CYBERGRID
A TOSHIBA Group Company

Efficient Use of Flexibility Potentials

TOSHIBA
Leading Innovation ▷▷▷

Landis+Gyr+
manage energy better

Christoph Gutschi
AIT Industry Day
Vienna, September 11th 2015

Company name	cyberGRID
Headquarters	Wien, Austria
Founded	2010
Ownership	76% acquired by Toshiba corp., 2013
Our focus	Technology solutions in the area of Demand Response/Virtual Power Plants
Our activities	Overall or partial solution provision Demand response related services provision Consultancy services Research projects

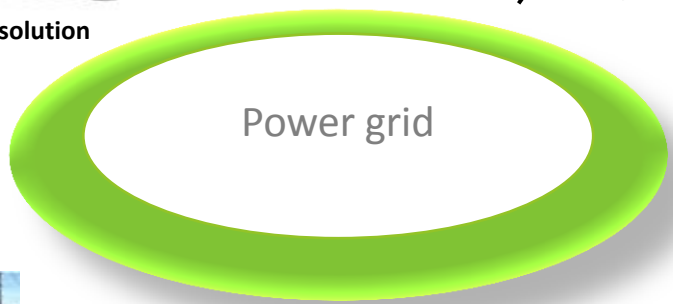# Real-time solutions for Right-time decisions

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TOSHIBA
Leading Innovation >>>

„Real time solutions...

Electric vehicles

Community DR

Prosumer storage

CYBERGRID
VPP

RES
PV, Wind, Hydro, Biogas
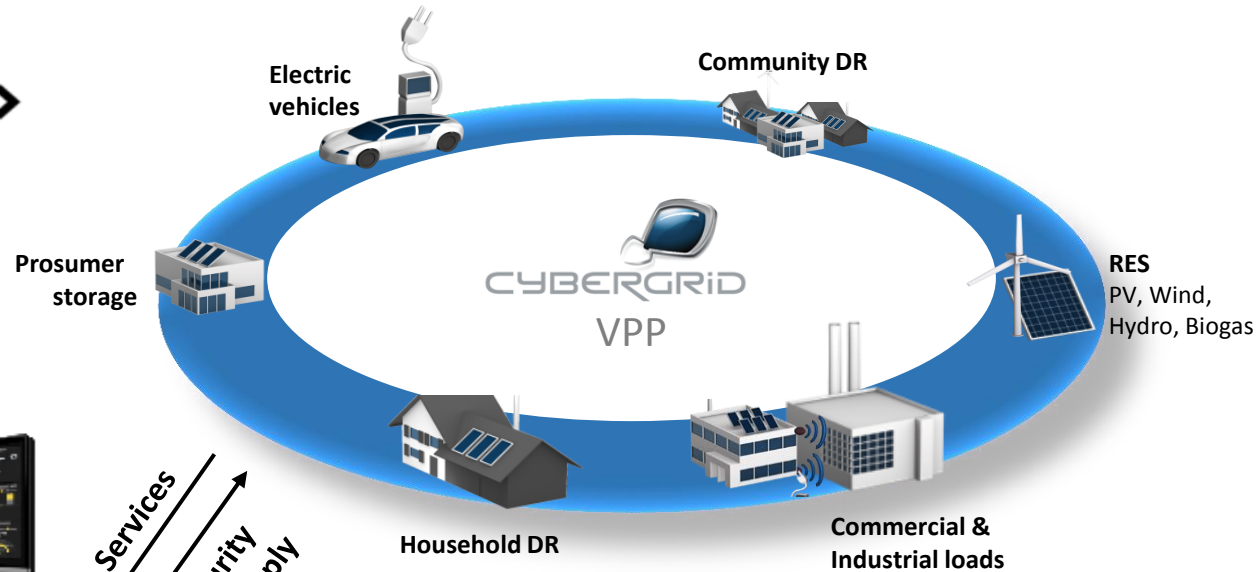
Services

Security of supply

Technical VPP

Household DR

Commercial & Industrial loads

Energy mgmt solution
μEMS

...for right time decisions"

Power grid

Smart distribution
Substation automation

Grid storage
SCiB

Controllable
grid devices

Smart grid

SERVICES

CONSULTING

- Product development
- Customer enrollment
- SW integration
- Market identification
- HW optimization
- Product Optimization
- IT enhancement
- VPP operation
- Energy management

CONSULTANCY

RESEARCH & PROJECT PARTNERSHIPS

SOFTWARE SERVICES

RESEARCH & PROJECT PARTNERSHIPS

- EU funded projects
- Strategic innovation
- Applied research

SOFTWARE SERVICES

- SW solutions
- Energy management platforms
- VPP´s
- Programming
- SW development

PRODUCTS   cyberNOC VPP´s:

- **Technical VPP**
- **Commercial VPP**
- **Hybrid VPP**

VIRTUAL POWER PLANT

cyberNOC

Selected customers, projects, partners

Commercial projects

VATTENFALL

ELEKTRO LJUBLJANA

eDF

GDF SUEZ

Research projects

EDRC
European demand response center; project coordinator

eBADGE
Pan European inteligent balancing mechanism; technical coordinator

cyberPRICE
Dynamic pricing mechanisms; Project coordinator

evolvDSO
Efficient DRES integration in distribution networks

hybrid-VPP4DSO
Intelligent load management for distribution network; technical coordiantor

Flexiciency
Innovative energy services for customers through smart meter data

Partners

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SEDC
Smart Energy Demand Coalition

IBM

RSE
Ricerca sul Sistema Energetico

vaasa ett

SAP

AIT
AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY

TU WIEN
TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

TU Graz
Graz University of Technology

What can DR flexibility be used for?

- Unlock generation assets dedicated to Reserve and Ancillary Services
- By increasing consumption during „valleys":
  - improve overall efficiency
  - reduce stress on assets
  - extend asset life expectancy

- Avoid/postpone investments in grid reinforcement
- Grid congestion management
- Reduce stress on the grid
- Overcome long lead times and reluctance for infrastruct. upgrades
- Voltage control...

GENERATION

DISTRIBUTION

VIRTUAL POWER PLANT

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PORTFOLIO OPT.

SALES
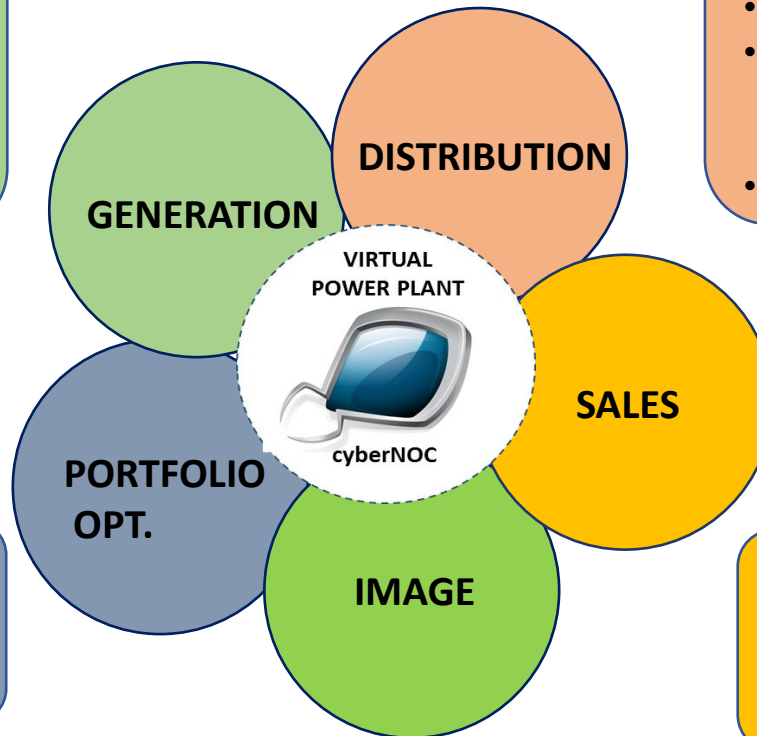
IMAGE

- Reduce imbalance costs
- Avoid peak price purchasing
- Optimize your portfolio/lower risks

- Offer new products and services
- Gain customer loyalty
- Better Demand Forecasting...

- Reinforce your green commitment image
- Reinforce your social responsibility image
- Take advantage of marketing opportunities

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INTEGRATED EXPERTISE ON DR/DSM

CUSTOMER FLEXIBILITY
- Identification
- Evaluation
- Acquisition

INTEGRATION
- Customer side
- Market side
- Operator side
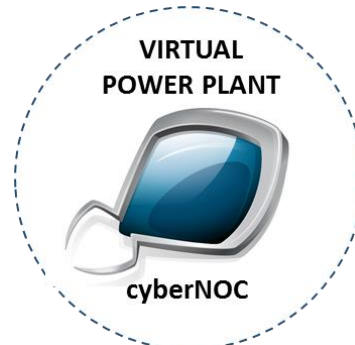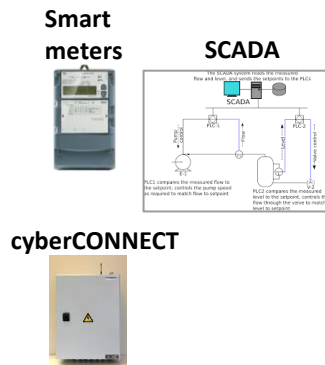- Third party
- Hardware

OPERATION
- VPP software
- Training
- Management

GRID and MARKETS
- Grid constraint Management
- Market ident.
- Product opt.
- Customer rel.

iLABORATORY
- Development
- Programming
- System optim.

RES

C&I Customers

SUPERMARKET

Storage

Distrubuted generation

Smart meters

SCADA

The SCADA system reads the measured flow and level, and sends the setpoints to the PLCs

cyberCONNECT

VIRTUAL POWER PLANT

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Grid stability

Portfoio optimization

Power markets

$$u = \frac{N \sum_{n=0}^{N-1} r_n - \sum_{n=0}^{N-1} r_n \bar{s}_n \sum_{n=0}^{N-1} s_n}{N^2 - \left| \sum_{n=0}^{N-1} s_n \right|^2}$$

Benefiting the energy value chain

EXPLOIT FLEXIBLE CAPACITY → BY USING cyberGRID'S TECHNOLOGY → TO TAKE YOUR BUSINESS TO THE NEXT LEVEL

Commercial VPP

- Market revenues
- Customer loyalty
- Lower imbalance costs
- Increased number of DR programs offered to customers
- Reduction of retail peak purchasing risk
- Portfolio optimization flexibility
- DRES market integration
- New products and services

Technical VPP

- Congestion management
- Voltage control
- Reduce service cost
- Postpone/avoid new investments
- Connect new customers
- Outage management
- Asset optimization
- Reduce stress on the grid
- Data provision services, market facilitator

Consumer VPP

- Share of market revenue
- Energy monitoring tool
- Energy consumption optimization
- Efficient use of generation resources
- Avoid peak consumption penalties
- Increased quality of supply and energy

CYBERGRID
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Real time

Scalable

Modular

Easy to use

Secure

Integrated

Automated

Intelligent

cyberCOM

REAL TIME, TWO WAY COMMUNICATION WITH DEVICES AND SYSTEMS

cyberBASE

BASELINE ALGORITHMS FOR RESOURCES AND ACTIVATIONS

cyberPLEX

ADVANCED OPTIMIZATION FOR PLANNING FUTURE ACTIVATIONS

cyberNOC dashboard

cyberSELECT

EVALUATION AND OPTIMIZATION ALGORITHMS

cyberREG

CONTROL OF ACTIVATIONS

cyberWALL

MONITORING AND REPORTING TOOLS

Elektro Ljubljana, Slovenia

Virtual Power Plant, Elektro Ljubljana

- Fully operational since 2011
- 100% availability of positive capacity
- Load curtailment and distributed generation
- Connections: Smart metering, Automation system (WS), RTUs
- Interconnectivity with smart meter head end system

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DLMS data collector

cyberNOC
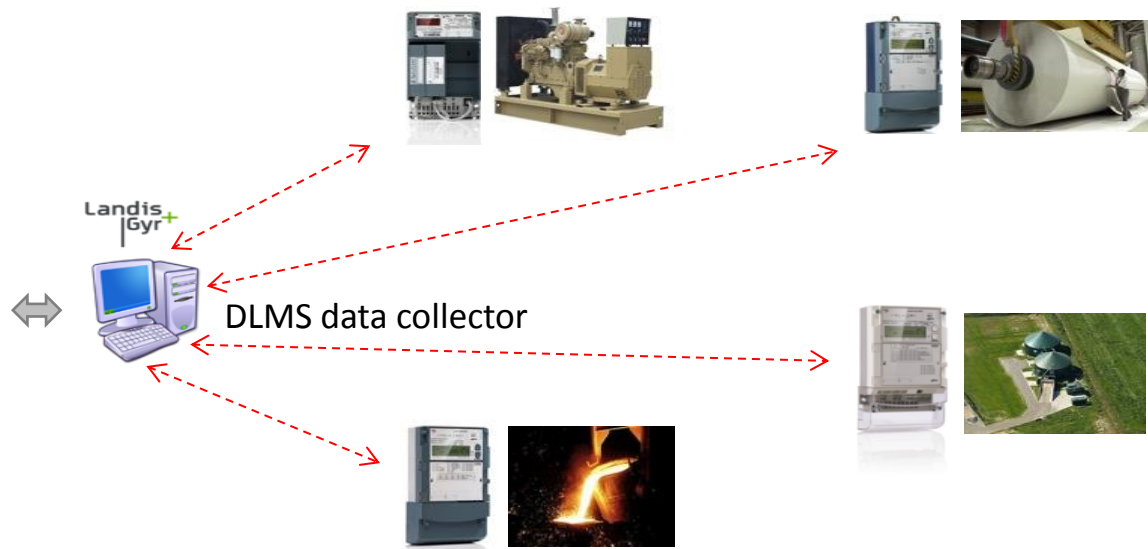
The *hybrid*VPP

Smart Market

price as "control signal"

power balance (demand/supply)

Smart Grid

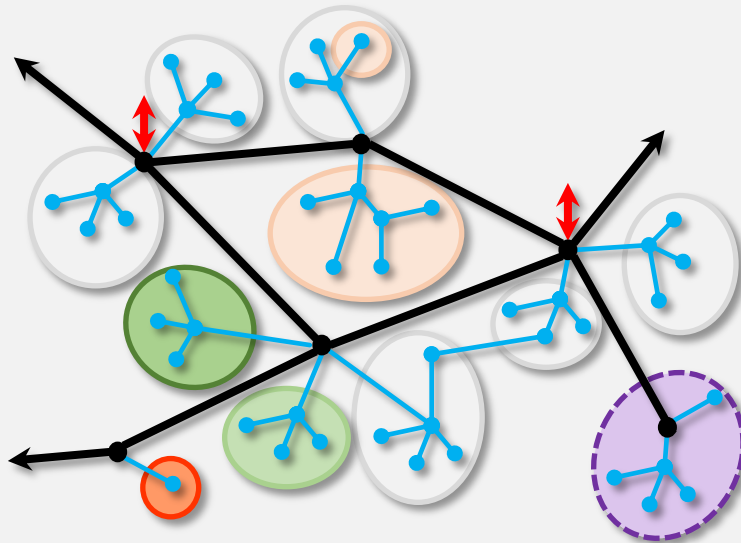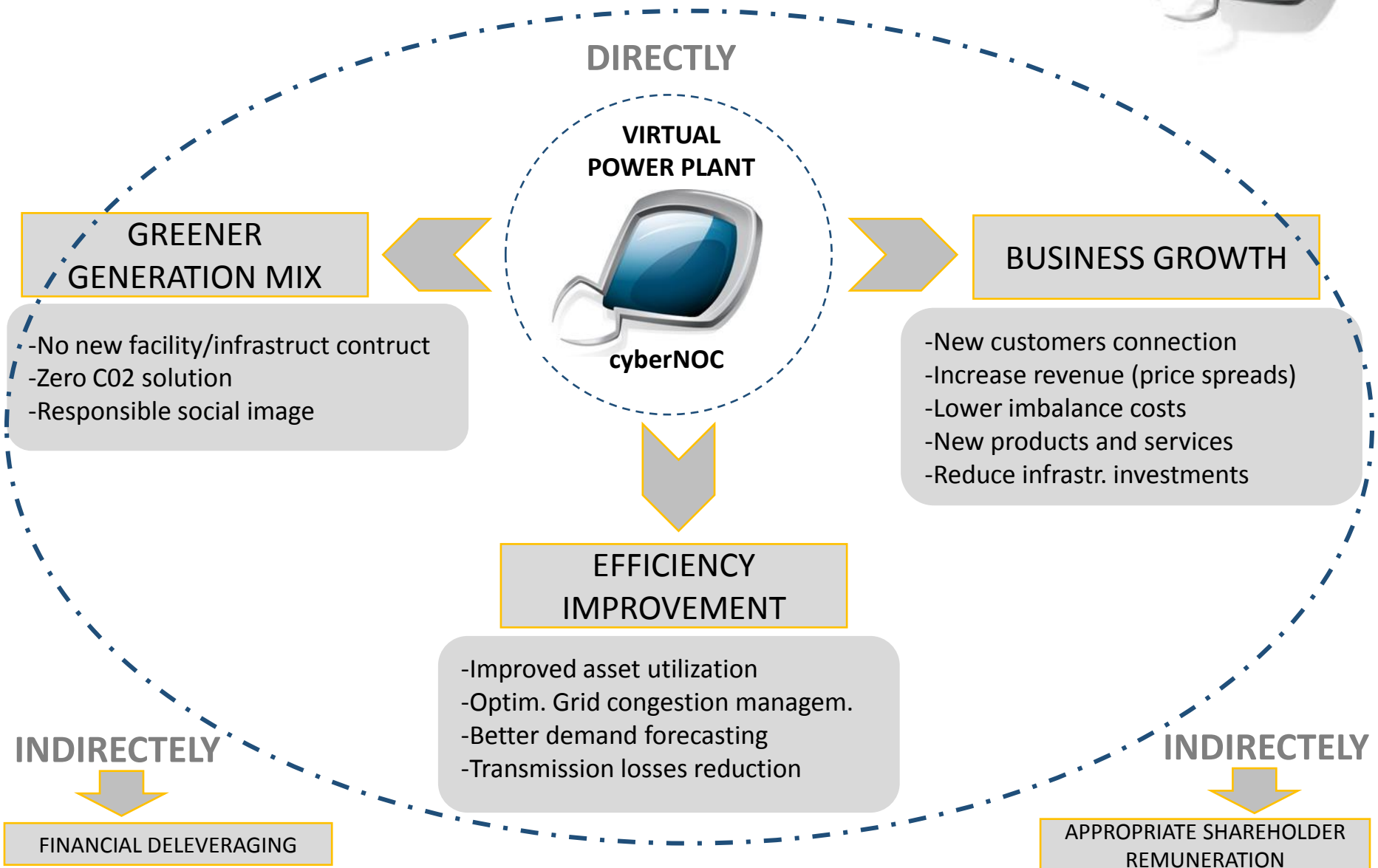"physical measurements" for controls

grid usage optimization

*hybrid*VPP

Combining network and market driven approaches

Piloting in distribution grids in Austria and Slovenia

MV Grid

HV Grid

HV interconnection to neighbouring HV grid

HV interconnection to transmission grid (transformer)

Non-critical: Curtailment of loads and generation allowed

Semi-critical: Curtailment of loads allowed

Critical: Curtailment of loads requested by DSO

Semi critical: Curtailment of generation allowed

Critical: Curtailment of generation requested by DSO

highly-critical: Curtailment by VPP not allowed

Meeting business targets

DIRECTLY

VIRTUAL POWER PLANT

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GREENER GENERATION MIX

-No new facility/infrastruct contruct
-Zero C02 solution
-Responsible social image

BUSINESS GROWTH

-New customers connection
-Increase revenue (price spreads)
-Lower imbalance costs
-New products and services
-Reduce infrastr. investments

EFFICIENCY IMPROVEMENT

-Improved asset utilization
-Optim. Grid congestion managem.
-Better demand forecasting
-Transmission losses reduction

INDIRECTELY

FINANCIAL DELEVERAGING

INDIRECTELY

APPROPRIATE SHAREHOLDER REMUNERATION

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- **Customer engagement**
  - Reliability
  - Identification and development of flexibilities
  - Transparent benefits for participation

- **Smart and resilient business model**
  - Use existing infrastructure
  - Find synergies

- **Corporate culture**
  - Flexibility of business processes
  - Open minded management and staff
  - Interdisciplinary experts

- **Sound architecture and technology**
  - Reliability and security
  - Adequacy
  - Adaption to existing resources
  - Interoperability
  - Cost effectiveness

Real time solutions for right time decisions

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