UNRAVELING THE MYTH OF BANKABILITY FOR GREEN HYDROGEN PROJECT FINANCING

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Abstract

The term “bankability” has become a prominent topic within the hydrogen community. However, it is often used as a buzzword and is subject to misinterpretation. Drawing on insights from the PV solar industry, this article reviews the literature on bankability and examines its implications for hydrogen projects.

In project finance, bankability encompasses financial viability, risk mitigation, regulatory alignment, and stakeholder collaboration to ensure predictable cash flows, strong risk management, and compliance with industry standards. This paper finds that bankability in the PV solar industry functions as a self-organised, industry-driven management system. However, unlike structured systems such as defect-avoidance in the automotive sector, flight safety in aviation, and health protection in food production, bankability fosters trust in project financing by aligning stakeholders on cash flow derisking – despite the absence of centralised regulation.

To enhance clarity, facilitate investment, and ultimately unlock financing for green hydrogen projects, the paper proposes establishing a Stakeholder Dialogue aimed at developing a Bankability Seal, a standardised framework designed to align hydrogen projects with financial institution requirements and ensure greater access to funding.

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Executive Summary

The concept of bankability has gained traction within the hydrogen sector yet remains inconsistently applied. While often used as a buzzword, bankability is crucial for securing funding in renewable energy projects, particularly green hydrogen, where financing is a key barrier to scale. This paper explores its definition, evolution, and strategic importance, drawing lessons from the photovoltaic (PV) solar industry, which successfully navigated similar challenges in its early stages.

Bankability extends beyond financial assessments – it is a multi-dimensional concept involving proactive risk management, project structuring, regulatory alignment, and stakeholder engagement. In project finance, it refers to a project's ability to secure funding based on its potential to generate stable returns while mitigating risks. From a financial institution's perspective, a bankable project must have predictable cash flows, strong risk management strategies, and a stable regulatory environment. Developers, system integrators, component suppliers and service providers all play distinct roles in ensuring quality assurance, technological reliability, and compliance with financial and industry standards.

Lessons from the PV solar industry provide insights into actively managing bankability. During the 2007–2008 financial crisis, credit markets tightened, yet PV projects with strong financial models, risk mitigation measures, and regulatory support continued to secure funding, proving bankability as a practical financing tool. Similarly, for hydrogen to scale, structured risk assessment frameworks, clear policy mechanisms, and reliable off-take agreements are essential.

This paper proposes developing a standardized Bankability Management System to streamline risk assessment and financing for hydrogen projects. It includes a Bankability Stakeholder Dialogue, a collaborative platform for financial institutions, policymakers, and project developers to define investment criteria, and a Bankability Seal, a standardized certification ensuring projects meet financial institution requirements.

Achieving widespread bankability in hydrogen can be accelerated through this structured system, aligning financial, technical, and regulatory considerations while adapting best practices from other industries. By establishing clear risk assessment frameworks, standardized evaluation criteria, and stakeholder collaboration, this paper outlines a systematic approach to de-risk investments, enhance investor confidence, and drive large-scale hydrogen deployment, ultimately accelerating the global energy transition.

Introduction

The emergence of the hydrogen economy

The rapid expansion of renewable energy sources (RES), particularly wind and solar, has significantly transformed the global energy landscape. These technologies have become central to efforts aimed at mitigating climate change and reducing reliance on fossil fuels. However, critical challenges remain in effectively integrating these intermittent energy sources into existing energy infrastructures. Bottlenecks, such as inadequate grid interconnections and limited energy storage capacity, frequently lead to energy curtailment during periods of surplus generation (IEA, 2023). Also, energy imports from regions with lower renewable energy production costs can efficiently support hard-to-abate sectors, including heavy industries and long-distance transport, which depend on alternatives to solely renewable power solutions (IEA, 2021). Addressing these challenges is crucial for ensuring the reliability and efficiency of renewable energy systems.

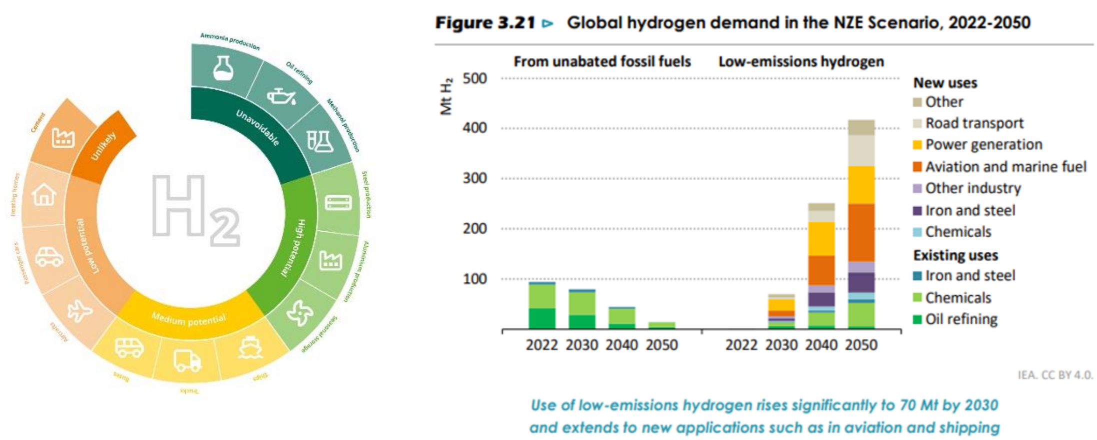

Figure 1: Sectors likely to move towards low-emission hydrogen consuming technologies (left, DEKRA, 2024). Resulting demand to replace fossil fuel hydrogen and to decarbonize hard-to-abate sectors (right, IEA, 2023).

Hydrogen and Power-to-X (PtX) technologies have emerged as promising solutions to overcome these integration challenges and advance toward a more sustainable energy system. Hydrogen and its derivatives offer exceptional versatility as feedstock, energy carriers, and fuels, making them ideal for decarbonizing hard-to-abate sectors. Additionally, they serve as an efficient solution for storing excess renewable energy, enhancing grid stability (IRENA, 2022). Low-emission hydrogen produced with electrolysers using renewable power – commonly referred to as green hydrogen – has the potential to significantly reduce greenhouse gas emissions, drive technological innovation, and create new economic opportunities (IEA, 2022).

Global hydrogen production currently amounts to approximately 100 million tons per year, primarily used as feedstock in fossil fuel refining, ammonia production, and methanol synthesis within the chemical industry (IEA, 2023). However, only about 1% of this hydrogen is produced using low-emission methods, while the vast majority comes from processing fossil fuels. This fossil-based hydrogen production generates nearly 1 billion tons of CO_2 emissions annually, accounting for over 2% of global greenhouse gas emissions (IPCC, 2023). Achieving sustainability in hydrogen production requires a fundamental shift toward renewable, low-emission methods, a transition strongly advocated by international energy policy frameworks (IEA, 2022; IRENA, 2022).

Meeting the ambitious Net Zero Emission (NZE) targets set forth by the International Energy Agency (IEA) and the 2015 COP Paris Agreement will necessitate a dramatic increase in green hydrogen production. By 2050, an estimated 400 million tons of low-emission hydrogen per year will be required to meet these targets (IEA, 2023). Addressing existing barriers and accelerating the deployment of green hydrogen and PtX technologies is therefore essential for achieving global climate goals and ensuring a sustainable energy future.

Investment needs for hydrogen projects

Achieving the ambitious goal of transitioning to low-emission hydrogen production requires substantial investment. The Hydrogen Council estimates that USD 514 billion in investments are planned to produce 48 million tons of clean hydrogen annually by 2030. This, however, falls short of the 64 million tons of low-emission hydrogen demand outlined in the NZE scenario for 2030. Currently, for the production of low-emission hydrogen only USD 38 billion in investments have been firmly committed by investors and banks—representing 7% of the total announced investment volume. Despite this, it marks a significant multi-fold increase compared to commitments made just two to three years ago. (Hydrogen Insights, 2024).

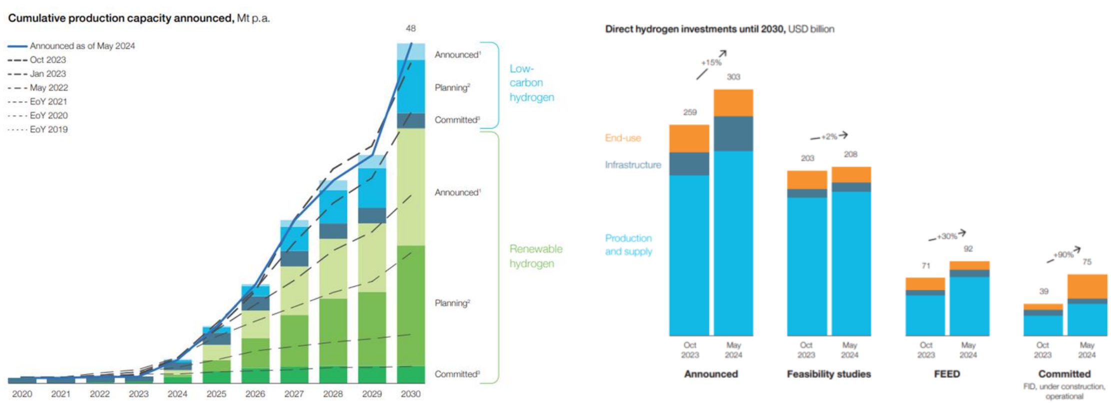

Figure 2: Today, projects for the production of 48 tons of clean hydrogen (sum of blue low carbon and green renewable hydrogen, per anno) in 2030 are at least announced (left, Hydrogen Insights, 2024). As of May 2024, for the production and supply of clean hydrogen only USD 38 billion in investments have been firmly committed by investors and banks – representing 7% of the total announced investment volume of USD 514 billion (right, Hydrogen Insights, 2024).

Given the nascent state of the hydrogen market and its uncertain future development, first movers may be reluctant to make Final Investment Decisions (FIDs). This reluctance is pertinent as the hydrogen market, while promising, requires substantial financial commitments to install the necessary production capacity. To meet the growing demand for green hydrogen, investment in infrastructure such as electrolysis facilities, hydrogen transportation, and storage is necessary. Moreover, supportive government policies, tax incentives, and risk-sharing mechanisms will play a pivotal role in attracting capital from both public and private investors. Addressing these financial gaps is crucial for scaling up hydrogen production and integrating it into the global energy system. In fact, recent government focus on integrating hydrogen into energy strategies has helped to build confidence in low-emission hydrogen production business cases and contributed to the maturation of the industries' project pipeline.

Bankability to unlock financing

Achieving the necessary financing for Power-to-X (PtX) projects – industrial processes that convert electrons to molecules, ideally from renewable sources, into hydrogen, ammonia, methanol, or hydrocarbon fuels – requires coordinated efforts from governments, industries, and financial institutions. While government incentives and supportive legislative frameworks are critical for mobilizing private capital, these alone are insufficient for funding large-scale projects.

The increasing demand for funding of PtX projects recently has led to a revival of the discussion about bankability (Butzengeiger, 2023; Craen, 2023; Hunt, 2024). Lessons from the photovoltaic (PV) solar industry, where myths and meanings around bankability have been scrutinised, provide valuable insights for the emerging hydrogen sector. In this publication, we suggest that these lessons can guide the adaptation of existing practices to suit the specific requirements of hydrogen projects, ensuring their financial and operational feasibility in a competitive market.

A historical parallel can be drawn with the nascent PV industry throughout the 2007-2008 financial crisis (Flink, 2011-2013). In the financial crisis, credit markets dried up, and banks became more cautious about lending. Despite tightened credit markets, PV projects with strong bankability – characterized by solid financial models and risk mitigation strategies – secured funding and sustained growth. Key to this success were regulatory frameworks like Germany's feed-in tariff (FIT), which improved bankability and made renewable energy investments more attractive. However, PV projects with strong bankability - characterised by solid financial projections, reliable off-take agreements, and comprehensive risk management plans - were able to secure financing even in a difficult economic climate. Their perceived lower risk and higher likelihood of stable returns made them particularly attractive to cautious investors and lenders. This was because these projects were perceived as lower risk and more likely to deliver stable returns.

As a result, the PV industry not only weathered the crisis, but experienced sustained growth, highlighting the resilience and immense potential of renewable energy investment (Fraunhofer ISE, 2024).

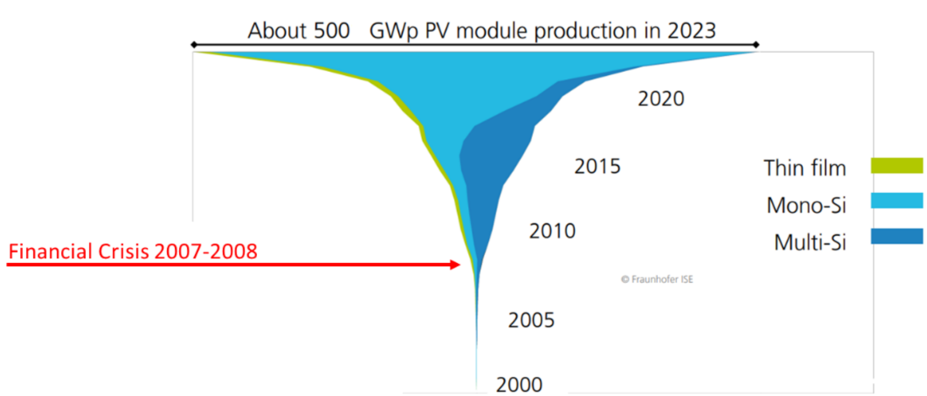

Figure 3: Success story of the photovoltaic industry overcoming the financial crisis in 2007-2008 (Fraunhofer ISE, 2024).

Central is the concept of bankability, which plays a pivotal role in unlocking financing by actively managing project risks. Bankability ensures projects are attractive to investors and banks by emphasizing robust risk management, reliable off-take agreements, and demonstrated financial viability. In doing so, it generates trust in the broader sector, informs policymakers, and attracts additional capital to similar projects. This coordinated approach is indispensable for scaling hydrogen production and meeting sustainability goals.

The objective of this publication

This paper aims to provide a comprehensive review of the concept of bankability in the renewable energy sector and its specific application to hydrogen projects. Drawing lessons from the photovoltaic (PV) solar industry, it explores the historical evolution of bankability, its foundational principles, and its impact on stakeholder engagement and project success. The paper focuses on key areas such as risk assessment, stakeholder dynamics, and proactive bankability management, aiming to demystify the concept and highlight its vital role in building investor confidence and enhancing project viability in the hydrogen sector.

The conceptualisation of bankability in the PV solar industry as a self-organised system – mirroring established management frameworks in industries such as automotive, aviation, and food safety – provides a strategic foundation for developing a bankability system for green hydrogen production. This review serves as a foundation for future initiatives, including the development of the Bankability Stakeholder Dialogue at Hydrogen Europe, a platform designed to gather actionable insights from market participants, and the creation of a Bankability Seal, a standardised framework aligning hydrogen projects with financial institution requirements.

Together, these components address financial, technical, and regulatory barriers, fostering a structured approach to enhancing investment confidence. By establishing this foundation, the paper contributes to scaling hydrogen projects and accelerating the renewable energy transition.

The Term Bankability

First appearance of the term "bankability"

The use of the term "bankable" has been part of the English lexicon since the early 19th century (Ngram, 2024). Initially, however, it referred to something that was acceptable for processing by a bank, such as "bankable cheques or money orders". This usage emphasized that something was dependable or reliable (Collins, 2024).

In the 19th century, cheques became a widely accepted, standardised means of payment, particularly in the United States. The development of banking institutions and the establishment of formal cheque clearing systems contributed to their recognition. Their popularity peaked in the 20th century, when they became the most widely used non-cash means of payment. However, with the advent of electronic payment methods, the use of cheques declined significantly in the early 21st century (accountinginsights.org, 2024).

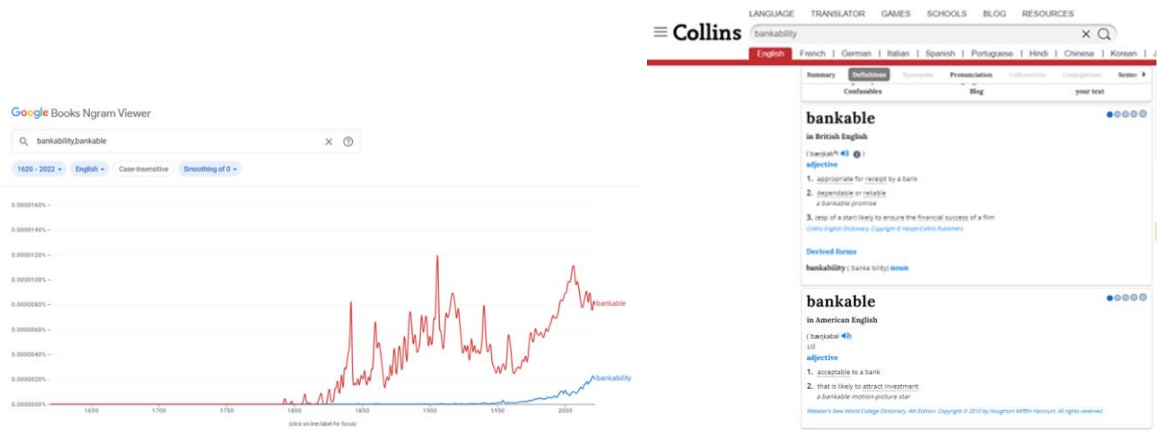

Figure 4: The appearance of the term "bankability" and "bankable" in the English language (Ngram, 2024; Collins, 2024).

Evolution of "bankability" in the entertainment industry

Then with the rise of Hollywood in the late 20th century, the term bankability expanded to the entertainment industry. Here, however, **"**bankable**"** referred to the commercial viability of a film script, often determined by the involvement of "bankable stars." These stars were actors whose names alone could ensure a film's financial success. (Wikipedia, 2024; 24/7wallst.com, 2024).

Producers enhance the bankability of scripts by attaching bankable actor**s** or bankable directors who have a proven track record of box office success. This reassures investors and financiers about the project's potential profitability, aids in marketing and promotion due to the actor's built-in fan base and helps secure favorable distribution deals. By leveraging the star power of these actors, producers can reduce financial risks and make the film more attractive to both investors and audiences, ultimately boosting the financial viability and marketability of the project (Monaco, 1979).

Emergence of "bankability" in project financing

Only the early 21st centuries saw the introduction of "bankability" as a distinct term in project financing. In the aftermath of the 2007–2008 financial crisis and the following Basel III regulatory framework, financial institutes needed to recondition their lending criteria and the assessment process for project finance became stricter. Banks naturally chose to focus on projects of outstanding quality and as a result the bankability of projects, project components, and stakeholders received increasing attention.

Figure 5: Meanings ranged from "pure philosophy" to a concept that needs to be taken seriously (Flink, 2011).

A study in 2011 titled "The Myth of Bankability: Definition and Management in the Context of Photovoltaic Project Financing in Germany" marks the first study dedicated to a comprehensive understanding of bankability. Based on the analysis of 20 in-depth expert interviews with equity investors, project developers, service providers, component manufacturers, and banks, the authors found that project stakeholders did not share a common understanding of what bankability actually is or why one should address it. Meanings ranged from “pure philosophy” to a concept that needs to be taken seriously and actively managed on strategic and operational levels.

Bankability holds different interpretations and impacts for the various stakeholders. In conclusion, the authors introduce a pivotal concept of bankability as a pro-active, multi-risk-dimensional and multi-stakeholder concept that underpins the success of project financing, by evaluating its potential to generate adequate returns to cover its depth services (Flink 2011-2014). This paper will explore this concept further.

The concept of bankability

Bankability, a gateway to project financing

The concept of bankability is utterly connected to the theory of project financing (Cambridge, 2007; Finnerty, 2013; Baker, 2014, Baker, 2022), hence, to limited or non-recourse financed projects, where the liabilities of a project are confined to a Special Purpose Vehicle (SPV). An SPV is a legal entity distinct from its parent company, with its own assets and liabilities, ensuring that creditors cannot claim the parent company's assets in case of default. This structure allows companies to manage financial risks effectively, safeguarding their core assets while undertaking large-scale projects. Banks, in turn, assume significant risks by providing non-recourse loans and rely on the project's capacity to generate sufficient cash flow to meet annual fees and repayment obligations. Bankability, thereby, describes the rigorous assessment of cash flow expectations, combined with pro-active due diligence and comprehensive stakeholder management, as it becomes critical to mitigating default risks and securing lender’s confidence (Flink, 2011-b).

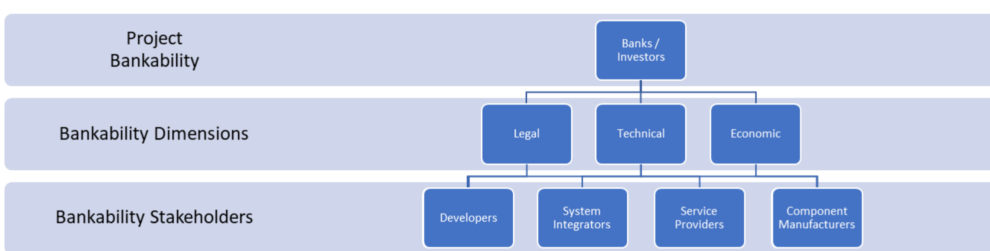

Figure 6: Risk Dimensions and Stakeholders contributing to a project’s bankability (Flink, 2011-b).

Bankability is often misinterpreted as merely a project's access to collateral or its position in the marketplace. However, this narrow view overlooks its broader significance as a thorough risk assessment and pro-active risk mitigation process. True bankability assessment begins only after securing essential elements like off-take agreements, which guarantee predictable revenue, a crucial aspect of financial viability. Projects that lack these components or operate in unstable regulatory environments are often deemed non-bankable due to increased risk. While collateral can enhance a project's attractiveness to lenders, it is not the defining factor. When collateral fully secures financing, lenders typically prioritize the sponsor's creditworthiness over a detailed evaluation of the project's risks and feasibility.

Project risk dimensions

A robust and systematic risk analysis is essential for achieving bankability in project finance. Bankability reflects a project's ability to secure financing and hinges on addressing i.a. financial, technical, operational, regulatory, market, macroeconomic and political risks.

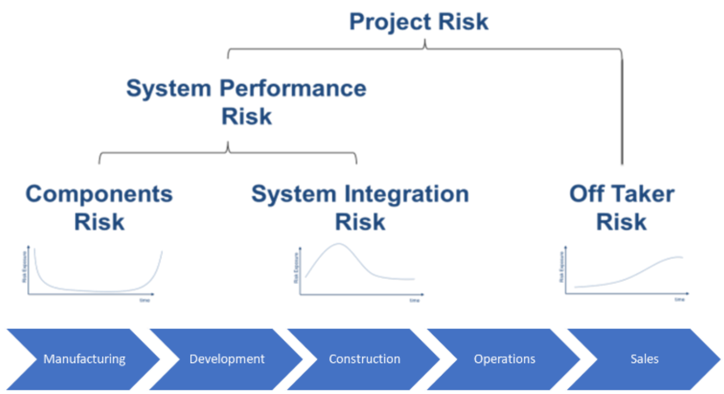

Figure 7: Generalized Risk Structure of a Project analysing System-Performance and Off-Taker Risks, as well as Component and System Integration Risks (Flink, 2013).

Key considerations include off-taker risks, such as the stability of revenue agreements and macroeconomic factors, system integration risks spanning development to operations, and component performance risks tied to quality, reliability, and supplier stability. By establishing a generalized risk analysis framework, projects can be evaluated consistently across sectors, ensuring that they meet the financial and operational expectations of lenders and stakeholders (Flink, 2013).

From a financial institution's perspective, risk mitigation is paramount. Banks prioritize projects demonstrating stable cash flows, operational sustainability, and comprehensive strategies for managing legal and technical risks. Stakeholders like developers, system integrators, service providers or component manufacturers, who emphasize bankability not only secure financing but also build investor trust and contribute to market credibility. This strategic focus is particularly important in competitive renewable energy markets, where bankability serves as both a benchmark for viability and a differentiator for stakeholders. Ultimately, the integration of quality assurance and risk mitigation ensures long-term project sustainability and strengthens the renewable energy sector’s growth and reliability.

Proactive management of bankability

The concept of bankability yet extends beyond due diligence processes or financial metrics to include qualitative and sometimes challenging-to-measure criteria that influence a project's attractiveness to lenders and investors. The term has evolved to signify the integration of cash flow perspectives with a holistic project evaluation framework. Components, stakeholders, and the overall project must meet predefined criteria to achieve "bankable" status, making them viable for financing. This emphasis on understanding and actively managing the core quality criteria of bankability is essential as project developers face increasing margin pressures (Flink, 2011).

Managing bankability is an ongoing, multidimensional process akin to quality management. It requires proactive strategies to align stakeholder interests and adapt to evolving market conditions. Active bankability management involves implementing measures such as performance guarantees, insurance, and stress testing of cash flow models to reduce uncertainties. Building strong relationships with banks, investors, and regulators through transparent communication and collaboration is also critical. Ensuring that all technical components meet established standards and performance benchmarks, supported by certifications and long-term warranties, is essential. Developing a strong track record and brand reputation instils confidence among stakeholders. Partnerships with established constructors or agreements with leading manufacturer can significantly enhance bankability.

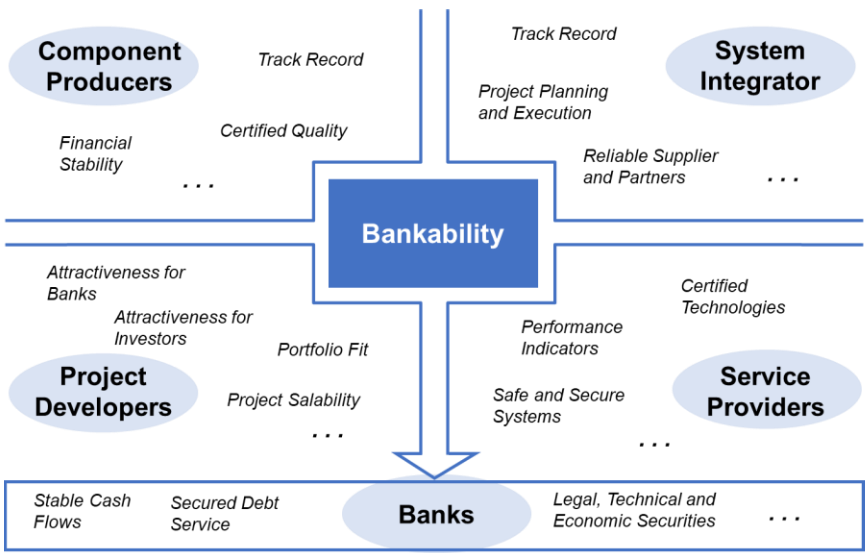

Figure 8: Active Management of Stakeholder's Bankability Requirements (Flink, 2011).

Moreover, managing bankability requires a tailored approach specific to each stakeholder's role. For banks, it involves rigorous risk assessments to reduce credit exposure, while equity investors prioritise stable returns. Project developers focus on selecting reliable components, construction partners, and ensuring financial stability. Suppliers of components and system integrators, like EPC (Engineering, Procurement and Construction) services emphasise operational excellence and building trust. Service providers, such as auditors and certification bodies, play a crucial role in mitigating risks and enhancing project credibility. Together, these priorities create a dynamic interplay that defines the bankability of a project (Flink, 2011).

Stakeholders Perspective

Banks and financial institutions seek predictable cash flows to ensure repayment

Ultimately from a bank’s perspective, bankability refers to criteria – independently defined by individual institutions – to assess trust in debt repayment and secure returns. At its core, this trust relies on predictable and stable cash flows throughout the financing period.

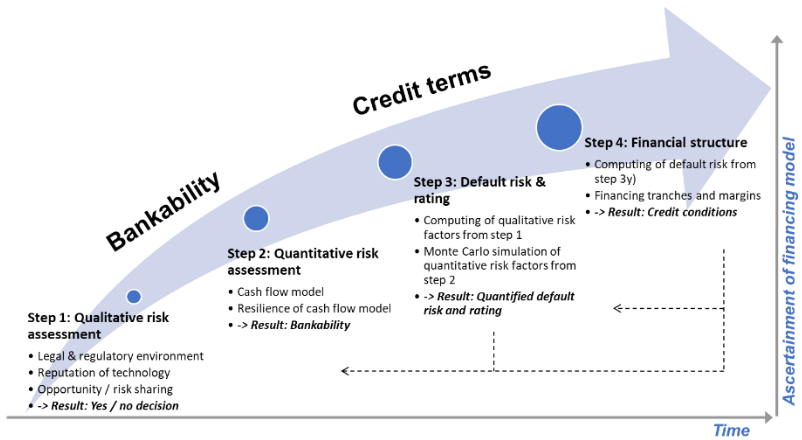

Figure 9: Banks’ Assessment of Project Financing and the Role of Bankability (Flink, 2013).

Banks assess project financing by evaluating both qualitative and quantitative factors to determine the project's bankability. They review project documentation, financial metrics, risk assessments, and legal compliance while considering the project sponsor's track record, management team's competence, strategic alignment, and environmental and social impacts. Key financial metrics include cost estimates, revenue projections, debt service coverage ratio (DSCR), and net present value (NPV). Additionally, banks ensure technical compatibility, data consistency, security, and cost management through rigorous assessments. Loan security mechanisms such as collateral guarantees, insurance-backed financing, and structured repayment plans influence their decision-making. By combining these factors, banks determine the project's bankability and its potential for successful financing.

Investors rely on assessment data from other stakeholders

Investors are typically attracted to mature projects with low risks, such as those in late-stage construction, turnkey projects, or operational projects from the secondary market, while some focus on early-stage projects depending on their risk appetite and business model. Banks require a certain equity ratio, which needs to be provided by project initiators or third parties like project developers, utility companies, institutional investors, or private investors.

Equity investors, acting as "secondary analysts," rely on data from banks and other stakeholders to evaluate factors like track record and financial strength of partners, technology performance, cash flow predictability, resale potential, tax benefits, and local legal reliability. Risk-return trade-offs and sensitivity analyses of market fluctuations are critical to their investment strategies. They also strive for long-term partnerships with project developers, system integrators, contractors, and banks, leveraging these relationships to lower transaction costs and foster global deal flows as investment patterns have become increasingly international.

Developers are the architects of bankable projects

Project developers adopt diverse business models based on their position in the value chain and level of integration. Some cover all stages, from module wholesale to EPC (Engineering, Procurement and Construction) and O&M (Operation and Maintenance), while others focus solely on technical development as general contractors. Integrated models include project financing, with developers creating turnkey projects to sell to investors, sometimes acting as temporary equity investors using their own funds, bank credit lines, or partnerships.

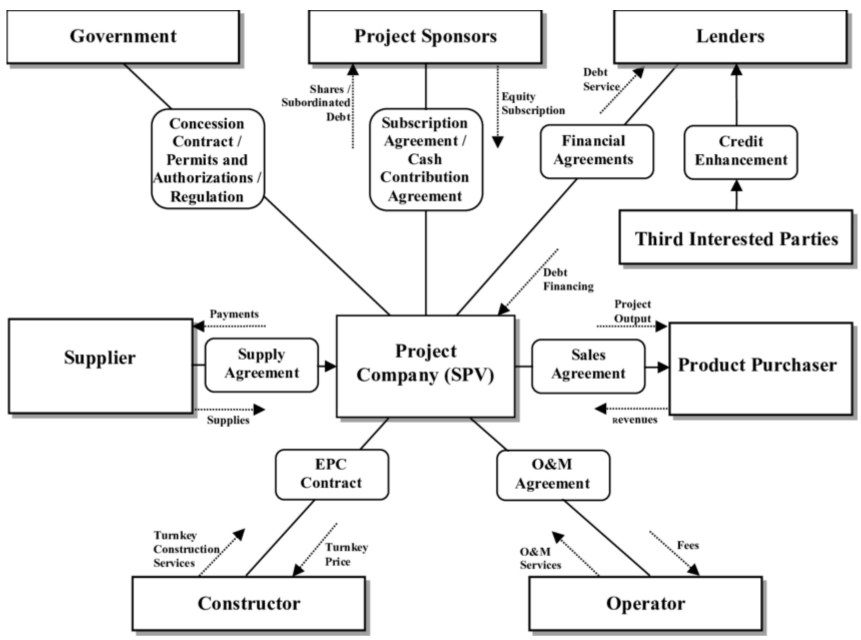

Figure 10: Project developers are the architects of project financing: the selection of stakeholders and their interactions set up the foundation for bankability (Pinto, 2017).

Developers play a crucial role in designing the bankability of a project. They initiate and drive the project from concept to completion, ensuring that every aspect is meticulously planned and executed. By identifying viable projects, conducting thorough feasibility studies, and structuring robust project frameworks, developers lay the foundations for a project's success. Their ability to secure initial funding, navigate regulatory landscapes, permitting processes, and environmental impact assessments, then align the project with strategic objectives is critical in demonstrating its bankability. Essentially, developers act as the bridge between the project's inception and its financial backing, making them indispensable in the process of securing financing by proving the project's potential and viability.

System integrators are transforming vision into bankability

During the construction phase of a project, financial outlays increase significantly as funds are allocated to materials, labour, and logistics, yet this stage is fraught with uncertainties that persist until the project becomes fully operational. Technical challenges, regulatory compliance issues, and unforeseen site conditions can lead to delays and cost overruns, jeopardizing financial stability. This creates a critical gap in investor and lender confidence, as the project's long-term viability remains unproven until it successfully transitions into the operational phase. System integrators, particularly EPC (Engineering, Procurement and Construction) companies, play a crucial role in mitigating these risks by managing the entire construction lifecycle, ensuring that projects adhere to technical, regulatory, and financial requirements.

A reliable EPC company enhances a project's bankability by delivering on time, budget, and quality commitments, which are essential for investor trust. By providing performance guarantees and warranties, system integrators reduce financial risk and improve project attractiveness to lenders. Their ability to execute comprehensive project management, conduct risk assessments, and maintain transparent stakeholder communication ensures alignment with investor expectations. Additionally, their proven track record and financial stability position them as trusted partners in managing the complexities and uncertainties of large-scale infrastructure projects. With a single point of responsibility, EPC companies streamline project execution, improve financing prospects, and ultimately facilitate the successful realization of bankable projects.

Component suppliers see bankability as a strategic choice

As the backbone of renewable energy projects, technology providers must balance technical innovation, operational excellence, and social responsibility to ensure project bankability and support the growth of a sustainable industry. Their role extends beyond simply supplying components; they must embed quality, safety, and performance into every aspect of their operations while maintaining a customer-centric approach throughout the project lifecycle.

Successful component suppliers view bankability as a strategic imperative that extends across their entire organization, recognising that it goes beyond product quality to encompass long-term credibility and trust with investors and financial institutions. Components are deemed bankable when they demonstrate a proven track record and meet stringent international standards, but this cannot be achieved through certifications alone. Instead, it requires continuous investment in innovation, rigorous testing, and alignment with industry benchmarks, along with third-party validation and compliance with regulatory standards. By adhering to these principles, component suppliers instil confidence in investors, strengthen their market position, and enhance the overall bankability of renewable energy projects.

Bankability is particularly critical for high-investment projects, where long-term warranties and performance guarantees are necessary to minimize financial risk and assure product longevity. However, manufacturers must also demonstrate financial stability and commercial strength to reassure investors of their ability to honour these commitments over time. Beyond product quality, robust technical support and after-sales service further enhance a supplier's credibility, ensuring prompt issue resolution and reducing opportunity costs associated with component failures.

Additionally, corporate governance and ESG (Environmental, Social and Governance) practices are becoming increasingly important in determining bankability, as investors prioritize ethical business practices, sustainability, and fair labour treatment. By integrating these principles, technology providers strengthen their credibility, attract investment, and contribute to the long-term success of the energy transition.

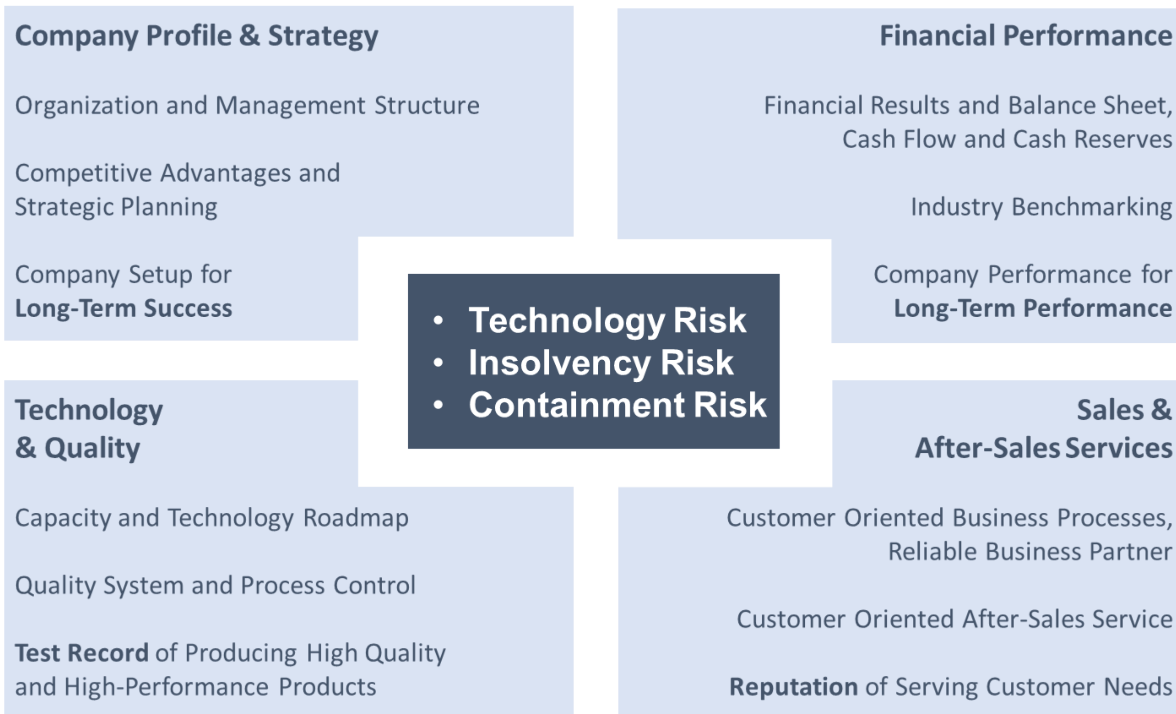

Figure 11: Bankability checklist for young component supplier to support long-term warranties (Flink, 2014).

Service providers elevate bankability and unlock investments

Service providers, such as Testing, Inspection, and Certification (TIC) companies, play a pivotal role in enhancing the bankability of projects. By ensuring compliance with regulatory and industry standards through rigorous testing and inspection processes, TIC companies reduce technical risks and improve project quality, thereby gaining the confidence of financiers. Their certification services add a significant level of trustworthiness, as they guarantee adherence to internationally recognized standards. This independent verification, combined with detailed risk mitigation reports, provides a solid foundation of reliability that is essential for attracting investors and securing financing for successful project implementation.

In addition, TIC companies have recognized bankability as a lucrative field for business development, leading to the innovation of tools aimed at enhancing bankability and unlocking investments. Some pioneering TIC companies successfully persuaded investors in PV solar projects to require their certification products from PV solar module suppliers as a prerequisite. By addressing module suppliers in the following, the TIC companies offered access to these bankable projects in exchange for purchasing and passing specific testing and certification packages. Additionally, other TIC companies managed to convince insurance providers to mandate their TIC-services before offering insurance for project components or entire projects. This strategy not only enhanced the credibility and bankability of the projects but also established a valuable business model for TIC companies (Flink, 2014; Flink personal experience)

Policymakers & regulators: The gatekeepers of sustainable progress

Policymakers and regulators play a pivotal role in shaping industries by establishing frameworks that ensure the financial viability of projects, a critical prerequisite for achieving bankability. Through policy incentives, market regulations, and risk mitigation mechanisms, they create an enabling environment that attracts investment, fosters innovation, and facilitates project development. By implementing clear and consistent policies, governments establish the legal and operational foundation necessary for projects to succeed.

One key policy intervention is the provision of subsidies and tax incentives, which enhance the economic feasibility of projects and encourage investment. Additionally, mandates and industry-specific requirements help drive market demand and ensure the adoption of new technologies and practices. Regulations on safety, emissions, and energy trade further impact project viability. Furthermore, streamlined permitting processes help reduce bureaucratic delays and uncertainty, providing developers and investors with greater confidence and clarity.

By balancing market-driven mechanisms with regulatory safeguards, policymakers play an essential role in de-risking investments and enabling the successful implementation of projects across various sectors.

Discussion

From concept to philosophy

Insights from the PV solar industry illustrate that bankability transcends the standard due diligence processes of banks. While risk assessment evaluates broader uncertainties, bankability specifically and proactively aligns project characteristics with the criteria lenders use to justify funding. It involves not just identifying risks but structuring projects – through agreements, technology choices, ownership structures, and engineering practices – to actively mitigate those risks and satisfy financial stakeholders.

Bankability is a collective effort among all project stakeholders, from developers to EPCs and major component suppliers. Their shared focus on project success drives strategies centered on customer needs, transparent communication, product and service quality, and dependable after-sales services. Focusing on reliable performance, this alignment enhances a project's ability to secure financing, benefiting the individual stakeholder, all project’s participants, and, not least, the broader industry. Proven in the PV solar sector, this philosophy must extend to the hydrogen community to unlock essential investments also for this part of the energy transition.

Bankability as a management system

At its core, bankability is a way of thinking following a common purpose akin to defect-avoidance in the automotive industry, flight-safety in aviation, or health-protection in food production. In well-established management systems such as the Automotive Quality Management System (AQMS), the Safety Management System (SMS) for aviation, and the Food Safety Management System (FSMS), the goal is not only to follow defined standards and regulations, but to cultivate a philosophy around them that ensures reliability, trust, and long-term sustainability. The widespread adoption of these structured approaches has driven the commercial success of its industries, and a similar transformation is possible for the energy sector.

Applying classical systems theory to the project financing of PV solar plants, see figure 12, bankability emerges as the core mechanism that governs stakeholder interactions, ensuring project formation, feasibility and success. However, unlike AQMS, SMS, or FSMS – where standards are actively managed by regulatory bodies – bankability in the solar industry functions as a self-organised system. There is no single authority, hierarchy, or legal framework governing it; instead, the need for funding acts as the driving force behind its coordination. Investors, developers, EPC and manufacturers align naturally behind financial institutions to mitigate risks and optimize returns, shaping a dynamic, decentralized system that continuously evolves to meet market demands.

Characteristic	**Automotive**	**Aviation**	**Food Safety**	**Bankability**
Elements / Components	OEMs, suppliers, regulators, quality tools	Airlines, manufacturers, regulators, ICAO	Food processors, suppliers, regulatory agencies	Financial institutions, investors, EPCs, developers, manufacturers, test labs
Relationships / Interactions	Compliance with OEM/customer requirements, supplier audits **(IATS 16949)**	Compliance with aviation authorities, international regulations **(SARP-ICAO)**	Compliance with global food safety standards **(ISO 22000)**	**PV Solar:** Self-alignment by stakeholders **Hydrogen:** Compliance with Hydrogen Bankability Seal
Structure	Hierarchical, with defined processes for quality, safety, and defect prevention	Regulatory framework ensuring operational safety, training, and standardization	Process-based for risk mitigation and food safety	Project-based structure with a focus on cash-flow stability and risk mitigation
Boundary	Defined by automotive industry standards and supply chain requirements	Defined by international aviation agreements and ICAO regulations	Defined by food safety regulations and hazard control	Defined by financial models, project longevity, and reliability standards
Purpose or Function	Ensuring high-quality, defect-free automotive	Guaranteeing global aviation	Ensuring food safety and quality assurance	Ensuring the financial and

	production for safety and performance	safety, security, and efficiency		technical viability of solar projects

Figure 12: The table compares management system frameworks using the key characteristics of a classical system. In contrast to the self-aligned interactions of PV solar bankability systems, compliance with a Hydrogen Bankability Seal is suggested for hydrogen projects.

Designing bankability for hydrogen projects

While hydrogen and PV solar projects both rely on renewable energy, their risk profiles and bankability considerations differ significantly (Butzengeiger, 2023; Craen, 2023). Unlike PV solar, where quality assurance is relatively straightforward (e.g., standardised solar modules), green hydrogen production involves complex electrolysis systems that require rigorous assessments for performance, safety, and integration reliability. Standards such as ISO 22734 govern electrolyser systems, but broader challenges – including technology scalability, infrastructure gaps, and regulatory uncertainty – make bankability for hydrogen projects more complex.

In fact, green hydrogen production plants share risk characteristics with the oil and gas sector, particularly in financing and risk management (Hunt, 2024). Financial institutions accustomed to evaluating refinery projects and fossil fuel operations apply their expertise to hydrogen investments, yet with limited insights from the solar industry. This underscores the need for tailored approaches to address the unique technical, regulatory, and market dynamics of hydrogen projects, ensuring they meet investor expectations.

To actively manage and govern the interactions of hydrogen project stakeholders, a Bankability Seal should be introduced as a standardized certification framework that aligns project risks, financial viability, and regulatory compliance. This seal, governed by a regulatory body or industry consortium, would establish auditable criteria, including technology reliability, financial stability, and long-term commercial viability. By defining clear investment benchmarks, the Bankability Seal would enhance investor confidence, streamline financing, and lower risk perception, making it easier for developers to secure funding. Furthermore, it would align stakeholders, create a common evaluation framework, and accelerate the deployment of bankable hydrogen infrastructure worldwide.

The next steps in developing a hydrogen project bankability system include refining an auditable checklist through industry collaboration, piloting the Bankability Seal on selected projects to test and improve its effectiveness, and engaging stakeholders to ensure alignment across the hydrogen value chain. These actions will create a robust framework to address financial, technical, and regulatory barriers, ultimately fostering investment confidence.

Conclusion

Ensuring bankability in hydrogen projects requires a structured, risk-managed approach that integrates financial viability with technical and regulatory alignment. Investors and financiers seek transparent frameworks that guarantee projects meet rigorous safety, environmental, and operational standards, which is crucial for securing funding and gaining market acceptance. However, the hydrogen sector still faces challenges due to evolving regulations, fragmented certification processes, and the absence of standardized investment criteria. Unlike more mature energy markets, hydrogen infrastructure and Power-to-X (PtX) technologies require greater alignment with international standards, regulatory clarity, and risk mitigation strategies to enhance project credibility and financial confidence.

To achieve bankability, projects must adhere to well-defined scientific, technical, and regulatory principles. This starts with the fundamentals of hydrogen production, storage, and transportation, ensuring a clear understanding of hydrogen behaviour, material risks, and efficiency. Adherence to international standards, such as ISO 22734 for electrolysis and ISO 14687 for hydrogen fuel quality, ensures compatibility across markets, reducing technical uncertainties and fostering investor trust. Regulatory frameworks, such as the Renewable Energy Directive (RED III) and the EU Taxonomy for Sustainable Investments, establish the legal boundaries, funding mechanisms, and compliance requirements necessary for the success of hydrogen projects. These frameworks ensure that hydrogen production meets sustainability criteria, enabling projects to access incentives, financing, and market opportunities while promoting alignment with climate goals. Additionally, they provide guidance on traceability mechanisms, including Guarantees of Origin (GO), Proofs of Sustainability (PoS), and Digital Product Passports (DPP), which enhance transparency, verify renewable hydrogen credentials, and support regulatory compliance across the hydrogen value chain.

Furthermore, adherence to established codes and norms strengthens project credibility by ensuring safety, technical reliability, and regulatory alignment. Compliance with these standards not only reduces liability risks but also enhances investor confidence, facilitates insurance approvals, and promotes workforce and public safety. Together, these elements create a structured, risk-managed approach that is essential for securing financing and scaling the hydrogen economy.

A structured conformity assessment process, involving third-party certifications and manufacturer declarations, further de-risks investments by verifying compliance with technical, safety, and environmental benchmarks. Investors prioritize projects with clear revenue models, secured off-take agreements, and strong regulatory backing, making them more financially viable. A key initiative to integrate these elements is the Bankability Seal for hydrogen projects, which would serve as a certification framework ensuring alignment with financial, technical, and regulatory requirements. By combining standards, risk mitigation strategies, and market acceptance criteria, this systematic approach reduces investment risks, enhances project credibility, and accelerates the development of the hydrogen economy and its role in the global energy transition.

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