

Green Bonds

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Green Bonds Definition

- **Green Bonds** can be defined as thematic capital-raising instruments whose proceeds will be exclusively applied (either by specifying Use , Direct Project Exposure, or Securitization) towards new and existing Green Projects
- **Green Projects** are defined as projects and activities with positive benefits for climate and the environment.

GREEN FINANCE

A growing community of financial institutions is taking action and demonstrating leadership on climate change



Swedish Bank SEB and World Bank IBRD partnership ignites development of green bond market



Public pension funds CalSTRS, AP2, AP3, UNJSPF and California State Treasurer are early supporters of green bond market



KfW, IFC and World Bank IBRD kick-start local markets (local currency bond)



Zurich Insurance Group to invest up to US\$2 billion in AAA rated green bond funds



US firm Bank of America Merrill Lynch (BoA) joins in corporate green bond issuance and sets ten year goal to reach US\$50 billion environmental business



The Economics of Green Bonds

Green Bonds' (GB) economic concept originates from Coase's theory of market efficiency and property rights.

According to this theory, instead of internalizing the externalities produced by private parties through Pigouvian taxes, market based mechanisms can be used to reconcile resource disputes.

Like other market instruments (ETS and PES), GBs engage two classes of traders: Buyers of Environmental Assets (Institutional Investors and Individuals) and Sellers, who commit to create or enhance Environmental Assets (Multilateral Institutions, Corporations, Governments and Public Agencies).

Together with ETS, PES and Carbon taxes, GBs aim to reduce CO₂ emissions (climate bonds) contribute to create a world market for carbon.

Green Bonds and Green GDP

(1) Net rather than Gross Economic Product should be used to account for welfare and growth (Green GDP should really be called Green NEP).

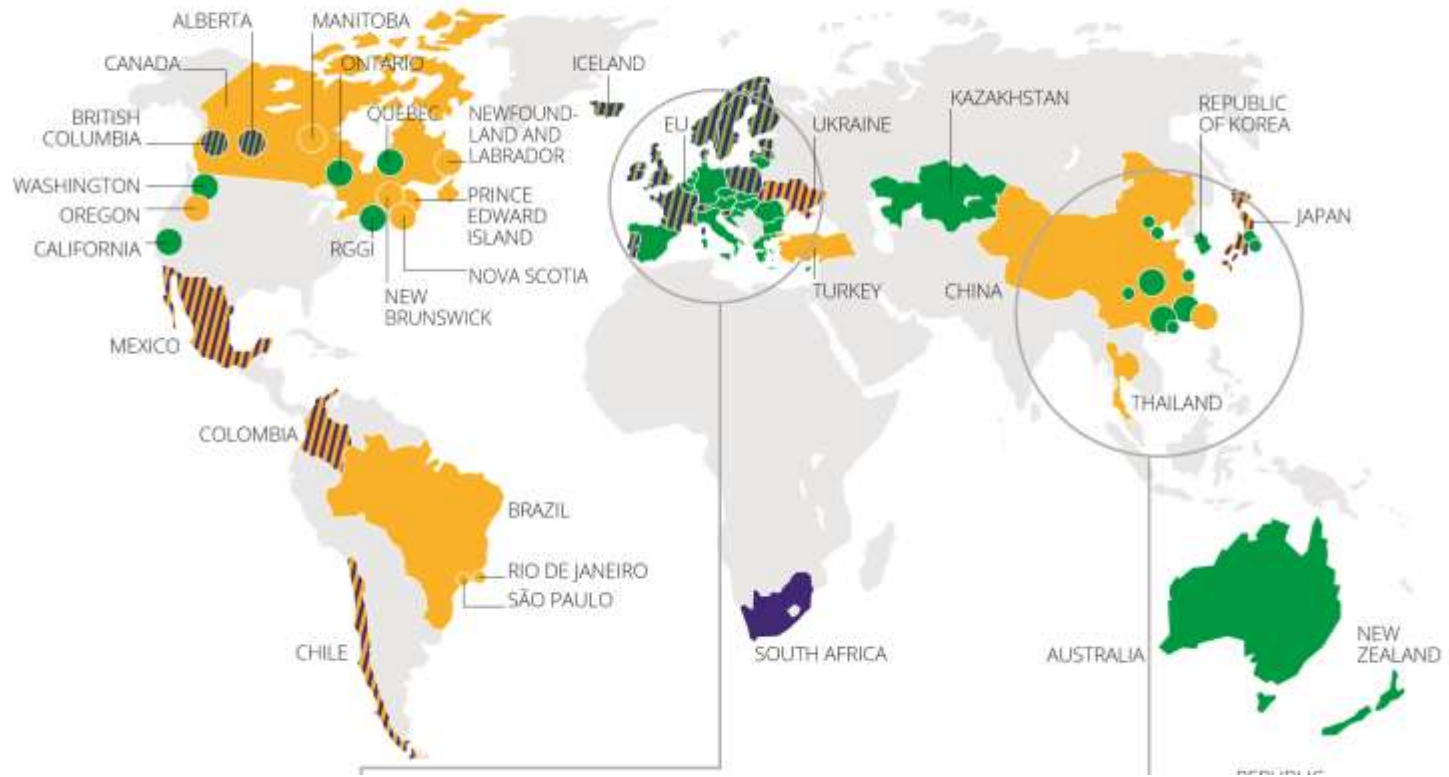
(2) Prices should include environmental externalities («Pigouvian» prices).

(3) Depreciation should include natural capital.

(4) Green bonds can contribute to both (2) and (3) by creating markets for environmental assets. But this requires their prices to move below correspondent plain vanilla bonds.

WORLDWIDE POLICIES

FIGURE 1 | Summary map of regional, national and subnational carbon pricing initiatives implemented, scheduled for implementation and under consideration (ETS and carbon tax)

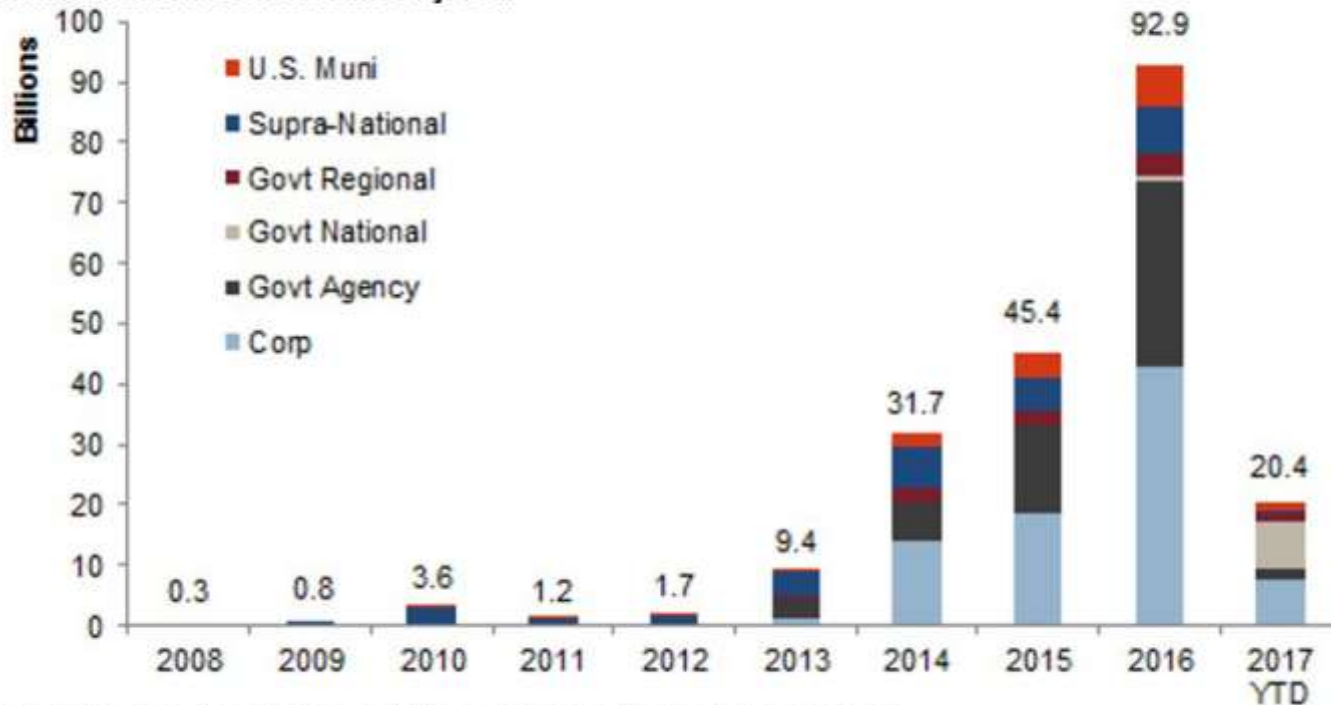


TYPES OF GREEN BONDS

- **GREEN USE OF PROCEEDS BOND** A standard recourse-to-the-issuer debt obligation for which the proceeds shall be moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process.
- **GREEN USE OF PROCEEDS REVENUE BOND** A non-recourse-to-the-issuer debt obligation in which the credit exposure in the bond is to the pledged cash flows of the revenue streams, fees, taxes etc., and the Use of Proceeds of the bond goes to related or unrelated Green Project(s).
- **GREEN PROJECT BOND** A project bond for a single or multiple Green Project(s) for which the investor has direct exposure to the risk of the project(s) with or without potential recourse to the issuer.
- **GREEN SECURITIZED BOND** A bond collateralized by one or more specific projects, including but not limited to covered bonds, ABS, and other structures.

The Growth of Green Bonds Today

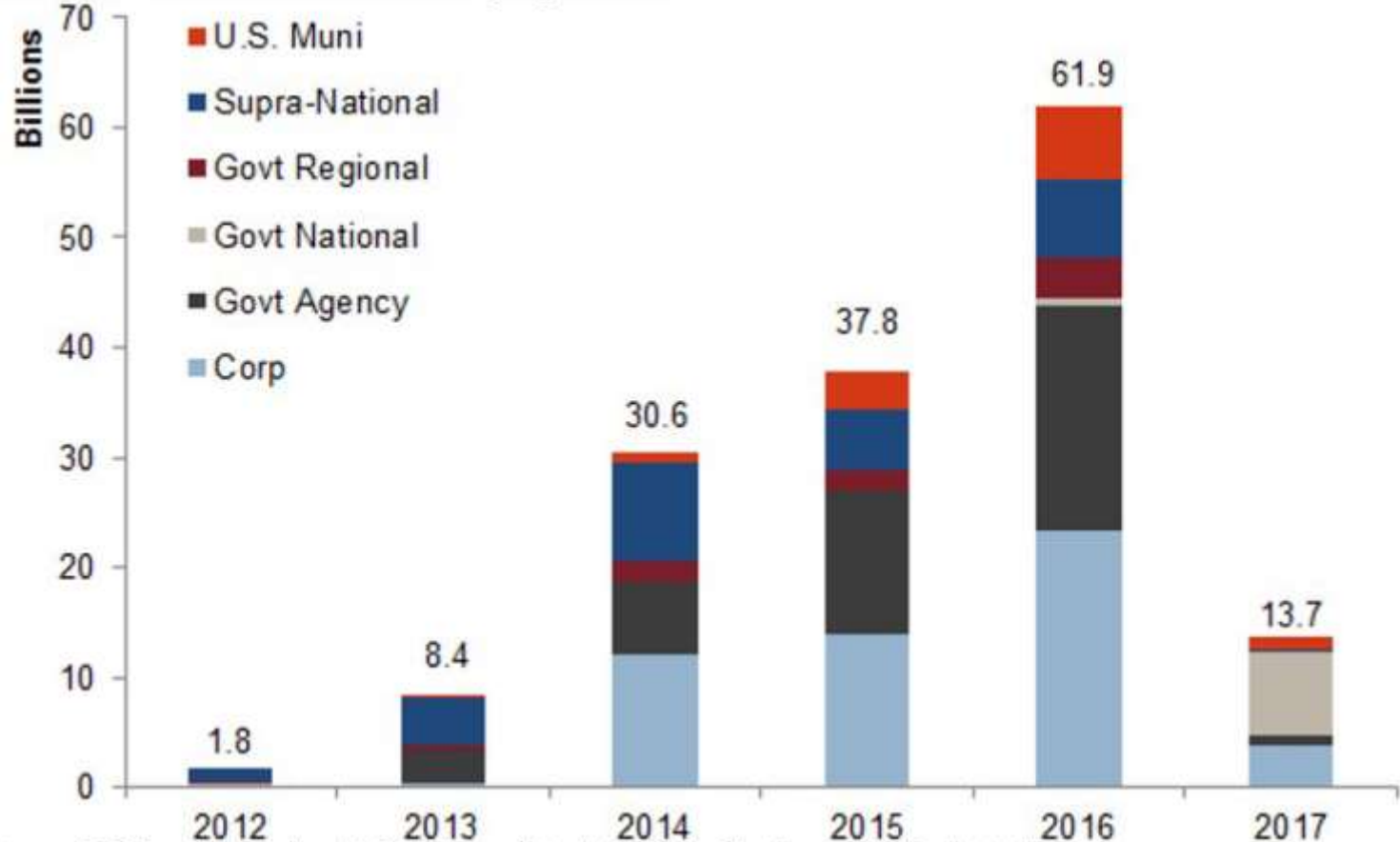
Exhibit 1: Green Bond Issuance by Year



Source: Bloomberg. Data as of March 23, 2017. Chart is provided for illustrative purposes.

The evolution of quality GBs

Exhibit 4: Green Bond Index Qualifying Issuance



Source: S&P Dow Jones Indices LLC. Data as of March 28, 2017. Chart is provided for illustrative purposes.

Are Green Bonds Developing a «Greenium»?

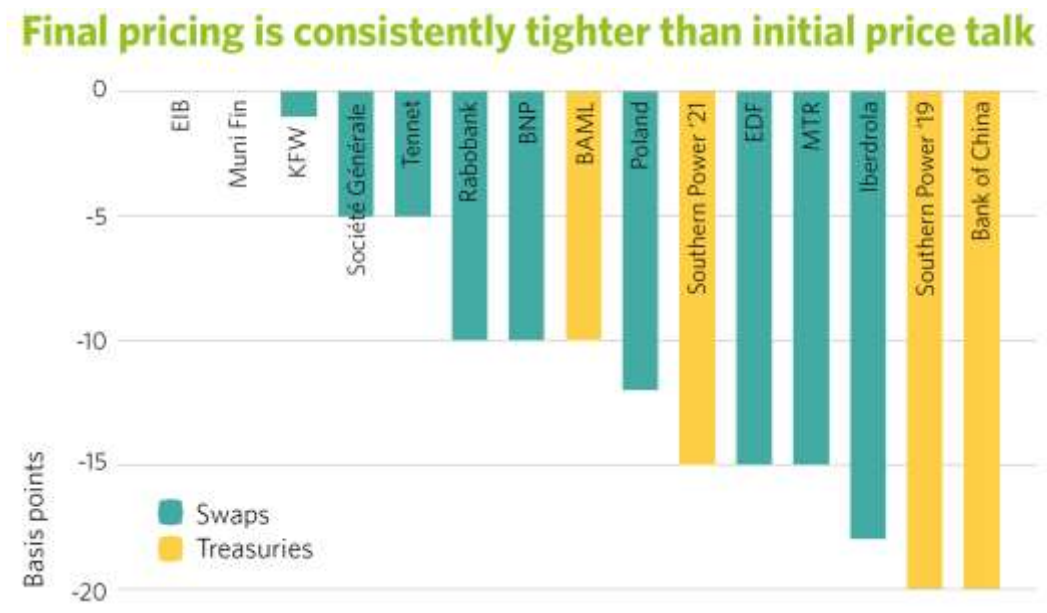
In the primary market, Green Bonds have been consistently oversubscribed.

They have also shown a tendency to be priced better than expected and to develop a premium thereafter.

Green bonds and green funds are trading at a premium in the secondary market, according to a few recent studies Lund University, Barclays and other research centers.

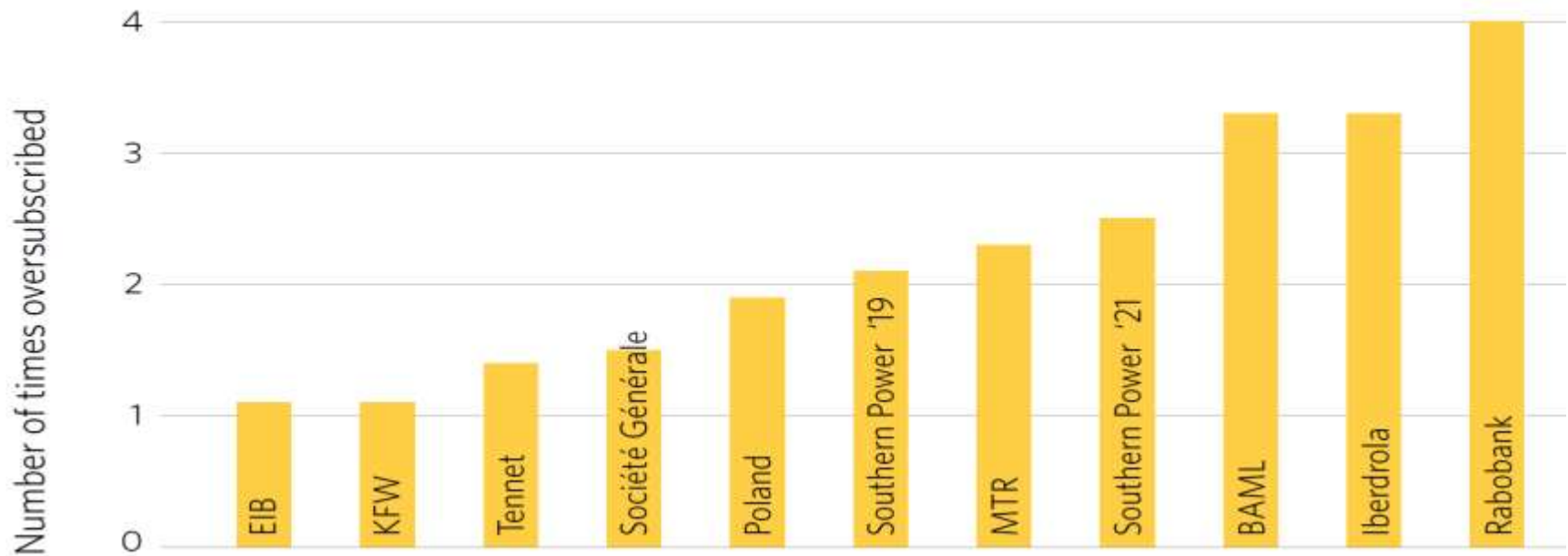
They have proved also to be less volatile during the past recession.

Is a “Greenium” emerging? Primary Market: Q4 2016 snapshot



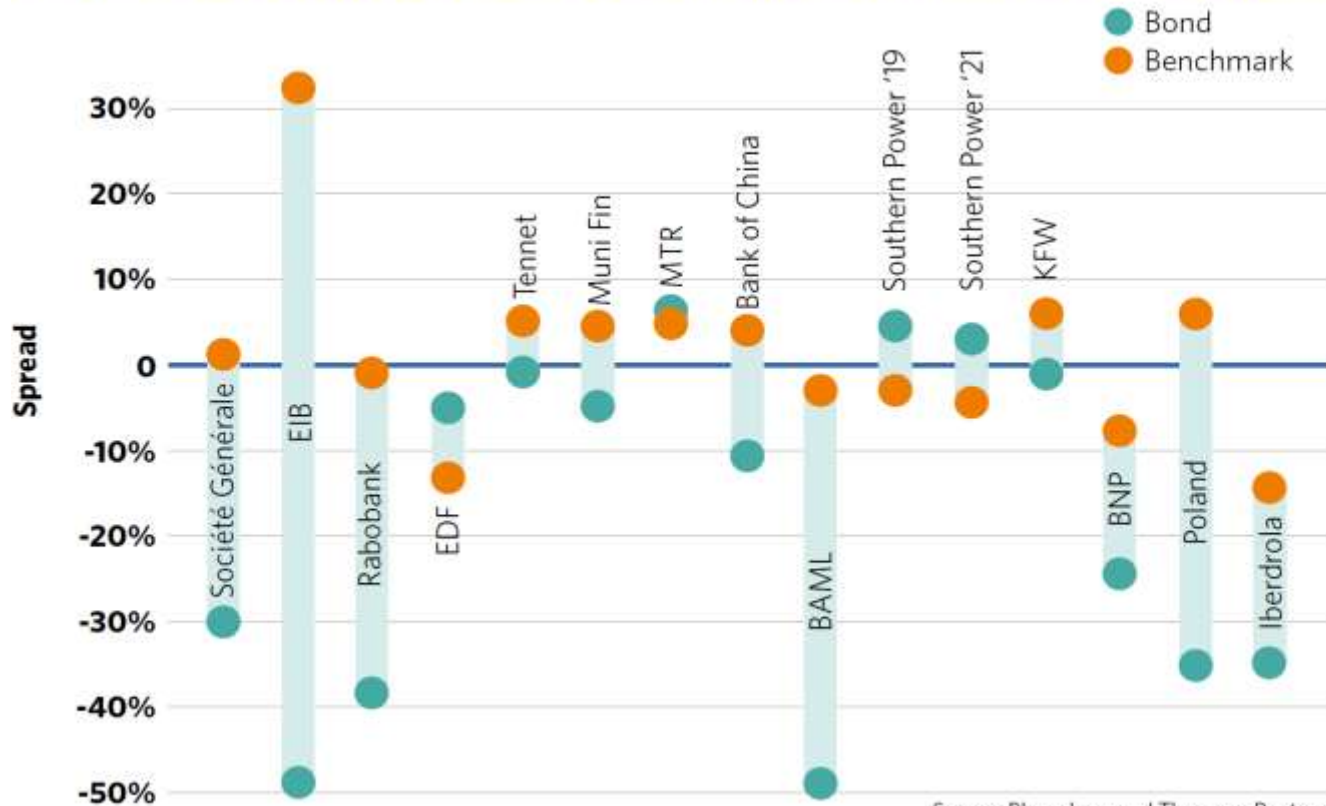
The «Greenium» reflects unmet demand for green bonds

Oversubscription is the norm



Market performance also reflects willingness to pay for green

After 28 days, most green bond tightened relative to the index



Source: Bloomberg and Thomson Reuters

The problem of evaluation

Green Bond Evaluation relates to Wealth Accounting: finding the true value of environmental goods and pricing them appropriately;

However, as multi-temporal contracts under uncertainty, GBs are affected by dynamic moral hazard and principal agent problems;

They can give rise also to adverse selection and lead to «green washing»

Thus evaluation should not only be «ex ante», but also «on going» and combined with monitoring.

Special features of the evaluation process

GBs are a trust good: they are no different from ordinary bonds unless the buyers trust the issuers' green promises.

However, as trust goods, they must send credible signals and provide acceptable guarantees until green reputation is established.

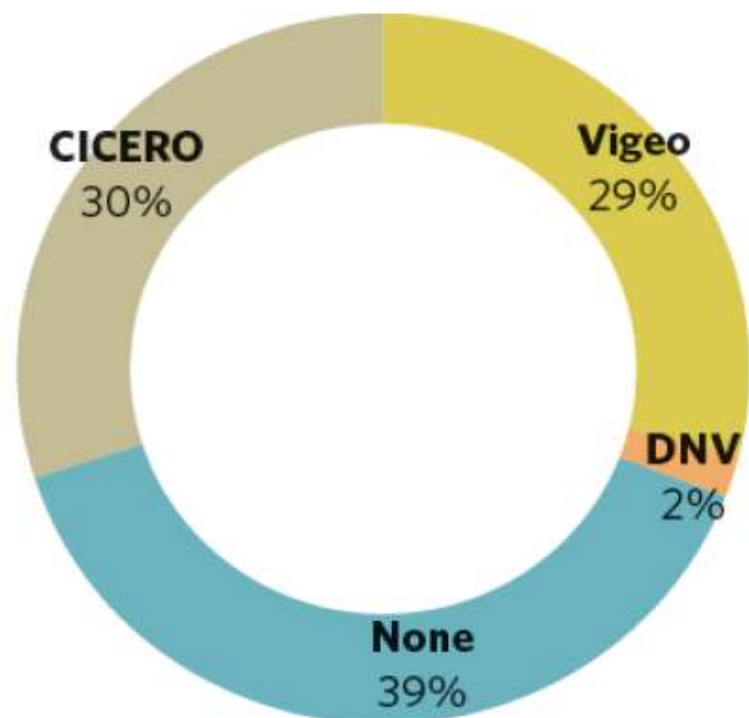
The evaluation process thus aims to assess capability and likelihood of green value creation within a framework of economic efficiency and project effectiveness.

Evaluation is aimed both to issuers and projects and should concern both predicted and realized green performance.

STATE OF THE ART IN GREEN BOND EVALUATION

Independent reviews

- Bespoke review
- Divergent methodologies / no common
- Verification the norm in EU not yet US
- Green Bonds principle pushes for independ
- Especially important with corporates



Green Bonds Rating

Exhibit 15: Moody's Green Bond Assessment Methodology

Assessment Overview



Five main targets of evaluation

- (i) the credibility of the environmental concern and activities of its issuer,
- (ii) the commitment of the issuer to the use of the funds obtained and to the purpose of the loan,
- (iii) the issuer's capability to implement the program or project proposed ,
- (iv) the project's capacity to deliver the output and the outcome promised, and
- (v) the likely impact of the project on the economy and the environment.

Principal – Agent and moral hazard problems

GB issuers can engage in hidden information and hidden action.

They may be less than transparent on their green investment practices, capabilities and plans.

If market conditions change in the course of time, they may be tempted to scale down or even abandon their green commitments.

For these reasons, issuers cannot credibly commit to green policies unless comprehensive evaluation both ex ante , on going and ex post and reliable monitoring are assured.

Four types of possible GB inefficiencies to evaluate

(a) Financing projects that do not improve the environment.

(b) Inducing the adoption of socially-undesirable resource uses, that supply environmental services, but at a cost higher than the value of the services .

(c) Financing the adoption of practices that would have been adopted anyway .

(4) Failing to deliver thus causing reputational losses that spill over the whole green sector.

EVALUATING RISKS

GREEN WASHING LIGHTER GREENING TARGET MISSING POLICY CHANGES

Use of proceeds
for not-green
investments

Environmental
benefits not as
significant as
expected

Investments do not
materialize as
expected either in
quantity or in timing

Resulting in
possible regulatory
or legal challenges



DAMAGES TO REPUTATION OF STAKEHOLDERS AND GBs

BUYERS

UNDERWRITERS

ISSUERS

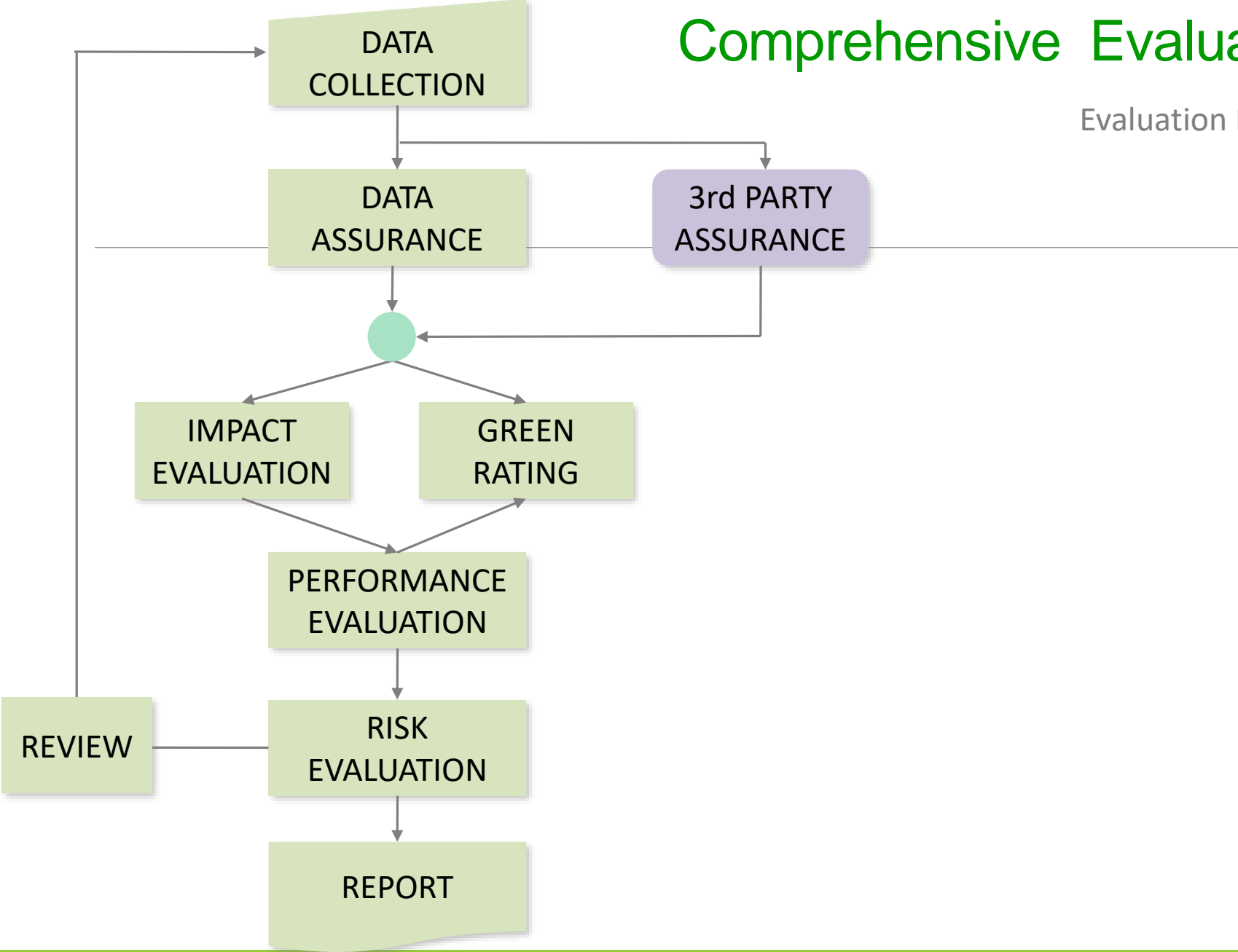
GREEN BONDS POSITIVE EFFECTS

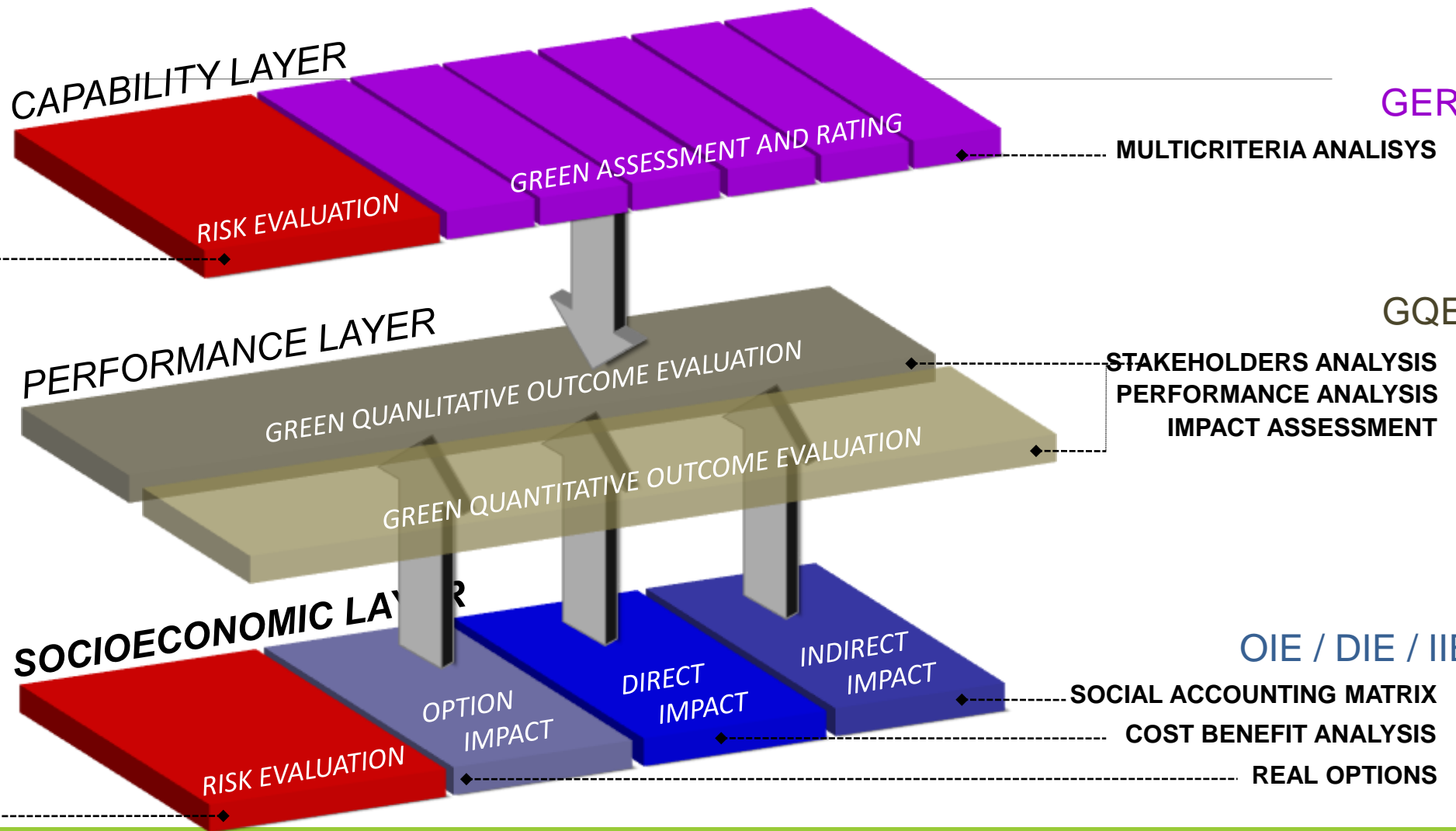
Finance Sector Leadership Actions

	Positive Outcomes	Capital deployment	Reducing emissions	Improving transparency	Changing corporate behaviour	Supporting better policy	Knowledge development
Low carbon investing and financing	✓	✓	✓				✓
Emissions reducing investing and financing	✓	✓	✓				✓
Adaptation finance and investing	✓	✓	✓				✓
Measurement and transparency			✓	✓	✓		✓
Engagement with companies			✓	✓			✓
Engagement with policy makers						✓	✓

Comprehensive Evaluation

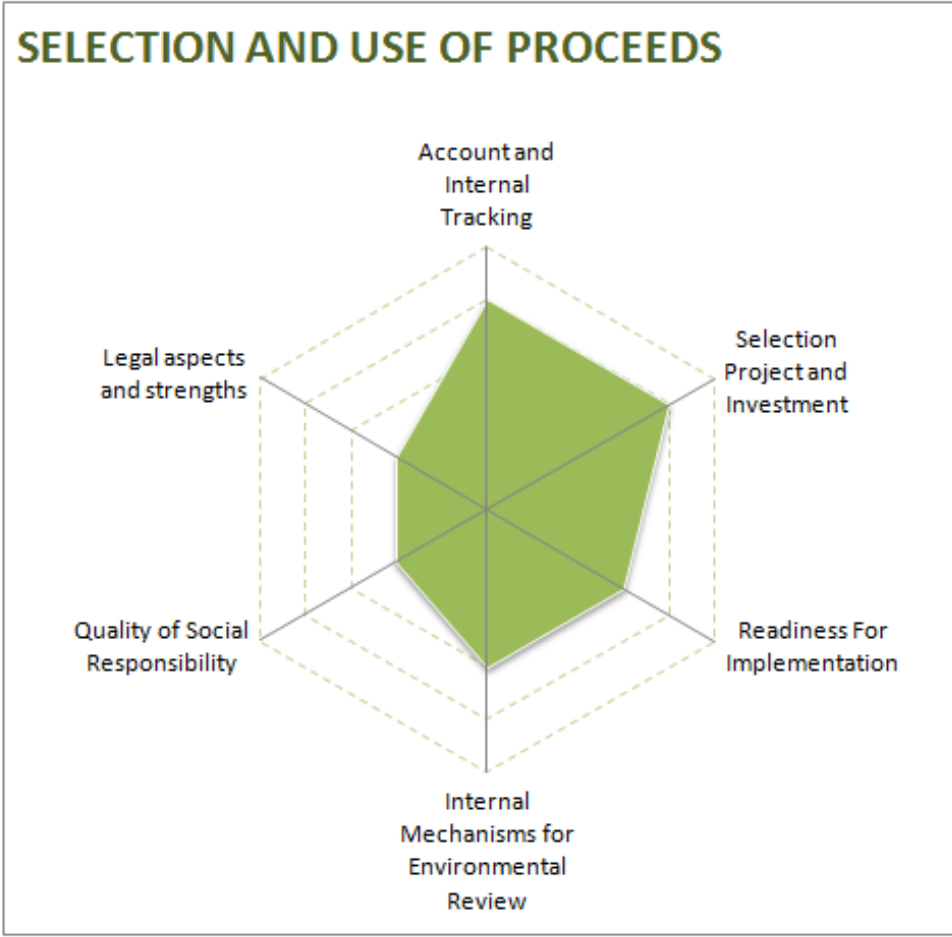
Evaluation Process





SELECTION AND USE OF PROCEEDS	Accounts and Internal Tracking
	Selection of Projects and Investments
	Readiness For Implementation
	Internal Mechanisms for Environmental Review
	Quality of Social Responsibility
	Legal aspects and strengths

A
A
BB
BB
CCC
CCC



Multicriteria application : a case study for Mexico

Category	Implementation	Phaseless
Credibility of the environmental concern and activities	BBB	BB
Reputational, Local and Environmental Risks	BB	B
Borrower's Capacity to Carry out Programs	A	BBB
Program Definition and Execution	B	CCC
Commitment of the issuer to the use of the funds obtained	AA	A
Reporting Evaluation and Assurance	BB	B
Economic Evaluation	B	B
Overall phaseless score	BB	
Overall Stage score	B	

Comprehensive evaluation : a case study for Mexico

Category	Subcategory	Rating
Credibility of the environmental concern and activities	Account and Internal Tracking	A
	Selection Project and Investment	BBB
	Readiness For Implementation	A
	Internal Mechanisms for Environmental Review	A
	Quality of Social Responsibility	BBB
	Legal aspects and strengths	AA
Reputational, Local and Environmental Risks	Political risks	BB
	State financial risks	BB
	State economic risks	BB
	Site specific political risks	BB
	Business climate risks	BB
	Infrastructure development	B
	Natural hazards	BB
Borrowers Capacity to Carry out Programs	Competences and experience	A
	Soft and hard resources	AAA
	Financial resources and liabilities	BB

Green evaluation: a case study for Mexico

Program Definition and Execution	Concept selection	BB
	Business planning	BB
	Design	BBB
	Construction	BB
	O&M	AAA
	Work planning	BBB
	Cost Management	BB
	Risk Management	B
	Organisation	AA
	Health, Safety and Environment (HSE)	B
	Reporting	AAA
	Audit & quality assurance	BB
	Commitment of the issuer to the use of the funds obtained	Use and Control Funds
Size and complexity		AA
Reporting Evaluation and Assurance	Report Transparencies	BB
	Quantitative Evaluation	AAA
	Qualitative Evaluation	BBB
	Stakeholder Consultation	AAA
	Publicly Available	AAA
	Thirty party independent verification	AAA
Integration	BB	

Green Impact Evaluation for Mexico

We consider a stylized “green” public investment and policy program in Mexico, mainly centered on the power sectors and energy saving measures, designed over ten years, centered on green technologies, consistent with the main tenets of Mexico green policy plan and aimed at reducing oil and gas consumption as well as pollutant emissions.

Is such a program sustainable and could green bonds contribute to finance it?

What would be the value of the green assets created?

Would a green program be sustainable in Mexico?

Economic model (SAM based) estimates:

For each billion pesos (56 billion USD) of expenditure, without considering the structural gains from pollutant reduction, value added present value over 10 years (PV at 6% discount) increases by 683 billion pesos, while PVs of carbon and air pollution reduction are, respectively 453 and 881 million.

Structural change results are estimated at PV of 556 billion of pesos. The effects in terms of pollution values is equal to a 6.8 billion pesos reduction for carbon (evaluated at the carbon tax level, but potentially much more if evaluated at the opportunity cost of carbon) for Carbon CHG and 2,4 billion pesos for the reduction of Air Pollution.

Green asset creation estimates

- (1) Permanent reduction in the propensity to use fuel and electricity for households.
- (2) Increase in the use efficiency of energy by the production sectors, and, as a consequence, a reduction of CHG and low atmospheric pollutant emissions.
- (3) Total present value effect on GDP equal to 1240 billion of pesos.

Mexico green bond

London: 17:00 GMT: 5/11/2015: The Climate Bonds Initiative has welcomed the move by Mexican based development bank Nacional Financiera, S.N.C (Nafin) to issue the first Mexican green bond and the first Latin American bond to gain Climate Bond Certification by the Climate Bonds Standard Board.

The USD 500 million bond has a five-year tenure, and a yield to maturity of 3.41. Registered demand reached an amount over USD 2.5billion – five times more than the total allocated amount. Bond proceeds will be solely focussed on wind energy projects.

The announcement is a significant milestone in the development of green bonds in Latin America.

Basic References

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**KEEP
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AND
THANKS FOR
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