Towards a distributed energy
Who we are

- **Awards**
  - COP 21 Climate Champion
  - Best Startup Cleantech 2014 (European Commission)

- **References**
  - 6% of the European Union’s energy
  - 5% of Singapore’s energy
  - #1 World Natural Gas Consumer
  - #1 World Power Consumer

- **Tier1 partnership with GE (May 9, 2016)**
What we do: software for energy

Smart meter

Efficiency

Other data

Portfolio / cost

Action plans / Billing / Alerts
More than 10,000 sites

>400,000 metering devices

600 TWh

Around the World
Large infrastructure case: airports

FedEx

Air France

Cargo

Hotels

Malls

Office buildings

90 million passengers per year & very large infrastructure
- 13 French Airports
- 3 new airports (Brazil, Iran, Cuba)

- 35,000 connected devices
- Energy, CO2, Waste, Water
- Central monitoring
- Real-time alerts
- Utilities billing generation
- Energy action plans
- ISO 50001 compliance
- Environment reporting
- Corporate Social Responsibility reporting
- Shareholders reporting
- 30 expert users
- 6000 light users

- Planned energy savings: 20%
- ISO 50001 obtained by Paris Airports
- World’s 1st ISO 50001 IT Airport project
- Implementation: 12 months
- Aligned with Airport IT Security requirements

- 5 Scada & OCC system (Schneider, Siemens, Honeywell): energy, water, electric vehicles...
- Building Management systems
- Waste and water collection system
Industry case

Demand response

Sample offloading profile

Portfolio management

Customer testimonial
Data sources:
- Scada systems
- Corporate systems
- Grid operators
- Reuters, Montel
- Local energy exchanges
- SAP

Sites:
- 80 steel mills
- 1 electricity grid

Needs:
- Multi-sites monitoring
- Real-time alerts
- Communication managers/operators
- Contracts management
- Billing validation
- Billing generation
- Price transfer
- Trading
- Balancing operations
- Demand-response
- Internal reporting
- Government reporting
- 20 expert users
- 100 light users

Outcomes:
- Implementation: 3 months
- > 2% energy cost savings
- Creation of ArcelorMittal Energy (2011)
- Automated Reporting
- Increased data security
- SOX compliance
- Energy supplier license (electricity, natural gas)
A new challenge: distributed energy

- Renewable production
- Optimisation
- Monitoring
- Remote control
- Coordinate resources
- Micro-generation
- Storage / Electric vehicles
- Distributed transactions
- Blockchain
A better energy mix

Source: ENEA
Blockchain technology

- Energy assets are more and more distributed
- Data shared and trusted amongst all parties
- Immutable source of truth, based on mathematical proof
- No need for central counterparty
- Complementary to other Evolution Energie technologies

Example of past project: CO2 registry

Blockchain makes it easier!
The zerochain framework

- Billions of transactions
- Widespread interoperability
- Edge computing
- Blockchain of things
- Support for energy and smart city business cases

Electrical production and loads

Other fluids (gas, water...)
The zerochain oracle (1/2)

Problem Size
Centralized Optimization Schemes submit the problems to the Operator, whom then solves the optimization problems for both parties.

- Huge computational cost for operators
- Single point of failure

Complexity
Classical Optimization Techniques use mathematical programming and convex optimization techniques to solve operator’s and users’ problems

- Includes Non-Convex, NP-Hard problems
- Computation time requirements

Distributed Optimization
Evolutionary Algorithms
We define a distributed optimal pricing strategy that acts as the oracle for energy balancing.

### Operator level optimization
- **Objectives**
  - ↓ Load fluctuation
  - ↑ Profits
- **Decision Variables**
  - Buying price
  - Selling price
- **Constraints**
  - Load Flow
  - Operating Limits

### User level optimization
- **Objectives**
  - ↑ Comfort
  - ↑ Convenience
  - ↓ Cost
- **Decision Variables**
  - Appliances Schedule
  - EV Charging Schedule
  - Air Conditioning
  - Local Generation Schedule
  - Manufacturing Process
- **Constraints**
  - Task deadlines
  - Battery
  - Temp.
  - Thermal Models
Real world implementations

Cities of Rueil, LePerray, Paris (France)

City of Gu’an (China)

UX design for end user (within GE predix)

And various corporate (industry) and large infrastructure projects (airports, trains ...)

Evolution Energie
**Business model**

- **KEY PARTNERS**
  - GE
  - Itron
  - Interpolation
  - Vodafone
  - Veolia
  - CFLD

- **KEY ACTIVITIES**
  - Blockchain
  - IEEE
  - ENedis

- **VALUE PROPOSITIONS**
  - Scalability
  - Reduced costs
  - Energy savings
  - Environment impact

- **CUSTOMER RELATIONSHIPS**
  - ISO 9001
  - ISO 14001
  - Bureau Veritas Certification

- **CUSTOMER SEGMENTS**
  - Industry
  - Large infrastructure

- **KEY RESOURCES**
  - Technology experts and sales

- **CHANNELS**
  - Microsoft
  - Dunod
  - open source
  - FabLab

- **COST STRUCTURE**
  - Lower IT costs
  - Technology experts and sales

- **REVENUE STREAMS**
  - Project implementation
  - Licence fee for enterprise features
    (e.g. 1€/month/citizen, or €/MWh, or €/m²)
Key take away

Cost and load optimization
Flexible energy management, on all sites and activities.

Open source (soon)
Develop the community around open projects and standards.

Distributed analytics
Distributed oracle to enable smart contracts for energy markets.

Full stack
Work with fablabs and industry partners to support the hardware, telco, software and services.

Robustness and time saving
Build upon a best of breed framework deployed by world leaders around the globe.

Return on investment
Lower TCO & scalable for large infrastructures and industries.

Conformity to market rules
Conformity to energy regulations and IT security.

Customer in mind
Ability to deploy globally. Worldwide partnership with General Electric.
THANK YOU

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OUR NEXT EVENT
MILAN, JUNE 8TH