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International Energy Agency
Technology Collaboration Programme on Energy Storage
(ES TCP)

Task 41

Evaluating the Economics of Energy Storage Systems – EcoEneSto



Executive Summary

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LIST OF ABBREVIATIONS

CapEx	Capital Expenditure
ESG	Environmental, Social, Governance
GHG	Greenhouse Gas
IRR	Internal Rate of Return
KPI	Key Performance Indicator
LCC	Life Cycle Costs
LCOS	Levelised Cost of Storage
NPV	Net Present Value
O&M	Operation & Maintenance
OpEx	Operational Expenditure
ROA	Real option analysis
ROI	Return on Investment
TES	Thermal Energy Storage

KEY MESSAGES AND POLICY RECOMMENDATIONS

KEY MESSAGES

- **Energy storage economics are inherently application-specific:** meaningful economic evaluation is only possible when storage technologies are assessed within clearly defined applications, including required power, energy capacity, duration, cycling frequency, and system context.
- **There is no universally “cheapest” or “best” storage technology:** cross-technology cost comparisons without reference to application lead to misleading conclusions and should be avoided in scientific and policy analysis.
- **The economic value of energy storage lies in the services provided, not in stored energy itself:** revenues are primarily generated through discharge-related services (e.g. grid balancing, peak supply, flexibility), while stored energy is rarely remunerated.
- **Cycle frequency is a key driver of profitability:** short-term, high-cycling applications favour more expensive but high-performance technologies, whereas long-duration or seasonal storage requires very low specific storage capacity costs.
- **Revenue stacking is often essential for viable business cases:** single-use applications are frequently insufficient to recover investment costs under current market conditions.
- **Standardised KPIs enable transparency and comparability:** harmonised technical, economic, environmental, and social KPIs are necessary for robust evaluation and informed decision-making.
- **Regulatory and market frameworks critically shape economic outcomes:** many technically beneficial storage applications remain uneconomic due to missing or inadequate remuneration mechanisms caused by regulations.

POLICY RECOMMENDATIONS

- **Mandate application-based evaluation of energy storage:** Require that policy assessments, funding schemes, and regulatory impact analyses evaluate energy storage systems in specific use cases rather than at technology level.
- **Enable and reward flexibility services across all energy sectors:** Design markets and tariffs that explicitly remunerate flexibility, balancing, reserve provision, and congestion relief in electricity, heating/cooling, and hydrogen systems.
- **Facilitate revenue stacking:** Remove regulatory barriers that prevent energy storage from providing multiple services simultaneously or across markets, and harmonise market participation rules.
- **Recognise long-duration and seasonal storage as system infrastructure:** Develop dedicated support mechanisms for long-term storage where societal value (e.g. security of supply, decarbonisation) exceeds short-term market revenues.

- **Adopt harmonised KPI frameworks in policy and planning:** Integrate standardised economic, environmental, and social KPIs into permitting, funding, and strategic energy system planning processes.
- **Align regulation with learning and innovation dynamics:** Support early deployment of emerging storage technologies to accelerate learning effects while avoiding lock-in to suboptimal solutions.
- **Ensure technology-neutral but application-sensitive policy design:** Avoid prescriptive technology mandates; instead, define performance- and service-based criteria that allow different storage solutions to compete fairly.
- **Strengthen data transparency and case study dissemination:** Support open databases and standardised reporting of techno-economic performance from real-world storage projects to improve model accuracy and comparability.
- **Integrate energy storage into long-term energy transition strategies:** Explicitly account for the role of storage in achieving high renewable shares, sector coupling, and system resilience in national and international energy strategies.

MAIN RESULTS IN A NUTSHELL

Task 41 provides a comprehensive, application-oriented assessment of the economics of energy storage systems across technologies, sectors, and use cases. The main outcome of Task 41 is that the economic viability of energy storage cannot be assessed at the technology level alone, but only within specific applications, where technical requirements, revenue mechanisms, and system context jointly determine value creation.

NO “BEST” STORAGE TECHNOLOGY—ECONOMICS ARE APPLICATION-SPECIFIC

A key finding is that cross-technology cost comparisons are not meaningful without a clearly defined application. Energy storage technologies differ fundamentally in cost structure, power-to-energy ratios, lifetimes, efficiencies, and scalability. Economic evaluation therefore requires matching storage properties (capacity, power, duration, and cycling frequency) to the needs of a concrete use case (e.g. seasonal heat storage, grid balancing, and short-term arbitrage). Only at this level can costs and revenues be consistently compared.

VALUE CREATION DEPENDS ON SERVICES, NOT STORED ENERGY

Energy storage derives its economic value primarily from the services it provides, not from the stored energy itself. Revenues are typically linked to:

- Energy discharge (e.g. peak supply, arbitrage),
- Power-related services (e.g. frequency regulation, reserve provision),
- Avoided system costs (e.g. grid reinforcement, curtailment),
- Resilience and security-of-supply benefits in specific niches.

Stored energy as such is rarely remunerated, except in emergency or backup applications. Consequently, cycle number and utilization rate are decisive for profitability, favouring short-term, high-cycling applications unless very low-cost storage is available.

HARMONISED KPIS ENABLE MULTI-DIMENSIONAL ASSESSMENT

Task 41 establishes a structured KPI framework covering technical, economic, environmental, and social dimensions. Traditional metrics such as LCC, LCOS, NPV, IRR, and payback time are complemented by indicators for environmental impacts (e.g. life-cycle GHG emissions, resource depletion) and social aspects (e.g. acceptance, land use, resilience benefits). This enables a more holistic assessment aligned with energy transition objectives and ESG considerations.

THREE COMPLEMENTARY ECONOMIC EVALUATION APPROACHES

To operationalise application-specific assessment, the Task develops and applies three methodological approaches:

- Benefit–Revenue–Cost approach: Explicitly links technical services to monetisable benefits and identifies non-remunerated benefits due to present regulation gaps.
- Maximum Acceptable Energy Storage Cost: Determines cost thresholds under which storage becomes competitive for a given application.
- 12-step valuation and business model framework: Integrates system definition, stakeholder analysis, and economic evaluation into a structured decision-support process.

Case studies across thermal, electrical, and chemical storage confirm that viable business cases often rely on revenue stacking and favourable regulatory conditions.

The examples presented primarily refer to technologies at higher Technology Readiness Levels (TRLs). Nevertheless, the underlying economic assessment methodologies are also applicable at earlier stages of technology development, provided that the greater uncertainty in technical and economic input parameters is appropriately taken into account.

POLICY AND MARKET DESIGN ARE DECISIVE

Finally, the Task highlights that regulatory frameworks strongly influence storage economics, often determining whether technical benefits can be translated into revenues. Clear market access, remuneration for flexibility and system services, and recognition of long-duration storage remain critical enablers for large-scale deployment.

EXECUTIVE SUMMARY

1 Short Description of Task 41

1.1 Objectives and Scope

The main goal of the Task was to evaluate the economic efficiency of energy storage systems on a theoretical basis using scientific methods. Within the Task, a coordinated evaluation of energy storage in all applications relevant to the energy system (centralised/decentralised storage; all sectors: electricity, heating/cooling, and mobility) was carried out. All storage technologies (electrical, thermal, and chemical) were considered.

The Task aimed to contribute to a better understanding of how a certain value is created from a certain benefit of an energy storage technology or system and how this can be translated into a business case in a systematic way.

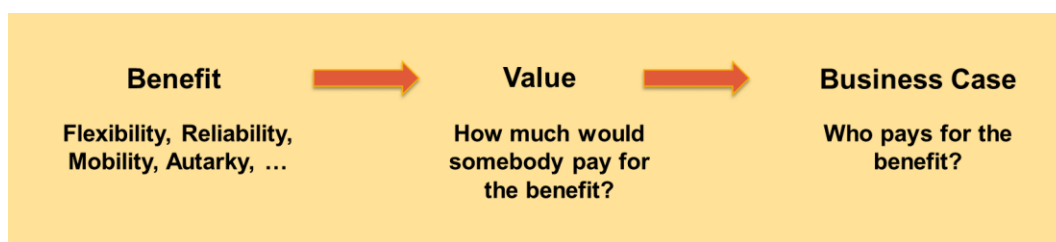


Figure 1-1: Benefits, value, and business case of energy storage systems.

The key objectives of the Task were:

- Collection of methods to evaluate the economic viability of energy storage systems for specific applications (e.g. the maximum acceptable storage costs approach)
- Definition of key performance indicators (KPIs) to evaluate the economics of energy storage
- Inventory of economically interesting energy storage configurations and deriving preferable conditions for energy storage operation in actual applications (technical and non-technical)
- Identification of difficult cases in which existing benefits of energy storage solutions cannot be transferred into possible business cases
- Comparison of energy storage configurations to solutions with other flexibility measures and to systems without energy storage
- Analysis of the influence of regulatory framework conditions on possible energy storage business cases by listing specific examples
- Establish a framework for the development of business cases for energy storage

The Task covered the following:

- All energy storage technologies: electrical, thermal, chemical
- All relevant energy storage applications in the energy system
 - Centralised, decentralised
 - All sectors: electricity, heating/cooling and mobility

Through an international approach, a wide variety of approaches for different energy systems were integrated. In parallel, to identify possible business cases, economically promising storage configurations were collected by the experts. An interdisciplinary approach (technical and economic background) was achieved by integrating relevant expertise from the participating countries.

1.2 Organisational Structure

The work of the Task was split into 4 Subtasks.

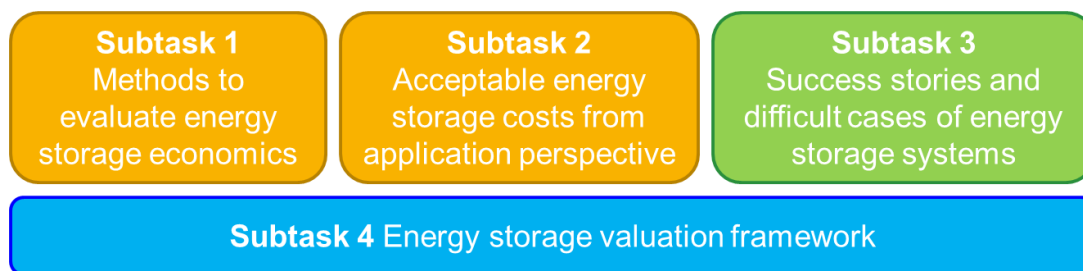


Figure 1-2: EcoEneSto Subtask structure.

Subtask 1 focused on calculation methods to evaluate energy storage economics. In Subtask 2, one specific method to evaluate energy storage economics was further developed. Economically successful energy storage implementations and difficult cases without a viable business model were collected in Subtask 3. Bringing the results from Subtasks 1 to 3 together, Subtask 4 was to establish an energy storage valuation framework.

The Subtask Managers were:

- Subtask 1: Justin Chiu, KTH, Sweden
- Subtask 2: Christoph Rathgeber, ZAE, Germany
- Subtask 3: Jianhua Fan, DTU, Denmark
- Subtask 4: Joris Koornneef, TNO, The Netherlands

For the structure of the final report, the authors have decided not to present the results of Task 41 in order of the four Subtasks. Instead, they first provide an introduction to the topic of energy storage and the costs of energy storage systems, followed by a chapter on the economic, technical, and social KPIs of energy storage systems. The three methods developed in Task 41 for evaluating the economic efficiency of energy storage systems are then presented in separate chapters.

1.3 Duration of Task

Task 41 had a duration of three years. It started on 1 July 2022 and ended on 30 June 2025.

1.4 Experts Meetings

Table 1-1 gives an overview of the expert meetings in this Task.

Table 1-1: Details about the date and location of each expert meeting.

City	Country	Date	# of Participants
Berlin	Germany	14-16 September 2022	30
Linz	Austria	10-12 May 2023	27
Utrecht	Netherlands	27-29 September 2023	47*
Copenhagen	Denmark	20-22 March 2024	32 + (40)*
Stockholm	Sweden	2-4 October 2024	52*
Lucerne	Switzerland	7-9 May 2025	33

*As part of the experts meetings in Utrecht, Copenhagen and Stockholm an industry workshop was held with national companies and institutions on the first day of the meeting with a broader group of participants.

1.5 Participation

14 countries have declared their interest in participating in the Task at the 90th ExCo meeting (online) in November 2020. During the experts meetings overall 109 people from 16 countries and 63 different organizations from both research facilities and companies participated in Task 41. Industry workshops as part of the experts meeting attracted more participation from the energy storage industry.

Table 1-2: List of participating institutions per country.

Country	Institution
Austria	AEE INTEC, Energieinstitut Linz, FIB, FH Wels
Canada	CanmetENERGY
China	Tsinghua University
Denmark	DTU, PlanEnergi, Aalborg CSP, Copenhagen Infrastructure Partners CIP, Hyme, Energienet, EWII, Heliac
France	INSA Lyon
Germany	BP Europa SE, BVES, Christ&Company Consulting GmbH, DIAS, DLR, Malta Hochtemperatur Wärmepumpen Stromspeicher GmbH, EDF Renewables Storage Deutschland GmbH, Fraunhofer Institute for Solar Energy Systems ISE, MAN Energy Solutions, Projektträger Jülich, Rubitherm Technologies GmbH, ZAE Bayern, KIT, Kraftblock GmbH, Otto-von-Guericke-Universität
Italy	Ricerca sul Sistema Energetico - RSE S.p.A.
Japan	University of Tokyo

Country	Institution
Norway	Cartesian, SINTEF Energy Research
The Netherlands	CE Delft, Corre Energy, Dr Ten, EBN, Eneco, Ennatuurlijk Aardwamte, GIGA Storage, Greenport West-Holland, Newton Energy Solutions, Recoy, RVO, TNO, Trecodome, Utrecht University
Sweden	Alfa Laval, KTH Royal Institute of Technology, Flower SE, Polestar, Southernlights, Vattenfall, Wind Energy Expert
Switzerland	HSLU
United Kingdom	Business Lift, Imperial College London, University of Birmingham, SSE Thermal, Swansea University
United States of America	Fluence Energy

2 Summary of the Final Report

2.1 Economic Properties of Energy Storage Technologies

The first chapter of the final report provides the conceptual foundation for evaluating energy storage economics by linking technology properties, service provision, and application-specific value creation. While the chapter begins with a general classification of storage technologies (electrical, thermal, chemical) and their cost characteristics, its core contribution lies in formalizing how economic value arises from storage and why meaningful evaluation is only possible within clearly defined applications.

It is a central principle: The economic value of energy storage is derived from the services it provides, not from the act of storing energy itself. In energy systems with high shares of variable renewables, storage primarily delivers value by enabling temporal decoupling of supply and demand, thereby supporting system balance across electricity, heat, and fuel vectors.

Energy storage systems are characterised by two fundamental technical parameters—energy capacity (how much energy can be stored) and power capacity (how fast energy can be charged or discharged). The relative importance of these parameters is application-dependent. Long-duration applications such as seasonal heat storage are dominated by energy capacity requirements, whereas short-duration applications such as grid stabilization or fast charging infrastructure are power-dominated. This distinction has direct economic implications, as energy-related and power-related cost components scale differently across technologies.

The chapter further distinguishes between benefits, value, and business cases. Benefits describe the technical or system-level contribution of storage (e.g. flexibility, reliability, autonomy). Value emerges only when these benefits are associated with a willingness to pay by identifiable actors. A viable

business case exists only if this value can be monetised through market mechanisms or contractual arrangements.

Importantly, the three operational stages of storage—charging, storing, and discharging—do not contribute equally to revenue generation. In most applications, revenues are generated during discharging, when energy or power services are delivered. In some cases, charging can also be remunerated (e.g. absorbing excess renewable generation or providing negative balancing power), but such revenues are typically uncertain and insufficiently predictable to support investment decisions. The stored energy itself is generally not paid for, except in “back-up” applications such as emergency supply or uninterruptible power systems.

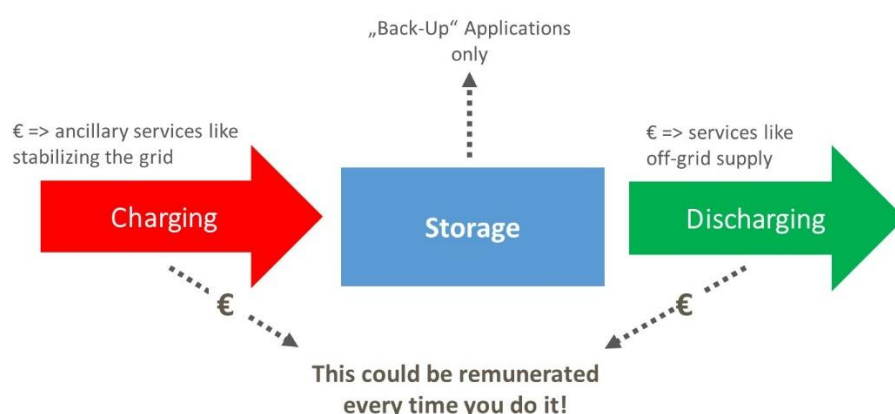


Figure 2-1: Metrics of return on invest i in the case of energys storage systems.

A key quantitative driver identified in this section is the number of charge–discharge cycles over time. Because revenues are usually earned per cycle, high-utilization, short-term storage applications can tolerate higher specific investment costs, whereas long-term or seasonal storage with low cycling frequency requires extremely low storage capacity costs to achieve acceptable returns.

It is a decisive methodological conclusion: Economic evaluation of energy storage is only meaningful in the context of a specific application. Generic statements about the cost-effectiveness or competitiveness of storage technologies are inherently misleading because storage technologies differ fundamentally in their cost structures, performance characteristics, and operational constraints.

For any valid economic assessment, both sides of the equation must be specified: On the cost side, the characteristics of the storage technology (investment cost, efficiency, lifetime, degradation, operational costs). On the revenue side, the application-defined requirements, including required energy capacity, power, duration, cycle frequency, and the remuneration mechanisms for delivered services.

Only when these parameters are jointly defined can costs and revenues be consistently compared. This leads to the rejection of technology-level rankings and supports an application-driven matching of storage technologies to system needs.

2.2 Key Performance Indicators for Energy Storage Economics

Recognizing the diversity of storage technologies and applications, the need for consistent methodologies and indicators that enable transparent comparison while respecting application-specific requirements was addressed.

A central outcome is the systematic identification and structuring of key performance indicators (KPIs) across four dimensions: technical, economic, environmental, and social. Technical KPIs (e.g. energy and power capacity, efficiency, lifetime, response time) were defined as essential input parameters for any economic evaluation. Economic KPIs such as life-cycle cost (LCC), levelised cost of storage (LCOS), net present value (NPV), internal rate of return (IRR), payback time, and return on investment (ROI) were reviewed and contextualised with respect to different storage applications and stakeholder perspectives.

As an example, the economic KPIs are summarised in the following Table 2-1.

Table 2-1: Common economic KPIs of energy storage systems.

Economic KPI	Unit	Description
Investment cost / Capital expenditure (CapEx)	€	The upfront amount invested to design, build and commission the facility
Life cycle cost (LCC)	€	Total cost over the system's full lifetime
Levelised cost of storage	€/kWh	Lifetime cost per unit of energy discharged
Installed power capacity cost	€/kW	Cost per unit of discharge power
Installed storage capacity cost	€/kWh	Cost per unit of installed energy storage capacity
CapEx per storage volume	€/m ³ & €/m ²	The investment cost per unit space or area, for thermal energy storage and other space-sensitive technology
Revenue	€	Total income and/or cost savings brought by the energy storage
Payback (PB) time	Years	Time needed to recover the investment via revenue or cost savings
Net present value (NPV)	€	The value of the energy storage cash flow is the sum of the present value of all the future cash flows that the storage will generate
Internal rate of return (IRR)	%	A discount rate where NPV equals to zero
Return on investment (ROI)	%	Ratio of net gain to total cost
Operational & maintenance (O&M) costs / Operational expenditure (OpEx)	€/year or €/cycle	Recurrent costs to keep the system functional, including inspections, repairs, and replacement

Beyond traditional financial metrics, the importance of environmental and social KPIs, including life-cycle greenhouse gas emissions, resource depletion, safety, public acceptance, and contribution to system resilience was emphasised. This broader KPI framework reflects the growing relevance of ESG criteria and system-level impacts in energy system decision-making.

Established economic evaluation methods, including discounted cash flow analysis, LCOS methodologies, and real options analysis (ROA), were also reviewed and compared. Particular attention was paid to the limitations of static methods under conditions of uncertainty, highlighting ROA as a valuable complement for capturing the economic value of flexibility, staged investments, and adaptive decision-making.

Overall, this chapter provides the conceptual and methodological foundation of Task 41. It demonstrates that robust economic assessment of energy storage requires a multidimensional KPI framework and application-specific modelling, forming the basis for the more applied approaches developed in the subsequent chapters.

Social KPIs were not a primary focus of Task 41, which concentrated mainly on the technical and economic performance of energy storage systems. This focus reflects the objective of the Task to assess storage technologies using quantifiable parameters directly related to system performance, costs, and economic viability. Social KPIs are generally more context-dependent and require different assessment approaches. Nevertheless, they can complement technical and economic KPIs when evaluating energy storage systems from a broader sustainability perspective.

2.3 Benefit-Revenue-Cost Approach

The Benefit-Revenue-Cost approach is introduced as a structured method to assess whether the system-level benefits of an energy storage system can be translated into realised revenues and compared against system costs. The approach explicitly distinguishes between benefits (theoretical system value), revenues (monetisable income streams), and costs (investment and operation), thereby addressing a common gap in storage valuation studies.

The method proceeds in three steps. First, all potential benefits provided by the storage system are identified and revenues quantified where possible. These include avoided generation costs, avoided grid reinforcement, flexibility provision, reliability improvements, and resilience benefits. Second, the subset of benefits that can actually be captured as revenues under existing market and regulatory conditions is determined. Importantly, revenues may accrue to different actors than the storage owner, highlighting misalignments between system value and private profitability. Third, these revenues are compared against the full cost structure of the storage system to assess economic viability.

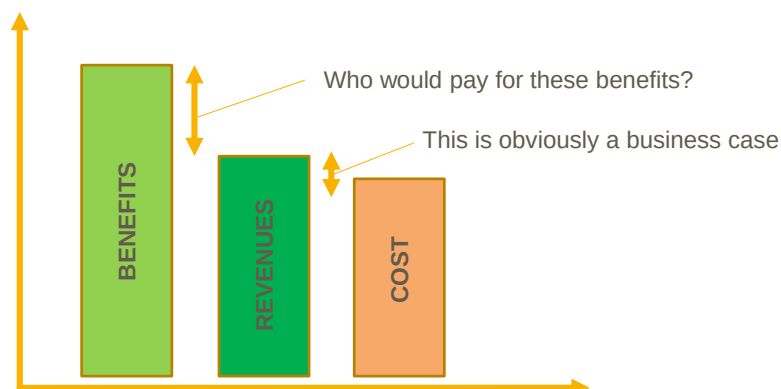


Figure 2-2: Benefit-Revenue-Cost approach developed in Task 41 – illustration for a promising business case.

A key insight of the Benefit-Revenue-Cost approach is that a storage system can be beneficial but not profitable, or profitable for one actor while delivering uncompensated benefits to others. The explicit comparison between benefits and revenues reveals where market failures or regulatory barriers prevent value capture. This makes the approach particularly useful for identifying policy gaps and designing remuneration mechanisms for flexibility services.

The chapter illustrates the methodology using realistic application examples, including power-to-cold storage in refrigeration and mobile thermochemical storage. These examples demonstrate how revenue stacking can improve viability, but also show that single-service business models are often insufficient.

From a technical perspective, the Benefit-Revenue-Cost approach is best suited for system-oriented analysis, early-stage feasibility assessment, and policy evaluation. It does not optimise technology design but instead clarifies who benefits, who pays, and where value leakage occurs. As such, it complements cost-threshold methods (cf. section 2.4) and detailed project valuation frameworks (cf. section 2.5).

2.4 Maximum Acceptable Energy Storage Cost Approach

The Maximum Acceptable Energy Storage Cost approach is a practical method for assessing the economic feasibility of energy storage in specific applications. Rather than asking whether a given storage technology is profitable at its current cost, the approach determines the maximum cost level at which a storage solution becomes economically viable under defined technical, operational, and market conditions.

The approach combines a top-down and a bottom-up perspective. The top-down view derives acceptable storage costs from system-level benefits and avoided costs (e.g. fuel savings, avoided grid investments, flexibility value), while the bottom-up view considers techno-economic characteristics of the storage system, including investment and operating costs.

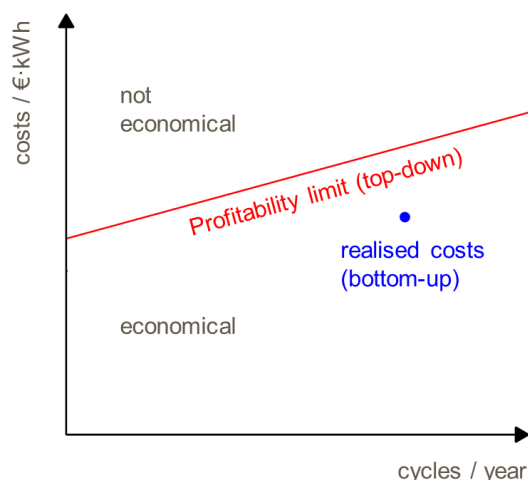


Figure 2-3: Top-down and bottom-up analysis of maximum acceptable energy storage costs.

A key outcome was the extension of the original methodology into three complementary variants: a reference-oriented version, an extended reference-oriented version, and a revenue-oriented version. These variants allow the method to be adapted to different data availability levels, application types, and stakeholder questions. To support practical implementation, an Excel-based tool was developed, enabling transparent and reproducible calculations.

The approach was applied to a broad set of real-world energy storage cases covering thermal, electrical, and chemical storage, as well as short-term and long-term applications. The evaluation revealed that economically successful projects are typically characterised by one or more of the following factors: high utilization rates, access to multiple revenue streams, integration into existing infrastructure (e.g. district heating networks), or operation under favourable regulatory frameworks. In contrast, cases without viable business models often suffer from low cycling frequencies, missing remuneration for system services, or regulatory barriers preventing revenue stacking.

An important finding is that technical feasibility does not imply economic viability. Several storage solutions provide clear system benefits—such as integration of renewable energies or grid stability—but cannot currently translate these benefits into sufficient revenues. This gap highlights the importance of appropriate market design and policy intervention.

2.5 12-Step Approach for Business Model Development

The 12-Step approach is proposed as a comprehensive energy storage valuation and business model development framework. It guides stakeholders from system definition to economic evaluation and business model formulation.

VALUE CREATION & BUSINESS MODEL FRAMEWORK

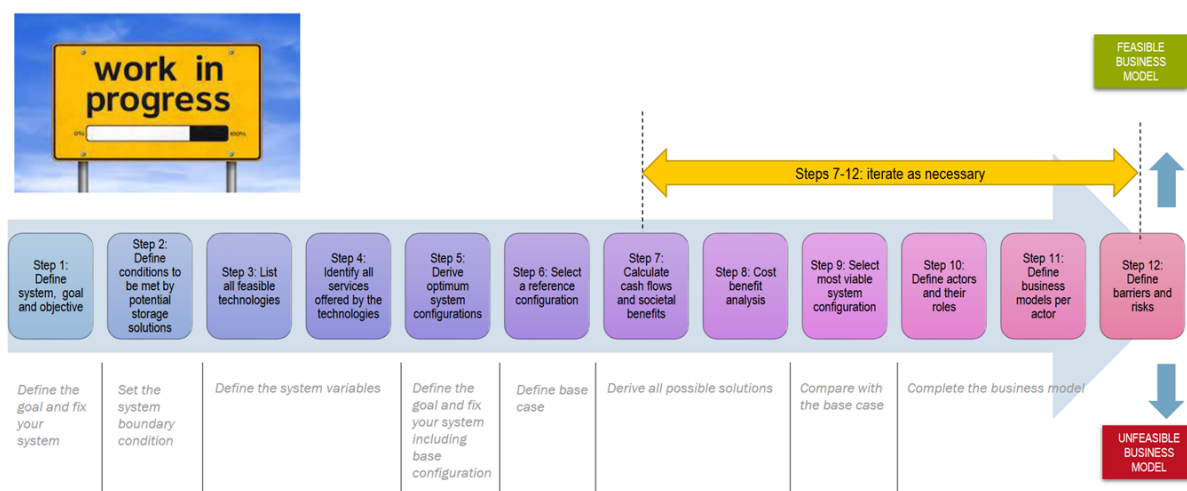


Figure 2-4: Value Creation and Business model framework.

The framework is divided into two main phases. Steps 1–6 focus on system definition and technical design, including application context, required storage services, technology selection, and operational characteristics. Steps 7–12 address economic evaluation, stakeholder analysis, revenue mechanisms, and business model development, integrating financial metrics with regulatory and market considerations.

A key contribution of this approach to the overall Task results is the explicit linkage between technical services, economic value, and paying actors. By systematically identifying who benefits from specific storage services and how these benefits can be monetised, the framework helps bridge the gap between system-level value and project-level business cases.

The framework is technology-neutral and applicable across energy sectors, including electricity, heating and cooling, hydrogen, and industrial applications. It explicitly incorporates uncertainty, regulatory constraints, and the potential for revenue stacking, reflecting the complexity of real-world deployment conditions.

The 12-Step approach demonstrates that successful energy storage deployment requires more than favourable technology costs. Viable business models emerge only when technical design, economic evaluation, and institutional context are aligned. The framework therefore serves as a practical guide for policymakers, system planners, and project developers aiming to translate the benefits of energy storage into bankable projects.

3 Comprehensive Results and Recommendations for Deployment

To assess the economic efficiency of energy storage systems, three methods were developed (further) in Task 41, which differ in their perspective and complexity.

The first method (A) compares the potential benefits and achievable revenues of an energy storage system with its costs (cf. Figure 2-2). The benefits are calculated as the monetary value of all services that could theoretically be offered with this storage system. The revenues correspond to the total realised income from the operation of the storage system. It is possible that the revenues accrue to different actors. By comparing benefits, revenues and costs, it is possible to conclude to what extent a particular energy storage system can be operated economically for certain players or could theoretically be operated economically. The comparison between benefits and revenues shows whether and which benefits could be monetised in addition to the revenues already realised.

The second calculation method (B) considers the maximum acceptable energy storage costs for different applications and users (cf. Figure 2-3). The economic assessment is based on the assumption that the cost of energy from storage must not exceed the cost of alternative energy supply. Using the annuity method, this results in the requirement that the annual costs for the storage investment must not exceed the annual savings in reference energy costs (*top-down* approach). The parameters of the tool are the interest rate on the investment, the target payback period, the reference energy costs and the annual number of cycles; these are compared with the investment costs of the storage facility and the storage capacity, from which the realised storage capacity costs can be calculated (*bottom-up* approach). The methodology was developed in collaboration with companies. Three different approaches are available. Two of the approaches are particularly suitable when the main purpose of the energy storage system is to supply a certain amount of energy and thus reduce the use of alternative energy sources. The third approach is particularly advantageous when considering different sources of income, i.e. when the implementation of a storage system in an application brings several advantages and resulting revenues. An Excel tool has been developed to apply the three approaches and published on the ES TCP website.

The third method (C) comprises twelve steps and evaluates the economic efficiency of energy storage systems holistically and in detail (cf. Figure 2-4). Based on the analysis of the specific application conditions, a techno-economic comparison of potentially usable energy storage technologies is carried out. The relevant players are then defined and their respective business models calculated. If the choice of technologies and players does not result in an economically viable concept, the corresponding steps are repeated and concept variants are examined.