Social and Environmental Metrics for US Real Estate Portfolios: Sources of Data and Aggregation Methods

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Abstract

- Purpose: To assesses the availability of information in the US for measuring the social and environmental performance of real estate portfolios.
- Design/methodology/approach: A search was conducted for relevant indicator data sources using internet, library and government resources. Priority was placed on information that could be accessed on line, by any user, free of charge, from reputable sources, using available search parameters, for all types of properties and for any properties anywhere in the USA. Useful sources were identified and assessed using data quality indicators. Information gaps were also identified. A previously published method was adapted for comparing the social and environmental performance of properties and portfolios and data collected from identified sources were used to illustrate the construction of indices useful for making comparisons.
- Findings: Nationwide data sources are available for most important dimensions with greater availability for the most important ones. There are, however, important data gaps related to such issues as water use, day light and ventilation, aesthetics, and others. Most sources only require a property address for queries but do not support batch processing. There are no data quality problems for most data sources but a substantial minority of the sources does

have at least one data quality issue. Available data can be used to construct indices useful for comparing properties and portfolios.

- Practical implications: Fund managers can use these results to compile extra-financial information on sustainability and corporate social responsibility and socially responsible investors can use them to evaluate investment opportunities.
- Originality/value: This is the first effort to identify and assess data sources needed for creating responsible and sustainable metrics and indices and responds to demand for better metrics in the field of sustainable and responsible property investing.

Keywords

Sustainability, Responsible Property Investing, Corporate Social Responsibility, Social Metrics, Environmental Metrics

Classification

Research Paper

1.0 Introduction

This paper assesses the availability of information in the USA for measuring the social and environmental performance of real estate portfolios. It also demonstrates how this information can be aggregated into indices useful for comparing properties and portfolios. It is intended to assist fund managers who want to compile extra-financial information on sustainability and corporate social responsibility and socially responsible investors and researchers who want to evaluate the social and environmental merits of property investment opportunities.

1.1 Responsible Property Investing

Almost a decade ago, Mansley (2000) predicted that property would join the main debate on socially responsible investing because “it is at the frontline of many social and environmental debates...” Since then, research on the built environment has only served to reinforce its significance for various contemporary issues. For example, according to the Intergovernmental Panel on Climate Change, just over half the total energy related greenhouse gas emissions produced worldwide in 2004 came from operating residential and commercial buildings (including related electrical production) and the road transport of people and goods between them (IPCC 2007). Evidence is growing that buildings affect the social and environmental footprints of individuals and organizations. For example, Junilla (2004) estimates that as much as 82% of the environmental impact per employee of service sector companies is associated with the design, location, and operation of their premises.

Scholars, organizations, and practitioners have begun developing a field that merges the disciplines of property investing, building science, and urban planning into what is being called Responsible Property Investing (RPI). Academic editorial writers and book reviewers have called attention to the topic (Sayce 2003, Jayne 2003, McAllister 2005) and research papers have examined its dimensions. So far, studies have focused on the role of property in socially managed funds (Newell and Acheampong, 2002), metrics for measuring the responsibility of property portfolios (Sayce and Ellison 2003, Kimmet and Boyd 2004, Boyd 2005, Boyd and Kimmet 2005, Pivo 2008), the impact of social and environmental issues on property valuation (Sayce *et al.* 2004, Lutzkendorf and Lorenz 2005, Pivo and Fisher 2008), the emergence of RPI as a business strategy (Pivo and McNamara 2005, Pivo 2005, Rapson *et al*. 2007), and the attitudes of investors toward RPI (Pivo 2007, Sayce *et al*. 2007). Property investment practitioners have also been leaders in the field, creating viable and innovative investment opportunities and management practices (UNEP FI 2007, Responsible Property Investing Center 2007, UNEP FI 2008).

The issue of finding good metrics to measure RPI runs throughout the literature. In a series of annual conferences on RPI, the need for metrics to gauge the responsibility of property investments was emphasized repeatedly as an important priority for the further development of the field (Pivo and Wood 2006, Arnaud 2007, Wood 2008). In a national survey of senior American property executives, 90 percent agreed "it would be useful to know more about the social and environmental merits of our activities and investments" (Pivo 2007). Unfortunately there have been no scientific surveys published in the academic literature on the attitudes of property executives in other countries toward metrics.

While some investment firms have begun to develop such measures (UNEP FI 2008), RPI metrics is still in its infancy. Szekely and Knirsch (2005) have identified a variety of approaches used by European corporations to measure social and environmental performance. They studied several business sectors excluding property. They concluded that "the assessment of environmental performance is still very limited" and the assessment of social performance is "much less developed than the assessment of economic and environmental performance". More research is needed to determine if that is an accurate description of the property sector and whether RPI metrics are being used by more than just the leaders in the field (UNEP FI 2007, 2008).

1.2 Social and Environmental Accounting

RPI can be viewed as a branch of corporate sustainability and social responsibility (CSR). As Perrini and Tencati (2006) observed, "a sustainability-oriented company is one that develops over time by taking into consideration the economic, social, and environmental dimensions of its processes and performance". Even though dozens of definitions of CSR have been published, they consistently refer to the relationship between business and the environment, society, economics, stakeholder groups, and ethical or voluntary conduct (Dahlsrud, 2008).

There is growing agreement that corporations have social and environmental responsibilities, though less clarity on what those responsibilities should be and what information they should provide about their performance and activities (Atkinson 2000, Joyner and Raiborn 2005). Several authors have called for better tools to measure sustainability and social responsibility (Atkinson 2000, Olsthoorn *et al*. 2000, Tencati *et al*. 2004, Joyner and Raiborn 2005, Xie and Hayase 2007). A variety of frameworks for such tools have been proposed. Many published before 2000 were reported by Dias-Sardinha and Reijnders (2001). More proposals have been published since then (Szekely and Knirsch 2005, Brown and Fraser 2006, Hubbard 2006, Perrini and Tencati 2006, Tam *et al*. 2006, Xie and Hayase 2007, Bebbington *et al*. 2007 and Isenmann *et al*. 2007). The key recommendations from all of work can be summarized as follows:

- Adoption of strategic objectives such as regulatory compliance, eco-efficiency, or sustainability.
- Adoption of key performance indicators, which can pertain to management activities (e.g., executive commitment, disclosure, tracking systems, etc.) and/or operational inputs and outputs (e.g., water use, waste disposal, etc.).
- Collecting data for the indicators through an information system that draws useful information from various sources.
- Aggregation of results into overall indices of organizational performance by converting individual indicators into common units and weighting the relative importance of individual indicators.

- Benchmarking against past performance, best practices, peers, minimum standards or longer range objectives.
- Engaging stakeholders in the selection of indicators and the interpretation of their results.
- Monitoring trends over time.
- Reporting results as part of the company annual report, special reports, or websites.

All these recommendations would improve the measurement of social or environmental results in order to better characterize corporate performance. Even though they were not developed with the property sector in mind, they can be applied to property. For example, the innovative Hermes Real Estate RPI program is consistent with all these recommendations (Hermes 2008).

Epstein and Roy (2001) developed a theoretical framework for understanding "the drivers of corporate social performance, the actions managers can take to affect that performance and the consequences of those actions on both corporate social and financial performance". Their work goes beyond metrics of social and environmental performance by conceptually linking them to corporate financial outcomes such as economic value added, return on investment and return on capital employed. In their framework, corporate sustainability actions (e.g., plans and programs) affect sustainability performance (e.g., product safety and environmental impacts), which in turn affects stakeholder reactions (e.g., customers and investors), which drive long term financial performance (e.g., economic value added, etc.). Unfortunately, they did not demonstrate the feasibility of using their approach in actual practice. As with the recommendations pertaining to metrics, their framework depends upon the development of an appropriate set of measures or performance indicators that can actually be implemented.

Metrics lie at the heart of these measurement and reporting systems. Olsthoorn *et al*. (2000) and Joyner and Raiborn (2005) have offered guidance for choosing good metrics. In their view, they should be clearly defined and understandable, measurable and objective, acceptable and responsive to stakeholders, consistent with organizational missions and objectives, cost-effective, comparable over time, and manageable in number. They should also be collectible and workable by using available data sources. Unfortunately, as noted by Koellner *et al*. (2005), compared to financial information, corporate environmental and social accounts are uncommon, making it difficult for companies to find the needed information. This becomes even more difficult when data about firms are being sought by third parties for the purpose of independent research, which requires either firms to have and share social and environmental metrics or the existence of third party or governmental databases. This paper addresses this problem of data supply by identifying public and proprietary data sources that are available and can be used by firms or third parties so long as they have some limited information to begin with, such as the name of a property firm and the address of the properties they own. Once data are identified that can be accessed by external stakeholders, and especially if these data are collected, organized and widely disseminated, firms may be pressured into producing and releasing their own accounts. It may also encourage them to participate in voluntary or governmental programs for sharing information and producing industry benchmarks. Examples of this include the National Council of Real Estate Investment Fiduciaries in the USA , which benchmarks the financial performance of data contributing members and is considering doing the same for environmental metrics, the US Environmental Protection Agency Energy Star program, which helps firms benchmark the energy efficiency of their properties against survey data collected by the US Department of Energy, BOMA International's Experience Exchange Report program, which benchmarks income and expenses, and the Property Environment Group in the UK, which benchmarks the environmental performance of shopping centres.

Not all researchers recommend settling for existing information though. In the field of environmental indicators, work has focused on both data-driven and theory-driven approaches (Niemeijer, 2002). Data-driven work exploits existing data sets to best measure environmental performance, while theory-driven approaches establish the theoretically optimal approach for future data collection. Nonetheless, any system of metrics depends on finding useable data if it is to be implemented.

1.3 Property Metrics

As with any sector, sustainability and responsibility in real estate will require metrics of social and environmental performance. So far, a standard set of appropriate metrics has not been defined (Pivo 2005). Before that occurs, agreement must be reached on what constitute the most important criteria for assessing responsibility in the property sector. Initial work on this was undertaken by the author in a previously published study (Pivo 2008) using the Delphi method to rank possible criteria.

The Delphi method has been used since the 1950s to gather and refine expert opinion in order to obtain consensus (Linstone and Turoff 1975). It employs a structured group interaction that proceeds through rounds of opinion collection and feedback. It has been used recently in the property field, for example, to develop site selection criteria (Park and Kahn 2005), to assess land use compatibility (Taleai et al 2007) and to select the most cost-beneficial urban renewal projects (Wey and Wu 2008). Examples of its use for developing assessment metrics can be found in the fields of computers science (*e.g.*, Lenz *et al.* 2000 and Valerdi et al. 2004), quality assurance (Moore 2005), surgery (Satava *et al.* 2003), wireless communication systems (Petitto 2003), and forestry (Egan and Jones 1997). In the Delphi process, each round is composed of a written survey followed by feedback to the respondents of the statistical scores summarizing the responses to each survey question. After each round the respondents are surveyed again to determine whether their opinions have shifted after seeing the results from the prior round(s). As these rounds proceed, there is typically a convergence of opinions.

In the author's Delphi project to develop RPI metrics, a survey asked the panellists to rate a list of criteria both in terms of importance to materiality and the public interest. Materiality was defined as importance to investors when making their investment decisions. Public Interest was defined as importance to ethical issues and externalities relevant to the general public welfare. Ratings were performed on a scale of 1 to 5. The 56 criteria that were ranked were largely drawn from existing sources on sustainability or social responsibility in property including Mansley (2000), Sayce and Ellison (2003a, b), Sayce *et al.* (2004), St. Lawrence (2004), Kimmet and Boyd (2004), Upstream (2004), Boyd (2005a, b) Boyd and Kimmet (2005), Pivo and McNamara (2005), the Sustainable Property Appraisal Project (2005), and Hermes Real Estate (2006). Rankings were done by an international panel from the real estate and social investing sectors. The panel included 51 experts purposely selected to represent a high level of expertise, a variety of professional backgrounds, gender balance, and national and ethnic diversity. Most members had backgrounds in real estate (40%) or socially responsible investing (35%) and most were US citizens, however very few differences were observed in the final ratings between panel subgroups defined in terms of professional background, nationality, or gender. The Delphi process produced a ranked set of criteria, grouped under ten broad dimensions, which were also ranked by importance. Overall, the panel put the greatest weight on measures that promoted less auto-dependent and energy efficient cities where worker well-being and urban revitalization are priorities. Table 1 summarizes the results of that study which were previously published elsewhere (Pivo 2008). Dimensions are listed in order of importance as are the indicators within them.

One major conclusion of that project was that once there is agreement on the criteria, databases and collection methods will be needed to provide the information necessary to evaluate the thousands of properties of interest to investors. Methods that collect and analyze data on many buildings at once must be developed as well as means for comparing buildings and portfolios to one another and industry benchmarks.

The Delphi process was consistent with the call by Fraser *et al*. (2006) for participatory approaches to identifying sustainability indicators. In their view, methods for choosing indicators to measure progress toward social and environmental goals "abound in both the academic and practitioner literature" and range from "top-down" approaches, where managers and experts choose what they see as the most relevant indicators, to "bottom-up" participatory processes, where communities and stakeholders identify their own indicators. They argue that the failings of top-down approaches, which can alienate community stakeholders and ignore important factors, have caused the emphasis to shift toward bottom-up, participatory techniques, such as the Delphi method that was used to select the indicators examined in this study.

This present work builds on the findings and conclusions of the prior Delphi study cited above. In particular, it shows where useful data can be found to measure properties according to the recommended criteria and how those data can be combined into an RPI index suitable for property- and portfolio-level comparisons. The emphasis, however, is not on which process should be used to select the indicators, but the supply of data available to implement the selected indicators and means of combining the collected data into useful composite indices.

2.0 Data Sources and Qualities

For each of the criteria listed in Table 1, a search was conducted for relevant indicator data sources. Resources used for the search included university library databases (e.g., Lexis-Nexis Academic Universe and the University of Michigan's *Statistical Resources on the Web*), internet search engines (e.g., Google and Yahoo!), federal information clearinghouses (e.g., the National Geospatial Information Clearinghouse and FedStats) and federal agency websites. Priority was placed on information that could be accessed 1) on line, 2) by any user, 3) free of charge, 4) from a reputable source such as the federal government, a university research center or a widely used private data provider, 5) using search parameters available to most individuals (e.g., a property address), 6) for all types of properties (e.g., office, industrial, etc.) and 7) for any properties anywhere in the USA. Information was collected on all potential sources, whether or not they met these priorities.

Free and public information was emphasized so all kinds of individuals and organizations could participate in the evaluation process, from corporations to individuals, regardless of their financial resources. Atkinson (2000) has pointed out the reticence of corporate decision makers to divulge environmentally sensitive information. As he says, "corporations have little incentive to reveal environmental data…or to reveal 'bad news' in general." More recently, however, Hasseldine *et al.* (2007) have argued that disclosure is affected by the degree of market, social and political pressure for information. Such pressure could be increasing on property firms, especially in countries where there is demand for such information from corporate stakeholders. However, despite the "steadily growing trickle" of social and environmental disclosure and accounting (Gray 2005), no studies have been published on trends in disclosure practices specific to the property sector. And since there appears to be an industry effect that determines the kind of information that is being disclosed (Sweeney and Coughlan 2008), valid studies are needed before making generalizations about the state of disclosure in the property field. Nonetheless, even if, as Atkinson points out, a company may want this information for its own internal purposes, it is important for external stakeholders to have access to information about property portfolios so they can make their own investment decisions. Prior research on corporate disclosure suggests that they cannot rely on property firms to fully disclose all the information that is pertinent to RPI metrics.

Table 2 lists the sources that were found and related details. All together, workable sources for 64 indicators were identified. In Table 2, the first two columns list the indicators, their source and their location on the World Wide Web (without http and www prefixes). Columns 3-7 give further details about the data. Column 3 indicates whether or not it is free to the public, Column 4 lists the information needed to query the database, Column 5 indicates whether batch processing is available (i.e. whether queries can be run for more than one property at one time), Column 6 shows which types of properties are covered, and Column 7 indicates whether data are available for all US locations. Column 8 categorizes the indicator according to whether the indicator describes a characteristic of a property or a property owner and whether property-level indicators pertain to location, use, performance, design, or management practices. Column 9 examines five specific data qualities, discussed below.

Several overall observations can be made about the results:

1) At least one indicator is available for all but one of the dimensions listed in Table 1. Local Citizenship and Social Equity/Community Development have the fewest available, with none or one. Several indicators are available for the most important dimensions (those with highest Grand Mean scores on Table 1 and listed first in Table 2).
2) As the importance rating for criteria increases, as indicated by quartile groupings in Table 1, the supply of indicators increases as well. In particular, useable indicators were found for 57%, 44%, 12%, and 2% of the 4th, 3rd, 2nd and 1st quartile criteria, respectively, listed on Table 1. Overall, useable indicators were found for nearly 30% of the criteria.

3) National datasets are unavailable for many of the criteria given in Table 1. Table 3 lists those for which a useful national database could not be found. The relative importance of these criteria is indicated by the ranking quartiles from Table 1, given in parentheses. The most highly rated criteria without national data included daylighting and ventilation, flexibility to adapt to changing uses, regulatory compliance, water conservation, recycling, and aesthetics. Much of the information needed for a comprehensive set of priority indicators is not yet available from easily accessible national sources.
4) There were three types of sources: federal sources (e.g., US Census Bureau), free non-federal websites (e.g., Walk Score and Google Earth), and subscription-based information services (e.g., CoStar Group). There are free sources (either federal or non-federal) for nearly every dimension.
5) Most sources simply require an address (or company name) to query the database. Occasionally a latitude/longitude or census tract or block group number is required. Free online sources are available for obtaining these required inputs for any known address. They are listed at the end of the table.
6) Only a few sources support batch processing. Without batch processing, data queries must be done one property at a time, increasing the time required to collect the information.
7) Most of the information is available for office, industrial, retail, and multifamily buildings. Where there are gaps, multifamily housing is most commonly affected.
8) Full national coverage is available for most of the reported indicators.
9) The most information is available for features that pertain to property location. It is much more difficult to find online information about building design features and owners' management practices. This limits the options for property managers to improve their ratings using just these indicators. While portfolio managers can do so by acquiring and disposing of properties with poor locational attributes (which of course still leaves these properties extant in the property market and

therefore does not improve the overall social or environmental performance of the built environment), asset and property managers have fewer options for improving their portfolio performance using this set of indicators. Unfortunately, management practices, design, and engineering probably explain a good deal of the social and environmental performance of properties. A set of indicators such as those found in this study that is weak in these areas cannot be considered a comprehensive set.

Data quality is a key consideration. As Weidema and Wesnæs (1996) point out, the reliability and thus the applicability of metrics depends on the quality of the original data. Weidema and Wesnæs (1996) have developed a series of data quality indicators which were used to assess the quality of the information reported in Table 2. According to their approach, five data quality issues should be considered:

1) *Reliability of measurements and verification*. Some data are provided by voluntary contributors and not fully checked for accuracy. An example would be the data on transit, childcare, and other services reported by the CoStar Group. In practice, this issue could be handled by excluding less reliable data from further use, giving less weight to lower quality data in the construction of indices, reporting a range of possible values rather than a single value, or validating the information thru independent checking by end users.

2) *Completeness of samples*. Some data are collected at the discretion of contributors. This can produce incomplete results. For example, buildings that qualify for energy star labelling may not be labelled because their owners did not apply for recognition.

3) *Temporal correlation between the time period being assessed and when data were collected*. Certain data are collected infrequently, reducing its correlation with present conditions. An example is the decennial census, which was used in the travel mode indictors. Current conditions may be different from when the data were collected due to improvements in transit levels of service since the date the census was taken.

4) *Geographical correlation between the spatial unit being assessed and the location represented by the data*. Some indicators measure overall conditions in a geographic area and the results for the geographic area may not accurately reflect conditions for specific buildings within it. For example, census-tract level data represents average conditions across a large area and may not accurately gauge conditions at a particular address.

5) *Further technical correlation*. This includes aspects of correlation, other than temporal or geographical, such as whether the data actually represent the process of concern. For example, for safety issues, exposure to natural hazards (e.g., proximity to earthquake shaking) is less important than risk of damage or injury (i.e., how well a building is designed to respond to shaking). But national data are only available on hazards, which must be used as an imperfect proxy for risk.

For each of these five issues, Weidema and Wesnæs created a 5 point scale (with 1 being highest) for rating indicators. Their system was used by the author to rate each identified indicator in terms of all five data quality issues. The results are given in Column 9 of Table 2. According to the analysis, 38 (59%) of the indicators have no quality limitations, 3 (5%) have one, and 23 (36%) have more than one. Any such concerns should be considered by end users when interpreting their results.

As already mentioned, one of the ways to handle data with quality issues is to not use it. This would improve data quality but in exchange for fewer RPI criteria. The number of criteria without data is already large, as shown in Table 3, and eliminating more indicators runs the risk of excluding some social or environmental issues from analysis that are important to stakeholders. As John Maynard Keynes said, "it is better to be roughly right than precisely wrong," suggesting it may not be worth increasing precision at the expense of completeness in the RPI criteria. Nonetheless, some of the indicators given in Table 2 could be eliminated without increasing the number of RPI criteria for which there are no available datasets because good alternatives exist. For example, the first two indicators in Table 2 – the percent who drive alone to work by census tract and block group - have some temporal issues because they are collected in the decennial census and may go out of date. However, they are indicators of transit oriented development and the third and fourth indicators in Table 2 – being less than ½ mile from a bus stop or transit station – are also indicators of transit oriented development. So in this case, the indicators with data quality problems could be eliminated without eliminating all indicators of transit oriented development, which is a highly ranked RPI criterion. This strategy could be used for several of the lower data quality indicators of less auto dependent development. In fact, for most indicators with data quality issues, across all the RPI dimensions, there are alternative indicators in Table 2 which could allow the lower quality indicators to be eliminated without decreasing the variety of RPI issues being measured. In some instances, however, this could not be done, as in the case of handicapped accessibility. There are no better quality indicators available and eliminating the one that is available because of data quality concerns would mean ignoring the issue of handicapped access, which is a significant stakeholder concern. In addition to the strategy of eliminating lower quality indicators when good quality substitutes are available, another way to think about the data quality issues is to recognize that in many cases the problem is data completeness rather than reliability or another quality concern. In other words, the data are accurate but they are unavailable for many properties. In this case, it would be reasonable to use what data are available so long as analysts disclose the missing data and any biases this might create when reporting portfolio summary statistics.

3.0 Index Construction

A small four building portfolio can be used to illustrate how these data can be combined into indices useful for comparing the RPI performance of properties and portfolios. The purpose here is to illustrate in a conceptual way how this can be done for a larger portfolio, rather than to demonstrate a fully operational system. A small portfolio is sufficient to do this and simplifies the presentation. It would be possible to expand this demonstration to tens or hundreds of properties. The primary problem that would be faced, however, is that many of the datasets do not support batch processing, so a commitment of 30 to 60 minutes per property (based on the experience of the author using the data sets) would be needed to collect the necessary data using the indicators listed in Table 2.

The method followed for this demonstration generally follows the procedures recommended by Krajnc and Glavic (2005) for comparing companies on sustainability indicators. In this case, comparisons are made between properties and portfolios rather than companies, but their method is fully applicable to this purpose because it deals with techniques for aggregating indicator scores regardless of whether the indicators describe firms, properties, or any other unit of analysis.

Table 4, Column 1 lists the dimensions and indicators used in the example. Again, for simplicity, eight dimensions are used with just two indicators for each. The dimensions and indicators chosen for the demonstration were those, which in the author's judgement would be interesting to real estate and SRI practitioners and would likely be included in an operational RPI metric system. Until a standardized set of indicators becomes available, analysts will be free to select indicators they feel best meet their needs.

Selection considerations may include data availability, data quality, property type, strategic objectives, and stakeholder priorities. The methodology for building indices illustrated here can be used with any number of dimensions and indicators. Ultimately, however, it would help facilitate comparisons and benchmarking if widespread agreement could be reached on an industry-wide set of standard RPI indicators.

Column 2 gives weights signifying the relative importance of each dimension and indicator. Each dimension is given a weight (shown in boldface) to indicate its importance relative to the other dimensions and each indicator is given a weight to indicate its importance relative to the other indicators *within its dimension*. Each set of weights (i.e. all the dimension weights and all the indicator weights within a single dimension) must sum to 1.0. Krajnc and Glavic discuss using an expert panel and a pairwise comparison technique to derive weights. Their technique is based on the Analytic Hierarchy Process developed by Saaty (1995). It asks each panelist to rate the importance of every indicator or dimension relative to all other indicators and dimensions. In the present example, their technique was not employed. Rather, the weights were assigned based on from the author's prior research (Pivo 2008). Rather than using a series of pair-wise comparisons to develop weights, experts were asked to assign weights to each criteria one at a time using a Likert scale without directly ranking them against the other criteria. This is referred to as the Single Judgement Method by Eshlaghy and Radfar (2006) and is commonly used in Delphi studies. According to Eshlaghy and Radfar there are 9 different methods for weighting criteria and "each and every one of the methods has relative advantages and disadvantages." For example, the Single Judgement Method is easy to perform and can handle qualitative criteria. However, each criterion is considered without concern for its rank in relation to other criteria and as such they judge the results to have lower validity. Pairwise methods, on the other hand, do consider relationships between criteria but in practice they can be complicated and face great problems when the number of criteria exceeds seven (Eshlaghy and Radfar 2006). As Krajnc and Glavic point out, these weights can be difficult to establish with sufficient accuracy. However an attempt should be made to judge the relative importance of the dimensions and indicators and quite possibly more than one weighting scheme could be used to reflect differing priorities unique to particular stakeholder groups or the strengths of different ranking methods.

Columns 3 – 7 give the raw scores given to each property for each indicator. The numbering system used to identify each property was a whole number and decimal, with the whole number indicating its portfolio and the decimal indicating its building number within its portfolio. For most indicators, the measurement scale used in the raw scoring was binary, indicating whether or not a property had the particular characteristic described by the indicator (1=yes, 0=no). For other indicators, however, various scales are used, depending on the scale used by the data source, such as 0 to 100% for the percent that drive alone to work.

In order to allow the scores for the various indicators to be aggregated, they have to be expressed in the same units. This required two formulas; one for indicators of positive performance, where a higher number was preferable (e.g., whether a property was Energy Star labelled, with yes=1 and no=0), and another for indicators of negative performance, where a lower number is preferable (e.g., whether a property was located on prime farmland, with yes=1 and no=0). This was done using a procedure adapted from Krajnc and Glavic (2005) which converts all raw scores to a common scale of 0.0 to 1.0 with larger numbers representing better performance. The procedure used equations (1) and (2):

$$I_{N,ip}^{+} = \frac{I_{\mathrm{A,i}}^{+} - I_{\mathrm{min,i}}^{+}}{I_{\mathrm{max,i}}^{+} - I_{\mathrm{min,i}}^{+}} \qquad (1)$$

$$I_{N,ip}^{-} = 1 - \frac{I_{\mathrm{A,i}}^{-} - I_{\mathrm{min}}^{-}}{I_{max,i}^{+} - I_{min,i}^{-}} \qquad (2)$$

where $I^{+}_{N,ip}$ is the normalized indicator *i* for positive indicators for property *p*, $I^{-}_{N,ip}$ is the normalized indicator *i* for negative indicators, $I^{+}_{A,i}$ and $I^{-}_{A,i}$ are the raw scores for positive and negative indicators, respectively, and min and max are the minimum and maximum possible score for a given indicator. The normalized scores produced with this procedure are given in Columns 7-10. As shown, all the normalized scores are now measured on a scale of 0 to 1 with higher values always equal to better performance. With this complete, the normalized value for each indicator was weighted by multiplying the normalized score by the weights from Column 2. The products of this step are given in Columns 11-14. The weighted indicator scores were then subtotalled by RPI dimension to obtain a weighted RPI Sub-Index for each property's performance in each dimension. This procedure used equation (3):

$$I_{D,jp} = \sum W_i \, I^{+}_{N,ip} + \sum W_i \, I^{-}_{N,ip} \qquad (3)$$

where $I_{D,jp}$ is the RPI Sub-Index for dimension *j* of property *p* and W_i is the weight for indicator *i*.

The results are given in the rows marked "*Sub-Indices*" in Columns 11-14. These values represent the relative performance of each property in terms of separate RPI dimensions. They are also shown in Figure 1.

In order to compute an RPI Composite Property Index, the RPI sub-indices for each property were multiplied by the weights for each dimension, given in Column 2, and then summed. This produced the Composite Index shown in the last row of Columns 11-14 and in Figure 1. This procedure used equation (4):

$$I_{RPI,p} = \sum W_j \, I_{D,jp} \qquad (4)$$

where $I_{RPI,p}$ is the RPI Property Composite Index for property *p* and W_j is the weight for dimension *j*. Notice how the composite index was very similar for all four properties even though the properties varied considerably by dimension. This underscores the importance of examining disaggregated data for composite indices, particularly for stakeholders who are more interested in particular issues. This has been referred to as the non-compensatory issue in criteria aggregation, where good performance in some criteria cannot compensate for bad performance in others (Koellner *et al*. 2005). In this case, for example, property 1.1 outperformed relative to other properties on Less Auto-Dependence and underperformed on Environmental Quality.

The next and final stage of the analysis was to compare the two portfolios. Two steps were taken to accomplish this. First, a weighted average of the dimension sub-indices for the properties in each portfolio was computed using each property's proportion of the total portfolio square footage as its weight. This weighting scheme was intended to more accurately portray each property's importance in its portfolio assuming that each property's contribution to total portfolio performance is a function of size. This step was accomplished using equation (5):

$$I_{D,jz} = \sum I_{D,jp} P_p \qquad (5)$$

where $I_{D,jz}$ is the RPI sub-index for dimension *j* of portfolio *z* and P_p is the proportion of total square footage represented by property *p* in its portfolio. The results are given in Columns 15 and 16. Finally, an RPI Composite Index for each portfolio was computed following equation (6), which uses the same procedure as equation (4), except the sub-indices for portfolios were used instead of the sub-indices for properties:

$$I_{RPI,t} = \sum W_j I_{D,jz} \qquad (6)$$

where $I_{RPI,t}$ is the RPI Composite Portfolio Index for portfolio *t*. The results of this last step are given in the bottom row of Columns 15 and 16 and Figure 2. As with the Property Composite Index, the Composite Portfolio Index allows the overall RPI performance of portfolios to be compared. But again, it masks the variability in performance at the dimension-level. By comparing the disaggregated results, it is possible to see the relative strengths and weaknesses of portfolios. This can be facilitated by displaying the dimensional results from Figure 2 in the form of a radar plot, as shown in Figure 3. The radar plot more clearly illustrates how Portfolio 1 is stronger than Portfolio 2 in Health & Safety and in Environmental Quality while Portfolio 2 is stronger in Energy Conservation, Less Auto Dependence and Urban Revitalization. One further step that could be taken would be to add minimum and planned performance levels or other benchmarks for each dimension to the radar plot to allow current performance to be compared to separately derived benchmarks, as suggested by Bonacchi and Rinaldi (2007).

Care should be taken when interpreting portfolio comparisons to take into account their varying objectives that could explain differences in their RPI performance (Koellner *et al*. 2005). For example, it seems unreasonable to expect a portfolio of industrial properties to compare favourably to an office portfolio when it comes to issues such as proximity to parks or plazas which are less feasible in industrial districts. However, this remains an open question that will require further research into the specific indicators that are most appropriate for different property types and how to approach comparisons across different types of portfolios.

4.0 Conclusion

This paper has identified and assessed data sources for measuring the social and environmental performance of US real estate portfolios and demonstrated how the data can be aggregated into RPI indices useful for comparing properties and portfolios. These results help further develop what has come to be called Responsible Property Investing (RPI) by addressing the increasing demand for useable RPI metrics. Other researchers have made progress on measuring corporate sustainability and responsibility but little has been done to date that is directly related to the property sector. As with these other efforts, metrics lies at the heart of social and environmental accounting and reporting systems and useable data must be found if these efforts are to succeed.

Building on prior research that identified dimensions and criteria for RPI, this study found sources for as many as 64 separate indicators obtainable from online sources that can be queried using a property address or other universally available location information. While at least one indicator is currently available for all but one RPI dimension, multiple indicators are available for the most important dimensions, which would allow them to be measured in more than one way. Fifty-seven percent of the most important criteria can be measured with nationally available indicators. Many, though not all, of the available indicators can be obtained from sources that are free to any user, cover properties of various types in all locations, and use data that have few or no data quality issues.

One concern that emerged from the analysis is that more information is available for location-related indicators, as opposed to property-level management or building design information. This means that while fund managers can improve the RPI performance of a fund in terms of these available indicators by acquiring more properties in more favourable locations, asset and property managers can do less within the context of these reported indicators to improve RPI performance because they cannot change the locations of their properties. A rating system heavily weighted to locational indicators would thus give asset and property managers fewer options for enhancing the RPI performance of their activities. Nonetheless, some indicators are reported here which do capture operational and management practices, so property and asset managers are not without opportunities to contribute to improving the RPI performance of properties and portfolios using this set of metrics.

Another concern is that there are no national databases that can be used to measure a number of RPI issues, such as water use, property safety, or handicapped access. Some of the issues without related data are among the most important for RPI, such as water conservation and building flexibility. To fill these gaps, individual owners could supplement the national data set by collecting additional information on their own until better databases can be constructed. This is essential if aggregated RPI indices are to cover all of the most important RPI issues.

Few of the identified indicators can be measured using batch processing techniques, so it takes time to compile the available information on larger portfolios. Database owners could address this problem by programming their websites to enable batch processing or by providing an application programming interface to support requests made by third party users.

Once the information is compiled, their performance on a variety of indicators can be aggregated into meaningful indices at the property or portfolio level. However, when the indices combine the performance of multiple dimensions (e.g., energy, environment, community development, etc.) into a single comprehensive measure, information on differences at the dimensional level is eliminated. This can be important to stakeholders who may be more concerned about some dimensions than others and it would be valuable, therefore, to present dimensional performance using a radar plot or another comparable method.

One last concern is that data quality is not always as reliable as it could be. Common problems appear to be related to the age of the data, the geographic specificity, and the completeness of coverage. The later is perhaps the most common problem because some databases rely on voluntary and discretionary contributions by property owners or their agents. More systematic collection efforts by government agencies, private data providers, or data consortia could be developed to address these concerns.

The results of this paper are important because they give a roadmap to RPI analysts and executives who wish to assess the extra-financial performance of properties and portfolios. Asset owners can ask their asset managers to compile this information, fund managers can use it to improve reporting and management of corporate sustainability and responsibility, and socially responsible investors can use it to independently screen and rate REITs and private equity funds as long as they can obtain the addresses of the properties that comprise the investments.

Further progress with RPI metrics can now proceed along several lines. First, fund managers can begin using these datasets on an experimental basis to further assess their usability. Second, those interested in standardizing RPI reporting can discuss the adoption of an industry-wide protocol that identifies which of these available indicators should be used by all analysts wishing to follow a common process. Third, data gaps and quality concerns can be addressed by encouraging existing database owners to address the concerns or by organizing new data collection efforts, such as a water use benchmarking system based upon the EPA Energy Star model. Fourth, data source managers can make it easier to use their data sets for multiple properties by providing batch processing capabilities. And fifth, these data on non-financial attributes can be combined with data on financial performance, such as those collected by the National Council of Real Estate Investment Fiduciaries and BOMA International, to allow the creation of national benchmarks for RPI and research into the relationship between RPI and financial performance.

Ultimately, these data and related research and development activities will allow property investors and managers to more rationally consider the social and environmental performance of our building stock. There are few elements of our society that are more central to such issues. Of course, the debate will continue about how far investors should go to address these concerns on their own and they will continue being driven by financial interests, stakeholder pressures, and internal leadership skills and priorities. But without practical sources of information for social and environmental metrics, it will be difficult to make much progress toward more responsible and sustainable property investing. Hopefully, this project will be just one of many aimed at strengthening the metrics that lie at the heart of this issue.

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Table 1: Summary of Delphi Results (from Pivo 2008)

Dimension	*Criteria Sorted by Panel Rating (ratings based on importance to both investment returns and the public interest, With 5 equal to most and 1 equal to least important)*				*Grand Mean**
	4th Quartile (>3.70 out of 5)	*3rd Quartile (3.42-3.70 out of 5)*	*2nd Quartile (3.07-3.41 out of 5)*	*1st Quartile (2.41-3.06 out of 5)*	
Less Auto Dependent	Transit Oriented Development, Transit Level of Service, Central Location, Dense Mixed Use & Walkable			Carpooling, Bike Trails & Facilities	4.30
Energy Conservation	Energy Efficiency, Daylight & Ventilation, Renewable Energy			Locally Sourced Materials	4.00
Worker Well-Being	Open Space, Parks & Plazas Nearby	Sense of Community & Place, Childcare, Accommodations for Disabled, Services for Working Parents			3.64
Urban Revitalization	Benefits Urban Revitalization, Flexibility to Adapt to Changing Uses	Catalyzes Positive Suburban or Peripheral Development, Brownfield & Infill		Not on Prime Farmland	3.63
Corporate Citizenship	Regulatory Compliance	Disclosure & Reporting	Engagement w/ Suppliers	Philanthropy & Volunteering	3.48
Environmental Protection	Water Conservation, Recycling	Low Contributions to Global Warming, Use of Sustainable Bldg. Materials, Wildlife Habitat	Trees, Wetlands, Ozone, Historic/Cultural, Native Plants, Runoff, Ridges & Views, Eco-Restoration		3.38
Local Citizenship	Aesthetics, Fit, Visual Blending & Quality Public Realm		Minimum Local Impacts, No Involuntary Displacement, Considerate Construction, No Undue Influence w/ Local Govt.	Public Art	3.29
Social Equity and Community Development		Community Relations & Development, Stakeholder Engagement, Solicits Community Input During Development, Affordability	Fair Labor Practices, Union Construction & Service Workers	Local Low-Income Hiring & Training, Promotes Multi-racial Respect, Respect for Indigenous People,	3.28
Voluntary Certifications		EPA (Govt.) Partner, Green Certified Bldg.		No SRI Pariah Tenants, SRI Mortgagee	3.05
Health and Safety		Property & Visitor Security	Low Risk of Injury, Low Risk from Natural Hazards	Gyms/Showers, Evac. & Aid Training, First Aid Equipment, H&S Signage, Visitor Insurance	2.89
*Grand mean is the average of the mean materiality and public interest ratings for the criteria listed in each dimension.					

Table 2: Sources and Qualities of RPI Information

(1) *Indicator by Dimension* *(Dimensions listed by order of importance)*	(2) *Provider & Website*	(3) *Availability* *FP = Free to Public* *$P = Fee to Public* *P = Proprietary*	(4) *Required Information*	(5) *Batch*	(6) *Property Types* *0 = Office* *I = Industrial* *R = Retail* *M = Multi Family*	(7) *U.S. Cover-age*	(8) *Type*	(9) *Data Qualities* *Reliability Completeness Temporal Geographical Technical*
LESS AUTO DEPENDENT								
Percent in census tract who drive alone to work by place of work or residence	U. of WI-Milwaukee <uwm.edu/Dept/ETI/drilldowns/index.html>	FP	State, County & Census tract	No	O I R M	Full	Location	1,1,4,2,1
Percent in block group drive who alone to work by place of residence	US Census 2000 Summary File 3 <www.census.gov>	FP	Address & City or Zip Code	No	O I R M	Full	Location	1,1,4,2,1
< ½ mi. to bus stop	Google Earth <earth.google.com>[1]	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
< ½ mi. to transit station	Google Earth <earth.google.com> BTS Full Transportation Atlas Database <bts.gov/publications/Full_transportation_atlas_database/2007/html/transit_sta.html>	FP FP	Address Latitude Longitude	No No	O I R M O I R M	Full Full	Location	1,1,1,1,1 1,1,2,1,1
Mixed use neighborhood	Walk Score ™ <walkscore.com>[2]	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
Commuter rail, metro/subway, or bus line	CoStar Group <costar.org>	$P	Address	No	O I R	Partial	Location	2,5,1,1,1
Office live/work, with street level retail, or office/residential	CoStar Group <costar.org>	$P	Address	No	O	Partial	Use	2,5,1,1,1
Mixed use property	CoStar Group <costar.org>	$P	Address	No	R	Partial	Use	2,5,1,1,1
Street parking only	CoStar Group <costar.org>	$P	Address	No	O I R M	Partial	Design	2,5,1,1,1
In central employment area	CoStar Group <costar.org>	$P	Address	No	O I R	Partial	Location	2,5,1,1,1
Floor area ratio	CoStar Group <costar.org>	$P	Address	No	O I	Partial	Design	2,5,1,1,1
Parking ratio	CoStar Group <costar.org>	$P	Address	No	O I R M	Partial	Design	2,5,1,1,1
Population, housing, job density within 1 mile (requires computation)	CoStar Group <costar.org>	$P	Address	No	O I R M	Partial	Location	1,1,1,1,1

[1] Data provided to Google by local transit service providers.
[2] Data obtained by Google from infoUSA.com.

Jobs/housing balance (requires computation)	CoStar Group <costar.org>	$P	Address	No	O I R M	Partial	Location	1,1,1,1,1
Street-level retail	CoStar Group <costar.org>	$P	Address	No	O	Partial	Design	2,5,1,1,1
ENERGY CONSERVATION								
Energy Star Buildings & Plants Partner	US EPA <energystar.gov>	FP	Name	No	O I R	Full	Owner	1,1,1,1,1
Energy Star New Homes Partner		FP		No	M	Full		1,1,1,1,1
Energy Star Partner of the Year	US EPA <energystar.gov>	FP	Name	No	O I R	Full	Owner	1,1,1,1,1
Energy Star Leader	US EPA <energystar.gov>	FP	Name	No	O I R	Full	Portfolio	1,1,1,1,1
Energy Star Top Performer	US EPA <energystar.gov>	FP	Name	No	O I R	Full	Portfolio	1,1,1,1,1
Energy Star Labeled Property	US EPA <energystar.gov> CoStar Group <costar.org>	FP	Address Address	No	O I R O I R	Full Full	Perform ance	1,1,1,1,1
Energy Star Rating	US EPA <energystar.gov>	P	Size, hours, computers…	No	O I R	Full	Perform ance	1,5,1,1,1
Skylights	CoStar Group <costar.org>	$P	Address	No	I	Partial	Design	1,5,1,1,1
Tenant Controlled HVAC	CoStar Group <costar.org>	$P	Address	No	R	Partial	Design	1,5,1,1,1
100% Green Power Purchaser	US EPA <epa.gov/greenpower>	FP	Name	No	O I R M	Full	Owner	1,5,1,1,1
WORKER WELL-BEING								
Access to services	Google Earth <earth.google.com> Walk Score ™ <walkscore.com> First American CoreLogic RealQuest®	FP FP $P	Address Address Address	No No No	O I R M O I R M O I R M		Location	1,1,1,1,1 1,1,1,1,1 1,1,1,1,1
Access to parks and recreation	Walk Score ™ <walkscore.com>	FP	Address	No	O I R M		Location	1,1,1,1,1
Childcare on or near the premises	Google Earth <earth.google.com> CoStar Group <costar.org> First American CoreLogic RealQuest®	FP $P $P	Address Address Address	No No No	O I R M O O I R M		Location	1,1,1,1,1 2,5,1,1,1 1,1,1,1,1
Banking, convenience store, cleaners, food service on premises	CoStar Group <costar.org>	$P	Address	No	O R	Partial	Uses	2,5,1,1,1
Courtyard on premises	CoStar Group <costar.org>	$P	Address	No	O R	Partial	Design	2,5,1,1,1
URBAN REVITALIZATION								
In tax abatement zone	US HUD <egis.hud.gov/egis/cpd/rcezec/welcome.htm> CoStar Group <www.costar.com > CCH Tax Zone Locator <tax.cchgroup.com/taxzonelocator>	FP $P $P	Address Address Address	Yes No Yes	O I R M O I R M O I R M	Full	Location	1,1,1,1,1 2,5,1,1,1 1,1,1,1,1
In low income, underserved or distressed tract	FFIEC <ffiec.gov/Geocode/default.aspx>	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
In Historically Underutilized Business zone	FFIEC <ffiec.gov/Geocode/default.aspx>	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
In Principal City	FFIEC <ffiec.gov/Geocode/default.aspx>	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
Brownfield Site	US EPA <iaspub.epa.gov/Cleanups/>	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
Adaptive reuse project	CoStar Group <costar.org>	$P	Address	No	R	Partial	Design	2,5,1,1,1
CORPORATE CITIZENSHIP								
Signatory to the UN Principles for	UNEP FI <unpri.org>	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1

Responsible Investing								
Publishes sustainability /responsibility rpt.	Corporate Register.com <corporateregister.com>	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
ENVIRONMENTAL PROTECTION								
Not on prime farmland	NRCS <websoilsurvey.nrcs.usda.gov/app/>	FP	Address	No	O I R M	Full	Location	1,1,1,2,1
On national register of historic places	NPS <nps.gov/history/nr/>	FP	Address	No	O I R M	Full	Location	1,1,1,1,1
Outside critical habitat	US F&WL <criticalhabitat.fws.gov>	FP	Address	No	O I R M	Full	Location	1,5,1,2,1
LOCAL CITIZENSHIP								
None								
SOCIAL EQUITY & COMMUNITY DEVELOPMENT								
Handicapped Accessible	Full Accessible Apartments Clearinghouse <accessibleapartments.org>	FP	City	No	R	Partial	Design	3,1,5,1,1
CREDENTIALING								
EPA Partnerships:								
Best workplaces for commuters	Bestworkplaces.org	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
Combined heat and power partnership	epa.gov/chp/	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
Energy Star building and plants partner	energystar.gov	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
Energy Star new homes partner	energystar.gov	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
Green power partnership	epa.gov/greenpower/	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
WasteWise	epa.gov/wastewise/	FP	Name	No	O I R M	Full	Owner	1,1,1,1,1
LEED certification	USGBC <usgbc.org> CoStar Group <costar.com>	FP $P	City and Project or Address	No No	O I R O I R	Full Full	Design	1,1,1,1,1 1,1,1,1,1
HEALTH AND SAFETY								
Outside high flood risk area	NFIP < floodsmart.gov/floodsmart/>	FP	Address	No	O I R M	Full	Location	2,1,4,1,1
Seismic hazard (ground motion)	USGS < gldims.cr.usgs.gov/nshmp2008/viewer.htm >	FP	Lat./Long.	No	O I R M	Full	Location	1,1,1,1,1
Seismic Risk Rating = A or AA	ABS Consulting PropertyRisk™ Report <propertyrisk.com/prquake.htm>	$P	Address	No	O I R M	Full	Design	2,5,1,1,1
Fitness facilities on the premises	CoStar Group <costar.com>	$P	Address	No	O	Partial	Design	2,5,1,1,1
Security system on the premises	CoStar Group <costar.com> All	$P	Address	No	O I	Partial	Mgt.	2,5,1,1,1
LOCATION INFORMATION								
Latitude/Longitude	Stephen P. Morse [stevemorse.org/jcal/latlon.php]	FP	Address	Yes	O I R M	Full	Location	1,1,1,1,1
Census tract and block group	US Census <factfinder.census.gov/servlet/DTGeoAddressServlet?_ts=230834899171>	FP	Address	No	O I R M	Full	Location	1,1,1,1,1

Acronyms: CID-NY – Center for Independence of the Disabled, New York, FFIEC – Federal Financial Institutions Examination Council, INCR – Investor Network on Climate Risk, NFIP – Full Flood Insurance Program, NPS – Full Park Service, NRCS – Full Resource Conservation Service, RC/EZ/EC – Renewal Community, Empowerment Zone or Enterprise Community, UNEP FI – United Nations Environment Programme Finance Initiative, US EPA – US Environmental Protection Agency, US F&WS – US Fish and Wildlife Service, US HUD – US Department of Housing and Urban Development, USGBC – US Green Building Council

Table 3: National RPI Data Gaps
(Ranking quartiles per Table 1)

LESS AUTO DEPENDENT
Carpooling facilities and services (1)
Bicycle trails and facilities (1)
ENERGY CONSERVATION
Daylighting and ventilation (4)
Use of locally sourced materials (1)
WORKER WELL BEING
Promotes community & sense of place (3)
Accommodations for the disabled (3)
URBAN REVITALIZATION
Flexibility & adaptability for changing uses (4)
CORPORATE CITIZENSHIP
Regulatory compliance (4)
Supplier screening & engagement (2)
Philanthropy and volunteering (1)
ENVIRONMENTAL PROTECTION
Water conservation (4)
Recycling (4)
Contributions to global warming (3)
Sustainable building materials & furnishings (3)
Surface water management (2)
Wildlife habitat (3)
Wetland and riparian protection (2)
Trees and native plants (2)
Views, ridgelines & landforms (2)
Ozone protection (2)
Eco restoration (2)
LOCAL CITIZENSHIP
Aesthetics, fit, blending, quality public realm(4)
Neighborhood impacts (2)
Involuntary displacement (2)
Considerate construction practices (2)
Undue influence in local government (2)
Public art (1)
SOCIAL EQUITY & COMMUNITY DEVELOPMENT
Community outreach and contributions (3)
Affordability (3)
Fair labor practices (2)
Local hiring and training programs (1)
Respect for diversity (1)
CREDENTIALING
Renting to pariah tenants (1)
Socially responsible mortgagee (1)
HEALTH AND SAFETY
Natural hazards (wildfire, landslide, etc.) (2)
Accidental death and injury record (2)
Evacuation/first aid training and equipment (1)
Health and safety signage (1)
Visitor insurance (1)

Table 4: Illustration of Property and Portfolio Data and Indices

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Indicator	Weight	Raw Score				Normalized Score				Weighted by Importance				Weighted by Importance and Property Size	
		Prop 1.1	Prop 1.2	Prop 2.1	Prop 2.2	Prop 1.1	Prop 1.2	Prop 2.1	Prop 2.2	Prop 1.1	Prop 1.2	Prop 2.1	Prop 2.2	Portfolio 1	Portfolio 2
Less Auto-Dependence	**0.2**														
Pct Drive Alone in tract	0.8	23.60	76.80	84.50	85.80	0.76	0.23	0.16	0.14	0.61	0.19	0.12	0.11		
1/4 mi. to rail	0.2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00		
Sub-Indices										0.81	0.19	0.12	0.11	0.67	0.12
Energy Conservation	**0.2**														
EStar Labeled Property	0.8	1	1	1.00	0.00	1.00	1.00	1.00	0.00	0.80	0.80	0.80	0.00		
EStar rating[2]	0.2	95	80	77.00	45.00	0.95	0.80	0.77	0.45	0.19	0.16	0.15	0.09		
Sub-Indices						1.00				0.99	0.96	0.95	0.09	0.98	0.69
Worker Well-Being	**0.12**					0.95									
Park or Plaza within 1/4 mi.	0.50	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.50	0.50	0.00	0.00		
Childcare on premises[1]	0.50	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.50	0.50		
Sub-Indices										0.50	0.50	0.50	0.50	0.50	0.50
Urban Revitalization	**0.12**														
In a Principle City	0.50	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.50	0.50	0.50	0.00		
In a federal RC/EZ/EC Zone	0.50	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.50	0.00	0.00	0.50		
Sub-Indices										1.00	0.50	0.50	0.50	0.88	0.50
Environmental Quality	**0.12**														
Certified Green Building	0.70	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.70	0.70		
Prime Farmland	0.30	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.30	0.30	0.30	0.30		
Sub-Indices										0.30	0.30	1.00	1.00	0.30	1.00
Health & Safety	**0.12**														
High Flood Risk	0.5	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.50	0.00	0.50	0.50		
Earthquake Hazard	0.5	47.03	34.34	3.88	1.68	0.53	0.66	0.96	0.98	0.26	0.33	0.48	0.49		
Sub-Indices										0.76	0.33	0.98	0.99	0.66	0.98
Corporate Citizenship	**0.12**														
AA1000AS Report	0.50	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.50	0.50	0.50	0.00		
PRI Signatory	0.50	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50		
Sub-Indices										0.50	0.50	0.50	0.50	0.50	0.00
RPI Property and Portfolio Composite Indices										0.73	0.48	0.63	0.46	0.67	0.52

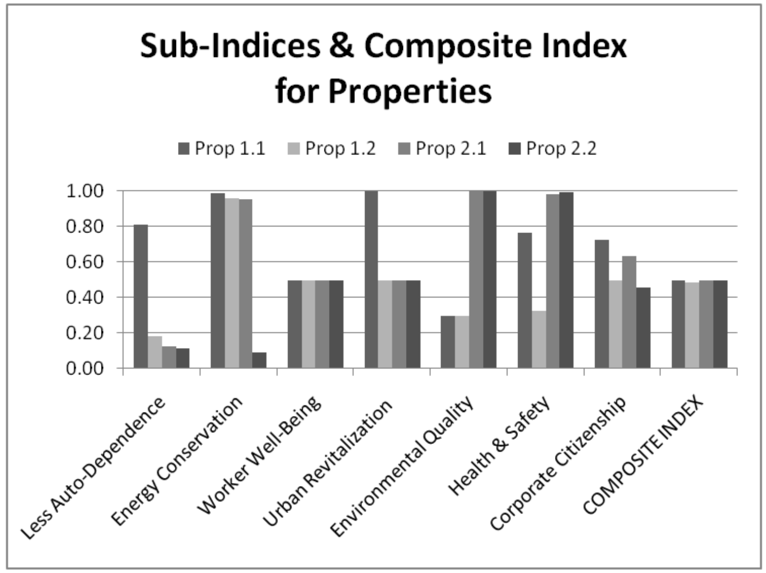

Figure 1

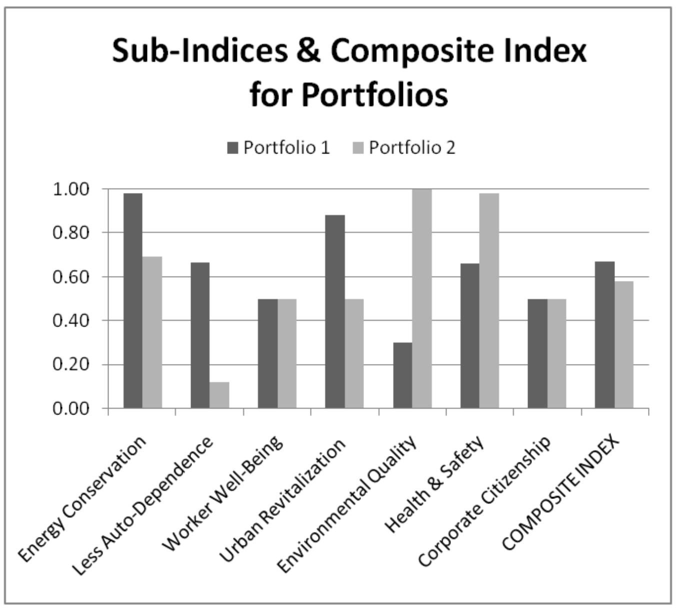

Figure 2

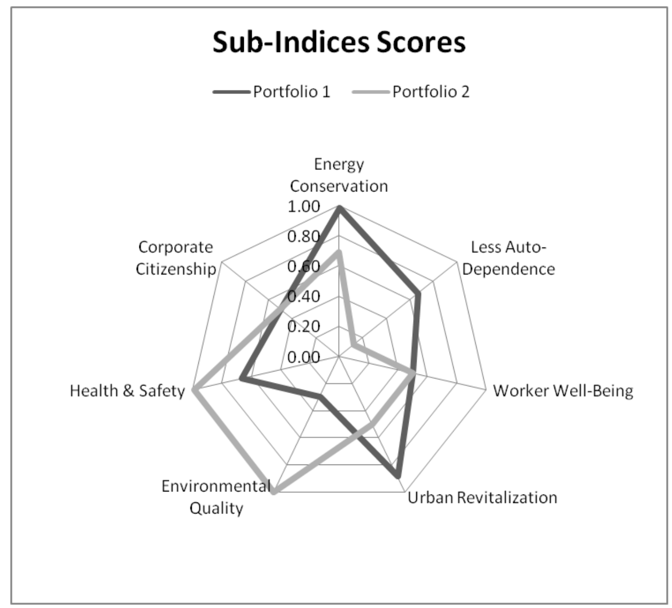

Figure 3