WORLDMETER.IO AS INTERNET OF THINGS CONCEPT FOR ENERGY DATA INTEROPERABILITY

Ewald Hesse
Grid Singularity GmbH

14. Symposium Energieinnovation 2016 Graz
Energy Market Development

Trends
- Centralized
- Decentralized
- Conventional
- Renewable
- Fixed
- Flexible

Challenges
- Grid instability
  - MW
- Grid congestion
- Volatile markets
  - €

Solutions
- Smart grids
- Intelligent markets

Flexibility

Power-2-Heat | Big Data | Data Privacy & (Cyber-) Security | RES | Virtual Power Plants | DSM
---|---|---|---|---|---
Smart Meter | System Balancing | “Smart Prosumers” | Power-2-Gas | E-Mobility | Smart Grid

Source: E-Control
Choose one!  (you cannot take two)

Source: Cisco
Choose one! (you cannot take two)
Choose one! (you cannot take two)

★ will everybody choose the ONE?
★ can I easily change if not?
★ they have all my data?
★ that probably costs hell…
★ what is my business model?

Source: Cisco
Choose one! (you cannot take two)

★ will everybody choose the ONE?
★ can i easily change if not?
★ they have all my data?
★ that probably costs hell…
★ what is my business model?

Your Data is their business model!!!
They don't want you to change…

Google, Facebook

Source: Cisco
Choose as many as you want! (no change cost)

Source: Cisco
Choose as many as you want! (no change cost)

★ they are interoperable?
★ i can switch between them in secs?
★ that probably is cheaper?
★ crowd wisdom?
★ who has my data?

Source: Cisco
Blockchain
### Startseite

Die Aktualisierung der blocks in der Bitcoin Blockchain

<table>
<thead>
<tr>
<th>Höhe</th>
<th>Alter</th>
<th>Transaktionen</th>
<th>Gesamtgesendet</th>
<th>Weitergeleitet von</th>
<th>Größe (kB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>398019</td>
<td>1 hour 20 minutes</td>
<td>1812</td>
<td>$ 11,502,020.10</td>
<td>F2Pool</td>
<td>887</td>
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<tr>
<td>398003</td>
<td>3 hours 26 minutes</td>
<td>673</td>
<td>$ 6,845,192.75</td>
<td>BitFury</td>
<td>350</td>
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<tr>
<td>398002</td>
<td>3 hours 30 minutes</td>
<td>390</td>
<td>$ 5,062,147.92</td>
<td>BitFury</td>
<td>219</td>
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<tr>
<td>398001</td>
<td>3 hours 31 minutes</td>
<td>1330</td>
<td>$ 9,226,405.44</td>
<td>AntPool</td>
<td>912</td>
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<tr>
<td>397996</td>
<td>4 hours 37 minutes</td>
<td>1285</td>
<td>$ 9,573,986.34</td>
<td>F2Pool</td>
<td>581</td>
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<tr>
<td>397976</td>
<td>6 hours 47 minutes</td>
<td>659</td>
<td>$ 1,269,891.34</td>
<td>BitFury</td>
<td>551</td>
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</tbody>
</table>

#### Neueste Transaktionen

- **5f445c9b8ac2b339d0b2f43d9:** <1 minute, $47.61
- **cf6ff6ece3a8d38c0f6083775:** <1 minute, $41.79
- **f095c417cf75f496741b39d8c:** <1 minute, $10.26
- **ae2e380f72b69f3e908ef555:** <1 minute, $6.12
- **e32e99bab3ac3397398ad60:** <1 minute, $288.79
- **2cc2619c3ac3378d0b2f43d9:** <1 minute, $44.91
- **d20b9da8a32069e8420736:** <1 minute, $1,995.29

### Suchen

Hier können Sie nach Blockhöhe, Adresse, Blockhash, Transaktions-Hash, hash160 oder IPv4-Adresse suchen.

```
Adressen / Firstbits / IP / SHA-Hash
```

#### NEWS

- **Maghr - Bitcoin Trading Platform | Trade with Leverage**
- **WTF, Coinbase. Fix this now.**
- **Stock Market Giant Deutsche Börse Working on Blockchain Prototypes**
- **Cypherpunks Continue to Write Code as Governments Threaten Encryption**
**Bitcoin**
Open source P2P money

**Ripple**
Instant international money transfers

**CryptoNote**
Completely anonymous egalitarian cryptocurrencies

**NXT**
The infrastructure for a digital economy

**XCurrency**
Versatile P2P platform

**BitShares**
The Decentralized Exchange

**Zerocash**
Privacy-preserving payments

**This could be your technology**
<table>
<thead>
<tr>
<th>Event</th>
<th>Speaker/Presenter</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 1st</td>
<td>Ismail El-Badawy</td>
<td>2022-01-01</td>
</tr>
<tr>
<td>January 15th</td>
<td>Ibrahim Faruq</td>
<td>2022-01-15</td>
</tr>
<tr>
<td>February 1st</td>
<td>Mohamed El Halima</td>
<td>2022-02-01</td>
</tr>
</tbody>
</table>

**Note:** The dates provided are placeholders and should be replaced with actual dates for the events.
R3 CEV’s Consortium: 42 Banks with Combined $600bn+ Market Cap; 60% Are Global SIFIs
cut the middleman = server
cut the middleman = server
cut the middleman = server

- who is in charge?
- who has my data?
- cheaper?
- crowd wisdom?
- how?
cut the middleman = server

who is in charge?
who has my data?
cheaper?
crowd wisdom?
how?
Worldmeter.io Platform

★ in-out API
★ crowd wisdom
★ decentral
★ open source
★ privat
★ interoperable
★ protocol agnostic
Main purposes of data exchange:

- Grid Balancing
- Demand side Management
- Green Certificates
- Certificate of Origin
- Forecast Validation
Energy Information - Grid Singularity vision

Data sits in secure, auditable, shareable data layer

Energy Blockchain identify, timestamp, store

Grid
- Grid Balancing Accounting
  - Grid data storage

Generation
- DSM
  - Generation data storage

Consumer
- Private data storage

Regulator
- Open data storage

Provider
- Private data storage

Smart Contract
- Payable

Open Data
- Free

Private Data
- Payable
Energy Information - Grid Singularity vision

Energy Blockchain identify, timestamp, store

Data sits in secure, auditable, shareable data layer

Internet of Energy worldmeter.io

Grid Balancing Accounting

Grid

Generation

Consumer

Open Data

Private Data

payable

free

payable

Smart Contract

Regulator

data storage

Provider private data storage

Provider private data storage

Provider open data storage

Generation

DSM
Energy Information - Grid Singularity vision

- **Grid**
  - Private data storage
  - Grid Balancing Accounting

- **Generation**
  - Private data storage
  - DSM

- **Consumer**
  - Private data storage

- **Regulator**
  - Open data storage

Energy Blockchain:
- Identify, timestamp, store
- Scaleability
- Zero Knowledge Proof
- IPFS

Data sits in secure, auditable, shareable data layer

Internet of Energy (worldmeter.io)
Energy Information - Grid Singularity vision

Energy Blockchain:
- Identify
- Timestamp
- Store
- Enable trade of private information

Internet of Energy:
- Grid Balancing Accounting
- Generation
- DSM
- Consumer
- Data storage
- Data sits in secure, auditable, shareable data layer

Energy Blockchain Features:
- Scaleability
- Zero Knowledge Proof
- IPFS

Data Provider
- Grid
- Generation
- Consumer

Data Trading:
- Smart Contract
- Open Data
- Private Data

Energy Balancing:
- Grid
- Balance
- Accounting

Data Storage:
- Provider
- Grid
- Generation
- Consumer
- Regulator

Trading Platform:
- Internet of Energy:
  - Worldmeter.io
  - Trading

Payable Data:
- Grid
- Generation
- Consumer

Data Access:
- Open
- Free
Information Exchange

Data Trading

Info Receiver

Info Provider

Send data

Payment

Service

Info Interpreter

Send data

Payment

Added value data
Information Exchange

Data Trading

- Info Receiver
  - send data

- Info Provider
  - payment
  - send data

- Info Interpreter
  - payment
  - added value data

Service

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Location</th>
<th>Granularity</th>
<th>Data Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open by Law</td>
<td>anonymous</td>
<td>yearly</td>
<td>“old” data</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>gps &amp; identification</td>
<td>millisecond</td>
<td>real-time</td>
</tr>
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</table>
Information Gateway - worldmeter.io

1. Data on page delayed by X hours.
2. Realtime data & stream available upon Login.
3. Map centered around GPS point of visitors IP address.

Log in

Show some near real-time performance:
energy sources currently generating

Search Field - open data

Show some real-time performance:
energy sources currently generating

News feed on:
1. New Dapps
2. Twitter
3. New Information Sources
4. Grid Edge & Transactive Grid News

Nokia MAPP: Power Plants, Consumer in Bulk, Grid, Battery

How would that map look like if we would have already the world connected.
Gateway - Login
Gateway - Login
Apps & DApps

Secondary Market:
- Balancing Group Accounting

Benchmark Performance:
- Forecast Energy Brainpool

Asset Performance Monitoring:
- Asset Valuation

Operation & Maintenance:
- Crowdfund Data Source Connections
- Emission Certificate Generation / Trading

World Green Bond:
- Project Development / Country

Secondary / Tertiary Reserve:
- Market Analysis / Research

Energy Trading Platform:
- Energy Trading Platform

Funding Platform:
- Funding Platform

Micro Grid Management:
- Micro Grid Management

...
Apps & DApps

- Secondary Market
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- Accounting
Vielen Dank!

@gridsingularity.com