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Socially Responsible Investment and Market Performance: The Case of Energy and Resource Firms

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Abstract Energy and resource companies have a crucial role in achieving future sustainable economies. We investigate the performance of international Socially Responsible Investment (SRI) energy and resource companies on the stock market over a 10-year period (February 2005-January 2015). We select portfolios of established energy and resource stocks with substantial environmental and social responsibility activities. Our findings demonstrate that the annual average performance of the energy and resource SRI portfolio was superior to returns of different benchmark indices. The energy and resource SRI stock investments were also more profitable on the risk-adjusted basis. Additionally, we applied Fama-French and Carhart four factor models and found that the returns of our portfolios are more consistently explained by the market factor than by other factors. We also show that oil price has a statistically significant influence on the returns of the SRI energy and resource stocks. However, the performance of the energy and resource SRI portfolio was no longer superior when dividends were excluded from the calculation of total returns. Indeed, the performance of portfolios without dividends was poor compared to the benchmark indices in most sub-periods, in the sub-samples of bullish and bearish markets and in the full sample. This finding demonstrates the importance of dividends in the investment performance of the energy and resource SRI stocks.

Keywords Socially Responsible Investment (SRI), SRI Stocks, Energy Stocks, Stock Market Returns, Dividends

JEL Classification G10, Q40, Q56

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Socially Responsible Investment and Market Performance: The Case of Energy and Resource Companies

ABSTRACT

Energy and resource companies have a crucial role in achieving future sustainable economies. We investigate the performance of international Socially Responsible Investment (SRI) energy and resource companies on the stock market over a 10-year period (February 2005-January 2015). We select portfolios of established energy and resource stocks with substantial environmental and social responsibility activities. Our findings demonstrate that the annual average performance of the energy and resource SRI portfolio was superior to returns of different benchmark indices. The energy and resource SRI stock investments were also more profitable on the risk-adjusted basis. Additionally, we applied Fama-French and Carhart four factor models and found that the returns of our portfolios are more consistently explained by the market factor than by other factors. We also show that oil price has a statistically significant influence on the returns of the SRI energy and resource stocks. However, the performance of the energy and resource SRI portfolio was no longer superior when dividends were excluded from the calculation of total returns. Indeed, the performance of portfolios without dividends was poor compared to the benchmark indices in most sub-periods, in the sub-samples of bullish and bearish markets and in the full sample. This finding demonstrates the importance of dividends in the investment performance of the energy and resource SRI stocks.

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1. Introduction

In order to achieve sustainable energy economy objectives, it is important to decouple energy use and its related emissions and environmental impacts from economic activity. Therefore, not only the governments but also energy and resource firms can have a crucial role through their actions and investments (see, e.g., IEA, 2014 and 2015). In recent years, many major companies have adopted Socially Responsible Investment (SRI) principles as a strategic tool and self-regulation for improving corporate image and gaining competitive market advantage.

SRI has grown drastically over the past two decades. According to a recent report from the Forum for Social Investment, the assets invested in SRI companies in the US have increased by over 900% to $6.6 trillion between 1995 and 2014 (a compound annual growth of 13.1%) representing nearly 18% of the $36.8 trillion total assets under management (USSIF, 2014). The number and value of SRI funds have increased significantly in many countries and has also led to the creation of SRI indices, such as: Calvert Social Index, Domini400 Social Index, FTSE4GOOD Social Index and MSCI ESG Social Indices etc.

However, it is not clear from the literature whether investments according to the SRI principles provide higher, lower or similar returns in comparison with conventional stocks (see the review studies by Margolis and Walsh (2003), Orlitzky et al. (2003) and more recently by Revelli and Viviani (2013)). In particular, the literature about the effect of SRI on performance of energy and resource firms is remarkably scarce (see Jenkins and Yakovleva (2006), Frynas (2009) and Zhao (2015) for rare exceptions) and the available findings are inconclusive. Therefore, the paper contributes to the literature on SRI investments and firm performance in general and in the case of energy and resource firms in particular. To the best of our knowledge this paper is the first such study to analyse SRI investments in energy and

resource companies on a global scale using international data from several markets in different geographical regions covering all six continents. We present novel empirical findings on the performance of international energy and resource SRI stocks and the results are relevant for a variety of energy market and financial market researchers. In particular, they will be of relevance for energy policymakers and for the investors in energy and resource firms.

There are two competing theoretical views about the profitability of investments in SRI stocks. The literature pointing towards a negative relationship between SRI and stock returns proposes two possible explanations. First, the cost of social responsibility is an extra expense for firms and reduces their profitability. However, SRI supporters argue that, over time, this extra cost is traded off by the extra benefits as a result of positive reputation. Second, focusing on SRI companies as a subset of available stocks reduces benefits of diversification (e.g., when tobacco stocks are excluded from portfolios), which may result in lower risk-adjusted returns. The proponents of SRI argue that the excluded companies are engaged in unsustainable products or services that will make them less profitable anyway over time. As we present and review in this study, these arguments are supported by many empirical studies that do not find meaningful differences between the performance of SRI and non-SRI stocks.

We analyse the performance of energy and resource SRI companies on the stock market and simulate an investment in portfolios of such stocks. We calculate raw returns of the energy and resource SRI stocks portfolios and analyse their performance using Fama-French (1992, 1993) and Carhart (1997) multi-factor models. Furthermore, we control for changes in oil price by including oil price returns as an additional variable in our Fama-French and Carhart estimations. We also measure the performance of the portfolio using risk-adjusted techniques, such as the

Modified Sharpe Ratio (MSR) and the Certainty Equivalent (CEQ) returns. Moreover, by measuring the performance of stocks with and without dividends, we analyse the effect of dividends on total returns of the portfolios.

The performance of energy and resource SRI stocks portfolios is subsequently assessed by comparisons with several global benchmarks including the broad market indices as well as the energy market, the SRI market and the alternative energy market sector indices (S&P Global 1200, MSCI World Energy, FTSE4GOOD Global 100, and S&P Global Clean Energy). Our sample period encapsulates both bull and bear market phases allowing the assessment of the impact of rising and falling market conditions on the profitability of energy and resource SRI stocks portfolios. We identify bull and bear market periods using the idea of non-overlapping "bull" and "bear" phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the price variability of indices and their long-term trends. Our sample is composed of global energy and resource stocks, hence we rely on the examination of bull and bear market phases of S&P Global Index and MSCI World Energy Index.

The paper is organised as follows. The next section presents a review of the literature that mainly relates to market return and performance of stocks and portfolios within the context of social responsibility. Section 3 discusses the data and the methodology. Section 4 presents the empirical results. Section 5 concludes.

2. Previous Studies

Theories and concepts of SRI have been evolving over time. In a review of the studies about the theories of social responsibility, Lee (2008) found that the research in the field has moved from macro level to micro (organisational) level over the last

six decades. For example, the literature in the 1950s and 1960s viewed social problems as a matter for politicians and civil society only. In the 1970s and 1980s, however, the literature began to investigate the relationship between social responsibility of firms and their financial performance. The practice of financial investments regarding the SRI attitudes has also evolved and triggered more research. For example, in a 2010 survey of 107 money managers on questions related to socially responsible investment, at least half of them saw social responsibility as a way to manage portfolio risk or to improve long-term performance (Voorhes and Humphreys, 2011).

The early research examining the relationship between SRI and financial performance includes the seminal studies by Moskowitz (1972) and Vance (1975). While Moskowitz (1972) found a positive relationship between social responsibility and financial performance, Vance (1975) identified a negative relationship between these two variables. However, both studies did not include the analysis of risk adjusted returns which was later carried out by Alexander and Buchholz (1978), who used social responsibility ranking data from Vance (1975) and applied CAPM models to capture the market risk factor, yet they did not find a statistically significant relationship between social responsibility and stock market performance.

In recent years, following the development of multi-factor models and availability of larger datasets, a number of studies have analysed the SRI relationship and performance separately for SRI indices (e.g., Sauer 1997, Statman 2000, Schroder 2007, Consolandi et al. 2008, Managi et al. 2012) and SRI funds (e.g., Hamilton et al. 1993, Goldreyer and Diltz 1999, Cummings 2000, Bauer et al. 2005, Bello 2005, Scholtens, 2005, Bauer et al. 2006, Bauer et al. 2007, Mill 2006, Gregory and Whittaker 2007, Jones et al. 2008, Renneboog et al. 2008, Cortez et al. 2009, Gil-Bazo et al. 2010, Climent and Soriano 2011, Humphrey and Lee 2011). A brief

review of the main findings on funds and indices is presented in Brzeszczyński and McIntosh (2014).

This paper compares the performance of portfolios which are possible to construct by a private investor (i.e. stocks meeting certain screening criteria related to socially responsible investment). Thus, we next focus on the literature on market return and performance of stocks and portfolios within the context of socially responsible business.

Margolis and Walsh (2003) and Orlitzky et al. (2003) reviewed the studies of the performance of SRI stocks and portfolios. In a summary of 127 studies, where 109 firms used social responsibility as independent variable, Margolis and Walsh (2003) found that nearly half (54) showed a positive relationship with financial performance while 28 of them could not show a significant relationship and 20 showed mixed findings while seven found a negative relationship with financial performance. Orlitzky et al. (2003) used a meta-analysis of 52 studies yielding a sample size of 33,878 observations and found a higher correlation between social responsibility and financial performance although the evidence appeared stronger for accounting based financial performance indicators compared to market based indicators.

Derwall et al. (2005) used eco-efficient screening criteria of creating more goods and services using fewer resources and yielding less waste and pollution. Their study covering US data from 1995 to 2003, found that the high eco-efficiency portfolio provided substantially higher average returns than the low eco-efficiency portfolio. Differences in market sensitivity, investment style or industry-specific factors could not explain the performance differential and the results remained significant for transaction costs up to 200 bps. Derwall et al. (2005) suggested that the superior performance of a portfolio, constructed using environmental considerations

as a key factor, could be a case of the market mispricing information on the ecological performance of companies.

Kempf and Osthoff (2007) presented a trading strategy in which they simulated trades relying on buying stocks with higher ratings for social responsibility and selling those with lower ratings. They found an alpha of 8.7% per annum for investors employing the "best-in-class" screening approach. The increased performance continued even after taking into account reasonable transaction costs. Likewise, Statman and Glushkov (2009) found portfolio of stocks with high ratings of a broad range of social responsibility characteristics outperformed those with low ratings. Their study showed community, employee and environment as some of the key screening factors that had influence on the performance.

Ambec and Lanoie (2007) examined several studies in which portfolio analysis was applied to examine whether SRI funds (or indices) exhibit different performance from funds in a more general investment context. A majority of them (11 out of 16 papers) did not find statistically significant differences between the performance of SRI funds and conventional ones, while in five of them SRI funds outperformed. Ambec and Lanoie (2008) found companies benefitting from environmental performance. They showed positive links between environmental and economic performance citing examples of better opportunities received for cutting costs and increasing revenues by environmentally friendly companies.

Humphrey et al. (2012) investigated whether corporate social performance ratings have a systematic effect on the market based financial performance and risk of the firms. They applied the test for the UK companies over the period 2002-2011. They found no difference in the risk-adjusted performance of portfolios among firms which had high and low corporate social performance ratings.

Galema et al. (2012) concluded that when considering the entire efficient frontier and not imposing any short sales restrictions, socially responsible US investors are generally worse off in mean–variance terms. However, they suffer only in terms of foregone risk reduction opportunities and not in terms of foregone returns. In addition, when short sale constraints are introduced, investors are no longer worse off by engaging in socially responsible investing activities.

Brzeszczyński and McIntosh (2014) analysed the performance of the British SRI stocks in the period 2000-2010. Using the "Global-100" list to select sustainable companies, they found average returns of SRI firms to be higher than market indices. The positive performance is also evidenced by risk-adjusted measures (certainty equivalent returns and modified Sharpe ratio) and a simple trading strategy beat the market indices, even after the inclusion of different levels of transaction costs.

In a recent meta-analysis of 85 studies and 190 experiments, Revelli and Viviani (2013) investigated whether inclusion of CSR and ethical criteria in the portfolio construction processes is more profitable than conventional investment policies. They found that, compared with conventional investments, the consideration of CSR in stock market portfolios is neither a weakness nor strength.

The analysis of the SRI samples used in the existing literature further highlights that in previous studies the data samples covered stocks from different industries, which may have had an impact on the empirical results. For example, Kempf and Osthoff (2007) and Statman and Glushkov (2009) used data for stocks from KLD ratings, which consist of firms from a large number of industries. Kempf and Osthoff (2007) divided the companies into 10 different industries for their best-in class approach of positive screening policy. Similarly, in Humphrey et al. (2012) the

sample companies come from 19 different industries and Brzeszczyński and McIntosh (2014) also investigated stocks from more than 15 different industry sectors.[1]

In summary, the above review of the relevant SRI studies supports conclusions about mixed findings available in the literature about the performance of SRI investments. Although some empirical evidence points towards superior performance of SRI investments (e.g. Derwall et al. 2005, and Kempf and Osthoff, 2007, Statman and Glushkov, 2009), many other studies differ in findings and could not identify consistent outperformance (for example, in Humphrey et al. 2012, the results of a superior risk adjusted performance could not be supported based on a range of market performance models).

3. Data and Methodology

3.1. Data

The sample selection process required us to first study the scope of business activity of all 335 companies from the Global-100 list that appeared in all 10 annual periods during the first 10 years since the listing started in 2005. The focus of this study are the energy and resource SRI stocks, hence from the Global-100 list we identified companies that: 1) produce energy, minerals and water, 2) produce energy related materials for consumption in energy or transport industry and 3) supply energy, minerals and water. This selection led to identification of the following industry groups:

[1] Methodologically, it is not clear how the effect of performance of stocks from different industries (which may again have different degree of social responsibility etc.) is captured by the commonly applied tools, such as through the estimations of multi-factor models. We simplify this problem by using in our sample only companies that are focused on the production and supply of energy and energy relevant resources (such as oil, gas water and minerals) whereas all of them are characterised by substantial social and environmental responsibility and have been screened as socially responsible. This sample selection has also allowed us to observe the performance of large and well established SRI firms making our work unique and our results different from other findings in the existing literature.

- Oil and Gas Producers
- Mining production
- Gas, Water, and Multi-utilities
- Electricity
- Alternative Energy
- Industrial Engineering.

We used the energy and resource SRI stocks data from the list compiled by Corporate Knights based in Toronto, Canada, which produces annually the "Global 100 Most Sustainable Corporations in the World" list of international SRI firms meeting 12 different key performance indicators (KPIs).[2] We filtered all SRI companies based on the above categories and this procedure provided us with 53 SRI energy stocks for the 10 year period between 2005 and 2015.

Table 1 presents constituent companies of the SRI portfolios used in this study. It also provides information about the country of origin, area of operation, number of employees and year of establishment.

[Table 1 around here]

As can be seen from Table 1, our list consists of long established firms generating large employment. For example, BP Plc, Lonmin Plc, PG & E Corp, Teck Resources, Tokyo Gas and Umicore are more than a century old. There are few companies that were founded more recently. However, their history usually is very old anyway. For example, the newest company in the list, Cenovus Energy Inc. formed in 2008, is a split from Encana which descends from the 19th century Canadian Pacific Railway. Similarly, BHP Billiton was incorporated in 2001 but it

[2] These key performance indicators (KPIs) are: Energy Productivity, Carbon Productivity, Water Productivity, Waste Productivity, Innovation Capacity, Percentage Tax Paid, CEO to Average Worker Pay, Pension Fund Status, Safety Performance, Employee Turnover, Leadership Diversity and Clean Capital Pay Link. More details are available at: www.corporateknights.com.

was a merger of Billington and BHP that were established in 1860 and 1885, respectively. Likewise, Aluminia Limited, established in 2002 is a demerger from WMC Resources which had a history that went back to 1950s.

Many of the companies have grown large over time and have a presence in many countries (e.g., British Petroleum has operations in 80 markets). These firms contribute to the national economies and provide employment in communities. The companies produce gas, oil, minerals and electricity with a range of local and global environmental impacts. Therefore, these firms are widely believed to bear important social, economic and environmental responsibilities. The companies in our sample have more than 26,000 employees on average. Those firms with relatively fewer employees, such as Cairn Energy from the United Kingdom which officially had 178 employees as of year-end 2014, as mentioned in the annual report for the year also had 707 contractors working for it in 2014.

In terms of geographical distribution, the 53 stocks in our database come from 19 countries of which the highest number of firms is from the UK (11 companies) followed by Canada (nine companies). There are six companies form the US and four from Spain. Further, Australia, Brazil and Finland have three companies each. Norway and Japan have two companies each and the remaining 10 countries have one company each. Considering the fact that most countries in the world have at least one energy company, the Global-100 ranking concentration in less than 10% of countries worldwide is an indication that in many countries SRI related criteria are not fulfilled by energy companies there.

Figure 1 shows the countries and number of SRI energy companies in the SRI energy portfolios.

[Figure 1 around here]

Table 2 presents the constituent companies in the Global-100 list broken into numbers for each year.

[Table 2 around here]

We use the stock price and dividend data for the stocks in the portfolio from Bloomberg. We used the ticker symbol of the respective stock exchange so the price at first was obtained in the currency of the country of the exchange and then used the Bloomberg currency converting function to convert both the stock price and dividends into US dollars to maintain uniformity for calculation purposes. Where stock price and dividends were quoted in 100^{th} currency terms (e.g., several British companies' prices are quoted in pence), we converted them into per unit of currency (e.g., to pound sterling) before applying the USD conversion.

Similarly to the approach from the study by Brzeszczyński and McIntosh (2014), the returns of the SRI portfolios were compared with the returns of various indices. However, we extend this analysis by utilizing a larger number of comparable benchmarks. We employ four benchmark indices as opposed to only two (FTSE100 as the broad market and FTSE4GOOD as the SRI index) in Brzeszczyński and McIntosh (2014). Our selection of benchmarks captures stocks globally and covers the broad market as well as energy market, SRI and alternative energy market sectors, which provides a broader perspective for the comparison purposes.

(1) Broad Market

For the broad market index, we employ the S&P Global 1200 which is a composite index comprising seven regional and country indices: S&P 500, S&P Europe 350, S&P/TOPIX 150 (Japan), S&P TSX 60 (Canada), S&P/ASX 50

(Australia), S&P Asia 50 and S&P Latin America 40. The S&P Global 1200 is calculated in US dollars. The index captures 70% of the global market capitalisation covering 30 countries inclusive of the country of origin of the stocks in our SRI energy portfolio only except for the stocks from India and South Africa. The main selection criterion for S&P Global 1200 is company size measured by its stock market capitalisation. Hence, it contains predominantly large blue-chip firms. Additional selection criterion is stocks liquidity, which is revised at a monthly frequency based on such indicators as stock's annual value traded, its float turnover and the number of days traded. The S&P Global 1200 index takes into account also sectoral classifications and ensures balance between 10 main broad economy sectors with respect to Global Industry Classification Standard (GICS).

(2) Energy Market Sector

We include the MSCI World/Energy Index as a benchmark for the energy sector. The index is designed to capture the large and mid-cap segments across 23 Developed Markets (DM) countries, 16 of which are common to the country of origin of our SRI energy stocks. Moreover, the index maintains sectoral classifications among seven energy categories that are again common in the portfolio of our SRI energy stocks. The selection criteria are based on index construction approach with a strong emphasis on index liquidity, investability and replicability, which allows for cross regional comparisons across all market capitalisation size, sector and style segments and combinations. Similar to S&P 1200 Global index, securities in MSCI World Energy Index are classified in the energy sector following the Global Industry Classification Standard (GICS).

(3) SRI Market Sector

In the SRI category, we use the FTSE4GOOD Global 100 Index as comparable benchmark. The index includes companies with high environmental, social and governance (ESG) ratings. The FTSE4GOOD index is designed to measure the performance of companies that meet globally recognised corporate responsibility standards. The selection criteria are revised on regular basis to meet market expectations and reflect the new developments in the CSR practice. They rely on extensive market consultation process and they are approved by an independent committee of experts. The FTSE4GOOD inclusion criteria are split into five areas: environmental, human and labour rights, supply chain labour standards, countering bribery and climate change. Each them is further divided into three categories: policy, management and reporting. Subsequently, there are indicators assigned to each of the policy, management and reporting subdivision. The number of the indicators that a company must meet depends on whether that company is classed as high, medium or low impact in a particular area. Moreover, FTSE4GOOD index excludes the companies with business interests in the following industries: tobacco producers, companies manufacturing either whole, strategic parts or platforms for nuclear weapon systems and companies manufacturing whole weapons systems.

(4) Alternative Energy Market Sector

In the case of alternative energy market sector, we employ the FTSE ET50 index which is composed of global companies that are involved in clean energy related businesses. The index is designed for the creation of index tracking funds, derivatives and as a performance benchmark. The selection criteria of the index consist of a diversified mix of clean energy production and clean energy technology and equipment provider companies. Therefore, during the selection process the stocks

are screened and weighted to ensure that the index is investable and also sufficiently liquid for trading purposes. The index consists of companies from the list of 17 countries, 9 of which are common to the country of domicile of our SRI energy stocks. Furthermore, the index maintains sectoral classifications among 8 industries including oil and gas, materials and utilities that are again common to the industry types of the companies in our SRI energy and resource stocks portfolios.

We evaluate the performance of our portfolios against the four indices mentioned above both at price and total return definition levels.

First, we compare the results of the investment in the SRI energy portfolio with the 'price index' (PI) versions of the four indices mentioned above. However, the SRI energy portfolios include dividend payments, which is income to investors holding these stocks. We also analyse the returns of the SRI energy portfolio against the 'total return index' (TRI) versions of the four indices (i.e. the versions of the indices which include dividend payments), such that the comparison is on equal ground. On the other hand, the 'total return' versions of the indices are not commonly used by investors as conventional benchmarks. Therefore, we also perform direct comparison between the 'price index' versions of the indices and the SRI portfolios without dividends, in order to level the playing field.

3.2. Methodology

The Global-100 list was used to construct portfolios of global socially responsible energy companies over the period from 02.2005 to 01.2015 (ten annual sub-periods) and their returns were compared to the returns of the respective indices. Since the Global-100 list is announced at the end of January each year, right before the meeting of the World Economic Forum (WEF) in Davos, we assumed the first

portfolio was constructed on the 1st of February 2005. The portfolios were then rebalanced each year on the last working day of January.

The selection procedure of stocks entering the portfolios was as follows. The companies selected from the Global-100 list, entered the portfolio in the first year and the portfolio was held until the next Global-100 list was announced a year later. Stocks that no longer appeared on the Global-100 were removed from the portfolio and the energy companies new to the Global-100 list were included. Effectively, this means that we simulate the trades relying on buying stocks that appeared on the list and selling those that were removed from it. This procedure was repeated every year until the last year in the sample period.

As the Global-100 was an unranked list for most of our sample period (ranking was only provided since the year 2014) rather than an index, it is assumed that each stock has an equal weighting in the SRI portfolios. This means that a stock which remains in the portfolio from one year to the next when the total number of stocks in the portfolio changes requires an adjustment (either additional purchases or sells) in order to maintain the same equal weighting.

When a company was taken-over and disappeared from the stock market in the period of the duration of our portfolios, we assumed that the proceeds were kept in a non-interest bearing account until the portfolio was rebalanced. The reason for the assumption is that private investors are less likely to insist on reinvesting the proceeds and may keep them in their current account until the portfolios are rebalanced. When mergers or takeovers involved payment in stocks rather than cash, it was assumed that the new stocks were held in the portion of the offer until the rebalancing event.

The stock price data and dividend payments data were collected and included in the analysis of the SRI energy portfolio performance. Data on price and dividend was imported from Bloomberg.

As mentioned above, similar to Kempf and Osthoff (2007) and Brzeszczyński and McIntosh (2014), the returns of the SRI portfolios are compared to the returns of market indices. The annual simple holding period returns for the SRI portfolios in two versions (with dividends and without dividends) as well as for the following indices: S&P Global 1200 (price index), S&P Global 1200 (total return index), MSCI World/Energy (price index), MSCI World/Energy (total return index), FTSE4GOOD Global 100 (price index), FTSE4GOOD Global 100 (total return index), FTSE ET50 (price index) and FTSE ET50 (total return index) were calculated for all 10 individual years and average annual geometric returns were computed for five-year sub-periods and for the overall ten-year period. In addition, we analyse returns in both bull and bear market periods.

The results in these sub-periods allow to conduct a deeper analysis of the performance of SRI portfolios and to conduct further robustness checks. The annual return was determined as a simple holding period return with any dividends added. For the one-, five- and ten-year periods, the average annual geometric returns using the annual data were calculated. For other sub-periods, returns were calculated using monthly data and then annualised to make them comparable with other periods. Whether the differences between returns on the SRI energy portfolio and the indices were statistically significant was assessed by a *t*-statistic.

We also analyse the performance of the SRI energy portfolio by using the most important risk-adjusted measures, such as the modified Sharpe ratio of Israelsen (2005) and the Certainty Equivalent returns (see e.g., DeMiguel et al., 2009), which were calculated for both versions of the SRI energy portfolio (with and without dividends) and both versions of all four indices (total return indices with dividends and price indices without dividends).

The Sharpe ratio (Sharpe, 1966; 1994) measures excess return per unit of total risk. However, the classical definition of the Sharpe ratio suffers from inaccuracy errors and incorrect assessment of risk when returns are negative in some sub-periods, so we calculated the modified Sharpe ratio (*MSR*) of Israelsen (2005):

$$MSR = ER/SD^{(ER/absER)} \tag{1}$$

where *ER* is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for *n* equal to 12, 60 or 120 months, respectfully, and *SD* is the sample standard deviation of the monthly differences of returns.

MSR is a commonly used measure to deal with the problem of negative returns and alleviates the problems with the traditional Sharpe ratio.

Certainty Equivalent (*CEQ*) returns are defined as:

$$CEQ = \hat{\mu}_k - (\gamma/2)\hat{\sigma}_k^2 \tag{2}$$

where $\hat{\mu}_k$ and $\hat{\sigma}_k^2$ are the mean and variance of excess returns of a given portfolio or an index k and γ is the risk aversion parameter. The formulation of *CEQ* in (2) assumes a multi-period investor with quadratic utility. The 'normal' level of risk aversion is γ=1, while higher (lower) values of γ indicate higher (lower) levels of risk aversion.

Finally, we estimate parameters of the Fama-French three-factor model (Fama and French, 1992; 1993):

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p}RMRF_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + \varepsilon_{pt} \tag{3a}$$

and the Carhart (1997) four-factor model:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p}RMRF_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + \beta_{4p}MOMENTUM_t + \varepsilon_{pt} \tag{3b}$$

where R_{pt} is the return on the SRI portfolio in period t; R_{ft} is the risk-free return in period t; R_{mt} is the return on the overall market in period t and $RMRF_t = R_{mt} - R_{ft}$;

SMB_t is the difference in return between small-cap and large cap portfolios in period t; HML_t is the difference in return between high book-to-market stocks (i.e. value stocks) and low book-to-market stocks (i.e. growth stocks) in period t; $MOMENTUM_t$ is the difference in return between portfolio of stocks classified as those that have strong momentum and stocks classified as those that have weak momentum (momentum is broadly interpreted as the variable which captures the stock price movements tendencies when the stock prices continue rising if they are going up and continue declining if they are going down) and ε_{pt} is the error term.

The data for the explanatory variables used in models (3a) and (3b), i.e. for R_{ft}, R_{mt}, $RMRF_t$, SMB_t, HML_t and $MOMENTUM_t$, were obtained directly from the Fama and French database available at Tuck School of Business at Dartmouth College. Defined as Fama/French Global Factors and Portfolios, the factors data is constructed from the portfolios of stocks of 23 different countries. We adopted the factor data from Fama/French Global Factors because 16 out of 19 stocks in our portfolio are from the countries in the list of Fama/French Global Factors.

Market is defined as the return on a region's value-weighted market portfolio minus the US one month T-bill rate. SMB is the equal-weighted average of the returns on the three small stock portfolios for the region minus the average of the returns on the three big stock portfolios:

$$SMB = 1/3\ (Small\ Value + Small\ Neutral + Small\ Growth) - 1/3\ (Big\ Value + Big\ Neutral + Big\ Growth) \quad (4)$$

HML is the equal-weighted average of the returns for the two high book to market (B/M) portfolios for a region minus the average of the returns for the two low B/M portfolios:

$$HML = 1/2\ (Small\ Value + Big\ Value) - 1/2\ (Small\ Growth + Big\ Growth) \quad (5)$$

WML is the equal-weighted average of the returns for the two winner portfolios for a given region minus the average of the returns for the two loser portfolios:

$$WML = 1/2\ (Small\ High + Big\ High - 1/2\ (Small\ Low + Big\ Low). \quad (6)$$

The next section presents the results of the analysis of raw returns and assesses the performance of the SRI energy portfolio relative to selected benchmark indices.

4. Empirical Results and Discussion

4.1. Raw Returns

The results of the analysis show that the SRI portfolio has beaten broad, energy sector, SRI and alternative energy market indices in most sub-periods and in the entire ten year period from 02.2005 to 01.2015, although the differences in returns are not statistically significant in most cases. Tables 3a–3c present first the annual returns and average annual geometric returns for multiple-year periods and other sub-periods based on the simulation of investment in the energy companies from the Global-100 list compared to all four benchmark indices and the values of the respective *t*-statistics.

Table 3a demonstrates the outperformance of the SRI energy portfolio of 12.02% against the S&P Global 1200 price index, 12.77% against the MSCI World Energy price index, 14.48% against FTSE4GOOD Global 100 Index and 12.31% against FTSE ET50 Index. It illustrates also that the SRI energy portfolio has outperformed all four indices in all six different five-year long periods. As a further robustness check, we analysed the returns in bull and bear market periods. The SRI energy portfolios consistently outperformed all four indices in both bull and bear market periods, however the differences were not statistically significant.

Next we analyse the returns of the SRI energy portfolio with dividends against the total return versions of all four indices, which also include dividends. Table 3b shows that the SRI energy portfolios have again outperformed the four indices (with dividends) in full, bull, and bear markets. The outperformance pattern is similar in the multiple-years case except for the one five-year period (02.2010-01.2015) and individual year performance is similar as in Table 3a.

However, the return performance of SRI energy portfolio without dividends in Table 3c against the price index versions of the four indices, which also do not include dividends, is significantly lower than the return figures in Tables 3a and 3b. The returns are much lower and in most single- and multiple-year periods poorer than the benchmark returns. The returns for the full 10-year period, bear as well as bull market sub-samples are again lower than all four benchmarks.

[Tables 3a, 3b and 3c here]

A noteworthy finding in Tables 3a–3c is that only the SRI energy portfolio with dividends have outperformed all four indices by higher margins. When dividends are removed the return performance is weaker than benchmark returns. We further compared the performance with additional broad, energy and alternative energy benchmark indices (S&P Global Energy, DAX Global Alternative Energy and Wilderhill Clean Energy). The performance of SRI Energy stocks compared to all benchmarks was found to be consistently better and higher.

Another interesting finding in Tables 3a–3c is that the SRI energy portfolio has outperformed indices by higher margins in the periods of both bull and bear market period. As previous studies took into consideration SRI stocks from multiple industries, we suggest that the superior performance by SRI stocks in the literature

(mainly during bear period) could be due to diversification benefit and not necessarily due to inclusion of SRI stocks.

4.2. Modified Sharpe Ratio (*MSR*)

The values of the modified Sharpe ratio (*MSR*) are presented in Tables 4a and 4b. Table 4a shows that the SRI energy portfolio (with dividends) outperformed all the four total return indices in four out of the six multiple-year periods.

[Tables 4a, and 4b around here]

Table 4a shows that the SRI energy portfolio outperformed all four indices also in full ten year periods, although the single-year performance of the SRI energy portfolio is better only in case of five individual years. Similarly, the bull market performance is superior to all other price index of benchmark indices.

However, the results in Table 4b demonstrate a poor performance of the SRI energy portfolio on the like-to-like comparison basis for variants without dividends. The modified Sharpe ratio (*MSR*) values of the benchmarks are mostly superior in both single- and multiple-year periods and they are always lower in full, bull and bear market sub-samples compared to the benchmark indices.

The MSR ratio provides further support for the results presented in Tables 3a-3c that dividends are crucial in achieving a higher return by SRI energy stocks.

4.3. Certainty Equivalent (*CEQ*) Returns

The values of Certainty Equivalent (*CEQ*) returns are presented in Tables 5a and 5b for three variants representing normal risk aversion of investors (γ=1), lower

risk aversion (γ=0.5, i.e. half of normal risk aversion level) and higher risk aversion (γ=2, i.e. double the normal risk aversion level).

Although the results for single-year periods are mixed, there is a clear dominance of the SRI energy portfolio's performance in most of multiple-year periods and in all of the full ten year, bull and bear market periods for all the reported risk aversion levels regardless of the type of comparison.

[Tables 5a and 5b around here]

However, as can be seen in Table 5b, CEQ results for SRI energy stocks without dividend are inferior for all the reported risk aversion levels in most single- and multiple-year periods, and in full, bull market and bear market periods.

4.4. Fama-French and Carhart Multi-Factor Models

We now focus on the analysis of the Fama-French three-factor model and Carhart four-factor model, which are the most widely used multi-factor models for explaining performance of funds or stock portfolios.

[Tables 6 around here]

In all regressions we first tested for presence of any seasonality. We then performed tests for autocorrelation and heteroscedasticity of the error term. For autocorrelation we used Ljung-Box Q test and for heteroscedasticity we applied the ARCH test of Engle (1982). When heteroscedasticity was present in any of the models, it was dealt with by estimating an appropriate GARCH class model.

Autocorrelation was removed by adding autoregressive (AR) and/or moving average (MA) terms.

Table 6 presents the estimation results of parameters of the Carhart four-factor model represented by equation (3b). The estimation results from Fama-French models are very similar. We do not report them here for the sake of space preservation and because Carhart equation is obviously a more complete extended version of the Fama-French model, however those estimates are available upon request. Table 6 shows that in the whole sample the market factor $RMRF_t$ is statistically significant (at the 1% level) and the other two variables HML_t and WML_t are not, whereas SMB_t is found significant at 10% level. In the multiple-year periods of five years, the $RMRF_t$ is again significant in all periods and in single-year periods it is significant in all except in two single-year periods out of ten (2005-06 and 2012-13). The SMB_t, HML_t and WML_t factors are mostly insignificant although the results for the HML_t in case of multiple-year periods are comparatively better. In multiple-year periods, HML_t is never significant whereas SMB_t is significant in one case and WML_t is significant in two multiple-years.

Table 6 also provides results for the estimations inclusive of the fifth variable, i.e. the crude oil returns. The estimate for the entire period is positive and equals 0.118064. It is statistically significant at the 1% level. This means that the oil price was an important factor in explaining stock returns of the portfolios of our SRI energy and resource companies, which is not very surprising given that many of them are directly involved in crude oil business or their financial situation heavily relies (directly or indirectly) on the crude oil price. The parameter estimates of the oil returns are both positive (at the 5% significance level) and statistically significant also in the sub-samples of bull and bear market phases. The asymmetry in estimates between 0.097086 for the bull market sub-period and 0.110651 for the bear market

sub-period indicates that oil price mattered in all crude oil market conditions but this relationship was stronger during the times of the declining crude oil prices. This finding shows a greater sensitivity of the SRI energy and resource stocks prices when the crude oil price slumps.

The estimate of the $RMRF_t$ variable parameter (henceforth referred to as: beta) in the whole sample is statistically significant at the 1% level and equals 1.075. It is very similar also in four out of six multiple-year periods. Results are again similar when the crude oil price return is included in the estimation.

Results in Table 6 show that beta is very similar in magnitude in full, bull and bear market phases. Hence, the risk of SRI portfolios does not change substantially across the stock market phases.

5. Conclusions

The main objective of this study was to investigate whether SRI energy and resource stocks performance is superior relative to the conventional benchmarks and if private investors could use freely available information about SRI energy and resource stocks to construct the portfolios that can outperform the market.

We first calculated raw returns and assessed the performance of the portfolios relative to the broad, energy sector, SRI and alternative energy market indices. We found that in the entire 10-year period (February 2005 to January 2015) the annual average outperformance of the SRI energy portfolio was superior compared to the corresponding returns of all the benchmark indices in: 1) most single- and multiple-year (five year) periods, 2) both bull and bear market periods and 3) full sample period, although the differences in returns were in most cases statistically insignificant in individual years. However, the annual average outperformance of the SRI energy portfolio was substantial 9.17%, 9.79%, 12.78% and 11.42% relative to the total

returns of the benchmarks: S&P Global 1200 Index, MSCI World Energy Index, FTSE4GOOD Global 100 Index and FTSE ET50 Index, respectively.

We also evidenced the positive performance of SRI energy and resource stocks through risk-adjusted measures such as the modified Sharpe ratio (MSR) and certainty equivalent (CEQ) returns. Additionally, we applied the Fama-French and Carhart four factor estimations with the additional control variable in form of the crude oil returns and we found the market risk factor and the crude oil price are statistically more important than other conventional variables.

However, we found that the performance of the SRI energy portfolios was not superior compared to the benchmark indices when dividends were excluded from the portfolio returns. In fact, the return performance in the variants of portfolios without dividends remained poor compared to all benchmark indices in most single- and multiple-year time periods and in the subsample periods of bullish and bearish market. This result clearly demonstrates the importance of dividend payments in the investments in SRI energy and resource companies.

Our analysis further shows that the group of SRI energy and resource companies from the Global-100 list in the last 10-year period has been limited to only 19 countries of origin, which includes 17 developed nations. This indicates that in many emerging economies, where production and consumption of energy and natural resources are substantial and steadily growing, the SRI related criteria are yet to be fulfilled by the firms from these sectors.

The results presented in this study may also have broader very important policy implications for financial market regulators and environment protection agencies in addition to the investors who allocate their funds in energy and resource company stocks (including alternative energy firms). Empirical findings presented in this study can also contribute to raising a general awareness among stock market

investors to mobilise capital in more sustainable ways and, possibly, to channel it towards more environmentally friendly methods of energy production.

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Table 1. List of SRI companies, country of origin, area of operation, number of employees and establishment year.

#	Company	Country	Area of Opreration	No of Employees	Year Established
1	Alumina Limited	Australia	Mining	7,727	2000
2	Anglo American Platinum Ltd	South Africa	Mining	49,763	1946
3	Barrick Gold Corp	Canada	Mining	17,260	1983
4	BG Group Plc	United Kingdom	Oil & Gas Producers	5,143	1998
5	BHP Billiton Plc	United Kingdom	Mining	47,044	1996
6	BP Plc	United Kingdom	Oil & Gas Producers	84,500	1909
7	Cairn Energy Plc	United Kingdom	Oil & Gas Producers	178	2002
8	Cenovus Energy Inc	Canada	Oil Equipment, Services & Distribution	3,545	2008
9	Centrica Plc	United Kingdom	Gas, Water & Multiutilities	37,530	1995
10	Companhia Energética de Minas Gerais S.A.	Brazil	Electricity	7,888	1952
11	Duke Energy Corp.	USA	Electricity	28,344	2005
12	Enagas SA	Spain	Gas, Water & Multiutilities	1,206	1972
13	Enbridge Inc	Canada	Gas, Water & Multiutilities	10,000	1987
14	Encana Corp	Canada	Oil & Gas Producers	3,129	2001
15	Expro International Group	United Kingdom	Oil & Gas Producers	5,400	1992
16	Fortum Corp.	Finland	Electricity	8,378	1998
17	FPL Group Inc	USA	Electricity	8,700	1984
18	Galp Energia SGPS SA	Portugal	Oil & Gas Producers	6,855	1999
19	Gamesa Corporacion Tecnologica SA	Spain	Alternative Energy	6,231	1976
20	Hess Corporation	United States	Energy	3,045	1920
21	Iberdrola SA	Spain	Electricity	28,210	1992
22	Lonmin Plc	United Kingdom	Mining	28,462	1909
23	Mitsui OSK Lines Ltd	Japan	Gas, Water & Multiutilities	10,508	1942
24	Nexen Inc	Canada	Oil & Gas Producers	3,228	1971
25	Norsk Hydro Asa	Norway	Mining	13,000	1988
26	OMV AG	Austria	Oil & Gas Producers	25,287	1943
27	Origin Energy Limited	Australia	Oil & Gas Producers	6,912	1946
28	Outotec OYJ	Finland	Mining	4,966	1990
29	Pennon Group Plc	United Kingdom	Gas, Water & Multiutilities	4,451	1989
30	Petrobras Petroleo Brasileiro	Brazil	Oil & Gas Producers	80,908	1966
31	PG & E Corp.	USA	Electricity	22,581	1905
32	Pinnacle West Capital Corp.	USA	Electricity	6,366	1985
33	Reliance Industries Ltd	India	Oil & Gas Producers	24,930	1973
34	Repsol SA	Spain	Oil & Gas Producers	24,289	1987
35	Rio Tinto PLC	United Kingdom	Mining	59,775	1962
36	Royal Dutch Shell Plc	Netherlands	Oil & Gas Producers	94,000	2002
37	Saipem S.p.A.	Italy	Oil Equipment, Services & Distribution	48,967	1957
38	Schlumberger Limited	USA	Oil Equipment, Services & Distribution	120,000	1956
39	Schneider Electric SA	France	Electricity	185,965	1995
40	Scottish & Southern Energy Plc	United Kingdom	Electricity	19,965	1989
41	Sembcorp Industries Limited	Singapore	Gas, Water & Multiutilities	17,806	1998
42	Severn Trent Plc	United Kingdom	Gas, Water & Multiutilities	7,442	1989
43	Statoil ASA (Statoilhydro ASA)	Norway	Oil & Gas Producers	22,516	1988
44	Suncor Energy Inc	Canada	Oil & Gas Producers	13,980	1989
45	Teck Resources Ltd	Canada	Mining	11,000	1906
46	Tokyo Gas Co Ltd	Japan	Gas, Water & Multiutilities	16,835	1885
47	Transalta Corp.	Canada	Electricity	2,786	1992
48	TransCanada Corp.	Canada	Gas, Water & Multiutilities	6,059	2003
49	Umicore SA	Belgium	Mining	14,074	1904
50	Vale SA	Brazil	Mining	76,531	1969
51	Vestas Windsystems A/S	Denmark	Industrial Engineering	18,162	1986
52	Wartsila Oyj	Finland	Industrial Engineering	17,707	1914
53	Woodside Petroleum Ltd	Australia	Oil & Gas Producers	3,803	1971

Source: Data collated by authors from companies' websites, annual reports and from Bloomberg databases.

Figure 1. Countries and number of SRI energy and resource companies in the analysed SRI energy and resource portfolios in the period from February 2005 to February 2015.

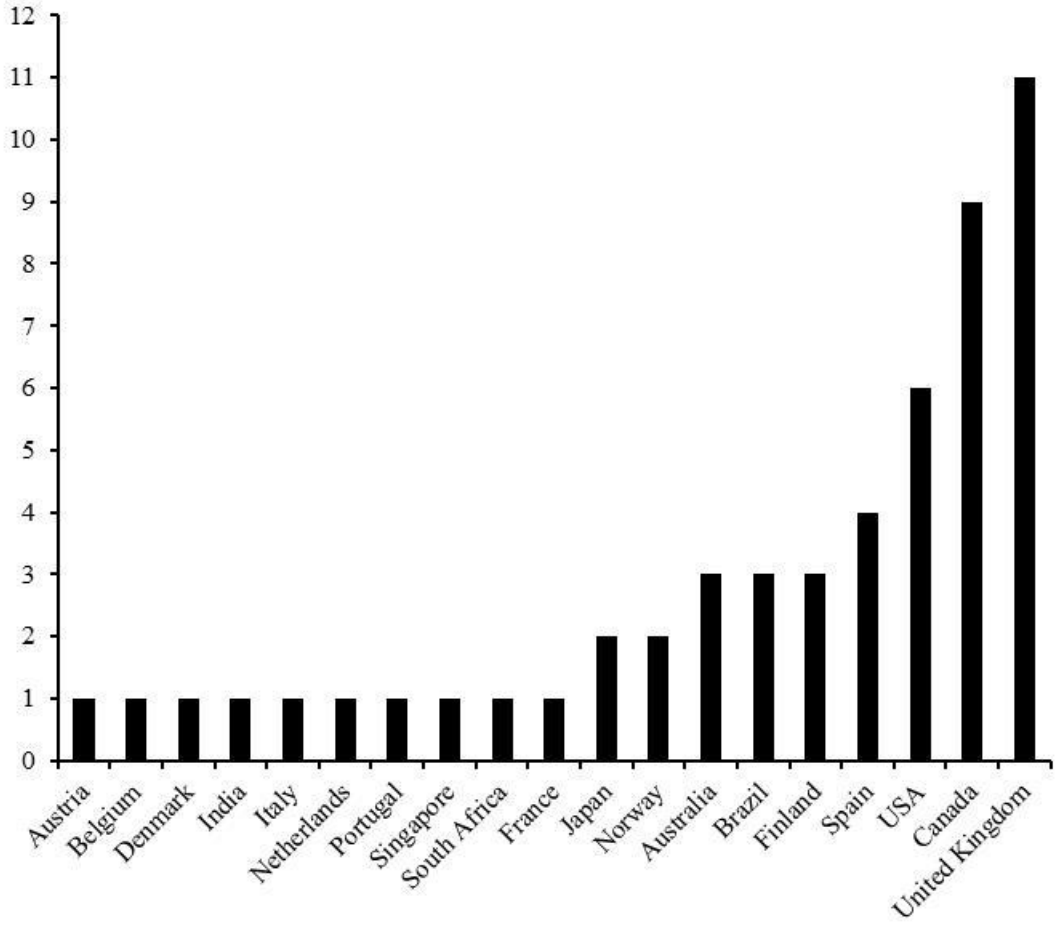

Table 2 List of companies in the SRI energy portfolios during the period 02.2005-01.2015.

S.No.	Company	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
1	Alumina Limited	x									
2	Anglo American Platinum Ltd						x	x	x		
3	Barrick Gold Corp									x	
4	BG Group Plc					x	x	x	x	x	x
5	BHP Billiton Plc					x					
6	BP Plc	x	x								
7	Cairn Energy Plc	x				x					
8	Cenovus Energy Inc									x	x
9	Centrica Plc	x	x	x	x	x	x	x	x	x	x
10	Companhia Energética de Minas Gerais S.A.									x	
11	Duke Energy Corp.						x				x
12	Enagas SA									x	
13	Enbridge Inc	x	x	x			x	x	x	x	x
14	Encana Corp					x	x	x	x		x
15	Expro International Group	x									
16	Fortum Corp.				x						
17	FPL Group Inc	x	x	x	x	x					
18	Galp Energia SGPS SA									x	x
19	Gamesa Corporacion Tecnologica SA	x	x	x							
20	Hess Corporation										x
21	Iberdrola SA		x	x	x	x	x	x	x		
22	Lonmin Plc					x	x				
23	Mitsui OSK Lines Ltd							x			
24	Nexen Inc				x		x	x	x	x	
25	Norsk Hydro Asa							x	x		
26	OMV AG				x		x		x		
27	Origin Energy Limited						x	x	x		
28	Outotec OYJ									x	x
29	Pennon Group Plc								x		
30	Petrobras Petroleo Brasileiro						x	x	x		
31	PG & E Corp.					x	x	x			
32	Pinnacle West Capital Corp.	x	x	x	x	x	x				
33	Reliance Industries Ltd							x	x		
34	Repsol SA							x	x	x	
35	Rio Tinto PLC				x						
36	Royal Dutch Shell Plc	x		x	x		x			x	x
37	Saipem S.p.A.				x	x					
38	Schlumberger Limited	x	x	x							
39	Schneider Electric SA								x	x	x
40	Scottish & Southern Energy Plc	x	x	x							
41	Sembcorp Industries Limited						x				
42	Severn Trent Plc	x	x	x							
43	Statoil ASA (Statoilhydro ASA)					x	x	x	x	x	x
44	Suncor Energy Inc						x	x	x	x	x
45	Teck Resources Ltd									x	x
46	Tokyo Gas Co Ltd							x			
47	Transalta Corp.	x	x								
48	TransCanada Corp.			x	x	x	x				
49	Umicore SA						x	x	x	x	x
50	Vale SA									x	
51	Vestas Windsystems A/S	x	x	x	x	x	x	x	x		
52	Wartsila Oyj					x					
53	Woodside Petroleum Ltd									x	

Note: The symbol ‘x’ means that the respective company appeared on the Global 100 list in the indicated year(s) and, therefore, it is included in the sample for the analysis in this study.

Table 3a. Annual returns for single-year holding periods (1-year returns, February to January) and average annual (February to January) geometric returns for multiple-year holding periods (5-and 10-year returns, February to January) and bull and bear market periods from 2005 to 2015 for the SRI energy portfolios (with dividends) and for the price index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio	S&P GLOBAL 1200 Price Index	Difference	*t*-Statistic	MSCI WORLD ENERGY Price Index	Difference	*t*-Statistic	FTSE4GOOD GLOBAL 100 Price Index	Difference	*t*-Statistic	FTSE ET50 Price Index	Difference	*t*-Statistic
2005-2006	**41.33%**	**15.11%**	**26.22%**	**0.808**	**41.06%**	**0.28%**	-0.322	**8.99%**	**32.34%**	**1.195**	**33.27%**	**8.07%**	-0.109
2006-2007	**43.40%**	**14.81%**	**28.59%**	**1.139**	-0.38%	**43.78%**	**1.413***	**13.67%**	**29.73%**	**1.205**	**17.78%**	**25.62%**	**0.524**
2007-2008	**31.49%**	-1.38%	**32.87%**	**0.952**	**15.53%**	**15.96%**	**0.152**	-6.02%	**37.51%**	**1.154**	**31.93%**	-0.44%	-0.342
2008-2009	-30.07%	-43.03%	**12.97%**	**0.046**	-33.89%	**3.82%**	-0.312	-44.51%	**14.44%**	**0.116**	-47.21%	**17.15%**	**0.029**
2009-2010	**57.28%**	**34.51%**	**22.77%**	**0.235**	**20.63%**	**36.65%**	**0.6**	**33.19%**	**24.10%**	**0.268**	**25.34%**	**31.94%**	**0.333**
2010-2011	**31.94%**	**16.88%**	**15.05%**	-0.058	**23.11%**	**8.83%**	-0.243	**10.25%**	**21.69%**	**0.117**	**3.63%**	**28.31%**	**0.256**
2011-2012	-5.48%	-5.07%	-0.41%	-0.471	-5.52%	**0.04%**	-0.425	-6.78%	**1.30%**	-0.407	-25.03%	**19.55%**	**0.25**
2012-2013	**10.61%**	**13.25%**	-2.65%	-0.555	**3.21%**	**7.39%**	-0.164	**14.20%**	-3.60%	-0.584	**2.73%**	**7.88%**	-0.134
2013-2014	**10.08%**	**12.50%**	-2.42%	**-1.369***	**1.99%**	**8.08%**	-0.777	**11.91%**	-1.83%	-1.324	**35.32%**	-25.24%	**-2.39****
2014-2015	-0.60%	**5.00%**	-5.59%	-1.19	-13.06%	**12.46%**	-0.179	**3.21%**	-3.80%	-1.094	-2.58%	**1.98%**	-0.665
Multiple-year Periods													
2005-2010	**24.00%**	-0.03%	**24.02%**	**0.908**	**5.30%**	**18.69%**	**0.371**	-2.96%	**26.96%**	**1.152**	**6.50%**	**17.50%**	**0.119**
2006-2011	**22.30%**	**0.28%**	**22.02%**	**0.629**	**2.47%**	**19.83%**	**0.38**	-2.74%	**25.04%**	**0.84**	**1.27%**	**21.03%**	**0.252**
2007-2012	**12.52%**	-3.46%	**15.98%**	**0.214**	**1.40%**	**11.12%**	-0.174	-6.52%	**19.04%**	**0.427**	-7.47%	**19.99%**	**0.217**
2008-2013	**8.69%**	-0.75%	**9.45%**	-0.256	-0.86%	**9.56%**	-0.283	-2.80%	**11.50%**	-0.117	-11.99%	**20.68%**	**0.326**
2009-2014	**19.02%**	**13.72%**	**5.30%**	-0.749	**8.11%**	**10.90%**	-0.34	**11.84%**	**7.18%**	-0.606	**6.25%**	**12.77%**	-0.231
2010-2015	**8.58%**	**8.22%**	**0.36%**	**-1.406***	**1.26%**	**7.32%**	-0.738	**6.27%**	**2.31%**	-1.214	**1.02%**	**7.56%**	-0.722
Full Period	**16.03%**	**4.02%**	**12.02%**	-0.28	**3.26%**	**12.77%**	-0.187	**1.55%**	**14.48%**	**0.106**	**3.72%**	**12.31%**	-0.322
Bull Period	**34.07%**	**20.00%**	**14.07%**	-0.28	**18.69%**	**15.38%**	-0.109	**17.19%**	**16.88%**	**0.042**	**25.85%**	**8.22%**	-0.755
Bear Period	-34.60%	-43.93%	**9.33%**	**0.056**	-39.70%	**5.10%**	-0.194	-45.18%	**10.58%**	**0.144**	-50.62%	**16.03%**	**0.389**

Notes: 1) *: Significant at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 105 months over 12.04 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 21 months during: 11.07 to 02.09 and 05.2011 to 09.2011 4) Periods of time for Bull and Bear market periods are different in length than full calendar year, so returns in those rows are presented as annualised returns based on monthly returns.5) Bold numbers indicate positive figures. 6) Cells highlighted in grey identify the portfolio or index with the highest return for that period. 7) Single-year period covers 12 months between 1st February to 31st January 8) Multiple-year period covers five consecutive single-year period.

Table 3b. Annual returns for single-year holding periods (1-year returns, February to January) and average annual (February to January) geometric returns for multiple-year holding periods (5-and 10-year returns, February to January) and bull and bear market periods from 2005 to 2015 for the SRI energy portfolios (with dividends) and for the total return index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio	S&P GLOBAL 1200 TR Index	Difference	*t*-Statistic	MSCI WORLD ENERGY TR Index	Difference	*t*-Statistic	FTSE4GOOD GLOBAL 100 TR Index	Difference	*t*-Statistic	FTSE ET50 TR Index	Difference	*t*-Statistic
2005-2006	**41.33%**	**17.84%**	**23.50%**	**1.187**	**44.62%**	-3.29%	-0.077	**8.99%**	**32.34%**	**1.715***	**33.27%**	**8.07%**	**0.231**
2006-2007	**43.40%**	**17.50%**	**25.90%**	**1.728***	**1.93%**	**41.47%**	**1.813****	**13.67%**	**29.73%**	**1.953****	**17.78%**	**25.62%**	**1.016**
2007-2008	**31.49%**	**0.99%**	**30.50%**	**1.284**	**18.81%**	**12.67%**	**0.4**	-6.02%	**37.51%**	**1.6***	**31.97%**	-0.48%	-0.072
2008-2009	-30.07%	-41.19%	**11.13%**	**0.312**	-32.08%	**2.02%**	-0.053	-44.51%	**14.44%**	**0.459**	-46.72%	**16.65%**	**0.271**
2009-2010	**57.28%**	**38.65%**	**18.64%**	**0.473**	**24.79%**	**32.49%**	**0.819**	**33.31%**	**23.97%**	**0.605**	**26.80%**	**30.49%**	**0.579**
2010-2011	**31.94%**	**20.07%**	**11.87%**	**0.452**	**26.61%**	**5.33%**	**0.202**	**13.86%**	**18.08%**	**0.588**	**4.75%**	**27.18%**	**0.741**
2011-2012	-5.48%	-2.33%	-3.15%	-0.136	-3.01%	-2.47%	-0.137	-3.62%	-1.86%	-0.088	-23.31%	**17.83%**	**0.565**
2012-2013	**10.61%**	**16.66%**	-6.05%	-0.158	**6.43%**	**4.18%**	**0.218**	**18.33%**	-7.73%	-0.227	**3.88%**	**6.72%**	**0.406**
2013-2014	**10.08%**	**15.55%**	-5.47%	-0.198	**5.21%**	**4.87%**	**0.325**	**15.59%**	-5.52%	-0.2	**36.82%**	-26.74%	-1.147
2014-2015	-0.60%	**7.72%**	-8.32%	-0.495	-10.24%	**9.64%**	**0.293**	**6.49%**	-7.08%	-0.434	-1.75%	**1.15%**	-0.05
Multiple-year Periods													
2005-2010	**24.00%**	**2.66%**	**21.34%**	**1.524***	**8.22%**	**15.78%**	**0.915**	-2.94%	**26.94%**	**1.977****	**6.95%**	**17.05%**	**0.727**
2006-2011	**22.30%**	**3.04%**	**19.26%**	**1.33***	**5.38%**	**16.92%**	**1.023**	-2.09%	**24.39%**	**1.689****	**1.92%**	**20.38%**	**0.925**
2007-2012	**12.52%**	-0.70%	**13.22%**	**0.902**	**4.34%**	**8.18%**	**0.457**	-5.27%	**17.79%**	**1.29**	-6.46%	**18.98%**	**0.894**
2008-2013	**8.69%**	**2.21%**	**6.49%**	**0.472**	**2.07%**	**6.63%**	**0.394**	-0.80%	**9.50%**	**0.671**	-10.83%	**19.52%**	**1.033**
2009-2014	**19.02%**	**16.99%**	**2.02%**	**0.302**	**11.40%**	**7.61%**	**0.625**	**14.88%**	**4.14%**	**0.447**	**7.68%**	**11.34%**	**0.797**
2010-2015	**8.58%**	**11.23%**	-2.65%	-0.148	**4.30%**	**4.28%**	**0.345**	**9.83%**	-1.25%	-0.033	**2.32%**	**6.26%**	**0.504**
Full Period	**16.03%**	**6.86%**	**9.17%**	**1.117**	**6.24%**	**9.79%**	**0.932**	**3.25%**	**12.78%**	**1.524***	**4.61%**	**11.42%**	**0.886**
Bull Period	**34.07%**	**23.17%**	**10.90%**	**1.19**	**21.98%**	**12.09%**	**1.1**	**19.29%**	**14.78%**	**1.612***	**26.73%**	**7.34%**	**0.639**
Bear Period	-34.60%	-42.15%	**7.55%**	**0.463**	-37.66%	**3.06%**	**0.159**	-44.64%	**10.04%**	**0.638**	-49.85%	**15.25%**	**0.725**

Notes: 1) *: Significant at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 105 months over 12.04 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 21 months during: 11.07 to 02.09 and 05.2011 to 09.2011 4) Periods of time for Bull and Bear market periods are different in length than full calendar year, so returns in those rows are presented as annualised returns based on monthly returns.5) Bold numbers indicate positive figures. 6) Cells highlighted in grey identify the portfolio or index with the highest return for that period. 7) Single-year period covers 12 months between 1st February to 31st January 8) Multiple-year period covers five consecutive single-year period.

Table 3c. Annual returns for single-year holding periods (1-year returns, February to January) and average annual (February to January) geometric returns for multiple-year holding periods (5-and 10-year returns, February to January) and bull and bear market periods from 2005 to 2015 for the SRI energy portfolios (without dividends) and for the price index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio	S&P GLOBAL 1200 Price Index	Difference	*t*-Statistic	MSCI WORLD ENERGY Price Index	Difference	*t*-Statistic	FTSE4GOOD GLOBAL 100 Price Index	Difference	*t*-Statistic	FTSE ET50 Price Index	Difference	*t*-Statistic
2005-2006	**31.06%**	**15.11%**	**15.94%**	**0.808**	**41.06%**	-10.00%	-0.322	**8.99%**	**22.07%**	**1.195**	**33.27%**	-2.21%	-0.109
2006-2007	**31.82%**	**14.81%**	**17.01%**	**1.139**	-0.38%	**32.20%**	**1.413***	**13.67%**	**18.15%**	**1.205**	**17.78%**	**14.04%**	**0.524**
2007-2008	**20.67%**	-1.38%	**22.05%**	**0.952**	**15.53%**	**5.14%**	**0.152**	-6.02%	**26.69%**	**1.154**	**31.93%**	-11.25%	-0.342
2008-2009	-43.55%	-43.03%	-0.51%	**0.046**	-33.89%	-9.66%	-0.312	-44.51%	**0.96%**	**0.116**	-47.21%	**3.67%**	**0.029**
2009-2010	**44.44%**	**34.51%**	**9.93%**	**0.235**	**20.63%**	**23.81%**	**0.6**	**33.19%**	**11.25%**	**0.268**	**25.34%**	**19.10%**	**0.333**
2010-2011	**14.65%**	**16.88%**	-2.23%	-0.058	**23.11%**	-8.46%	-0.243	**10.25%**	**4.41%**	**0.117**	**3.63%**	**11.02%**	**0.256**
2011-2012	-17.30%	-5.07%	-12.23%	-0.471	-5.52%	-11.78%	-0.425	-6.78%	-10.53%	-0.407	-25.03%	**7.72%**	**0.25**
2012-2013	-1.43%	**13.25%**	-14.69%	-0.555	**3.21%**	-4.65%	-0.164	**14.20%**	-15.63%	-0.584	**2.73%**	-4.16%	-0.134
2013-2014	-11.53%	**12.50%**	-24.03%	**-1.369***	**1.99%**	-13.53%	-0.777	**11.91%**	-23.44%	-1.324	**35.32%**	-46.85%	**-2.39****
2014-2015	-16.71%	**5.00%**	-21.71%	-1.19	-13.06%	-3.65%	-0.179	**3.21%**	-19.92%	-1.094	-2.58%	-14.13%	-0.665
Multiple-year Periods													
2005-2010	**11.20%**	-0.03%	**11.22%**	**0.908**	**5.30%**	**5.89%**	**0.371**	-2.96%	**14.15%**	**1.152**	**6.50%**	**4.70%**	**0.119**
2006-2011	**8.26%**	**0.28%**	**7.98%**	**0.629**	**2.47%**	**5.79%**	**0.38**	-2.74%	**11.00%**	**0.84**	**1.27%**	**6.99%**	**0.252**
2007-2012	-1.38%	-3.46%	**2.08%**	**0.214**	**1.40%**	-2.77%	-0.174	-6.52%	**5.14%**	**0.427**	-7.47%	**6.09%**	**0.217**
2008-2013	-5.29%	-0.75%	-4.54%	-0.256	-0.86%	-4.42%	-0.283	-2.80%	-2.49%	-0.117	-11.99%	**6.70%**	**0.326**
2009-2014	**3.61%**	**13.72%**	-10.10%	-0.749	**8.11%**	-4.50%	-0.34	**11.84%**	-8.22%	-0.606	**6.25%**	-2.63%	-0.231
2010-2015	-7.19%	**8.22%**	-15.41%	**-1.406***	**1.26%**	-8.45%	-0.738	**6.27%**	-13.46%	-1.214	**1.02%**	-8.21%	-0.722
Full Period	**1.59%**	**4.02%**	-2.43%	-0.28	**3.26%**	-1.67%	-0.187	**1.55%**	**0.04%**	**0.106**	**3.72%**	-2.14%	-0.322
Bull Period	**17.56%**	**20.00%**	-2.45%	-0.28	**18.69%**	-1.14%	-0.109	**17.19%**	**0.37%**	**0.042**	**25.85%**	-8.29%	-0.755
Bear Period	-43.10%	-43.93%	**0.83%**	**0.056**	-39.70%	-3.40%	-0.194	-45.18%	**2.08%**	**0.144**	-50.62%	**7.52%**	**0.389**

Notes: 1) *: Significant at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 105 months over 12.04 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 21 months during: 11.07 to 02.09 and 05.2011 to 09.2011. 4) Periods of time for Bull and Bear market periods are different in length than full calendar year, so returns in those rows are presented as annualised returns based on monthly returns.5) Bold numbers indicate positive figures. 6) Cells highlighted in grey identify the portfolio or index with the highest return for that period. 7) Single-year period covers 12 months between 1st February to 31st January 8) Multiple-year period covers five consecutive single-year period.

Table 4a. Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2015 for the SRI energy portfolios (with dividends) and for the total return index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio With Div		S&P GLOBAL 1200 TR Index		MSCI WORLD ENERGY TR Index		FTSE4GOOD GLOBAL 100 TR Index		FTSE ET50 TR Index	
	MSR	**SD**	MSR	**SD**	MSR	**SD**	MSR	**SD**	MSR	**SD**
2005-2006	**0.6414**	**2.2218**	**0.4864**	**1.6848**	**0.4444**	**1.5396**	**0.2613**	**0.9053**	**0.3530**	**1.2229**
2006-2007	**0.8893**	**3.0806**	**0.5031**	**1.7429**	-0.0001	-0.1034	**0.3383**	**1.1718**	**0.2187**	**0.7575**
2007-2008	**0.4185**	**1.4496**	-0.0001	-0.2039	**0.2191**	**0.7589**	-0.0003	-0.7522	**0.2789**	**0.9661**
2008-2009	-0.0031	-1.0734	-0.0029	-2.0738	-0.0026	-1.1030	-0.0031	-2.4519	-0.0055	-1.1952
2009-2010	**0.6314**	**2.1874**	**0.4613**	**1.5980**	**0.3234**	**1.1202**	**0.4132**	**1.4312**	**0.2628**	**0.9104**
2010-2011	**0.4849**	**1.6797**	**0.2925**	**1.0133**	**0.3161**	**1.0950**	**0.1966**	**0.6811**	**0.0846**	**0.2932**
2011-2012	-0.0002	-0.2278	0.0000	-0.0457	0.0000	-0.0023	-0.0001	-0.1162	-0.0014	-0.8865
2012-2013	**0.2310**	**0.8002**	**0.3676**	**1.2735**	**0.1245**	**0.4312**	**0.3807**	**1.3189**	**0.1011**	**0.3504**
2013-2014	**0.2327**	**0.8059**	**0.4244**	**1.4700**	**0.1473**	**0.5102**	**0.4137**	**1.4332**	**0.8382**	**2.9037**
2014-2015	-0.0001	-0.1026	**0.2925**	**1.0131**	-0.0004	-0.5108	**0.2404**	**0.8329**	0.0000	-0.0408
Multiple-year Periods										
2005-2010	**0.0088**	**2.3531**	**0.0299**	**0.2313**	**0.1017**	**0.7874**	-0.0001	-0.6543	**0.0903**	**0.6992**
2006-2011	**0.2872**	**2.2247**	**0.0474**	**0.3673**	**0.0747**	**0.5790**	-0.0001	-0.2888	**0.0482**	**0.3731**
2007-2012	**0.1682**	**1.3027**	**0.0047**	**0.0363**	**0.0726**	**0.5627**	-0.0002	-0.4929	-0.0002	-0.1635
2008-2013	**0.1384**	**1.0720**	**0.0604**	**0.4681**	**0.0566**	**0.4387**	**0.0167**	**0.1297**	-0.0005	-0.5529
2009-2014	**0.3200**	**2.4790**	**0.2974**	**2.3034**	**0.1837**	**1.4228**	**0.2569**	**1.9902**	**0.1331**	**1.0313**
2010-2015	**0.1675**	**1.2975**	**0.2443**	**1.8920**	**0.0906**	**0.7020**	**0.2083**	**1.6136**	**0.0656**	**0.5079**
Full Period	**0.1675**	**0.0547**	**0.1333**	**1.4599**	**0.0966**	**1.0578**	**0.0636**	**0.6969**	**0.0806**	**0.8826**
Bull market Period	**0.4614**	**4.6827**	**0.4562**	**4.6296**	**0.2833**	**2.8755**	**0.3667**	**3.7217**	**0.3442**	**3.4937**
Bear market Period	-0.0028	-2.0879	-0.0026	-3.7017	-0.0031	-2.3355	-0.0027	-4.1631	-0.0061	-2.4234

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): MSR = ER/SD(ER/absER), where ER is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for n equal to 12, 60 or 120 months, respectfully, and SD is the sample standard deviation of the monthly differences of returns. 2) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 105 months over 12.04 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 21 months during: 11.07 to 02.09 and 05.2011 to 09.2011. 3). Bold numbers indicate positive MSR and SD figures. 4) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period 5) Single-year period covers 12 months between 1st February to 31st Jan 6) Multiple-year period covers five consecutive single-year period.

Table 4b. Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2015 for the SRI energy portfolios (without dividends) and for the price index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio without Dividend		S&P GLOBAL 1200 Price Index		MSCI WORLD ENERGY Price Index		FTSE4GOOD GLOBAL 100 Price Index		FTSE ET50 Price Index	
	MSR	**SD**	MSR	**SD**	MSR	**SD**	MSR	**SD**	MSR	**SD**
2005-2006	**0.4856**	**1.6820**	**0.3985**	**1.3804**	**0.4173**	**1.4456**	**0.2613**	**0.9053**	**0.3530**	**1.2229**
2006-2007	**0.6446**	**2.2331**	**0.3923**	**1.3588**	-0.0002	-0.2401	**0.3383**	**1.1718**	**0.2187**	**0.7575**
2007-2008	**0.2572**	**0.8910**	-0.0002	-0.3970	**0.1760**	**0.6097**	-0.0003	-0.7522	**0.2785**	**0.9646**
2008-2009	-0.0041	-1.5547	-0.0031	-2.2210	-0.0028	-1.1984	-0.0031	-2.4519	-0.0056	-1.2150
2009-2010	**0.5101**	**1.7670**	**0.4240**	**1.4688**	**0.2812**	**0.9742**	**0.4113**	**1.4248**	**0.2530**	**0.8763**
2010-2011	**0.2126**	**0.7364**	**0.2509**	**0.8691**	**0.2780**	**0.9629**	**0.1529**	**0.5298**	**0.0732**	**0.2536**
2011-2012	-0.0008	-0.8044	-0.0002	-0.1966	-0.0002	-0.0997	-0.0002	-0.2895	-0.0016	-0.9654
2012-2013	**0.0046**	**0.0158**	**0.2954**	**1.0233**	**0.0744**	**0.2578**	**0.2989**	**1.0354**	**0.0756**	**0.2619**
2013-2014	-0.0004	-0.8140	**0.3473**	**1.2030**	**0.0659**	**0.2283**	**0.3222**	**1.1162**	**0.8108**	**2.8086**
2014-2015	-0.0007	-0.9965	**0.1984**	**0.6874**	-0.0005	-0.6921	**0.1300**	**0.4504**	-0.0001	-0.0947
Multiple-year Periods										
2005-2010	**0.1539**	**1.1925**	0.0000	-0.1725	**0.0665**	**0.5152**	-0.0001	-0.6566	**0.0861**	**0.6671**
2006-2011	**0.1187**	**0.9193**	**0.0014**	**0.0111**	**0.0390**	**0.3019**	-0.0001	-0.3699	**0.0420**	**0.3252**
2007-2012	**0.0073**	**0.0568**	-0.0001	-0.2885	**0.0390**	**0.3022**	-0.0003	-0.6361	-0.0003	-0.2400
2008-2013	-0.0001	-0.2458	**0.0169**	**0.1305**	**0.0220**	**0.1707**	0.0000	-0.0968	-0.0006	-0.6543
2009-2014	**0.0808**	**0.6256**	**0.2466**	**1.9099**	**0.1399**	**1.0836**	**0.2100**	**1.6267**	**0.1151**	**0.8916**
2010-2015	-0.0003	-0.6987	**0.1854**	**1.4358**	**0.0467**	**0.3621**	**0.1418**	**1.0988**	**0.0458**	**0.3548**
Full Period	**0.0362**	**0.3963**	**0.0784**	**0.8593**	**0.0573**	**0.6278**	**0.0303**	**0.3323**	**0.0702**	**0.7695**
Bull market Period	**0.2362**	**2.3973**	**0.3935**	**3.9939**	**0.2393**	**2.4286**	**0.3211**	**3.2590**	**0.3334**	**3.3841**
Bear market Period	-0.0028	-2.0879	-0.0027	-3.9307	-0.0033	-2.4980	-0.0027	-4.2367	-0.0063	-2.4768

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): MSR = ER/SD(ER/absER), where ER is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for n equal to 12, 60 or 120 months, respectfully, and SD is the sample standard deviation of the monthly differences of returns. 2) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 105 months over 12.04 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 21 months during: 11.07 to 02.09 and 05.2011 to 09.2011. 3). Bold numbers indicate positive MSR and SD figures. 4) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period 5) Single-year period covers 12 months between 1st February to 31st Jan 6) Multiple-year period covers five consecutive single-year period.

Table 5a. Certainty Equivalent (*CEQ*) returns (for risk aversion parameters: γ = 0.5, γ = 1 and γ = 2) from 2005 to 2015 for the SRI energy portfolios (with dividends) and for the total return index versions of benchmark indices.

Single-year Periods	γ = 0.5					γ = 1					γ = 2				
	SRI Energy Portfolio with Dividend	S&P GLOBAL 1200 TR Index	MSCI WORLD ENERGY TR Index	FTSE4GOOD GLOBAL 100 TR Index	FTSE ET50 TR Index	SRI Energy Portfolio with Dividend	S&P GLOBAL 1200 TR Index	MSCI WORLD ENERGY TR Index	FTSE4GOOD GLOBAL 100 TR Index	FTSE ET50 TR Index	SRI Energy Portfolio with Dividend	S&P GLOBAL 1200 TR Index	MSCI WORLD ENERGY TR Index	FTSE4GOOD GLOBAL 100 TR Index	FTSE ET50 TR Index
2005-2006	**2.84%**	**0.93%**	**2.96%**	**0.47%**	**2.24%**	**2.79%**	**0.92%**	**2.84%**	**0.46%**	**2.13%**	**2.69%**	**0.89%**	**2.60%**	**0.44%**	**1.91%**
2006-2007	**2.79%**	**0.77%**	-0.19%	**0.68%**	**1.03%**	**2.77%**	**0.76%**	-0.25%	**0.67%**	**0.96%**	**2.72%**	**0.74%**	-0.36%	**0.65%**	**0.84%**
2007-2008	**2.05%**	-0.45%	**1.16%**	-0.85%	**2.15%**	**1.99%**	-0.48%	**1.08%**	-0.88%	**1.98%**	**1.86%**	-0.55%	**0.92%**	-0.95%	**1.63%**
2008-2009	-3.35%	-4.58%	-3.10%	-4.80%	-4.76%	-3.60%	-4.70%	-3.30%	-4.91%	-5.16%	-4.10%	-4.94%	-3.71%	-5.13%	-5.95%
2009-2010	**4.09%**	**2.58%**	**1.93%**	**2.50%**	**2.14%**	**3.98%**	**2.48%**	**1.84%**	**2.40%**	**1.94%**	**3.76%**	**2.28%**	**1.64%**	**2.20%**	**1.55%**
2010-2011	**2.64%**	**1.37%**	**2.08%**	**1.17%**	**0.51%**	**2.57%**	**1.29%**	**1.96%**	**1.06%**	**0.36%**	**2.41%**	**1.12%**	**1.72%**	**0.85%**	**0.05%**
2011-2012	-0.46%	-0.38%	-0.14%	-0.25%	-2.06%	-0.54%	-0.45%	-0.28%	-0.32%	-2.20%	-0.709%	-0.591%	-0.565%	-0.464%	-2.484%
2012-2013	**1.02%**	**1.07%**	**0.57%**	**1.44%**	**0.34%**	**0.97%**	**1.03%**	**0.51%**	**1.40%**	**0.31%**	**0.86%**	**0.96%**	**0.38%**	**1.33%**	**0.24%**
2013-2014	**0.92%**	**1.00%**	**0.45%**	**1.23%**	**2.67%**	**0.88%**	**0.98%**	**0.42%**	**1.21%**	**2.64%**	**0.790%**	**0.939%**	**0.369%**	**1.165%**	**2.589%**
2014-2015	-0.22%	**0.42%**	-0.84%	**0.54%**	-0.10%	-0.28%	**0.41%**	-0.91%	**0.52%**	-0.16%	-0.41%	**0.38%**	-1.04%	**0.50%**	-0.26%
Multiple-year Periods															
2005-2010	**1.70%**	-0.14%	**0.56%**	-0.39%	**0.58%**	**1.61%**	-0.18%	**0.45%**	-0.43%	**0.40%**	**1.44%**	-0.27%	**0.24%**	-0.51%	**0.06%**
2006-2011	**1.66%**	-0.05%	**0.38%**	-0.25%	**0.23%**	**1.57%**	-0.11%	**0.27%**	-0.31%	**0.05%**	**1.38%**	-0.24%	**0.06%**	-0.44%	-0.32%
2007-2012	**1.00%**	-0.29%	**0.39%**	-0.44%	-0.40%	**0.89%**	-0.37%	**0.26%**	-0.52%	-0.60%	**0.67%**	-0.52%	**0.01%**	-0.69%	-1.01%
2008-2013	**0.80%**	**0.02%**	**0.27%**	**0.01%**	-0.74%	**0.69%**	-0.06%	**0.15%**	-0.07%	-0.91%	**0.48%**	-0.22%	-0.09%	-0.23%	-1.24%
2009-2014	**1.64%**	**1.13%**	**0.98%**	**1.22%**	**0.73%**	**1.57%**	**1.07%**	**0.90%**	**1.16%**	**0.64%**	**1.43%**	**0.96%**	**0.73%**	**1.03%**	**0.44%**
2010-2015	**0.78%**	**0.70%**	**0.43%**	**0.83%**	**0.28%**	**0.72%**	**0.66%**	**0.35%**	**0.79%**	**0.21%**	**0.59%**	**0.58%**	**0.19%**	**0.70%**	**0.06%**
Full Period	**1.24%**	**0.28%**	**0.49%**	**0.22%**	**0.43%**	**1.17%**	**0.24%**	**0.40%**	**0.18%**	**0.32%**	**1.02%**	**0.15%**	**0.22%**	**0.09%**	**0.08%**
Bull market Period	**2.29%**	**1.61%**	**1.47%**	**1.35%**	**1.85%**	**2.22%**	**1.57%**	**1.39%**	**1.31%**	**1.77%**	**2.09%**	**1.51%**	**1.25%**	**1.24%**	**1.61%**
Bear market Period	-3.58%	-4.56%	-3.97%	-4.91%	-5.69%	-3.58%	-4.56%	-3.97%	-4.91%	-5.69%	-3.58%	-4.56%	-3.97%	-4.91%	-5.69%

Notes: 1) Certainty Equivalent (*CEQ*) returns are defined as: $\hat{\mu}_k - (\gamma/2)\hat{\sigma}_k^2$, where $\hat{\mu}_k$ and $\hat{\sigma}_k^2$ are the mean and variance of excess returns of a portfolio or an index k and γ is the risk aversion parameter. This formulation of *CEQ* assumes a multi-period investor with quadratic utility. The 'normal' level of risk aversion is 1, while higher (lower) values indicate higher (lower) levels of risk aversion. 2) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 105 months over 12.04 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 21 months during: 11.07 to 02.09 and 05.2011 to 09.2011. 3) Bold numbers indicate positive *CEQ* figures. 4) Cells highlighted in grey identify the portfolio or index with the highest *CEQ* value for that period for a given risk aversion level of γ.

Table 5b. Certainty Equivalent (*CEQ*) returns (for risk aversion parameters: $\gamma = 0.5$, $\gamma = 1$ and $\gamma = 2$) from 2005 to 2015 for the SRI energy portfolios (without dividends) and for the price index versions of benchmark.

Single-year Periods	$\gamma = 0.5$					$\gamma = 1$					$\gamma = 2$				
	SRI Energy Portfolio without Dividend	S&P GLOBAL 1200 Price Index	MSCI WORLD ENERGY Price Index	FTSE4GOOD GLOBAL 100 Price Index	FTSE ET50 Price Index	SRI Energy Portfolio without Dividend	S&P GLOBAL 1200 Price Index	MSCI WORLD ENERGY Price Index	FTSE4GOOD GLOBAL 100 Price Index	FTSE ET50 Price Index	SRI Energy Portfolio without Dividend	S&P GLOBAL 1200 Price Index	MSCI WORLD ENERGY Price Index	FTSE4GOOD GLOBAL 100 Price Index	FTSE ET50 Price Index
2005-2006	**2.06%**	**0.93%**	**2.74%**	**0.47%**	**2.24%**	**2.01%**	**0.92%**	**2.62%**	**0.46%**	**2.13%**	**1.92%**	**0.89%**	**2.39%**	**0.44%**	**1.91%**
2006-2007	**1.95%**	**0.77%**	-0.38%	**0.68%**	**1.03%**	**1.92%**	**0.76%**	-0.44%	**0.67%**	**0.96%**	**1.88%**	**0.74%**	-0.55%	**0.65%**	**0.84%**
2007-2008	**1.28%**	-0.45%	**0.92%**	-0.85%	**2.15%**	**1.21%**	-0.48%	**0.84%**	-0.88%	**1.97%**	**1.07%**	-0.55%	**0.68%**	-0.95%	**1.63%**
2008-2009	-4.53%	-4.58%	-3.32%	-4.80%	-4.83%	-4.76%	-4.70%	-3.52%	-4.91%	-5.23%	-5.22%	-4.94%	-3.92%	-5.13%	-6.03%
2009-2010	**3.19%**	**2.58%**	**1.65%**	**2.49%**	**2.04%**	**3.08%**	**2.48%**	**1.55%**	**2.39%**	**1.85%**	**2.87%**	**2.28%**	**1.36%**	**2.20%**	**1.46%**
2010-2011	**1.22%**	**1.37%**	**1.85%**	**0.90%**	**0.42%**	**1.12%**	**1.29%**	**1.72%**	**0.79%**	**0.27%**	**0.93%**	**1.12%**	**1.47%**	**0.57%**	-0.04%
2011-2012	-1.49%	-0.38%	-0.36%	-0.52%	-2.24%	-1.59%	-0.45%	-0.50%	-0.60%	-2.39%	-1.77%	-0.59%	-0.79%	-0.74%	-2.67%
2012-2013	-0.05%	**1.07%**	**0.32%**	**1.14%**	**0.25%**	-0.13%	**1.03%**	**0.25%**	**1.10%**	**0.21%**	-0.29%	**0.96%**	**0.12%**	**1.02%**	**0.14%**
2013-2014	-0.98%	**1.00%**	**0.19%**	**0.96%**	**2.57%**	-1.02%	**0.98%**	**0.16%**	**0.94%**	**2.55%**	-1.10%	**0.94%**	**0.11%**	**0.89%**	**2.50%**
2014-2015	-1.46%	**0.42%**	-1.10%	**0.27%**	-0.18%	-1.52%	**0.41%**	-1.17%	**0.26%**	-0.23%	-1.64%	**0.38%**	-1.30%	**0.24%**	-0.33%
Multiple-year Periods															
2005-2010	**0.80%**	-0.14%	**0.33%**	-0.39%	**0.54%**	**0.88%**	-0.18%	**0.22%**	-0.43%	**0.37%**	**0.88%**	-0.27%	**0.01%**	-0.52%	**0.03%**
2006-2011	**0.63%**	-0.05%	**0.15%**	-0.31%	**0.18%**	**0.72%**	-0.11%	**0.04%**	-0.37%	-0.01%	**0.72%**	-0.24%	-0.17%	-0.50%	-0.37%
2007-2012	-0.06%	-0.29%	**0.15%**	-0.55%	-0.48%	**0.05%**	-0.37%	**0.02%**	-0.63%	-0.69%	**0.05%**	-0.52%	-0.23%	-0.80%	-1.10%
2008-2013	-0.33%	**0.02%**	**0.03%**	-0.16%	-0.85%	-0.21%	-0.06%	-0.09%	-0.24%	-1.02%	-0.21%	-0.22%	-0.34%	-0.41%	-1.35%
2009-2014	**0.38%**	**1.13%**	**0.73%**	**1.00%**	**0.62%**	**0.46%**	**1.07%**	**0.65%**	**0.93%**	**0.52%**	**0.46%**	**0.96%**	**0.48%**	**0.81%**	**0.33%**
2010-2015	-0.55%	**0.70%**	**0.18%**	**0.56%**	**0.17%**	-0.48%	**0.66%**	**0.10%**	**0.51%**	**0.10%**	-0.48%	**0.58%**	-0.06%	**0.42%**	-0.04%
Full Period	**0.12%**	**0.28%**	**0.26%**	**0.08%**	**0.36%**	**0.20%**	**0.24%**	**0.16%**	**0.04%**	**0.25%**	**0.20%**	**0.15%**	-0.02%	-0.05%	**0.01%**
Bull market Period	**1.17%**	**1.38%**	**1.23%**	**1.19%**	**1.79%**	**1.10%**	**1.35%**	**1.16%**	**1.15%**	**1.71%**	**0.96%**	**1.29%**	**1.01%**	**1.08%**	**1.55%**
Bear market Period	-4.70%	-4.81%	-4.23%	-4.99%	-5.82%	-4.70%	-4.81%	-4.23%	-4.99%	-5.82%	-4.70%	-4.81%	-4.23%	-4.99%	-5.82%

Notes: 1) Certainty Equivalent (*CEQ*) returns are defined as: $\hat{\mu}_k - (\gamma/2)\hat{\sigma}_k^2$, where $\hat{\mu}_k$ and $\hat{\sigma}_k^2$ are the mean and variance of excess returns of a portfolio or an index k and γ is the risk aversion parameter. This formulation of *CEQ* assumes a multi-period investor with quadratic utility. The 'normal' level of risk aversion is 1, while higher (lower) values indicate higher (lower) levels of risk aversion. 2) Bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover: 02.2005 – 10.2007, 03.2009 – 04.2011 and 10.2011 – 01.2014 and bear market periods cover: 11.2007 – 02.2009 and 05.2011 – 09.2011. 3) Bold numbers indicate positive *CEQ* figures. 4) Cells highlighted in grey identify the portfolio or index with the highest *CEQ* value for that period and for a given risk aversion level of γ.

Table 6. Estimation results of parameters of Carhart four-factor model and Carhart model with crude oil returns as a control variable (second row for each period) in the entire sample from 02.2005 to 01.2015 and in the individual single- and multiple-year sub-periods.

Period	Year	Constant	RMRFt	SMBt	HMLt	WMLt	Crude Oil Return	R^2	Q(10) and *p* value	Log Liklihood
Single Year Period	2005-06	-0.014224	0.373307	0.094944	0.377604	2.135884**		0.85	7.494 (0.678)	31.9346
		-0.013481	0.440351	-0.071803	0.14456	2.061254**	0.050905	0.85	8.792 (0.552)	32.0452
	2006-07	0.008775	1.619958**	-0.881506	0.118782	-0.318596		0.49	8.087 (0.620)	29.0133
		0.017445*	1.417481**	-0.887517**	-0.744162	-0.325342	0.128615	0.57	5.610 (0.847)	29.9661
	2007-08	0.017866	0.853918***	0.007014	-0.620635	0.509437		0.85	7.273 (0.699)	30.6925
		0.021081*	0.834835***	0.073989	-0.723879	0.530043	-0.066245	0.85	5.267 (0.873)	30.8749
	2008-09	0.013184**	1.406031***	0.419823	-1.087269***	0.590721***		0.98	12.873 (0.231)	34.3015
		0.014923**	1.349006***	0.346739*	-1.034448***	0.554365***	0.066243*	0.99	11.157 (0.345)	37.1050
	2009-10	0.012117	0.967583**	-0.537041	-0.60477	-0.165463		0.86	15.339 (0.120)	27.7223
		0.018734***	1.023971***	-0.896372*	-1.042441***	-0.259331**	-0.178471**	0.99	5.171 (0.739)	43.3879
	2010-11	0.015718***	0.825687***	0.164535	0.168918	-0.206418		0.98	20.188 (0.028)	41.6278
		0.013044**	0.830532***	-0.05615	0.108657	-0.26975	0.09833	0.98	11.379 (0.251)	40.4916
	2011-12	0.000665	0.985782***	0.970473	0.142348	0.033757		0.92	7.986 (0.630)	32.7620
		-0.000348	0.974171***	0.844351	0.122086	0.004898	0.053357	0.92	8.903 (0.541)	32.8871
	2012-13	0.020114**	0.398052	-0.131041	-0.536214	-1.287057**		0.84	12.991 (0.224)	31.2335
		0.020108*	0.397941	-0.131445	-0.535694	-1.286874*	0.000242	0.84	12.991 (0.224)	31.2335
	2013-14	0.010183	1.382999***	0.064512	-0.472101	-1.168215		0.69	7.618 (0.666)	28.7700
		0.007633	1.306**	-0.05118	-0.428856	-0.910336	0.171674	0.71	8.448 (0.585)	29.0736
	2014-15	0.00741	1.179109***	0.215953	2.582353***	0.541991		0.81	13.195 (0.213)	29.2085
		0.008333	1.154522**	0.238513	2.556487***	0.554703	0.013932	0.81	13.171 (0.214)	29.2147
Multi Year Period	2005-10	0.017153***	1.244363***	0.042579	-0.656392**	0.158176		0.82	13.450 (0.200)	129.8928
		0.016015***	1.189862***	-0.040242	-0.61929**	0.150599	0.082014**	0.83	14.862 (0.137)	132.1949
	2006-11	0.015254***	1.18452***	-0.057313	-0.741959***	0.061038		0.85	7.174 (0.709)	134.6739
		0.014597***	1.143195***	-0.102242	-0.705494	0.059906	0.061379	0.86	6.719 (0.752)	136.0246
	2007-12	0.00956***	1.143234***	0.246369	-0.605451***	0.069596		0.86	8.727 (0.558)	134.0395
		0.008681**	1.106419***	0.184971	-0.57223***	0.067842	0.059756	0.87	6.796 (0.745)	135.1304
	2008-13	0.004362	1.112092***	0.535058**	-0.485496**	0.022112		0.87	10.315 (0.413)	134.9878
		0.004241	1.088869***	0.485109*	-0.462282**	0.021343	0.03467	0.87	9.159 (0.517)	135.3456
	2009-14	0.002572	0.991026***	0.173037	-0.17853	-0.13866*		0.83	5.361 (0.866)	142.2625
		0.002542	0.989886***	0.169475	-0.177378	-0.138129*	0.003038	0.83	5.386 (0.864)	142.2642
	2010-15	0.001342	0.909092***	0.535716***	0.216927	-0.204118**		0.76	11.027 (0.355)	141.3655
		0.003136	0.91052***	0.410197*	0.397281*	-0.264056*	0.091897*	0.79	13.445 (0.200)	140.8554
FullPeriod	2005-15	0.006849*	1.075992***	0.329049*	-0.059963	0.08564		0.76	7.252 (0.611)	253.2916
		0.006971**	1.015647***	0.210692	-0.091643	0.049209***	0.118064***	0.77	15.198 (0.125)	257.3550
Bull period		0.007747***	1.011631***	0.203603	0.283492	-0.030592		0.64	6.2266 (0.796)	227.4019
		0.005474*	0.965551***	0.057503	0.431291*	-0.059019	0.097086**	0.67	6.2775 (0.791)	225.2677
Bear period		0.01342	1.275744***	0.163282	-0.998632**	0.387154*		0.90	15.205 (0.125)	48.8200
		0.013828*	1.204157***	0.203264	-0.858074**	0.403789**	0.110651**	0.93	14.401 (0.155)	52.0919

Note: *** - statistical significance at the 1% level, ** - statistical significance at the 5% level and * - statistical significance at the 10% level.

List of abbreviations:

CAPM – Capital Assets Pricing Model

CEQ – Certainty Equivalent Returns

CSR – Corporate Social Responsibility

ILO – International Labour Organisation

MSCI – Morgan Stanley Capital International

MSR – Modified Sharpe Ratio

OECD – Organisation for Economic Co-operation and Development

PI – Price Index

S&P – Standard and Poor's

SR – Socially Responsible

SRI – Socially Responsible Investments

TR – Total Return Index

UN – United Nations

USD – US Dollar