Innovest

Strategic Value Advisors

New Alpha Source for Asset Managers:

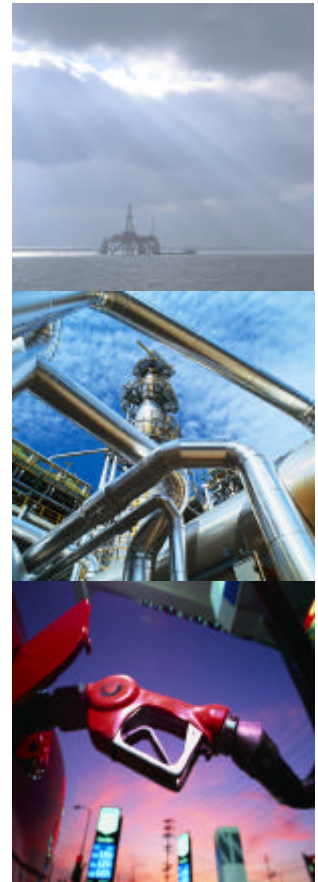# Environmentally-Enhanced Investment Portfolios

Live, real-time simulations based on six actual investment portfolios of a major U.S. Public Pension Fund during the year 2002

EXECUTIVE SUMMARY

April 2003

Live Simulation of Environmentally-Enhanced Investment Portfolios

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1 EXECUTIVE SUMMARY

A major U.S. public pension fund ("The Client") wanted to investigate whether or not environmental and social (SRI) analysis can be used as part of decision-making in its investment process without adverse impacts on its portfolios' risk-adjusted returns. To pursue this, the Client engaged Innovest Strategic Value Advisors, Inc. (Innovest), an internationally recognized research and analysis firm which, among other things, evaluates the environmental performance of over 1200 large, publicly-held companies globally, using its proprietary EcoValue21® ratings (EV21). See **Appendix 1** for background information on Innovest itself; additional information is available at www.innovestgroup.com; see **Appendix 2** for a detailed description of the analytical methodology underpinning the EcoValue21® ratings.

Through Innovest, the Client is pursuing two initiatives. First, Innovest provides its proprietary EcoValue21® environmental performance ratings to one of the Client's portfolio managers ("The Manager") which in turn uses these ratings as factor in its investment algorithm for an actual investment fund. In this particular case Innovest's signal accounts for approximately 20% of the weight in this investment algorithm. The actual portfolio run by the Manager using the Innovest overlay has out-performed its S&P 500 benchmark by approximately 150 basis points since inception in March 2002.

Second, Innovest has applied the EcoValue21® ratings as an overlay to the investment portfolios of six other money managers that the Client's currently uses. Innovest created a number of live simulations, or "shadow portfolios", to investigate possible uses and impacts of the ratings. The goal of this initiative is to have a live simulation of the effects of Innovest ratings (rather than a back test), to use actual portfolios, to apply actual current EV21 ratings, to track performance, and to repeat the procedure during the course of one full year. The Client wanted to answer two questions in particular: 1.What effect, if any, does adding SRI considerations to an existing investment? 2. Which investment styles, capitalization levels, and regional focus lend themselves to an SRI overlay? This initiative is the subject of this report.

To perform the simulations, Innovest obtained from the Client's managers the actual holdings of each of the six portfolios as of 12/31/01, and at the end of each quarter thereafter through 12/31/02. For each quarter, we applied the EcoValue21® ratings to the portfolios and created three simulations per portfolio (i.e. 18 simulations in total per quarter). This is analogous to "turning up the volume" of the Innovest signal to three different levels. This was accomplished using a portfolio optimization model such as is commonly used in the investment management business, and setting the "tracking error" to three different levels – 50 basis points, 100 basis points and 200 basis points. In these simulations, we maximized the EcoValue21® ratings subject to these tracking errors.

After one year of simulations, the results generally indicate that the application of Innovest EcoValue21® ratings to the investment process has a positive effect on investment performance. In five of the six investment portfolios, use of Innovest ratings improved investment return relative to the performance of the underlying portfolio. In most cases, this improvement increases as the "volume" of the Innovest signal increases (see Figure 1). The

case of the Manager 5 (an enhanced index portfolio), where addition of Innovest ratings did not improve performance, will be discussed in more detail below.

These results would seem to be significant, inasmuch as the six portfolios to which the Innovest overlay was applied represent a considerable range of investment styles (growth, value, active, enhanced index), capitalization levels (large cap, mid and small cap), and geographic exposures (U.S., EAFE, global). Due to the use of the portfolio optimization model, the outperformance realized in these simulations is achieved without industry sector biases.
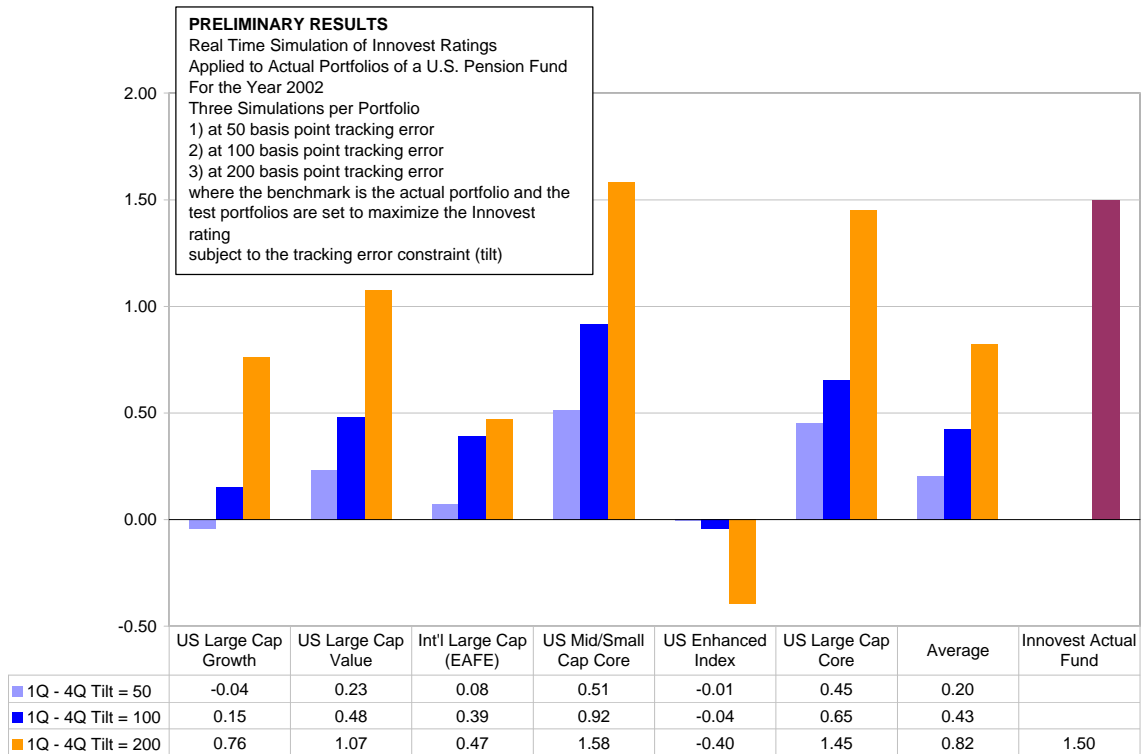
PRELIMINARY RESULTS
Real Time Simulation of Innovest Ratings
Applied to Actual Portfolios of a U.S. Pension Fund
For the Year 2002
Three Simulations per Portfolio
1) at 50 basis point tracking error
2) at 100 basis point tracking error
3) at 200 basis point tracking error
where the benchmark is the actual portfolio and the test portfolios are set to maximize the Innovest rating
subject to the tracking error constraint (tilt)

	US Large Cap Growth	US Large Cap Value	Int'l Large Cap (EAFE)	US Mid/Small Cap Core	US Enhanced Index	US Large Cap Core	Average	Innovest Actual Fund
1Q - 4Q Tilt = 50	-0.04	0.23	0.08	0.51	-0.01	0.45	0.20	
1Q - 4Q Tilt = 100	0.15	0.48	0.39	0.92	-0.04	0.65	0.43	
1Q - 4Q Tilt = 200	0.76	1.07	0.47	1.58	-0.40	1.45	0.82	1.50

Figure 1 - Relative Performance of Innovest Enhanced Portfolios vs. Underlying Portfolios

Source: Innovest's EcoValue21® Rating Model and databases, 2002.

The experience at this particular client would appear to parallel and confirm the findings of similar studies recently completed by several mainstream financial institutions[1]. The results of a major study completed in late 2002 by the German bank West LB Panmure is typical of this recent work:

> The findings of our study clearly suggest that it can pay to take the "sustainability factor" into account when selecting

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[1] See for example, West LB Panmure Bank (2002) More Gain than Pain: Sustainability Pays Off, and (2002) From Economics to Sustainomics: SRI – Investment Style with a Future; UBS Warburg (2001) Sustainability Investment: The Merits of Socially Responsible Investment; Bank Sarasin (1999) Sustainable Investments: and Analysis of Returns in Relation to Environmental and Social Criteria; and (1998) Environmental Shareholder Value.

stocks. There is an additional return even after risk adjust-ment. We estimate the "style" alpha at 2.1% per annum . . .

Another important finding of our analyses is that sustainabil-ity filters can create added value regardless of whether one is a value investor, or an investor opting for the small, mid, or large-cap style . . .

Sustainability will, therefore, become increasingly important for the capital markets also for performance reasons. We are at any rate convinced that sustainability filters will be used as a matter of course in equities investments in only a few years' time. Mainstream investors, too, should be aware of this and of the possible "early bird" benefits.[2]

CONCLUSIONS

The study would seem to confirm that portfolio managers can indeed add value by incorporating a comprehensive assessment of companies' environ-mental and social performance into their investment analyses.

While the results are entirely consistent with other academic findings, it must be acknowledged here that the study results *are* specific to the Innovest methodology. In other words, a different environmental rating system, espe-cially one less heavily weighted towards financial performance considera-tions, could yield different results. What *can* be said with certainty is that the Innovest methodology did indeed generate out-performance in five out of the six portfolios, and that the greater emphasis given to the Innovest rankings, the greater the out-performance.

Going forward, there is every reason for fiduciaries and their money manag-ers to believe that this "SRI premium" will become even larger in future. There are at least six powerful global "mega-trends" which can be expected to increase the *financial* importance of SRI factors even further:

- Changing demographics for both consumers and investors, substantially increasing the saliency and financial stakes of companies' environmental and social performance.

- Tightening national, regional, and global regulatory requirements for stronger performance *and* disclosure on SRI issues.

- Growing pressures from the international non-governmental organiza-tions (NGO's), armed with unprecedented resources, credibility, and global communication platforms.

- A substantial broadening of the purview of what is considered to be the legitimate fiduciary responsibility of investors to include addressing companies' social and environmental performance. (In the U.K. and a number of other European countries, this enlarged view of fiduciary re-sponsibility has been enshrined in law).

- The globalization and intensification of industrial competition, particu-larly into emerging markets, exponentially increasing the level of envi-ronmental and social risk for major corporations and investors.

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[2] West LB Panmure, November 2002, <u>More Gain than Pain: Sustainability Pays Off</u>, p.1.

- A growing inclination – and capability – among major institutional investors for shareholder activism on environmental and social issues.

RECOMMENDATION

That the Client seriously consider extending the application of the Innovest SRI overlay to one or more of its other investment portfolios. Currently, the overlay is in place only with the one enhanced index portfolio, where it helped add approximately 150 basis points of out-performance over its first year.

Inasmuch as SRI factors seem likely to become even *more* critical to companies' competitiveness, profitability, and share price performance in future, the fiduciary imperative of enhancing risk-adjusted returns would seem to confirm the wisdom of a move in that direction. Based on the risk-adjusted out-performance of their portfolios, the three which would have benefited the most from an Innovest SRI overlay are the following:

- Manager 2 (U.S. Large-cap value)

- Manager 4 (U.S. Small/mid-cap core)

- Manager 6 (U.S. Large-cap core)

2 BACKGROUND

INNOVEST RATINGS

Innovest's EV21 ratings are modeled after bond ratings, whereby Innovest rates the environmental and sustainability performance of companies within a given industrial sector using the following scheme:

RATING	
AAA	Best
AA	
A	
BBB	Average
BB	
B	
CCC	Worst

In order to generate the EV21 ratings, our analysts evaluate companies relative to their same-sector peers in Innovest's database of over 1200 global companies. This is accomplished though the completion of our analytical matrix via review of a wide variety of information from the company, industry trade groups, government databases, research organizations, non-governmental organizations, and, importantly, interviews of the company by our analysts. **See Appendix 2** for a detailed description of the analytical methodology underpinning the EV21 ratings and a sample company profile.

Innovest's clients, primarily financial institutions, use these ratings in their investment decisions. In some cases, this is in a qualitative way whereby a portfolio manager would read our company profiles to inform his or her opinion about a specific stock. In other cases, this is in a quantitative way whereby our "signal" (the rating) becomes an input into a quantitative investment model. It is this latter way that the ratings have been used in this study.

THE ASSIGNMENT

Innovest was asked to create SRI-enhanced "shadow portfolios" for six of the Client's current equity portfolios. Each shadow portfolio hold the same securities as its real-world counterpart; the only difference was be that companies with high EcoValue21® scores were overweighted and those with low scores were underweighted. The shadow portfolios were run for an initial, experimental period of one year. Innovest monitored any performance differentials between the shadow portfolios and the underlying portfolios, and conducted an attribution analysis in order to identify and explain any differentials.

The principal objectives of this live simulation were:

- To verify empirically what if any effect the inclusion of social and environmental performance factors (SRI factors) have on the portfolios' risk-adjusted returns.

- To ascertain which investment styles, capitalization levels, and sector tilts generate the greatest "SRI alpha".

- To conduct the analysis in a live simulation format, so that none of the Client's assets will be at risk.

In order to try to isolate the impact of the SRI factors, all other characteristics of the simulation portfolios will be kept identical to those of the underlying real portfolios. The simplest way to accomplish this objective would be to hold the same securities; the only difference will be the Innovest-generated SRI tilts.

The portfolios which will be analyzed are:

- Manager 1 (50+) securities
- Manager 2 (80)
- Manager 3 (250)
- Manager 4 (70)
- Manager 5 S&P 500 Diversity-Weighted Index
- Manager 6 (50)

In combination, the six portfolios represent over 720 different securities.

3 METHODOLOGY

In theory, the benchmark against which to measure the added value of Innovest research for a given portfolio would be the performance of that portfolio itself without the use of the Innovest research. In the actual portfolios, managers may (and in fact did) make a number of purchases and sales during the course of a given quarter. For the purposes of this simulation, we have made one simplifying methodological change. In order to create a baseline or benchmark for the simulations, we have started with the actual holdings of each portfolio at the start of the quarter, then held those stocks throughout the quarter, without any trading of stocks. At the start of the next quarter, we start with the new actual holdings.

We provided the Client's investment consultant Innovest monthly ratings for the period 11/01 through to the present. In the simulation, we have used the ratings which existed as of the month prior to the quarter end for each quarter of the simulation. That is, we have applied ratings published as of 11/01 to the portfolio balances as of 12/31/01 and the ratings published as of 2/02 to the portfolio balances as of 3/31/02, and so forth.

Each quarter, we received portfolio information from the Client's custodians. (i.e. for 12/31/01, 3/31/02, 6/30/02 and 9/30/02). For each portfolio, we confirmed prices using data from Thomson Financial databases when possible. This process also served to help us confirm each security so that it can be properly matched to the Innovest database. In some cases, the portfolio managers hold ADRs for companies which we rate, so we use our rating of the security which trades in the home country for the ADR. We also need to match companies to the data available in the Advanced Portfolio Technologies (APT) optimization model that is used for the simulation.

THE OPTIMIZATION MODEL

Advanced Portfolio Technologies was founded in 1985 by John Blin (Chairman), formerly a professor of econometrics at Northwestern University and a senior vice president at the New York Futures Exchange. According to the company, "the APT System is a full, genuine and uncompromising implementation of the Arbitrage Pricing Theory".

> Taking any portfolio of securities, we can measure its overall risk and its components:

> 1. Systematic Risk shared by all securities – to different degrees. Since it is shared and thus not diversifiable, this risk is shunned by portfolio managers as they strive to keep the systematic risk profile of their portfolio in line with that of their target index.

> 2. Security-/Company-Specific Risk. This is the risk that comes with the specific strategies, earnings surprises, legal entanglements and other idiosyncratic events that differentiate a firm from its competitors.

> Portfolio risk follows naturally. First we take the weighted sum of the individual APT profiles (using the portfolio holdings as weights) to obtain the portfolio APT profile. Then

treating this profile as a single (synthetic) security, we apply the same square-root-of the-sum-of-squares formula as for any other security.

With this information, the APT model can calculate a portfolio's tracking error to any target index. Extensive backtests and out-of sample simulations have demonstrated that the APT tracking error is the most accurate estimate available.

THE PORTFOLIOS

As of 12/31/02, there were five portfolios, and a sixth, Manager 5, was added as of 3/31/02:

Manager	Description	12/01	3/02	6/02	9/02
Manager 1	US Large Cap Growth	Y	Y	Y	Y
Manager 2	US Large Cap Value	Y	Y	Y	Y
Manager 3	International Large Cap (EAFE)	Y	Y	Y	Y
Manager 4	US Mid/Small Cap Core	Y	Y	Y	Y
Manager 5	US "Diversity-Weighted" Index	**N**	Y	Y	Y
Manager 6	US Large Cap Core	Y	Y	Y	Y

Table 1 - Description of Manager Style

THE SIMULATION PROCESS

The steps in the simulation process are:

- Receive actual portfolio information from the custodians. These portfolios will serve as the benchmarks for the simulation. Note that the performance of these benchmarks will not be identical to that of the actual portfolios because the benchmarks will remain unchanged during the given quarter, while the actual portfolios will most likely change due to trades that managers make.

- Put these portfolios into the APT optimizer format.

- Load the 12/2001 APT factor database and the 2002 performance database.

- Create 5 performance indexes for the period 12/2001 through 3/2002. These will serve as the benchmarks for 1Q 2002.

- Using Innovest ratings as of 11/2001, apply ratings to all rated companies in the portfolios. Note that for this process, the ratings have been converted into numbers as follows: AAA=6, AA=5, A=4, BBB=3, BB=2, B=1, CCC=0.

- Starting with the actual portfolio weights for each portfolio, set constraints as to the maximum change that can be made to each weight. For companies without Innovest ratings, there will be no change in portfolio weight. For the Tilt = 50bps and Tilt = 100bps portfolios, the maximum change is 1%. For example, if a stock had a weight of 0.4% in the actual

portfolio, its weight could be increased to as much as 1.4% in the simulations. For the Tilt = 200bps portfolios, the maximum change is 1.5%.

- Use the APT optimizer to create 15 tilted portfolios as of 12/2001, that is, three tilted portfolios (Tilt = 50 bps, Tilt = 100bps, Tilt = 200 bps) for each of the 5 portfolios. The optimizer is set to maximize the Innovest rating (the 0 to 6 score) subject to the constraints imposed.

- Compute and plot the performance of each tilted portfolio and its benchmark 12/2001 through 3/2002.

- Repeat the process in Steps 1 through 8 for the 6 portfolios which exist for 2Q, 2Q, and 4Q 2002, creating 18 tilted portfolios per quarter.

The portfolios which result from these steps are included in Appendices 4 through 9.

RESEARCH COVERAGE OF THE PORTFOLIOS

Not all stocks in the portfolios are covered in the APT system and not all stocks have been rated by Innovest. The following tables indicate the coverage by APT, Innovest and both for each portfolio, for each quarter, by number of companies (not by market capitalization). Note that the coverage by APT of the Manager 3 international portfolio is relatively low and that the coverage by Innovest of the Manager 4 portfolio is 15% or below, due to the fact that Innovest primarily covers large cap stocks and this is a mid cap and small cap portfolio.

If a company was covered by APT but not by Innovest, or was not covered by either APT or Innovest, the weight in the test portfolio would typically be unchanged from the underlying portfolio, though in some cases the weight might be slightly higher or lower due to the overall effects of the optimization model.

If a company was covered by Innovest but not by APT, or by both Innovest and APT, the weight in the test portfolio would typically vary within the limits stated above (for the Tilt – 50bps and Tilt = 100bps portfolios, maximum change of 1%; for the Tilt = 200bps portfolios, maximum change 1.5%), though still subject to the overall effects of the optimization model.

12/31/01 Portfolios	Portfolio	Covered by APT	%	Covered by Innovest	%	Covered by Both	%
Manager 1	49	49	100.0%	34	69.4%	34	69.4%
Manager 2	81	77	95.1%	48	59.3%	47	58.0%
Manager 3	200	106	53.0%	104	52.0%	80	40.0%
Manager 4	66	64	97.0%	10	15.2%	10	15.2%
Manager 5	NA	NA	NA	NA	NA	NA	NA
Manager 6	42	42	100.0%	35	83.3%	35	83.3%

3/31/02 Portfolios	Portfolio	Covered by APT	%	Covered by Innovest	%	Covered by Both	%
Manager 1	54	54	100.0%	35	64.8%	35	64.8%
Manager 2	82	80	97.6%	45	54.9%	45	54.9%
Manager 3	195	84	43.1%	106	54.4%	66	33.8%
Manager 4	67	65	97.0%	9	13.4%	9	13.4%
Manager 5	447	447	100.0%	314	70.2%	314	70.2%
Manager 6	42	42	100.0%	36	85.7%	36	85.7%

6/30//02 Portfolios	Portfolio	Covered by APT	%	Covered by Innovest	%	Covered by Both	%
Manager 1	55	55	100.0%	29	52.7%	29	52.7%
Manager 2	85	85	100.0%	37	43.5%	37	43.5%
Manager 3	221	121	54.8%	111	50.2%	77	34.8%
Manager 4	70	70	100.0%	9	12.9%	9	12.9%
Manager 5	463	463	100.0%	316	68.3%	316	68.3%
Manager 6	41	41	100.0%	33	80.5%	33	80.5%

9/30/02 Portfolios	Portfolio	Covered by APT	%	Covered by Innovest	%	Covered by Both	%
Manager 1	49	49	100.0%	34	69.4%	34	69.4%
Manager 2	77	77	100.0%	45	58.4%	45	58.4%
Manager 3	204	115	56.4%	115	56.4%	77	37.7%
Manager 4	68	67	98.5%	9	13.2%	9	13.2%
Manager 5	448	448	100.0%	304	67.9%	304	67.9%
Manager 6	44	44	100.0%	36	81.8%	36	81.8%

Table 2 - Percentages of Portfolio Stocks Covered by Innovest and by APT

4 RESULTS

The results of the analysis are summarized in the table below detailing the risk level (volatility) for each portfolio, the performance (cumulative returns) for the four quarters of 2002, and the information ratio providing a comparable measure of value added across the different portfolio.

	Ex Post Volatility (SD)	Cum. Return Through 4Q	Info. Ratio Full Year 2002		Ex Post Volatility (SD)	Cum. Return Through 4Q	Info. Ratio Full Year 2002
Manager 1				**Manager 5**			
4Q 2002 - Benchmark	30.94	-25.22		**4Q 2002 – Benchmark**	29.56	-6.87	
Tilt = 50 bps	31.04	-25.27		Tilt = 50 bps	29.44	-6.36	
Difference		**-0.04**	**-0.09**	**Difference**		**0.51**	**0.96**
Tilt = 100 bps	30.99	-25.07		Tilt = 100 bps	29.16	-5.96	
Difference		**0.15**	**0.14**	**Difference**		**0.92**	**0.90**
Tilt = 200 bps	31.28	-24.46		Tilt = 200 bps	29.06	-5.29	
Difference		**0.76**	**0.30**	**Difference**		**1.58**	**0.81**
Manager 2				**Manager 6**			
4Q 2002 - Benchmark	34.09	-11.54		**4Q 2002 – Benchmark**	31.90	-12.52	
Tilt = 50 bps	34.19	-11.31		Tilt = 50 bps	31.93	-12.53	
Difference		**0.23**	**0.45**	**Difference**		**-0.01**	**-0.01**
Tilt = 100 bps	34.68	-11.06		Tilt = 100 bps	32.10	-12.56	
Difference		**0.48**	**0.36**	**Difference**		**-0.04**	**-0.04**
Tilt = 200 bps	34.80	-10.47		Tilt = 200 bps	32.40	-12.92	
Difference		**1.07**	**0.41**	**Difference**		**-0.40**	**-0.21**
Manager 3				**Manager 7**			
4Q 2002 - Benchmark	26.24	-9.65		**4Q 2002 – Benchmark**	35.54	-16.41	
Tilt = 50 bps	26.54	-9.58		Tilt = 50 bps	35.54	-15.96	
Difference		**0.08**	**0.13**	**Difference**		**0.45**	**0.59**
Tilt = 100 bps	26.78	-9.26		Tilt = 100 bps	35.52	-15.76	
Difference		**0.39**	**0.41**	**Difference**		**0.65**	**0.53**
Tilt = 200 bps	27.66	-9.18		Tilt = 200 bps	35.31	-14.96	
Difference		**0.47**	**0.26**	**Difference**		**1.45**	**0.52**

Table 3 – Summary of Simulation Results

Actual performance – It should come as no surprise to anyone that the actual performance of the underlying portfolios was very poor during 2002, as was true of the equity markets in general. The performance ranged from -6.87 (the simulated Manager 4 portfolio) down to -25.22 (the simulated Manager 1 portfolio).

Relative performance – As can be seen from Figure 1 above and the table below, the relative performance number is the measure of value added by the Innovest ratings, which has been positive for most of the portfolios. Most of the time the addition of Innovest ratings has improved investment performance. For example the tilt to Manager 2's enhanced performance by 107 bps over the four quarters. The exceptions are a modest under-performance on the smallest Innovest tilt to Manager 1's portfolio, = 50bps portfolio (down by 4 bps) and Manager 5's portfolio (negative in each portfolio), which will be discussed below.

Risk levels – The degree of tilt for each portfolio is determined by the level of active risk. Using the portfolio optimization model, three tilted portfolios are constructed with varying levels of active risk as measured by the ex-ante tracking error of 50bps, 100bps and 200bps . The overall risk of each portfolio (volatility), as presented in the results table, confirms that total risk for the underlying portfolios and the final Innovest enhanced portfolios are very close to each other. For example for Manager 1 portfolio the risk level (ex-post volatility) was 30.94% while the Innovest enhanced portfolio with maximum tilt (i.e. 200bps tracking error) had a risk level of 31.28%.

Information Ratio – This is a risk/return measure that is comparable across the portfolios. The information ratio of each Innovest enhanced portfolio was calculated by dividing the cumulative return for the year (performance of the portfolio) by the ex-post tracking error (the level of active risk). The higher the information ratio, the greater the value added resulting from the Innovest enhancement. For example, the Innovest enhanced Manager 6's portfolio with tilts 50bps to 200bps had information ratios in the range of 0.52 to 0.59. Thus for every 100bps of active risk the portfolio realized an active return of over 50bps beyond the underlying benchmark portfolio. For portfolios of this type, this level of information is considered to be very good.

Performance Attribution – The portfolio with the maximum tilt (200bps) was used for the performance attribution analysis. The optimization model which was used to construct the three portfolio tilts of 50bps, 100bps and 200bps ensured that industry bets were minimized or eliminated and thus the performance was attributable to the individual stock selection decisions based on the Innovest ratings.

Portfolio turnover – The trading volume for each portfolio, measured by the weighted mean trading volume, was considered to be generally moderate across the universe of portfolios. Although one portfolio exhibited very high portfolio turnover (see discussion on Manager 5 portfolio below).

Other comments

Two portfolios need special mention. As is clear from Figure 1, the addition of Innovest information to the Manager 5 portfolio slightly hurt its overall performance. We believe that there are several reasons for this result:

- The large number of holdings in the Manager 5 portfolio of approximately 450 stocks and the internal constraints applied by the optimization model generated very high portfolio turnover, on average twice that of the portfolios for the other managers.

- Because of optimization, we had only 230 stocks (in the Tilt = 200bps portfolio), which in turn led to the underweighting or elimination of a number of 3- and 4-rated stocks (that is, BBB and A rated stocks that would normally be neutral or positive) just to have enough weight to put in 5s and 6s (that is, AA and AAA rated stocks)

- Conclusion – The risk minimization dynamics of the optimization model and its internal restraints did not support the mechanics of the Innovest overlay for the Manager 5 portfolio.

As is also clear from Figure 1, the addition of Innovest information to the Manager 4 portfolio substantially improved its overall performance. This is somewhat of a surprise given that Innovest only covers about 13% to 15% of

the stocks in the portfolio. However, due to this fact and to the fact that there are only approximately 60 to 70 stocks in this portfolio, those stocks on which Innovest had ratings could be given a much larger weight than would be the case in a portfolio such as Manager 5. Thus the Innovest signal was in effect more important in this portfolio.

Appendices for each manager consist of the following information for the underlying portfolio and the three test portfolios for each quarter:

1) Summary table showing returns of the underlying portfolio and the three test portfolios for each quarter and for the entire year, along with information ratios.

2) Comparative data table showing the items described below in Table 4.

3) Graph highlighting the stocks with the greatest overweight or under-weight relative to the underlying portfolio. This is only for the Tilt = 200bps portfolio, for each manager for each quarter. These same stocks would typically be overweighted in the Tilt = 50bps and Tilt = 100bps also, but just to a lesser degree.

4) Attribution analysis showing the net weighted return of the Tilt = 200bps portfolio, for each manager for each quarter. This table typi-cally shows the top ten results of adding the Innovest information and the bottom ten results (in some cases such as Manager 4, there are fewer than 20 companies that had different ratings so the table is shorter). The net weighted return is the actual quarterly stock per-formance of the particular stock multiplied by its weight in the port-folio. Thus this table shows where the Innovest ratings have had the largest effect, whether beneficial (top) or detrimental (bottom) to the performance of the portfolio. As can be seen in these tables, in the case of the top ten, the net weighted return results from a mix of some stocks that were overweighted, performed well and so added return to the portfolio, and others which were underweighted, per-formed poorly and so hurt the return less because they were under-weighted. The bottom ten, i.e. where the Innovest signal was not ef-fective, is the inverse. Overall, as is clear from the previous tables and graphs, the Innovest signal helped more often than it hurt the portfolio performance

5) Portfolio weights and Innovest EV21 ratings (where available) for all stocks in the underlying portfolio and each of the test portfolios (Tilt = 50bps, 100bps and 200bps)

The Target Portfolio = The manager's holdings at the start of each quarter. This portfolio was held unchanged for the entire quarter.
The Optimal Portfolio = The Innovest Enhanced Portfolio = a portfolio constructed from the same stocks held in the Target portfolio but tilted towards the Innovest rankings. The highly ranked stocks would be overweighed while the low rated stocks would be underweighted and in some cases eliminated. The stocks not ranked by Innovest were held at the original weight. This portfolio was created as of the start of each quarter and was held unchanged for the entire quarter.
Ex-Ante Tracking Error = The expected deviation (+ or -) of the performance of the Optimal portfolio from Target portfolio. This expected deviation is predicted by the APT optimization model. Three simulations were run for each manager with the expected tracking errors set to 50 bp, 100 bp and 200 bp. Note: In the spreadsheet 50 bp prints as 0.50
Ex-Post Tracking Error = The actual deviation (+ or -) of the performance of the Optimal portfolio from Target portfolio. This is calculated as the standard deviation of the difference between the weekly returns of the Optimal Portfolio and the Target Portfolio.
Target Stock Overlap = The percentage of the stocks in the Target Portfolio that are held in the Optimal Portfolio. Note: The Target portfolio always owns 100% of itself.
Target Correlation = The historical correlation of the Target portfolio with the Optimal portfolio. Note: The Target portfolio always correlates 100% with itself.
Target Beta = The percentage the Optimal portfolio is expected to move when the Target portfolio moves 1%. This is the same definition as a standard CAPM Beta.
Total Volatility (SD) = The risk of the portfolio measured by the optimization mode (APT).
Ex-Post Volatility (SD) = The risk of the portfolio measured from the realized weekly change in the portfolio value. This is the annualized standard deviation of the weekly returns for the portfolio.
Stocks Held = The number of stocks held in each portfolio.
Stocks Increased = The number of stock positions were the percentage of the total portfolio was increased.
Stocks Reduced = The number of stock positions were the percentage of the total portfolio was reduced.
Stocks Bound by Min/Max = The number of stock positions were the optimizer raised or lowered the portfolio weight by the maximum allowed. For the 50 bp and 100 bp simulations, the maximum was current weight +/- 1.0%. For the 200 bp simulations the maximum was current weight +/- 1.5%.
Turnover (weight) = The portion of the total portfolio holdings that were changed by the optimizer. Note: A 10% turnover prints as 0.10
Innovest Weighted Average Rating of the Portfolio = The weighted average sum of the 0 to 6 Innovest ratings for each company. The optimizer tries to maximize this number, subject to the holdings constraints. Note: Companies not rated by Innovest get a default value of zero.

Table 4 – Description of Comparative Data which appears in Appendices

Appendix 1
Innovest Background

Appendix 1

Ecovalue'21® - Identifying Hidden Value for Investors

Innovest Strategic Value Advisors is an internationally recognized investment research and advisory firm specializing in analyzing companies' performance on environmental, social, and strategic governance issues, with a particular focus on their impact on competitiveness, profitability, and share price performance.

Innovest provides its clients with three basic types of products and services:

- Industry, company and specialized reports
- Asset management sub-advisory services
- Custom research, consulting and portfolio analysis

Founded in 1995 with the mission of identifying non-traditional sources of risk and value potential for investors, the firm currently has over US $1 billion under direct sub-advisory mandates with partners including ABN-AMRO, Mellon Capital, Brown Brothers Harriman, T. Rowe Price, and Credit Lyonnais. Innovest also provides custom portfolio analysis and research to leading fund managers including Schroders, State Street Global Advisors, and Rockefeller & Co. Innovest's institutional clients include two of the largest pension funds in the world – CalPERS (USA) and ABP (Netherlands). In addition, the firm provides research and strategic advice to senior executives of Global Fortune 500 industrial companies.

Innovest's chairman Jim Martin was chief investment officer for North America's largest pension fund for over fifteen years. The firm's founder, Dr. Matthew Kiernan, is a former partner with KPMG and director of the World Business Council for Sustainable Development and it's co-founder, Hewson Baltzell, is a former banker and investor from Lehman Brothers and JP Morgan Chase. Innovest's other principals and advisory include former senior executives from several of the world's leading financial companies, as a former G7 finance minister, and the former chairman of Royal Dutch/Shell. Innovest's flagship product is the EcoValue'21® investment analytics platform, which was developed in conjunction with strategic partners including Pricewaterhouse Coopers and Morgan Stanley Asset Management. Innovest is headquartered in New York with offices in Toronto and London.

Innovest's Directors and Senior Advisors

Directors

- Mr. Jim Martin: Chairman, Innovest Strategic Value Advisors; formerly Chief Investment Officer, TIAA-CREF.

- Mr. David Van Pelt: Vice Chairman, Former Executive Vice President, Citicorp.

- Mr. Alan Silberstein: CEO, Western Union

- Mr. Arthur Lipper III: Founder, The Arthur Lipper Corporation.

- Mr. Ken McCready: Former CEO, Transalta Corporation.

- Sir Mark Moody-Stuart (Emeritus): Chairman, Anglo-American Mining, former Chairman, Royal Dutch Shell Group

- The Rt. Hon. Lord Nigel Lawson (Emeritus): Chairman, Central Europe Trust, former Chancellor of the Exchequer, United Kingdom.

Technical Advisory Committee

- Derek Osborn, Chair, former Director of the U.K. and European Environment Agencies

- Dr. Stuart Hart, Professor, University of North Carolina

- William Russell, former Director, U.S. Environmental Practice, Pricewaterhouse Coopers

- Dr. Andrew King, Professor, Stern School of Business, New York University

- Alan Willis, Advisor, Global Reporting Initiative

- Franz Knecht, former head of environment management, Swiss Bank Corporation

- Stephen Viederman, former President, Jessie Smith Noyes Foundation

Appendix 2
EcoValue21® Background and Rating Methodology

Ecovalue'21® - Identifying Hidden Value for Investors

"The aggregate numbers concerning potential environmental costs are staggering. Environmental liability, if it isn't already, will soon become a prominent concern for virtually all securities marketplace participants."

Commissioner Richard Y. Roberts
U.S. Securities and Exchange Commission

"The capital markets will soon come to reward eco-efficiency much more systematically; far-sighted company leaders and investors will position themselves accordingly."

Stephan Schmidheiny and
The World Business Council for Sustainable Development

Eco-Efficiency: A New Source of Strategic Value Creation

An understanding of eco-efficiency is critical for a new generation of investing.

To an increasing degree, financial analysts and investors are recognizing that there is a strong, positive, and growing correlation between industrial companies' environmental performance (eco-efficiency) and their competitiveness and financial performance, whether measured as ROI, ROE, or total stock market return. Recent back-test evidence and live portfolios indicate that a diversified portfolio of eco-efficient companies can be expected to outperform its less efficient competitors by 300 basis points or more per annum.

Eco-efficient companies can outperform their competitors from 300 to 2500 basis points or more.

Comparison of the stock performance of top-rated companies to bottom-rated companies in sectors with high environmental intensity (e.g. mining) shows out-performance of as much as 2500 basis points. This gap will likely widen in the future, as the forces of tighter international environmental standards, tougher disclosure requirements, and globalized competition combine to increase the financial and competitive premium on superior eco-efficiency.

Over the last several years, international surveys by Salomon Brothers and others have documented a significant increase in the degree to which major financial institutions have become concerned with environmental risk as a core business issue. A Price Waterhouse study of 1,100 major U.S. manufacturing companies has revealed that over 62% had major, but undisclosed, environmental liabilities. Innovest's own analytical models have detected variances as great as 500% in the environmental risk and eco-efficiency profiles of companies which conventional financial analysts and rating agencies continue to regard as identical credit and investment risks. Furthermore, from an investment perspective, eco-efficient companies generally demonstrate superior strategic and financial management across the board, and therefore tend to produce superior financial returns. In short, eco-efficiency turns out to be an extraordinarily good proxy for - and predictor of - superior corporate

Eco-efficient companies carry an undeniable premium in light of increasing environmental standards.

management, which in turn generates financial out-performance and shareholder value.

What has been missing, until now, is a robust and credible set of analytical models capable of assessing environmental risks and opportunities systematically, translating them into financial terms, and identifying hidden value potential in individual companies. Innovest Strategic Value Advisors created the EcoValue'21® analytics platform specifically to exploit that prospect. By superimposing its proprietary analytical models on top of conventional investment screens, Innovest's analysis team can identify hidden value opportunities, and thereby create superior returns for investors.

Environmental factors represent both threats and financial opportunities:

Threats

Balance sheet risk - Historic liabilities, impairment of real property values, underwriting losses.

Market risk - Damage to corporate reputation and image, reduced customer acceptance, potential loss of "social license to do business".

Capital cost risk - Pollution control expenditures, product redesign costs.

Operating risk - Emissions and discharge risk, product liability risk, required process changes.

Transaction risk - Potential cost of time, money, and delayed or canceled acquisitions or divestitures.

Business sustainability and eco-efficiency risk - Potential competitive risk from lack of efficiency/sustainability in energy, materials, and resource use or potential eco-taxes.

Financial Opportunities

Superior environmental performance can create competitive advantage, profits, and shareholder value for companies by enhancing at least five major "value drivers":

Cost containment - 3M has saved over $750 million through pollution prevention and waste reduction efforts. Dow, DuPont, and Baxter Healthcare are only three other high-profile examples.

Sales and market share growth - Companies such as DuPont, Chevron, Monsanto, Interface, and many others are already producing top-line revenue growth with new products and services predicted on environmental out-performance.

Franchise value - Major corporations remain dependent on their "social license to do business", a license which can be revoked summarily over perceived environmental transgressions. The Brent Spar North Sea oil platform incident, for example, cost Royal Dutch/Shell fully 30% of its market share

in Germany within one month. Exxon is still recovering from the reputational damage it suffered from the Valdez disaster.

Stakeholder satisfaction - Customers, employees, suppliers, regulators, and other key stakeholders can all be positively influenced by a superior environmental track record. Executives at companies as diverse as Chevron and Bristol-Myers Squibb, for example, are convinced that their superior environmental performance and reputations have generated concrete shareholder value through improved relations with regulators, customers, suppliers, and employees.

Innovation Capacity - There is a good deal of evidence to suggest that environmental innovation and excellence can be "contagious" and spread to other functions and departments. Companies as varied as Nortel Networks, ABB, and Interface can all point to examples where environmental innovations have helped create an entirely new corporate ethos and have elevated the companies' overall "innovation quotient" considerably.

Each of these five environmentally driven attributes can and often do contribute directly to a company's competitive advantage in the marketplace. Environmental out-performance will almost inevitably strengthen one or more of these five critical value drivers. The value drivers generate competitive advantage, which in turn creates additional market share, profits, and shareholder value. Schematically, the process can be represented this way:
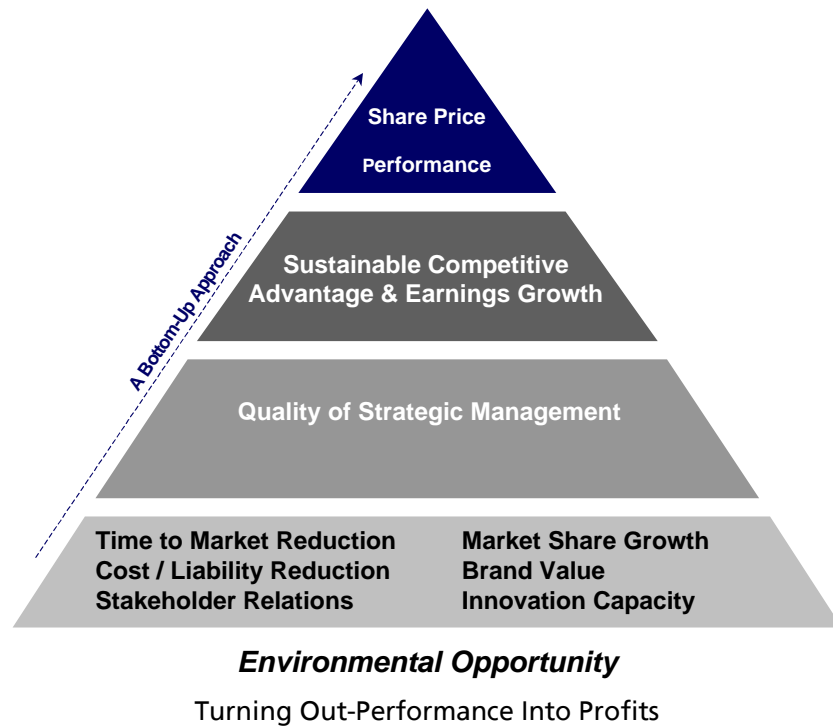

Environmental Opportunity

Turning Out-Performance Into Profits

Figure A1: Environmental Alchemy At Work
Source: Innovest

Background to EcoValue'21[®]

EcoValue'21® is the product of over three years' development by Innovest and its strategic partners, including PriceWaterhouseCoopers and Morgan Stanley. The model grew directly out of insights and research generated by the initial Capital Markets Task Force of the Business Council for Sustainable Development in Geneva. The BCSD included the chairman of several of the world's leading industrial companies, including Volkswagen, DuPont, Royal Dutch/Shell, Mitsubishi, and Asea Brown Boveri, and served as the Principal Business and Industry Advisor to the Secretary General of the historic Earth Summit in Rio de Janeiro in 1992. Innovest's founder served as the head of the initial BCSD capital markets task force.

EcoValue'21®'s intellectual capital base has been further enriched by comprehensive, 5-year back-tests on over 350 Fortune 500 companies. These back-tests have allowed individual environmental risk factors to be identified, and their varying relative impacts on ROI, ROE, and total stock market returns to be calculated. This has assisted Innovest in constructing robust models of both the financial consequences and the hidden value potential inherent in environmental risk. These models have been further refined through beta tests with leading financial institutions, including Morgan Stanley, Bank of America, Union Bank of Switzerland, the Zurich Insurance Group.

Empirical Tests of EcoValue'21[®] Ratings

In tests performed by QED International Associates, a quantitative financial analysis firm, the returns of equally weighted portfolios composed of the highest-rated companies (ratings equal to AAA or AA) were compared to the returns of the equally weighted total universe of all rated companies. The portfolios were rebalanced at each year-end, over the period from December 31, 1996 through year-end 2000. The highly rated portfolio outperformed the universe by over 700 basis points (7.21%) over the four-year period.

The following chart demonstrates EcoValue'21®'s ability to generate investment out-performance.
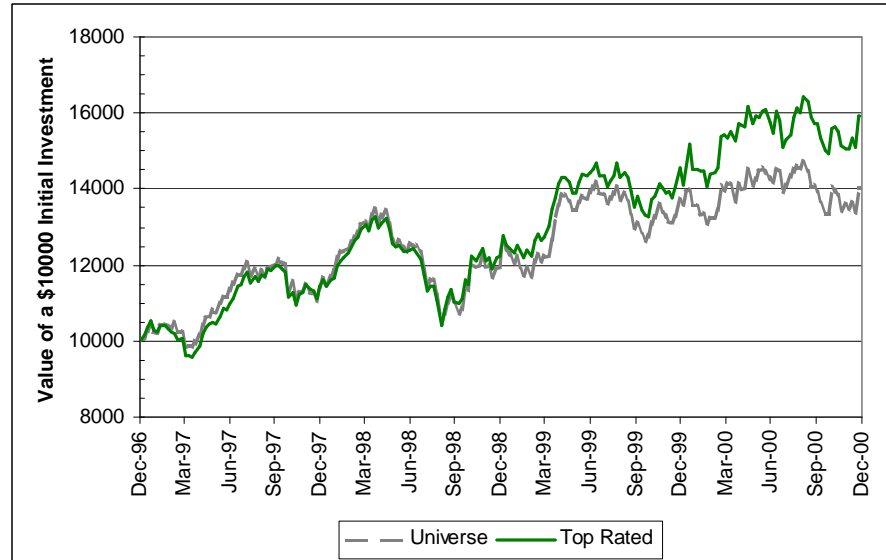
Characteristics	1997	1998	1999	2000
Rating Date	Dec-96	Dec-97	Dec-98	Dec-99
No. of Stocks in Top-Rated Portfolio	49	61	89	130
No. of Stocks in Innovest Universe	184	190	342	490
Ann. Weekly Std. Dev. Of Top-Rated (%)	9.51	10.59	12.59	13.82
Ann. Weekly Std. Dev. Of Universe (%)	10.00	10.89	14.02	15.11
Average Rating of Top-Rated Stocks (%)	5.33	5.38	5.48	5.55
Average Rating of the Universe (%)	3.11	3.25	2.89	2.94
Return of Top-Rated Stocks (%)	14.45	6.91	19.00	9.52
Return of Innovest Universe (%)	13.97	4.93	14.74	2.31
Difference in Basis Points	**48**	**198**	**426**	**721**

Figure A2: EcoValue '21 Test Portfolio – 4 Year Performance.

Source: QED International Associates

Eco-Efficiency Investing: The International Experience

Since 1997, many new investment vehicles have been created in Europe and Japan by mainstream institutions attempting to capture the excess returns produced by superior eco-efficiency. Some of the sponsors of these initiatives were: Scudder/Storebrand (Luxembourg), UBS (Switzerland), Credit Suisse (Luxembourg), Sustainable Performance Group, including Swiss Re-Insurance (Switzerland), Bank Sarasin (Luxembourg), SNS Asset Management (Netherlands), ABN AMRO Bank (Netherlands), RaboBank (Netherlands). Funds based directly on Innovest research include the ABP Loyalis Fund (Netherlands), the T. Rowe Price fund, marketed in Europe and also in Japan (as Daiwa Securities Mrs. Green Fund), the ABF Capital Clean Future Fund (France) and the State Street Global Advisers/Environment Agency fund (United Kingdom).

Many international institutions recognize the advantages offered by eco-efficiency.

The EcoValue'21® analytical model has been developed to enable investors and industry analysts to assess companies' relative environmental performance, risk, and strategic positioning as well as the financial consequences of these factors. The following section describes the model.

METHODOLOGY - THE ECOVALUE'21® RATING MODEL

At the heart of EcoValue'21® analytical model and risk algorithms is the attempt to balance the level of environmental risk with the companies' capacity to manage that risk strategically and profitably into the future. It is the product of these two variables, not the absolute level of risk alone, which determines the ultimate financial consequences of environmental risk for industrial companies and their investors.

The EcoValue'21® model addresses three fundamental types and sources of environmental risk factors:

- **Historical Liabilities** - Ongoing risk exposure arising from past actions.

- **Operating Risk** - Risk exposure arising from current operations.

- **Sustainability and Eco-Efficiency Risk** - Future risk exposure caused by potential undermining of the company's material sources of long-term profitability and competitiveness. For example, electric utility companies emitting more pollutants per megawatthours (MWH) generated than their competitors would have greater financial and competitive exposure to the likely imposition of more stringent emission restrictions.

In addition, the model evaluates:

- The company's capacity to manage environmental risk effectively; and

- The company's ability to position itself to profit from environmentally-driven business opportunities.

Broadly speaking, the EcoValue'21® model uses two kinds of inputs and data:

- **Quantitative data** on the sources and levels of corporate environmental risk and performance relative to industry competitors; and

- **Qualitative judgments** about future environmental/ financial performance and risk, based on an expert assessment of the companies' environmental risk management capabilities.

Examples of the types of data used in the model include:

Rating a company means examining both environmental risk and a company's ability to manage that risk.

Advanced eco-efficiency analysis means that risks, management, and profit opportunities are all considered.

Quantitative Environmental Risk Indicators

- Historical environmental risk profile of the company's industrial sector;

- Number of Superfund sites relative to industry average;

- Officially estimated capital cost of remediation and clean-up liability exposures, relative to industry averages;

- Ratio of environment-related fines (RCRA, CAA, CWA, etc.) to revenues, relative to industry averages;

- Concentration of high-risk products in company product portfolio;

- Site-specific emissions data on individual plant sites;

- Corporate budgetary allocation for environmental protection and research and development; and

- Adequacy of environmental insurance cover.

Qualitative Risk Mitigation Factors

- Adequacy of board-level mechanisms for environmental reporting and management;

- Company-wide environmental management capability;

- Staff resource commitment to environmental management;

- Environmental audit capacity, frequency and transparency;

- Environmental cost accounting and measurement systems;

- Adequacy and universality of staff training on environmental risk management;

- Capacity to manage supplier relations for environmental performance;

- Environmental innovation capacity;

- Mechanisms for corporate reporting of environmental performance;

- Integration of environmental performance with staff compensation; and

- Potential for successful commercialization of environmental research and development.

While companies' current performance levels are obviously important to the analysis, the EcoValue'21® models are designed to move beyond simply providing a static snapshot of the present situation. Instead, they attempt to provide dynamic, predictive indication of companies' relative ability to manage environmental issues profitably into the future. Accordingly, the models place considerable emphasis on the trajectory and rate of performance improvement (if any), and on the robustness of the company's strategic management capability. The EcoValue'21® rating model can be expressed schematically as shown below:

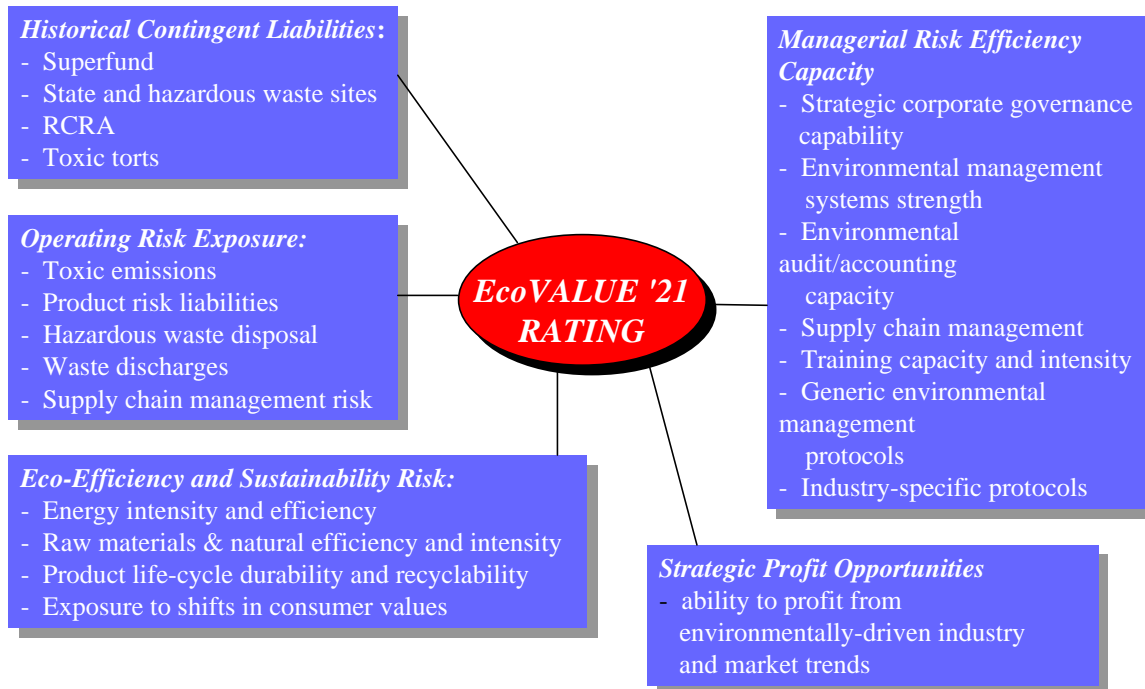*EcoVALUE '21 analyzes over 60 key variables using over 20 data sources:*

Historical Contingent Liabilities:
- Superfund
- State and hazardous waste sites
- RCRA
- Toxic torts

Operating Risk Exposure:
- Toxic emissions
- Product risk liabilities
- Hazardous waste disposal
- Waste discharges
- Supply chain management risk

Eco-Efficiency and Sustainability Risk:
- Energy intensity and efficiency
- Raw materials & natural efficiency and intensity
- Product life-cycle durability and recyclability
- Exposure to shifts in consumer values

EcoVALUE '21 RATING

Managerial Risk Efficiency Capacity
- Strategic corporate governance capability
- Environmental management systems strength
- Environmental audit/accounting capacity
- Supply chain management
- Training capacity and intensity
- Generic environmental management protocols
- Industry-specific protocols

Strategic Profit Opportunities
- ability to profit from environmentally-driven industry and market trends

Figure B1: Schematic of Major EcoValue'21® Analysis Factors.

Source: Innovest

STRATEGIC PROFIT OPPORTUNITIES

The Strategic Profit Opportunities component of the model is broadly comprised of two measurements: environmental competence and environmental opportunity.

Environmental Competence

This is a measure of the firm's capabilities, competence, and level of focus toward implementing an environmentally-oriented business strategy. Considerations include the following:

- Does the firm have a culture that supports environmental innovation? (e.g., Shell Oil, which is realigning the core competencies of the firm around a sustainable business strategy)

- Does the firm have internal systems or an organizational structure which supports environmental innovation (e.g., DuPont's Business Opportunities group within the Safety, Health, and Environmental Excellence Center)

- Is the culture and/or strategy proven? Or new? (e.g., 3M—30 years of experience integrating environmental issues into business strategy vs. Monsanto—brand-new strategy)

Environmental Opportunity

- This is a measure of environmentally-related business opportunities available to the firm relative to same-sector competitors. Considerations include the following:

- Does the firm serve a different demographic target area than its competitors which is more responsive to environmental strategies (e.g., Patagonia vs. Eddie Bauer-both are apparel manufacturers, however, Patagonia's customers are clearly more willing to pay for environmental stewardship activities).

- Does the firm operate primarily in a different regional area which is more responsive to environmental strategies? (e.g., Arco with a heavy prevalence in California vs. Amoco's primary Midwest location - Arco has a viable market supporting the development of lower emission reformulated gasoline).

- Does the firm produce products or services likely to be phased out or banned due to environmental impacts? (e.g., CFCs, lead, or asbestos).

- Does the nature of the firm's business provide a greater (vs. other same-sector competitors) potential for strategic environmental improvements? (e.g., Microsoft has little room for improvement vs. Intel or Seagate which have significant impacts although all may be considered "high tech")

- Does the firm operate in a different portion of the sector than its competitors which is more environmentally-sustainable? (e.g., copper, aluminum, or molybdenum mining vs. lead mining)

Data Sources

Information needed to complete EcoValue'21® ratings is gathered from several sources, including company literature (environmental reports, annual reports, 10Ks, 10Qs, websites, etc.), environmental groups and other NGOs, trade groups and other industry associations, government data bases, periodical searches, and financial analysts' reports. Following a review of the literature, Innovest analysts usually interview senior executives at the companies, most often in the environmental area. When comparing companies, data is normalized by the most relevant, available factor, such as domestic sales or production levels.

The Scoring System

For most categories, the data is then converted to a relative score, by allocating the company with the best performance within its industry sector in a given category a ten, the top score, giving the company with the worst performance a zero, the lowest, and scoring the remainder pro-rata between ten and zero. This system is designed to clarify and highlight performance differentials that would otherwise be more difficult to discern.

To profit, companies need to be both environmentally competent and aware of the possible opportunities.

Eco-efficiency analysis demands thorough data acquisition and disciplined examination.

The end result is the translation of complex environmental issues into financially relevant measures.

All of this data is then input into the scoring matrix, where it is adjusted by weightings for each category. We have developed these weightings through extensive back-testing with over 350 Fortune 500 companies. The weightings were then further refined through beta-testing with our strategic partners such as PriceWaterhouseCoopers, with financial institutions such as Union Bank of Switzerland and the Zurich Insurance Group, and with specialist environmental engineers and other colleagues. They reflect our view of the relative importance of each category in determining companies' medium-term profitability and share price performance.

The final EcoValue'21® relative score is intended for comparison within industry sectors. The scores have been converted into the familiar letter categories used by bond rating agencies.

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