



Grundgrün Energie GmbH

**Trading Electricity from Renewables:
Competitive trading and marketing
of renewable energy power plants**

IEA Workshop, Paris, March 24, 2015



Grundgrün as leading energy services company focused on next generation power markets



Overview

Our customers

- Renewable energy producers
- Energy user, retailers & utilities
- Grid operators



Market focus

- Predominantly Germany, capabilities to extend across European energy trading pools
- Within top #5 trader of renewable energy in Germany, currently placing ca. 2.7 GW of power annually for over 250 wind, solar and biogas generators

Our state-of-the-art service delivery platform

- Arguably the industry's most efficient, cost-effective, scalable and flexible service delivery platform, creating significant competitive advantages in the rapidly changing wholesale energy services market
- Delivery of strategic, high value services
- Power forecasting and risk management capability, including integrated trading

Our services

- Wholesale power marketing & placement
- Balancing
- Procurement
- Demand response
- Portfolio optimisation
- End-to-end fulfilment services
- Billing
- White-Label / Multi-Brand
- C&I services

Our performance

Growth from launch in 2011 to ca. €132 million annual revenue in 2014

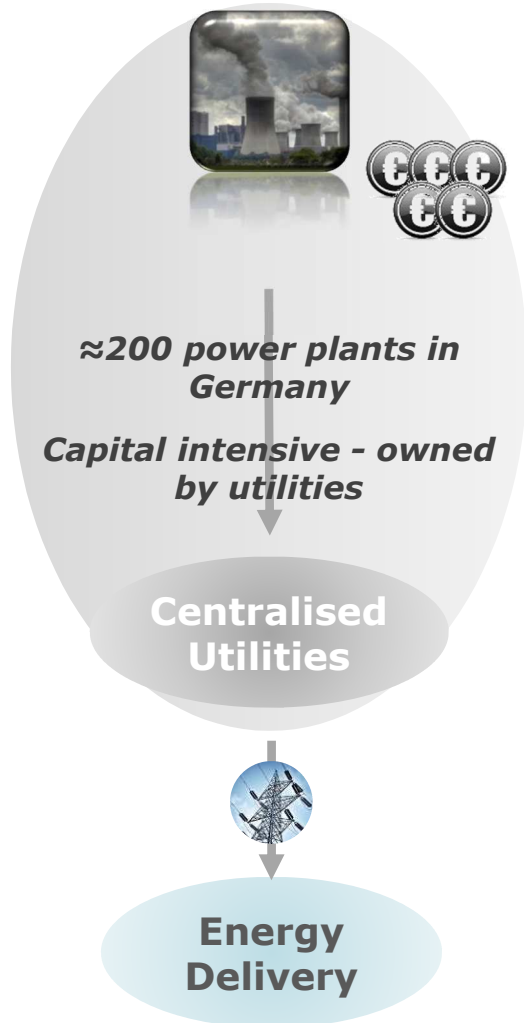
Employees & headquarters

65+ experts, based in Berlin
Management with over 100 years experience in the European energy and utility industry

Our platform is custom-built for the delivery of new energy services



The traditional market for centralised power is in terminal decline



Source: GG
March 2015

The new power market has become decentralised...



Dr. Felix Grolman – CEO

...and requires innovative services...

For renewable generators:

- Wholesale power marketing & placement
- Procurement, billing & end-to-end fulfilment services

For grid operators:

- Balancing
- Demand response
- Portfolio optimisation

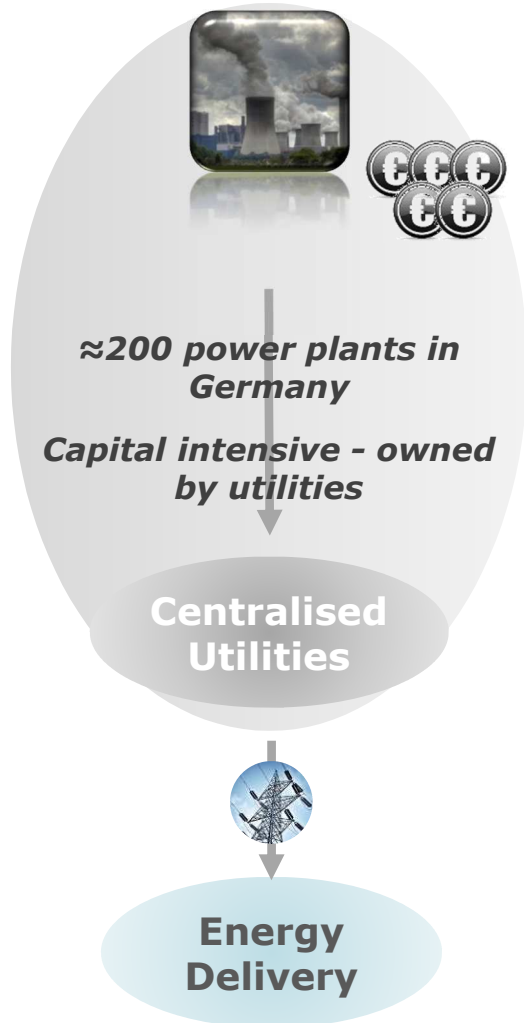
For energy users, retailers & utilities:

- White-label / multi-brand
- Procurement, billing & end-to-end fulfilment services
- Small PV marketing and placement
- C&I services
- Energy for mobility

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We have reached high competitiveness in renewable production, enabling matching of demand



Better forecasts

- Continuous improvement of weather forecasts
- Historical data available now for at least last 3 years

Monitoring, metering, modelling

- Continuous online metering of production
- Quantitative models, big data analyses delivering results

24/7

- Selling or adjusting the production at the exchange 24/7

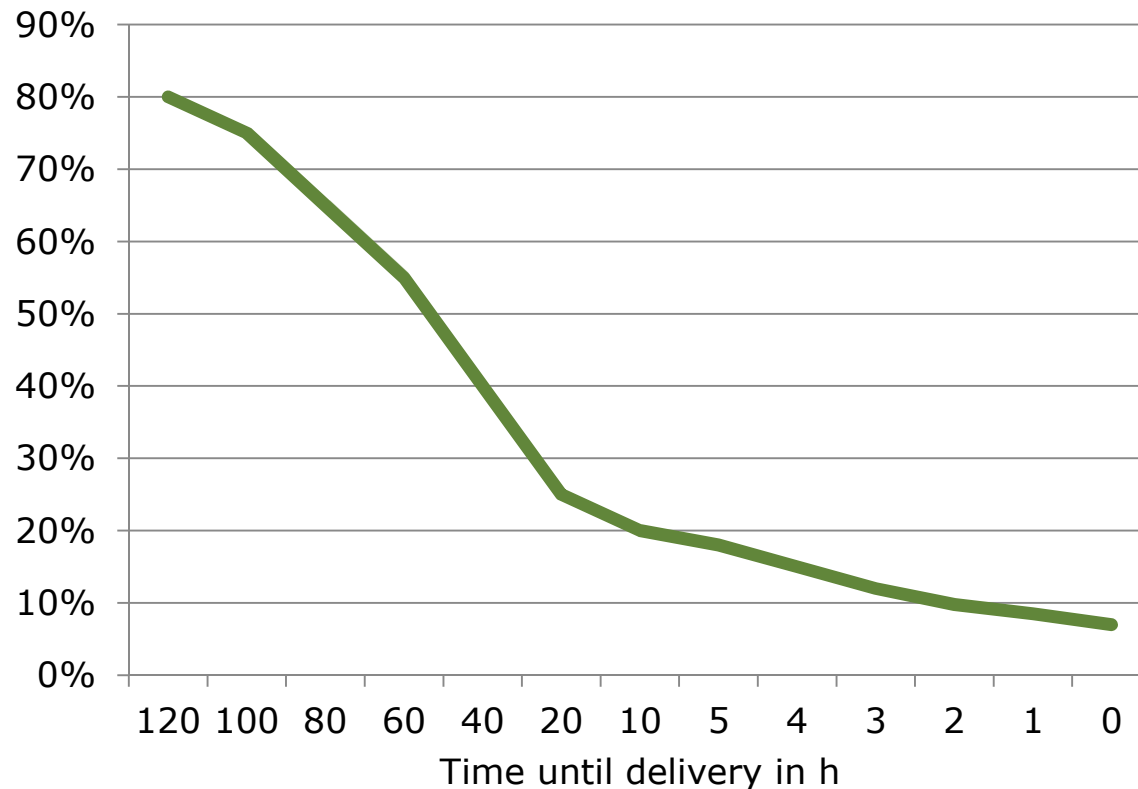
High resolution/frequency

- Quarter hourly resolution lead to marketing at the exchange 96 times a day

Better forecasts lead to lower costs ...



Forecast error by time until delivery in %



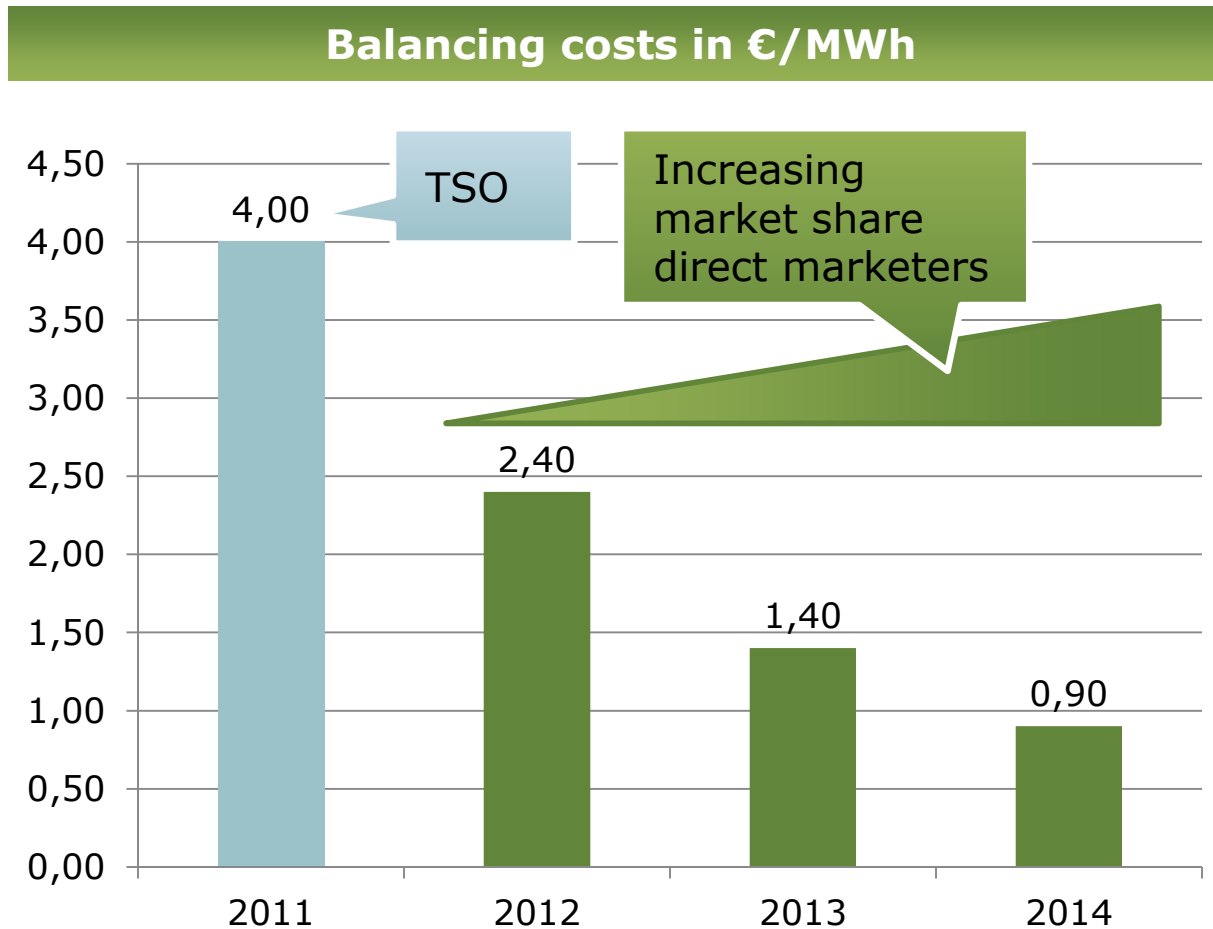
- Today the production prognosis has more than 90% accuracy 1 hour before delivery
- Gate closure before delivery will be reduced to 30 minutes in 2015⁽¹⁾
- Renewable index future on German renewable production will be tradeable starting this year on both Nasdaq OMX and EEX

(1) According to EPEX Spot
Source: GG

March 2015

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... that show in a decline of balancing costs



- TSOs were historically restricted to day ahead marketing of renewable production
- TSOs marketed by generating balancing costs of around 4 €/MWh
- Today the average direct marketer realises costs of around 1 €/MWh

Moving closer to efficient market price

Germany introducing marketing of small scale power plants




Regulatory background

- Starting 2016 direct marketing of renewable energy production is mandatory for power plants **< 100 kW**

Typical example

Small scale power plant in Berlin

- Capacity: 100 kW
- Yearly performance: 88.500 kWh
- Service fee: 0,1 Ct/kWh
- Annual Revenue: **88,50 €**



Market comparable to automated flow consumer business

Power marketing and placement becomes standardised process due to smaller asset size



Customer acquisition

- Acquisition and closings highly automated
- Preferably via internet

Contracts

- Standard terms and conditions
- No exceptions

Customer service

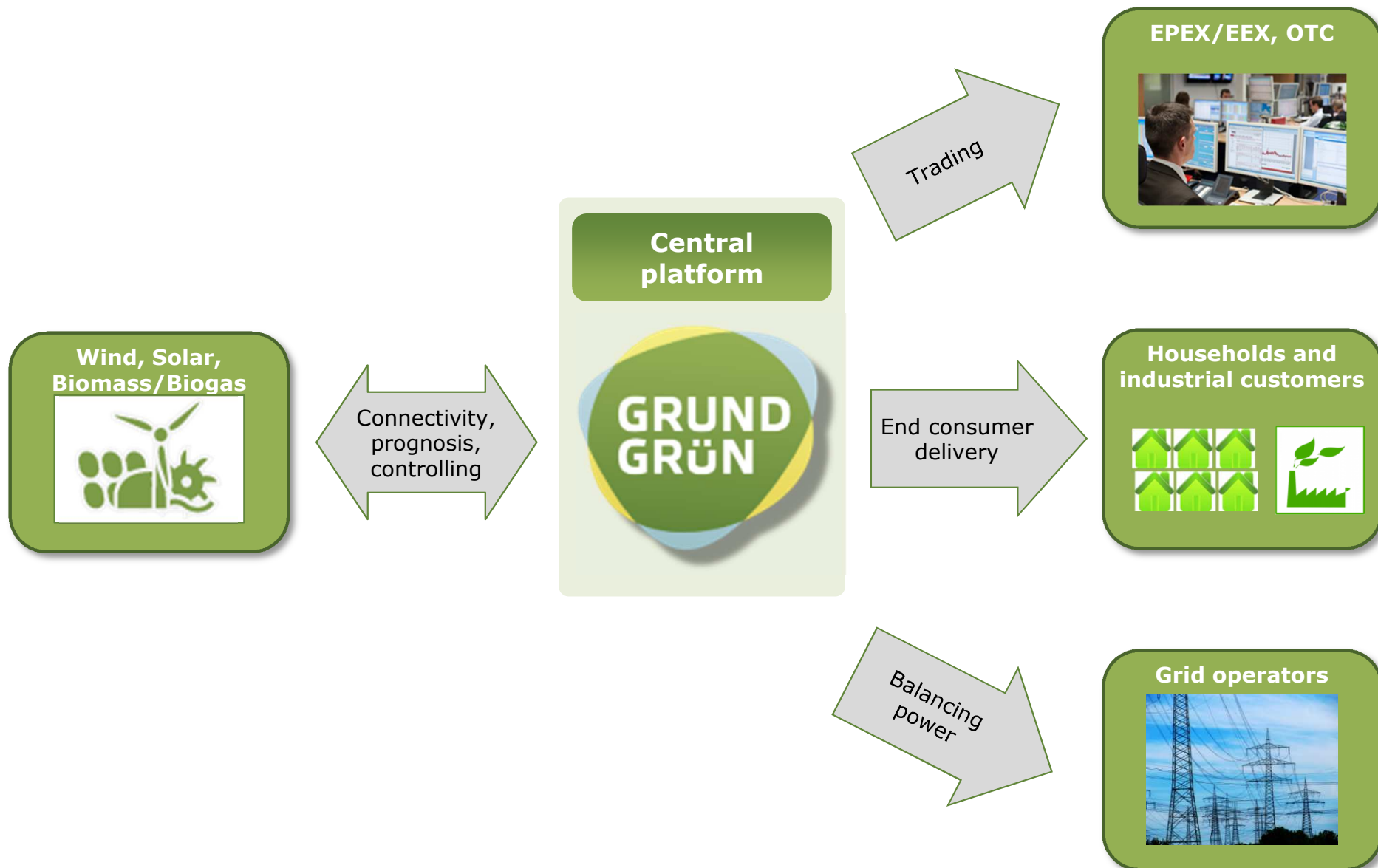
- Highly standardised
- Highly automated

Processes

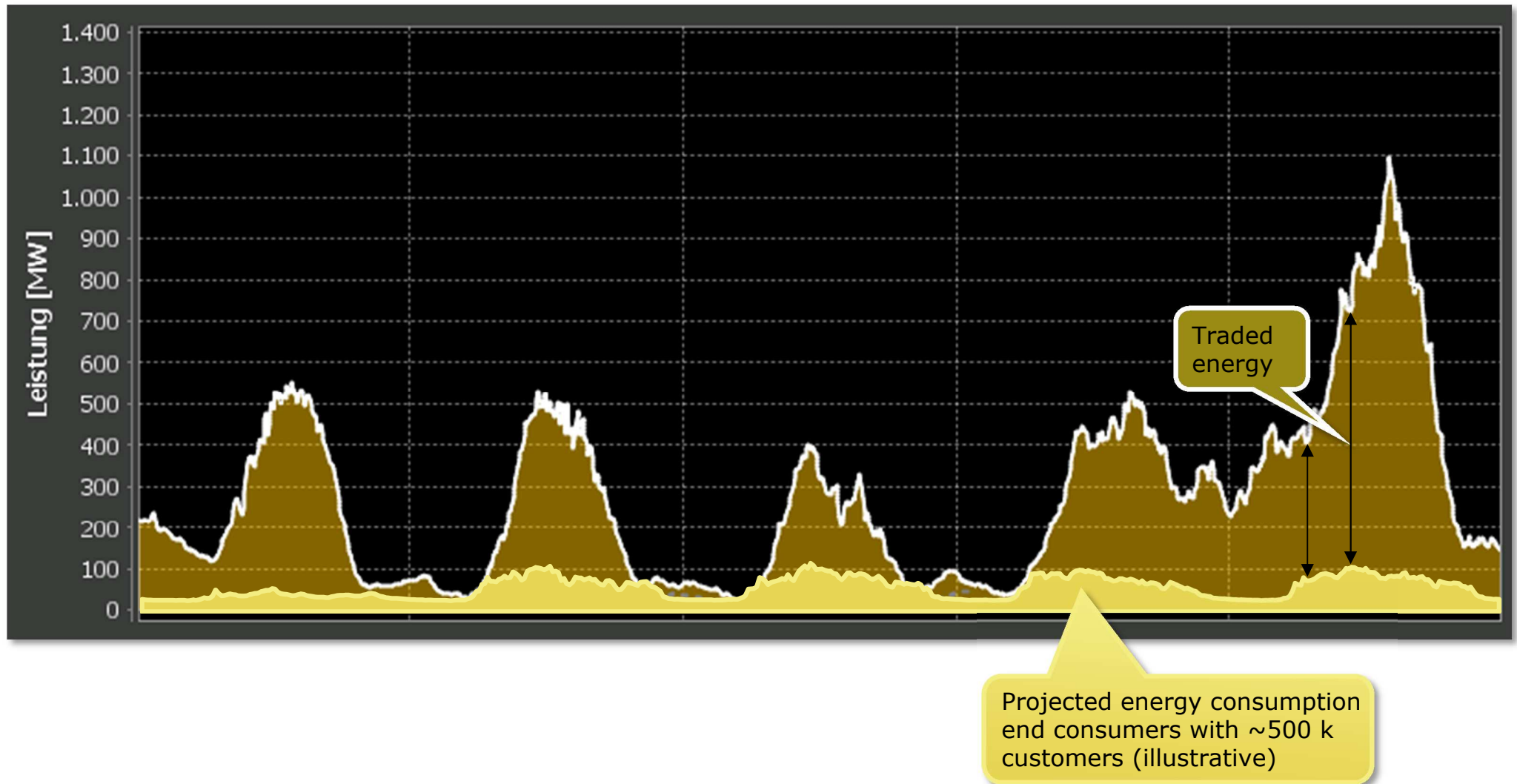
- Highly automated communications
- Automated data exchange with involved parties:
Plant owner, system/grid operators, other traders

Natural fit with mass end consumer processes and decentralised generation

We connect production with consumption directly to enable cost efficient access to renewable energy



Matching of consumption profile with production profile possible using market access for differences



Source: GG
March 2015

Dr. Felix Grolman – CEO



Thank you!

Dr. Felix Grolman

CEO

Grundgrün Energie GmbH

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