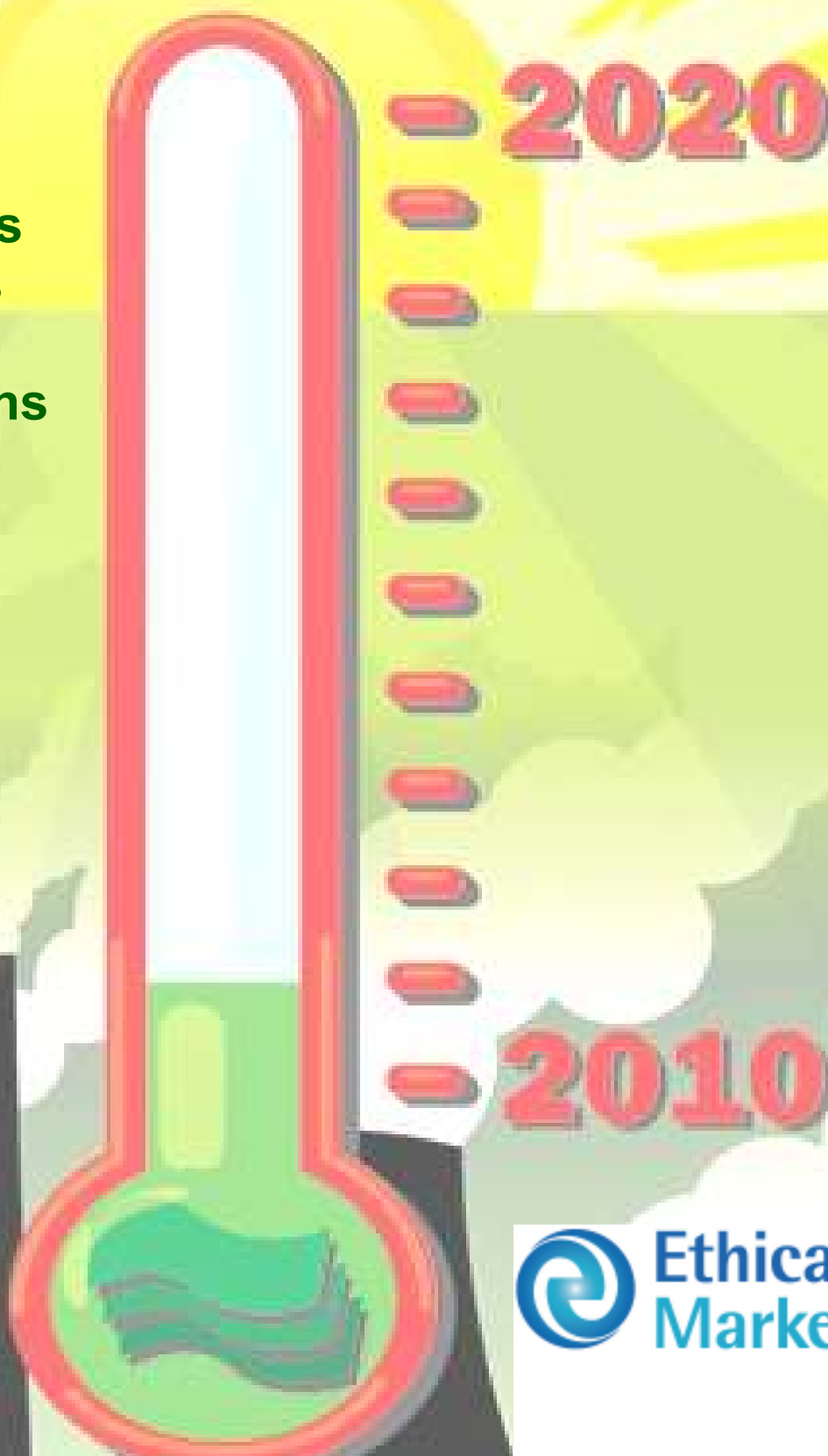


Report on the Green Transition Scoreboard®

February 2011

A Primer for
Pension Funds
Endowments
Institutions
Foundations
VCs



I am dedicating my work on this report to the memory of the great Indian futurist, DR. J.C. KAPUR, scholar and publisher of *World Affairs Journal*, engineer, pioneer of solar and renewable energy, founder-chairman of the Kapur Surya Foundation, World Public Forum - Dialogue of Civilizations. His vision guided so many of us in understanding the boundless options and future possibilities of our human family. His legacy will be commemorated in Delhi on March 12th, and I will be there in spirit with his dear spouse and lifelong partner Urmilla Kapur and her family.

Hazel Henderson, Feb. 17, 2011

Report on the Green Transition Scoreboard® February 2011

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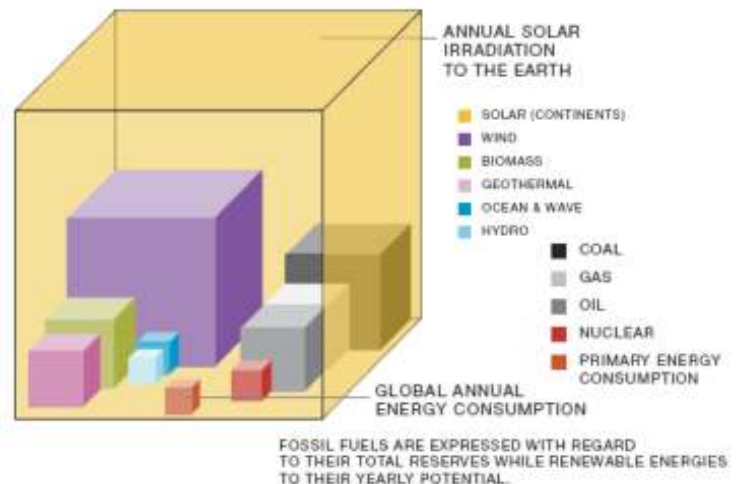
A Personal Note from Hazel Henderson



The global economy is now at a tipping point – emerging from the 300-year fossil-fueled Industrial Era to the cleaner, greener information-rich renewable energy societies which I predicted in my [The Politics of the Solar Age](#) in 1981. Although prominently reviewed in the *New York Times* and based on six years of service on the Technology Assessment Advisory Council of the US Office of Technology Assessment, the National Science Foundation and the National Academy of Engineering – my book went unheeded until recently. The health and environmental damage of reliance on fossil fuels led me to found Citizens for Clean Air in New York City in 1964 and persuade local media to carry an Air Pollution Index on weather reports. Technology assessment research deepened my understanding of the scientific realities now entering public awareness: our planet Earth is awash in energy – that free daily photon shower from the sun. We now need to accelerate our methods for efficient capture and use of this gift of Nature which green plants innovated in photosynthesis – providing food for humanity.

While waiting for the politics to reflect the coming Solar Age, I became a patient, well-informed, long-term investor, delving deeper into why economics and finance were missing this transition – obscured by fallacies of "efficient markets" and "rational actors." I avoided this herd behavior by becoming an early investor in Jeffrey Leonard's Global Environment Fund, whose world view matched mine: find companies in efficient, renewable technologies, minimizing throughput of energy and materials used in producing national output. This confirmed my view that GDP gives a [Grossly Distorted Picture](#) of a country's progress. My understanding expanded after founder Wayne Silby's invitation in 1982 to join the Advisory Council of the Calvert Group of socially responsible mutual funds. By 2000, I and Calvert launched our Calvert-Henderson Quality of Life Indicators as an unbundled dashboard of 12 systemic trends in national progress (www.calvert-henderson.com).

Changing the scorecards of success both at the company and national accounts levels became my passion. Calvert deepened my understanding of the role of finance in technological innovation. Both public and private finance can play leadership roles: public investments created satellite communications, the internet, the inter-state highway system and many civilian spinoffs of military budgets, while the private sector innovated in chemistry, biotech, the worldwide web-based economy and a whole range of efficient, renewable energy and materials technologies. These latter innovations were largely ignored by Wall Street due to those fallacies in economic textbooks and their EMH underlying most financial models: CAPMs, Value at Risk, Black-Scholes-Merton Options Pricing as well as security analysts' asset allocation "buckets" which still lack a sustainability sector. Solar, wind, geothermal, whose annual potential exceeds total reserves of fossil fuels, are lost in their Energy sector ([still dominated by oil](#)).

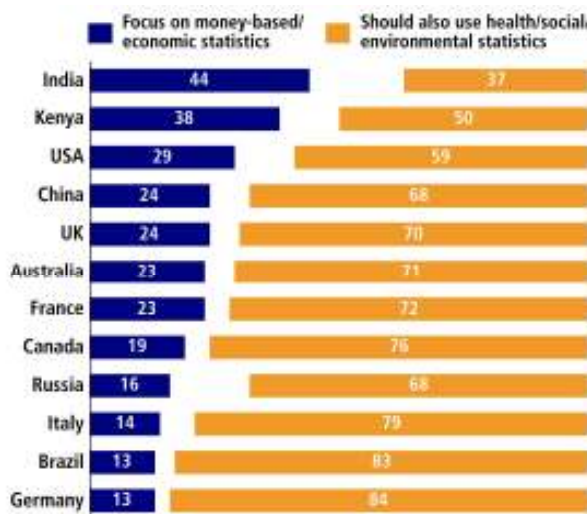


Solar Irradiation versus established global energy resources ***Solar Generation 6, EPIA 2011***

Energy efficiency was lost to investors' view until Bloomberg and FTSE began noticing their rapid paybacks of 12-24 months, obscured by textbook economics ignoring the "externalities." The FTSE's EO Energy Efficiency Index highlights these investment opportunities – now increasing as subsidies to fossil fuels are cut in many countries and making such cuts is on the agenda of the G-20.

Calvert, Pax World, Domini and other SRI funds pioneered, along with Alice Tepper Marlin's Council on Economic Priorities, the new metrics of ESG company valuation. At the UN, Dr. Elizabeth Dowdswell, head of UNEP, pioneered UNEP-FI, bringing global financial groups into awareness of how economies are dependent on nature's ecosystems. Thoughtful financiers pondering their persistent crises are learning from ecologists how to correct financial models, while recognizing that finance is a part of our global commons (www.transformingfinance.net).

Out of UNEP-FI, many initiatives have now joined the global Green Transition: UN-PRI with 800 firms with assets under management of \$25 trillion; the UN Global Compact with 5300 signatory companies to its 10 Principles of Global Corporate Citizenship, the Green Economy Initiative with UNDP, ILO and the new TEEB analyses of the value of ecosystems and biodiversity as material to asset valuation. In the private



Beyond GDP: International Public Opinion on Measuring National Progress 2010, Globescan and Ethical Markets Media, January 2011

sector, SwissRE, CERES, the GRI, REN 21 and WWF joined in pioneering new metrics, while new stock indices and market letters covered the emerging green sectors, companies and investors. Among individuals, our research with Globescan shows the growing awareness of the value of environmental considerations to overall wellbeing.

By 2003, I had decided that it was time to launch Ethical Markets Media to help reform markets and grow the green economy globally. My green investments were flourishing. Pioneers Matthew Kiernan, founder of Innovest, Nicholas Parker, founder of Cleantech, Jeffrey Leonard and all the daily news of the Green Transition needed a special media voice. As I posted all the daily

news on Ethical Markets, I saw the need to track all the private investment in green sectors to give a clearer overview of this

global sustainability sector. So, I created the Green Transition Scoreboard® and selected only those technologies and companies I knew would meet the long-term criteria of sustainability. Thus we deliberately omit many investments we believe are mistaken (see page 3).

It's time to end fossil fuel subsidies which would cut deficits and return billions annually to taxpayers and allow the green sectors to compete on a level playing field (www.globalsubsidies.org). Today, 70% of all US federal subsidies go to oil, natural gas and coal and another 15% to ethanol – not to mention the hidden subsidies to nuclear. As James Fletcher, former NASA Administrator told our Technology Assessment Advisory Council in 1976, if all of these subsidies over past decades had instead gone toward solar, wind, all renewables and efficient energy, the US economy would have been 100% powered by these renewable sources by the mid-1970s. Our Green Transition Scoreboard® now tracks this technology evolution through these investments, shifting from the past to the future. The World Social Forum has been saying since 2000, "Another world is possible." The Green Transition Scoreboard® details this new 21st century economy and how we are moving toward this cleaner, greener sustainable future.

Hazel Henderson

Creator, Green Transition Scoreboard®

President, Ethical Markets Media (USA and Brazil)

Author, Ethical Markets: Growing the Green Economy (2006)

Executive Summary

"No leader, from the CEO of the smallest of corporations to the president of the largest of nations, could do better than internalizing the principles of Ethical Markets and always keeping a sharp eye on the Green Transition Scoreboard."

Ashok Khosla, Chairman, Development Alternatives and pioneer social entrepreneur

The Green Transition Scoreboard® (GTS) is a time-based, global tracking of the private financial system for all sectors investing in green markets. This update of the GTS has found investments totaling more than \$2 trillion in the green economy since 2007.

INVESTMENTS IN GREEN TRANSITION	
2007 - 2010	
Sector	(US \$)
Renewable Energy	\$1,358,937,000,000
Efficiency and Green Construction	\$282,011,000,000
Cleantech	\$65,024,042,088
Smart Grid	\$135,263,000,000
Corporate R&D	\$163,813,743,000
Total	\$2,005,048,785,088

This amount is significant because many studies, computer models and reports indicate that investing \$1 trillion annually until 2020 can ramp up material and energy efficiencies, reduce costs of wind, solar, geothermal and other renewable energy, increase sustainable land-use and forestry, and support smart infrastructure, transport, building and urban re-design, accelerating the Green Transition worldwide. The updated 2010 finding of over \$2 trillion puts global investors and countries on track to reach \$10 trillion in investments by 2020.

To ensure meeting the target, investment funds need to shift away from more speculative sectors such as hedge funds and dark pools and away from investing in fossilized sectors to investing at least 10% of their portfolios directly in companies driving the global Green Transition. With the data in the GTS, security analysts can update their strategic asset allocation (SAA) models to highlight green

markets, as now recognized in the report by Mercer that "standard approaches to SAA rely heavily on historical quantitative analysis ... historic precedent is not an effective indicator of future performance" (see page v).

The Green Transition Scoreboard® tracks five sectors: Renewable Energy, Efficiency and Green Construction, Cleantech, Smart Grid and Corporate R&D. Renewable Energy includes private technology development, equipment manufacturing, project finance and M&A activity. Efficiency and Green Construction include new building construction and existing building retrofits. Cleantech is a broad

sector and includes agriculture; air and environment; energy efficiency, infrastructure and storage; materials; recycling and waste; transportation; and water/wastewater. Smart Grid includes companies actually putting smart grids in place, building the infrastructure rather than designing the technology. Together, these first four sectors account for over \$1.8 trillion in investments since 2007.

Corporate Research and Development (R&D) in green transition technologies alone accounts for over \$163 billion in investments. This number becomes more significant in light of the \$100 million threshold, meaning thousands of R&D projects remain unaccounted for. The Green Transition Scoreboard® is the only place to find aggregate corporate green research and development investments, specifically tracking R&D dollars for innovative technologies that reduce the use of natural resources and minimize environmental impacts.

Several subsectors such as nuclear, biofuels and coal carbon sequestration have been purposefully omitted either because of controversy or lack of consensus that they will make a long-term contribution to sustainability.

Companies, organizations and the sources of financial data included in the GTS are screened by rigorous social, environment and ethical auditing standards. Data sources include the highly respected Cleantech Group, LLC, and traditional reporting sources such as Bloomberg, Yahoo Finance and the NASDAQ OMX Green Economy Global Benchmark Index.

The Green Transition Scoreboard® was created as a public service to help grow the green economy and reform market metrics and due diligence worldwide. The full report and other supporting materials are available [online](#).



We created this information base on private investments in green sectors because many developing countries where these technologies are of paramount importance lack the resources to compile this data. Green technologies often draw on available local resources in a more cost effective, time effective manner than technologies from the fossil-fueled era.

To provide this information as widely as possible, we are making the GTS available to those UN agencies spearheading the UN's Green Economy Initiative.

The Green Transition Scoreboard® is a trademarked, ongoing program of research with new reports published every six months. We intend to deepen this research, expanding current categories and adding new ones as the green sectors grow and develop in many countries.

Mercer: Climate Change: Implications for Strategic Asset Allocation

A study with 14 leading global investors representing some \$2 trillion of assets under management found that increasing asset allocation in low-carbon and efficiency improvements by up to 40% will help mitigate risks and capture new opportunities which could reach \$5 trillion by 2030. Mercer, New York, February 15, 2011.

Introduction

Smart money is fueling the transition from the fossil-fueled Industrial Age to the information-rich Solar Age, and the GREEN TRANSITION SCOREBOARD® (GTS) is informing this positive change. Through the end of 2010, over \$2 trillion has been invested or committed to the green economy since 2007.

The Green Transition Scoreboard is a time-based global tracking of the private financial system for all sectors investing in green markets, producing a transparent line of sight toward the ethical progress of wealth building as defined by the triple bottom line of planet, people and profits.

The GTS logo represents a visual symbol of progress as its barometer rises, away from the symbols of the fossil-fueled Industrial Era, tracking private green investments increasing over the next ten years.

Many studies, computer models and reports such as [Climate Solutions 2: Low-Carbon Re-Industrialisation](#)¹ indicate that investing \$1 trillion annually until 2020 can ramp up material and energy efficiencies, reduce costs of wind, solar, geothermal, water, sustainable land-use and forestry, and together with smart infrastructure, transport, building and urban re-design, can accelerate the Green Transition worldwide.

"These and other disruptive technologies are displacing the old polluting legacy firms and financiers still trying to preserve the past," says Hazel Henderson, creator of the Green Transition Scoreboard® and founder-president of Ethical Markets Media. "The Green Transition Scoreboard® shows private investors, using enhanced due diligence, are on track to meet the 2020 goal, setting the path for governments and institutional investors to follow."

When Ethical Markets Media first reported on the Green Transition Scoreboard®, over \$1.24 trillion had been invested in green technologies from 2007 to the end of December 2009. The August 2010 update found that number had risen to over \$1.64 trillion of private investment from companies and investors growing the green economy since 2007.

[Ethical Markets](#), its partners [Mercado Etico](#), the [World Business Academy](#) and the thousands of groups linking to Ethical Markets see this Green Transition as inevitable, viable and achievable, by scaling up existing technologies and energy efficiency gains.

Reports confirm this, such as the July 2010 study [Solar and Nuclear Costs – the Historic Crossover](#) by economist John O. Blackburn, former Duke University Chancellor, which finds that solar energy is now cheaper than nuclear.²



"The GTS makes a uniquely useful contribution to the necessary macro-economic transition in at least two important respects: it adopts a much more comprehensive and therefore effective working definition of a green economy than is usually the case, and it also provides a robust and consistent framework for measuring our progress towards it," explains Matthew Kiernan, founder of Innovest and founder-CEO of Inflection Point Capital Management, author of [Investing in a Sustainable World](#).

Timothy Nash, M.Sc., Ethical Markets' Senior Advisor and Director of Sustainability Research, compiles and analyzes the Green Transition Scoreboard®. "The year-end 2010 data of over \$2 trillion puts global investors and countries on track to reach the 2020 target of \$10 trillion."

"This \$10 trillion goal is much less than the \$23 trillion U.S. taxpayers are liable for, including bailouts since 2008 (www.sig tarp.gov) and only represents 10% of global pension and institutional portfolio assets of some \$120 trillion," says Henderson. Pension fund investors such as Blackrock already see SRI as a tool in a complex mix for risk management.³ "This figure has outpaced even the most optimistic expectations for investments in the green economy, providing tangible evidence that investors are shifting their assets in a sustainable direction and that momentum is building for the green economic transition," says Nash.

This momentum encourages pension fund and foundation portfolio managers to shift their assets toward growing green economies, taking a generational approach for their beneficiaries and descendents.⁴ Many portfolio managers still use obsolete economic textbook models now discredited, based on "efficient markets" and "rational actors." They take real risks investing in hedge funds, private equity "dark pools," flash-trading, commodities and other speculation which have led to huge losses.^{5, 6}

Henderson and Nash share the hope that this data and the shift to "triple bottom line," ESG accounting standards will encourage pension funds to follow the lead of the Institutional Investors Group on Climate Change ([IIGCC](http://www.iigcc.org)) with assets totaling £5 trillion to shift more of their portfolios away from risky investments in the fossilized sectors and commodities speculation to more direct investments in growing the green sectors.⁷

We at Ethical Markets call for at least 10% of these portfolios to shift away from hedge funds, dark pools, commodity speculation and fossilized

sectors to investing directly in the thousands of companies driving the Green Transition globally. We also urge security analysts to update their asset allocation models which obscure new technologies and companies.

Ethical Markets Executive Director Rosalinda Sanquiche says, "With this data, Individual investors can see the green economy growing on Main Street, tangible evidence that green investing is a mainstream way of ensuring positive change, especially in developing countries."⁸

¹ [Climate Solutions 2: Low-Carbon Re-Industrialisation](#), a report to WWF International. *Climate Risk*, Pty Ltd., 2009.

² Blackburn, John O. [Solar and Nuclear Costs – The Historic Crossover](#). NCWARN: Waste Awareness and Reduction Network, July 2010.

³ "Responsible Investment at BlackRock: The Journey to Signing the UNPRI" presentation by Alex Popplewell, Global Co-head of Responsible Investment, October 2008.

⁴ "Financing Sustainability; Partnering with the Future" Esalen Institute's Center for Theory and Research, January 13-18, 2008.

⁵ Turner, Adair, et al. [The Future of Finance](#). The Paul Woolley Centre for the Study of Capital Market Dysfunctionality, London School of Economics, 2010.

⁶ Hechinger, John and Karmin, Craig. "Harvard Hit by Loss as Crisis Spreads," [Wall Street Journal](#), Dec. 4, 2008.

⁷ "Investor Statement on Climate Change Report 2009," www.iigcc.org.

⁸ Miller, Damian. [Selling Solar](#), Earthscan, 2011.

2011 will be the year that stock buyers finally realize that solar won't need any subsidies globally by 2016 -- sooner in selected markets. This has never happened for oil coal and gas which still enjoy \$550B in subsidies per year. - Jigar Shaw, CEO Carbon War Room

Sectors

What's Included

The Green Transition Scoreboard® tracks five sectors: Renewable Energy; Efficiency and Green Construction; Cleantech; Smart Grid; and Corporate R&D.

These represent broad areas of investment in green technologies, many of them overlapping. Each was chosen because it represents an area of substantial capital investment in technologies which Hazel Henderson's years of research as a science advisor and the [Ethical Markets Advisory Board](#) expertise indicate have and are contributing to a sustainable future.

Companies, organizations and the sources of financial data included in the GTS are screened by the strictest rigorous social, environment and ethical auditing standards. They can be found in mutual fund indexes such as Calvert, Domini and Pax World. Data sources include the highly respected Cleantech and traditional reporting sources such as Bloomberg, Yahoo Finance and the NASDAQ OMX Green Economy Global Benchmark Index, advised by Rona Fried, PhD, CEO of SustainableBusiness.com.

What's Omitted

Foremost, the GTS focuses on private sector investments. Government funded projects and initiatives have been purposefully omitted. When government funding is part of a larger project, the research team has removed, in as far as is transparent, those investments from government funds. Green technologies suffer from the misperception that they cannot stand alone. By omitting government funding and still exceeding \$2 trillion in investments, we inform governments to become bolder in using proven green technologies.

Several subsectors have been purposefully omitted either because of controversy or lack of consensus that they will make a long-term contribution to sustainability.

For example, the research team was approached to include nanotechnology as a solution to stave off future crisis in agriculture

and manufacturing. After convening a working group with David Rejeski, Director of the Woodrow Wilson Center Science and Technology Innovation Program, and others researching the field, the team decided that nanotechnology as it appears in particular projects may be appropriate but would not be included or treated as automatically sustainable until further research confirmation.

Other technologies were easier to omit. Despite arguments made that nuclear energy is a sustainable option, we found evidence to the contrary once mining, enrichment, processing, transportation, waste disposal, decommissioning, the enormous taxpayer subsidies and the Price-Anderson government insurance provision⁹ are taken into consideration.

We also omitted coal carbon sequestration (CCS) due to its major government subsidies and huge costs, according to an MIT CCS study which projects costs would raise current 5 cents a Kwh to 8 cents (not including coal subsidies and externalities).^{10,11}

"The economy's shift beyond industrial growth has been largely invisible because we have lacked the data to detect it. The GTS tool is profoundly important to help governments understand that they can now stop subsidizing the carbon emitters." – Dennis Meadows, co-author, [Limits to Growth](#)

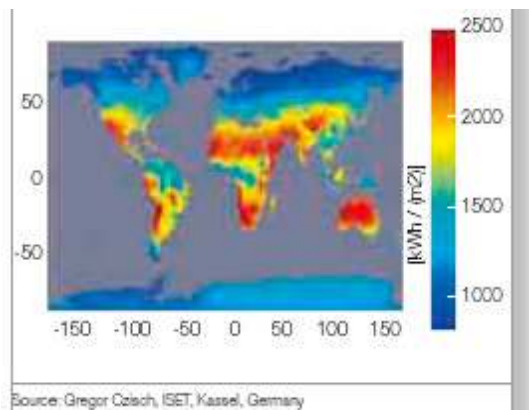
Biofuels were omitted because research indicates that this is not a sustainable use of agriculture better suited for food production. Exceptions are made for biofuels from algae or other organic matter which does not take from the essential lifecycle of returning nutrients to the soil.

Financial Impact

As impressive as is \$2 trillion invested in the green economy since 2007, there are many investments in the Green Economy which are not included in the GTS. For accounting and data collection purposes, each sector only includes those investments which meet a specific dollar threshold. Projects below the threshold, set sector by sector, would add to the

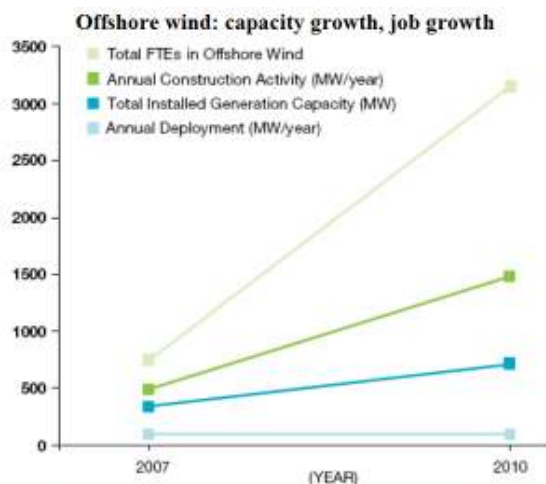
overall total while not changing the order of magnitude.

By no means are these smaller ventures to be dismissed. Renewable capacity, whether solar, hydro, geothermal or other forms, is available around the world.



Solar Irradiation Around the World
Solar Generation 6, EPIA 2011

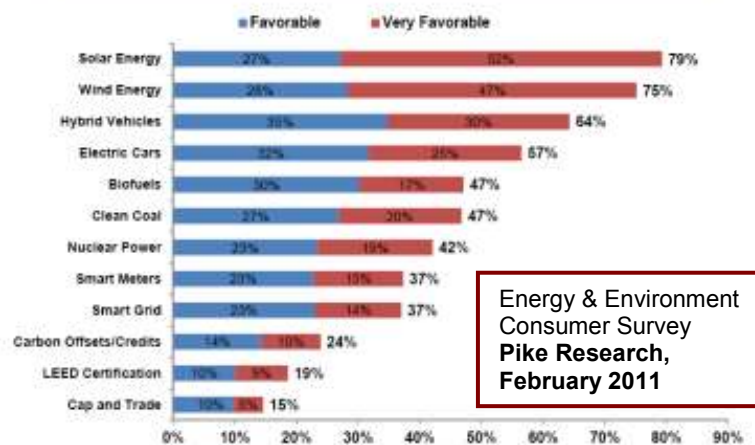
The impact on job creation is undeniable.



RenewableUK and EU Skills Survey, February 2011

Many thousands of investments ranging from \$100,000 dollars to several millions offer significant opportunities to move the green economy forward at the local and regional levels. The compilation of these "small" investments will transform Main Street and finally may reach Wall Street's attention. Ethical Markets Media is reaching deeper into these figures with each update of the GTS.

Favorable Impressions of Energy and Environmental Concepts



Energy & Environment
Consumer Survey
Pike Research,
February 2011

⁹ "Price-Anderson Nuclear Industries Indemnity Act," Title 42 U.S. Code, Ch. 23.A.XIII (2006).

¹⁰ Hamilton, Michael, Howard Herzog and John Parsons. "Cost and U.S. public policy for new coal power plants with carbon capture and sequestration." *Energy Procedia* 1 pp. 4487-4494, 2009.

¹¹ "Dig Deep." *The Economist*, June 21st, 2008.

Renewable Energy

Investments in **Renewable Energy** include private technology development, equipment manufacturing, project finance and M&A activity. The sector is divided into current investments by year of funding and future commitments.

The reporting threshold for Renewable Energy is \$100 million. Projects below \$100 million are being compiled for future reports.

RENEWABLE ENERGY	
Year	(US \$)
2007	\$177,700,000,000
2008	\$196,400,000,000
2009	\$191,500,000,000
2010	\$222,000,000,000
Commitments	\$571,337,000,000
Total	\$1,358,937,000,000

The majority of the current investment numbers are based on global trends reporting by Bloomberg and the Sustainable Energy Finance Initiative's "Global Trends in Sustainable Energy Investment 2010" report.¹²

Commitment numbers have been compiled project by project from daily monitoring by Hazel Henderson, online research and other sources. The \$400 billion Desertec project is included in the commitments section and will be modified as projects come to fruition. With the backing of companies like Deutsch Bank, ABB and Siemens, we are confident that this Club of Rome initiative will reach its full commitment to provide 15% of energy needs to the European Union from the Sahara, if not more.

Government R&D is omitted to remove public investments.

As a rule, Corporate R&D is omitted here and reported in the Corporate R&D sector (page 9) to avoid double-counting.

Biofuels are omitted because biofuel production competes with food production and because studies, such as that from Cornell and Berkeley, show that biofuels have a negative EROI.¹³

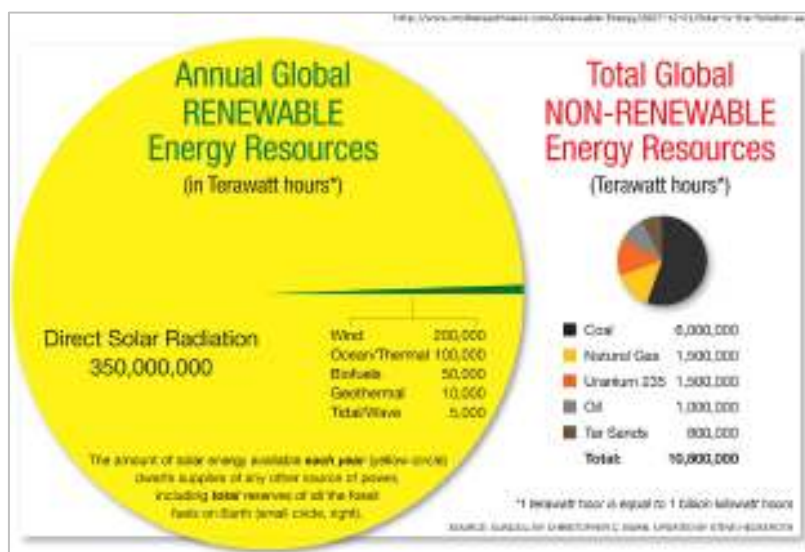
However, amounts for 2010 and Commitments (see Appendix 2) are aggregates from industry and company press releases, limiting our ability to remove all Corporate R&D or biofuels.

Please note that international investments are reported in US dollars and are subject to fluctuating exchange rates.

Breakdown of commitments are available in the source report (Appendix 2).

¹² "Global Trends in Sustainable Energy Investment 2010." United Nations Environment Programme and New Energy Finance, 2010.

¹³ Pimentel, David and Patzek, Tad W. "Ethanol Production Using Corn, Switchgrass and Wood; Biodiesel Production Using Soybean and Sunflower." Natural Resources Research, vol. 14, no. 1, March 2005.



Efficiency and Green Construction

Investments in Efficiency and Green

Construction include new building construction and existing building retrofits. The sector is divided into current investments by year of funding.

While this sector has been the most challenging to quantify, it has the potential to be the most significant, estimated to yield \$520 billion in returns in the USA alone by 2020.¹⁴ According to WWF and ECOFYS, by 2050, maximum energy efficiency will become central to all economic activity, saving nearly £4 trillion a year through reduced costs.¹⁵

EFFICIENCY & GREEN CONSTRUCTION	
Year	Billions (US \$)
2007 (USA only)	\$28,180,000,000
2008 (USA only)	\$41,921,000,000
2009	\$103,200,000,000
2010 ¹⁶	\$108,710,000,000
Total	\$282,011,000,000

Figures for 2007 and 2008 are based on estimates from McGraw Hill that were published in the US Green Building Council 2009 Green Jobs Study.¹⁷ Amounts are calculated using the value of the green construction market, defined as construction built to LEED standards or that incorporate multiple green building elements. Since public-sector information is not recorded, the total includes some government buildings.

Figures for 2009 are found in the “Diamonds in the Rough: Uncovering Opportunities in the \$277 Billion Green Buildings Market” report by Lux Research.¹⁸ It compiles revenues from “any function, equipment, or material that improves the energy efficiency or reduces net material consumption of a building over and above that of the standard used at the time of original construction.” The broad categories are: Services, including green engineering and design companies; Equipment, including lighting, HVAC, and water heating systems; and Materials, including insulation, windows and some structural materials that double as thermal insulators.

We subtracted figures for government buildings, energy generation equipment and energy monitoring services and hardware (smart meters,

etc.) to avoid public investments and double-counting with Smart Grid.

There is no clear reporting threshold for Efficiency and Green Construction, as figures are taken from revenues of larger equipment and material providers in OECD countries. Smaller projects and those in non-OECD countries are being compiled for future reports.

Companies now recognize efficiency investments' rapid payback periods from 12-24 months with revenues for pure-play energy efficiency companies seen as expanding by 13% annually through 2020.¹⁹

*Compared to other options for improving energy performance of buildings assessed by the European Commission, wide low or zero energy/carbon buildings/passive house requirements gave **by far** the largest energy and carbon savings and **resulted in the largest number of jobs created**.*

Nearly zero energy buildings: achieving the EU 2020 target, European Council for an Energy Efficient Economy, February 2011

Similar data for other countries has been a challenge to compile (to provide country-specific sources on efficiency and green construction not included here, please contact our [research team](#)).

Note that international investments are reported in US dollars and are subject to fluctuating exchange rates.

¹⁴ Unlocking Energy Efficiency in the US Economy. McKinsey Global Energy and Materials, 2009.

¹⁵ The Energy Report: 100% Renewable Energy by 2050, World Wide Fund for Nature (WWF), ECOFYS and OMA, Gland, Switzerland, January 2011.

¹⁶ 2010 amounts are based on 2009 figures multiplied by the expected compound annual growth rate.

¹⁷ Green Jobs Study. US Green Building Council, Booz/Allen/Hamilton, 2009.

¹⁸ Diamonds in the Rough: Uncovering Opportunities in the \$277 Billion Green Buildings Market. State of the Market Report, Lux Research, March 2010.

¹⁹ "A Bright Outlook for Energy Efficiency Plays," Bloomberg Businessweek, p. 53, Feb. 7, 2011.

Cleantech

CLEANTECH		
Type	Year	(US \$)
Venture Capital	(2007-2010)	\$13,759,567,956
Initial Public Offerings	(2007-2010)	\$11,797,936,968
Mergers & Acquisitions	(2007-2010)	\$39,466,537,164
Total		\$65,024,042,088

Cleantech is a broad sector and includes companies in the following areas: agriculture; air and environment; energy efficiency, infrastructure and storage; materials; recycling and waste; transportation; and water/wastewater.

Cleantech figures are derived in cooperation with The Cleantech Group, LLC, based on their quarterly reporting. For this report, Cleantech Group removes those investment categories which we have chosen not to include in the GTS such as biofuels, clean coal and carbon offsets.

We omitted investments in clean coal, as they are a palliative fix for fossil fuel consumption and do not contribute to the green transition. Carbon sequestration of coal emissions could be costly enough to price coal out of many markets.²⁰ In any case, carbon is best sequestered in soils and forests. Many soil-enrichment land-management methods are ancient and well proven, such as the biochar "terra prieta" used in Latin America and the sustainable management of grasslands.²¹

As Cleantech grows, energy storage will continue to increase in importance, both at the level of power plants and grid electricity and at retail and local levels with improvements in batteries, fuel cells, flywheels, ultra capacitors, compressed air as well as metering of use at all levels.

Growth in the number of deals reported daily on www.ethicalmarkets.com shows they are rising substantially. We are delving more deeply into this for the next report.

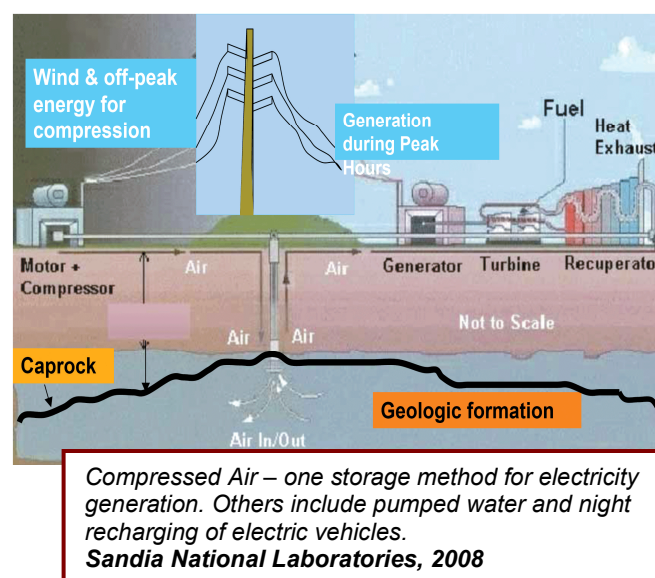
Because this sector is divided into Venture Capital, Initial Public Offerings and Mergers & Acquisitions, there is no overlap with the Green Construction and Smart Grid sections that only

count revenues. Where these kinds of investments are included in the Renewable Energy category, they are omitted here.

There is no reporting threshold for Cleantech figures, as the Cleantech Group compiles deals of all sizes.

Please note that international investments are reported in US dollars and are subject to fluctuating exchange rates.

Breakdown of investments by value chain, sector and geography are available from the Cleantech Group.



²⁰ "Carbon Capture and Storage: Trouble in store." *The Economist*, March 5, 2009.

²¹ "The Grasslands Story." *Field Guide to Investing in a Resilient Economy*. Capital Institute Field Study no. 1, 2010.

Smart Grid

The **Smart Grid** sector includes investments in those companies actually putting smart grids in place, building the infrastructure rather than designing the technology. The sector is divided into current investments by year of funding and future commitments.

SMART GRID	
Year	(US \$)
2008	\$17,000,000,000
2009 ²²	\$25,000,000,000
2010 ²³	\$29,000,000,000
Commitments	\$64,263,000,000
Total	\$135,263,000,000

Current investments are an aggregate from proprietary GP Bullhound Ltd. research, from their publically available report "How Real is the Vision of a 'Smart Grid'?" published in June, 2009. ²⁴ They include revenues from advanced meter infrastructure, demand response and distribution and components.

Commitment figures are gathered project by project from daily monitoring by Hazel Henderson and from online research of large national and international utilities in the private domain. This is a limited group of companies, including US utilities and private initiatives from Russia's Federal Grid Company and South Korea's Smart Grid Institute.

Local US experiments such as those in Boulder, Colorado, offer a bird's eye view of how smart grid components link utilities with local consumers' demand monitoring. ²⁵

Part of the current investment figures are likely government purchases, but there is not enough information to omit them. Government promises have not been included in commitments.

Companies supplying components or R&D are listed in other sections of the GTS.

There is no reporting threshold for Smart Grid investments.

Please note that international investments are reported in US dollars and are subject to fluctuating exchange rates.

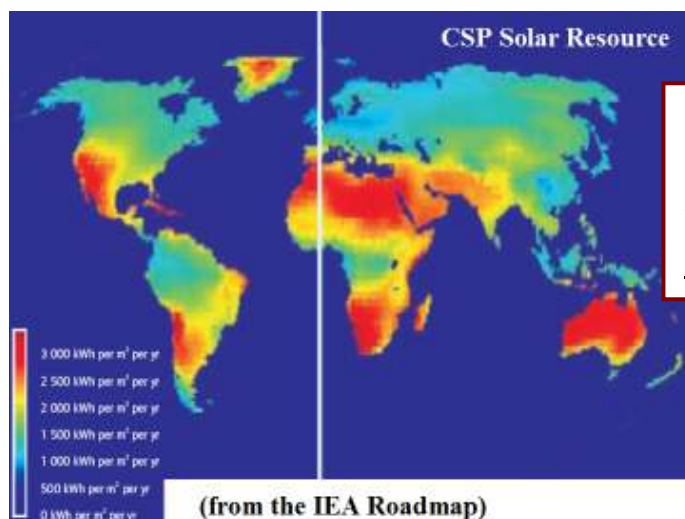
Breakdown of commitments by company are available in the source report (Appendix 2).

²² 2009 and 2010 amounts are based on forecasts and will be updated as real numbers become available. At this time, the figures are a forecast based on past reporting.

²³ ditto

²⁴ GP Bullhound. "How Real is the Vision of a 'Smart Grid'?" June 2009.

²⁵ ONEARTH, Natural Resources Defense Council, Washington, DC, Spring 2009.



*CSP is just ONE renewable resource fueling smart grids, with tremendous coverage. Combine all renewable resources, and the need for fossil fuels disappears. **Technology Roadmap: Concentrating Solar Power, IEA 2010***

Corporate R&D

The Green Transition Scoreboard® is the only place to find aggregate corporate green research and development (R&D) investments. We know of no other organization specifically tracking **Corporate R&D** in green transition technologies.

The reporting threshold for Corporate R&D is \$100 million. Commitments below \$100 million are being compiled for future reports.

CORPORATE R&D	
Year	(US \$)
2007-2010	\$84,416,743,000
Commitments	\$79,397,000,000
Total	\$163,813,743,000

Corporate R&D includes investments in innovative technologies that reduce the use of natural resources and minimize environmental impacts, with green investments self-defined by each company. The sector is divided into an aggregate of current investments covering 2007-2010 and future commitments.

Corporate R&D figures for investments in green R&D are based on Ethical Markets Media and our Advisory Board research. Data has been gathered project by project from daily monitoring by Hazel Henderson, outreach to known companies in the field, online research and other resources.

Analyzing balance sheets and self-reported expenditures, complete R&D budgets were used for pure-play companies within the cleantech sector, while only amounts targeted to green areas were counted for more diversified companies. R&D by renewable energy companies is from Global Trends 2010 cited in the Renewable Energy section of this report, but is being counted in this section for consistency.

The green transition affects every sector, but some have recognized it sooner than others, such as the auto and electronics industries which have recognized consumer demand moving in this direction and are now making

significant investments (see Appendix 2). Expect different sectors to shine from update to update of the GTS. For example we project that storage technology will emerge strongly, making a large impact on Smart Grid investments. Other innovations in 3-D printing have huge potential for energy and materials efficiency.²⁶

Why are some companies, many with substantial green marketing, not counted in the GTS? Given the amount of publicity for sectors such as renewable energy, the number of companies listed in the appendix is relatively small.

"Just your reporting of Corporate R&D commitments alone is impressive. Of course, we're delighted to see you using our data as well."

**Nicholas Parker,
Executive Chairman,
Cleantech Group**

One cause - many publically traded companies are quite active, such as Toyota and Ford, but they are not publishing their numbers for commitments moving forward into 2012 and beyond.

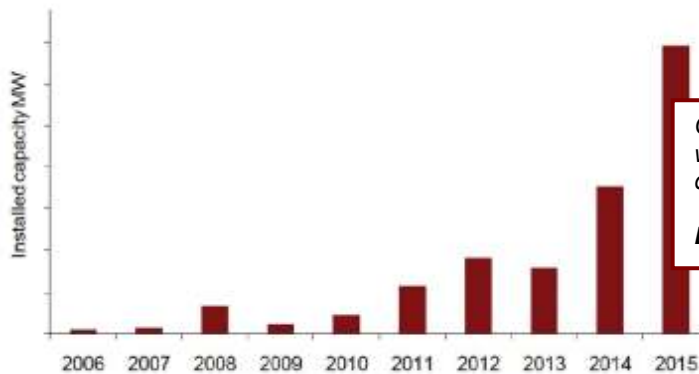
Another reason - while including many corporations with significant investments, we focus on the top 20-30 pure-play cleantech companies, deriving data from each company's annual financial and sustainability reports, leaving many smaller companies – Tesla, for example – out of the accounting. More private and publically traded companies will be included as we increase the depth of the research for subsequent reports (any company investing in green R&D not included here, please contact our [research team](#)).

Companies making long-term investments in R&D have these figures tallied as commitments. Assuming that companies will stay true to these

commitments and then follow through into application, we are listing everything in present-day dollars. Note that international investments are reported in US dollars and are subject to fluctuating exchange rates.

Breakdown of investments and commitments by company are available in the source report (Appendix 2).

²⁶ "Briefing on 3-D Printing." The Economist, p. 77 Feb. 12, 2011.



Corporate R&D in renewables spans beyond wind and solar. Water is quickly moving from demonstration project to application.
Wave & Tidal market Report 2011-2015,
Douglas-Westwood 2010

Installed capacity MW – total per year

Conclusion

The Green Transition Scoreboard® was created as a public service to help grow the green economy and reform market metrics and improve due diligence worldwide.

One of the many reasons we created this information base on private sector investments in green sectors is because many developing countries where these technologies are of paramount importance lack the resources to compile this data.²⁷ Green technologies often draw on available local resources in a more cost effective, time effective manner than fossil-fueled era, dated technologies.

To provide this information as widely as possible, we are making the GTS available to those UN agencies spearheading the UN's [Green Economy Initiative](#). We welcome enquiries from these and other public agencies and those wishing to present our results at conferences, webinars and other venues.

Ethical Markets Research team members Rosalinda Sanquiche, Timothy Nash and Hazel Henderson are available to answer any questions and for interviews on the findings of this report and the continuing process of tracking investments in the green economy.

The Green Transition Scoreboard® is an ongoing program of research with new reports published every six months. We intend to deepen this research, expanding current categories and adding new ones as the green sectors grow and develop in many countries.

The report is a collaborative effort from colleagues in all sectors of the global green economy, drawing on Ethical Markets Media's daily collating and evaluating of green economy news from worldwide sources such as the American Council for an Energy-Efficient Economy, GreenBusiness, Greentech Media, CSRWire, New World Energy News and Responsible Investor, London, UK, and generating hands-on research in collaboration with Cleantech; New Energy News; CSR China; REN 21, EU; Mercado Etico and Instituto Ethos, Brazil; Climate Risk Pty, Sydney; ASRIA, Hong Kong, and many other venues reporting on the green transition around the world.

²⁷ See for example, [Energy for a Sustainable Future](#), Summary Report and Recommendations, UN Secretary General, New York, April 28, 2010.

Appendices

Appendix 1 – Investment Totals

INVESTMENTS IN GREEN TRANSITION 2007 - 2010	
Sector and Year	Amount (USD)
RENEWABLE ENERGY	\$1,358,937,000,000
2007	\$177,700,000,000 ²⁸
2008	\$196,400,000,000 ²⁹
2009	\$191,500,000,000 ³⁰
2010	\$222,000,000,000 ³¹
Commitments	\$571,337,000,000
EFFICIENCY & GREEN CONSTRUCTION	\$282,011,000,000
2007 (USA only)	\$28,180,000,000 ³²
2008 (USA only)	\$41,921,000,000 ³³
2009	\$103,200,000,000 ³⁴
2010 ³⁵	\$108,710,000,000 ³⁶
CLEANTECH³⁷	\$65,024,042,088
Venture Capital (2007-10)	\$13,759,567,956
Initial Public Offerings (2007-10)	\$11,797,936,968
Mergers & Acquisitions (2007-10)	\$39,466,537,164
SMART GRID	\$135,263,000,000
2008	\$17,000,000,000 ³⁸
2009	\$25,000,000,000 ³⁹
2010 ⁴⁰	\$29,000,000,000 ⁴¹
Commitments	\$64,263,000,000
CORPORATE R&D	\$163,813,743,000
2007-2010	\$84,416,743,000
Commitments	\$79,397,000,000
GRAND TOTAL	\$2,005,048,785,088

²⁸ United Nations Environment Programme & New Energy Finance. "Global Trends in Sustainable Energy Investment 2010". pg. 13. 2010.

²⁹ Ibid

³⁰ Ibid

³¹ Bloomberg New Energy Finance. "Clean Energy Investment Storms to New Record in 2010". 11/01/11.

³² Booz Allen Hamilton. "U.S. Green Building Council Green Jobs Study". pg. B-2. 2008.

³³ Ibid, B-3.

³⁴ Lux Research "Diamonds in the Rough: Uncovering Opportunities in the \$277 Billion Green Buildings Market" March 2010.

³⁵ Estimate, see page 6.

³⁶ Lux Research "Diamonds in the Rough: Uncovering Opportunities in the \$277 Billion Green Buildings Market" March 2010.

³⁷ Cleantech Group, LLC.

³⁸ GP Bullhound. "How Real is the Vision of a 'Smart Grid'?" June 2009.

³⁹ Ibid

⁴⁰ Estimate, see page 8.

⁴¹ GP Bullhound. "How Real is the Vision of a 'Smart Grid'?" June 2009.

Appendix 2 – Source Report

While some companies in this report are not considered green, we include their green investments.

GTS Research Team

RENEWABLE ENERGY COMMITMENTS	
By Company	
Company	Amount (USD)

Areva	\$2,914,000,000	42
Desertec	\$560,000,000,000	43
Iberdrola	\$6,523,000,000	44
Pacific Gas & Electric	\$900,000,000	45
Soros	\$1,000,000,000	46

TOTAL	\$571,337,000,000
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SMART GRID COMMITMENTS	
By Company	
Company	Amount (USD)

Atlantic Wind Connection	\$5,000,000,000	47
Duke Energy	\$1,000,000,000	48
Federal Grid Company (Russia)	\$31,300,000,000	49
Florida Power & Light	\$378,000,000	50
Korea Smart Grid Institute	\$20,000,000,000	51
Mitsubishi Electric	\$85,000,000	52
Rubenius	\$4,000,000,000	53
Southern California Edison	\$1,500,000,000	54
Southern Company	\$1,000,000,000	55

TOTAL	\$64,263,000,000
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CORPORATE R&D By Company		
Company	Amount (USD)	
Bayer	\$1,358,000,000	56
Corning, Inc.	\$1,983,000,000	57
Cree, Inc.	\$249,539,000	58
Dionex, Inc.	\$102,246,000	59
Donaldson, Inc.	\$167,439,000	60
Energy Conversion Devices	\$39,729,000	61
Energy Recovery, Inc.	\$9,790,000	62
EnerNOC, Inc.	\$23,080,000	63
Fuel Systems Solutions	\$46,907,000	64
Fujitsu	\$72,000,000	65
General Electric	\$5,000,000,000	66
Hexcel Corp.	\$109,900,000	67
IBM	\$3,000,000,000	68
Itron Inc.	\$410,388,000	69
Kadant Inc.	\$19,737,000	70
Mazda	\$250,000,000	71
MEMC Electronic Materials	\$146,100,000	72
Pacific Gas & Electric	\$1,043,300,000	73
Pall Corp.	\$257,251,000	74
Philips	\$1,358,000,000	75
Power Integrations Inc.	\$104,045,000	76
Renewable Energy	\$49,300,000,000	77
Robert Bosch	\$8,830,000,000	78
Siemens	\$1,358,000,000	79
Toyota	\$8,700,000,000	80
Woodward Governor Co.	\$478,292,000	81
TOTAL	\$84,416,743,000	

R&D COMMITMENTS By Company		
Company	Amount (USD)	
Audi	\$12,905,000,000	82
Bolloré Group	\$1,500,000,000	83
Exxon	\$600,000,000	84
General Electric	\$10,000,000,000	85
Hyundai / Kia	\$3,710,000,000	86
IBM	\$2,000,000,000	87
LG Group	\$18,100,000,000	88
Mazda	\$1,750,000,000	89
NEC	\$1,216,000,000	90
Panasonic	\$1,000,000,000	91
Renault / Nissan	\$5,434,000,000	92
Samsung	\$21,000,000,000	93
Sharp	\$182,000,000	94
TOTAL	\$79,397,000,000	

⁴² Singh, Sudheer Pal & Mukul, Jyoti. "Areva has Rs 13,300-crore plans for solar energy". Business Standard, 11/01/2010.

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⁴⁹ Anotova, Maria. "Federal Grid Company Seeks \$30Bln Investment Plan". The Moscow Times. 06/18/2010.

⁵⁰ Florida Power & Light. "President Obama Joins FPL for Commissioning of Nation's Largest Solar PV Power Plant; Announces \$200 Million in Smart Grid Funding for FPL's Energy Smart Florida". Press Release. Viewed on 02/06/2011.

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⁵⁷ finance.yahoo.com viewed on 01/28/2011.

⁵⁸ Ibid

⁵⁹ Ibid

⁶⁰ Ibid

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- ⁶² Ibid
- ⁶³ Ibid
- ⁶⁴ Ibid
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Appendix 3 – Research Team

HAZEL HENDERSON, D.Sc.Hon., FRSA, created the Green Transition Scoreboard®. She is founder of [Ethical Markets Media](#), is a futurist, evolutionary economist and author of award-winning *Ethical Markets: Growing the Green Economy* and many other books translated in many languages. Her editorials are syndicated by InterPress Service, with articles in [Harvard Business Review](#), [New York Times](#) and many international journals. She leads the [Transforming Finance](#) initiative and developed with Calvert Group the widely used alternative to GNP, the [Calvert-Henderson Quality of Life Indicators](#). Henderson lectures worldwide, holds many honorary degrees and serves as editorial advisor/board member of [Futures](#), Elsevier UK; [State of the World](#) and [State of the Future](#) reports; Instituto Ethos de Empresas e Responsabilidade Social (Brazil) and [World Affairs](#) (India). She is an honorary advisor to the International Technology and Economy Institute, Beijing, China, and served as Advisor to the U.S. Congress Office of Technology Assessment, the National Science Foundation and the National Academy of Engineering, tracking disruptive technologies since the 1970s. Henderson provided overall guidance for this report with real-time analysis and synthesis of studies on the green transition.

ROSALINDA SANQUICHE, MA, Environmental and Resource Policy, George Washington University, is the executive director of Ethical Markets Media and principal author of this report. She began her environmental career working for the American Wind Energy Association in Washington, DC, in research and communications. She has written on the construction industry for [Builder/Architect](#) and on the environment for various outlets. She has taught environmental policy and team-taught field classes combining ecology and policy in Florida and Belize. Sanquiche is an advisor to Collins Capital Management where she was instrumental in developing the first SRI portfolio

specific to northeast Florida. She is treasurer of the Northeast Florida Green Chamber, is a featured columnist for the *Green Business Quarterly* and continues as a speaker on environmental issues.

TIMOTHY JACK NASH, MSc, Strategic Leadership Towards Sustainability, Blekinge Institute of Technology, Sweden, is a senior advisor for Ethical Markets Media and, as director of sustainability research, lead researcher for this report. He is the principal of SSI – Strategic Sustainable Investments in Toronto, Canada.

Nash worked closely with MATT MILAM, MSc, Strategic Leadership Towards Sustainability, Blekinge Institute of Technology, Sweden. Milam is currently working for the Tennessee Dept. of Labor assessing green jobs, current and expected, as well as skills requirements for Tennesseans looking to pursue careers in sustainability.

LESLIE DANZIGER is a pioneer entrepreneur who is Co-Founder and former Chairman of Solaria Corporation, a developer and manufacturer of advanced solar modules and systems solutions (www.solaria.com) and Co-Founder and former Chairman and CEO of LightPath Technologies (www.lightpath.com), an optical technologies developer and manufacturer which she took public. She has been featured in *Business Week* and the *Wall Street Journal*. She holds two patents and was named the New Mexico Inventor of the Year. She currently serves on the Advisory Boards of Equal Access (www.equalaccess.org), WorldBlu (www.worldblu.com), and Ethical Markets Media (www.ethicalmarkets.com). She is a member of the Solar Circle and the American Solar Energy Society.

For full disclosure: members of the GTS research team and other principals of Ethical Markets Media are invested in companies supporting the green transition, most of which are privately held, early stage, pre-IPO companies.

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