

Blockchain Based Hydrogen Market (BBH₂): A Paradigm-Shifting Innovative Solution for Climate-Friendly and Sustainable Structural Change

Authors : Volker Wannack

Abstract : Regional, national, and international strategies focusing on hydrogen (H₂) and blockchain are driving significant advancements in hydrogen and blockchain technology worldwide. These strategies lay the foundation for the groundbreaking "Blockchain Based Hydrogen Market (BBH₂)" project. The primary goal of this project is to develop a functional Blockchain Minimum Viable Product (B-MVP) for the hydrogen market. The B-MVP will leverage blockchain as an enabling technology with a common database and platform, facilitating secure and automated transactions through smart contracts. This innovation will revolutionize logistics, trading, and transactions within the hydrogen market. The B-MVP has transformative potential across various sectors. It benefits renewable energy producers, surplus energy-based hydrogen producers, hydrogen transport and distribution grid operators, and hydrogen consumers. By implementing standardized, automated, and tamper-proof processes, the B-MVP enhances cost efficiency and enables transparent and traceable transactions. Its key objective is to establish the verifiable integrity of climate-friendly "green" hydrogen by tracing its supply chain from renewable energy producers to end users. This emphasis on transparency and accountability promotes economic, ecological, and social sustainability while fostering a secure and transparent market environment. A notable feature of the B-MVP is its cross-border operability, eliminating the need for country-specific data storage and expanding its global applicability. This flexibility not only broadens its reach but also creates opportunities for long-term job creation through the establishment of a dedicated blockchain operating company. By attracting skilled workers and supporting their training, the B-MVP strengthens the workforce in the growing hydrogen sector. Moreover, it drives the emergence of innovative business models that attract additional company establishments and startups and contributes to long-term job creation. For instance, data evaluation can be utilized to develop customized tariffs and provide demand-oriented network capacities to producers and network operators, benefitting redistributors and end customers with tamper-proof pricing options. The B-MVP not only brings technological and economic advancements but also enhances the visibility of national and international standard-setting efforts. Regions implementing the B-MVP become pioneers in climate-friendly, sustainable, and forward-thinking practices, generating interest beyond their geographic boundaries. Additionally, the B-MVP serves as a catalyst for research and development, facilitating knowledge transfer between universities and companies. This collaborative environment fosters scientific progress, aligns with strategic innovation management, and cultivates an innovation culture within the hydrogen market. Through the integration of blockchain and hydrogen technologies, the B-MVP promotes holistic innovation and contributes to a sustainable future in the hydrogen industry. The implementation process involves evaluating and mapping suitable blockchain technology and architecture, developing and implementing the blockchain, smart contracts, and depositing certificates of origin. It also includes creating interfaces to existing systems such as nomination, portfolio management, trading, and billing systems, testing the scalability of the B-MVP to other markets and user groups, developing data formats for process-relevant data exchange, and conducting field studies to validate the B-MVP. BBH₂ is part of the "Technology Offensive Hydrogen" funding call within the research funding of the Federal Ministry of Economics and Climate Protection in the 7th Energy Research Programme of the Federal Government.

Keywords : hydrogen, blockchain, sustainability, innovation, structural change

Conference Title : ICHIEEA 2023 : International Conference on Hydrogen Infrastructure for Energy Engineering Applications

Conference Location : Rome, Italy

Conference Dates : September 11-12, 2023