CarbonCount® Methodology

CarbonCount® is a scoring tool that evaluates bond investments in U.S.-based, energy efficiency (EE) and renewable energy (RE) projects to determine how effectively they can be expected to reduce CO_2 emissions per $1,000 of investment.

The Alliance to Save Energy is an internationally known and respected non-profit organization led by industry leaders including Southern Company, the Edison Electric Institute, Whirlpool Corporation, and The Dow Chemical Company, that now offers third-party green bond certifications in accordance with the CarbonCount® methodology. Through our CarbonCount® methodology, the Alliance aims to increase financial flows toward, and justify favorable capital pricing for, projects that promise superior climate benefits.

The CarbonCount® scoring tool is the winner of a Finance for Resilience (FiRe) prize, competitively awarded at the 2015 Bloomberg New Energy Finance Summit. FiRe recognizes innovative projects that accelerate finance for clean energy, climate, sustainability and green growth. In November 2015, HSBC praised the CarbonCount® process for its ability to provide the "single metric" that investors need to "compare the environmental quality of green bonds".

What is the Goal?

- Provide a single, concise, comparable and readily-available metric for RE and EE projects
- Promote accountability and transparency in the growing green bond market
- Encourage allocation of funds to those projects that are most impactful in terms of avoiding climate change
- Increase demand (and therefore price) for the most impactful bonds, which should ultimately lower borrowing costs for project developers

How Does It Work?

A CarbonCount® score combines forward-looking project data already used for credit ratings, emissions modeling software developed by the U.S. Environmental Protection Agency, and standard assumptions for renewable generation and building energy use developed by U.S. Department of Energy and U.S. national labs to produce a quantitative score tailored for use by finance professionals. The CarbonCount® score is denoted in metric tons saved annually per $1,000 of investment.

$$\frac{\begin{pmatrix}Annaul\ Hourly\ MWh/Therms\\ Avoided\ by\ Underlying\\ EE\ and\ RE\ Projects\end{pmatrix} \times \begin{pmatrix}Dynamically\ Calculated,\\ Location\ Specific\ Hourly\\ Grid\ Emissions\ Factor\end{pmatrix}}{Total\ Capital\ Cost} = CarbonCount^{®}\ Score$$

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What Drives a CarbonCount Score?

The CarbonCount® score is driven by three primary variables:

- Regional electricity grid fuel mix & emissions factor
- Project operating profile & capacity factor (RE) and/or avoided energy use (EE)
- Project Cost

	Bond Issuance		
	Continental Wind	Hannon Armstrong SYB 2015-1 Solar and Wind	SolarCity 2013-1
Weighted Average Capacity Factor	30%	27% (wind), 28% (solar)	16%
Electricity Market	MI (41%) KS (23%) ID (14%) Other (22%)	CA (78%) NV (6%) NM (6%) Other (20%)	CA (47%) AZ (28%) CO(11%) Other (14%)
Effective Emissions Factor (tCO2/MWh)	0.67	0.49	0.52
Derived Cost per MW	$1.71m	70% Solar: $3.12m 30% Wind: $2.24m	$4.52m
CarbonCount® Score	**1.04**	**0.39**	**0.16**

How Can You Participate?

- Issuers
  - Have the Alliance to Save Energy score your bond
- Portfolio managers
  - Ask Issuers to provide a CarbonCount® rating
- All parties
  - Demand information on CO_2 emissions impact per $ unit of investment

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How Many CarbonCount® Scores Have Been Calculated?

The Alliance has scored nine issuances, and has engaged with Connecticut Green Bank to score an additional bond.

1. **Continental Wind LLC Senior Secured Bond:** used to refinance the construction cost of a 13-project wind portfolio with a total capacity of approximately 667 MW distributed across the United States.
   ~1.04 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Bond

2. **Southern California Public Power Authority's Milford Phase One Revenue Bond:** used to fund the prepayment by Southern California Public Power Authority of the electricity to be generated by a 203.5 MW wind farm over the 20-year delivery term of the project's power purchase agreement (PPA).
   ~0.39 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Bond

3. **SolarCity Series I LMC 2013-1 Bond:** asset-backed securities supported by 5,033 operational rooftop and ground-mounted solar PV systems. The systems have a total capacity of 43.9 MW distributed across the United States
   ~0.36 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Bond

4. **Topaz Solar Farms LLC Series A Senior Secured Bond:** used to refinance the construction cost of a 550 MW_{ac} solar PV power project in San Luis Obispo, California. Construction began in December 2011 and achieved commercial operation ahead of schedule in November 2014.
   ~0.20 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Bond

5. **Hannon Armstrong Sustainable Yield Bond—Representative Example:** representative example of an estimated $90 million face value bond secured by governmental energy savings performance contract (ESPC) projects.
   ~0.52 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Bond

6. **Hannon Armstrong Private Placement:** asset-backed securities supported by utility scale solar and wind real estate related assets.
   ~0.39 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Bond

7. **Deutsche Bank AG transaction with HA Rooftop I, LLC:** purchase of a portfolio of residential solar photovoltaic facilities located in several U.S. states.
   ~0.14 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Estimated Asset Value

8. **Hannon Armstrong Global Wind LLC:** purchase of a portfolio of wind facilities located in the Upper Midwest of the U.S.
   ~1.92 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Estimated Asset Value

9. **Hannon Armstrong Municipal Energy Efficiency and Solar Bond:** purchase of a portfolio of municipal energy efficiency and solar projects in California, Arizona, and Tennessee.
   ~0.27 Metric Tons of CO_2 Emissions Offset (in 1 Year) per $1,000 Estimated Asset Value

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