

# Exploring Energy Efficiency of Blockchain Technology



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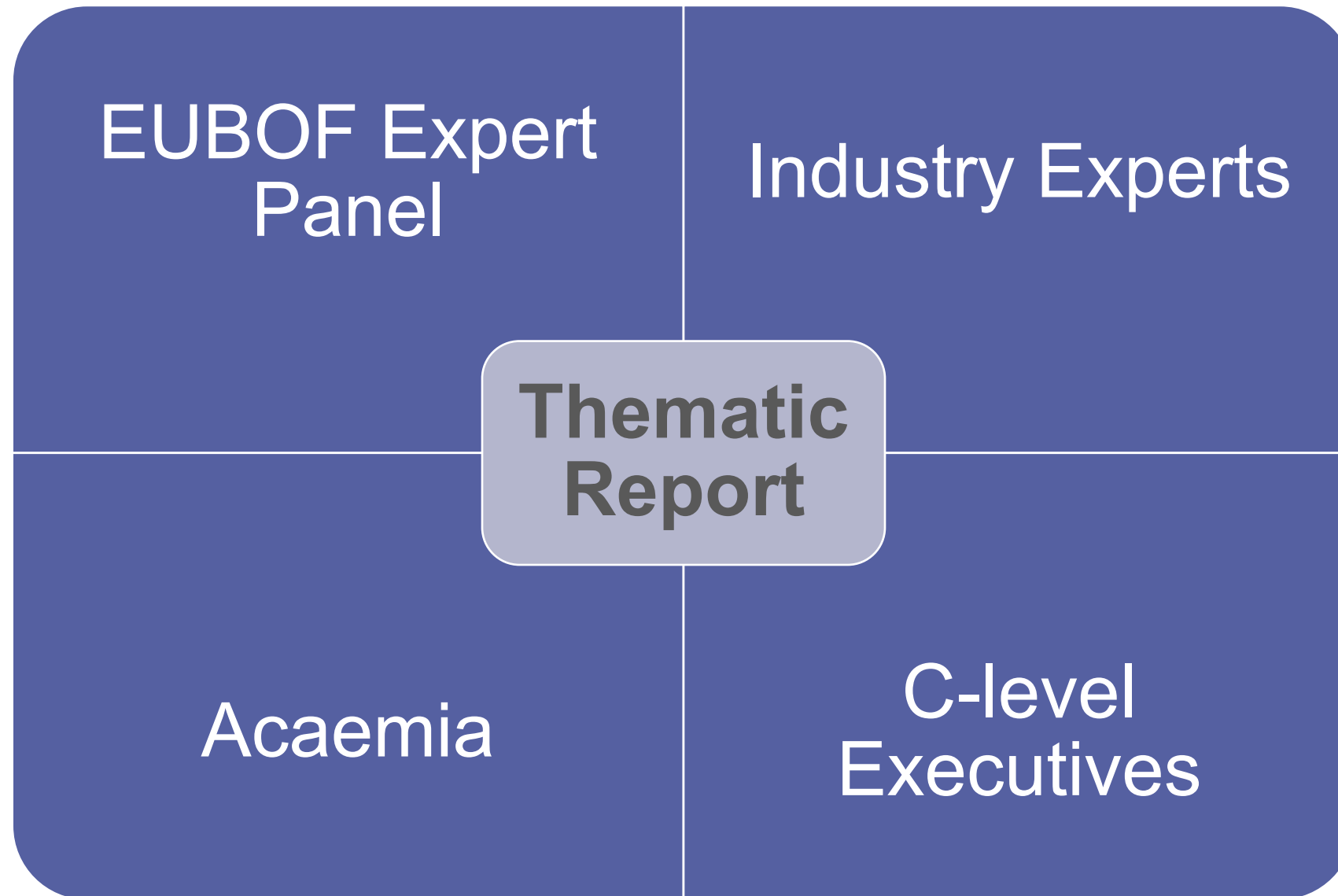
# Thematic Report

## EUBOF: EXPLORING ENERGY EFFICIENCY OF BLOCKCHAIN TECHNOLOGY

a thematic report prepared by  
THE EUROPEAN UNION BLOCKCHAIN  
OBSERVATORY & FORUM





# Thematic Report ToC

- **Chapter 1: Demystifying Consensus Protocols**

- **Overview of Consensus Protocols**

- General presentation of Byzantine Fault Tolerant systems, consensus mechanisms, and blockchain types (public, private, and hybrid).

- **Comparison of Consensus Protocols**

- Comparison of the various consensus protocols such as Proof of Work (PoW), Proof of Stake (PoS), delegated Proof of Stake (dPoS), Proof of Authority (PoA), Byzantine Fault Tolerance (BFT), etc.

# Thematic Report ToC

- **Chapter 2: Cryptocurrency Mining**

- **Overview of Cryptocurrency Mining Industry**

- Overview of the geography where mining operations take place, as well as the size of the industry. Issues related to limitations on local or regional regulation frameworks related to cryptocurrency mining of this industry will also be covered.

- **Energy resources and Cryptocurrency Mining**

- Analysis of the energy resources have been used for mining operations, as well as the profitability of mining operations.

# Thematic Report ToC

- **Chapter 3: Blockchain Energy Consumption Index**

- **Bitcoin Energy Consumption Index**

Overview of the various methodologies for bitcoin energy consumption index.

The bottom-up (techno-economic approach) and top-down (economic approach) methodologies are analyzed. Moreover, two different approaches for the Bitcoin Energy Consumption Index calculation are analyzed:

- the Cambridge Bitcoin Electricity Consumption Index and
    - the Digiconomist Bitcoin Energy Consumption Index.

# Thematic Report ToC

- **Chapter 4: Blockchain Performance**

- **Blockchain Performance Comparison**

Comparison of the various blockchains in terms of validation time, throughput, and energy consumption per transaction. Comparison will also consider the impact of redundancy to energy consumption and the selected blockchain architecture.

- **Comparison of Cryptocurrency Mining Infrastructure**

Comparison of the energy consumption of the cryptocurrency mining infrastructure. Issues related to the categorization of the different types of mining machines according to their performance and their environmental impact (e.g. carbon footprint) will also be analyzed and presented.



# Thematic Report ToC

- **Chapter 5: Scalability and Performance Considerations**

- **Overview of Blockchain Limitations**

- Overview of the challenges faced by various sectors (e.g. fintech, energy, etc.) related to scalability and performance when blockchain technologies are to be used in a commercial setting.

- **Overcoming Scalability and Performance Barriers**

- Approaches to overcome the scalability and performance limitations. This subsection will also present commercial applications of blockchain solutions and the way they handle and resolve the blockchain limitations.



# Thematic Report ToC

- **Chapter 5: Decarbonizing the Blockchain**
  - **The Crypto Climate Accord**
    - Overview of the Crypto Climate Accord initiative

# Thank you!