



J.P. Morgan Perspectives

ESG INVESTING GOES MAINSTREAM

Long-term Strategy

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J.P. Morgan Securities LLC

ESG investing goes mainstream: summary

- ESG is part of the broad **Socially Responsible Investing** (SRI) movement that focuses on achieving Environmental, Social, and Governance objectives, contributing to the development of a more sustainable and well governed financial system. SRI recognizes the fiduciary role for companies and issuers to act in the best long-term interests of beneficiaries.
- ESG investing is now moving into mainstream, gravitating from negative screening to more **quantitative, data-driven and index** approaches as the availability and quality of ESG metrics and reporting have increased. Systematic **integration** of ESG metrics is now available from index providers and consultants.
- ESG investment no longer requires foregoing **returns** as companies that are socially responsible are likely to lead in overall management capabilities.
- Surveys show some \$23tr in AUM following some form of ESG, but the more systematic integration of ESG metrics is probably only followed by some **\$2.5tr in AUM**, while ESG funds have reached \$108.3bn AUM.
- **Europe is at the forefront** of ESG investing and regulations, while US shareholders and stakeholders are demanding greater transparency and disclosure and adopting more quantitative and commercial approaches that prioritize ESG without sacrificing returns. **EM lags**, even as SRI arguably was born in EM via official lending conditionalities. **Green bonds** and **microfinance** have served as the most accessible gateways to EM ESG investing in the past.

New J.P. Morgan Research products

- JESG is our new ESG compliant index for **EM external and local government bonds**. It incorporates ESG score integration, positive screening (green bonds), and exclusions of controversial sectors that do not adhere to the UN Global Compact.
- ESGQ is our new proprietary **stock selection** metric that facilitates responsible equity investing, while raising returns and reducing volatility and drawdowns.

ESG investing goes mainstream: summary

Impact

- The objective of ESG is to **broaden corporate behavior beyond narrow profit maximization**. In response to greater reporting, transparency and disclosure, as well as the growth in ESG flows, companies have indeed **improved their ESG scores**, in particular in **EM and Japan**, even as progress elsewhere has plateaued.
- But our company analysts are also seeing more concrete impact as their **companies** are making efforts to reduce carbon print and water usage and to improve governance and gender equality. The green movement in particular is creating new business opportunities in alternative energy, electric cars and batteries.
- The Environmental pillar of ESG has received the most attention, but focus is increasingly shifting to Social and Governance, in particular **Gender Balance** at companies and issuers. European regulations and investor pressure are inducing more companies to disclose gender pay metrics and to improve gender balance at company boards. Companies with better gender balance have produced better returns on equity, thus providing greater incentives for investors to push for gender balance.
- Shareholder and public demand for ESG investing and evidence that it can boost returns are also inducing governments to pursue a more active regulatory program. The **EU** most recently launched a broad action plan on sustainable finance, targeting company disclosure, manager and advisors' duties, and sell-side research. While the **US federal government** has yet to mandate ESG guidelines and requirements, investors, companies and **state and local authorities** are providing broader support for ESG investing.

How big is the ESG universe?

- We believe that surveys overstate the “true” ESG investment universe where ESG factors are systematically and actively incorporated into investment processes and decisions.
- While we acknowledge it is impossible to pinpoint the exact size of the universe of ESG assets, we believe that this universe is perhaps a tenth of what is reported by the GSI Alliance Survey.
- In the fund space, we calculate that the ESG fund universe has an AUM of around \$650bn and accounts for less than 2% of the total fund universe.
- Surveys suggest that institutional investors make up $\frac{3}{4}$ of AUM, giving us a order-of-magnitude estimate of \$2.5tr of ESG AUM across both retail and institutional money.
- This implies that an active and systematic adoption of ESG factors in the investment process is at its infancy rather than advanced stage.
- This is not necessarily a bad thing as it means ESG adoption has plenty of room to grow from here as investors transition to more active ESG implementation approaches.

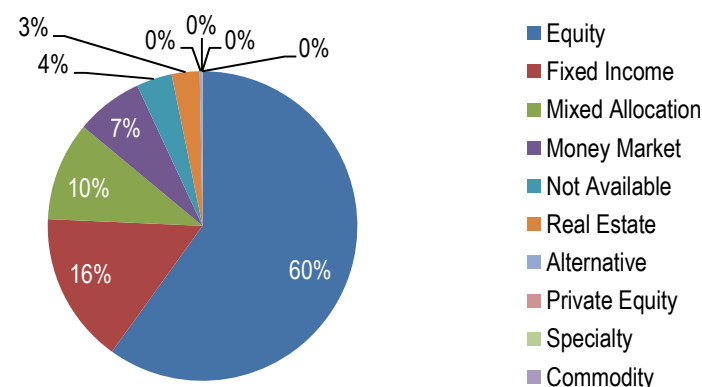
ESG fund universe growth

Annual growth rate

	ESG fund universe AUM	All funds AUM
2015	4%	3%
2016	23%	6%
2017	38%	22%

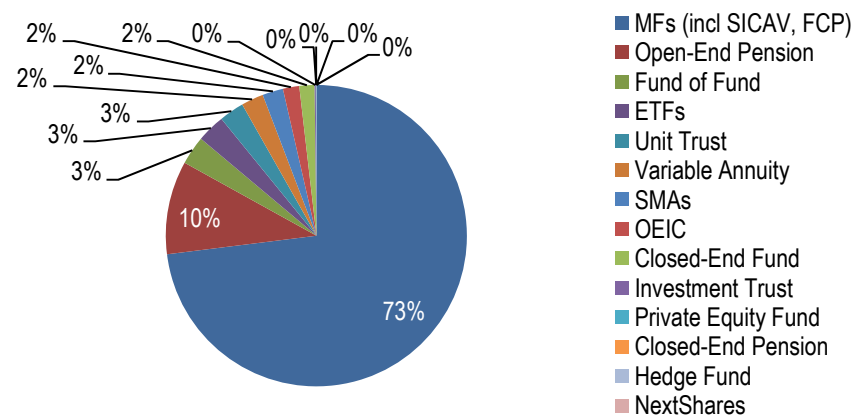
Source: Bloomberg, J.P. Morgan.

ESG fund universe by asset class



Source: Bloomberg, J.P. Morgan calculations.

ESG fund universe by fund type



Source: Bloomberg, J.P. Morgan calculations.

Launching **JPM's ESGQ**: Building an ESG score for companies

J.P. Morgan's ESGQ is a quantitative tool to help investors pick stocks in a responsible way

What have we learned?

- MSCI ESG scores **provide good insight for returns**, Sharpe ratios and lowering draw-downs.
- Broad stock universe or compliant universe? Depends on long only or long/short portfolios, and the limits to draw-downs to be absorbed.
- Aggregate ESG scores more useful than ESG pillars, themes and key issues. One exception is selective ESG mapping.
- **Faster moving ESG data** such as that compiled by Arabesque and RepRisk seem to have their place as a complimentary data-set.
- Arabesque S-Ray data is highly correlated to MSCI ESG inputs but reported more frequently (daily/monthly).
- Additionally, there is also significant information in the **change** in ESG scores, which is captured by the ESG Momentum from one period to the next.
- JPM ESGQ is a proprietary quantitative ESG metric that encompasses:
 - 1) **Stable ESG scores** that capture the long term corporate responsibility profile of a company,
 - 2) **Faster moving ESG data helps** to isolate news flow on potential controversies,
 - 3) **Momentum in these scores** captures changes in sentiment and price behavior.

JPM's ESGQ – What is it?

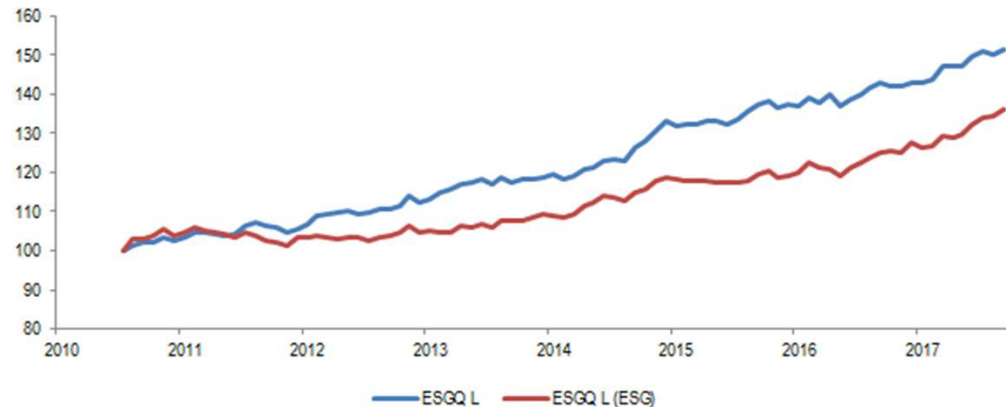
J.P. Morgan's ESGQ



Source : J.P. Morgan Quantitative & Derivatives Strategy

JPM ESGQ Europe long excess returns over MSCI Europe and MSCI ESG Leaders index

Ratio, 100=1.



Source : J.P. Morgan Quantitative & Derivatives Strategy

■ ESGQ is a tool to help investors pick stocks in a responsible way.

1. ESGQ marries stable ESG scores that capture the long term corporate responsibility profile of a company,
2. And couples these scores with faster moving ESG data that isolate news flow on potential controversies.
3. Additionally, we use the Momentum in these scores to capture changes in sentiment and price behavior.

■ ESGQ shows outperformance in both:

1. MSCI Europe
2. MSCI ESG Leaders Index

ESG Relative Performance

Indices	Returns	Adjusted EPS	Adjusted P/E	Time period	Returns	Time period
MSCI World Index	2.18%	0.76%	1.41%	Since Q4 2012	0.60%	
MSCI World ESG Leaders Index	2.12%	0.79%	1.32%	Since Q4 2012	0.56%	Since Q3 2007
MSCI World ESG vs Index	-0.06%	0.03%	-0.09%	Since Q4 2012	-0.04%	
MSCI Europe Index	1.04%	-0.01%	1.05%	Since Q4 2012	1.29%	
MSCI Europe ESG Leaders Index	1.11%	0.33%	0.77%	Since Q4 2012	1.41%	Since Q2 2009
MSCI Europe ESG vs Index	0.07%	0.34%	-0.28%	Since Q4 2012	0.12%	
MSCI USA Index	3.02%	0.99%	2.01%	Since Q4 2012	3.10%	
MSCI USA ESG Leaders Index	2.86%	1.29%	1.54%	Since Q4 2012	2.94%	Since Q2 2009
MSCI USA ESG vs Index	-0.16%	0.30%	-0.47%	Since Q4 2012	-0.16%	
MSCI EM Index	0.43%	0.77%	-0.33%	Since Q4 2013	-0.61%	
MSCI EM ESG Leaders Index	2.27%	1.01%	1.24%	Since Q4 2013	1.47%	Since Q3 2007
MSCI EM ESG vs Index	1.84%	0.24%	1.58%	Since Q4 2013	2.08%	

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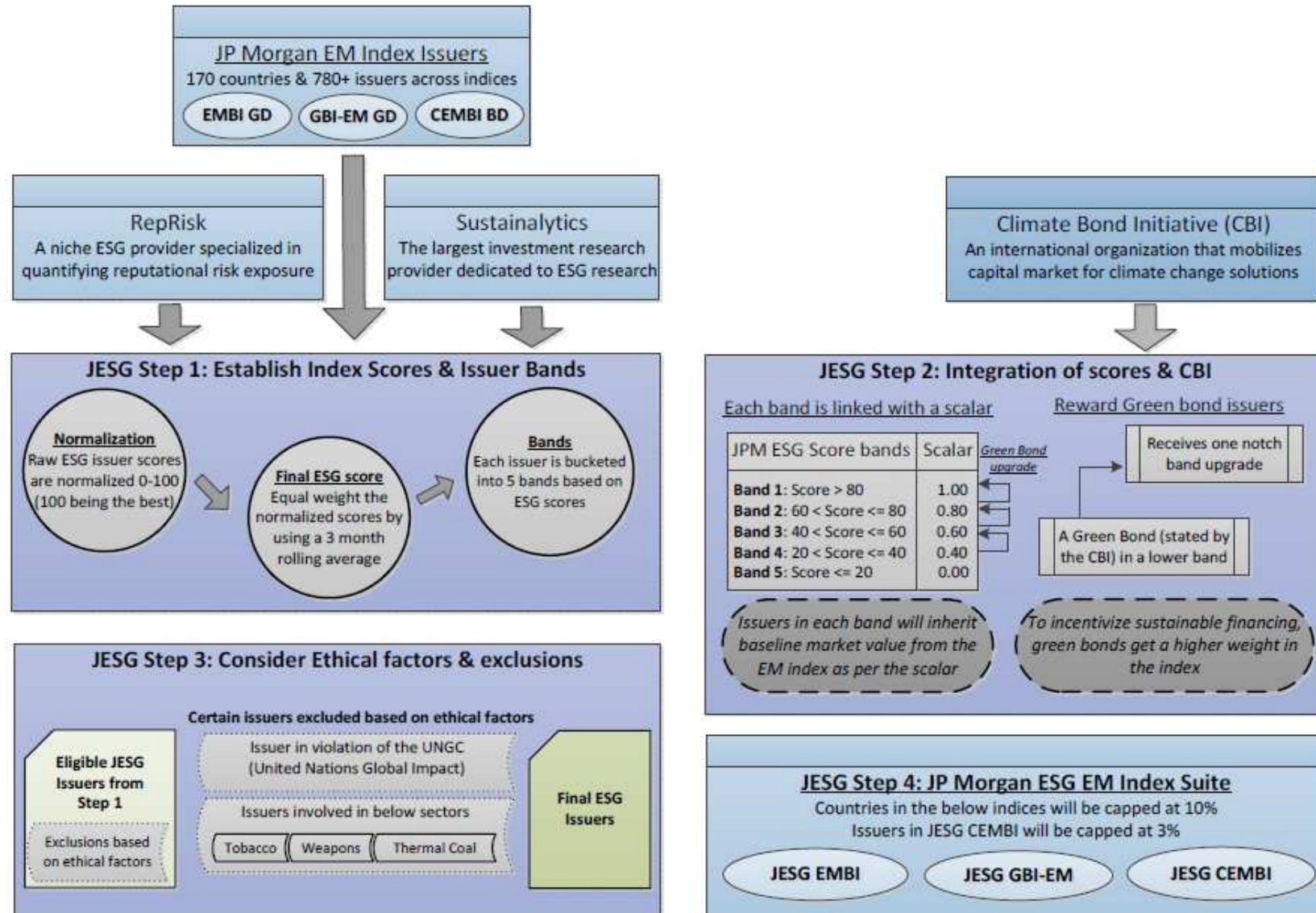
See page 129 for analyst certification and important disclosures, including non-US analyst disclosures.

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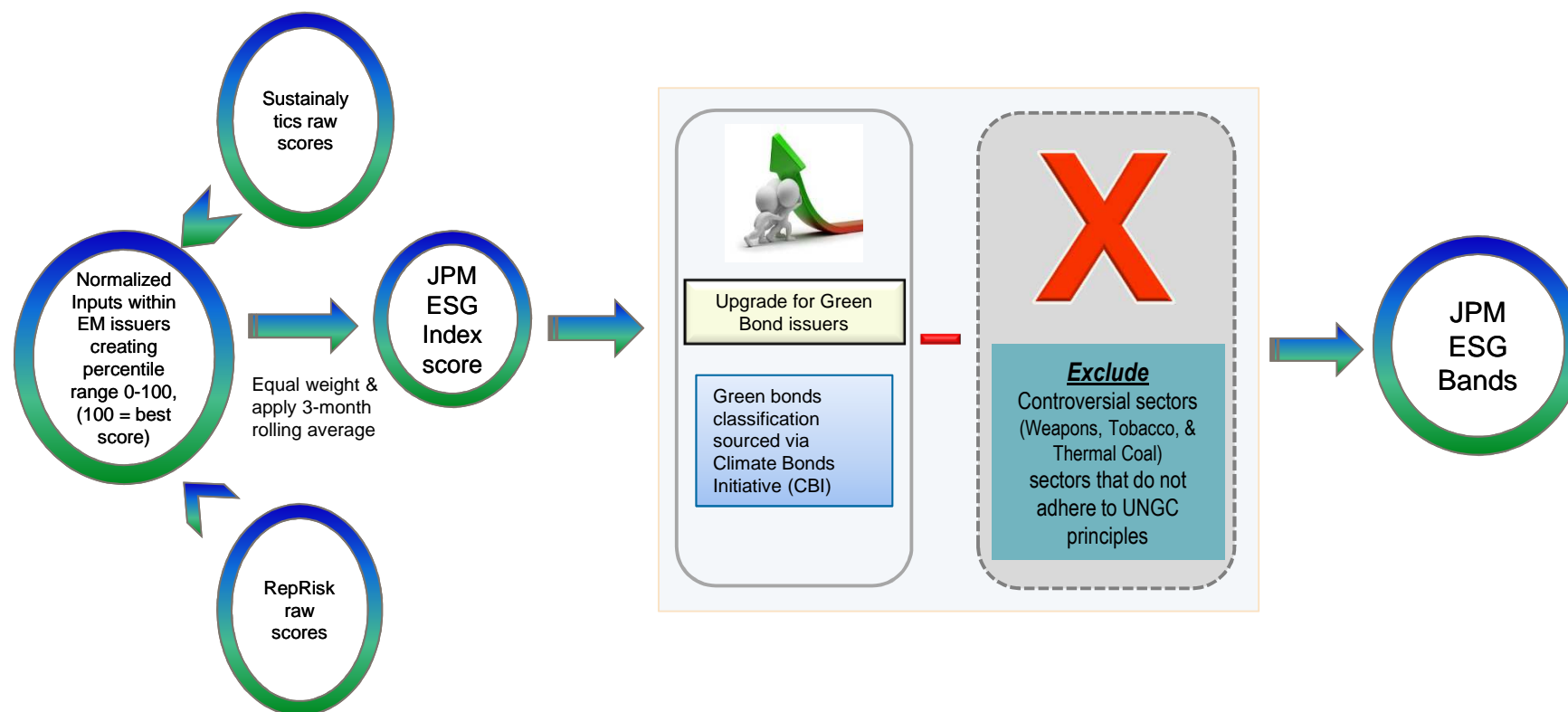
Introducing the J.P. Morgan ESG Index suite (JESG)

- **J.P. Morgan ESG suite of indices (JESG)** is a global fixed income index family which integrates environmental, social, and governance factors in a composite benchmark.
- JESG Index Scores for over 170 countries and 780+ issuers are calculated daily, using data from RepRisk, Sustainalytics and Climate Bonds Initiative (CBI) as inputs.
- JESG is unique to any other benchmark bond index in both design and scope:
 - **First of its kind** in emerging markets fixed income space
 - **Leverages J.P. Morgan's leading flagship emerging markets suite of indices** (EMBI Global Diversified, GBI-EM Global Diversified and CEMBI Broad Diversified)
 - Utilizes both **fundamental ESG factors and dynamic event-driven signals**
 - Combines several selection approaches: **ESG integration, positive screening, and ethical exclusions**
- J.P. Morgan launched JESG to meet the rising demand from fixed income investors looking to incorporate ESG and responsible investing in their overall investment strategies.
- The JESG family of indices is the most recent example of J.P. Morgan's full commitment to meet the needs of our global fixed income client base through the strengthening and expansion of our research-focused, intellectually-led index business.

JESG Bands – A unique construction to stratify issuers in terms of normalized ESG ratings



Sustainalytics and RepRisk – Key JESG factors along with CBI and UNGC principles

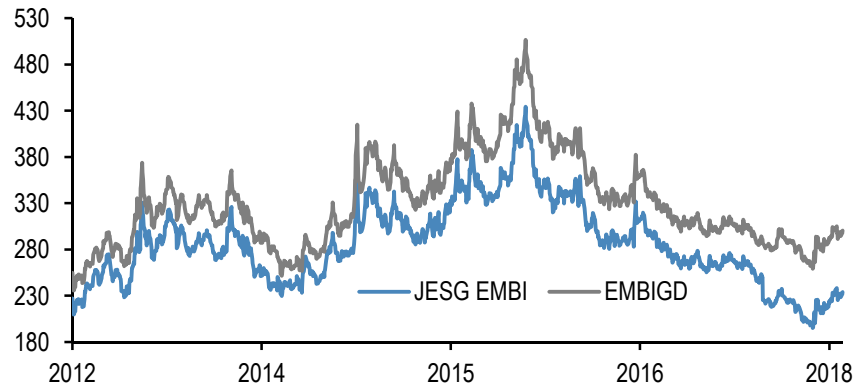


Scores provided by ESG vendors encompass the broader fixed income market. Therefore, the inputs need to be adjusted to be compared to Emerging Markets and practical benchmarking

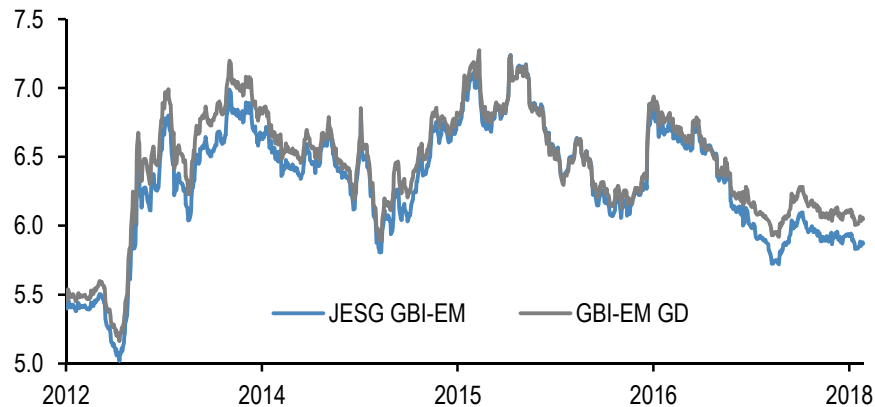
- ESG vendor scorings are normalized and then averaged to produce one standardized JPM ESG score per issuer.
- The finalized JPM ESG Index Score for the issuer incorporates a 3-month rolling average
- The weights take into account the base benchmark caps for country (or issuer for corporates)
- Quasi-Sovereign issuers with no coverage from either vendor default to its sovereign ESG score
- Corporate issuers with no coverage from either use the regional-sector average score from its respective sector
- ESG scores are divided into five Bands, with the Band rebalance occurring with a one month lag

JESG indices deliver comparable absolute returns to that of the baseline conventional indices

JESG EMBI vs. EMBIGD Spread (bps)



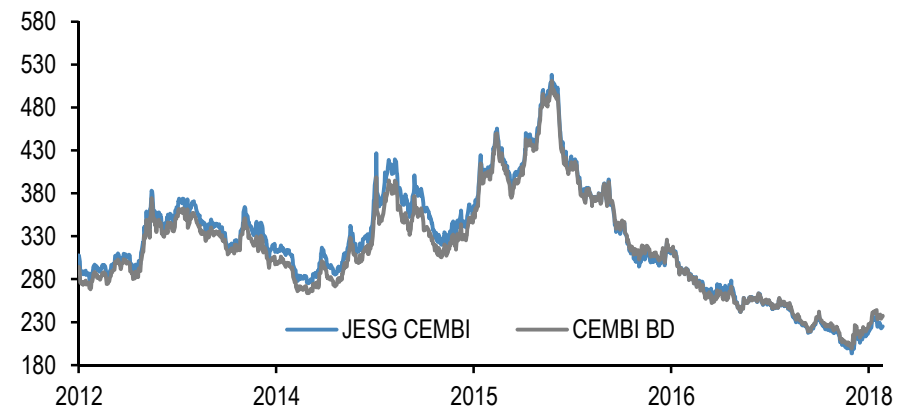
JESG GBI-EM vs. GBI-EM GD Yield %



JESG indices exhibit higher ESG scores versus the baseline – illustrating the quality of SRI enhancements delivered without compromising performance

Instrument	Annualized Rtn	Annualized Vol	Yield	Spread (bps)	Duration	Avg Life	ESG Score
JESG CEMBI	3.92%	4.05%	4.95	233	4.44	6.11	57
CEMBI BD	4.13%	4.11%	5.05	241	4.60	6.53	51
Chg	-0.22%	-0.06%	-0.10	-8	-0.16	-0.42	11%
JESG EMBIG	4.05%	5.98%	5.11	236	6.99	11.17	54
EMBIG Div	4.01%	6.12%	5.76	302	6.78	10.71	46
Chg	0.04%	-0.14%	-0.65	-66	0.21	0.46	18%
JESG GBI-EM	-0.67%	10.97%	5.83	-	5.14	7.45	57
GBI-EM GD	-0.66%	10.98%	6.01	-	5.17	7.58	55
Chg	-0.01%	-0.01%	-0.18	-	-0.03	-0.13	5%

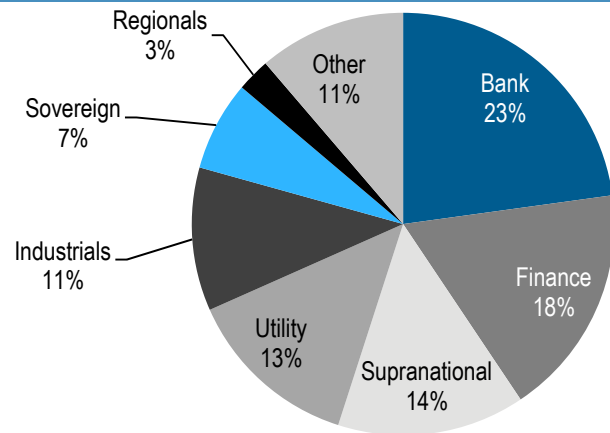
JESG CEMBI vs. CEMBI BD Spread (bps)



Relative parity is achieved despite the modestly lower yields resulting from exclusion of issuers with the weakest ESG scores

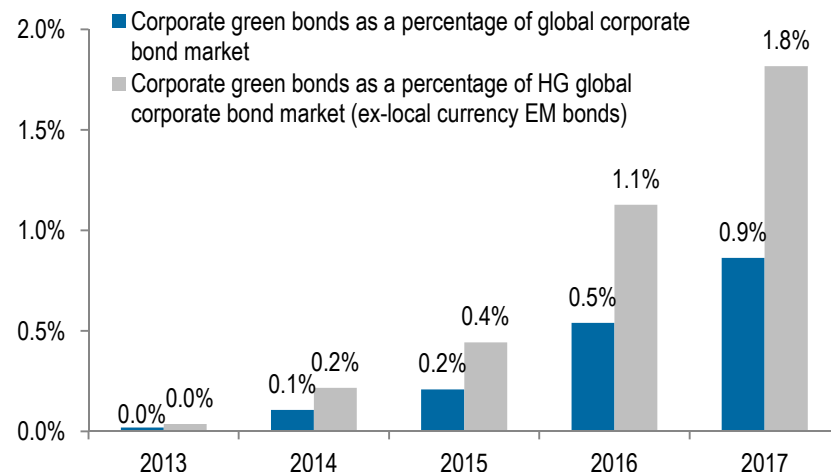
Green bond market growth is accelerating, almost doubling in 2017, from issuance by corporates and sovereigns

The financial sector accounts for more than a third of the green bond issuance over the past few years



Source: Dealogic, J.P. Morgan

Green corporate bond market remains a niche market but is picking up pace



Source: Dealogic, J.P. Morgan

What is a green bond?

- Green bonds are fixed income securities that raise capital for a project with specific environmental benefits
- The environmental benefit projects must be aligned with the four core components of the GBP:
 - Use of Proceeds
 - Process for Project Evaluation and Selection
 - Management of Proceeds
 - Reporting
- External review recommended to confirm the bonds alignment with the Green Bond Principles

Investing in gender balance: Opportunities and challenges

- We provide an overview of the toolset and approaches for investing in gender, which has proved challenging to incorporate into the ESG framework due to the low frequency of reliable indicators.
- Demand for faster progress toward gender balance has moved the discussion on gender diversity beyond voluntary reporting to calls for legislative change.
- Governments across the world, especially in Europe, are mandating diversity requirements for corporate boards, greater disclosure on gender pay gaps, and women in executive leadership positions.
- Various jurisdictions have introduced disclosure requirements and guidelines for gender pay gaps, most recently the UK.
- Initial results from the UK gender pay gap reporting regulations show that the financial/insurance and education industries reported the largest pay gaps, depending on the measure used.
- Gender metrics for the private sector reflect modest improvements when compared to public investment entities.
- The ratio of women on corporate boards is the most common metric used to measure gender balance in existing ESG frameworks, followed by female representation in executive positions.
- Representation for women on corporate boards has improved over time, suggesting a positive impact from inclusion in ESG metrics.
- Financial inclusion has risen in absolute numbers, but women still lag behind.
- Gender budgeting, which uses fiscal policy and administration to promote gender equality, has achieved modest results so far.
- A number of Gender Diversity Indices have been launched, mainly related to Women on Corporate Boards, but AUM tracked against these benchmarks is tiny at only ~ \$1.5 bn.
- Future governance guidelines around gender diversity are likely to focus on reporting and disclosure.

Gender Balance Index – investable indices

Key Point

- **Investable indices** are similar to traditional financial benchmarks, only in that they incorporate gender diversity into their investment selection process.

Index	Inception	Market	AUM (\$M)	12M Relative Return*	Relative Return Since Inception	Factors	Selection Approach
JPX/S&P Capex & Human Capital Index	27-Apr-16	Japan	965	1.7%	-1.6%	Female retention, gender pay equity, etc	Universe screen
MSCI Japan Empowering Women Index	3-Jul-17	Japan	10	0.8%	-0.7%	Gender Diversity Score (attraction, retention, promotion)	Gender Score Tilt
SSGA Gender Diversity Index	12-Feb-16	US	309	-0.7%	-6.0%	Women on Boards / Female CEO	Universe screen
Pax Global Women's Leadership Index	28-Feb-14	Global	203	0.8%	1.1%	Women on Boards / Leadership / Diversity	Universe screen
Barclays Women in Leadership	9-Jul-14	US	36	-7.5%	-11.7%	Women on Boards / Female CEO	Universe screen
MSCI World Women's Leadership Index	4-Aug-16	Global		-0.4%	-1.1%	Women on Boards / Leadership / Diversity	Universe screen
MSCI USA IMI Women's Leadership Index	4-Aug-16	US		0.8%	3.3%	Women on Boards / Leadership / Diversity	Universe screen
MSCI Europe Women's Leadership Index	4-Aug-16	Europe		2.2%	0.8%	Women on Boards / Leadership / Diversity	Universe screen
MSCI Canada IMI Women's Leadership Select Index	22-Feb-18	Canada		na		Women on Boards / Leadership / Diversity	Universe screen
FTSE All-Share Women on Boards Leadership Index	1-Feb-18	UK		0.5%		Women on Boards	Gender Score Tilt
Russell 1000 Women on Boards Leadership Index	1-Feb-18	US		1.0%		Women on Boards	Gender Score Tilt



Source for both charts: Bloomberg, Barclays, JPX, S&P, MSCI, FTSE, PAX, SSGA

Mandate driven / reverse enquiry indices:

- The JPX/S&P Capex & Human Capital Index by the Bank of Japan.
- MSCI Japan Empowering Women Index by Japanese investment community
- SSGA Gender Diversity Index by CalSTRS

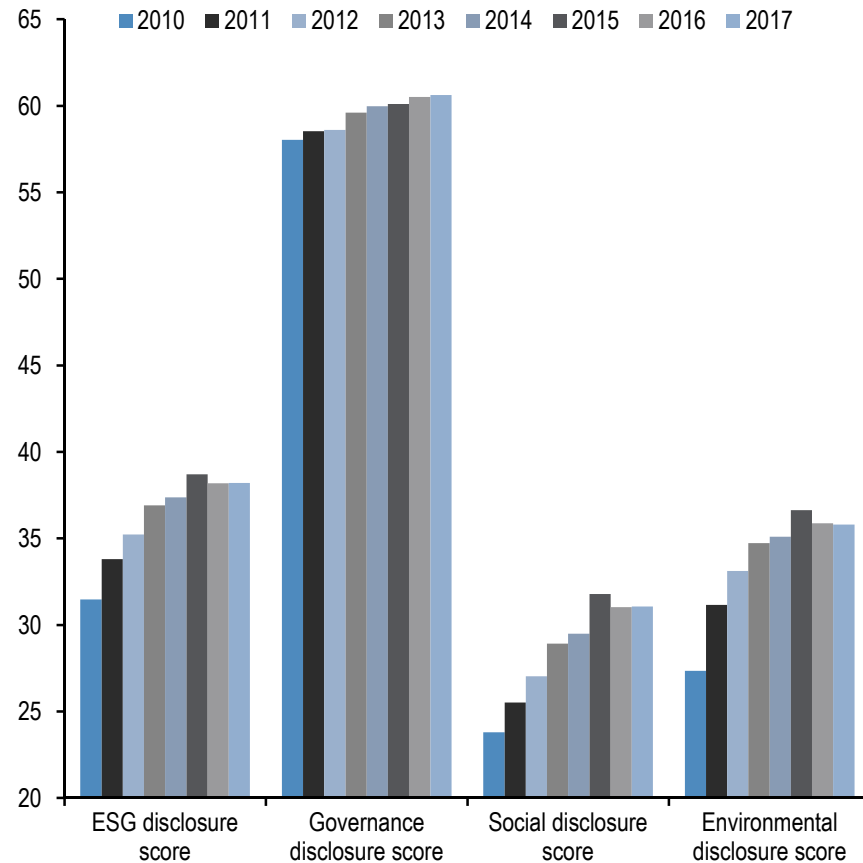
Broad based indices layered on conventional indices:

- The Pax Global Women's Leadership Index
- MSCI Global and Regional Women's Leadership Index Suite
- FTSE/Russell Women on Board Index Series

Is ESG having an impact? The increased attention on ESG has seen an increase in disclosure of ESG data by companies...

Average disclosure scores have improved gradually, though there has been some signs of peaking in 2015

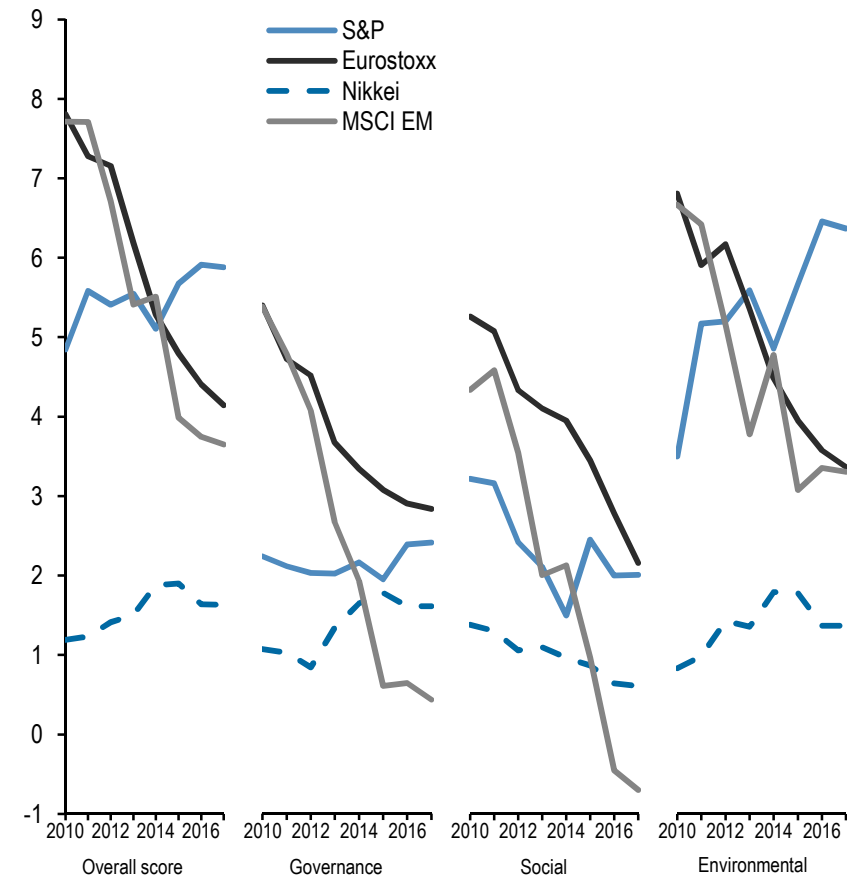
Market cap weighted average for a constant sample of companies in the S&P 500 index



Source: Bloomberg, J.P. Morgan

Smaller companies have improved disclosures more than larger ones in the Eurostoxx and MSCI EM

Difference between market capitalization- and equally-weighted scores as proxy for lar for the overall ESG disclosure score and the three pillars separately



Source: Bloomberg, J.P. Morgan

...as well as improvements in individual performance metrics

Individual ESG metrics have generally improved for S&P and Eurostoxx firms...

Market cap weighted average for a constant sample of companies in the S&P 500 and Eurostoxx indices for which each of the metrics are available

S&P		2010	2011	2012	2013	2014	2015	2016	2017
E	Total greenhouse gases to sales*	245	233	227	215	209	220	214	214
	% of companies with waste reduction policy in place	61.6	66.1	69.5	76.3	77.1	78.9	81.0	81.1
S	% of female executives	11.3	11.3	11.9	12.5	13.8	17.7	18.8	19.0
	Social supply chain management**	37.6	45.4	52.6	60.7	64.1	71.0	79.9	80.6
G	% of independent board members	81.6	82.5	83.2	83.7	84.3	84.0	84.6	84.7
	% of women on board	16.3	17.4	18.8	19.9	20.8	22.3	23.2	23.8

Eurostoxx

E	Total greenhouse gases to sales*	242	221	213	222	225	242	238	229
	% of companies with waste reduction policy in place	76.6	81.5	88.9	88.5	88.8	90.0	89.6	91.5
S	% of female executives	5.7	5.8	7.5	7.1	7.5	8.7	9.6	11.2
	Social supply chain management**	67.2	78.4	87.1	90.2	92.2	93.0	93.9	94.8
G	% of independent board members	57.9	59.1	59.9	61.9	60.6	61.4	62.1	62.7
	% of women on board	12.8	15.1	18.0	21.1	25.2	28.4	32.3	33.1

Source: Bloomberg, J.P. Morgan

...as well as Nikkei and MSCI EM firms, though there are some exceptions

Market cap weighted average for a constant sample of companies in the Nikkei 225 and MSCI EM indices for which each of the metrics are available

Nikkei		2010	2011	2012	2013	2014	2015	2016	2017
E	Total greenhouse gases to sales*	1.22	1.24	1.24	1.12	1.10	1.12	1.17	1.17
	% of companies with waste reduction policy in place	92.0	92.0	96.0	96.5	96.5	96.1	96.9	96.9
S	% of female executives	0.7	0.8	1.1	0.7	1.3	1.4	1.5	1.7
	Social supply chain management**	55.2	57.8	64.9	71.0	73.0	76.9	80.8	80.8
G	% of independent board members	15.9	17.9	20.5	23.1	26.4	29.9	32.4	32.6
	% of women on board	1.7	2.0	2.6	3.4	4.4	5.2	6.1	6.2

MSCI EM

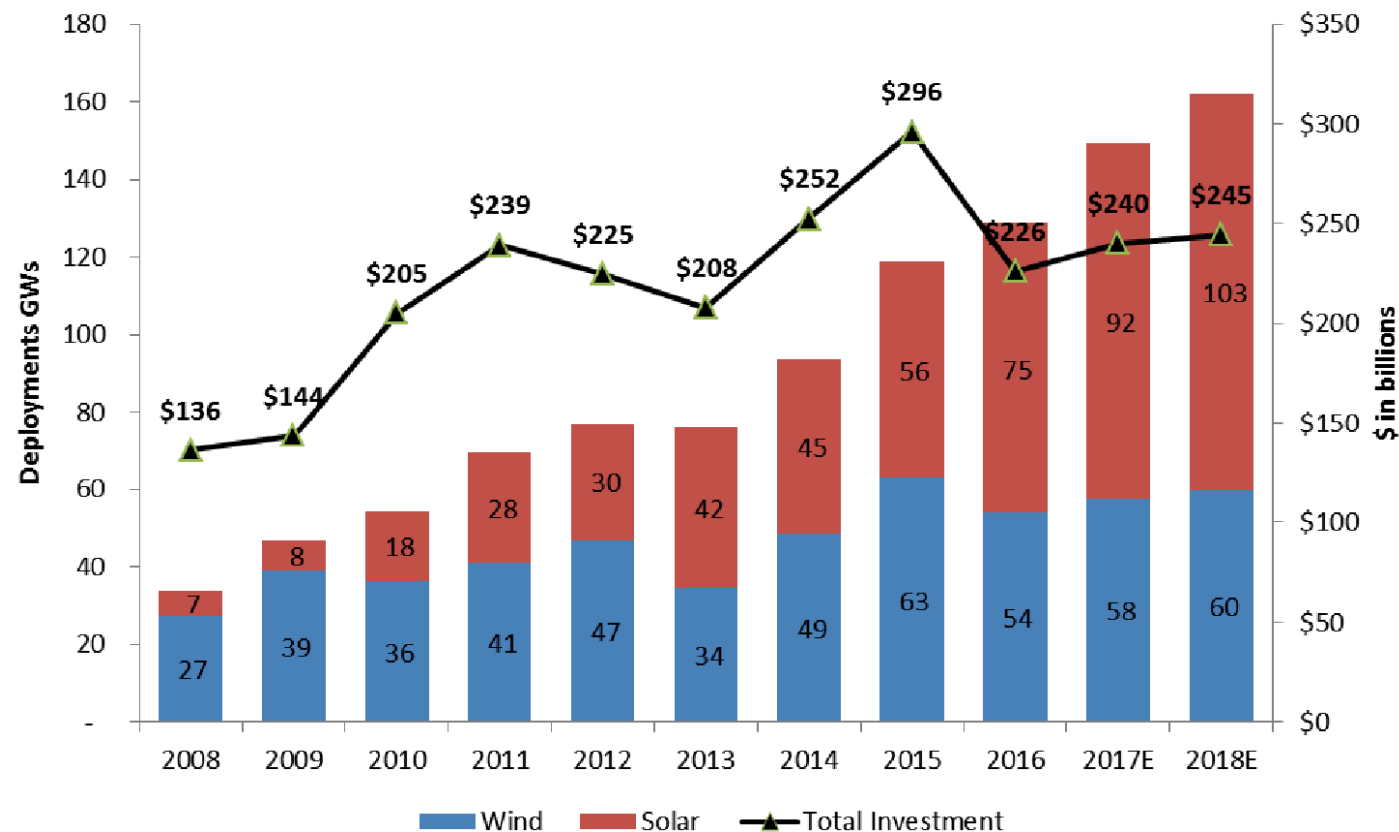
E	Total greenhouse gases to sales*	424	383	404	406	373	456	463	461
	% of companies with waste reduction policy in place	59.0	60.4	62.6	65.9	68.7	70.6	73.6	73.5
S	% of female executives	6.9	7.3	7.5	7.3	7.1	7.9	8.2	7.7
	Social supply chain management**	35.9	45.8	48.8	55.4	59.6	61.7	73.1	73.3
G	% of independent board members	42.8	44.3	45.1	44.3	44.4	44.4	45.4	45.3
	% of women on board	7.0	8.0	7.9	8.1	8.8	8.9	8.6	8.9

Source: Bloomberg, J.P. Morgan

Alternative Energy: Investment in renewables has exceeded investment in new fossil-fuel generating capacity since 2015

Investment Forecast for Wind and Solar Capacity Through 2018

Deployments in GWs, Investment in \$ Billions



Source: Bloomberg New Energy Finance, J.P. Morgan estimates.

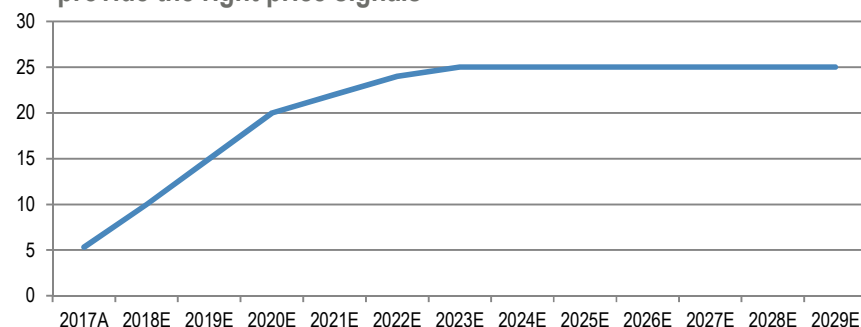
European Utilities: Setting Long Term Targets

More demanding renewable / efficiency targets for 2030

- Initial targets of the EU Commission for 2030:
 - **40% cut in greenhouse** gas emissions vs 1990
 - **27%+ share of renewable** energy consumption
 - **27%+ energy savings** vs BAU scenario
- An interim target towards the final target: to cost-effectively achieve de-carbonization by 2050.
- **The EU Parliament backs** more aggressive targets: from 27%+ to 35% target in renewables / efficiency
- **JPM expects a compromise at 30%.** The drop in the LCoE of new renewable projects means that meeting a 30% target would cost the same as initially estimated for the 27% target

Carbon emissions abatement: JPM estimated EU CO₂ allowances price trajectory

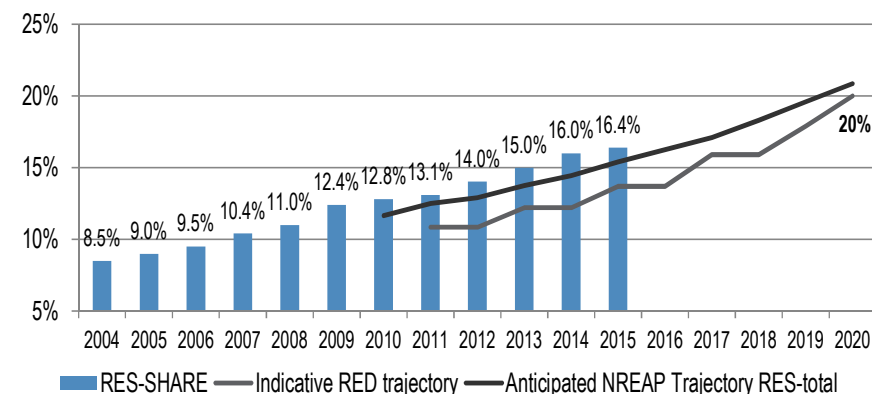
- **The Market Stability Reserve** starts to operate in Jan 2019
- It should allow to eliminate the structural oversupply of EU CO₂ allowances => **The EU Emissions Trading Scheme should finally provide the right price signals**



Source: J.P. Morgan estimates. 2017A is average YTD

De-carbonization via renewables: on track to meet 2020 target

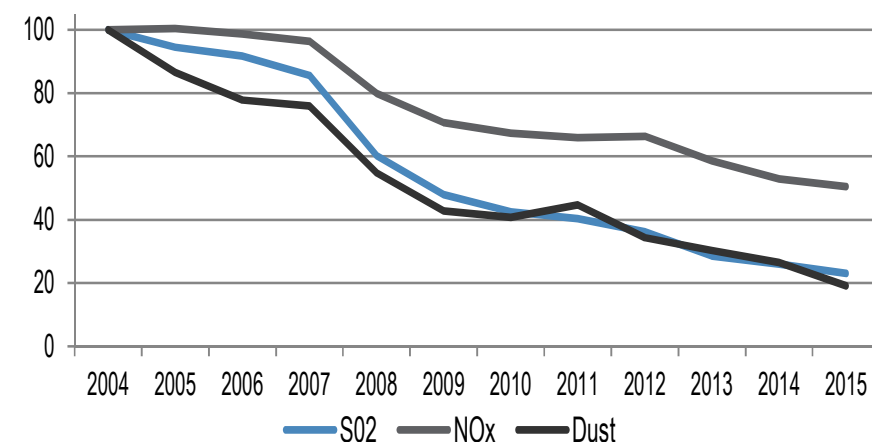
Renewables Share of EU Energy Production



Source: Renewable energy progress report

Evolution of SO₂, NO_x and dust emission in the EU

Index, 2004 = 100



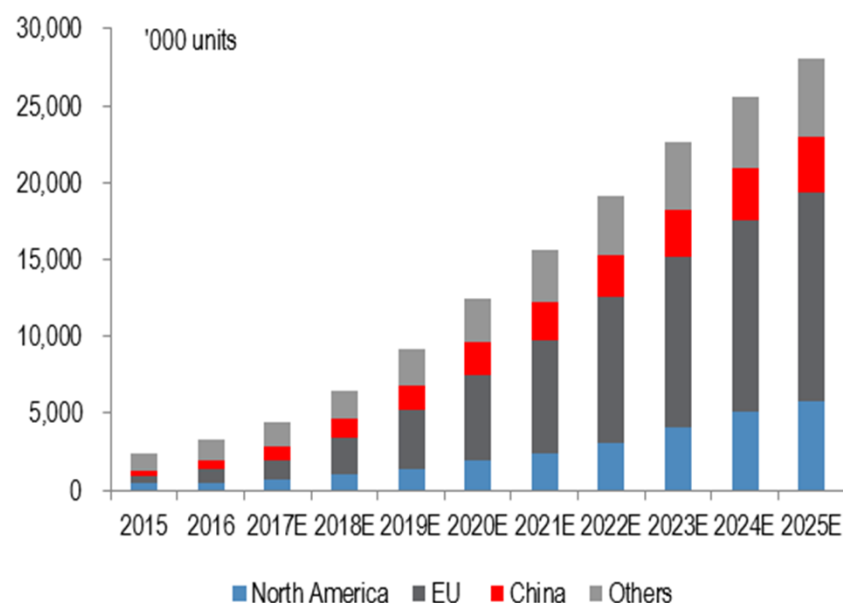
Source: European Environment Agency

China: New Energy Vehicle (NEV) market and policy

Key Points

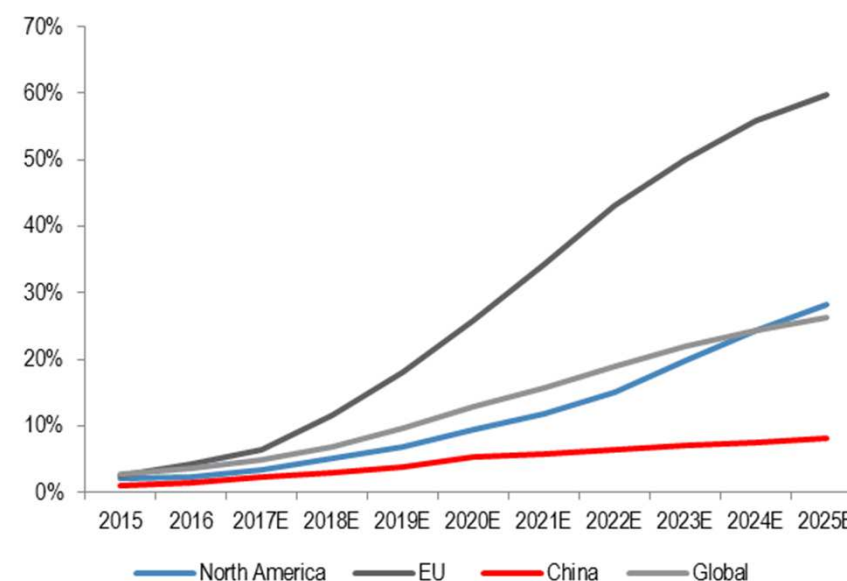
- The inconvenient truth: Automotive industry accounts for around 30% of NOx emissions in China nowadays.
- China clearly aims to lead the global NEV market (new energy vehicle) given its size and growth potential. In 2017, China accounted for 55% of global EV/PHEV demand which is expected to top 42%/37% by 2020/2025.
- Two main policies are designed not only to support NEV demand but also at the same time push carmakers to invest in R&D in this business: 1) financial subsidies and 2) a credit trading scheme.

J.P. Morgan global xEV forecast



Source: J.P. Morgan estimates, IHS

Global xEV penetration



Source: J.P. Morgan estimates, IHS

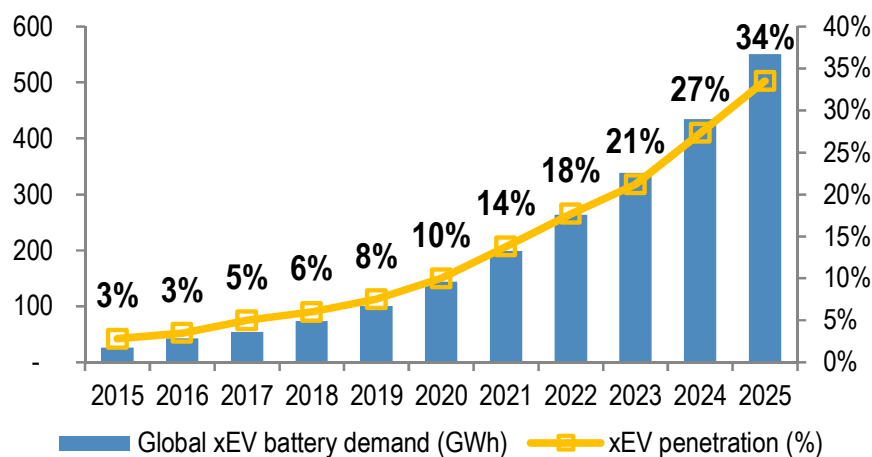
ESG in Asian technology – Green transportation and safe transportation

Key Points

- **Green Transportation – NEV transition to benefit EV batteries, auto semi and auto motor/drivetrain electrification**
 - **EV batteries:** We forecast high-teen % CAGR throughout 2025 in NEV battery market. The industry is likely to move towards the use of higher nickel/silicon chemistry and adopt battery recycling/reusing program for a sustainable business model.
 - **Auto semis:** Accelerated growth for NEV could benefit semi players, as we estimate average semi content per car to be 1.5x – 3x higher in EVs and HEVs than in conventional cars.
 - **Auto motors and drivetrain electrification:** Electrification will likely lift demand of high-output traction motors (to replace gasoline engine) and electrical subsystems powered by medium-output motors (to substitute mechanical subsystems).
- **Safe Transportation – From Assisted Driving to Fully Autonomous, driving more electronics content in automobiles**
 - **Govt. safety programs (ex: NCAP)** are targeting to increase road safety by pushing forward ADAS development. We believe this could support a widespread adoption of certain ADAS features, e.g. auto emergency braking and lane departure warning.

Global xEV battery demand/penetration forecast

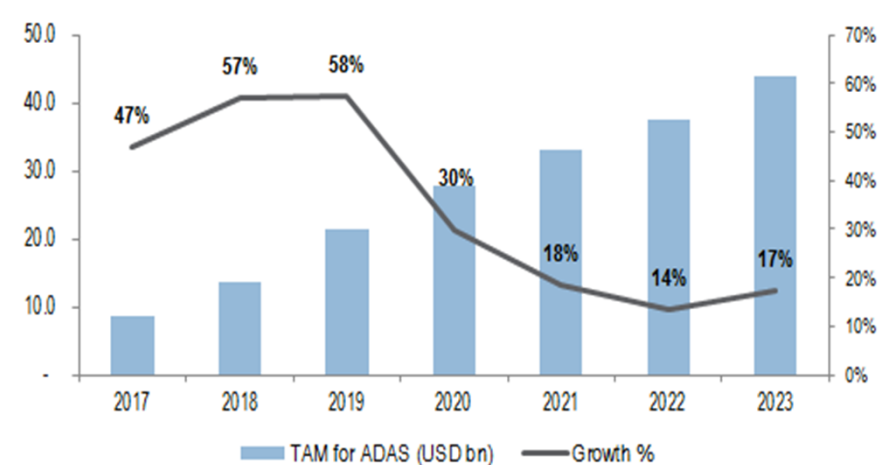
Demand (GWh), penetration (%)



Source: Company data, J.P. Morgan estimates. Note: xEV includes hybrid, Plug-in hybrid and pure EV.

ADAS-related automotive electronics addressable market

\$ mn, %



Source: J.P. Morgan estimates