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Global Trends in Sustainable Energy Investment 2009

Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency

United Nations Environment Programme

Endorsed by

REN21 Renewable Energy Policy Network for the 21st Century

FOREWORD

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The 2009 Global Trends in Sustainable Energy Investment report, considered by many to be the most authoritative appraisal of clean energy investment trends, is being released during one of the worst financial and economic crises for a generation with sharply rising unemployment in many parts of the globe.

It also comes less than six months before the crucial UN climate convention meeting taking place in Copenhagen, Denmark.

It is the view of the UN Environment Programme and increasingly others that a Green Economy approach to these and other emerging challenges, such as energy security, resource efficiency and catalyzing an innovation-based economy, go hand in hand.

Renewable energy, with its low carbon footprint, the relative speed with which it can be deployed into developed and developing communities alike and its ability to generate new kinds of businesses and green jobs, is a key element of that transition.

This year's Global Trends survey was never likely to show the kind of extraordinary growth in renewables that has underlined previous years. Nevertheless, investment in the sustainable energy market has in some ways defied the global recession growing by around five per cent—from $148 billion in 2007 to around $155 billion in 2008.

Support for sustainable energy investments will now depend on several factors. In response to the economic crisis the G-20 group of nations recently announced stimulus packages totalling $3 trillion or 4.5 per cent of their GDP.

Several economies, from China, Japan and many European ones to the Republic of Korea and the United States, have earmarked multi-billion investments in clean energy, including smart grids, under the banner of a global 'green new deal'.

While the $155 billion sustainable energy investment in 2008 and the multi-billion stimulus packages can go a long way, investment needs to reach a half trillion dollars per annum by 2020 to help ensure a peak in greenhouse gas emissions by then.

Intelligent market mechanisms and incentives will also play a key role in both developed and developing economies, including a review of the well over $200 billion a year spent on subsidising fossil fuels.

Perhaps the biggest stimulus package of them all will happen in Copenhagen if governments agree a scientifically-credible and forward-looking new climate agreement.

This will give certainty and continuity to the carbon markets and a clear signal that renewable energy will become an increasingly important slice of the overall 'fuel' mix and a major contributor to the sustainable development agenda, including achieving the poverty-related UN Millennium Development Goals.

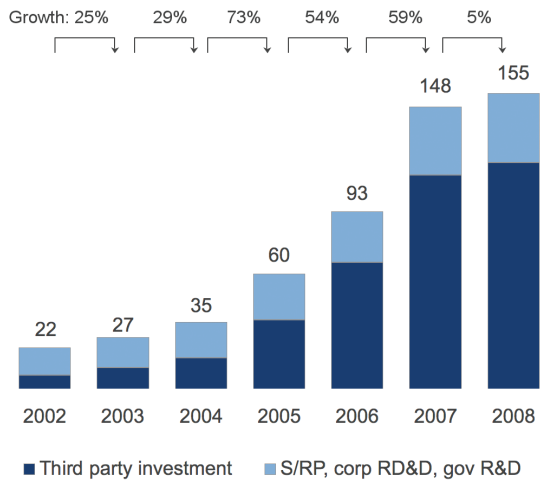
Achim Steiner
UN Under-Secretary General and UN Environment Programme (UNEP) Executive Director

EXECUTIVE SUMMARY

Investment in renewable energy generation projects grew by 13% during 2008, to $117 billion, and new private investment in companies developing and scaling-up new technologies increased by 37% from 2007 to $13.5 billion.

The year 2008 was another milestone for investment in sustainable energy, especially in view of the difficult overall investment climate. A total of $155 billion was invested in companies and projects globally, a more than four-fold increase on 2004. As compared with 2007, however, investment growth was only 5%, in stark contrast to the growth rates of over 50% in previous years (see Figure 1). This was mainly due to the global financial crisis, which had a significant impact on investment in the second half of the year: investment in the second half of the year was down 17% on the first half, and down 23% on the final six months of 2007.

Figure 1: New Investment in Sustainable Energy, 2002-2008
$ billion



S/RP = small/residential projects. New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals

Source: New Energy Finance

$180 billion of fiscal stimulus support for sustainable energy suggests the political will has never been greater.

Investment in new energy generation projects (wind, solar, biofuels etc.) grew by 13% during 2008, to $117 billion, and new private investment in companies developing and scaling-up new technologies, including energy efficiency, increased by 37% from 2007 to $13.5 billion (see Figure 2). Other types of finance decreased. Capital raised via the public stock markets for equipment manufacturing and project pipelines fell 51% to $11.4 billion, as clean energy share prices lost 61% of their value during 2008. Total transaction value in the sustainable energy sector during 2008 – including corporate acquisitions, asset re-financings and private equity buy-outs – was $223 billion (see Figure 2), an increase of 7% over 2007 .

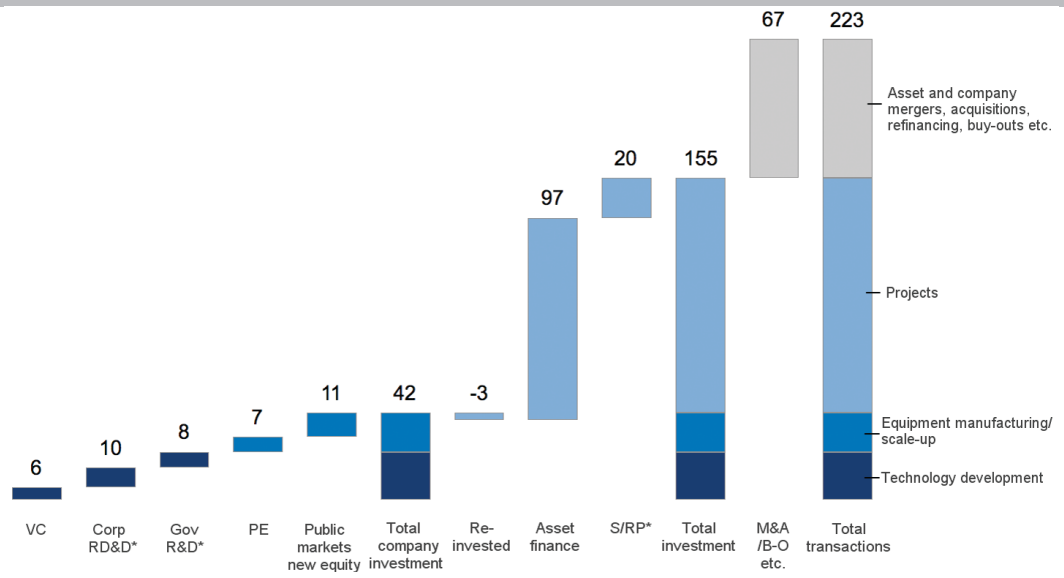
There were some 'green-shoots' of recovery during the second quarter of 2009, but the sector has a long way to go this year to reach previous investment levels.

While the sustainable energy sector was showing signs of being negatively affected by the global financial crisis, it was not until the start of 2009 that the full impact was really evident. In the first quarter of 2009, new financial investment fell by 53% to $13.3 billion compared to the same period in 2008, the lowest level of quarterly investment for three years. There were some 'green shoots' of recovery during the second quarter of 2009, but the sector has a long way to go this year to reach the investment levels of late 2007 and early 2008.

At a macro level the sustainable energy sector was impacted by many factors in 2008, including politics and economics, the financial markets, and the wider energy market. The election of a new administration led by President Obama heralded a change in US policy on climate change and sustainable energy. This gave a timely boost to the sector as private sector investment started to fall. The inclusion of an estimated $180 billion of support for sustainable energy in the major fiscal stimulus packages suggests that the political will to secure sustainable energy supplies and reduce energy-related carbon emissions has never been greater.

Less liquidity in the global financial markets since September 2008 has meant less available capital for clean energy companies and projects. Central banks lowering their interest rates has reduced the cost of financing renewable energy projects, insofar as finance has been

Figure 2: Global Transactions in Sustainable Energy, 2008, $ billion



S/RP = small/residential projects. Total values include estimates for undisclosed deals. * data based on estimates from various industry sources

Source: New Energy Finance

available, though this reduction has been offset by an increase in the risk premium lenders are now charging. Reassuringly, China has made $680 billion of finance available through its state-owned banks to support the growth of the domestic market, which is having a positive impact on its sustainable energy sector.

All eyes – including those of politicians, industry players and the media – are on the Copenhagen UNFCCC Conference of the Parties (COP) in December 2009, which will seek to reach agreement on a successor to the Kyoto Protocol. As the current financial crisis recedes, there is still a need for appropriate policies to support the shift to a cleaner, low-carbon energy mix. The industry is seeking a well-designed set of support mechanisms, tailored to each geography and to the technological maturity of each sector. Sectors nearing maturity and competitiveness with fossil fuels need revenue support as they close the gap; technologies that work in the lab but are too risky to scale up need commercialisation support; sectors with longer-term technological promise need research funding. It is encouraging that some of these elements are included in the current stimulus packages.

As a result of the economic slowdown, electricity demand growth fell in 2008 to 2.4% from 2.9% in the previous year, however, renewable energy's share of the overall power generation market increased from 3.9% to 4.4% (see Figure 3). In addition, approximately 40GW of new renewable energy power generation capacity was installed globally in 2008 (REN21 Renewables Global Status Report 2009 Update)[i], resulting from the investments made in response to government policies over the previous few years. Although the oil price fell to less than $40 per barrel from its peak of $147 in mid 2008, the economics of experience curves and oil and gas depletion are working powerfully to level the playing field. In 2008, the new 40GW of renewable energy plants accounted for 25% of new nameplate capacity.

2008 was the first year that new power generation investment in renewables was greater than investment in fossil-fueled technologies

Combined with approximately 25GW of new large hydropower stations, renewable energy overall represented 41% of total new global capacity. 2008 was the first year that investment in new power generation capacity sourced from renewable energy technologies (approximately $140 billion including large hydro) was more than the investment in fossil-fueled technologies (approximately $110 billion). Given the long life of power sector assets, however, it will be some time before renewable energy dominates the generation mix. In 2008, renewable energy still only accounted for 6.2 % of total power sector capacity (see Figure 3).

Within the carbon markets several countries have followed the lead of the European Union Greenhouse Gas Emission Trading System (EU ETS) and the Kyoto Compliance Markets, including Australia, Japan, and the US through its regional, federal and voluntary initiatives.

REN21. 2009. Renewables Global Status Report: 2009 Update (Paris: REN21 Secretariat): Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH.

President Obama has clearly stated his support for a federal cap-and-trade scheme and a strengthened global scheme may result from the negotiations in Copenhagen in December. A system of interlinked policy-led financial markets, similar to currency markets, is emerging, where every major economy puts a price on greenhouse gas emissions, thereby providing another enabler for sustainable energy. Despite the turmoil in the world's financial markets, transaction value in the global carbon market grew 87% during 2008, reaching a total of $120 billion.

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During 2008, wind was the largest sector in terms of new investment, while solar took second place, by surpassing biofuels. Total financial investment in wind was $51.8 billion, down 1% on 2007, and in solar was $33.5 billion, up 49% from the previous year. (see Figure 4). A large proportion of this investment went into wind and solar projects, particularly in the established markets of the European Union and North America, but also increasingly in China, Eastern Europe and Latin America.

Sustainable energy technologies on the whole are becoming cheaper to manufacture as they reach scale and gain operating experience. Recently, this has not always translated into price decreases because of demand outstripping supply and commodity prices soaring. But the investment surge of recent years and softened commodity markets have started to ease supply chain bottlenecks, especially in the wind and solar sectors, which will cause prices to fall towards marginal costs and several players to consolidate (at the end of 2008 there were over 70 major wind turbine manufacturers globally and over 450 photovoltaic (PV) module makers). The price of solar PV modules, for example, is predicted to fall by over 43% in 2009.

New investment in biofuels reached $16.9 billion, down 9% from 2007. Other renewable energies such as geothermal and mini-hydro were up 26% to $5.4 billion, but there was a 25% fall in investment in biomass and waste-to-energy to $7.9 billion. Private investment in new energy efficiency technologies was $1.8 billion, a fall of 33% on the previous year. However, the energy efficiency sector recorded the second highest levels of venture capital and private equity investment (after solar), which will help companies develop the next generation of sustainable energy technologies.

On a regional basis, investment in Europe in 2008 was $49.7 billion, a rise of 2%, and in North America was $30.1 billion, a fall of 8% (see Figure 4). These regions experienced a slow-down in the financing of new renewable energy projects due to the lack of project finance and the fact that tax credit-driven markets are mostly ineffective in a downturn. Within South America investment in Brazil increased by 76% to $10.8 billion, mostly in cane-based ethanol as domestic and foreign demand increased. In China sustainable energy investment grew 18% to $15.6 billion – driven by some timely policy interventions - and in India by 12% to $3.7 billion. Investment in Africa was $1 billion, an increase of 10% on 2007. Total new investment in developed countries was $82.3 billion, a fall of 1.7% from 2007. Total new investment in developing countries was $36.6 billion, up 27%.

In conclusion, the drivers that have propelled investment in the sustainable energy sector so dramatically for the past five years are still at work – climate change, energy insecurity, fossil fuel depletion, new technologies etc. There is also a strong core of demand for clean energy based on firm mandates: feed-in tariffs, renewable portfolio standards, renewable fuel standards, building codes, and efficiency regulations. In many markets clean energy also provides strong economic returns, particularly green jobs, even in a period of lower energy prices.

Sustainable energy has a significant role to play in mitigating climate change. According to the Intergovernmental Panel on Climate Change (IPCC)'s Fourth Assessment Report in 2007[ii], limiting likely average global temperature to 2.0 to 2.4°C – thought to be the highest "safe" level – means stabilising CO2 equivalent concentrations at 445 to 490 parts per million, which in turn requires reaching peak CO2 emissions by 2015. At its Heiligendamm Summit in 2007, the G8 acknowledged the need for CO2 emissions "to peak within 10 to 15 years", or between 2017 and 2022.

A more rapid transition to – and accelerated pace of investment in – sustainable energy is required so that CO2 peaks by 2020. Annual investments in renewable energy, energy efficiency and carbon capture and storage need to reach $500 billion by 2020, rising to $590 billion by 2030, representing an average investment of 0.44% of GDP between 2006 and 2030. These levels of investment are not impossible to achieve, especially in view of the recent four year growth from $35 billion to $155 billion. However, reaching them will require a further scale-up of societal commitments to a more sustainable, low-carbon energy paradigm.

ii. IPCC Fourth Assessment Report on the mitigation of climate change for researchers, students, and policymakers: IPCC Secretariat, Geneva. 2008, Intergovernmental Panel on Climate Change.

With the current stimulus packages now in play and a hoped-for Copenhagen climate deal in December, the opportunity to meet this challenge is greater than ever, even seen from the depths of an economic downturn.

This report presents the financial perspective on the current state of play in the development of sustainable energy. The analysis consists of actual data on the different types of capital flows and their movement over time, combined with analysis of regional and sectoral trends. The information is intended to serve as a strategic tool to be used by decision makers in the policy and finance communities globally as they weigh-up commitments to the sustainable energy sector. Accompanying resources, including a data set for the report´s graphs and a powerpoint presentation, can be downloaded from www.sefi.unep.org.

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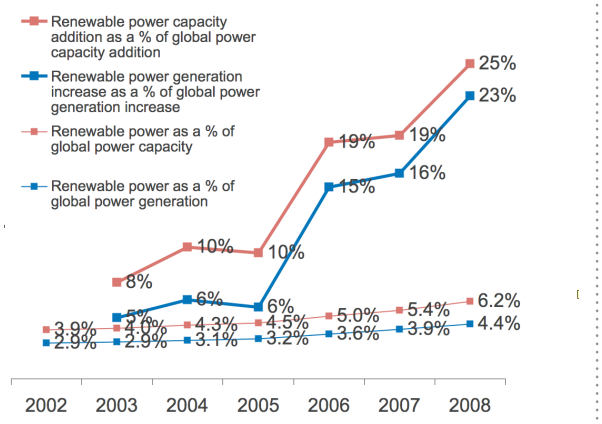
Figure 3: Renewable power* generation and capacity as a proportion of global power, 2003-2008, %



* Excluding large hydro

Source: EIA, IEA, New Energy Finance, Global Futures, UNEP SEFI

Figure 4: SEFI Global Trends, $ billion

Category / Year	2004 $bn	2005 $bn	2006 $bn	2007 $bn	2008 $bn	2007-08 Growth %	2004-08 CAGR %
1 Total Investment							
1.1 New Investment	35	60	93	148	155	5%	45%
1.2 Total Transactions	45	91	133	209	223	7%	49%
2 New Investment by Value Chain							
2.1 Technology Development							
2.1.1 Venture capital	1.4	2.0	4.1	5.9	6.0	3%	45%
2.1.2 Government R&D*	4.9	5.6	5.9	7.1	7.5	6%	11%
2.1.3 Corporate RD&D*	5.5	6.8	8.4	9.8	9.5	-3%	15%
2.2 Equipment Manufacturing							
2.2.1 Private equity expansion capital	0.3	1.0	3.3	4.0	7.4	86%	115%
2.2.2 Public markets	0.7	4.1	11.0	23.4	11.4	-51%	100%
2.3 Projects							
2.3.1 Asset finance	14.1	28.5	50.3	84.5	97.4	15%	62%
Of which re-invested equity	0.0	0.0	2.3	5.3	3.4		
2.3.3 Small/residential scale projects*	8.2	11.6	12.5	19.0	19.5	2%	24%
Total Financial Investment	17	36	66	112 0	119	6%	64%
Gov'n R&D, Corporate RD&D, Small projects	19	24	27	36	37	2%	18%
Total New Investment	35	60	93	148 0	155	5%	45%
3 Other Transactions							
3.1 Private equity buy-outs	0.9	3.4	1.9	3.6	5.8	60%	60%
3.2 Corporate M&A	4.0	13.2	16.9	25.9	21.7	-16%	52%
3.3 Project acquistion & refinancing	5.1	12.2	19.0	26.1	38.7	48%	66%
4 Financial Sector New Investment by Technology							
4.1 Wind	10.0	19.1	25.0	51.3	51.8	1%	51%
4.2 Solar	0.6	3.2	10.3	22.5	33.5	49%	172%
4.3 Biomass	1.8	4.1	7.0	10.6	7.9	-25%	45%
4.5 Marine & small-hydro	0.6	1.3	1.5	3.4	3.2	-5%	53%
4.4 Geothermal	0.9	0.4	1.0	0.9	2.2	149%	24%
4.6 Efficiency	0.5	0.9	1.6	2.8	1.8	-33%	39%
4.7 Other low carbon technologies	0.8	1.6	1.9	2.4	1.5	-37%	18%
4.8 Biofuels	1.3	5.1	18.0	18.6	16.9	-9%	90%
Total	17	36	66	112	119	6%	64%
5 New Investment by Geography							
5.1 Global							
5.1.1 Europe	8.4	17.7	26.3	48.6	49.7	2%	56%
5.1.2 North America	4.2	10.3	22.6	32.7	30.1	-8%	63%
5.1.3 South America	0.3	1.6	4.3	7.6	12.3	63%	145%
5.1.4 Asia & Oceania	3.3	5.5	12.1	21.7	24.2	12%	64%
5.1.5 Middle East & Africa	0.2	0.3	1.1	2.0	2.6	29%	81%
Total	17	36	66	112	119	6%	64%
5.2 Selected Developing Countries/Regions							
5.2.1 Brazil	0.2	0.8	4.0	6.1	10.8	76%	173%
5.2.2 China	0.9	2.5	7.4	13.2	15.6	18%	106%
5.2.3 India	0.7	0.8	1.1	3.3	3.7	12%	50%
5.2.5 Africa	0.2	0.3	0.2	1.0	1.1	10%	54%

New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals. Venture capital figure includes PIPE & OTC. * Estimates. Other Transactions exclude Public Market exits.

Source: New Energy Finance, UNEP, SEFI

KEY FINDINGS

- **Due to the economic downturn, new investment in sustainable energy was $155 billion in 2008, slightly (5%) higher than 2007's $148 billion** – but the second half-year figure was down 17% on the first half, and 23% lower than in the final six months of 2007.

- **Clean energy resisted the global financial crisis more successfully than many other sectors for much of the year,** helped by sky-high oil prices, but felt the impact from September 2008 onwards. Shares prices fell 61%, more sharply than the overall stock market, and have since only made up a fraction of the lost ground. Investor mood will be critical to continued growth. One of the reasons sustainable energy share prices underperformed in late 2008 was a general flight from risk and growth sectors.

- **Leading governments committed over $180 billion to sustainable energy within their various stimulus packages**, but there has been a big divergence between countries in the generosity and clarity of their measures. An enormous monetary stimulus has also been applied through the drop in global interest rates, but although central bank rates are at historic lows, banks are still too worried about solvency to lend. When lending does start to flow, renewable energy projects stand to be among the early beneficiaries, as they produce a reliable stream of revenues from good counter-parties, the utilities.

- **The number of companies under incubation fell slightly during 2008.** Incubated companies number 338, down just under 2% from last year. The large majority of incubated companies were in the solar sector with 73, or 21% of the total number of incubated companies. Solar is followed by wind, biofuels, and energy efficiency supply and demand side sectors.

- **In 2008, venture capital and private equity funds invested $19.3 billion in renewable energy and energy efficiency firms**, an increase of 43% compared with 2007. Of this, $13.5 billion represented "new" money – everything except private equity buy-outs – an improvement of 37% on the $9.8 billion of fresh investment in 2007. This money helped a broad spectrum of young companies to develop technologies in fields as diverse as carbon capture and storage and tidal power, while enabling those further down the track to ramp up and commercialise production.

- **Investment in clean energy firms via the world's stock markets tumbled 51% to $11.4 billion, from $23.4 billion in 2007.** Activity noticeably slowed in the second half of 2008, and the public markets have effectively been closed for clean energy initial public offerings so far in 2009. Fewer companies chose to make their debut on the public markets. In 2008, 18 companies floated on the world's main exchanges raising a total of $3.6 billion. This was 30 fewer than during 2007, when 48 clean energy firms completed IPOs raising $13.6 billion.

- **Financing of sustainable energy assets grew by 12.9% in 2008 to $116.9 billion**, the bulk of which was for new power generation projects. The terms of debt finance deals for renewable energy projects in Europe have become tougher since October 2008, but the ratification of President Obama's $787 billion stimulus package in February 2009 offers a number of new project financing solutions to developers in the US. New-build wind project financing increased during 2008 to $47.9 billion from $41.3 billion in 2007, but collapsed in the first quarter of 2009. New-build solar project financing underwent a dramatic increase in 2008, rising to $22.1 billion from $12.1 billion in 2007. However, it too fell sharply in the first quarter of 2009.

- **The volume of money changing hands in mergers and acquisitions of clean energy companies fell 16.2% to $21.7 billion.** The lack of available credit, plunging stock markets and a worldwide financial crisis made it difficult for deal-makers. This left equipment manufacturers to garner the largest slice of mergers and acquisitions investment, taking $9.4 billion, or 43.3% of the $21.7 billion total. Deals targeting developers saw the biggest year-on-year increase. The $7.3 billion recorded in 2008 was up 156% on 2007 as consolidation swept through Europe's wind market. M&A activity is likely to increase as well-capitalised players take advantage of lower clean energy company valuations and some distressed opportunities.

- **Far fewer clean energy funds were launched in 2008.** In 2007, private clean energy funds were being launched at an average rate of one a week; in 2008, this slowed to one a month. Nevertheless, a number of large funds completed funding rounds during 2008, and a number of new funds have been announced in recent months. Now that markets have lost 40% or more of their value, investors are beginning to venture back into the market. Private and project equity funds have become more prominent in 2008, responding to the effective closure of the world's public markets and very limited access to debt.

- **Despite the turmoil in the world's financial markets, 2008 was another year of record growth in the carbon markets.** Transaction value in the global carbon market grew 87% during 2008, reaching a total value of $120 billion. Currently, the most liquid markets are the European Union Greenhouse Gas Emission Trading Scheme (EU-ETS) and the global Kyoto compliance market. The EU-ETS, which started its second phase in 2008, covers some 45% of Europe's total greenhouse gas emissions. It has dominated carbon credit trading to date, accounting for 79% of transactions by value. Despite some downward movement in price towards the end of 2008 as a result of the global economic downturn, the average settlement price of European Union Emissions Allowances (EUAs) closed the year at around $25 per tonne.

- **Financial investment in developing countries increased to $36.6 billion in 2008**, an increase of 27% on 2007, whilst investment in developed countries fell by 1.7% to $82.3 billion. Developing countries' share of total global financial investment increased to 31% in 2008, from 26% in 2007. China led investment in Asia, with $15.6 billion of new investment, mostly in new wind projects, and some biomass plants. Investment in India grew 12% to $3.7billion in 2008, of which asset finance represented $3.2 billion, up 36%. Brazil accounted for almost all renewable energy investment in Latin America in 2008, receiving $10.8 billion, up 7% from 2007.