Digitalization and the Energy Sector

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100 YEARS MINING OIL SHALE

Enefit

Enefit

- Established in 1939
- 5800 employees
- 9 markets
- More than 25 subsidiaries and related companies
- 2.500 mln EUR investments during the last 10 years
- Group's net profit in 2017: 101 mln EUR
- Sales revenues of the group in 2017: 754 mln EUR

Customer Services

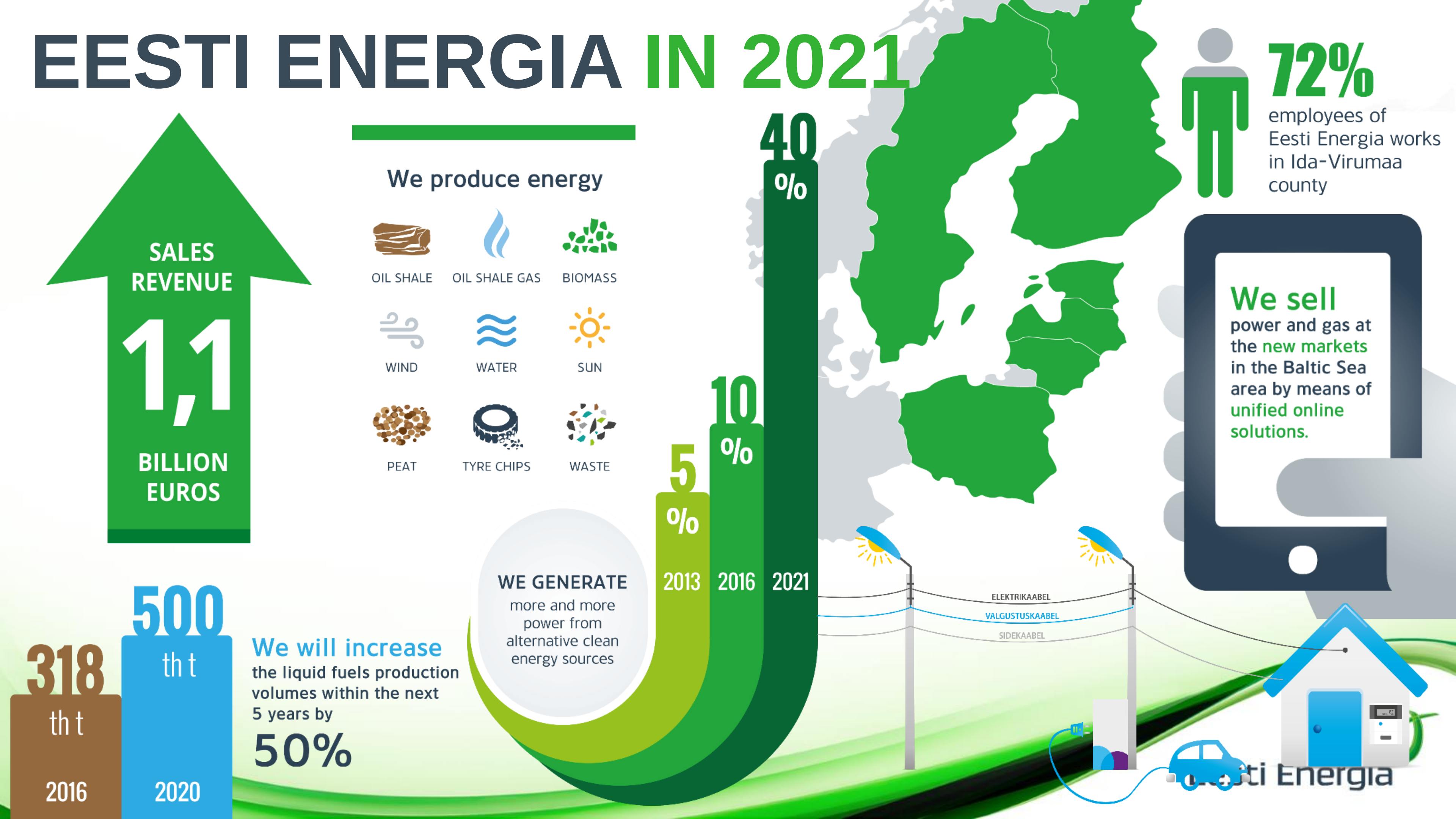
Renewables, incl. Waste to Energy

Large Scale Energy Production

R&D

Network Services


Our
Energy
Sources

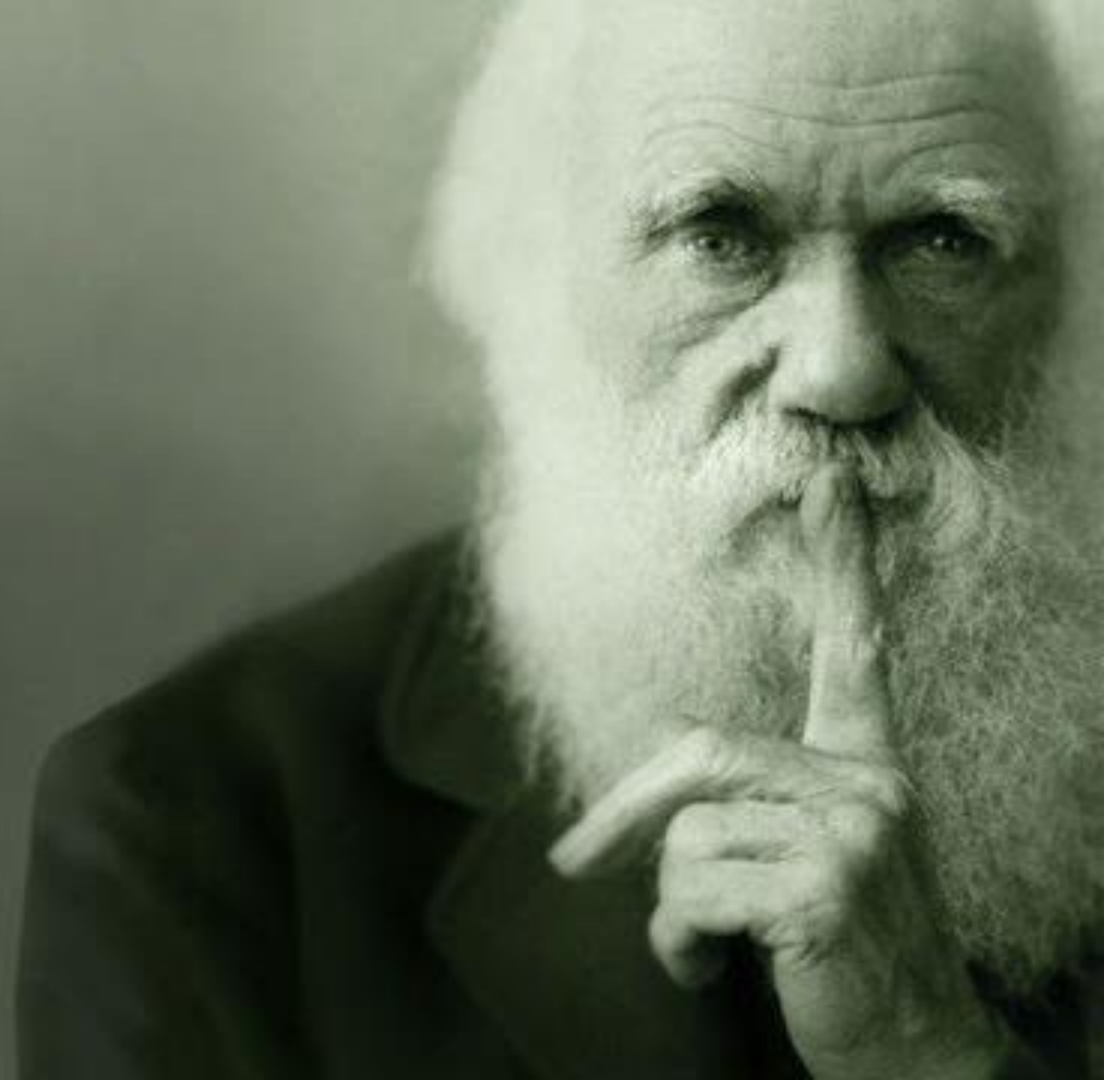

EESTI ENERGIA IN 2021
SALES REVENUE
1,1
BILLION EUROS
We produce energy
OIL SHALE
OIL SHALE GAS
BIOMASS
WIND
WATER
SUN
PEAT
TYRE CHIPS
WASTE
40 %
10 %
5 %
2013
2016
2021
WE GENERATE
more and more power from alternative clean energy sources
72%
employees of Eesti Energia works in Ida-Virumaa county
We sell
power and gas at the new markets in the Baltic Sea area by means of unified online solutions.
318
th t
2016
500
th t
2020
We will increase
the liquid fuels production volumes within the next 5 years by
50%
ELEKTRIKAABEL
VALGUSTUSKAABEL
SIDEKAABEL

Digitalization is driving the megatrends that are changing the energy industry.

Environment

Technology

Markets



Charles Robert Darwin
1809-1882

e-Estonia: 20 years of experience

- 1996 — e-Bank (hanza.net MITMEKORDSELT KASULIK)
- 1999 — e-Invoice for electricity (Enefit)
- 2000 — e-Tax (Republic of Estonia Tax and Customs Board; E-Tax/E-Customs; Enter with ID card)
- 2000 — m-Parking (Maksa mobiiliga; emt; TELE2; Bravocom; elisa)
- 2001 — e-selfservices for electricity (Enefit)
- 2001 — X-road (EESTI.ee Gateway to eEstonia)
- 2002 — e-School (eKool)
- 2002 — Electronic ID
- 2005 — e-Elections
- 2007 — m-ID
- 2007 — e-Police
- 2008 — e-Health (E-HEALTH)
- 2010 — Digital recipe
- 2012 — e-Population and Housing Census (Everyone counts!)
- 2014 — e-Residency
- 2014 — App for B2C (Enefit)
- 2016 — Smart grid of DSO (Enefit)
- 2017 — App for B2B (Enefit)

e-Energy: digitalization of Eesti Energia

Large-scale Energy

Productivity improvement, efficiency (Industry 3.5)

Energy Trading

e –Trading platform for producers and consumers

Grid

DSO digital product portfolio (incl Analytic Grid)

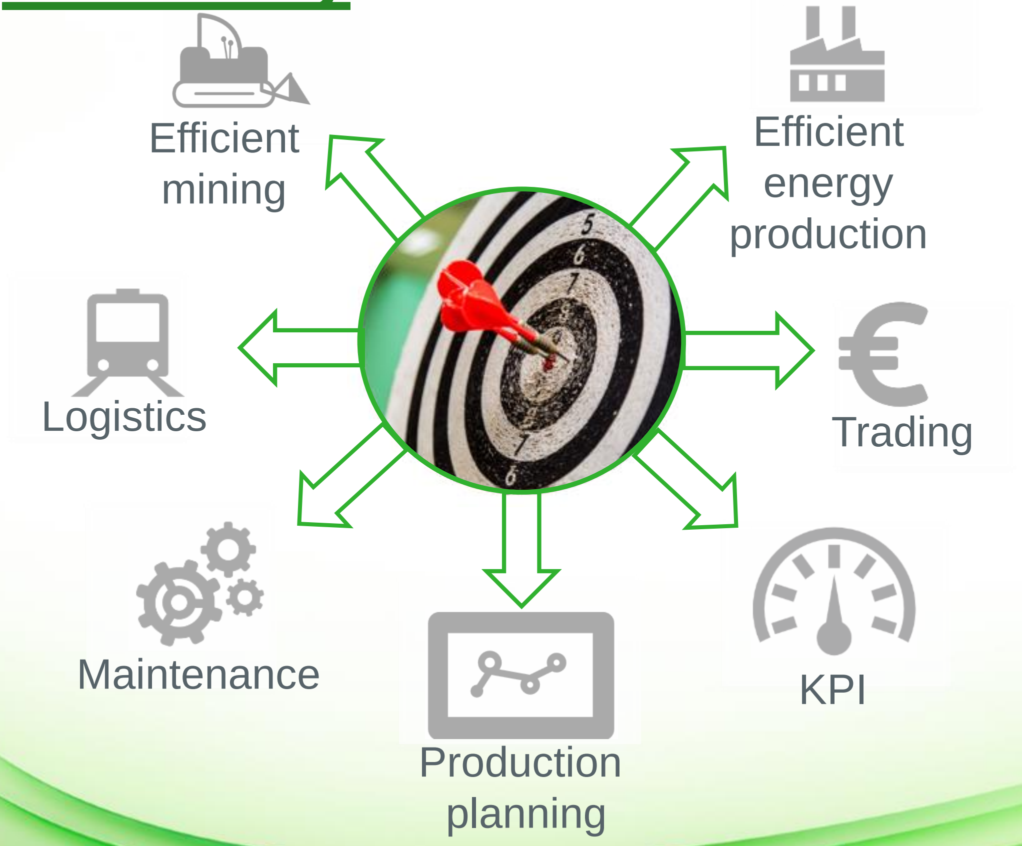
Customer Services

New markets entry,
New Services for Prosumers

- Modern working enviroment (Office 365)
- Bigdata & Data-based Mng
- OT/ IT infrastructure improvement
- Cyber and information security

Enefit

Digitalization means we need to use data more efficiently

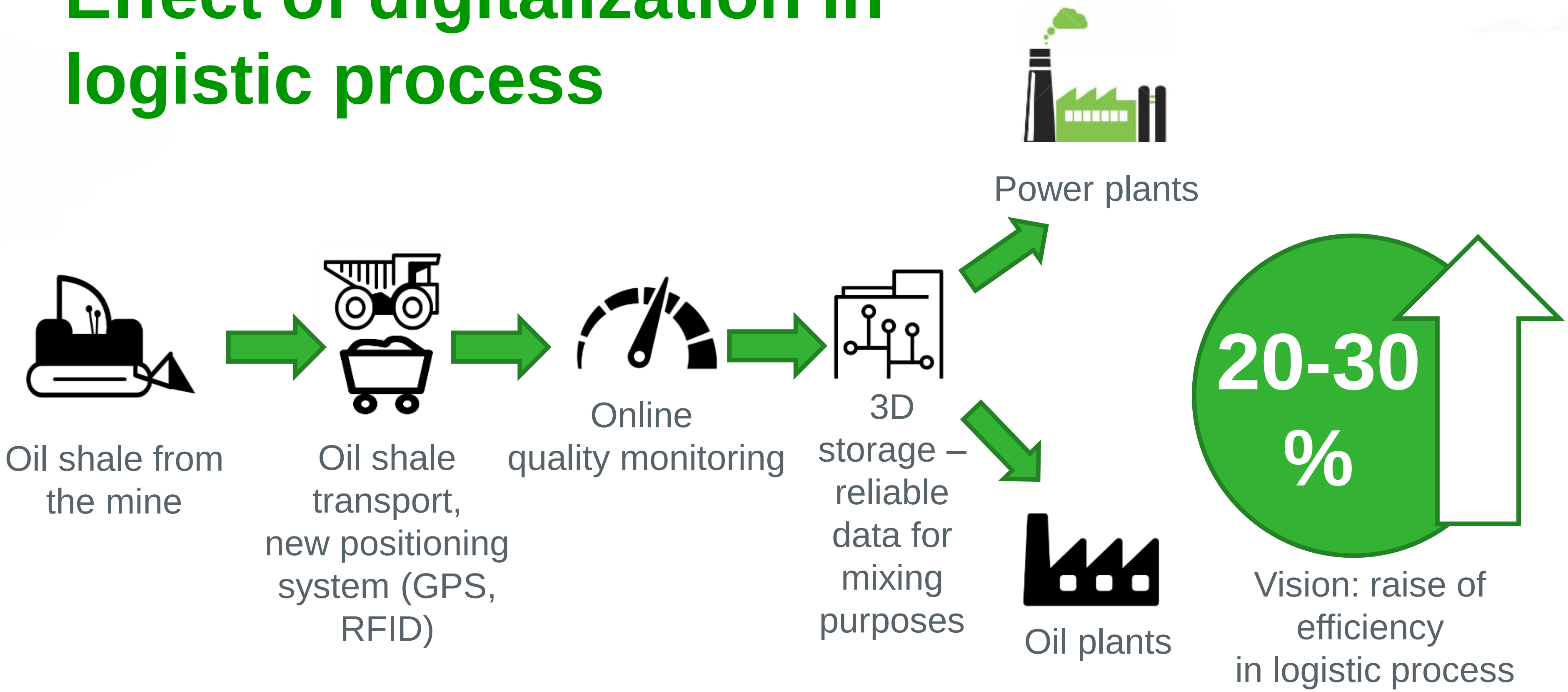


Engagement of more than 300 employees

In 2015 cooperation with PWC to find possibilities for efficiency in oil shale chain

Enefit

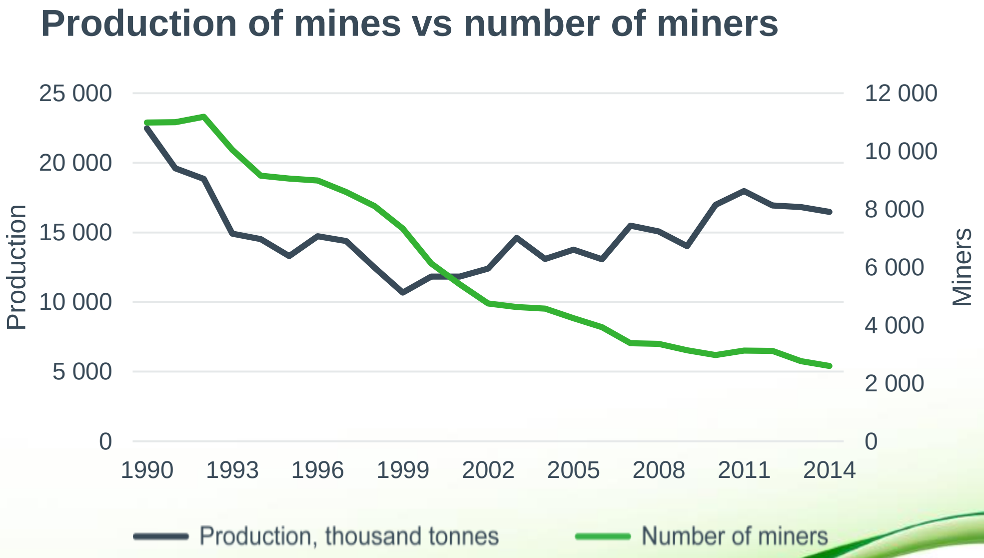
Effect of digitalization in logistic process



Improving Mining Efficiency

More than **1.1 billion tons of oil shale** has been mined in Estonia during 100 years

Longwall mining conveyers in Estonia mine



TSO functions as a data hub

- Personal data about consumption, production, seller authorizations
- Calculations of right amperage level
- Tools for apartment associations to bundle electricity agreements
- Consumer flexibility to the market
- Innovation: product development opportunities for start-ups

Digitalization in the grid

Fuse optimizer Voltage quality analyser Customer alerts and switching	Customer services	Network loss management	Monitor alerts Analyser Detection
Fault prevention	Investment planning	Fault elimination	Operative management

Self-learning algorithm for **communication baseline** definition

Self-learning algorithm for voltage baseline detection

Detect **change of consumption pattern** after work completion on meter

More Effective System Balancing

Consumers become part of system balancing:

- Effective response services for customers to shift the consumption curve
- Hourly data allows the TSO to follow the shift in demand curve

Digitalized production management enables producers to plan energy production more accurately (i.e based on fuel quality)

Eesti Energia’s new Auvere 300MW power plant can use up to 50% biomass

Elektrilevi – the largest DSO in Estonia

475 000 customers

649 000 metering points

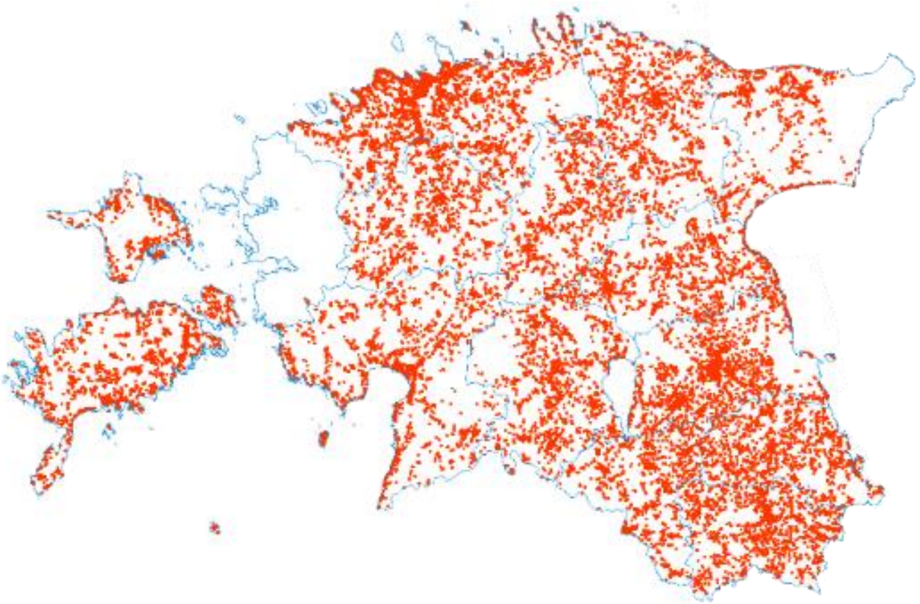
10 500 data concentrators

61 000 km power lines

24 000 substations

830 employees

90 % of network area



places of consumption

0-50 kWh/year

57 458 pcs

Eesti Energia

DSO's efficiency and customer satisfaction up

- **Network losses reduced by 20%**
  5,7% in 2012 => **4,1%** in 2016

- **Customer satisfaction increased**
  39 points in 2012 => **52** points in 2015

- **Customer inquiries reduced by 50%**
  Customer inquiries related to metering/invoicing
  305 339 => 145 754

Eesti Energia

Digitalization and customer services

Customer Services

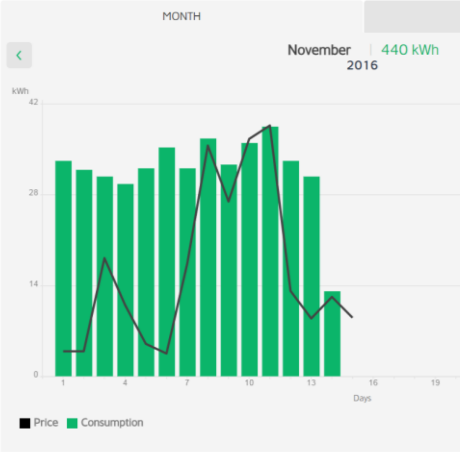
- Creating a common customer-based service platform for all 6 home-markets
- Piloting and commercializing of new value-added services
- Flexible sales, development and marketing analytics (to answer the questions: who, what, why and how)

Eesti Energia

Our goal is to be a leader in digitalization of customer services

Becoming digital (… – 2013)

- Only digital contracts
- Digital invoices
- Remote monitoring



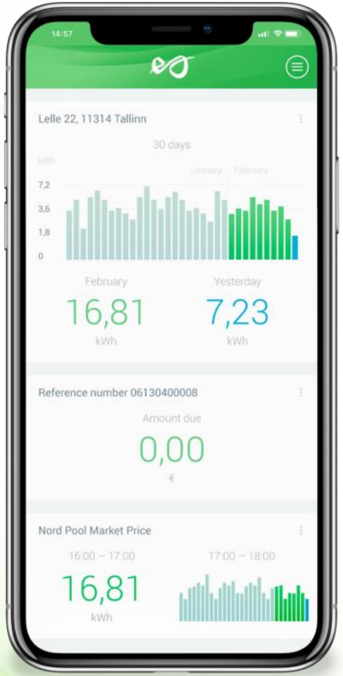
Becoming „mobile“ (2014-2016)

- Smart meters
- Mobile app (consumption history, invoices, contract info, notifications for price increase)

Becoming „smart“ (2017 – …)

- Demand-side management
- Distributed generation
- Storage and virtual power plant
- Prosumers

Sales & service => becoming „mobile“ (2014 – 2017)



App for B2B and B2C clients that shows:

- Consumption history & data
- Billing information & payments
- Price alarms & updates for the next day
- Electricity contract information

- More than 24 000 monthly users

„The best m-service in the Environment Category“
World Government Summit 2017

„2017 Best Energy-Saving App Baltic Award”
Capital Finance International

Eesti Energia

Active market and smart services

- Switching is easy, consumption data is available
- Solutions for analyzing electricity consumption
- Solutions for shifting energy consumption to off-peak hours
- Smart solutions on when to buy energy and when to use stored energy

>100% meters + smart metering
Reduced Network losses 5.7% -> 4.1%
Client satisfaction has doubled

>94% of our clients are served online
E-service, mobile app, smart metering

>90% of all electricity contracts are signed or prolonged digitally
Online self-service; e-mail

>90% of all invoices are sent/received digitally
E-mail; sms; online self-service

>50% increase of active mobiile app users in 2017

Enefit


House
of digitalization
Online client services
Smart grid
Big data
Data HUB
Smart meters
Regulations
What are the
next steps?
We have the base structure
(first floors)
The foundation
(regulations)

Estonia as a Test Lab

- 100% smart grid and smart meters
- Data HUB
- Online client services
- Digitalization of production processes

Estonian experience to share

OUR KNOW-HOW	SERVICES
Legislation consulting	• Legal analyses for smart metering system, data hub, operating model of the retail market, one invoice
Business consulting	• Procuring and contracting smart metering systems • Procuring and contracting data hub solutions • Test laboratory for DSO-s • Digitalization of energy retailers´ business processes (sales, billing & debt, customer care, consumption data, forecasting)
Project management	• Managing smart metering projects • Managing data hub projects • Digitalization of energy retailers´ business processes (sales, billing & debt, customer care, consumption data, forecasting)
Development & implementation	• Data hub • Services for end-users => * e-channel solutions (contracts, invoices, consumption data, etc – electricity & gas) * mobile app (electricity & gas) * consumption management services

For energy sector digitalization IS THE WAY to survive

Enefit