Schneider Electric

World's leading expert in energy management

a leading developer and supplier of integrated energy-efficient solutions for

- energy and infrastructure
- industrial enterprises
- civil and residential buildings
- data centers

energyadvice.ru

Schneider Electric: Mission and values

Access to energy is a fundamental human right

1.3 billion
people do not have access toelectricity

+1 billion
people use low-quality electricity

2.4 million
households got access to energy thanks to our programs

70,000
people from low-income segments of the population were trained in energy

Schneider Electric key worldwide values

170,000
employees in more than 100 countries

200
factories worldwide

1,500
experts in energy supply

20
of the world's largest oil and gas companies use our solutions

11
large international companies in the field of FGCG are our customers

300,000
sites run in more than 100 countries

9 of the10
largest mining and metallurgycompanies use our products and solutions

Schneider Electric in Russia: a success story

1974
Equipment for the Samara Refinery

1993
Establishment of Schneider Electric representative office

1997
Establishment of Schneider Electric ZAO

2006
Opening of the Regional Distribution Center in Moscow Oblast

2005
Opening of the Customer Support Center

2008
Opening of a factory in Kazan and a logistics center in Yekaterinburg

2010
Establishment of a plant in Leningrad Oblast

2012
Opening of the third logistics center in the Far East

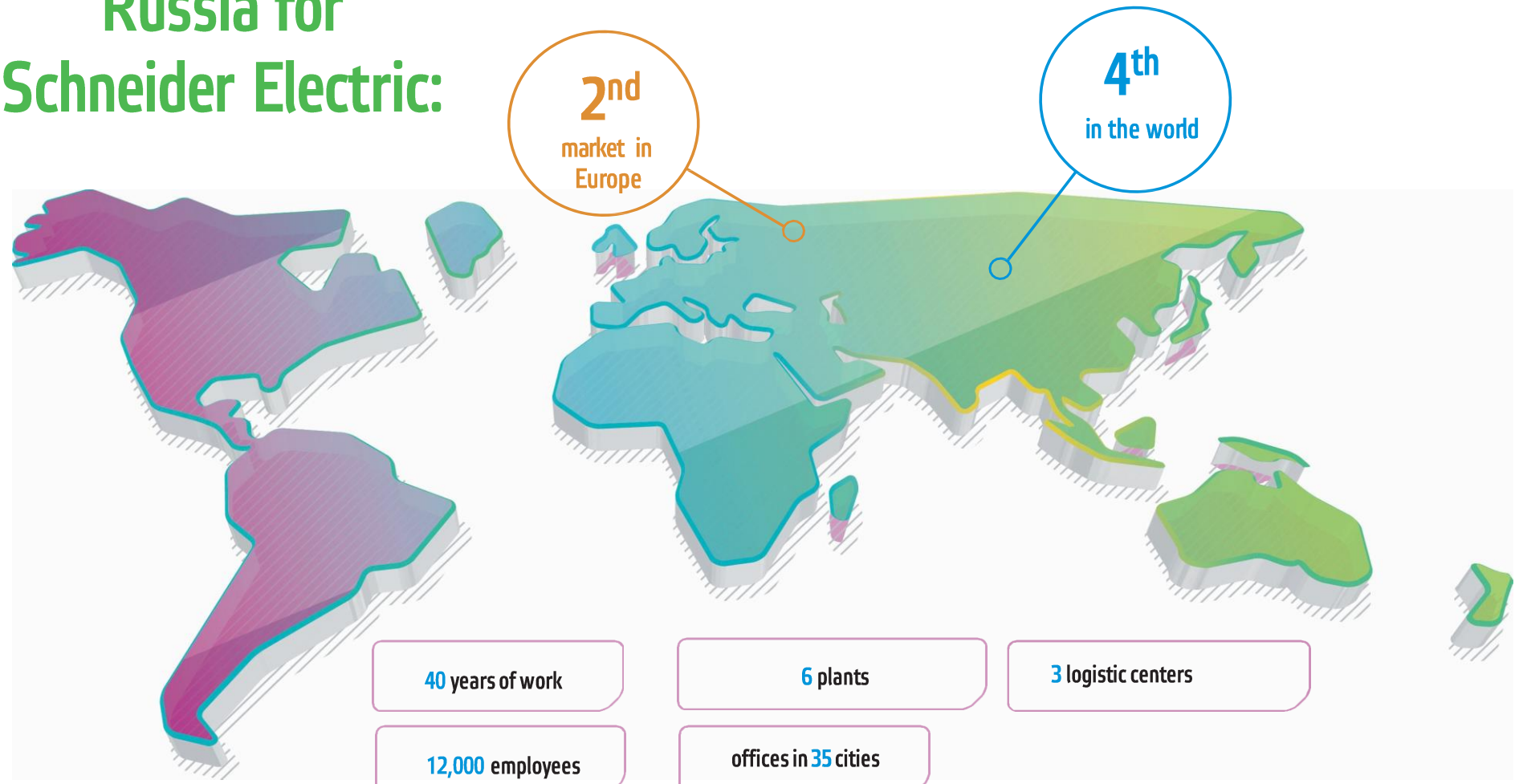
Opening of the international scientific and educational center based in SPbPU

2015
Acquisition of transformer production plant in Samara

2013
Agreement on the establishment of an R&D Center in Skolkovo

Schneider Electric in Russia: development continues

Russia for Schneider Electric:



40 years of work

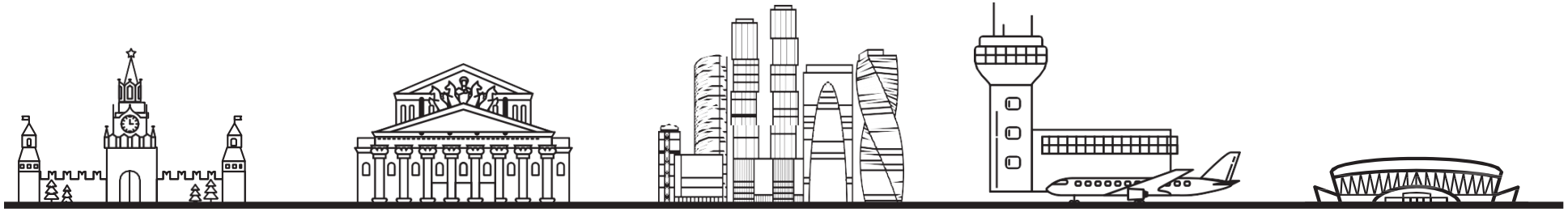
6 plants

3 logistic centers

12,000 employees

offices in 35 cities

Schneider Electric in Russia: we are trusted with the most important tasks



The Moscow Kremlin

The Bolshoi and the Mariinsky Theaters

Moscow International Business Centre

Airports of Moscow and other cities

Fisht Olympic Stadium in Sochi

Gazprom, Transneft, Rosneft, Sibneft, Surgutneftegaz

Metallurgical and power grid enterprises

Breweries

Schneider Electric Services

Our goal is to support and increase the reliability, performance, convenience, and efficiency of your power system

Our businesses

- Energy
- Industry
- Projects via partners
- EcoBilding
- Retail
- Process automation
- IT solutions

ESS / Energy and Sustainability Services

Schneider Electric's Energy & Sustainability Services
- comprehensive energy management
- modernization of infrastructure and increase of energy efficiency
- systems of power supply control and reliability
- monitoring and analysis of energy consumption
- services for sustainable development
- management of energy resources procurement
- research and development of energy saving programs

ESS Schneider Electric: geography of activities

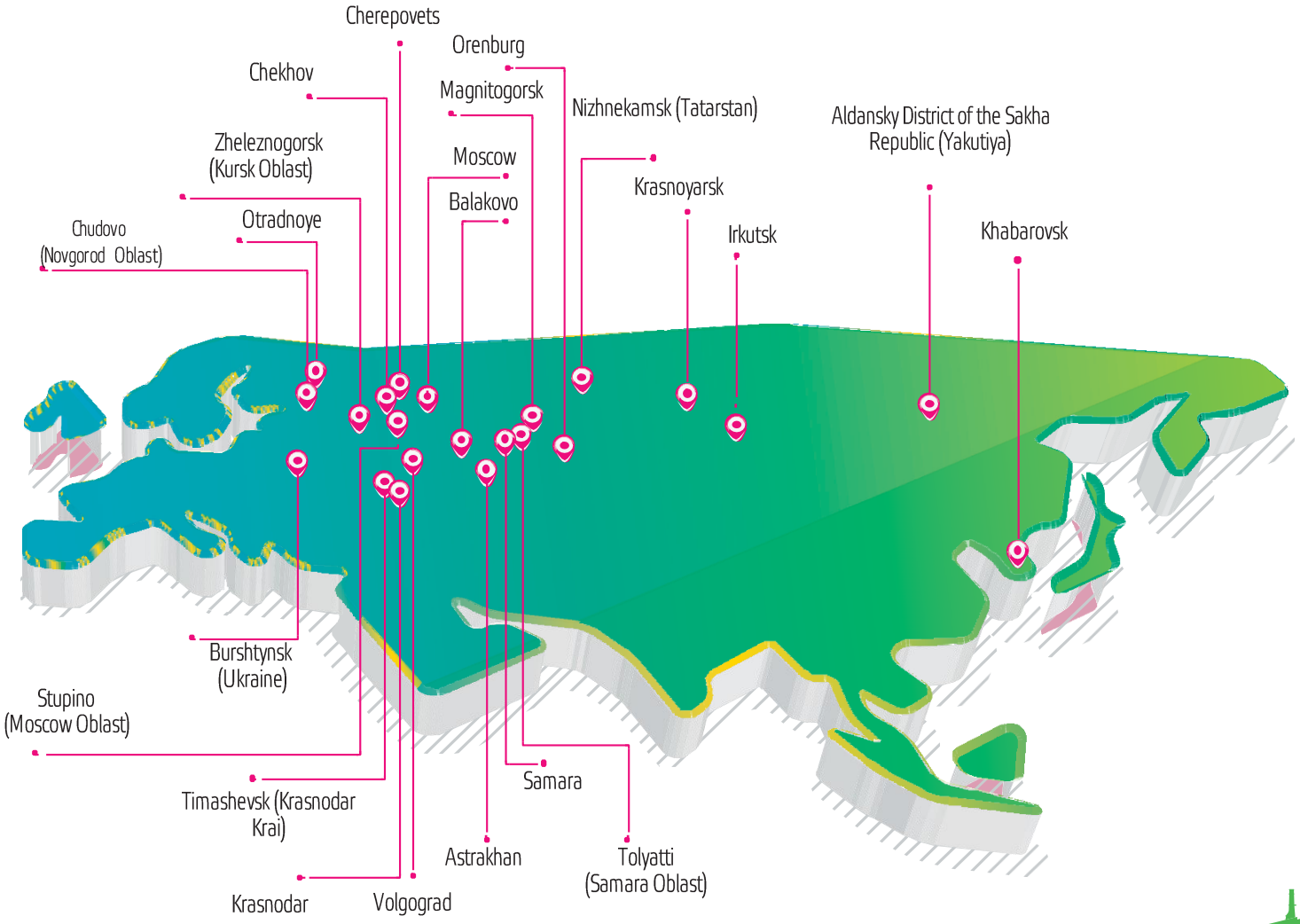
ESS experience in Russia:

5 years

of work in Russia and CIS

more than 50

projects implemented



World energy trends

2:1

Investments into renewable energy worldwide are twice as high as investments into traditional energy

$95.7 billion

The volume of trade in green bonds doubled in 2016 compared to 2015

$13 billion

Investments in energy efficiency reached $13 billion in 2015

80 %

of solar generation will reach the price parity with grid electricity in 2017

5,150 %

US companies purchased 5,150 % more green energy than eight years ago

World energy outlook

×2

increase of energy demand

÷2

CO2

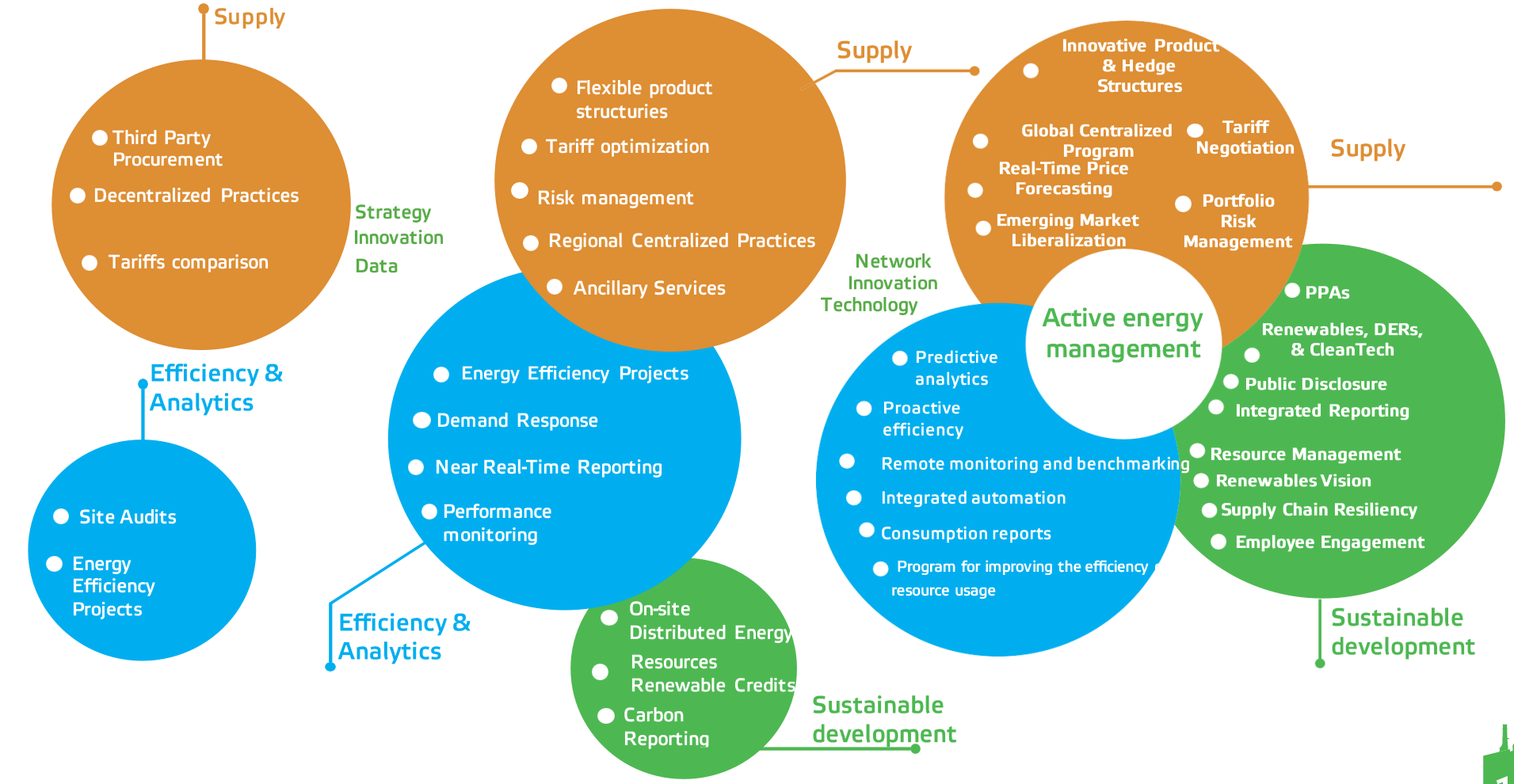
Reduction of green house gases

4×

more effective we should become

The Journey to Active Energy Management

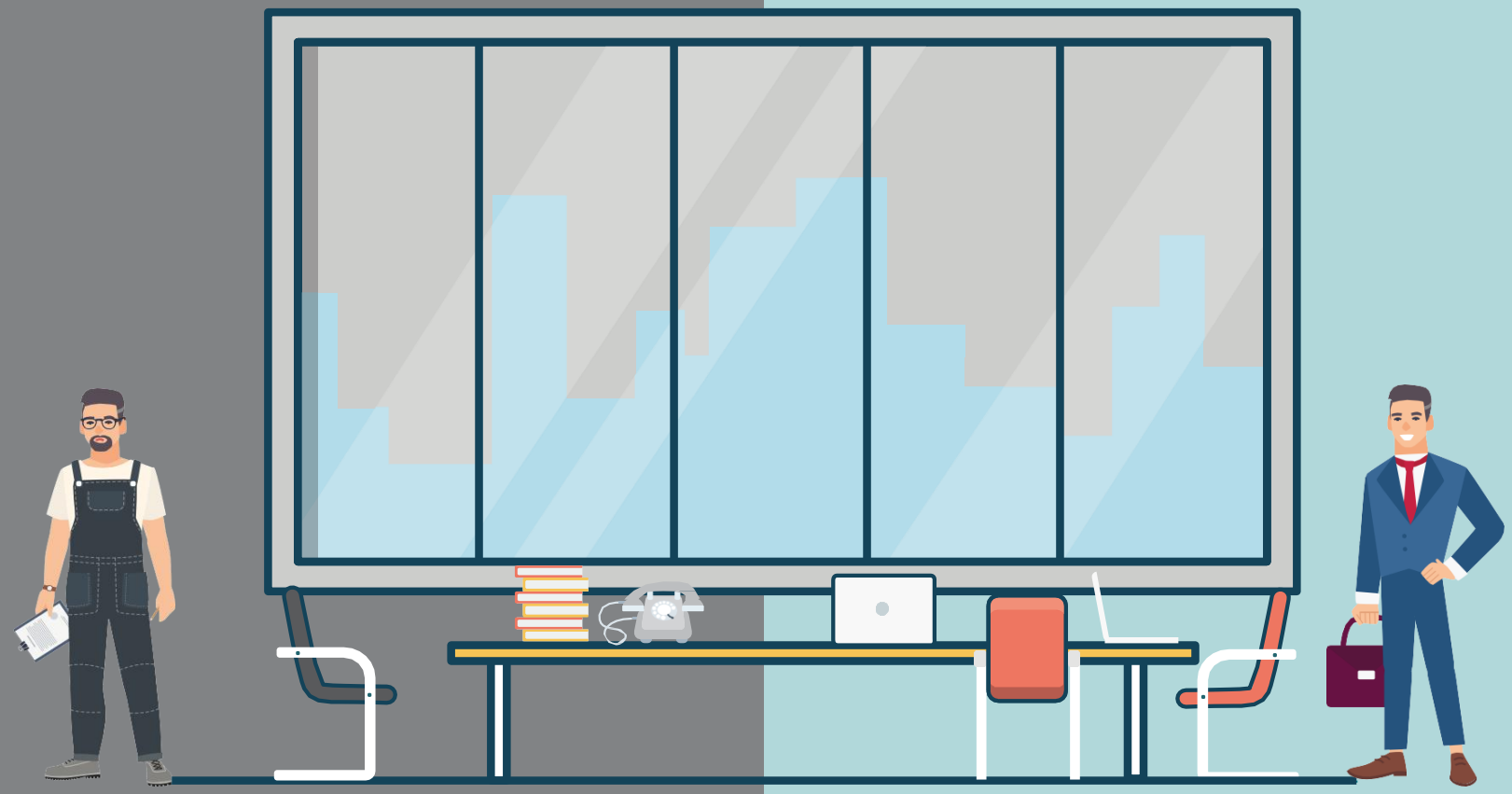
Schneider Electric



How much the electricity costs

Energy efficient infrastructure TODAY means innovations and higher life quality TOMORROW

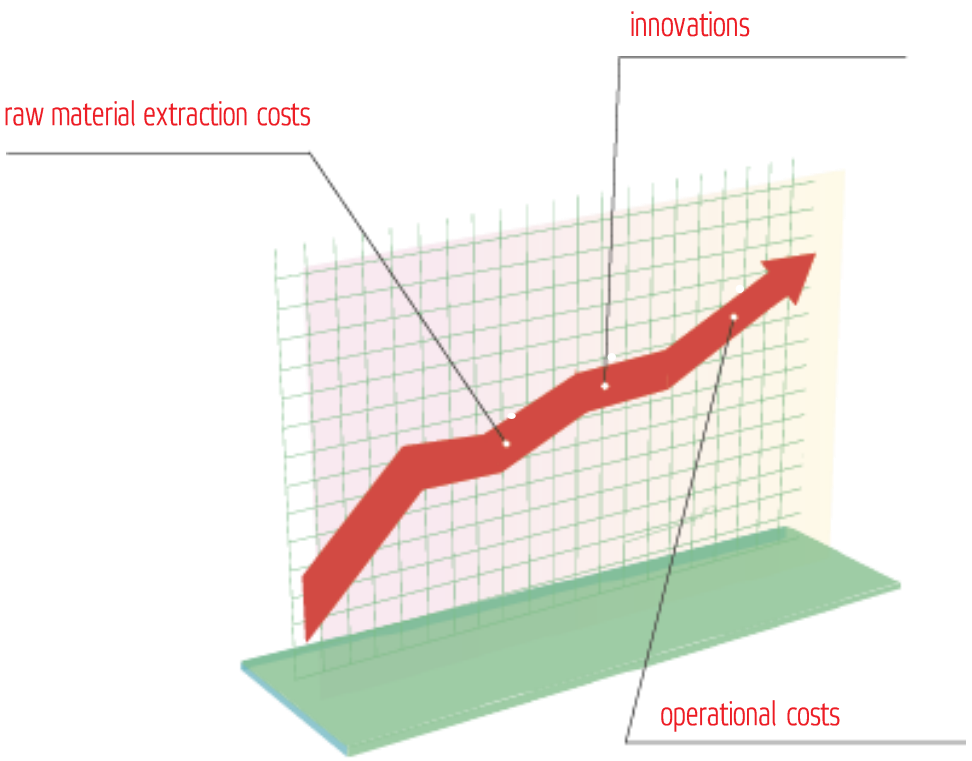
What motivates us for saving energy?

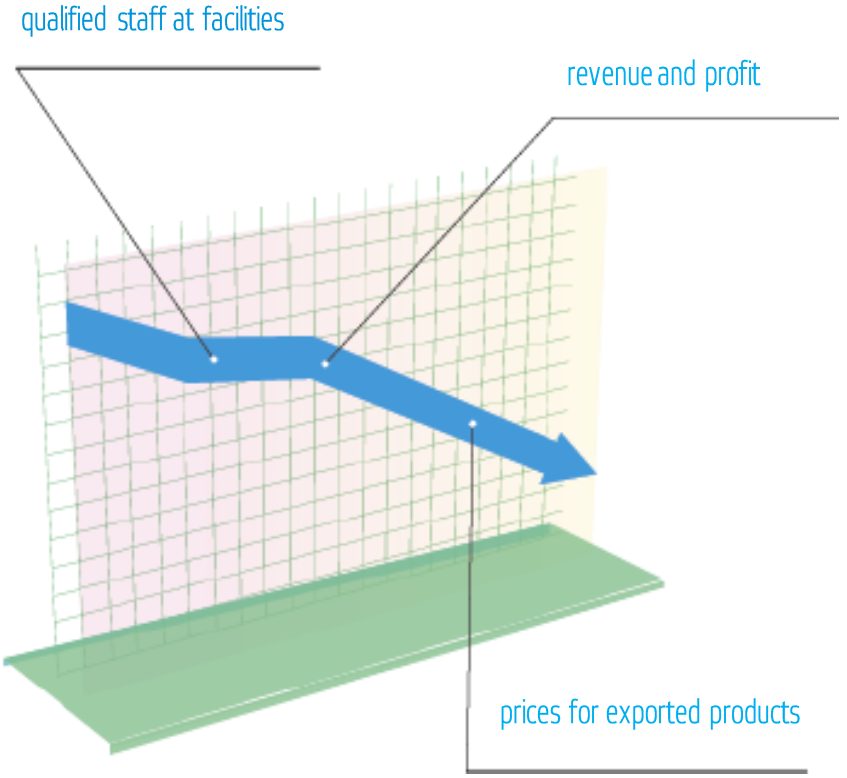


STAY IN THE PAST, USE INEFFECTIVE SOLUTIONS AND ALWAYS CATCH UP WITH THE OTHERS

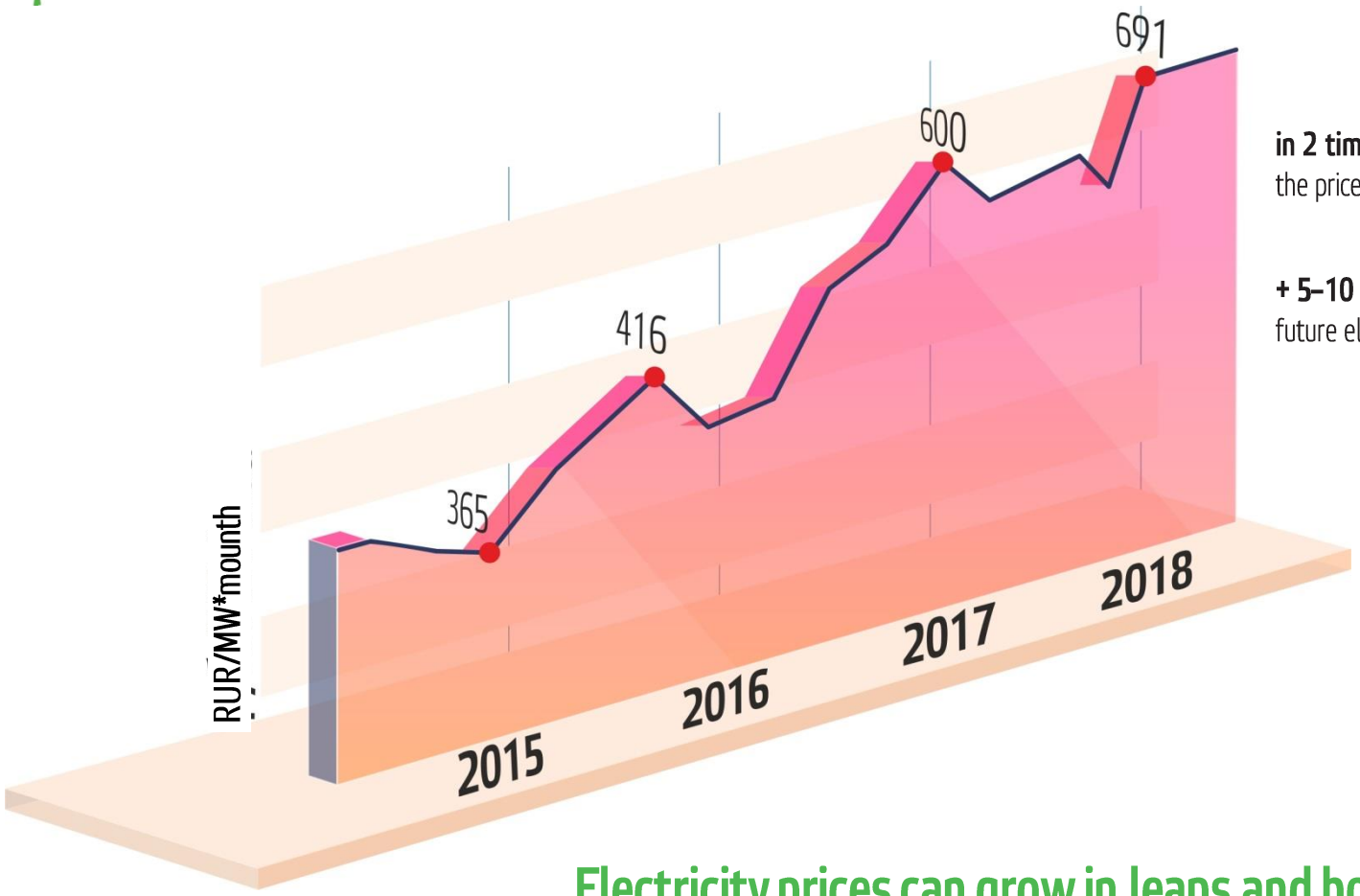
START TO BENEFIT FROM MODERN ENERGY INFRASTRUCTURE AND BE AMONG LEADERS

Modern industry challenges





Increase of price for electricity



in 2 times for 3 years
the price for power has grown

+ 5–10 % per year: the rate of future electricity price growing if natural gas price curbed

Electricity prices can grow in leaps and bounds, making it difficult to predict your costs

What do you pay for when purchasing electricity from grid?

As an industrial consumer, you pay for 3 types of subsidies

Population and regions

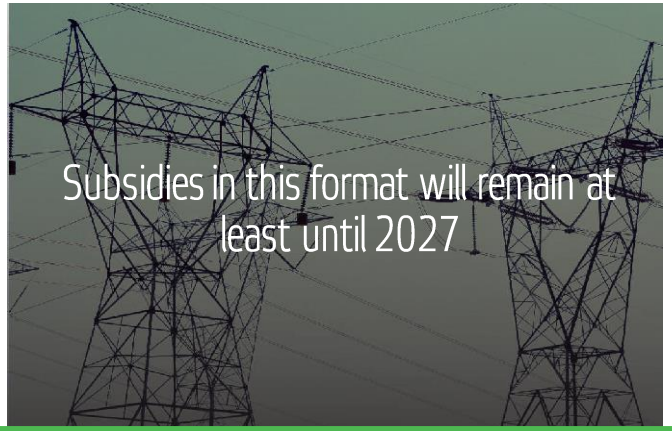
- Electricity price subsidies for the population (cross subsidization)
- The Far East
- Crimea and Sevastopol
- Yakutsk Oblast
- Neighboring energy-dependent states

Energy

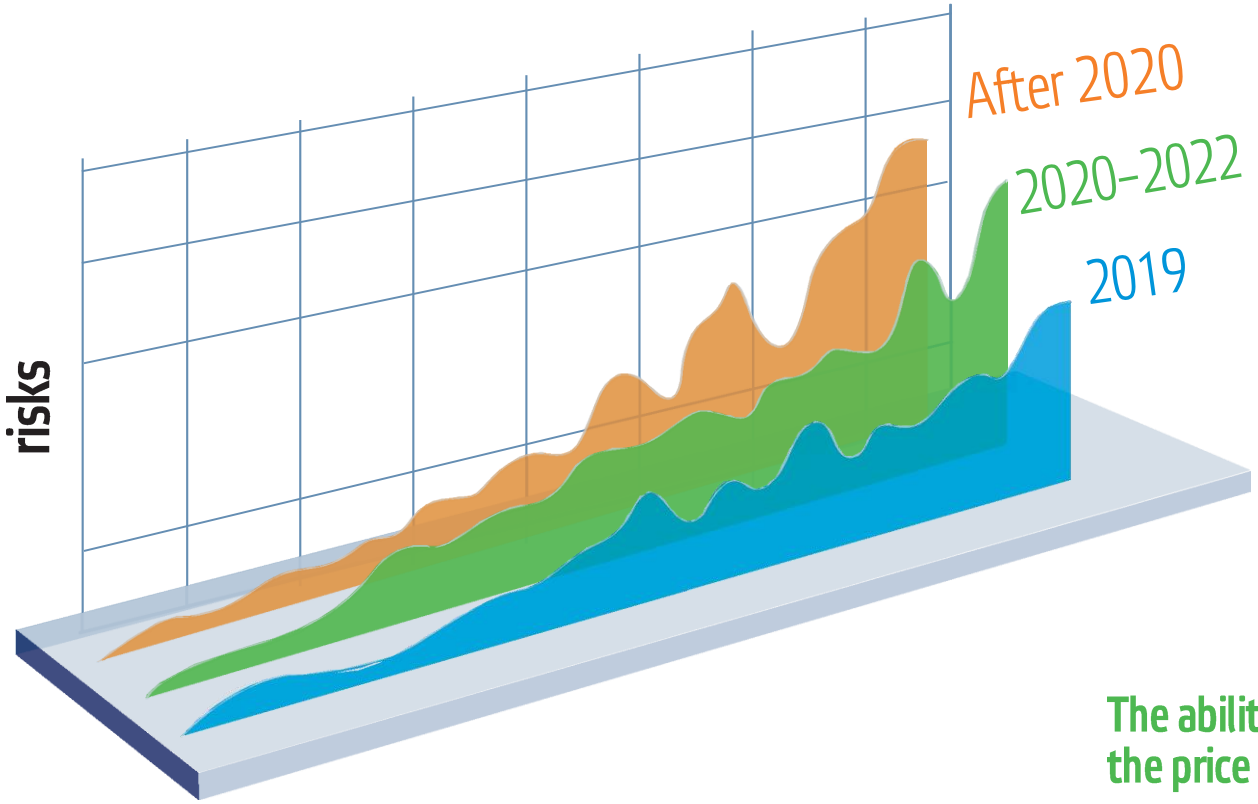
- Construction of power plants
- Thermal and nuclear power plants
- Hydroelectric power stations
- Solar stations / windmills
- Reconstruction of worn-out objects
- Investment program for power grids

Miscellaneous

- The program for the construction of waste-incineration plants in the Moscow Oblast and Tatarstan
- Peatery



Prerequisites for further price increase



DPM', The Program for Renovation of Old Power Facilities in the Energy Industry after 2020.

Commissioning of waste incinerators in 2020–2022.

Commissioning of nuclear power plants in Leningrad Oblast in 2019.

The ability of consumers to influence the price is very limited

Source:
encosts.ru; NP Market Council; Federal Antimonopoly Service of Russia

Your questions

Chairman, Board of Directors	How to increase EBITDA?
Financial Director	How to predict energy consumption accurately in order to avoid additional energy costs?
Chief Power Engineer	How to optimize energy consumption? How can I control the power supply?
Plant Director	How to reduce operating costs of the enterprise as a whole and per unit of product?
Production Director	How to analyze the efficiency in production processes in real time?

What happens if ...

You act independently

- Self-study and selection of the optimal strategy for energy optimization
- Increase of staff / distraction of other employees from their direct duties => increase in payroll
- Search for low-cost and fast payback solutions
- Taking risks
- Lack of guarantees

We face the task

01 Expert evaluation of the facility production processes

02 Identification of inefficient use of energy resources

03 Implementation of energy-saving measures

04 Specific key indicators of energy efficiency for different production units

05 Optimal tariff policy when purchasing of energy resources

06 Analysis of loads, power quality and optimization of the electrical circuit

07 Guaranteed result

Advantages of ESS Schneider Electric services

Do you have unique tasks?
We have the expertise that you can trust!

proven experience of increasing energy efficiency of industrial enterprises in Russia and the CIS

expert support of foreign colleagues

specialized solutions for different fields of industry

opportunities to save money in any conditions

THE RESULT IS FINANCIALLY GUARANTEED

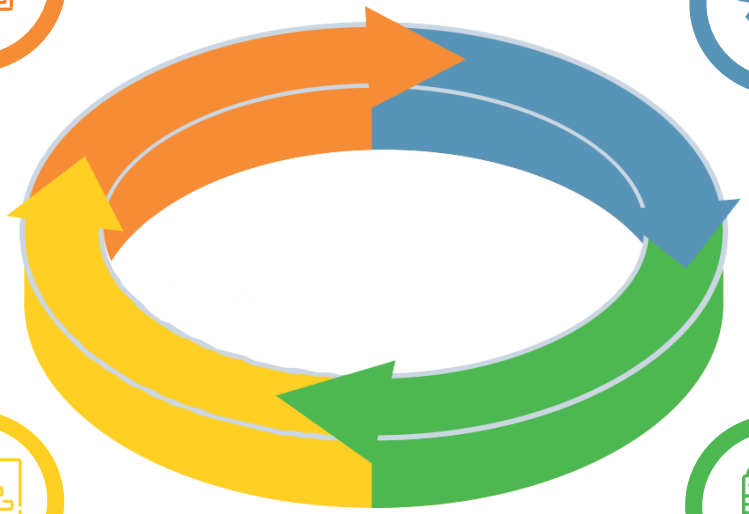
comprehensive methods for reducing energy costs and increase the performance of your facilities

Our mission is to help you produce more with fewer resources

Active energy management

Acquisition of resources:
- optimization of network connection
- reduction of natural gas purchase cost

Solutions:
- energy efficiency projects and technologies
- systems for optimizing production and technological processes



Resources monitoring:
- technical accounting power
- technology monitoring

Investment energy audit
- energy analysis
- measures
- energy efficiency indicators
- development of programs and action plans

Investment energy audit

2 types of energy audits:

Local,
focused on specific, most energy-intensive equipment.

Integrated,
affecting all power systems of the enterprise

We need:

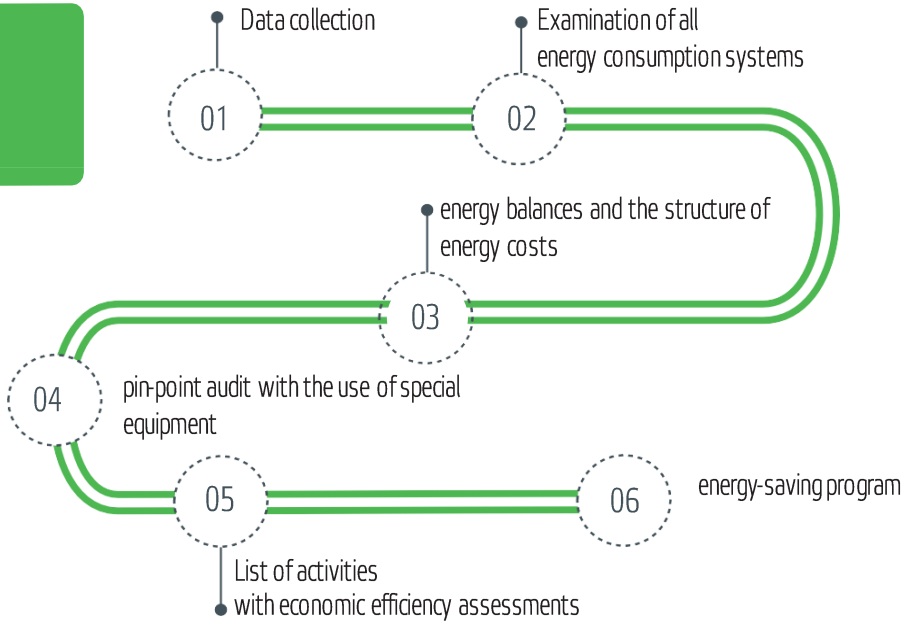
2 weeks to 6 months, depending on the site

What happens after the work is completed?

We stay with you and accept financial responsibility for the effectiveness of the implemented activities

What do we inspect?

- compressed air
- vapor
- self-generation
- thermal energy
- cold
- power supply systems
- power consumers
- pumping and ventilation systems
- engineering and lighting systems



Resources monitoring

Power Monitoring Expert is a complete solution for real-time monitoring of energy consumption which increases reliability and efficiency of power systems

integrated solutions for advanced technical accounting of all energy resources, including solutions with Russian-made meters

power quality analysis

integration with software products for commercial energy metering

integration with SCADA, BAC, DCS, ERP, BMS and other systems.

visual web -interface and expansion of reporting functions

Optimal configuration of old and new devices

- use of existing measuring instruments
- new devices manufactured by SE, as well as other domestic
- and foreign manufacturers

As a server we use

- existing equipment
- SE modem
- cloud solution

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Acquisition of resources

Optimization of grid tariff

01 SEARCH FOR BENEFITS

analysis of price categories of the guaranteeing energy supplier, verification of bills, optimization of payment terms

02 SUPPORT

tenders with the most competitive suppliers for energy supplies to customers

Reduction of natural gas purchase cost

01 TENDERING

with the largest independent gas producers on the market for gas supplies

02 CONTRACTS OF ANY DURATION

short-term (one year) long-term (more than five years)

Result: savings of energy costs up to 20 %

Active energy management

Solutions

Activities for energy efficiency improvement

- installation of variable frequency drives
- replacement of engines
- arrangement of economizers retrofit of resource supply routes
- optimization of ventilation, air conditioning and
- cooling systems
- modernization of lighting systems
- optimization of CIP at food industry enterprises
- and much more

We offer timely solutions based on reliable, comprehensive, and understandable data

examples are in the annex

The result is ensured by the integrated approach to energy management

Energy service is a business model in which the investments needed today are covered by energy savings in the future with a minimum risk for you:

01 we INTRODUCE energy-efficient technologies into your facility

02 you PAY for implementation of the project from saved funds AFTER THE RESULT IS ACHIEVED

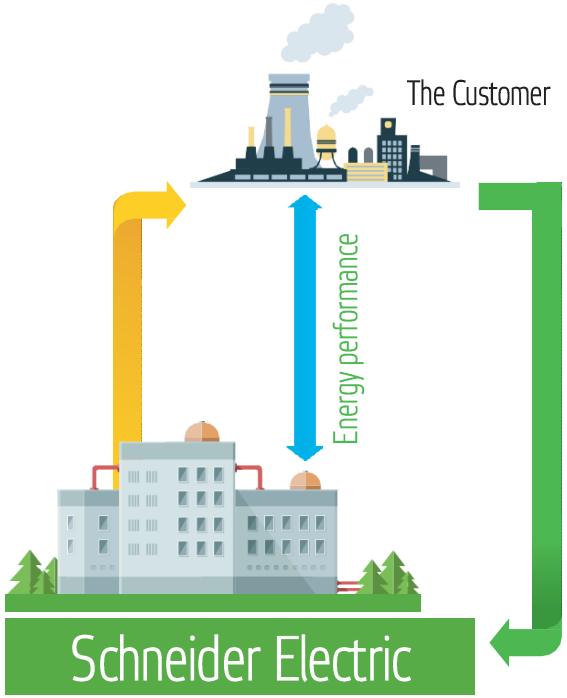
Implementation of energy service:

01 Using your own funds or from existing credit lines | ENERGY PERFORMANCE

02 Through the borrowed funds from energy service companies | ENERGY SERVICE

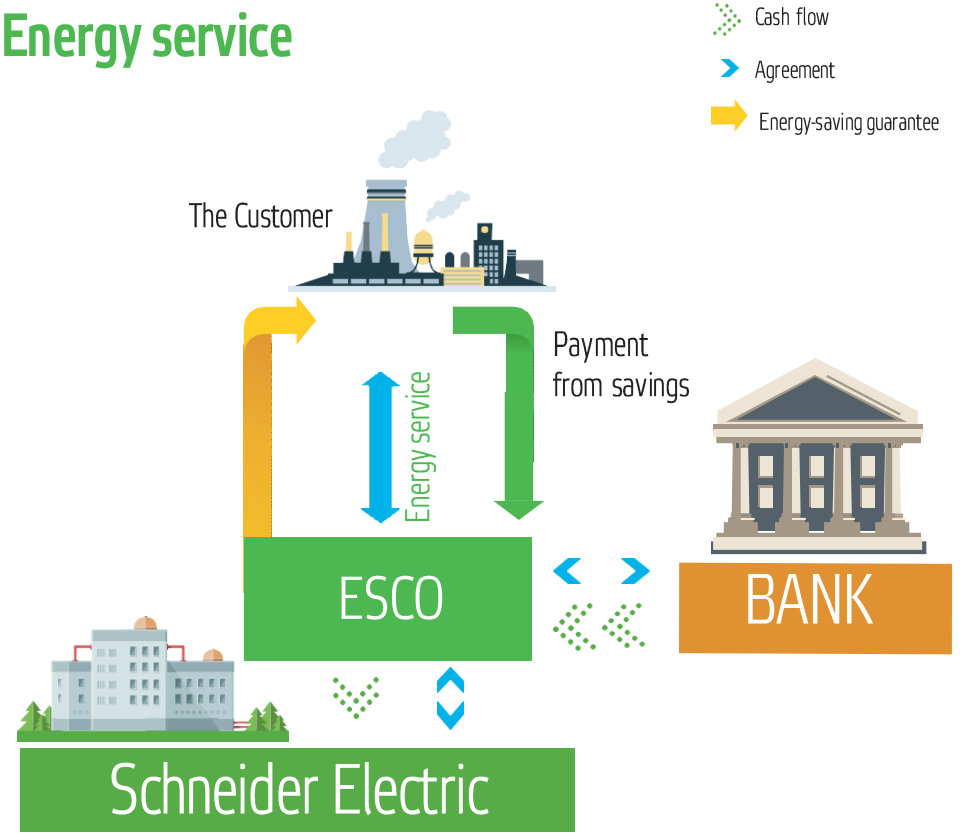
Energy service agreement: business models

Energy Performance

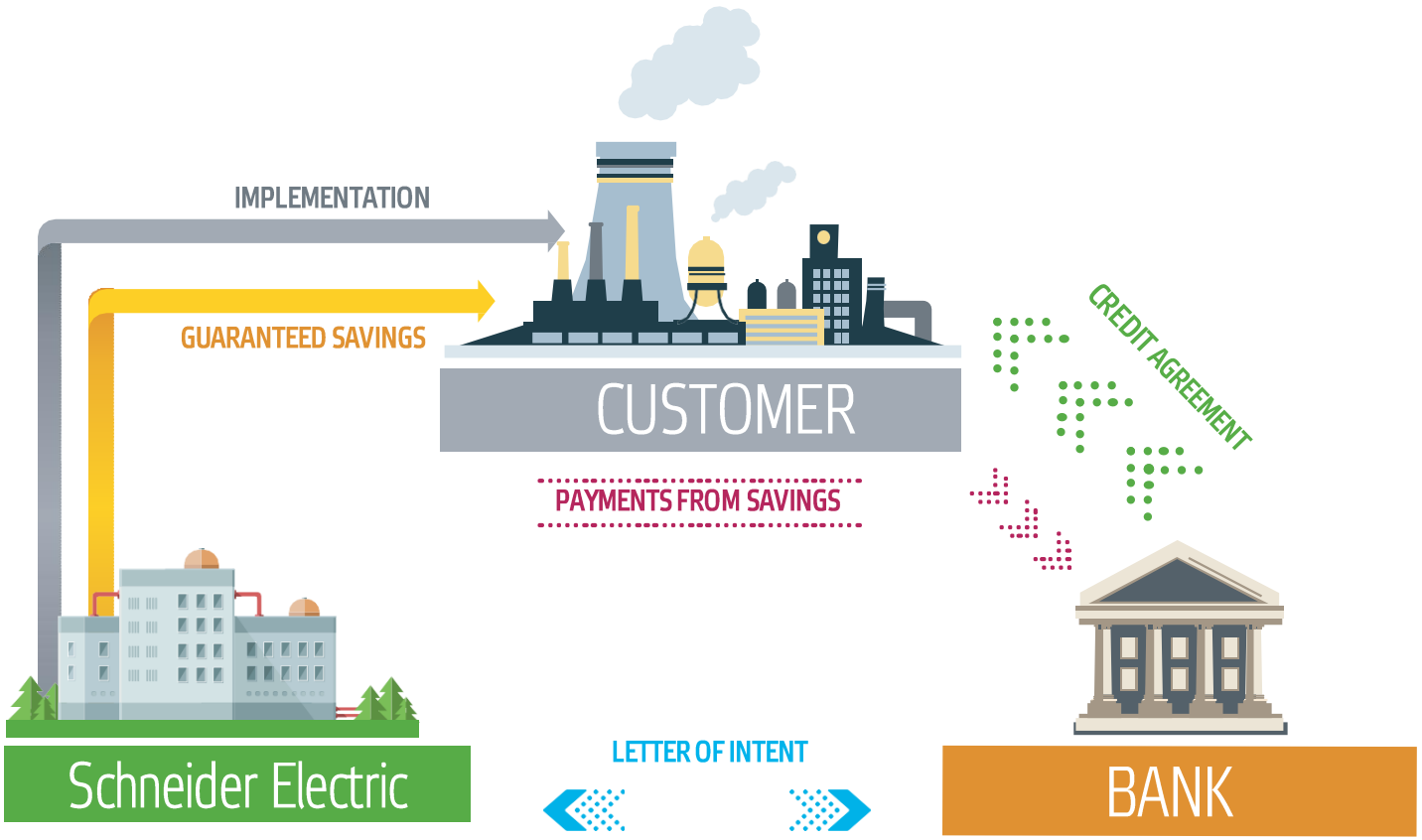


- The project is financed by the customer (from their own or borrowed funds)
- Schneider Electric guarantees a high level of power savings

Energy service

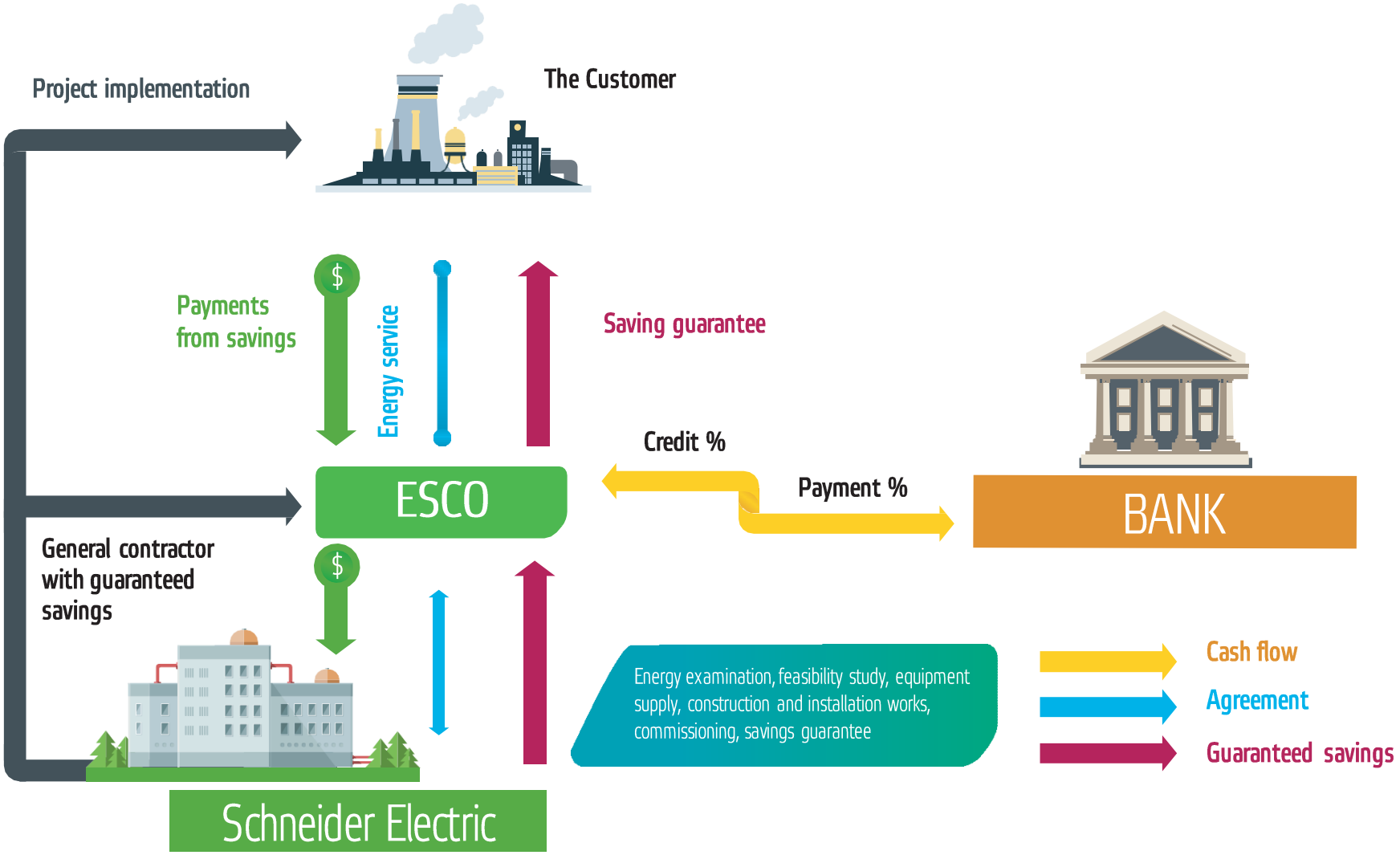


- Schneider Electric implements the project as a contractor for ESCO
- Schneider Electric guarantees a high level of power savings

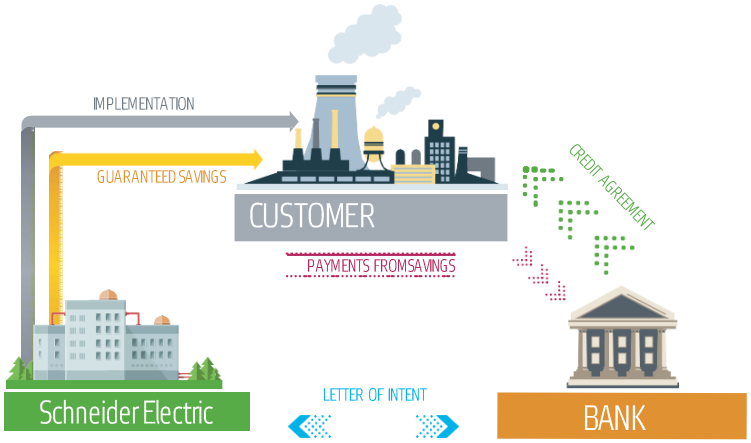


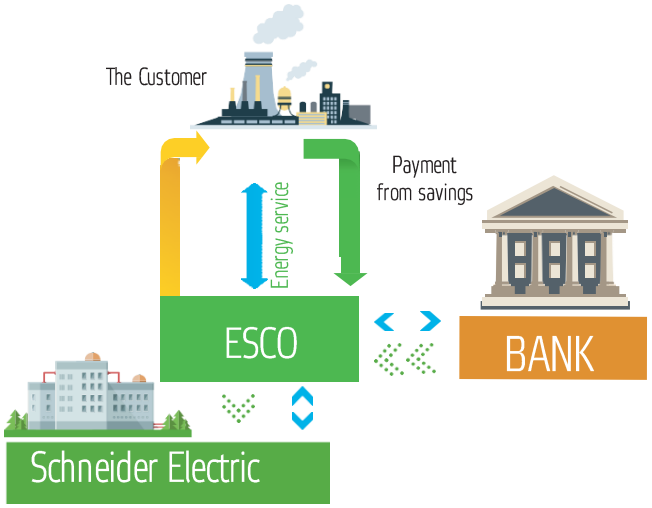
SAVINGS GUARANTEE CAN BE IN EFFECT DURING THE TEST PERIOD OR DURING THE ENTIRE PAYBACK PERIOD

Energy service



Energy Performance and Energy Service: Comparison of Business Models





Solution delivery cost

+ Cost of financing

Payback period:

up to 5 years

Operating costs of ESCO + GM%

Delivery cost

+ Cost of financing

Payback period increases by

1.5 ~ 2 times

Success Stories
A metallurgical plant

About the Customer

- The largest enterprise in Russian ferrous metallurgy
- Annual production of 14 million tons
- Increasing volume of export deliveries
- Company's shares are traded on the London Stock Exchange

Tasks

- Finding possibilities for energy savings
- Reducing energy consumption by key production processes
- Implementing a financing plan for ESCO "Off-balance sheet model" energy service

Our solution

- Energy performance: a contract (due to return of funds from the savings achieved) for optimization of exhauster operation with melting mode
- Payback period: 3–5 years

Success Stories
International Retailer

About the Customer

- One of the world's largest foodstuff retail chains
- 17 countries of presence
- 35th in the world by number of employees
- 85 clients serviced per second

Tasks

- Implementation of the company's strategy for sustainable development
- Reduction of energy consumption in stores by 25 %

Our solution

- Energy management of the enterprise is performed with the use of an effective system of energy consumption metering and monitoring of key energy efficiency indicators
- Contract terms for purchasing energy resources are optimized
- Performance contract for 5 years with guaranteed energy savings of 26 %

Success Stories
confectionery manufacturer

About the Customer

- The largest manufacturer of chocolate bars, pet food, chewing gum, etc.
- 9 factories in Russia
- Investments into the Russian market of more than $1 billion

Tasks

- Achieving the objectives of the global program on improving energy efficiency of production
- Benchmarking of energy efficiency of plants and shops in one integrated system
- Automatic generation of key performance indicators in GJ per ton of products throughout the plant and individual shops
- Identification of inefficient usage of energy resources
- Monitoring of the effectiveness of implementing energy-saving measures

Our solution

- The Energy Management System integrated with the existing Process Control System

Success Stories
World clothing brand

About the Customer

- One of the world's largest clothing
- retail chains 3,500 stores in 57 countries
- More than 100 stores in Russia
- The average store area in Russia is 2,500 m²

Tasks

- Remote management of various sales points
- System integration at optimal prices, while maintaining a given level of costs

Our solution

- Presentation of data in a single format on a single platform
- Collection and visualization of data on energy consumption
- Obtaining a reliable database for analytics

Success Stories
Leading gold mining company

About the Customer

- One of the largest gold producers
- in the world 3rd largest gold reserve
- 20 % of total amount of gold produced in Russia
- > 10 thousand employees

Tasks

- Integration of a large number of distributed quarries into a single energy metering system
- Comprehensive increase of energy efficiency
- Increase of production profits

Our solution

- Solutions for implementation of a unified Energy Management System for regional MPPs were suggested
- A program for increasing energy efficiency at mines was developed in 2014–2019.

Success Stories
Leading beverage manufacturer

About the Customer

- The largest company-manufacturer
- of bottled drinks 28 countries of presence
- 10 factories in Russia
- 10,000 employees in Russia

Tasks

- Achieving sustainable development in energy management
- Energy consumption management on levels of workshops and enterprises
- Identification of inefficient energy consumption
- Monitoring of effectiveness of energy-saving measures
- Standardization and simplification of reporting
- Optimal tariff policy for in energy purchasing

Our solution

- Analytics platform for energy resources management

Success Stories
The largest electrical engineering enterprise in the Volga region

Schneider Electric

About the Customer

- Founded in the 40s of the XX century
- Manufacturer electrical equipment
- More than 6,000 employees
- Since 2013 the plant is part of Schneider Electric

Tasks

- Collecting data on energy consumption on the enterprise level
- Real time monitoring of energy consumption
- Determining the potential for savings
- Optimization of energy costs

Our solution

- Installation of a tracking system for energy resources
- Optimization of conditions of energy resources procurement

Success Stories

Schneider Electric

LEARN THE OPPORTUNITIES OF YOUR ENERGY ™

Together with ESS Schneider Electric

Schneider Electric

Schneider Electric

Opti-CIP system:

01 Reduces washing time

02 Saves resources

03 Guarantees the efficiency of washing and additional confirmation of compliance with food safety requirements

The solution

monitors the main parameters:

- temperature at different sections of pipelines
- conductivity of detergent composition
- flow rate
- turbiditycomposition
- concentration
- positions of valves
- levels of liquids in buffer tanksoperating
- status of circulating pumps

The user:

- observes all registered washing processes in the table
- traces signal trends recorded during the washing in thedatabase
- reveals the causes and consequences of deviations from target values

Opti-CIP system: assessment of the current state of washing stations for compliance with international best practices and EHEDG, 3A, FDA standards.

Targets of survey of washing stations and facilities:

Process audit

Audit of automation systems

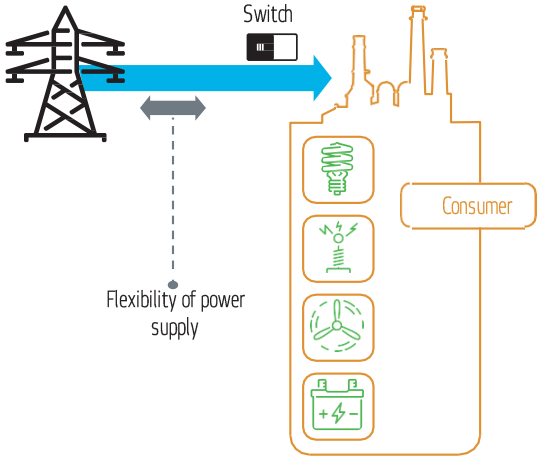
IT infrastructure audit

The result of the survey is a single report with:

- clear description of the current status of washing stations
- Identified problems
- specific recommendations for improving the situation

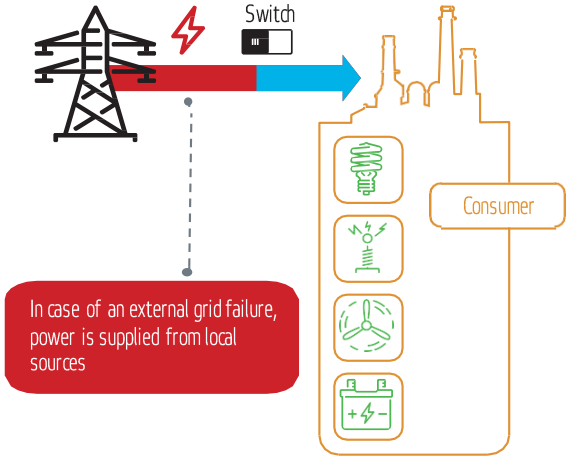
What is a micro power system?

An integrated power system composed of distributed energy sources (standby sources, renewable energy sources, power storage systems) that is able to operate in parallel with the external power grid / in "island" mode / in isolated mode.



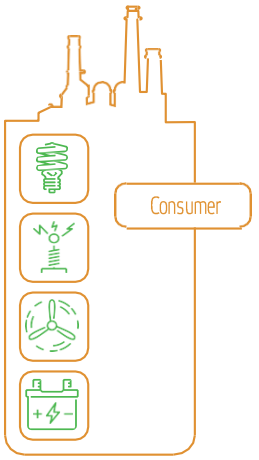
Parallel mode

Consumer's renewable energy sources, power storage systems, and on-site generation operate in parallel with the external power grid



Island mode

The micro power system will generate electricity from its own sources in any other cases when consumption from the external sources is less profitable



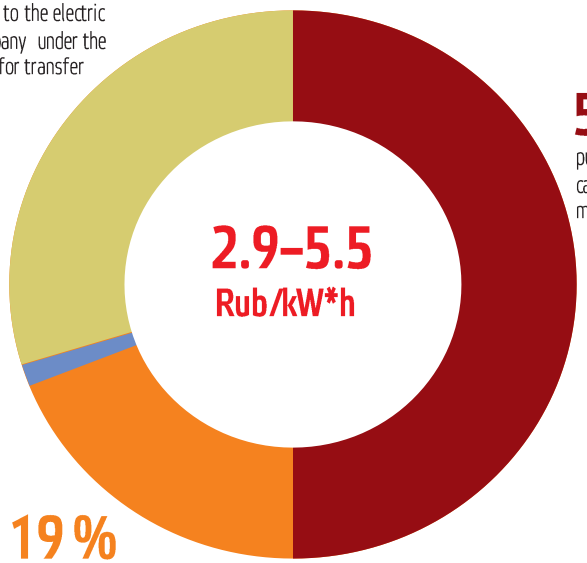
Isolated mode

The micro power system will produce electricity only from its own sources

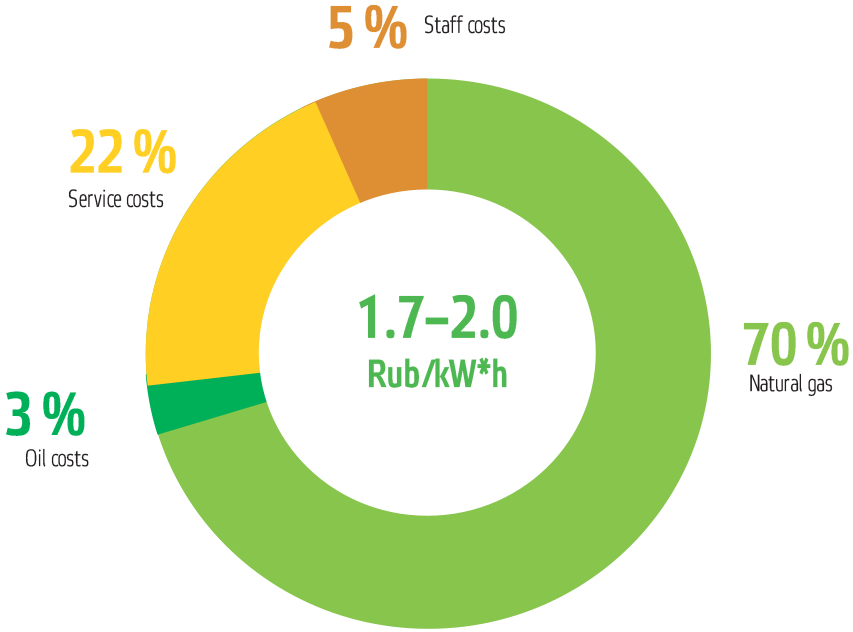
Solutions
Microgrid with its own mini-CHP plant

Schneider Electric

The structure of the final price of electricity for the industry when purchasing from the grid:

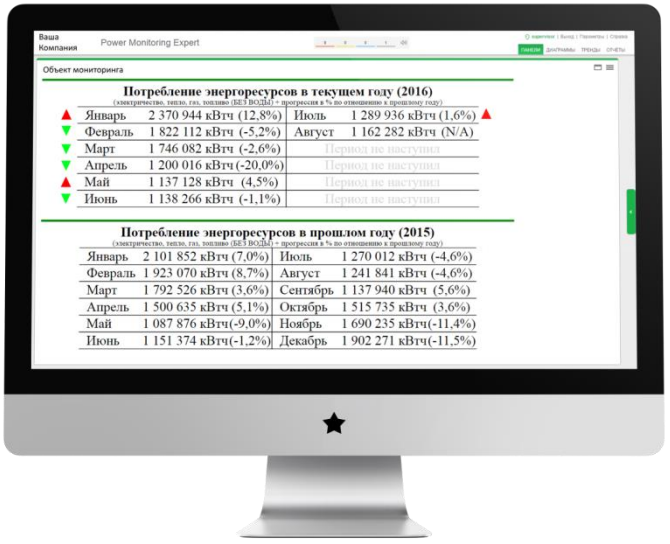


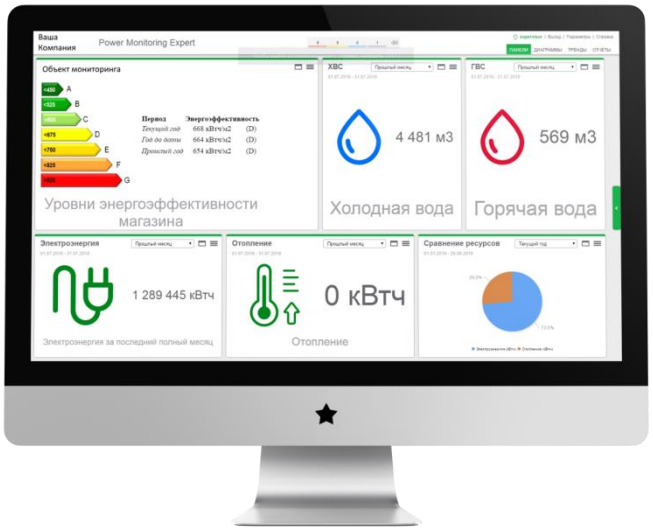
The structure of the final price for electricity when constructing of self-generation:



depending on the voltage level and the RF region

Solutions
Energy management system (ASTUE / AIIS KUE)





The components which usually give results the first:

01 Identification of misuse of energy resources

02 Search for energy-saving measures and monitoring of their implementation

03 Reasonable formulation of specific key energy efficiency indicators for various production units

04 Development of the optimal tariff policy for energy purchasing

05 Analysis of loads and power quality, optimization of the power grid

06 Benchmarking

Variable high pressure (HP) regulator with variable speed drives:

01
Adjusts high pressure setpoints

02
Sends information to the fan control unit

03
Determines the setpoint so as to optimize energy efficiency of the system.

In food processing facilities, warehouses, supermarkets, and hypermarkets 30 to 80 % of energy is consumed for cooling and freezing.

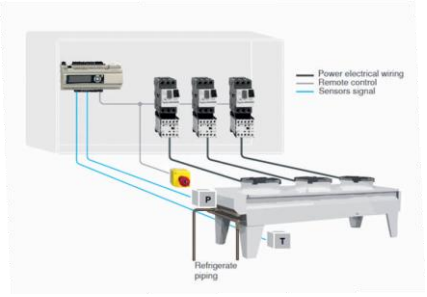
High-performance logic controllers

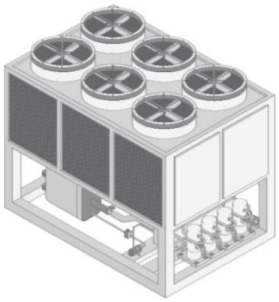
Energy savings of up to 40 %

when using variable speed drives in combination with variable HP regulators.

Typical application

condensers with air cooling





Solutions
Optimization of cooling systems

Specialized solution for centralized cooling systems: effective pressure control with the use of specialized controller, software, and drive speed adjustment.

Description

- condensation pressure adjustment depending on the ambient air temperature
- pressure adjustment downstream the evaporators depending on the total load on the cooling system

Benefits

Energy savings reach

40 %

with an effective control
of condensing pressure and pressure downstream
evaporators.

Typical application

Centralized cooling systems with
external air-cooled condensers.

Solutions
Control and optimization of lighting systems

A specialized solution for large-scale lighting systems:
LED illumination with zone control of groups of lighting sources as per schedules

Description

- installation of high-performance LED lighting in large rooms with zone control of groups of lighting sources
- taking into account the work schedule of employees and presence of visitors

Benefits

Energy savings reach

50 %

when replacing fluorescent lighting.

Solutions
Local optimization of power supply

Altivar VSD

- reduction of noise level, vibration level, risks of hydraulic impacts and cavitation
- extended equipment life cycle due to lowered rotation speed
- rotation speed control

Where to use:

Water conditioning and treatment

Oil and gas industry

Oil refining

Food industry

Mining and Metallurgy

RPC – reactive power compensation AccuSine SWP, AccuSine PCS+, and AccuSine PFV+

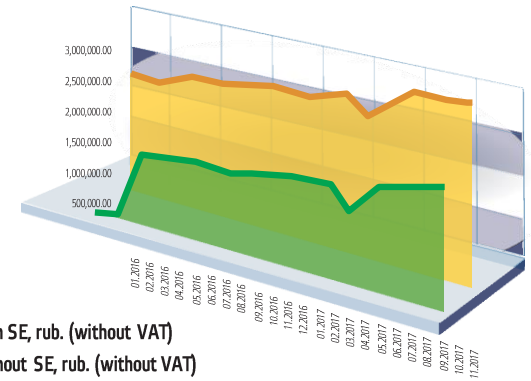
- power factor increasesymmetry
- voltage stabilization
- reduction of penalty surcharges for excessive reactive
- power reduction of CO2 emissions
- reduction of electricity costs by 5 to 10 %

Where to use:

Wherever optimization of the electrical installation is needed and can be performed by reducing energy consumption and increasing available capacity.

Success Stories on Energy Costs Optimization

Site No. 1
North-Western Federal District:

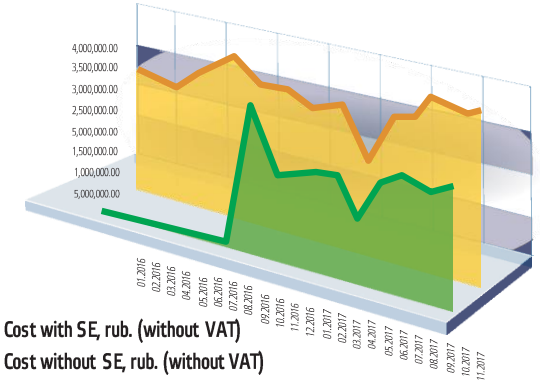


Savings

32 %

16.5 million rubles

Site No. 2
Central Federal District:

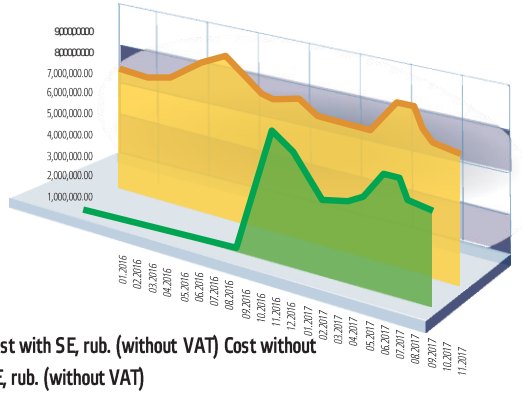


Savings

43 %

17.6 million rubles

Site No. 3
Southern Federal District:



Savings

25 %

18.6 million rubles

John G. Shedd Aquarium

Type: campus
Registered Office: Chicago, USA Consumption: 3 MW
The project was delivered in 2016

Customer Request

Reduction of energy bills, usage of green energy

Solution

Lithium-ion battery of 1 MW for participation in the government program of supporting frequency regulation in the power grid

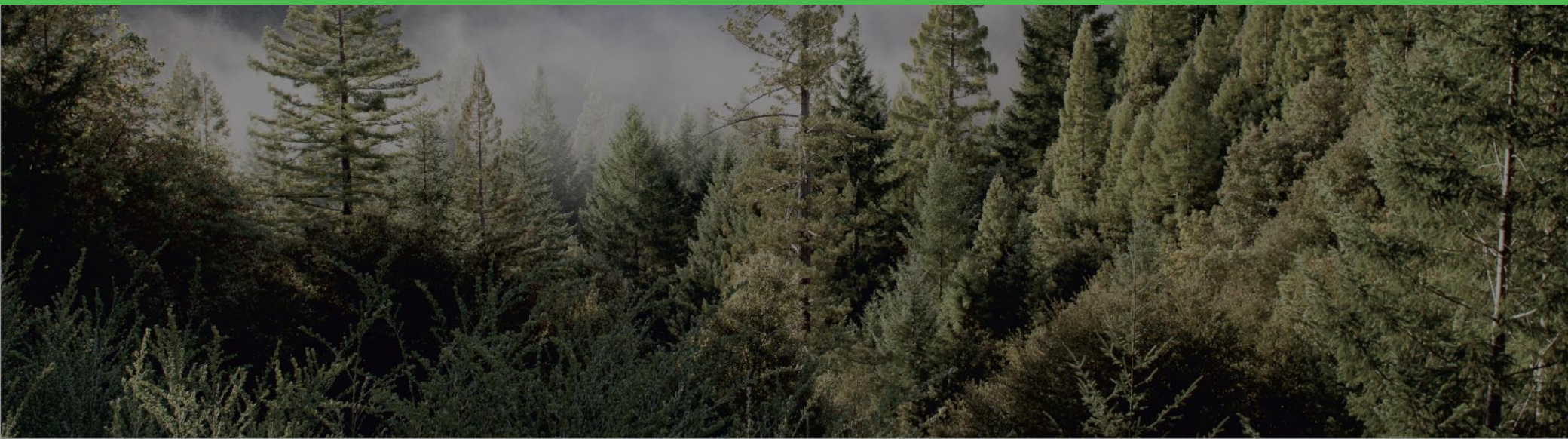
Methods

- Turnkey construction + inverter supply
- EcoStruxure Microgrid Advisor as a solution for optimization, visualization and consumption control of micro power system

30 thousand hectares of forest

That's how many trees are needed
to compensate for greenhouse gas emissions from energy resources that we have saved

Schneider Electric



LEARN THE OPPORTUNITIES OF YOUR ENERGY™

Schneider Electric