Integrating social concerns into the decision-making process associated with the petroleum industry

Bryony Cunningham[1,2], Walter Wehrmeyer[2], Roland Clift[2] and Linda Brewer[1]

[1] Shell Global Solutions (UK), Cheshire Innovation Park, Chester, P.O. Box 1, CH1 3SH
[2] University of Surrey, Centre for Environmental Strategy, Guildford, Surrey, GU2 5XH
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Abstract

The integration of social concerns within decision-making processes poses a particular challenge for the petroleum industry. A method of monitoring and measuring qualitative and quantitative aspects is required. To support this, this paper focuses on the use of sustainability indicators as a decision-making tool. Working from a concrete definition of SD and sustainability within the context of the petroleum industry, it is possible to develop a framework that applies to business operations at both the product and process levels. Case studies are introduced to demonstrate the difference between product and process level indicators with their use in external and internal decision-making processes respectively.

1. Introduction

> *"Our success as an organisation is intimately linked to that of society. We wish to play our part responsibly – by maintaining and enhancing natural and social capital, as well as contributing to the global economy's capacity to generate and distribute wealth"* Shell Report, 2000, p.6

This quote highlights the recognition by Shell that social concerns are an important aspect of business operation. If society is to advance and develop without jeopardising the prospects for future generations (the underlying idea of sustainable development) then social and environmental consequences must be considered by industry in their long and short-term implications. In order to incorporate these qualitative and quantitative aspects within the decision-making process, a method of identification and measurement must be developed. The focus in this paper is placed on such indicators of sustainable development (SD), particularly how to develop and evaluate them as effective tools.

Indicators are an essential component in the overall assessment of progress towards sustainability (Moldan and Billharz, 1997). Indicators require the ability to summarise diverse information into useful and understandable indicators. There is no internationally accepted framework to measure SD, nor consensus on how indicators should be developed or what they should cover. This partly reflects the fact that different indicators are required for different purposes. A number of publications refer to the difficulty of developing effective indicators (e.g. Bell and Morse, 1999; Department of the Environment, 1996; MacGillivray and Zadek, 1995; Moldan and Billharz, 1997). Major problems include the inherent difficulty of deriving measures that are recognised as important, but cannot be easily quantified (for example aesthetic value and quality of life). In such cases other available surrogate measures may be used that may be less reliable or representative. Even when parameters can be derived there may be the added complexity of the necessary data being unavailable. By looking at specific purposes within the petroleum industry this paper proposes a

method of indicator development in order to aid decision-making processes associated with SD.

Sustainability refers to the ideal where society, environment and the economy have all reached a favourable state and can be maintained at that level. There are many interpretations of the meaning behind SD and sustainability, with little consensus on their specific meaning. One of the most commonly cited definitions of SD is the original by the Brundtland Commission:

> *"…development that meets the needs of the present generation without compromising the ability of future generations to meet their on needs"* WCED, 1987, p. 43

The WCED definition does not resonate with individuals or in business terms. In order to be accepted and implemented within the decision-making processes of industry, a working definition reflecting the broad ideas of the above concept needs to be produced. The general ideas must be interpreted for industry-specific contexts; without definition of SD there can be no meaningful measures or decision-making processes. By focusing on the petroleum industry it is possible to make a concrete definition of this term. SD is interpreted as a requirement that the petroleum industry must work towards ensuring that the use and demise of oil reserves does not lead to negative impact on people's quality of life (for current and future generations) or the longevity of the industry.

2. Sustainable Development (SD) Within The Petroleum Industry

There are two major issues regarding SD within the petroleum industry. Firstly, the industry itself is based on an unsustainable resource. The second, perhaps over-riding concern is that emissions levels for the industry are high. Modern society is dependent on the production and use of oil. The economic value of current operation is assured. However, there will come a time when the impacts of global climate change will affect business operation through the need to reduce emission levels. The carrying capacity of the environment for emissions will become saturated. According to the Intergovernmental panel on Climate Change (IPCC) the maximum sustainable CO_2 concentration in the atmosphere is a fraction of current known reserves; therefore, emissions will limit fossil fuel use. The industry must understand upcoming legislation, be able to accurately assess its emission levels and be able to make justifiable decisions on trade-offs such as whether less CO_2, SO_2 or NO_2 is preferable. This requires an understanding of public perception and values, in other words the social concerns of today's society.

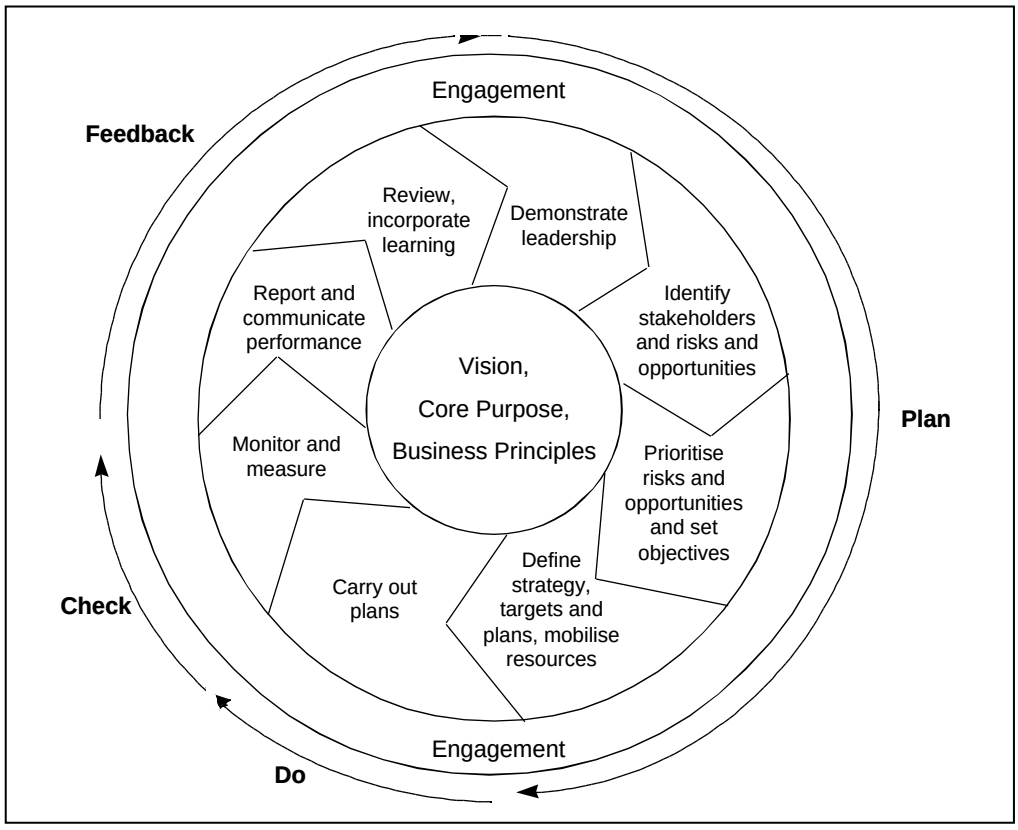
The Shell Group has produced a Sustainable Development Management Framework (SDMF) designed to manage the integration of SD and sustainability within decision-making processes. This diagram is displayed in Figure 1. The Exploration and Production (EP) section of the Shell Group has already made attempts to integrate the SDMF into business processes through development of sustainability principles. The sustainability principles are the intermediary between the SDMF and the sustainability indicators. The principles are:

- Respect and safeguard people;

- Engage and work with stakeholders;
- Minimise impact on the environment;
- Use resources efficiently;
- Maximise profitability;
- Maximise benefits to the community.

The principles are designed to provide overall direction for the business and are intended to be applicable from the corporate to the site level.

Figure 1: Sustainable Development Management Framework (SDMF)



3. Evaluation of Sustainable Development (SD) Indicators

Indicators of SD are the principal means of bringing SD into an operational reality within the petroleum industry. The starting point in relation to sustainability indicators for conceptualisation and practical implementation is the establishment of the qualities that are of most use within an indicator set. The indicators developed must display certain characteristics, to avoid the danger of being unnecessary pieces of information with no application. Table 1 provides a list of characteristics that have been compiled from research available in the field (particularly Meadows, 1998 and Moldan and Billharz, 1997).

Each indicator can be assessed based on these characteristics in order to affirm whether the indicator is suitable or not. In many instances this is not a simple yes or no answer. For example, the indicator may not be verified immediately, but it could be the case that it will be in the future. Therefore, a graded response to an indicator's characteristics is required to ensure the full range of responses is accommodated.

Table 1: The Characteristics of Indicators

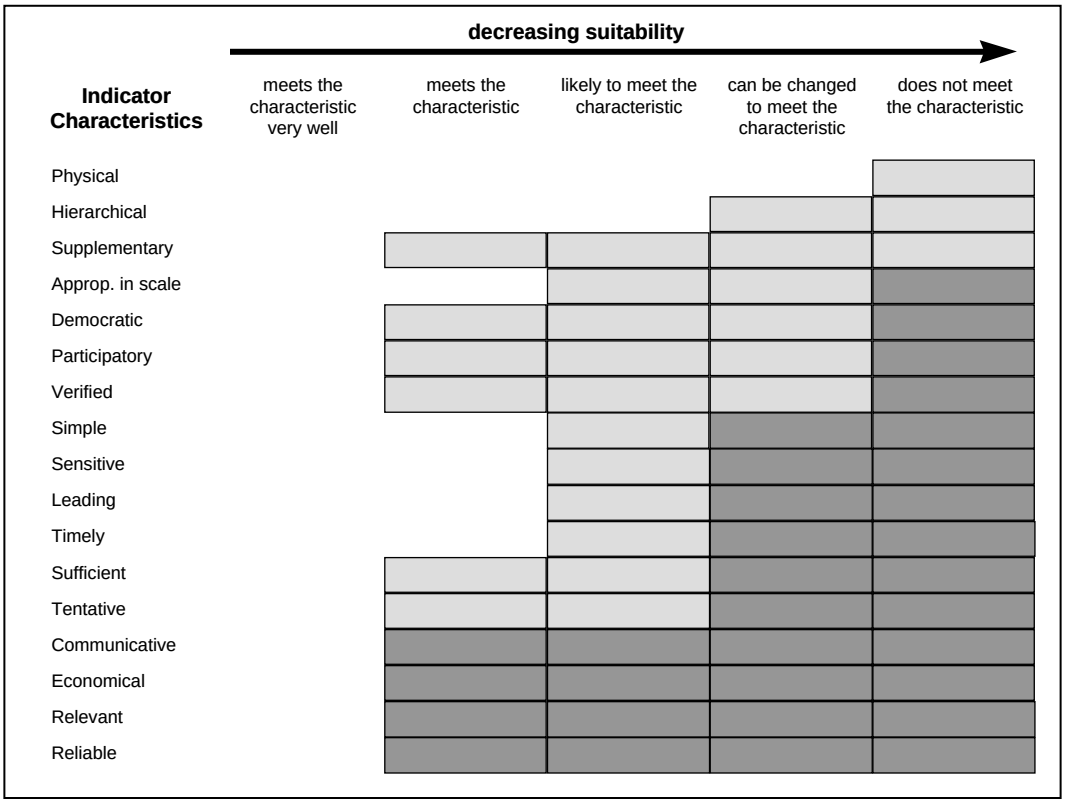
Physical	Money and prices are inflatable and unstably exchangeable.
Hierarchical	A user should be able to delve down to detail if desired but also obtain the general message quickly.
Supplementary	A user should be provided with information on issues that they cannot measure for themselves (such as radioactive emissions).
Appropriate in scale	Not over or under aggregated.
Democratic	People should have input to indicator choice and have access to the results.
Participatory	People should be able to measure indicators for themselves; measurement should not be based on obscure issues.
Verified	The homogeneity of interpretation can be assured through the use of external verification.
Simple	Information should not be overly complicated. Indicators should be useful to all stakeholders.
Sensitive	The indicators must reflect any changes in issues effectively.
Leading	Information must be provided in time to act on it.
Timely	Coming at the right point in time.
Sufficient	There should not be too much information to comprehend yet information should not be too little to give an adequate interpretation of the issue.
Tentative	The indicators should be available for discussion, learning and change.
Communicative	Indicators should provide information to all stakeholders and be easy to understand.
Economical	The collection of indicators should balance the information requirement with the available resources. The information should also not take too long to collate.
Relevant	Indicators must remain relevant to the issue it depicts.
Reliable	The information collected should come from reliable resources.

The characteristics have been placed in a matrix similar to ones produced for risk assessment to allow for graded responses[1]. The indicator evaluation matrix is demonstrated in Table 2. When indicators have characteristics that can be graded within the dark grey boxes of the matrix, the indicators can be interpreted as inappropriate for use. The more dark grey boxes correspond to an indicator, the more important it is that the indicator displays the characteristic. In this way the matrix demonstrates that certain characteristics are mandatory for indicator sets such as: communicative, economical, relevant and reliable. Other characteristics allow for a more flexible response (for example physical, hierarchical and supplementary). Ideally indicators should possess a minimum of four characteristics (the number of mandatory characteristics). A complete indicator set should have an average of 10 characteristics within the first column ("meets the characteristic very well"). The indicators developed should rank within the white or light grey boxes. The use of the matrix should counteract any difficulties that may arise due to subjectivity. The matrix is designed for use by anybody dealing with indicator development and assessment. Each indicator should be evaluated against the characteristics in the

[1] Examples of a Risk Assessment Matrix (RAM) can be found at http://www.sverdrup.com/safety/workmatrix.pdf and http://www.controleng.com/archives/2000/ctl0101.00/0001auw1.htm

matrix, to ensure the indicators utilised within decision-making processes are effective. A re-evaluation of the indicators must occur periodically.

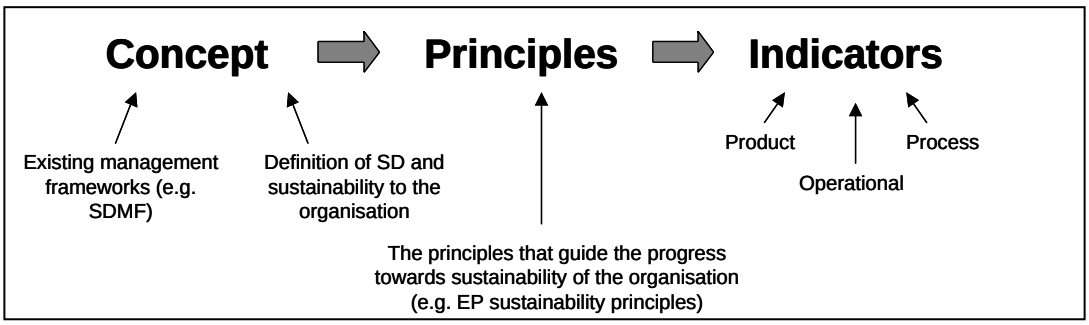
Table 2: Indicator Matrix for Evaluation



4. Framework for Indicators of Sustainable Development (SD)

It is not effective to develop exhaustive lists of indicators, as their availability is no longer the important issue in relation to indicator development; it has shifted to indicator suitability (Wehrmeyer et al., 2001). For industry, suitability means that they should reflect a number of levels within the organisation: operational, product and process. In the case of the Shell Group the indicators developed must be based on the sustainability principles that derive from the Sustainable Development Management Framework (SDMF) (displayed in Figure 1) and the meaning of SD and sustainability to the organisation. The indicators should retain applicability for both internal and external decision-making processes. Figure 2 demonstrates an indicator framework that can be interpreted for use within all organisations.

Figure 2: The Indicator Framework for Industry



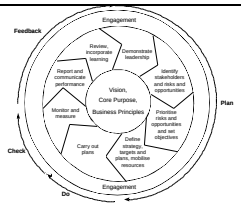
This framework is similar to the Global Reporting Initiative (GRI, 2000) approach of *category, aspect* and *indicator*. For the GRI framework *category* refers to the broad areas or groupings of economic, environmental or social issues of concern to stakeholders. *Aspects* are the general types of information that are related to a specific category. A *category* may have several aspects. An *aspect* may have several indicators. The *indicators* are defined by the GRI as the specific measurements of an individual aspect that can be used to track and demonstrate performance. Examples of the GRI framework are given in Table 3.

Table 3: Examples of the GRI Framework (GRI, 2000)

CATEGORY	ASPECT	INDICATOR
Air	Greenhouse gas emissions	Tonnes of emissions
Energy	Energy consumed by source	Net joules of energy used during the lifespan of a product
Labour Practices	Child labour practice	Adherence to a specific international standard on child labour
Local Economic Impacts	Donations to local host communities	Monetary contributions per year to host communities

Veleva and Ellenbecker (2000) outlined how twenty-one corporations used the GRI framework. The conclusions were that the GRI had insufficient guidance, indicators without clear business value and burdensome reporting requirements. The foundation on stakeholder concerns meant the work was heavily driven by external perceptions of industry. This makes the GRI applicability limited in terms of internal decision-making. The concept, principles and indicator (CPI) framework outlined in this paper is designed to incorporate both external and internal decision-making processes. Examples of the CPI framework are included in Table 4.

Table 4: Examples of the Concept, Principles and Indicator Framework (taken from the case study on RME biodiesel)

CONCEPT	PRINCIPLES	INDICATOR
 SD Management Framework (SDMF)	Use resources efficiently	Average distance the product travels from agriculture to biofuel producer and finally to the end user
SD = a requirement that the petroleum industry must work towards ensuring that the use and demise of oil reserves does not lead to negative impact on people's quality of life (for current and future generations) or the longevity of the industry.	Respect and safeguard people	Level of toxicity
	Minimise impact on the environment	Level of exhaust emissions
	Engage and work with stakeholders	Acceptability of fuel to consumer

Within the framework the inclusion of *concept* allows for more focused consideration of SD and sustainability thereby making it more applicable for industrial systems. The *concept* refers to the basis of SD within the organisation. This could be from a vision statement, plan or management framework (for the petroleum industry this has

been taken as referring to the SDMF and the meaning of sustainable development to the industry). Bossel (1999) noted that indicators may be different but if based on the same criteria it is likely that sustainability assessments will produce comparable results. The *principles* refer to the aspects that that are key to the progression of the organisation towards sustainability (such as the EP sustainability principles). The *indicators* are developed for a variety of purposes (product, process and operational). The work on the case studies explained in the following sections are an attempt to demonstrate how the indicator evaluation and framework can be applied to issues within the petroleum industry to demonstrate how social concerns can be integrated within the decision-making process.

5. Product Case Study

The work associated with this case study was completed as part of an assessment of sustainability of Rapeseed Methyl Ester (RME) biodiesel, a "renewable" transport fuel. Much attention has been focused on the environmental aspects (Altin, 2001; BABFO, 1994; BABFO, 1999; Kraus et al., 2000; Peterson and Hustrulid, 1998; Reinhardt and Jungk, 2000). Information on social concerns is harder to obtain. The project exposed a number of key points in relation to work on social indicators. In particular it highlighted the added complexity from the introduction of stakeholders to the decision-making process. The Shell Group had done no previous work on social concerns of products. In order to structure the analysis a Social Impact Assessment (SIA) perspective was taken.

SIA is defined as a process that predicts the significant social effects of an activity (Barrow, 1997). Traditionally within the Shell Group SIA has been used to interpret social concerns at a process level. However, the categories[2] of the SIA provide an effective method for the management of social concerns at a product level. With demographic impact the focus is on a change in the size or make-up of the population. The principal demographic impact is migration. There is currently a diminishing agricultural industry that has important repercussions on the rural community; people are migrating from rural areas in pursuit of employment and improved standard of living as rural income decreases. The growth of rapeseed could be a counter factor through increased employment (whether direct or indirect) and additional income to contribute towards stabilising the rural population. The socio-economic impacts of RME biodiesel refer to the level of employment creation (particularly long-term)[3]. Understanding of the impact on social infrastructure and impact on lifestyle is currently at a theoretical stage. Consideration of impacts is needed on issues such as the migration of people to an area, and people's attitudes using RME biodiesel as opposed to conventional fuel. The social equity of impacts requires an understanding of the stakeholder groups that will benefit and be adversely affected by the introduction of RME biodiesel. This introduced the need for stakeholder identification and engagement associated with the development of social indicators.

[2] Developed by Shell Exploration and Production (EP) in the internal HSE Manual yellow Guide: "Social Impact Assessment" EP 95-0371. The categories are: demographic impacts, socio-economic impacts, health impacts, impacts on social infrastructure, impacts on natural resources, impacts on lifestyle, impacts on cultural property and social equity of impacts.

[3] It is also important to investigate the health impact of rapeseed plantations, which would relate to hay fever and asthma sufferers. However, this information should ideally be included within the environmental concerns as it is directly related to the level of airborne particles.

By applying the indicator framework proposed within this paper, it was possible to develop a set of indicators designed to reflect the social impacts of RME production. The principal indicators, selected from the full set of 20, are summarised in Table 5, chosen to reflect the main issues identified within the introduction of RME biodiesel to the marketplace.

Table 5: Principal Indicators Produced for Rapeseed Methyl Ester (RME) Biodiesel

Use resources efficiently	SDI: Average distance the product travels from agriculture to biofuel producer and finally to the end user SDI: Amount of land required to produce RME
Respect and safeguard people	SDI: Level of toxicity SDI: Level of change required to the current fuelling structure
Minimise impact on the environment	SDI: Level of exhaust emissions SDI: Number of hay fever and asthma sufferers found near to RME crops
Engage and work with stakeholders	SDI: Acceptability of fuel to consumer SDI: Affect on engine performance
Maximise benefits to the community	SDI: Level of employment SDI: Amount of RME required from other countries
Maximise profitability	SDI: level of investment required for production SDI: Price of fuel for consumer

6. Process Case Study

The second case study studied the development of indicators to reflect a process's operation. Sakhalin Energy Investment Company (SEIC) Ltd. is constructing a Liquefied Natural Gas (LNG) facility along the south coast of Sakhalin, Russia. A literature review was produced on all previous cases where work of a similar nature had been undertaken by industry and the lessons learned were highlighted. Stakeholder identification and engagement was carried out in Sakhalin by a qualified social scientist from the Shell Group. The results from the literature review and engagement process identified social indicators that were related specifically to work impacts and are displayed in Table 6 (work is ongoing on this project; therefore, a total number of indicators cannot be provided).

Table 6: A Sample of Indicators Produced for the Sakhalin Case Study

Use resources efficiently	SDI: The number of years of oil or gas available for extraction SDI: The average hours spent by employees on training each year
Respect and safeguard people	SDI: The current number of employees SDI: The average working day for employees
Minimise impact on the environment	SDI: The frequency of emissions testing every month
Engage and work with stakeholders	SDI: A plan for stakeholder dialogue is in place SDI: The frequency of meetings (each year) between the company and local community
Maximise benefits to the community	SDI: The number of employees that have been employed from a 30 mile radius to the process SDI: The percentage of all suppliers that have come from the local area (radius 30 miles)
Maximise profitability	SDI: The level of investment required by the Shell Group or majority partner to maintain the licence to operate SDI: The price (e.g. per barrel of the product).

7. Discussion

The development of indicators of SD has been presented on a product and process level within this paper. Analysis of social concerns from a product or process perspective requires very different thinking. The indicators demonstrated within this work highlight this point. For example, indicators to reflect the social concerns of products are, to a great extent, out of the control of the company. People's perceptions and the value they place on certain products, both socially and economically are very difficult to predict. For instance, perhaps surprisingly modern society places a stronger emphasis on the performance of petroleum products as opposed to the environmental impacts. It is questionable whether this preference will remain; if it does change it is crucial to the decision-making of the petroleum industry to understand and recognise when this happens.

The inclusion of social concerns within decision-making associated with products requires a high level of interaction. The process of stakeholder engagement becomes crucial to understanding people's perceptions and concerns. The indicators demonstrated reflect this, such as "Acceptability of the fuel to the consumer". The only way accurate information on this subject can be collated is through effective stakeholder engagement. The petroleum industry must ask stakeholders how they value the product in order to know whether the product can become (or remain) successful. The use of external decision-making processes is vital to indicators developed for products.

On the other hand the process indicators reflect issues that are more within the control of the company. The company has direct control over the inputs and outputs from the site. Therefore, careful monitoring and minimising adverse impacts would deem the site successful. There are exceptions where stakeholder engagement is required predominantly when a new process site is proposed and approved. What is more important is that communication levels remain open and transparent and so processes such as stakeholder dialogue are introduced. The social concerns that are of most importance to a process site are those of the employees. Internal decision-making processes; therefore, become the crucial focus of attention.

8. Conclusion

The work on producing an indicator framework and method of evaluation demonstrates that structure can be developed to accommodate social concerns. It is dependent on a definition of SD and sustainability being developed from a specific perspective, in this case the petroleum industry. It also requires an understanding of how a particular industry can work towards sustainability through the identification of the underlying principles and their specific embodiment for that industry. When these points have been established it is possible to develop communicative, economical, relevant and reliable indicators. There may be variations, particularly on the level of stakeholder engagement but a common structure does allow for some commonalities to be identified. For the purposes of the petroleum industry product and process level indicators can both be based on the same principles: use resources efficiently, respect and safeguard people, minimise impact on the environment, engagement and work with stakeholders, maximise benefits to the community and maximise profitability.

They both offer critical tools for decision-making; the product indicators are predominantly used for external decision-making, whilst process indicators focus on internal issues. Both demand the inclusion of social concerns and this demands an understanding of the values and judgements held by today's society. In association with this is the realisation that social concerns cannot be addressed by a single decision. The original decision will need revision and updating through information that arises from the use of the indicators of SD. Just as the meaning of SD and sustainability will change and evolve over time, so too will the social concerns and this must be accommodated within the decision-making processes.

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