



Designation: E2453 – 19

# Standard Practice for Estimating the Life-Cycle Cost of Ownership of Property Assets<sup>1</sup>

This standard is issued under the fixed designation E2453; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## INTRODUCTION

The purpose of this practice is to establish organizational processes to achieve on high-value property assets the outcome of reliable reporting of the life-cycle cost of property assets for good decision-making purposes. Historically, and frequently, the financial and property management communities have considered the “cost” of an item or group of items to be the acquisition value or historical cost of the item(s). Unfortunately, when only acquisition cost is considered rather than an estimated life-cycle cost of ownership, users may find other operating costs were not considered and a new item may be too expensive or inconvenient to use. If operating cost is substantially less, management may take the opportunity to plan and make further operational adjustments. Better asset management decisions are made when estimated life-cycle costs are considered along with the acquisition cost. However, for the purpose of this practice on life-cycle costing (LCC), one should consider that in addition to the initial procurement costs, there are myriad costs (actual or estimated) required to support, maintain, operate, and dispose of the item(s). This practice on LCC provides an accepted methodology for calculating and summing those costs and provides a true total cost of ownership that helps management make more informed and better acquisitions decisions.

## 1. Scope

1.1 This practice covers the establishment of a process consensus model for determining the life-cycle cost (LCC) of property assets owned or used by an entity.

1.1.1 For businesses, these property assets are required to seek to achieve financial returns from producing and selling goods or services, or both.

1.1.2 For institutions and agencies, these property assets are required to accomplish their primary mission.

1.2 Real and personal property assets may include capital (fixed) assets and movable assets including customer-supplied assets, rental/leased assets, contract/project direct-purchased assets, or expense items.

1.3 Asset service lives can be divided into three distinct stages, each with several separate yet interrelated substages: acquisition, utilization, and disposition. These primary stages

are not intended to be all-encompassing but are offered as the basis for establishing LCC.

1.4 This practice is expected to be primarily used for considering the life-cycle cost of personal property, however, the concept can and should be used for various types of assets including personal, real, tangible, and intangible.

1.5 This practice does not supersede applicable generally accepted accounting principles but is intended to be consistent with the accounting principles particularly in the area of internal controls (see the GAO Green Book) and processes and requirements for estimating. Some life-cycle cost estimating may be required for accounting purposes. (See AS 2501.)

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and to determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E53 on Asset Management and is the direct responsibility of Subcommittee E53.03 on Financial Management.

Current edition approved May 1, 2019. Published June 2019. Originally approved in 2005. Last previous edition approved in 2013 as E2453–13. DOI: 10.1520/E2453–19.

*Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

**E2135** Terminology for Property and Asset Management  
**E2279** Practice for Establishing the Guiding Principles of Property Asset Management

### 2.2 Other Documents:

**ASC 410** Asset Retirement and Environmental Obligation<sup>3</sup>  
**AS 2501** Auditing Accounting Estimates<sup>4</sup>  
**GAO-14-704G** Standards for Internal Control in the Federal Government (the “Green Book”), 2014<sup>5</sup>  
**ISO 55000** Asset management -- Overview, principles and terminology<sup>6</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 *asset*—the term for accounting purposes is generally defined in an organization’s policy based on applicable accounting standards. The term for asset management purpose should also be defined in an organization’s policy and may include the ISO 55000 definition of an asset: item, thing, or entity that has potential or actual value to an organization.

3.1.1.1 *Discussion*—Value can be tangible or intangible, financial or nonfinancial, and includes consideration of risks and liabilities. It can be positive or negative at different stages of the asset life.

3.1.1.2 *Discussion*—Physical assets usually refer to equipment, inventory, and properties owned by the organization. Physical assets are the opposite of intangible assets, which are nonphysical assets such as leases, brands, digital assets, use rights, licenses, intellectual property rights, reputation, or agreements.

3.1.1.3 *Discussion*—A grouping of assets referred to as an asset system could also be considered as an asset.

3.1.1.4 *Discussion*—Asset management generally supports the accounting arena in which the accounting rules apply. Asset management may operate and use the broader definition of asset management that may not only impact financial accounting reporting but also other organizational objectives and commitments. Company management, who has the responsibility to establish adequate internal controls, should identify in

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

<sup>3</sup> Available from Financial Accounting Standards Board (FASB), 401 Merritt 7, P.O. Box 5116, Norwalk, Connecticut 06856-5116, <https://www.fasb.org>.

<sup>4</sup> Available from the Public Company Accounting Oversight Board (PCAOB), 1666 K Street, NW, Washington, DC 20006-2803, <https://pcaobus.org>.

<sup>5</sup> Available from U.S. Government Accountability Office (GAO), 441 G St., NW, Washington, DC 20548, <http://www.gao.gov>. The GAO Green Book is based upon Committee of Sponsoring Organizations of the Treadway Commission, Internal Control - Integrated Framework (New York: American Institute of Certified Public Accountants, 2013).

<sup>6</sup> Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

procedures and use in processes and practices the appropriate uses of the term “asset.”

3.1.2 *life-cycle cost (LCC)*, *n*—the sum of all known material costs associated with an item or group of items and these costs include not only the acquisition value, but also activities related to an item from acquisition through utilization and disposition. Sometimes referred to as TCO (see 3.1.4). **E2135**

3.1.3 *personal property*, *n*—tangible property other than land;<sup>7</sup> in law, the tangible, movable property of an individual, exclusive of land and including items such as automotive vehicles, boats, and money.

3.1.3.1 *Discussion*—Software (intellectual property) is considered personal property.

3.1.4 *total cost of ownership (TCO)*, *n*—analogous to LCC; for clarity and consistency, this practice will use LCC exclusively.

## 4. Summary of Practice

4.1 For decision-making purposes, this practice provides for complete accountability and financial control of assets by separating the three major life-cycle stages into more comprehensive substages and then associating those stages and substages with the effort and costs.

4.2 Entities adhering to this practice will establish a demonstrable and consistent methodology to ascertain the LCC for individual assets or groups of assets. Elements of the methodology will consider, at a minimum, those factors described in this practice.

4.3 The costs, now identified, can be tracked and analyzed, leading to a more comprehensive understanding of how assets can be more effectively and efficiently used, especially from a cost standpoint.

## 5. Significance and Use

5.1 For agencies and institutions, measuring and managing the LCC of ownership of property may directly result in improved accountability, in the form of cost savings, increased asset utilization, extended asset life, and increased mission effectiveness.

5.2 For companies, measuring and managing the LCC of ownership of property may directly result in cost savings, increased asset utilization, and, therefore, improved profit margins.

5.3 Including LCC in the three stages is consistent with Practice **E2279** under the reporting principle.

## 6. Associated Costs

6.1 Associated costs can be broken down into three distinct stages:

6.1.1 *Acquisition*—Budgetary/planning—concept, feasibility, studies, funding, lease/buy, make/buy, and so forth, and site acquisition, construction, design, purchase, receipt, and so forth;

<sup>7</sup> Definition from *Encarta World English Dictionary* (North American Edition), Microsoft Corp., 2004.