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Petroleum and natural gas industries — Life cycle costing —

Part 1: Methodology

Industries du pétrole et du gaz naturel — Estimation des coûts globaux de production et de traitement —

Partie 1: Méthodologie

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 15663 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15663-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*.

ISO 15663 consists of the following parts, under the general title *Petroleum and natural gas industries — Life cycle costing*:

— *Part 1: Methodology*

— *Part 2: Guidance on application of methodology and calculation methods*

— *Part 3: Implementation guidelines*

Introduction

The purpose of this part of ISO 15663 is to provide guidance on the use of life-cycle costing techniques within the petroleum and natural gas industry. The principal objective is to speed the adoption of a common and consistent approach to life-cycle costing within the oil industry. This will happen faster and more effectively if a common approach is agreed internationally.

Life-cycle costing is the systematic consideration of the difference between costs and revenues associated with the acquisition and ownership of alternative options required to fulfil an asset need. It is an iterative process of estimating, planning and monitoring costs and revenue differences throughout an asset's life. It is used to support the decision-making process by evaluating alternative options and performing trade-off studies. While the largest benefits can be achieved in the early project stages of evaluating major configuration options, it is equally applicable to all stages of the life cycle, and at many levels of detail.

Life-cycle costing is distinct from investment appraisal in that it is not concerned with determining the financial viability of a development. It is concerned only with determining the differences between competing options and establishing which options best meet the owners' business objectives.
In the past, the petroleum and natural gas industry has assessed the financial viability of project options on the basis of minimum capital expenditure: operating expenditures have played little part in the decision-making process. This has ignored a potentially large cost and in many cases has resulted in reduced asset value.

This omission is now recognized by the industry. As the number of new large developments has declined, the emphasis has moved towards the maintenance and update of existing assets; naturally this has focused more attention on operating expenditures. In addition, external pressures, such as a low and static oil price, have further added to the pressures to minimize costs.

Life-cycle costing techniques are used by a number of companies within the industry. However, the development of such techniques has been pursued independently and their application has been patchy, with little participation by the contractors and vendors — contracting for equipment supply is still largely on a basis of minimum capital expenditure. All participants in the process — operators, contractors and vendors — can have a substantial impact on the life-cycle costs of ownership, and it is not until all are involved that the benefits sought from the use of life-cycle costing will be realised. If this is to be achieved, a common, consistent, industry-wide approach is required.

Where the life-cycle costing approach was applied, life-cycle costing methods were developed and valuable experience was gained. However, the approaches were diverse with variable success.

This diversity has caused confusion amongst contractors and vendors. It also has resulted in higher engineering and supply costs. Experience indicated that this could potentially result in low quality information being used to support management decisions, in order to maintain project schedules and avoid delay. Therefore, in a project context, a clear, well defined methodology is needed to define how, when, where and why life-cycle costing needs to be applied.

It has also been recognized that project and asset management staff need a clear and unambiguous definition of the overall economic objectives of a project and how to apply the same business criteria when making major engineering decisions. It is further recognized that long term management commitment to life-cycle costing is crucial for its successful implementation in the project execution of an asset.

The principal benefits associated with the systematic application of life-cycle costing may include any or all of the following.

— **Reduce ownership costs**
  Operating costs in other industries such as aircraft, defence and automotive have been significantly reduced in the last decade. When users begin to consider operating expenditures before making decisions, the whole supply industry takes a different approach to quality and service.

— **the alignment of engineering decisions with corporate and business objectives**
Sound business principles must be applied to all major engineering decisions if the business objectives of a development are to be realized. Currently, in taking these decisions, the consequences on operating expenditures and the effect on the revenue profile are often ignored. If all major engineering decisions can be aligned to business objectives then the value of an investment can be optimized.

— **the definition of common objective criteria that can be used by operators, contractors and vendors and against which, business transactions may be managed and optimized**
Performance contracts which relate only to capital do not necessarily lead to improved business performance. Small increases in initial cost can, if applied in the right place, result in significant reductions in operating expenditures and/or increased revenue. Standard life-cycle costing methodologies will facilitate the development of performance contracts based on business parameters that will lead to real increases in value and benefit for all.

— **reduction of the risk of operating expenditure surprise**
When new assets are being considered and there is little information on likely operating expenditures, it is important to apply methodologies which enable high operating expenditure elements to be identified at an early stage. In such cases, operating expenditures are often underestimated and therefore real business risks exist in not achieving the required rates of return. Life-cycle costing methodologies demand that support costs of major packages are quantified on a systematic basis to reduce these risks. The methodologies would enable the industry to identify, optimize and acquire the needed support in a timely and cost-effective manner.

— **changing the criteria for option selection**
Traditionally decisions were taken on options using criteria such as best available technology or lowest price and this did not necessarily lead to maximum value for the asset. Life-cycle costing provides criteria for selection which can be directly linked to increased asset value and hence improved profitability over the asset life cycle.

— **maximization of the value of current operating experience**
Actual operating experience is a valuable resource that can be used to evaluate options for new assets and improve the performance of existing assets. This experience is only valid if it is judged against the required operating context. Equipment or configuration options that were of value when capacity utilization was high are often not of value in smaller assets, or when capacity utilization profiles decline. All operators have a wide range of equipment and configuration options. Data on actual performance, collected using modern maintenance management, are of real value when options need to be compared.

— **the provision of a framework within which to compare options at all stages of development**
When comparing options for one process function it is important to consider the effect of that decision on other process functions. A planned approach within an overall framework is vital if the best combination of options is to be achieved. Previous experience shows that life-cycle costing studies were being carried out too late, often in isolation with a variable quality output. The standard identifies planning needs and resource requirements to ensure studies are carried out at the right time, to the right depth and within planned resource budgets and targets.

— **the provision of a mechanism by which major cost drivers can be identified, targeted and reduced**
Life-cycle costing methodologies identify in a systematic way all major cost elements of an investment. Having identified the cost drivers, a sensitivity analysis can be carried out to establish critical areas where improvement will lead to increased cost effectiveness. These critical areas become targets for research and development, technology transfer and a focus for management effort.

This part of ISO 15663 is based on the principles defined in IEC 300-3-3.