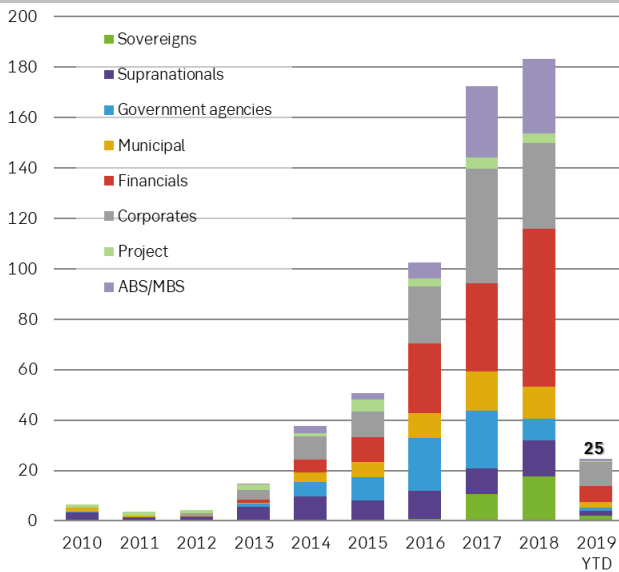
The first months of 2019 brought the long-awaited arrival of the telecommunications sector to the green bond market with Telefónica and Verizon issuing EUR 1 billion and USD 1 billion apiece. The Verizon transaction is an especially positive augur for the U.S. corporate green bond market, which has unparalleled and latent potential. As we wrote last year, we see the potential for issuance to rise significantly in the U.S. in 2019, to at least USD 45 billion, with much stronger contributions from American corporates responding to keen investor demand. As a compelling illustration, one of the largest pension funds in the world (APG) [called on U.S. corporates to increase green bond issuance](#), outlining several recommendations for how they could.

Were corporates in the U.S. and globally to genuinely harness their potential for green financing, it would be aligned with our “**Green Growth**” scenario (USD 240 billion) which employs similar drivers, but with bolder assumptions in terms of the prospective scale of the

¹ Henceforth, YTD will refer to the period of 1 January 2019 – 8 February 2019

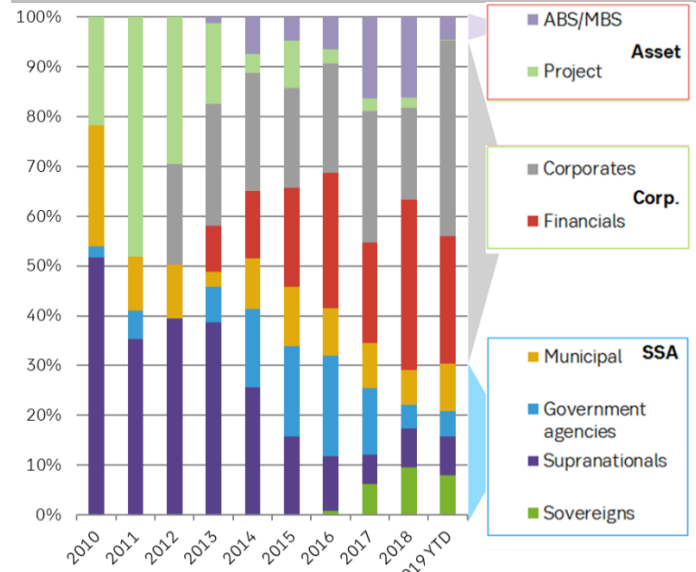
green infrastructure investment pipeline (see for instance the forecasts of BNEF for electric vehicles and renewables in Figures 5 and 6), and more issuers across new sectors and geographies finding deeper pools to fund on their balance sheets. Even though it is still early in the year, as demonstrated by the right-hand side of Figure 4, corporate issuance already accounted for 65% of green bond issuance YTD, up from 53% in 2018 and 47% in 2017.

Figure 3. Green bond market growth (USD Bn) by sector



Source: SEB analysis based on Bloomberg and SEB data.

Figure 4. Sectoral evolution (% share of annual issuance)



Source: SEB analysis based on Bloomberg and SEB data. SSA: Sovereign, sub-sovereign (municipal/regional), Supranational and Agency

We stated one year ago that we expected 2018 to be a year in which the green bond market experiences “healthy consolidation and very modest growth”; with the potential for USD 185 billion of issuance. As shown in Figure 1, the final tally for green bond issuance came in at USD 183 billion in 2018, up 6% YoY (from USD 173bn in 2017). With a more complete dataset, we have taken further stock of the green bond market’s dynamics in 2018. In our end of year report released on 10 December 2018, our database contained USD 163 billion of issuance, which suggested that the market may struggle to reach even the prior year’s volumes, however we also stated that it would likely be revised upwards as it takes time to account for the full volume of green bonds that have come to market. As it turns out, there were still several decent sized trades to be done in December, but it was indeed the elusive green securitisations and project bonds that had been issued throughout the year that accounted for most of the additional volumes to be catalogued by January (see Figures 3 and 4).

There was also a lag in accounting for the full volumes in China and private placements; but it was the securitisations that added the most, with Fannie Mae’s Green MBS published and Obvion’s significant Green STORM RMBS programmes taking the lion’s share, along with other large ABS (e.g., Tesla and Mosaic) and project bonds (e.g., Global Infrastructure Partners).

The bullish view that we hold for prospects this year, as well as in the medium-to-long-term, applies not just to green bonds but for a wide range of sustainability-themed capital markets solutions. It is on account of the unremittingly strengthening risk-return investment proposition, that we have written about extensively in previous edition, that exists for an expanding range of low-carbon and resource-efficient infrastructure projects and activities. It is also due to supportive policy attention, on the upswing in 2019 across large parts of Asia and as a key focus of the European Commission’s sweeping work on sustainable finance.

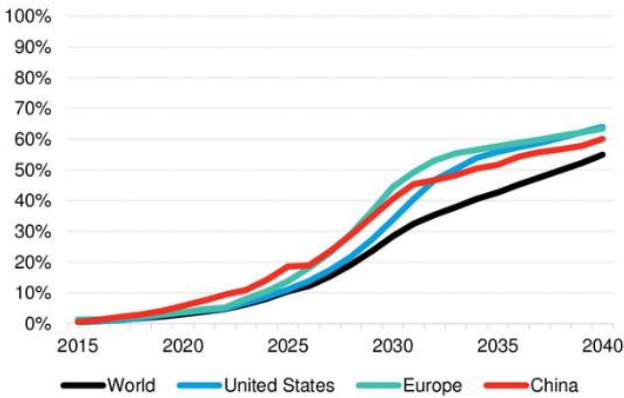
In the U.S., various proposals for a “Green New Deal” (GND) are being articulated. In the first week of February, Congressional Democrats led by Rep. Alexandria Ocasio-Cortez of New York and Senator Edward Markey of Massachusetts released a non-binding Congressional Resolution entitled “Recognizing the duty of the Federal Government to create a Green New Deal”,² calling for a 10-year national mobilisation in which the U.S. would attain net-zero greenhouse gas emissions. The name of the legislation is inspired by President Franklin Roosevelt’s New Deal, a rubric for a massive plan for public works, investment and social

² <https://www.congress.gov/bill/116th-congress/house-resolution/109/text>

reforms launched in 1933 in the midst of the Great Depression. While American policy trajectories remain unclear, it appears that the “Overton Policy Window” for low-carbon and climate-resilient development may be on the move in 2019.

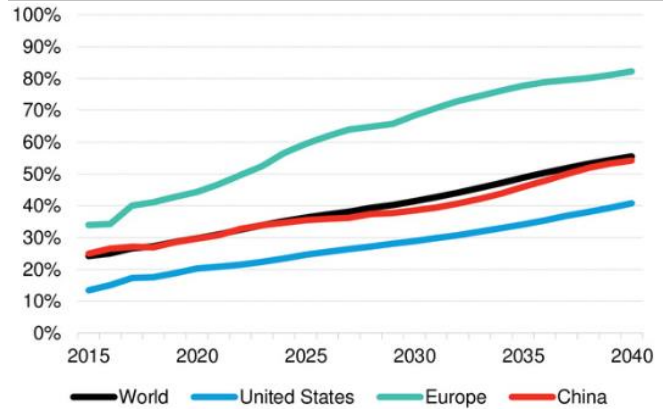
Other types of recent policy moves are more transparent in their potential effects. For instance, the Government in Sweden moved to ban new cars with diesel or petrol engines from being sold after 2030, becoming the 10th country to enact such a concrete phase-out date (although targeting a decade earlier than in France and the U.K.). In Germany, the “Coal Exit Commission” of 28 members from industry, politicians and NGOs agreed to phase out coal-fired power generation by 2038. A review in 2032 will decide if the deadline can be brought forward to 2035. These policy decisions are especially salient when juxtaposed with the projections from BNEF shown in Figures 5 and 6.

Figure 5. Electric Vehicle % of Passenger Vehicles Sales



Source: BloombergNEF2018 EV Outlook

Figure 6. Renewables Share of Total Generation, Forecast

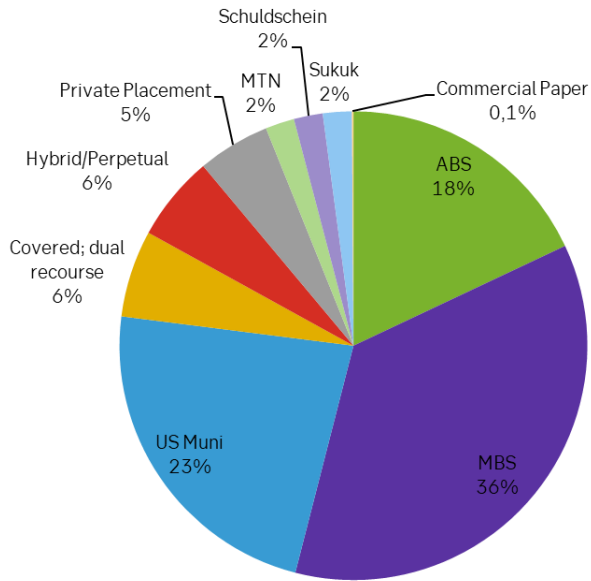


Source: BloombergNEF2018 New Energy Outlook

We see the potential for a further USD 38-45 billion of social and sustainability bonds issued in 2019, latching on to the momentum that pushes forward the green bond market. As shown in Figure 8, these green bond cousins have proliferated, but the most conspicuous development in the chart is the emergence of USD 35.5 billion of sustainability and ESG-linked corporate loans. The first months of 2019 featured issuance of all types of sustainable bonds and loans taking cumulative sustainable debt issuance to USD 31 billion YTD.

Another development over the course of the last year (Figure 7) is the diversification of financial structures used by green bond issuers. Most of the market has come in the form senior unsecured (with some secured) bonds, but when inspecting the other types of structures, beyond the increasingly common securitisation and U.S. municipal revenue and general obligations bonds, a microcosm of other structures has emerged. Hybrids and covered bonds continued to be popular in 2019 with European utilities, with Engie, EDP and Iberdrola all offering green hybrids in the first months of the year, and SBAB launching the first Swedish green covered bond backed by residential mortgages, which SEB was honoured to underwrite.

Figure 7. Beyond Senior Unsecured and Secured: Diverse Green Bond Structures Emerge



Source: SEB analysis based on Bloomberg and SEB data. Note: Excludes senior unsecured and senior secured (except for part of MTN program)

Figure 8. Sustainable Debt Issuance: Green, Social and Sustainability Bonds & Loans (USD Bn)



Source: Bloomberg New Energy Finance data & SEB calculations

From a geographic perspective, 16 jurisdictions³ (excluding Supranationals) featuring green bond issuance in the first months of the year, compared to 12 in 2018 YoY (and 45 in total during 2018).

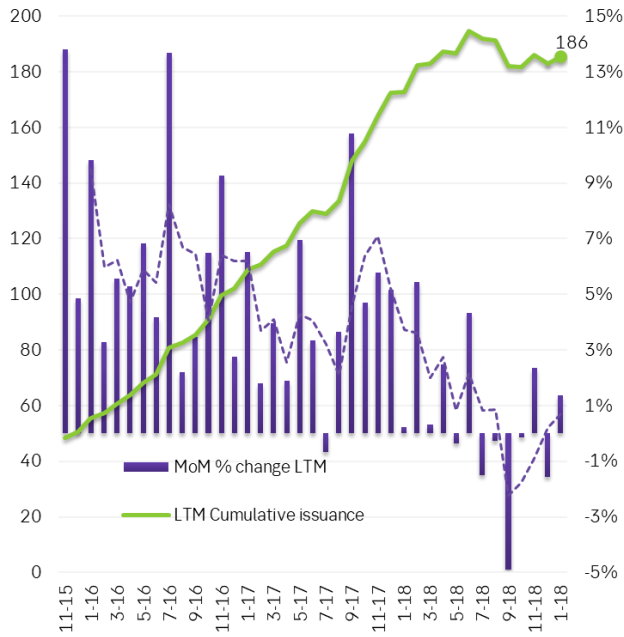
Europe outpaced North America at the beginning of 2018 as the largest region for green bond issuance and continued to pull the gravity of the market away from other regions through to 3Q18, when measured for momentum with a moving Last Twelve Months (LTM) average of green bond issuance shown in Figure 10. However, in 4Q18, European green bond momentum abruptly peaked at USD 80 billion over the trailing year and had fallen by USD 9 billion into the first week of February. While a counterfactual is indefinable, our view was that before the publication of the EU Taxonomy, the work of the European Commission on Sustainable Finance had supported green bond market confidence for both European issuers and investors for most of 2018. Whether concerns around the draft EU Taxonomy, which emerged in early December contributed to a fall in momentum, is unclear and an open question.

At the same time, North American issuance, which had plateaued earlier in the year before falling by USD 14 billion reversed its course markedly in December and rose through January (with a combination of strong American and Canadian issuance), to return to USD 50 billion of trailing annual issuance in January.

Chinese LTM numbers had dropped by almost USD 10 billion from their peak at USD 34 billion before bouncing back to USD 30 billion on the strength of financials resuming their traditional activity in 2H, and Japan continued to boost Asia-ex China issuance to surpass the Nordics.

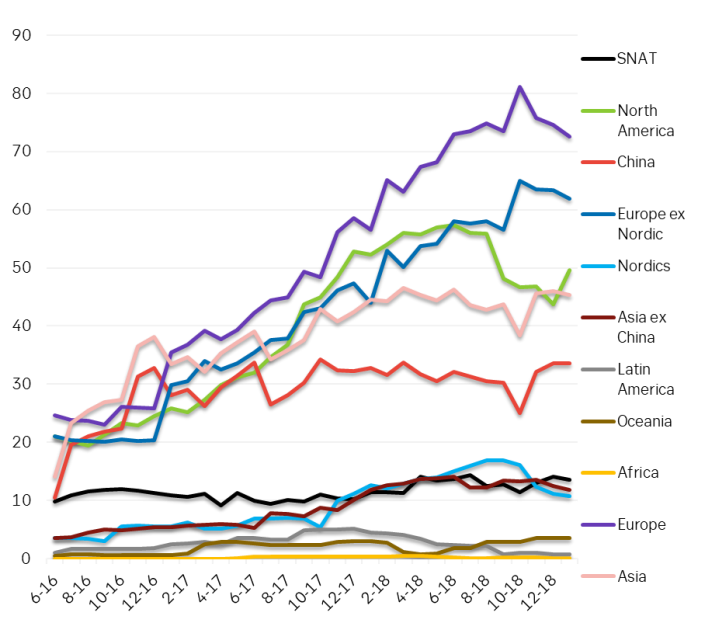
³ Classified by Ultimate Parent Country of Risk.

Figure 9. Green Bond Issuance Last Twelve Months Analysis (USD Bn, LHS) with % change (RHS)



Source: SEB analysis based on Bloomberg and SEB data.

Figure 10. Cumulative Annual Green Bond Issuance with SEB 2019 Scenarios



Source: SEB analysis based on Bloomberg and SEB data.

In terms of country rank (Figure 11) the Top 5 for 2018 shifted from our previous analysis due to more green securitisations being catalogued out of the Netherlands, but otherwise featured the same stalwarts of the U.S., China, France and Supranationals in the same order as in 2017.

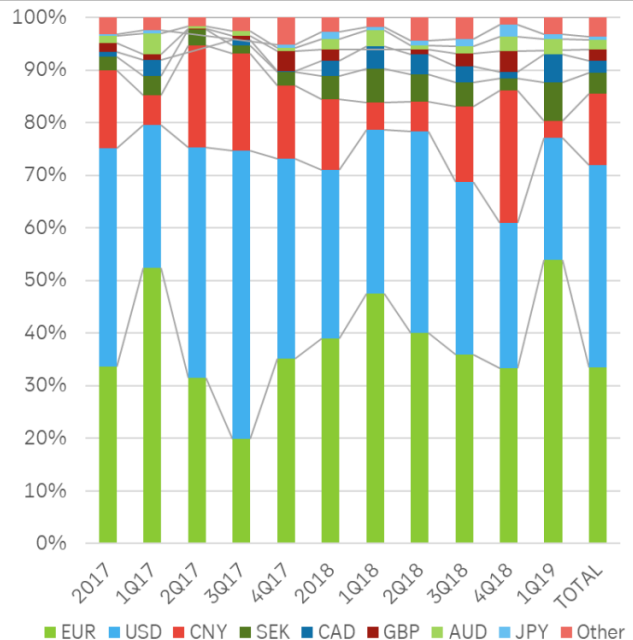
By the first week of February 2019, the order of the ranking looked very different YoY, with the top 4 countries (U.S., France, Canada and Spain) all up by double and triple digits, and Swedish issuance surging by over 400% to USD 1.3 billion. After a robust 2018 with issuance up by almost 40%, supranationals rounded out the fifth place in 2019 but down by -23% YoY.

Figure 11. Top 15 geography by issuance in 2018, incl. Supras

	2018	\$ Bn	Rank Change YoY	Issuance Δ YoY	2019 YTD	\$ Bn	Rank Change YoY	Issuance Δ YoY
1	USA	38.9	=	-14%	USA	7.1	+1	66%
2	CHINA	33.5	=	4%	FRANCE	3.6	+5	173%
3	FRANCE	17.0	=	-14%	CANADA	2.5	+9	216%
4	SUPRANAT.	14.2	+1	39%	SPAIN	2.0	+12	935%
5	NETHERLANDS	13.1	+4	202%	SUPRANAT.	1.9	-1	-23%
6	GERMANY	7.5	-2	-29%	ITALY	1.4	-1	-6%
7	BELGIUM	6.7	NEW	∞	SWEDEN	1.3	+8	412%
8	SWEDEN	6.4	-1	30%	PORTUGAL	1.1	NEW	∞
9	SPAIN	4.8	-2	-9%	CHINA	0.8	+2	-10%
10	CANADA	4.8	+2	39%	PHILIPPINES	0.6	NEW	∞
11	JAPAN	4.7	+6	109%	NETHERLANDS	0.6	-8	-81%
12	UK	3.7	+4	62%	GERMANY	0.6	-2	-51%
13	NORWAY	3.5	+9	428%	SOUTH KOREA	0.5	NEW	∞
14	IRELAND	3.5	NEW	∞	SWITZERLAND	0.2	NEW	∞
15	AUSTRALIA	3.3	=	14%	HONG KONG	0.2	-2	-73%

Source: SEB analysis based on Bloomberg and SEB data. SUPRANAT.: Supranational

Figure 12. Currency distribution of green bond issuance



Source: SEB analysis based on Bloomberg and SEB data

In January, SEB was honored to work with the Nordic Investment Bank to its first [Nordic-Baltic Blue Bond](#). The five-year SEK 2 billion bond was launched under the NIB Environmental Bond Framework and will focus on investments within water resource management and protection for

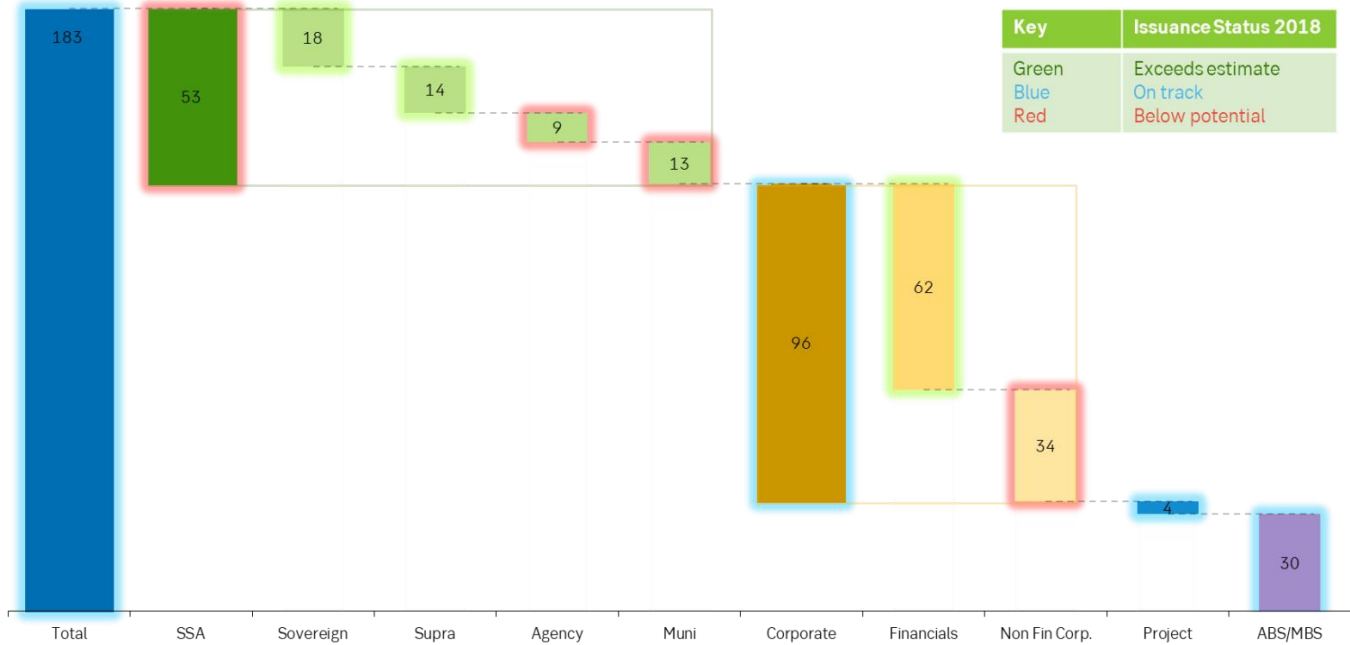
The Green Bond 1Q 2019 (1)

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a region rich in water resources, but where human activity and new types of pollution are putting increasing pressure on water environments. The Baltic Sea has particularly been affected by eutrophication due to the high levels of nitrogen and phosphorus discharge that result in excessive plant and algae growth.

In terms of currencies (Figure 12) EUR remained popular in 2018, especially with sovereigns and corporates, although their share fell successively each quarter of the year as issuance picked up in USD and CNY. However, EUR returned with vigour in 1Q19 accounting for over half of issuance YTD. CAD, AUD, and SEK also proved popular currencies to target for issuers raising green capital in 2018. Sweden set another record in January with 66% of all Swedish Krona (SEK) bond issuance coming in green format, up from an adjusted 10% throughout 2018.

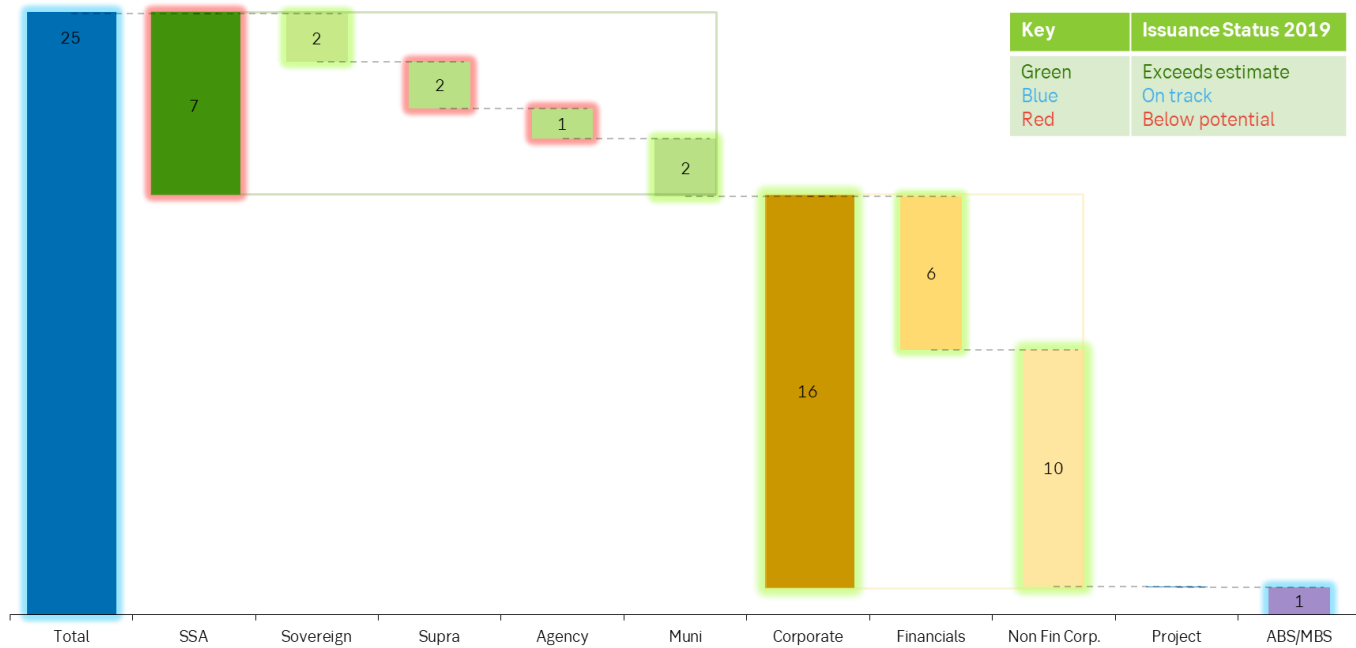
Figure 13. Green bond issuance in 2018 by sector and sub-sector (USD Billion)



Notes: ABS/MBS = Asset Backed Securities/Mortgage Backed Securities; SSA = Sovereign, Supranational, Agency and Municipal, Regional and other sub-sovereign; Financials include Real Estate and Insurance; N-F Corp. = Non-Financial Corporates. SEB uses the BICS sector classification system with some adjustments using Bloomberg/MSCI green bond sector classifications. Bloomberg (see Guide to Green Bonds on the Bloomberg Terminal) methodologies used to qualify green bonds, including Schuldscheine and private placements, and excluding pure plays.

Source: SEB analysis based on Bloomberg/BNEF and SEB data.

Figure 14. Green bond issuance in 2019 by sector and sub-sector (USD Billion)



Notes: ABS/MBS = Asset Backed Securities/Mortgage Backed Securities; SSA = Sovereign, Supranational, Agency and Municipal, Regional and other sub-sovereign; Financials include Real Estate and Insurance; N-F Corp. = Non-Financial Corporates. SEB uses the BICS sector classification system with some adjustments using Bloomberg/MSCI green bond sector classifications. Bloomberg (see Guide to Green Bonds on the Bloomberg Terminal) methodologies used to qualify green bonds, including Schuldscheine and private placements, and excluding pure plays.

Source: SEB analysis based on Bloomberg/BNEF and SEB data.

2. Prospective publicly announced green, social & sustainability bond pipeline⁴

- Access Bank
- Banco Nacion Argentina
- Bank Australia
- Baseload Capital
- Contact Energy
- Ence Energia
- FS Italiane
- Government of Navarre
- Gussing Renewable Energy International
- Hong Kong Green Sovereign
- Kenedix Office Corp
- LA County MTA
- Land NRW
- Macquarie University
- Monash University
- Nigeria Green Sovereign
- NSP-SPV Powercorp
- Odakyu Electric Railway
- Pepper Group
- Republic of Poland Sovereign
- Snam
- State of Netherlands Sovereign Green Bond
- TRokyo Tatemono
- UBI Banca
- Walloon Region

⁴ As of 8 February 2018; includes issuers that have published frameworks online but have not announced mandates.

Christa Clapp

Research Director, Climate Finance
CICERO

Harald Francke Lund

Senior Advisor
CICERO

Note that this text is provided by the contributing party and constitutes the opinion of the party and not necessarily that of SEB. SEB plays a role in enabling its stakeholders to benefit from a broad overview of initiatives by allowing key market participants to contribute through The Green Bond.

3. Preliminary comments on the proposed EU Taxonomy

We clearly recognize the importance of developing a common language on sustainable finance. The strength of the green bond market so far has been its ability to build capacity on green finance across investors, issuers, and banks by providing context and good reasoning around how green bond frameworks align with a low carbon and climate resilient future. The green bond issuers we have reviewed over the past 10 years (representing almost 30 percent of the global green bond market) have all taken important steps in a process to transform their activities in a greener direction. The EU taxonomy should facilitate this important dialogue on green transformation with market actors. Based on our initial reading of the draft Sustainable Finance Taxonomy, we have some concerns about the implications of the initial design that could make it difficult to follow up in practice for many market participants.

The taxonomy should be interpreted as a guidance, which requires additional transparency on the context of projects. How the taxonomy will be implemented is still open for interpretation, but the proposal uses the language ‘taxonomy compliant’, setting expectations that the taxonomy is intended to be used more as a standard than as a guidance. Duly-justified voluntary thresholds that guide the market combined with transparency on reporting could have the same impact without setting up a binary compliance that could exclude important actors without an understanding of the context surrounding green transformation.

Example: [City of Reykjavik's Green Bond Framework](#) (rated Dark Green by CICERO) would not comply with the 50% energy efficiency improvement threshold for buildings, yet the building efficiency is less relevant in this case since the underlying electricity grid in Iceland is renewable-based. Would there be possibilities to interpret the context surrounding the taxonomy thresholds – or would the City of Reykjavik need to apply for an exemption from compliance?

It could shut out needed transformation. The success of the green bond market has been that it has welcomed those issuers that want to reach out to investors to show that they have taken first steps in a greener direction. Binary thresholds can rule out important early actions that need to be taken today, but which can be deepened over time under good governance policies of the issuer. To solve the climate challenge, we need transformation to begin in all sectors. Early actions today that are careful to avoid locking in further greenhouse gas emissions are an important part of the solution.

Example: [Fannie Mae Multifamily Green Bond Framework](#) (rated Light Green by CICERO) would not comply with the threshold of 50% energy efficiency requirements, yet they are driving the green mortgage market in the US by taking important first steps in energy and water efficiency improvements and with a strong governance structure in place to become more green over time via annual reviews of building criteria. It is unclear if an international issuer trading in the EU market would need to comply.

The taxonomy could de-motivate green market leaders. By establishing fixed binary thresholds against which green activities must comply, actors that have been leading in innovative green market solutions may not be incentivized.

Example: [Vasakronan's Green Finance Framework](#) (rated Dark Green by CICERO) might not comply, yet they are a leader in environmental analysis of the construction phase and building materials. In addition to its 100 kWh/per square meter requirement for all buildings in its portfolio, Vasakronan has the ambition to have 100% of its portfolio covered by international buildings certificates with LEED Platinum for all new construction and major renovation projects, and at least LEED Gold for all existing buildings. In Sweden and other countries, where both the electricity grid and the district heating networks to a large extent are already based on renewable sources, energy efficiency should not be the only focus for green bond real estate issuers. Construction phase emissions, choice of building material (wood vs. cement), integrated transportation solutions and resiliency considerations are just as important in order to define a green building. The NZEB criteria for Sweden are some of the highest, and out-of-reach for the time being for the property companies we have reviewed, which are responsible for some of the most energy efficient buildings in the world. Voluntary threshold guidelines could provide incentives for striving to reach the targets.

The proposed taxonomy approach does not currently provide an integrated framework for informing investors about climate and environmental risks. The Financial Stability Board's Task Force on Climate-Related Financial Disclosure (TCFD) recommends that all companies and financial institutions disclose on climate risk – including both transition and physical risk. Currently, mitigation and adaptation activities are considered separately. The way the taxonomy is set up, if a building is tagged as a mitigation activity, it merely needs to avoid negative impacts on adaptation. This could result in missed opportunities for infrastructure investments to be designed to minimize climate risk by integrating both low emissions and resiliency to extreme weather changes and other physical climate impacts that can have significant material impacts. We also see a clear link between good governance of issuers and the potential for them to manage climate risk going forward.

Careful consideration should be taken to understand the interlinkages between thresholds in different categories of the taxonomy to avoid unintended climate and environmental consequences. For example, by automatically qualifying for the taxonomy if a new building is a high performer in the market on energy efficiency it runs the risk of favoring new buildings over important improvements in existing buildings. This could be counterproductive in an environmental lifecycle perspective. Further, construction including building materials are not considered in the buildings category.

Approximately 67% of the green bond frameworks we have reviewed would probably not comply, based on a preliminary interpretation of the taxonomy. Without consideration of the regional context, and without consideration of the specific activities of the issuer and how they fit with governance for a green transition, many green bond market leaders run the risk of not complying. Depending on how the taxonomy is implemented, this approach could significantly slow down new issuers from coming to market.

Our Shades of Green methodology is an award-winning approach grounded in the latest climate science that rates green bonds on a scale to indicate the relative level of climate risk. Our approach encompasses a range from Light Green to Dark Green projects and takes into consideration the context surrounding the climate activities of the issuer in their given region. If an issuer has a mechanism for tightening reductions over time, this feeds into our consideration. If an issuer considers climate resiliency in infrastructure projects, this also feeds into our analysis. If an issuer considers construction-phase emissions during hydro plant construction, we take this into account. These contextual elements are missing from the taxonomy threshold approach, and thus we have concerns that the majority of the frameworks we have reviewed would not comply, despite their contributions to a green transition.

Potential compliance of CICERO-reviewed Frameworks with draft EU Taxonomy

	Yes	No	Can't assess until Phase 2 criteria are published	Total
Frameworks with CICERO Second Opinions (count)	11	61	19	91
Frameworks with CICERO Second Opinions (percentage of total count)	12%	67%	21 %	
Estimated value (billion USD)	2	126	42	170
Reasoning	Renewable energy (excluding biofuels) and clean transport that appear to comply	Primarily renovated buildings that wouldn't meet threshold criteria despite strong governance on energy efficiency targets and climate goals	Need more information e.g. on country thresholds for buildings, water, waste, biofuels, and electricity grid projects	

Notes: Preliminary assessment based on our interpretation of draft taxonomy categories and threshold. Results are meant to be indicative of the potential unintended consequences of the taxonomy and are not a full assessment of compliance. Values were calculated from Bloomberg data

Source: CICERO

A more simplified approach could protect against greenwashing and encourage a stream of new green projects to be funded. Determining compliance with a complex bottom-up taxonomy is not a simple process, judging from the preliminary assessment of the frameworks we have reviewed against the taxonomy. In some cases, calculating the threshold would involve developing an emissions baseline that is open for interpretation. More important than estimating avoided emissions based on an unrealistic counterfactual is to encourage all investments to be as green as possible.

To have any hope of limiting the most dangerous levels of greenhouse gas emissions in the atmosphere, all new infrastructure investments need to be low carbon and climate resilient. To achieve this goal, we would advocate a simpler approach based on guidelines for avoiding lock-in of fossil fuel-based infrastructure, encouraging deeper emissions reductions over time, and considering resiliency to the already-observed physical impacts of climate change. Such an approach would be more in line with the TCFD recommendations of transparency on climate risk that are not fully addressed with a taxonomy that is built on a list of separate mitigation and adaptation activities.



Björn Bergstrand

Head of Sustainability, Kommuninvest
Chairperson of the Nordic public sector
cooperation on green bonds impact
reporting

The position paper is available for
download on the signatories' web
pages such as www.munifin.fi,
www.kommuninvest.se and
www.kommunalbanken.no

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4. Position Paper on Green Bonds Impact Reporting, January 2019

Nordic issuers update their green bonds impact reporting guide

Since 2016, a group of Nordic public sector green bond issuers⁵ cooperate on impact reporting topics, with the aim of harmonising and advancing reporting practices across the Nordic region. The results were originally published in a Position Paper on Green Bonds Impact Reporting, launched in October 2017. The group continues to work together and has now launched an updated version.

In the 2019 update, which includes a number of improvements and clarifications over the previous version, the issuers also introduce recommendations regarding the reporting of climate-related physical risk and the Sustainable Development Goals.

What characterises Nordic public sector issuers of green bonds is that we finance projects across a range of categories and sizes, and that we have a limited number of people available to work with environmental reporting. These guidelines make our reporting efforts easier, while at the same time hopefully making the different reports more harmonised and comparable to the reader, says Torunn Brånå, Head of Green Finance at Norway's Kommunalbanken and chairperson of the cooperation's technical/environmental working group.

Developed as a practical user guide and "first-point-of-entry" for issuers engaging in impact reporting, the Nordic Position Paper primarily targets the Nordic market but the signatories hopes it will be used also by issuers from the private sector and other countries as well as by the investor community.

The paper provides suggestions for metrics and indicators relevant to eight different project categories. The recommendations build on and reference the reporting approaches suggested by the Green Bond Principles and multilateral development banks.

Key reporting principles

- A project's impact is quantified based on the share of the investment cost that has been financed by Kommuninvest and on Green Loans disbursed and outstanding.
- Calculations are based on projected (ex-ante) values; unless actual outcomes (ex-post) are available.
- CO₂ emissions and emissions reductions are reported as scopes 1 and 2 as defined by the Greenhouse Gas Protocol, ie. direct emissions from projects and indirect emissions from the production of electricity and/or district heating.
- Energy production, energy savings and other sustainable activities are converted into greenhouse gas emissions savings using an emission factor for electricity production in mainland EU and Norway of 380g CO₂/kWh). The rationale for applying a European baseline for Nordic investments is due to i) the increased interconnectedness between the Nordic and European energy markets and ii) the Nordic issuer position that a margin approach should be applied when assessing the environmental benefits of investment projects.
- All projects to which funds are outstanding should be included in the reporting regardless of whether the funds were disbursed during the year of reporting or at a prior date. The issuers include reporting recommendations for both non-dynamic and dynamic portfolios and encourages approaches that meet reporting demands both from investors which prefer impact reporting data relevant to the specific bond that they have purchased as well as from investors who prefer an aggregated approach.
- Reporting impact from activities financed by green bonds should be done on a yearly basis.

⁵ The group include the local government funding agencies Kommunalbanken (Norway), Kommuninvest (Sweden) and MuniFin (Finland); the Swedish Export Credit Corporation (SEK); and seven Swedish municipal or regional issuers including City of Gothenburg, the municipalities of Lund, Norrköping, Västerås and Örebro, Region Skåne and Region Stockholm. Crédit Agricole CIB, the Nordic Investment Bank and SEB has advised the group. The paper has also benefited from input from CICERO Center for International Climate Research as well as several institutional investors.



5. The business benefits for setting science-based targets (SBTs)

The business benefits for setting science-based targets (SBTs) are becoming ever clearer to global firms.

Setting a science-based target means setting an emissions reduction target in line with what climate science dictates is needed to keep global temperature rises below 2 degrees. That is, in line with the goals of the Paris Agreement agreed in 2015.

Companies setting SBTs do so because the positive effect of their action on our planet, and on their business, is well understood. An SBT can help spur ambition and the type of innovation needed for a company to transition successfully to a model suitable for a low carbon, sustainable economy. That innovation helps to redefine a company's bottom line, by creating new business models and revenue streams, and by disrupting unsustainable economic systems.

Setting these targets before carbon regulations allows companies to be ahead of the curve, and respond with agility to policy changes. This is a crucial signal for investors, who can now identify which companies have the robust commitments and governance required to be prepared for the future.

Companies with science-based targets are best placed to manage the risks, and take advantage of the opportunities, related to climate change.

According to more than half of executives (52%), publicly committing to setting an SBT has boosted confidence among their investors, whose interest in future-proofing returns demands that their stocks have transition plans in line with the Paris Agreement.

But how are investors already using SBTs, and what might be around the corner to signal to more companies that capital markets consider their targets?

An increase in investor action

Investors are becoming more vocal with their direct calls for companies to engage.

Take France, for example, where ten major firms, including SUEZ and L'Oreal, have approved targets through the Science Based Targets initiative (SBTi). French asset manager PhiTrust wrote last year to the companies listed on the CAC40 index, representing the country's 40 largest stocks, calling on them to set an SBT before their AGMs.

Denis Branche, PhiTrust's deputy CEO, argued that their aim was to directly engage firms' boards with SBTs and normalize top-level action across the market.

PhiTrust are not alone. More than 60 major investors managing more than US\$1 trillion, including Aegon, Candriam and Hermes, have joined a new direct engagement campaign called the Investor Decarbonisation Initiative.

Through the campaign the group have asked the CEOs of companies from Skanska to Deutsche Telekom to take their calls for action seriously and set SBTs to align their businesses with a low-carbon future.

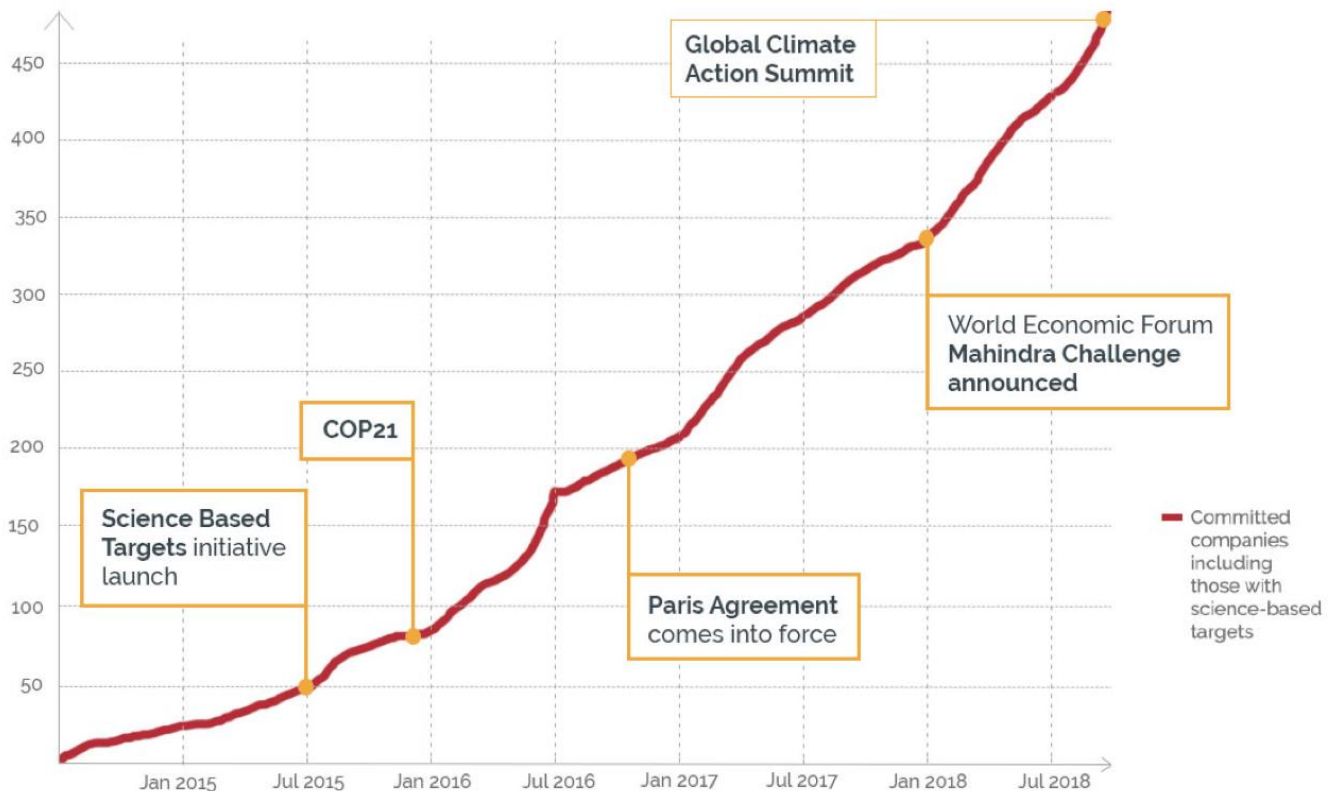
That pressure from investors is being heard loud and clear in corporate boardrooms. In Europe, the past year has seen a **65%** increase in the number of approved targets, a signal that SBTs are becoming a best-practice corporate norm. Now, 515 companies around the world - worth almost \$10 trillion - have set or are officially committed to setting a target within the next two years.



Laurent Babikian
Director Investor Engagement
CDP Europe

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Number of committed companies, including those with science-based targets



Source: CDP

Almost half of that number are based in Europe, with 20 companies in Sweden including IKEA, Electrolux, Swedbank, Husqvarna and H&M.

Building regulatory resilience

Investors' responsibilities to deliver long-term returns, resistant to climate risks, will become more deeply regulated over the next few years.

This is particularly the case in Europe, where the EU's Action Plan on Sustainable Finance has set out the goals for a [fit-for-the-future financial system](#), including the development of a new green taxonomy to define and label sustainable investments across the EU.

Additional sustainable investment worth €180 billion are required to meet the EU's energy and climate targets, according to the EU Commission - with private businesses responsible for the majority of these investments.

Aligning capital flows with the goals of the Paris Agreement is a critical area now for policymakers in light of the recent report from the Intergovernmental Panel on Climate Change (IPCC), which called for nothing short of a wholesale transformation of our economy.

In light of that report, and in order to use the most up-to-date climate science, the Science Based Targets initiative will be enabling companies to set targets in line with 1.5C pathways.

Aligning capital flows with the Paris Agreement

With SBTs representing the best-practice methodology for aligning finance with science, investors already have transparency about which companies in their portfolios are prepared for the future - whether in regulatory changes or their business models - and should join those already encouraging corporates to set them.

As the momentum behind this target-setting grows, investors are also gaining better access to the data and products that allow them to vote with their money for these best-prepared businesses.

Science-based target setting – a business norm

Most recently was the move by CPR Asset Management, 100% subsidiary of Europe's largest asset manager Amundi, to launch a new Climate Action fund using science-based targets data alongside scores from non-profit CDP, which publishes annual environmental scores for 7000 global companies. The fund selects the 70 top climate performers from a universe of 700 global equity stocks.

And a new index created by Euronext in September last September - exclusively for Goldman Sachs to use for structured products, chooses stocks from the French SBF120 based on CDP scores, which increasingly reward companies with approved SBTs.

[Climetrics](#), the climate rating for funds developed by CDP and ISS-climate, is another example of this data being used as a market norm. Its new methodology, which gives funds in Europe a climate rating from 1 to 5, scores funds higher if they invest in companies with SBTs.

Showing the market impact SBTs can make for firms, analysis of 50 of Europe's best-rated funds on Climetrics has found that more than two thirds have above-average investment in stocks with SBTs.

As managers create products that help investors support these long-term goals, the future holds much more. Science-based target setting is becoming a strategic norm, and investment strategies and products will look to SBTs as a leading indicator to define a 2-degree aligned universe that is best-positioned to seize the transition's economic opportunities.

6. The year of ESG and Sustainable Finance

Environmental, social, and governance (ESG) matters are climbing the business agenda and investors are increasing their focus in their investment mandates on companies that are seen as acting more sustainably.

S&P Global Ratings believes ESG has become more relevant to credit quality for three reasons:

- ESG-related impacts on a company's performance are becoming increasingly obvious as climate change is causing more extreme weather events. Similarly, the broader public's desire for a sustainable future is having a greater direct influence on product and brand acceptance by customers.
- Environmental and social regulations are evolving to address the shift in societal priorities, and a company's management of political and regulatory relationships are increasingly intertwined with ensuring broader public acceptance.
- The frequency and severity of financial consequences have surged, as the physical impacts of climate change have increased and ESG-related breaches or perceived lack of focus on customers and communities are triggering more decisive action and litigation.

For example, U.K. water utility Thames Water, at our November Infrastructure & Utilities Conference in London, underscored how ESG had changed the company's strategic direction to emphasize delivering operational performance targets (including customer satisfaction), aligned with objectives set out by the regulator.

The most recent case of how each of the three ESG factors contributed to a severe deterioration in creditworthiness is California-based utility **PG&E Corp.** (D/--/D). The company filed for bankruptcy on Jan. 29, 2019, under Chapter 11 of the U.S. Bankruptcy Code. In its press release of the same date, PG&E stated that throughout the forthcoming process, it remains committed to "Working with customers, civic leaders, regulators, policymakers, the financial community and other key stakeholders to consider alternatives to provide for the safe delivery of natural gas and electricity and new safety solutions in an environment challenged by climate change." (For more on PG&E, see the box below.)

Financing was a focal point, too, at COP24, the latest U.N. climate change conference, held in Katowice, Poland, in December 2018. On a global scale, financing from public, private, and multilateral sources is scaling up, which we expect could broaden climate-aligned asset types and financing vehicles across geographies. But financing such efforts, particularly in the developing world, is still lacking--and climate finance remains a relatively small portion of the overall global finance market.

This, we believe, is partly because demonstrating to decision makers the "resilience benefit" of committing to capital-intensive projects can prove difficult. In our view, however, this perception may begin to shift. In articles published this month, we set out why it makes economic sense to tackle global warming--and offer the case study of China, which has positioned pollution control and an environmentally conscious society at the forefront of its development agenda (see our most recent "Quarterly Infrastructure Outlook," published on Jan. 30, 2019, which summarizes those articles, here at:

<https://www.spratings.com/documents/20184/1818036/IFR+Outlook+Q4+2018/06a97bf0-074b-3b7f-d5d6-fba2ca386d27.>)

The Impact of Recent ESG Events On PG&E

After having already experienced three rating downgrades in 2018 due to escalating wildfire risks, a combination of events hastened the deterioration in credit quality of PG&E, which, together with its utility subsidiary Pacific Gas and Electric Co., filed for bankruptcy under Chapter 11 of the U.S. Bankruptcy Code on Jan. 29, 2019.

In the immediate aftermath of the 2018 Camp Fire in California, we believed that credit risk had increased but also expected that regulatory and political support for the utility's credit quality remained. This was reflected in our downgrade on Nov. 15, 2018, of PG&E's issuer credit rating to 'BBB-', and our CreditWatch listing with negative implications. At this time, we indicated that increasing financial, political, and operational risks related to the Camp Fire

S&P Global Ratings

Michael Wilkins

Managing Director and head of Sustainable Finance, S&P Global Ratings

[Link to video](#)

Further research and information on how ESG factors are incorporated into S&P Global Ratings' analyses can be found here:

<https://www.spglobal.com/en/who-we-are/corporate-responsibility/esg>

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had increased the probability of a downgrade of one or more notches over the next few months. Still, legislators and regulators appeared to us to remain supportive, as we believed that they recognized that having financially healthy utilities is not only in the best interest of ratepayers but also necessary for the state to reach its ambitious renewable portfolio standards. Some indicated that they were looking into the possibility of extending the state's bill SB 901, which addresses the utilities' 2017 wildfire liabilities to include the 2018 wildfires.

However, public anger further intensified in November and December as the full extent of the catastrophic Camp Fire became more evident. The negative public sentiment toward the utility intensified and the California Public Utility Commission opened a new and unrelated proceeding to consider potential penalties against the utility for the alleged falsification of natural gas safety records. Following this disclosure, some of the political and regulatory officials who previously supported the utility expressed their distrust of the utility.

These events culminated with PG&E issuing a press release on late Jan. 4, 2019, indicating that its board of directors was reviewing its structural options, including its operations, finances, management, and governance. The announcement was a clear indication, in our view, that governance and oversight are needed to improve to account for the company's unique enterprise risks. Later that evening, media reports speculated that PG&E could be preparing for a voluntary bankruptcy filing as part of its contingency planning. It was the totality of these events that led us, on Jan. 7, to downgrade the issuer credit ratings on both PG&E and Pacific Gas and Electric to 'B' and, one week later, to 'CC' following the company's announcement earlier that day of the intention to file for Chapter 11 protection on or around Jan. 29.

On January 31 2019 S&P Global Ratings announced that it has started to include Environmental, social, and governance (ESG) sections within its issuer credit rating reports on corporate entities. The announcement coincides with the publication of the UN Principles for Responsible Investment (PRI)'s third instalment of the "Shifting Perceptions: ESG, Credit Risk And Ratings" report series, which recommends that credit rating agencies (CRAs) explicitly signpost credit-relevant ESG risks and opportunities in rating reports.

As a member of the PRI's Advisory Committee on Credit Ratings (ACCR), we have worked with the PRI since the launch of the ESG in Credit Ratings Initiative in 2016, presenting at investor roundtables globally and contributing to the two previous reports in the series, which help to clarify the link between sustainability and credit quality.

We are phasing in the incorporation of ESG sections into our corporate ratings reports. The process started with two sectors that have greater exposure to ESG risks and opportunities--the oil & gas and utilities sectors. An example is shown here: BP PLC, published Nov. 12, 2018.

We are now rolling out the new section to all major companies across every sector, and to smaller companies in the sectors most exposed to ESG factors, which may be relevant to ratings. In all, we expect to incorporate ESG sections in approximately 2,000 credits through the course of the year. This represents around 40% of our rated corporate universe.

The inclusion of an ESG-focused section in credit reports is the latest innovation in S&P Global Ratings' sustainable finance-related capabilities and research. Last year, we completed our two-year ESG Lookback series across all practices, which identified historical patterns for environmental and climate, social, and governance risks, as well as cases where such factors had directly or indirectly informed a rating action between 2015 and 2018. In total, we identified 372 instances where ESG factors had an impact on ratings. For corporates alone, approximately 15% of all rating reports during this period referenced ESG factors as a meaningful part of the credit analysis. The reports provided conclusive evidence of the influential role that ESG risks can play in credit quality, thus laying the foundation for greater transparency regarding disclosure of ESG factors.



SBAB!

Malin Pellborn
Head of Sustainability
SBAB

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7. Sweden’s first green covered bond, backed with residential mortgages

SBAB was founded in 1985 and is wholly owned by the Swedish state. SBAB primarily provides mortgages but also offer loan and savings products to consumers, tenant-owners’ associations and property companies in Sweden. Since 2017, SBAB’s sustainability efforts are fully integrated into SBAB’s business plan. As part of SBAB’s ambition to drive the housing market in a sustainable direction together with customers and investors, SBAB issued on January 23 Sweden’s first covered green bond with residential mortgages as assets.

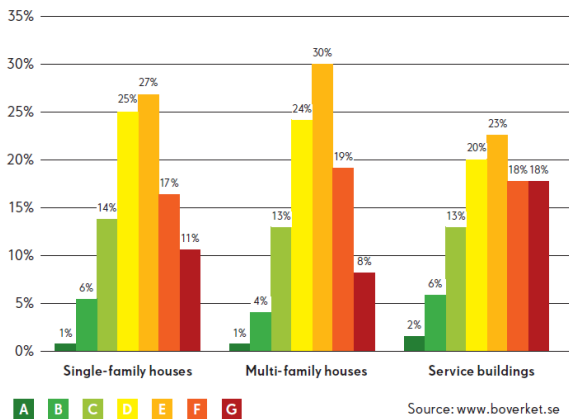
In 2018, SBAB launched the lending product Green Mortgage for retail customers with energy efficient properties. SBAB took a pro-active approach and converted all mortgage loans who meet the requirements to Green Mortgages and gave customers an interest rate rebate automatically – something that is not done by other banks who offer similar products. The capital from Green Mortgages was the asset category that gave SBAB the opportunity to issue the covered green bond.

It is very gratifying that there has been such a great interest for this issue. The investor collective plays an important role in closing the cycle where both lending and borrowing are green. We have the ambition to drive the housing market in a more sustainable direction and this gives us good opportunities to achieve even better traction and greater exchange from that work,

The bond was highly appreciated by investors and the SEK 6bn deal was met by a great interest with demand well above the target volume and it was priced with a green premium, called “greenium”.

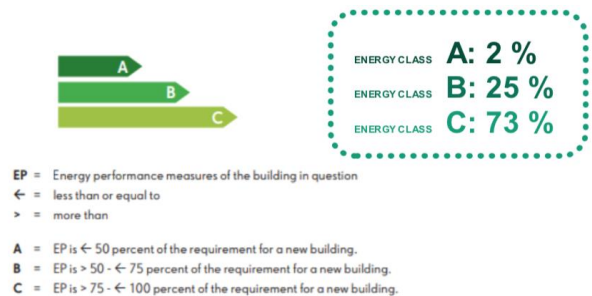
SBAB’s updated framework has been examined by CICERO (Center or International Climate and Environmental Research - Oslo) and is classified as Medium Green. The framework, Second Opinion as well as other relevant documents are available at [SBAB’s web site](#).

National distribution of energy classes (A to G) as per 2016/31/12

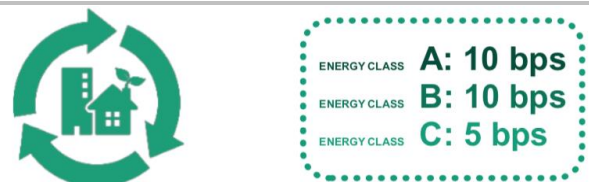


Source: www.boverket.se

Green Mortgage – distribution of energy classes as per 2018/31/12



Green Mortgage – Product offering



8. A new narrative: markets will propel energy revolution

Sustainable investments are becoming increasingly popular, reflecting a broader understanding of climate issues as the single-most important challenge we face as a species. Investors naturally want to be part of the solution, but until now this approach has not been driven by maximization of returns. Over the past years, a new argument for investing sustainably has emerged: It's not just that it might help save the planet, but investing in front runners in the transition, to a new and less destructive energy system could result in higher return too. Capital will be reallocated to the energy transition.

Elizabeth Nørgaard Mathiesen

Macro Strategist

SEB

Large Corporates & Financial
Institutions

1. Lower price, stronger growth, reduced risk are key investment drivers

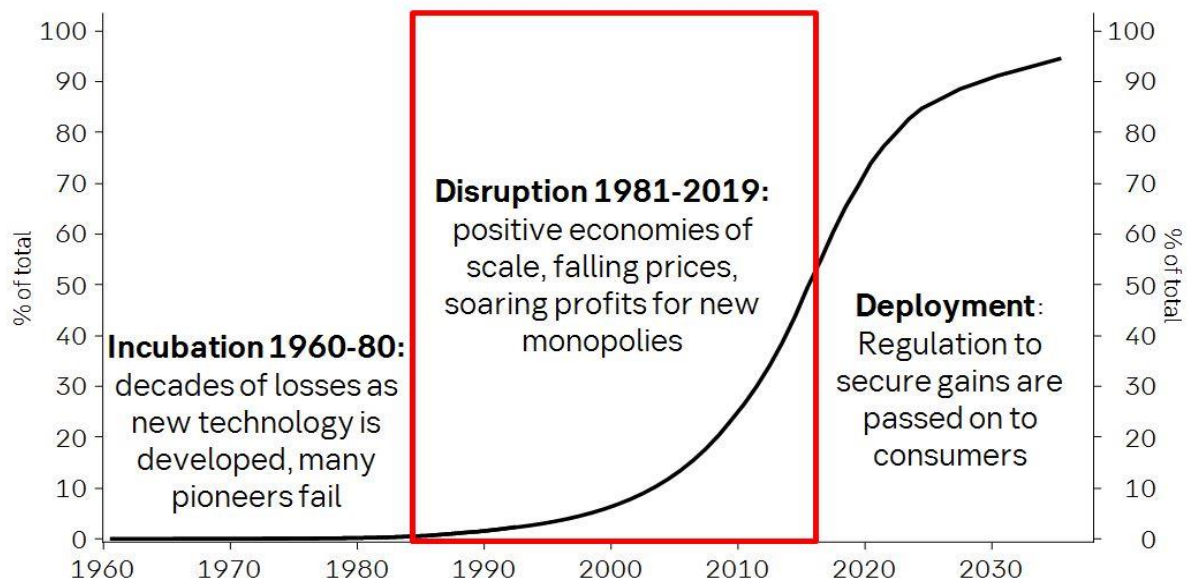
During the past 2-3 years, the return for Green Bonds and equities linked to companies first to deploy sustainable technologies, have been systematically higher than for their peers. This might be because more investors are looking for such investments, but the supply is limited. However, we think there is a more compelling and exciting explanation: sustainable technologies are starting to be superior to traditional alternatives, in terms of price but also in terms of technology efficiency and applicability. This would also translate into excess returns, but driven by fundamentals like stronger growth and lower risk for those who lead the way.

Thus, sustainable investment means also investing in a technological revolution. The pattern we have seen so far is no different from other technology revolutions where the technology is linked to secular growth stories, known as deep general-purpose technologies.

2. Renewables: a technology revolution like any other

New technologies always start out being inferior to the incumbent. After typically 30 years of investment and experimentation in what is known as the incubation phase, the technology becomes competitive without subsidies or idealism, triggering 30 years of explosive growth with positive economic return generation. The technology matures and new business models are fully developed and deployed into the economy over the following decades. The first cars were no better than horse carriages and the first telephone no better than a telegraph when it first came out. New technologies tend to become commoditized and cheaper over time, eventually replacing the incumbent due to lower prices and better quality/performance.

IT maturing after almost 4 decades of disruption: now it's deployment time

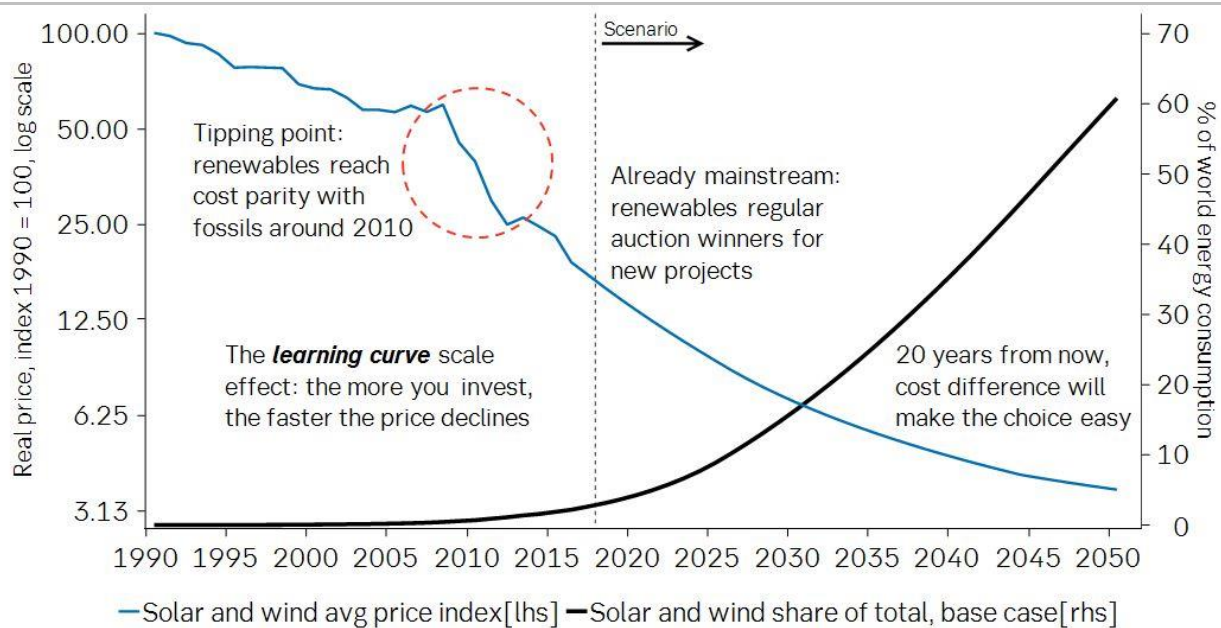


Source: Macrobond, SEB Strategy Team

If we look at the underlying learning-curve mechanism: the disruption becomes destabilizing when increasing production leads to lower prices. The dynamic adaption process requires continuous innovation. The process is initially characterized by uncertainty, where the new technology is predominantly useless and few are willing to run the risk. The technology is

improved as more users join and apply the technology. Positive economies of scale and learning by doing result in a steep learning curve with exponential efficiency gains in the first part of the diffusion process. When this has occurred for long enough, the technology becomes competitive, reaching cost parity. When tipping points are reached, they usually catch us by surprise. However, once exponential growth takes off history tells us there is still 30 years of exponential gains and price declines left.

Swanson's law: same disruptive price decline as for IT



Source: Macrobond, SEB Strategy Team

Renewables are now where IT was in the early 1980s, at the beginning of their 30-years of disruption. We would argue that we have passed the tipping point within renewable space. As the process evolves and investments increase, the competitive advantage will be more evident, creating a self-propelling mechanism: the more solar we consume, the cheaper it becomes.

3. How did we get here? IT revolution was missing a key ingredient

No matter what, this technological revolution is coming. It can be argued that the IT revolution is becoming exhausted, not just from a technology perspective but also when you consider other external limitations surrounding economic growth. Something important is missing to complete the IT revolution, as increasing production driven by 100-year-old energy supply is a recipe for disaster. Energy is the lagging component. Why are we only just seeing competitive renewable alternatives to the existing incumbent now?

Solar and wind haven't been ready, before today. Until the late 1970s nuclear power was positioned to be the next big thing, but Three Mile Island in 1979 put an abrupt end to the development and application of nuclear energy as an energy source. The following decade was characterized by low oil prices, thus there was no readily available competitive alternative energy source and perhaps no one really saw the necessity. However, the IT production model led to China's industrialization throughout the 2000s, which led to a doubling of the global coal consumption and an explosion in oil prices. Thus, the development of new alternative technologies gained considerable momentum. In fact, the energy transition will be the first technological revolution that hasn't resulted in negative externalities.

When the first solar panels were installed in the early 80s, it would have been much cheaper to use existing technology. This remained the situation for decades, but over the past five years, solar power has started to beat fossil fuels on price in auctions. Similarly, electric vehicles were not taken seriously by car enthusiasts, until the Tesla model S launch in 2012, but nobody is laughing now. This is also normal, just think about the carnage in dot-com stocks before the internet had matured.

From an investor's perspective, this 'tipping point', where new technologies achieve parity, marks a major change. Once the new technologies offer the same quality at cheaper prices, markets will start rewarding the first-movers, as the new technology will offer both superior growth potential and lower financial risk. The first point is easy to understand: using a better technology will reduce costs and improve efficiency; the lower risk reflects the fact that at some point politicians may decide to force fossil fuel users to bear the full cost to society.

4. Where do we go from here? Getting to 50% fossil-free already in 2045

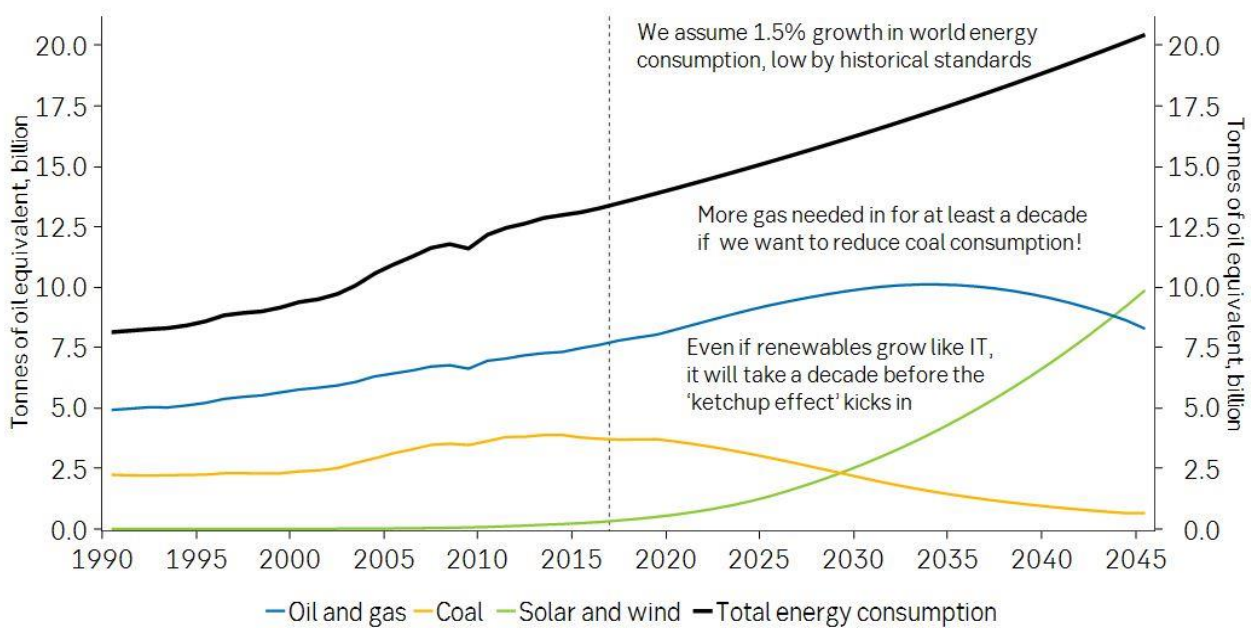
5-10 years down the road, these technologies will have evolved to the point where we choose them simply because they are superior. Once this happens, the 30-year transition is likely to follow regardless of political incentives and other arguments simply because it is the best business decision.

In our main scenario, we extrapolate the historical learning curve forward and find that the pure economic drivers are strong enough to take us to 50% of all primary energy coming from renewables already in 2045, which is way ahead of most official estimates.

The nature of exponential growth and price declines means that even with price advantage it takes time to reach the future because a lot of physical investment needs to take place and it can't be done overnight. The transition will require alignment between a range of supplementing technologies to realize the full potential.

Currently, solar and wind only comprise a fraction of global energy consumption, close to 3%. It will take another 30 years before we truly can alter the energy system so that it is primarily driven by renewables. In the meantime, it is important that we use the greenest of the brown (natural gas, bio-mas etc.) to avoid using coal.

Transition from coal to natural gas is key part of the de-carbonization story



Source: BP, Macrobond, SEB Strategy Team

5. Is it happening fast enough? 50% in 2045 means 10% in 2028.

Although exponential growth can surprise us in a positive way, it is also easy to be fooled by the nature of the process. It can be debated whether the development within renewables is happening fast enough to put brakes on the rising temperature – something that almost every top decisions maker agrees is necessary for a long-term scenario where we exist in 100 years, to be possible. Political intervention can influence relative price adjustment, thereby speeding up the transition process. Changing the relative pricing of carbon or making the capital

requirements for loans that plug into the energy revolution would undoubtedly enhance the learning curve effect.

This would make good economic sense too. Every economist will tell you that consumers of fossil fuels are nowhere near paying the full economic cost once you factor in externalities like climate change - if they were, we wouldn't be having a serious climate problem today. It is testament to the powerful nature of the new technologies that they are already cost-competitive regardless of this disadvantage. A change in the political stance towards this question could change a smooth transition to an even more disruptive process as it would change relative costs faster than the economy can adjust.

6. Investment case: green is better, cheaper, more efficient and the advantage will grow.

From a fundamental perspective, renewables are simply proving to be better: Lower cost equals competitive advantage. Lower default risk results in lower discount rate & higher valuation. Lower fossil use - and the planet survives. All three are important motives to invest. This makes the argument for sustainable investment even more compelling. In equities, there are long-term opportunities if you can identify technology leaders, but you can also enhance the return in a broad portfolio by focussing on first-mover sustainable technology users. In fixed income, Green Bonds are likely to offer a slightly lower realized default rate over the duration of the bonds lifetime because issuers are better prepared for disruption. You get higher returns AND help save the planet: what's not to like.



SEB Climate & Sustainable Finance

Christopher Flensburg

Head of Climate & Sustainable Finance
 Phone: +46850623138
christopher.flensburg@seb.se
 Assistant: johanna.cavallin@seb.se

Christopher Kaminker, PhD

Head of Research, Climate & Sustainable Finance; Senior Advisor, Large Corporates & Financial Institutions
 Phone: +46850623095
christopher.kaminker@seb.se

Gunilla Svensson

LC&FI Marketing & Communications
Gunilla.Svensson@seb.se

Ben Powell

Senior Banker
 Climate & Sustainable Finance
benjamin.powell@seb.no

Samantha Sutcliffe

Senior Advisor, Climate & Sustainable Finance
samantha.sutcliffe@seb.se

Mats Olausson

Senior Advisor, Climate & Sustainable Finance
mats.olausson@seb.se

Gabriella Eriksson

Advisor and Specialist Green Library, Climate & Sustainable Finance
gabriella.eriksson@seb.se

Kristoffer Nielsen

Leverage Finance / Climate & Sustainable Finance
kristoffer.nielsen@seb.se

Siri Sachs

Corporate Finance / Climate & Sustainable Finance
siri.sachs@seb.se

Anna Svensson, CFA

Head of International Credit Sales
anna.x.svensson@seb.se

Urban Josefsson

Head of International, Financial Institutions Coverage
urban.josefsson@seb.se

Sir Roger Gifford

Senior Banker, Large Corporates & Financial Institutions, London
roger.gifford@seb.co.uk

This report was published on 11 February 2019. Cut-off date for calculations was 8 February 2019, unless otherwise stated.

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Charlotte Asgermyr

Chief Covered Bond and FI Market Strategist, SEB Research & Strategy
charlotte.asgermyr@seb.se

Lars Dybwad

Head, Macro Sales, Norway
lars.dybwad@seb.no

Miikka Riihimäki

Head, Macro Sales, Singapore
miikka.riihimaki@seb.fi

Martin Bergqvist

Head, Markets, Hong Kong
Martin.Bergqvist@seb.se

Bo Madsen

Denmark
bo.madsen@seb.dk

Jukka Honkaniemi

Finland
Jukka.Honkaniemi@seb.fi

Jonas Englund

Cross Asset New York
jonas.englund@sebny.com

Paul Bergel

Macro & Credit Sales New York
paul.bergel@sebny.com

Lauri Hälikkä

Macro & Credit Sales New York
lauri.halikka@sebny.com

Anders Wickman

London UK Sales, Fixed Income
anders.wickman@seb.co.uk

Peter Thiberg

London UK Sales, Fixed Income
peter.thiberg@seb.co.uk

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