Cross Market Optimization
of Batteries, Conventional and Renewable Portfolios

Presentation, February 11th 2025

Georg Ostermaier

decision trees
energy optimization solutions

We offer

- Customized software/consulting in mathematical methods for the energy industry
- Optimization systems for the electricity sector
    - Long-/short-term optimization, dispatch planning, valuation of asset portfolios
    - Bid/Offer optimization in Spot- and ancillary services markets
    - Optimal resource management, fuel supply chain, hydro power systems
    - District heating systems, cross-commodity-optimization
    - Renewable generation portfolios, battery portfolios
    - Industrial consumer portfolios
- Optimization systems for the gas and oil sector
    - Extrinsic/Intrinsic valuation of gas storages/contracts, LNG cargos and portfolios of those
    - Dynamic hedging of forward positions
    - Stochastic optimization of gas portfolios
- Advantages and more profit through our competency in stochastic optimization

Partners:

TRAYPORT
VISOTECH

PowerBot

abd ACHIEVE BETTER DECISIONS

SOPTIM

Decision Trees

- Founded by Dr. Georg Ostermaier in 2008

- Spin Off from the Institute for Operations Research und Computational Finance at the university of St.Gallen (Switzerland)

- Solid customer base in Europe

- Active in various research projects in optimization (stochastic optimization)

  - University of St.Gallen (HSG)

  - University of Duisburg/Essen

  - Technical University of Lausanne (EPFL)

- Main office in Munich

- More then 20 employees

- Modern, cutting edge IT System for energy portfolio optimization: DT.Energy

- Software and Consulting for the introduction of advanced Energy Optimization Solutions in the Energy Industry

- Added value of Stochastic versus Deterministic Optimization

DT.Energy

DT.Energy is an energy portfolio optimization, workflow process and forecasting system

It offers vast opportunities to create mathematical models of any kind of energy/asset/commodity portfolios, which can be optimized in any planning horizon

- Thermal power plants (including CHP)
- Hydro power plants
- Gas storages and gas portfolios
- Long term supply&demand contracts
- Virtual power plants
- Industrial consumers
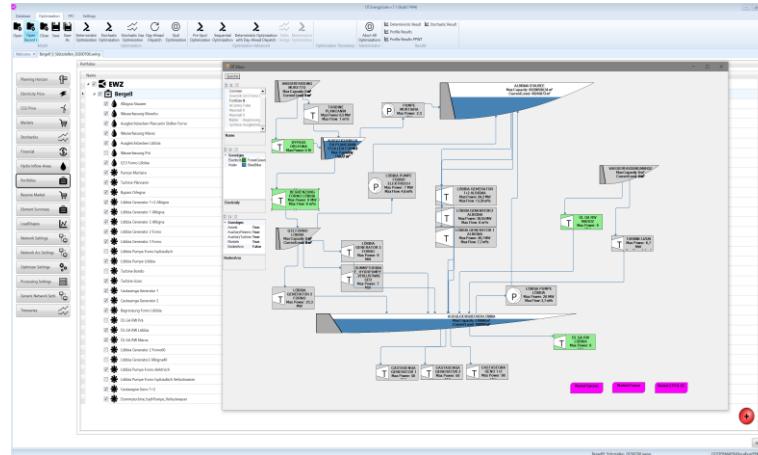
Modelling of all relevant markets in power and other commodities

- Forward markets
- Day-Ahead-markets
- Ancillary services markets
- Intraday markets

In addition, DT.Energy provides mathematical models for price forward curves and forecasts

- HPFC for power markets, DPFC for gas markets
- Solid scenario generation for spot and forward market prices of many commodities.

DT.Energy Services

Long Term Valuations

- Support of investment decisions
- Support of long term forward trading (delta hedging)
- Stochastic optimization for support of risk management
- Support of long term asset maintenance planning

Short term operative planning

- End of months optimizations
- Day Ahead optimizations for day ahead capacity market offers
- Day Ahead optimizations for day ahead power market offers
- Intraday optimizations for support of continuous automatic day ahead trading
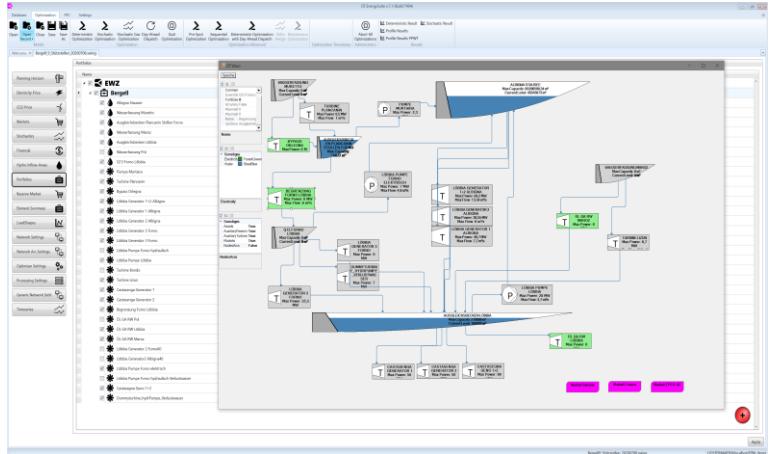
BigBatt of Leag (Oberlausitz, East Germany)

Die BigBattery Lausitz am Kraftwerksstandort Schwarze Pumpe, Foto: Andreas Franke für LEAG

Type: BESS
Power: 66 MW
Energy storage   66 MWh
Efficiency: ca. 86%

Optimization in Day Ahead, Primary and Secondary Reserve Markets, Intraday Market

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# Pumped Storage Plant Rönkhausen

Type:	Pumped Storage without natural inflows
Power:	2 x 70 MW
Bauart:	Francis pump turbines
Start of operation:	1969 (2003/2018 refurbished)
Average elevation diff.:	266 m
Volume upper lake:	1,2 Mio m³
Energy storage:	735 MWh
Efficiency:	ca. 75 %

Daily Optimization Workflow for BigBatt

¼ h resolution
Frequency: daily, 8:00 am
Horzion: 5 days

¼ h resolution
Frequency: daily, 9:00 am
Horzion: 5 days

¼ h resolution
Frequency: daily, 10:00 am
Horzion: 5 days

¼ h resolution
Frequency: daily, 14:00 pm
Horzion: 5 days

¼ h resolution
Frequency: 15 min
Horzion: Rest of day +
next day (as from 16:00)

PRE-Spot-Optimization for Primary Reserve Market

PRE-Spot-Optimization for Secondary Reserve Market

PRE-Spot-Optimization for Day Ahead Market

Post Spot Optimization Day Ahead

Day Ahead Optimization 15min Intraday Auction

Optimization in Continuous Intraday Market

Stack of Primary Reserve market offers

Stack of Secondary Reserve market offers

Day Ahead Offer Schedule

Intraday Positions Marginal Prices (Buy/Sell) for multiple stacks

Primary and Secondary Reserve Market Prices

Secondary Reserve Market Prices Primary Reserve Position

Primary Reserve Position Secondary Reserve Position

Day Ahead Asset Schedules

HPFC Availabilities of assets

Day Ahead Settlement Prices Day Ahead Position Primary Res. Position Secondary Reserve Position

Orderbook data Day Ahead and Intraday Positions

DT.Energy Database

Data Interfaces

External Systems

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New approach:
Full Automation with Optimzation+ AutoTrader

EPEX **NORD POOL**

Datenhaltung, Zeitreihenmanagement, autoTRADER & Fahrplanmanagement

iTRADE
LIKRON
PowerBot
VISOTECH

Preise

bid / ask

Preise & Position

Handels- Strategie
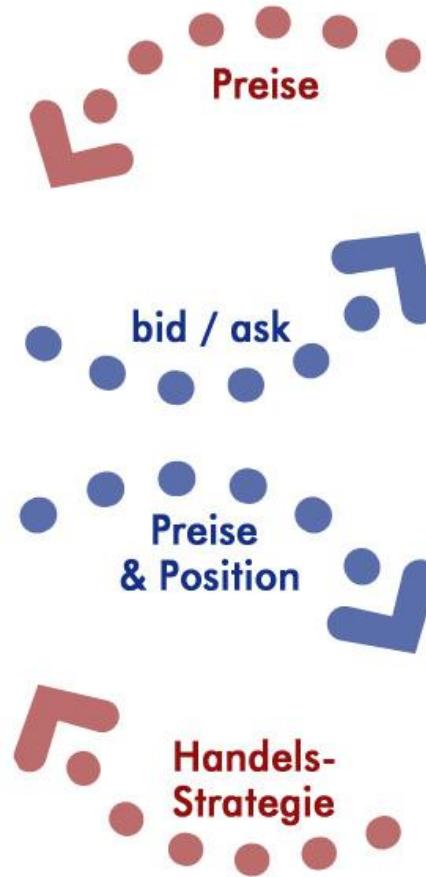
Optimierung von
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System Architecture (in MS Azure Cloud)
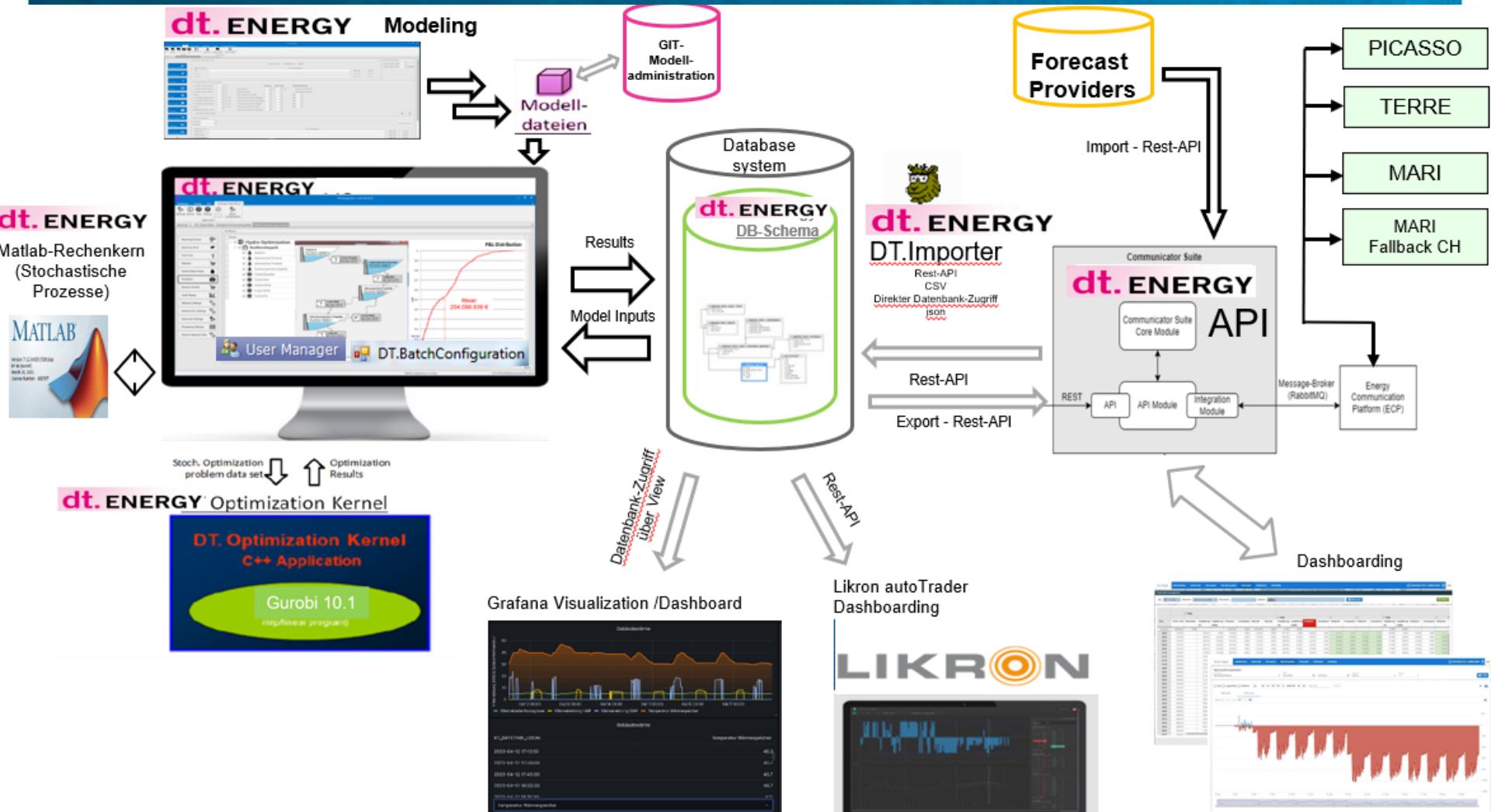
Additional portfolios

- **Complex power plant systems** (pump storage, cogeneration thermal systems, industrial manufacturing etc.) can only be marketed on the continuous intraday market through a **combination of optimization/marginal cost calculation + autoTrader**

- Further complex asset systems will follow:

Municipal utility in Germany, 4 Blocks of CHP production, 669 GWh annual heat production, 605 GWh power production (2022)


Renewable 16 MW Wind farm + hydrogen production + battery portfolio

40 MW paper mill, 30 GWh annual energy demand

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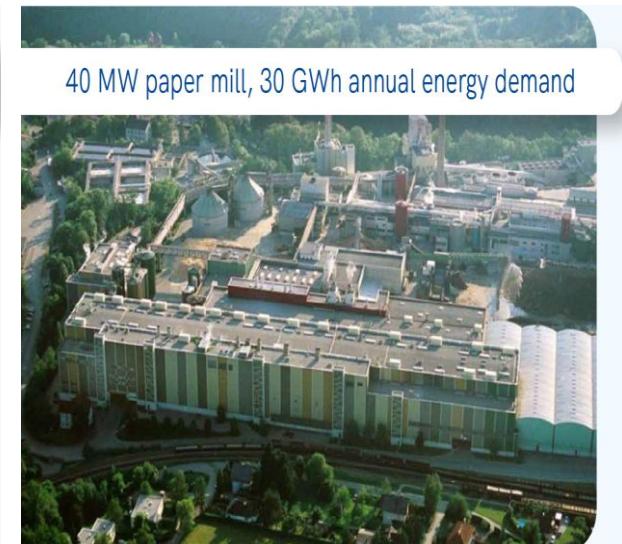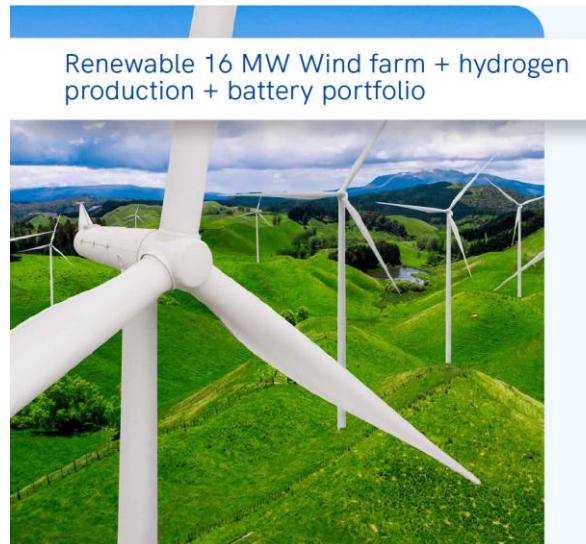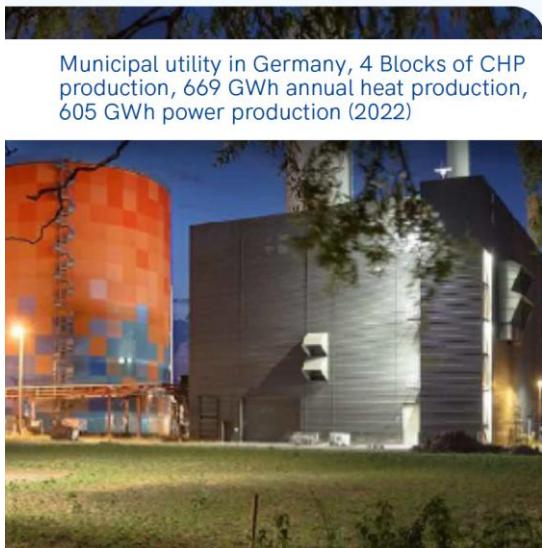
We look forward to your questions!

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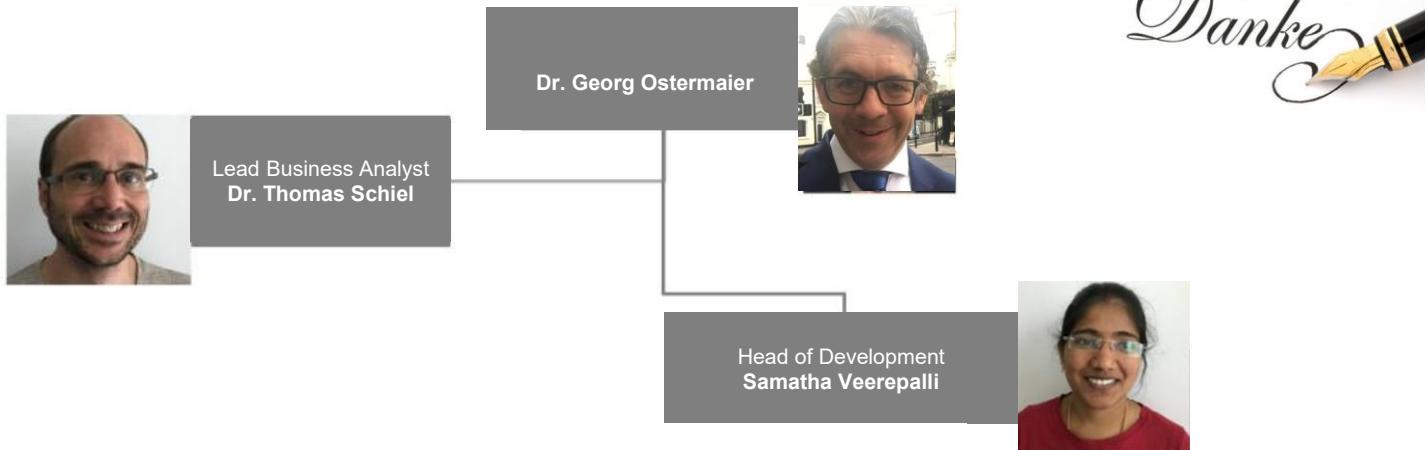
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