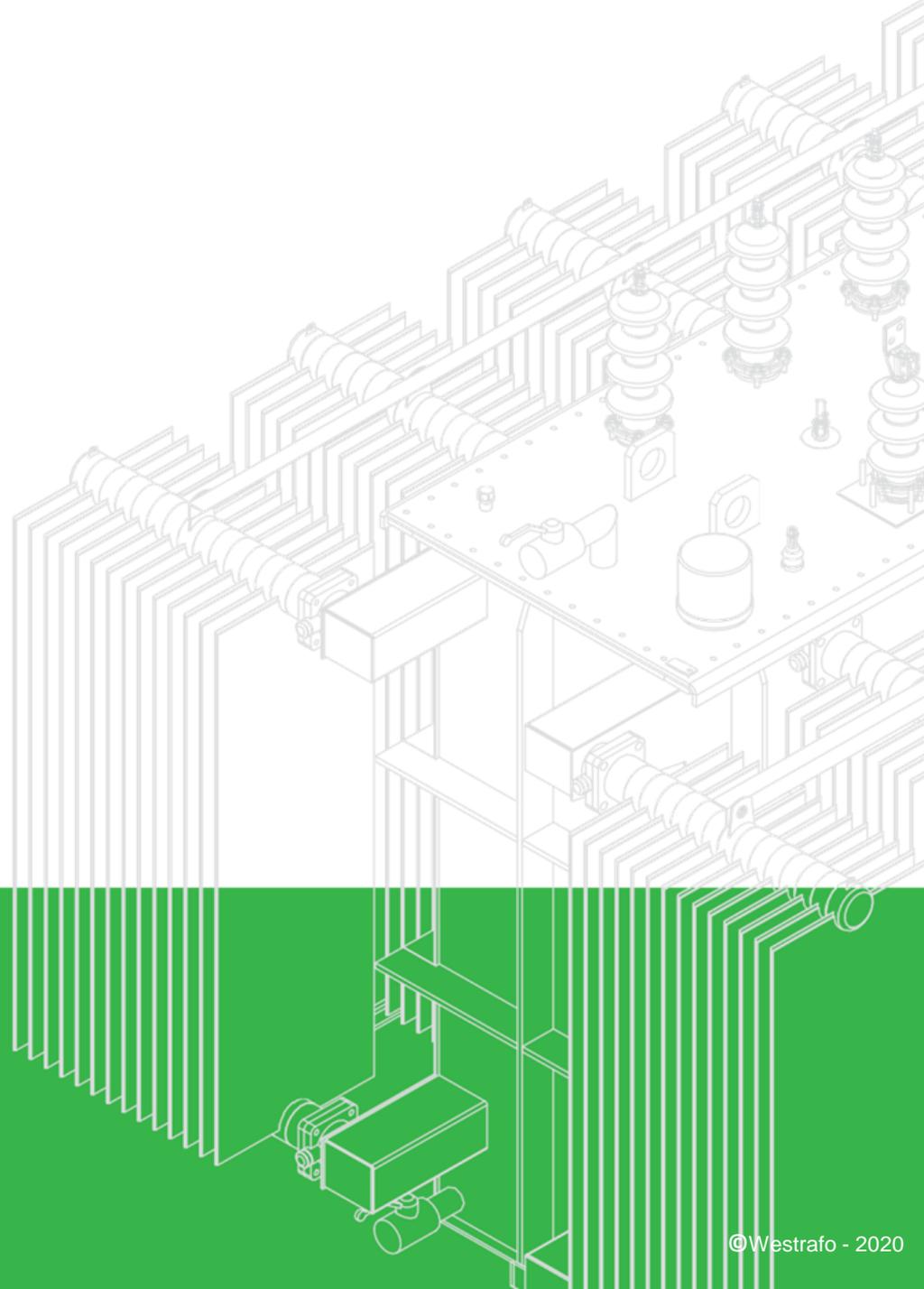


WESTRAFO

Power Transformers and
Energy Solutions



ENERGY SOLUTION BUSINESS

DISCLAIMER

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PRODUCTS FOR EVERY APPLICATION

POWER TRANSFORMERS AND ENERGY SOLUTIONS FOR GENERATION & TRANSMISSION

Taylor-made projects based on customer specifications and operational environment of every plant to maximize efficiency and return on investment

+600

Completed projects for installations in 35 countries as of 2019



HV & MV GENERATION PLANTS



MV & LV DISTRIBUTION



SOLAR FARMS



WIND PARKS



HYDROELECTRIC APPLICATION



BIOGAS

RELATED PRODUCTS

- HV fluid insulated power transformers
- MV fluid insulated and cast resin distribution transformers
- Complete MV substations, including MV and LV panels and fittings
- Energy solutions and transformers customized for inverter load
- Integrations with energy storage systems

ENERGY SOLUTIONS FOR A SUSTAINABLE FUTURE

60

Installations for renewable energy applications as of (2019)

Turnkey high efficiency solutions to allow the fast commissioning of every plant

350

Charging spots powered by customized recharge systems as of 2019

High-speed recharge solutions also suitable for city centres, allowing a significant cost reduction for security and maintenance.

WESTRAFO



ENERGY STORAGE



E-MOBILITY



SMART GRID



INTEGRATED SOLUTIONS

RELATED PRODUCTS

- Battery Energy Storage container solutions
- Recharge station systems with complete substations
- Transformer monitoring systems
- Integrated engineering solutions





50

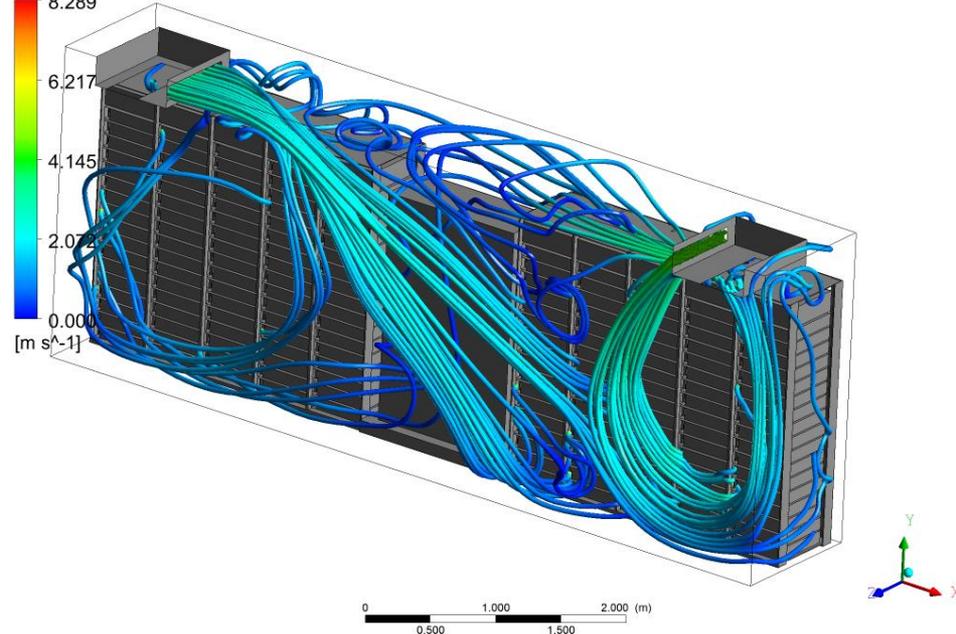
Years of experience
in the business

KNOW HOW

- Taylor made production
- Maximum operational flexibility with 2 hours average time of working station set-up



Velocity
Streamline 2 Figure 9
8.289



12K

Yearly hours devoted
to R&D

INNOVATION

- Research on materials to improve efficiency and sustainability
- Constant update of operational procedures





PRODUCT DESIGN

- Advanced design analysis with FEM simulations, thermal dispersion and mechanical stress studies
- Partnerships with third part laboratories and with Universities

<1%

Average difference between calculated and measured efficiency

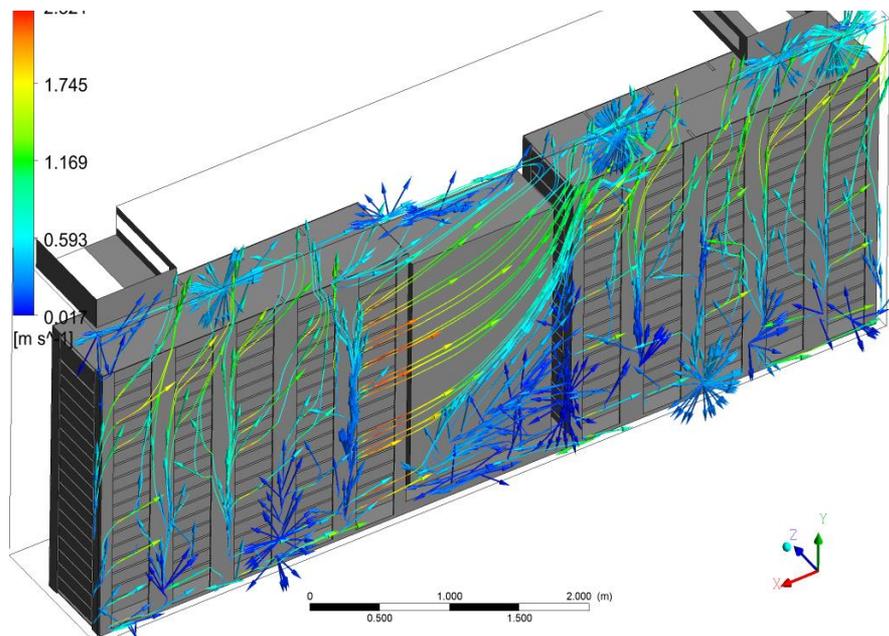
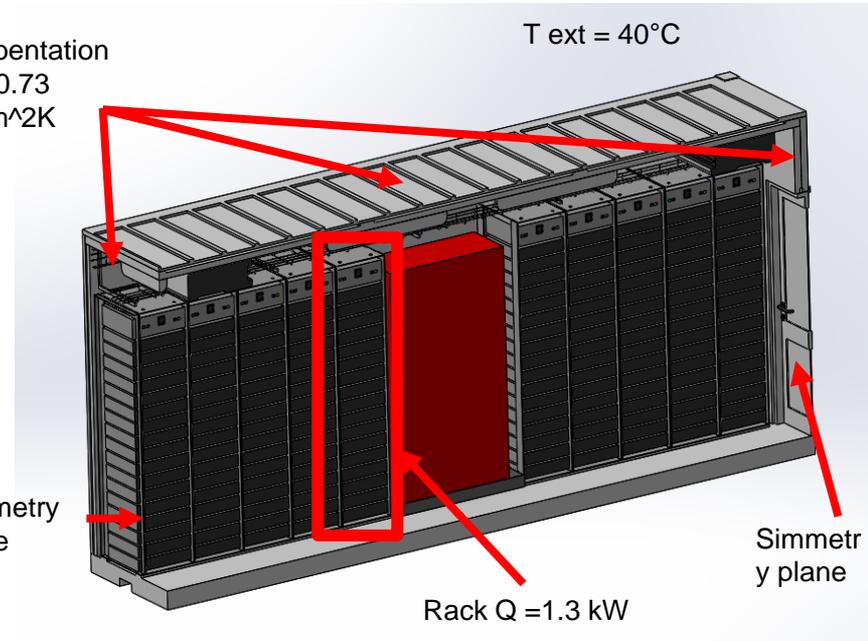
Coibentation
 $U = 0.73$
 W/m^2K

$T_{ext} = 40^{\circ}C$

Simmetry plane

Rack Q = 1.3 kW

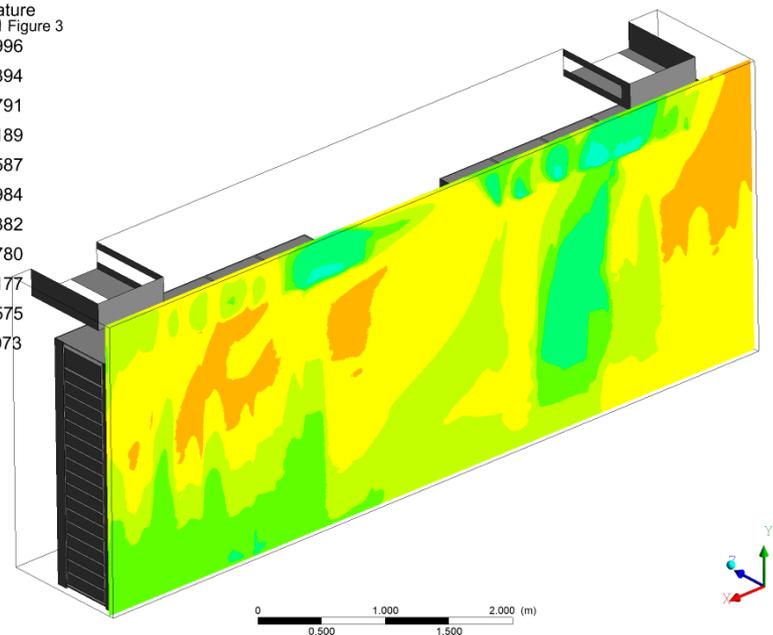
Simmetry plane



Temperature
 Contour 1 Figure 3

47.996
44.394
40.791
37.189
33.587
29.984
26.382
22.780
19.177
15.575
11.973

[C]



7%

of working hours is dedicated to on-the-job training and updates

TEAM



Nothing of what we do would be possible without our strong and dynamic team, always up-to-date with our projects, giving energy to our values everyday.



OUR QUALITY CERTIFICATIONS

In order to compete in the current market, Westrafo has implemented a complete management system both from the point of view of quality and the environment and has also obtained various certifications for its products.

Company quality certifications:

- **ISO 9001: 2015 certification**
- **ISO 14001: 2015 certification**

Product quality certifications:

- Product type certifications issued following type and special tests performed under customer supervision
- Certificates of short circuit tests performed at CESI on various transformers
- Certificates of special and type tests performed under the supervision of CESI
- UL certification for our series of transformers for the photovoltaic market valid for the American market
- Collaboration with various universities for type tests on transformers and cabinets



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

BATTERY STORAGE CONTAINER

Our Energy Solutions division designs and manufactures Battery Storage Container; the main areas of study and production concern:

- 10/20/40/45 ft containers or E-House
- AC panels
- DC panels
- HVAC system
- F&G system (detection and suppression)
- Communication systems
- Commissioning and Service



MEDIUM VOLTAGE STATION

Specialized in the realization of MVS.

Main technical details:

- 10ft/20ft/40ft container structure or concrete solutions
- 3 compartments (Low Voltage, Transformer, Medium Voltage)
- Auxiliary, fan, security systems
- LV Distribution Board of our design and production (with main switch and fuses switch-disconnector IP20)
- MV cabinet of Main brands
- Communication systems
- Commissioning and Service



SOME REFERENCES - ENERGY SOLUTIONS



CASE HISTORY - SOLAR ENERGY STORAGE ENERGY SYSTEM FOR 'THE BRANDO'

This project is particularly important for us in Westrafo, as it testifies our ability to provide vertical solutions and to expand our consultancy, design and project management to applications going beyond the supply of power and distribution transformers.

The supply of this battery container solution on Brando Island was rendered particularly tricky because of the remote location.

The container was designed taking particular care about the weight and dimensional restrictions, as it needed to be transported via ship to Papeete and then, on a smaller ship with weight limitations, to The Brando, a private Island hosting an exclusive resort.

The final installation and commissioning was completed by Westrafo Technicians on site.

Project Description:
1 battery storage container 40ft
Power 3 MW

Application:
Energy storage

Destination:
Assembly and finishing: Papeete
Final destination:
Brando Island, French Polynesia

Year:
2018



SOME REFERENCES - ENERGY SOLUTIONS

CASE HISTORY - SOLAR ENERGY STORAGE ENERGY SYSTEM FOR SCHWARZE PUMPE



The BigBattery will be built next to the Schwarze Pumpe power plant. 13 containers have been planned on an area of 110 by 62 metres to accommodate the lithium-ion batteries. The battery storage system will be connected to the grid at the high-voltage level (110 kilovolts). The connection to the extra-high voltage grid is also provided here.

BigBattery Lausitz combines modern power plant infrastructures with storage technology in a completely new order of magnitude. In this constellation the project is the only one of its kind in Europe, to date.



Project Description:
13 battery storage container 45ft
HVAC system 4 MW

Application:
Energy storage

Destination:
Assembly and finishing: Germany

Year:
2019

SOME REFERENCES - ENERGY SOLUTIONS



CASE HISTORY - SOLAR ENERGY STORAGE ENERGY SYSTEM FOR MAYREAU ISLAND

In mid-2018, St. Vincent and the Grenadines will be connecting its first microgrid to its power system.

The EPC contract was signed in late December 2018 between St. Vincent and the Grenadines utility, and Curacao solar energy firm, for the utility's first solar battery storage microgrid.

The system, to be built on the island of Mayreau in the Grenadines, will produce enough energy to power the island for 6 to 10 hours per day.

The microgrid will be designed to withstand the strongest Category V hurricanes, and will be instrumental in meeting national goals of greenhouse gas reduction and increase in renewable energy.

This project contract signing signifies progress, and demonstrates VINLEC's and the Government of Saint Vincent and the Grenadines' continued commitment to changing the current electricity generation mix.

Project Description:
2 battery storage containers
20ft ISO

Application:
Energy storage

Destination:
Mayreau Island
of St. Vincent and the Grenadines

Year:
2019



SOME REFERENCES - ENERGY SOLUTIONS



CASE HISTORY - MVS INTEGRATION ENERGY SYSTEM FOR PROJ. KRANICH

Project Description:

1 MVS-STP unit including a
660 kVA 20/0,4 kV transformer

Application:

Solar energy substation optimized for inverter load

Destination:

Germany

Year:

2019

MVS-STP is the first MT turnkey solution in the world, in a 10-foot container specific for string inverters.

The realization of photovoltaic power plants with decentralized configuration is in this way considerably simplified: in addition to the greater rapidity of transport, the medium voltage station allows to save costs also thanks to the reduced installation and commissioning times.

So far, for decentralized photovoltaic power plant manufacturers, the only possibility was to make the connection necessary for connection to medium voltage networks directly on site with the individual components of the supply.

All the components for connection to the medium voltage network are already completely pre-installed inside MVS-STP, making the installation immediate upon arrival at the site.



SOME REFERENCES - ENERGY SOLUTIONS



CASE HISTORY - MVS INTEGRATION ENERGY SYSTEM FOR SOTO CANO AND BUFFALO (HONDURAS)

Project Description:

4 MVS-STP unit including a
1350 kVA 33/0,48 kV transformer

Application:

Solar energy substation optimized for inverter load

Destination:

Honduras

Year:

2019

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SOME REFERENCES - ENERGY SOLUTIONS



CASE HISTORY - MVS INTEGRATION ENERGY SYSTEM FOR DAYSTAR (GHANA)

Project Description:

1 MVS-STP unit including a
1000 kVA 11/0,4 kV transformer

Application:

Solar energy substation optimized for inverter load

Destination:

Ghana

Year:

2019



SOME REFERENCES - ENERGY SOLUTIONS



CASE HISTORY - E-MOBILITY

SPL TRANSFORMER FOR RECHARGE STATION AFFI SUPERCHARGER

This project for the supply of transformers designed for electric cars battery chargers is proving Westrafo to be a transformer Company capable of designing a solution exactly for the type of application requested by the end customer.

In particular, our Sustainable Peak Load transformers are able to sustain effortlessly the high energy peaks needed to recharge completely an electric car in less than 30 minutes, without damaging the transformer (and, naturally, the Superchargers) in the long run.

The new Superchargers are now being installed all across Europe with the contribution of Westrafo's transformers.

These devices will exploit the new 350 kW DC technology to ensure very high-speed refills with just slightly longer stop times compared to what is used today at a normal fuel distributor.

Westrafo's SPL application fits perfectly to the purpose, guaranteeing great performance and reliability in every Supercharger station across Europe.

Project Total Power:
16 superchargers available 24/7
fed by a sustainable peak
load transformer insulated
with FR3 natural ester

Transformers supplied:
1 Unit Power
1550 /1400-150 kVA
Voltage 20/0,48-0,40 kV

Destination:
Verona - Italy

Year:
2018



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