



Energy IoT solution for a SHARE ENERGY ECONOMY PLATFORM

Olivier Brie

 **Green Days@Sophia** 

Tarifs spécifiques

Loi de transition énergétique

Auto-consommation
résidentielle et collective

Communautés,
coopératives
énergétiques

Objets intelligents, communicants
compteurs, thermostats...

There is a general agreed consensus that the energy world re-invents itself – it is happening now and in many places

Just like in Telcos, services around sharing resources will disrupt the market, we make sure it does not take another 15 years....

2

- YOUR PC
- YOUR DSL bandwidth
- YOUR power for the CPU



But in return you get:



- YOUR PV, CHP, Heatpump, Storage Heater
- YOUR DSL bandwidth
- YOUR power for the CPU



But in return you get:

- heating flatrate
- power flatrate
- energy autonomy
- low CO2 footprint

A few words about us...

3

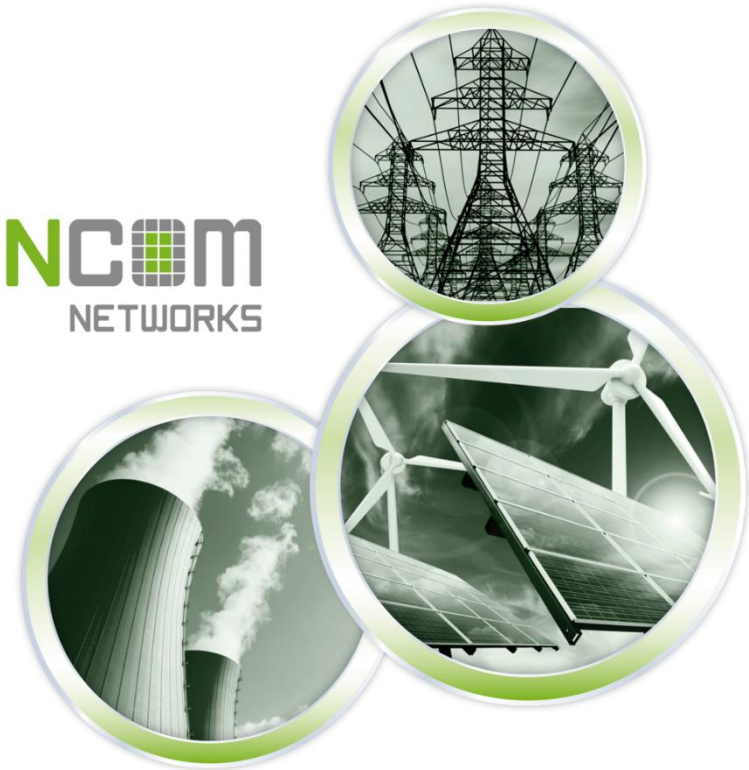
Business

- Strategy experts in the Utility sector
- Created SmartGrid BU within Cisco
- Vision of the future decentralized energy system

GREENCOM
NETWORKS

Technology

- Largest installation contemplating 5M devices in the mid 2000s
- IoT paradigm before the word even existed
- Created Ubinode in 2010 with a focus on IoT platform
- Merged Ubinode with GreenCom Networks to focus on the energy vertical

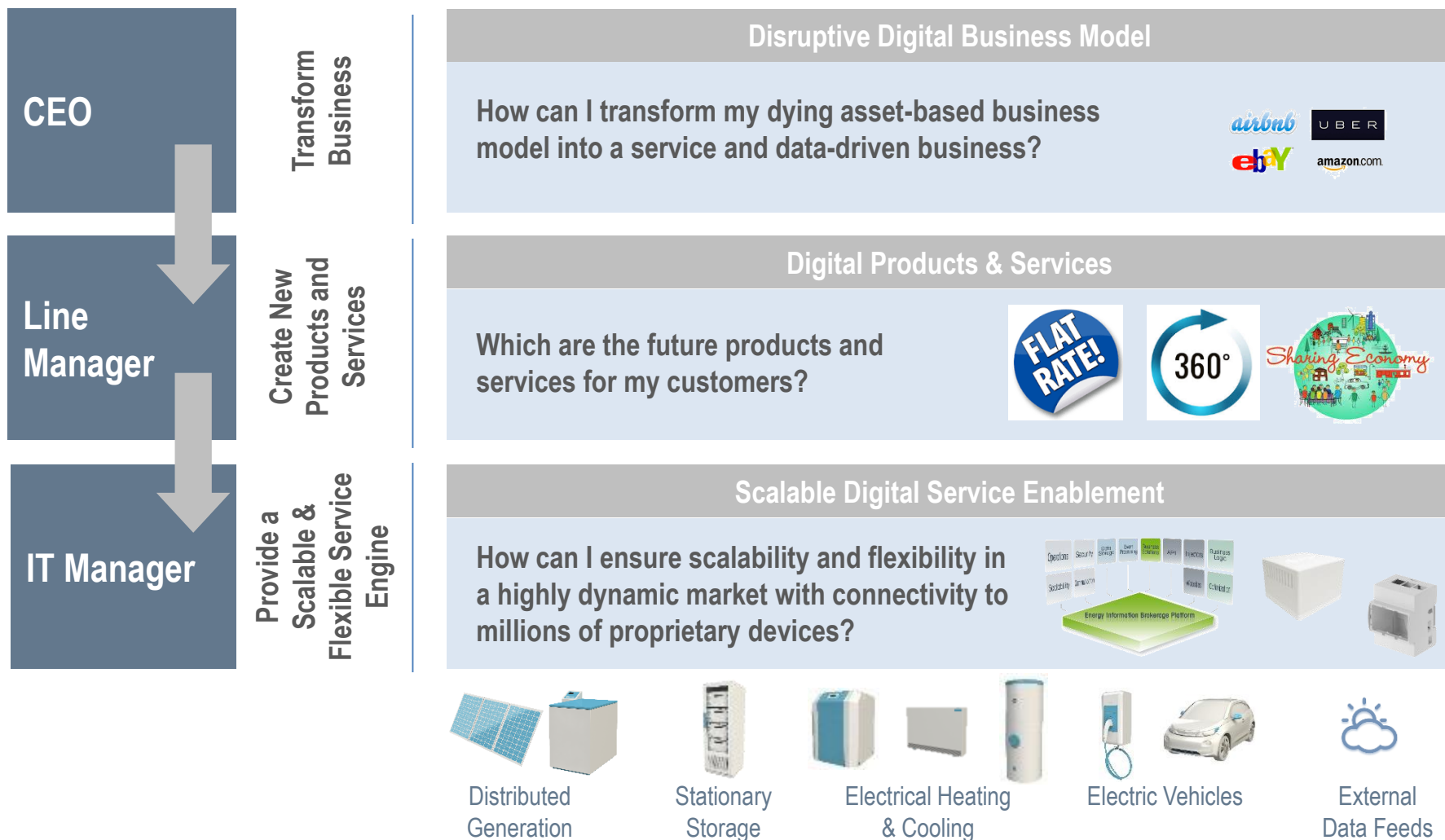




Energy IoT solution for a
SHARE ENERGY ECONOMY PLATFORM

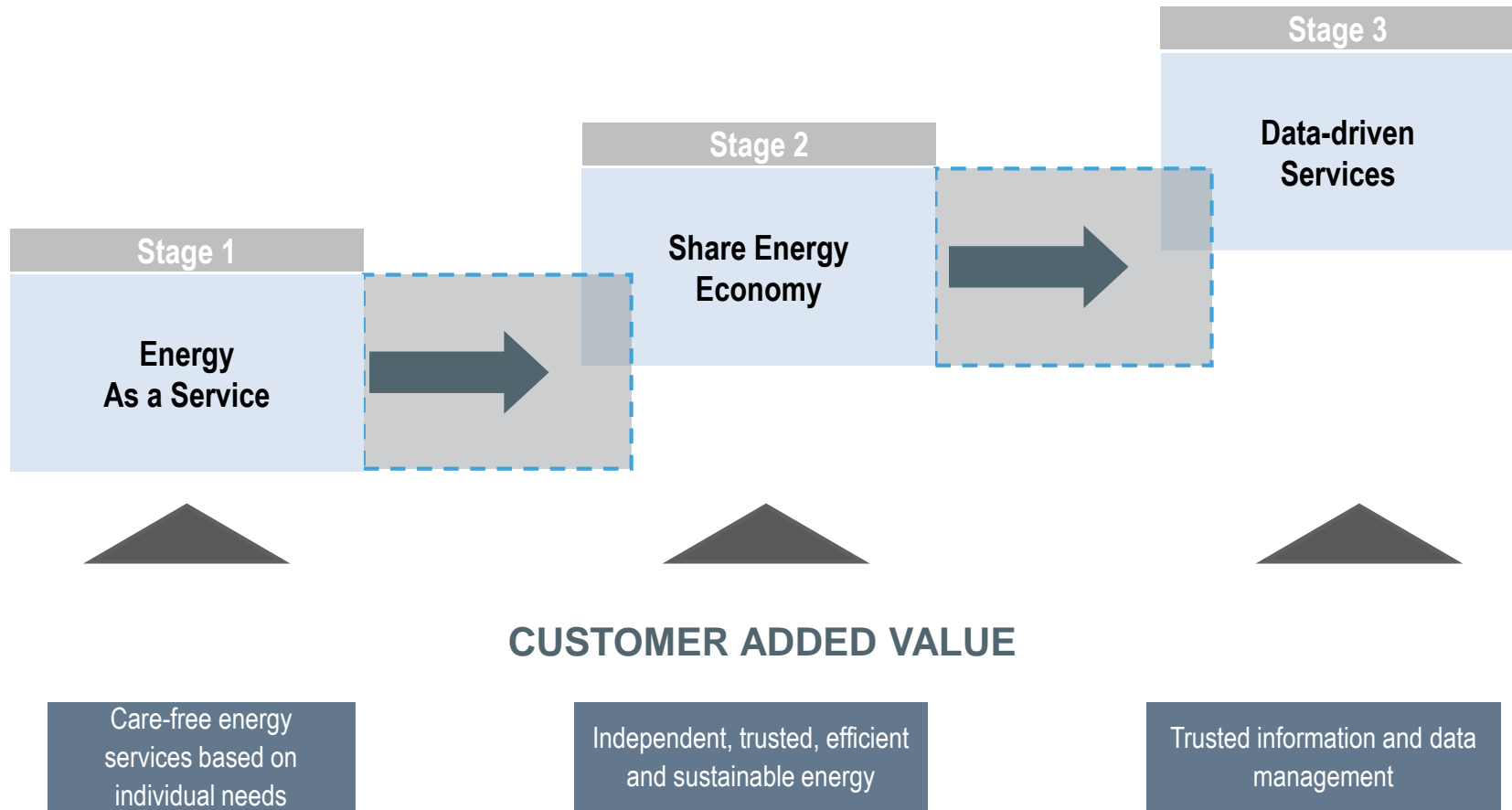
Transformation towards future services and data happens at all levels within a utility organization

5



Energy business transformation from kWh towards services and data

6



And we have done it already end-to-end...

7



Und was, wenn das jetzt alle machen?

Die Welt verändern. Einfach so. Tja, dann wird sich die Welt verändern. Einfach so. Mit Photovoltaik auf dem Dach. Batteriespeichern im Keller. Und einem System, das genauso smart ist, wie die Gemeinschaft, die es benutzt.



So funktioniert beegy!



beegy bringt Ihnen Unabhängigkeit und Planungssicherheit für Ihre Energieversorgung. Mit beegySOLAR produzieren Sie Ihren eigenen Sonnenstrom. Mit beegyBATTERIE speichern Sie, was Sie

Beegy Power
Flatrate

Beegy
Lifetime
Service
Guarantees

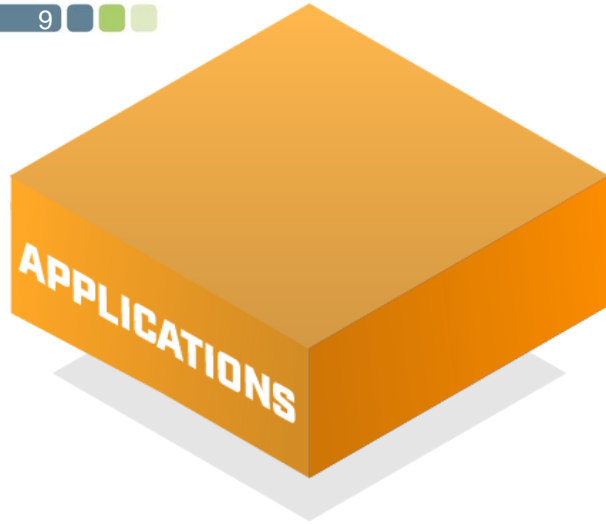
Beegy Mobility
Flatrate

Beegy Energy
Community

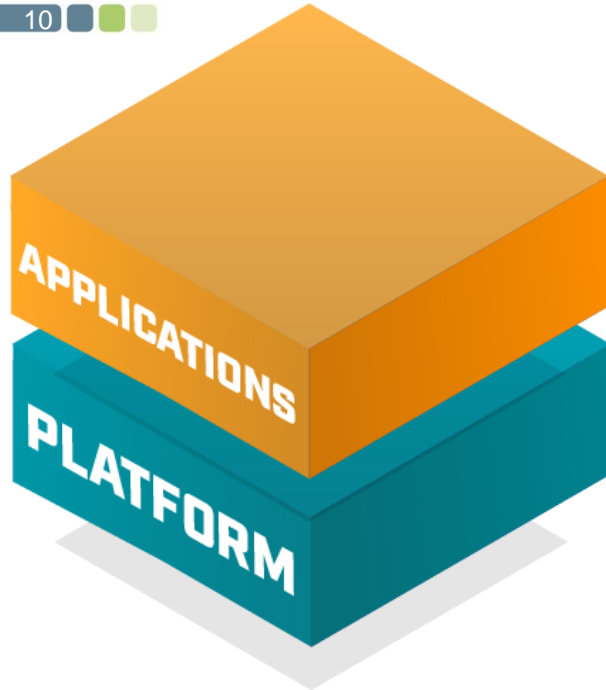
Beegy Virtual
Power Plant



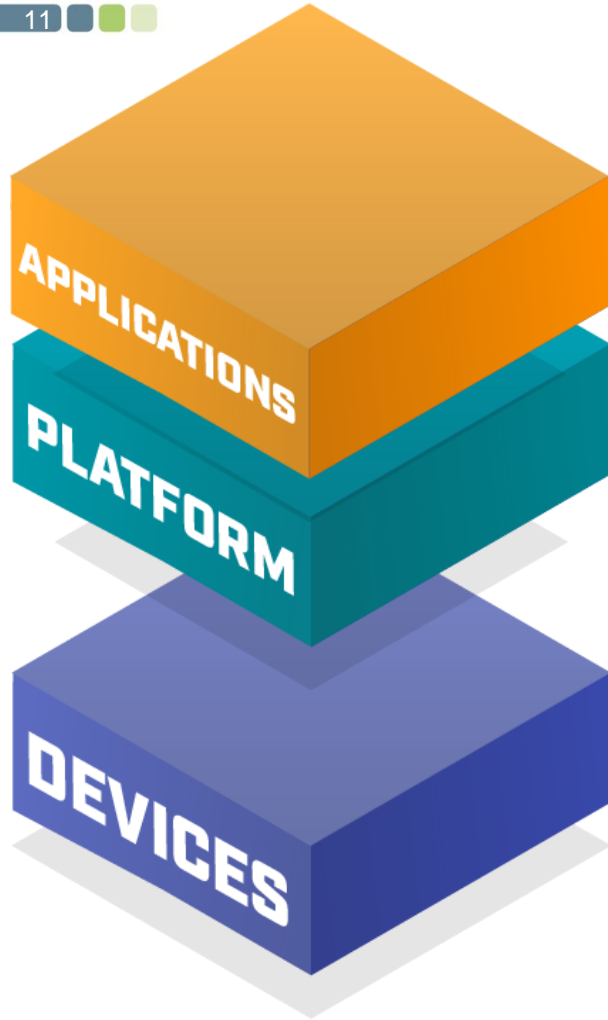
Energy IoT solution for a SHARE ENERGY ECONOMY PLATFORM



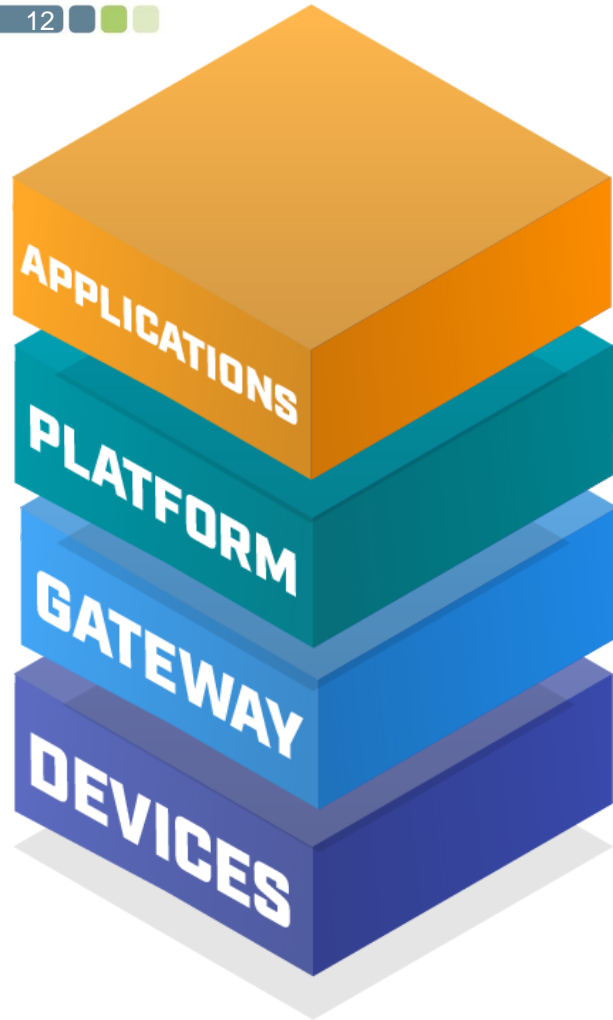
A typical IoT solution consists of
a set of **applications**



A typical IoT solution consists of a set of **applications** leveraging an IoT **platform**



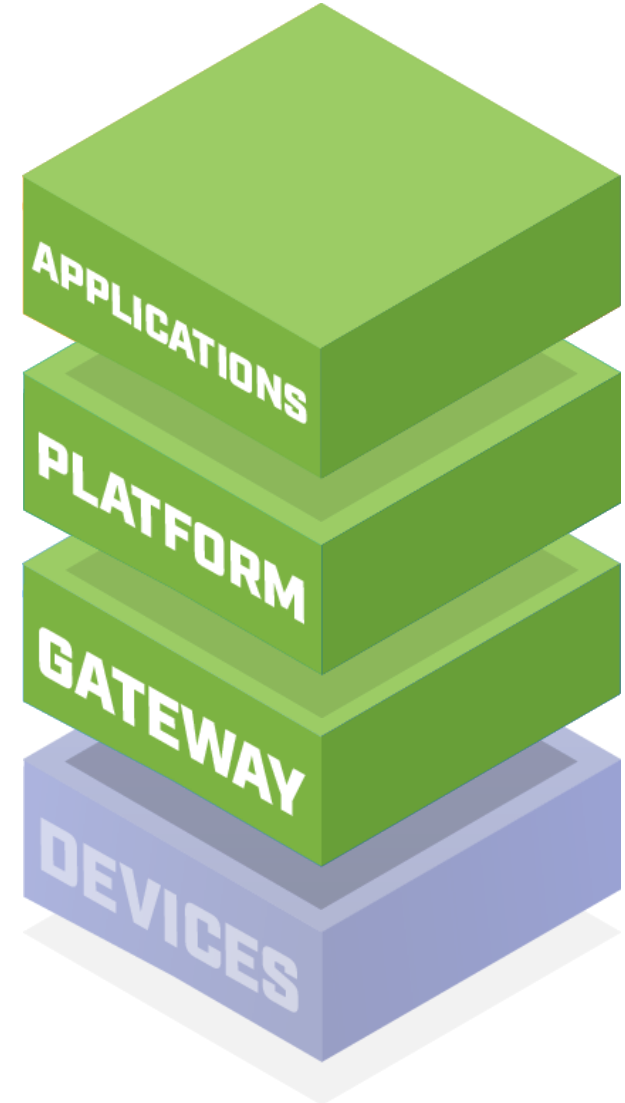
A typical IoT solution consists of a set of **applications** leveraging an IoT **platform** to connect to a large amount of **devices**

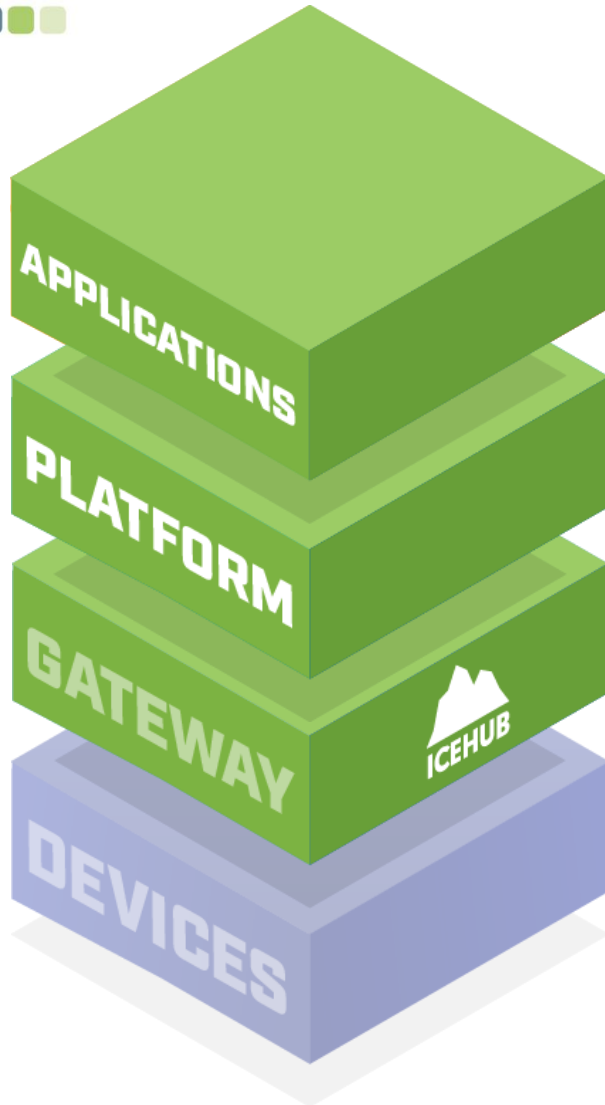


A typical IoT solution consists of a set of **applications** leveraging an IoT **platform** to connect to a large amount of **devices** through some sort of **gateway**.

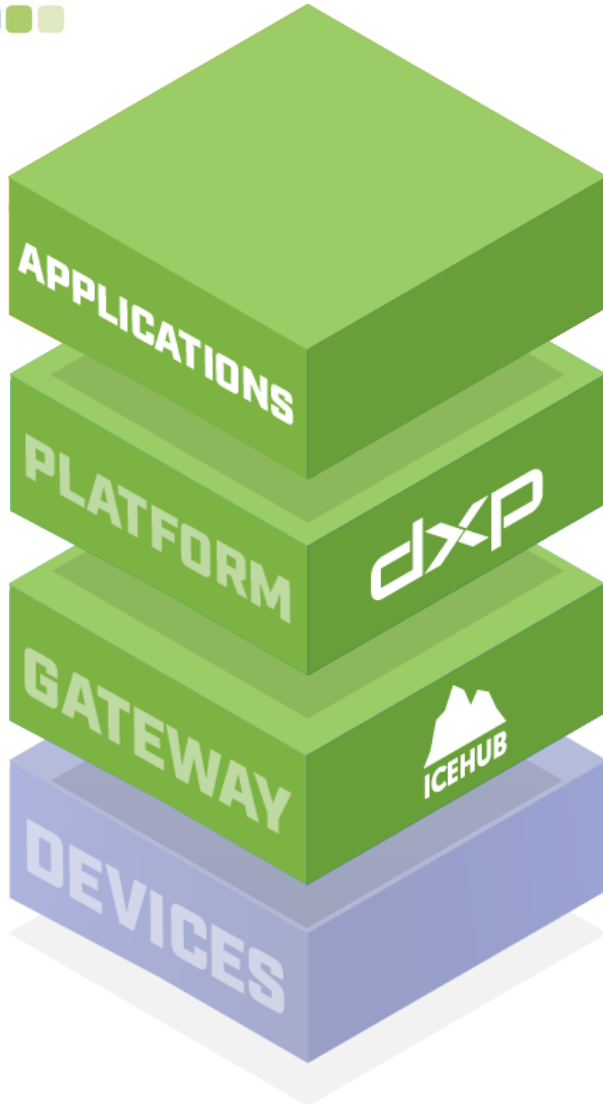


GreenCom Networks through its various offerings is acting in the **application, platform and gateway** spaces.

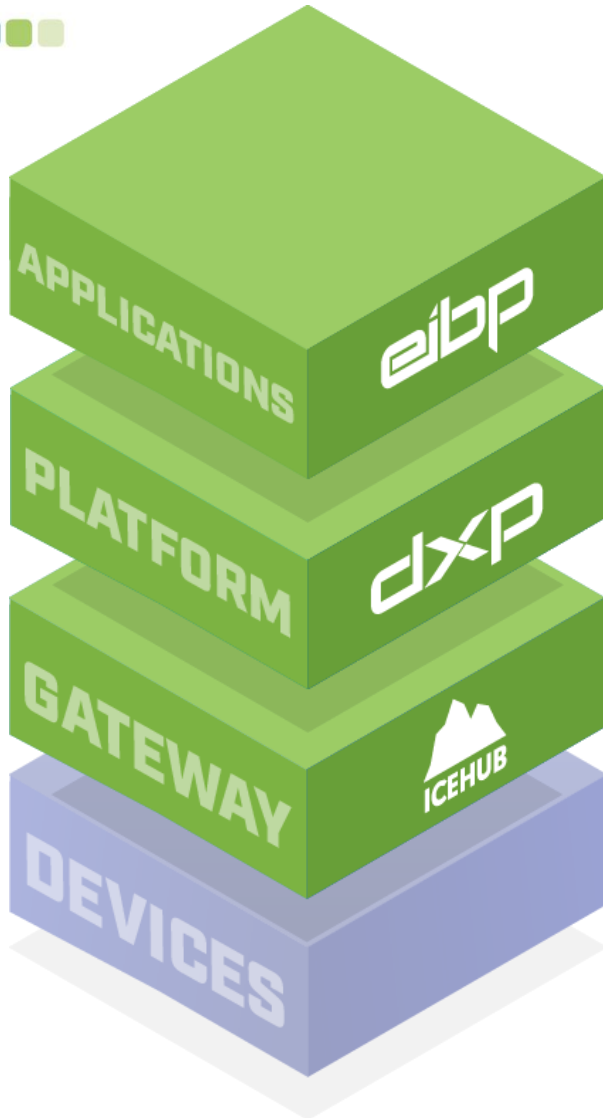




A comprehensive end-to-end
gateway stack



An event driven, scalable, API oriented,
micro service based platform



Energy Information Brokerage Platform

The energy related applications and use cases

The gateway stack



17

A comprehensive end-to-end Gateway stack

- Gateway software stack
- Library of already integrated devices
- Data collection engine
- Steering capabilities
- Activation flows management
- Gateway management
- Software management
- Communication capabilities
- SDK

- Hardware : Raspberry PI (reference implementation)
- Operating System : Debian based
- OSGi runtime: Equinox
- Business Data transport protocols: MQTT
- Business Data encoding: json
- Business Data protocol: customisable (proprietary, oBIX, ...).
- Technical Data transfer protocols: MQTT
- Remote access : openVPN

The platform

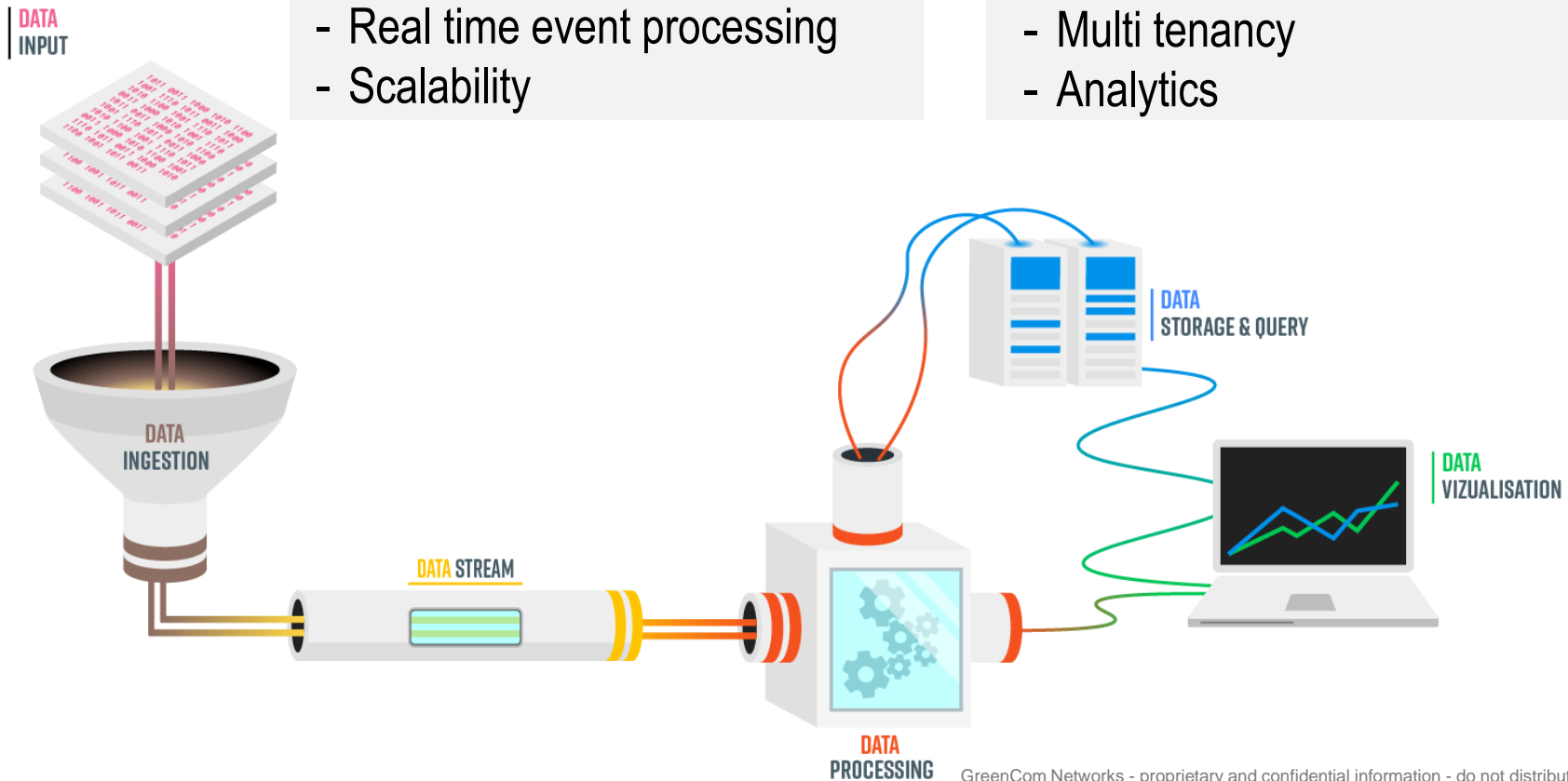


18

An **event** driven, **scalable**, **API** oriented, **micro service** based platform, addressing:

- Data collection
- Real time event processing
- Scalability

- Security
- Multi tenancy
- Analytics



The platform



19

Scalable Data Collection and Storage



- Time Series Storage / Management
- Metadata Storage / Management
- Scalability
- Replication / Data center awareness (data safety)
- Performance

Apache Cassandra is an **open source, distributed** database management system designed to handle **large amounts of data** across many **commodity servers**, providing **high availability** with **no single point of failure**. Cassandra offers robust support for clusters spanning **multiple datacenters**, with asynchronous masterless replication allowing low latency operations for all clients.

Cassandra also places a high value on **performance**.

The platform



20

Everything is Event

We are now able to collect and store massive amount of data.

However, every data could be turned into an event (if it ever makes sense)

- Meter reading
- EV plugged
- Account Created



Receiving and managing
massive amount of events



And processing them

The platform



21

Everything is Event



@linkedin

400 nodes,
18k topics,
220 billions msg/day
(peak 3.2 M msg/s)

@gcn

3 clusters, 9 nodes,
2.6k topics,
500 millions msg/day
4900 messages/second

@spotify

22 nodes,
15 topologies,
200K tuples/second

@gcn

3 nodes,
170 topologies



The platform



22

Everything is Event

Volume of transaction we are aiming for gets closer to

- 100 000 households
- 100 endpoints/ site
- 30 seconds interval datapoints

meaning

28 800 000 000 direct raw events / day
> 350K events / second

The applications



Service oriented

Moving up in the food chain, we are now able to receive and process billions of events a day and collect and store massive amount of data.

But the platform still needs to ease application creation, deployment and scaling.

meaning

Implementation API based (Restful)
Service Oriented

The applications



24

Micro-services architecture

- Simple: small code base, easy to create, understand and maintain.
- Fits in the head of one developer
- The services are small - fine-grained as a singular business purpose
- The services are elastic, resilient, composable, minimal, and complete.
- Easy to test and deploy
- Easy to scale : only the required component can be scaled (!= monolithic architecture)
- Trivial lifecycle management : in a fast moving environment, micro services can be updated/modified/thrown away easily.
- Resilience: if a service fails, impact on the platform is limited

@GreenCom - each new functional block / ability is designed and delivered as a micro-service

This encompasses infrastructure (message queues, ...), functional blocks (forecast engine, ...), operational tooling (deployment, ...).



Data Processing



GCN Data Center
Operating System



Event Processing
Engine



DATABASE



CORE



VERT.X



WWW

Foundation
ZURB



mobile



ANDROID



debian

Containerization



docker



vmware
vSphere

Virtualisation

Thank You

Your Contacts:

Olivier Brie

1300 route des crêtes

06560 Valbonne - Sophia Antipolis

France

olivier.brie@greencom-networks.com

+33 (0) 6 1867 3643

Christian Feisst

Chief Executive Officer

Ganghoferstraße 68

80339 Munich

Germany

christian.feisst@greencom-networks.com

+49 (89) 5108 5622