



# BAE Batterien GmbH

*Reliable Energy and Quality since 1899*

# BAE Batterien GmbH

Made in  
Germany



<b>Foundation</b>	1899
<b>Branch</b>	Production of Premium Lead Batteries
<b>Status</b>	SME-Status
<b>Standard</b>	“Quality made in Germany”
<b>Production</b>	100% in Berlin
<b>Mission</b>	Highest reliability and lowest operational expenses
<b>Employees</b>	180
<b>Export</b>	80%

# BAE – World wide active

Made in  
Germany



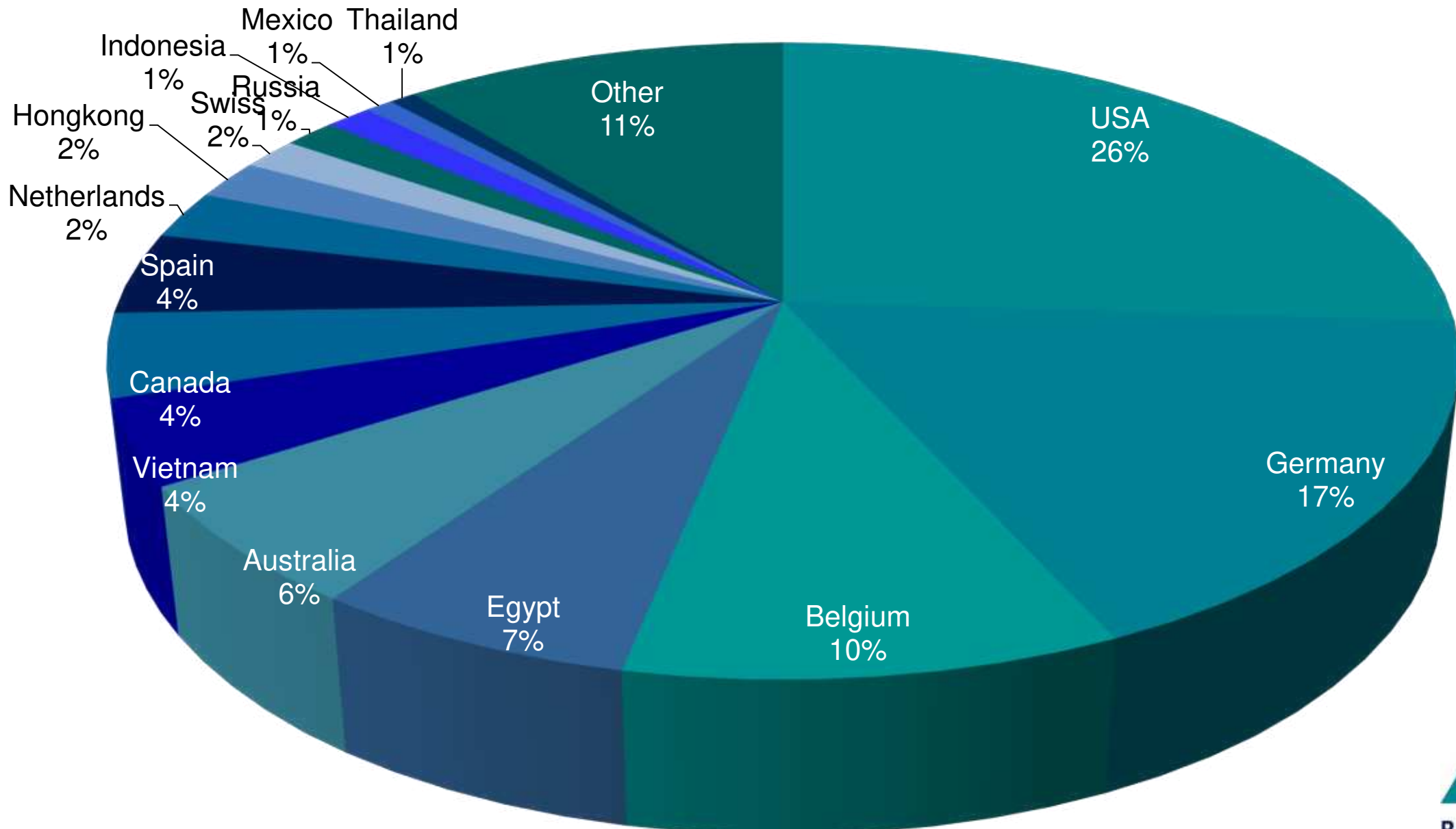
- ✘ Production site in Berlin, Germany
- ✘ Regional Office, Singapore

Distribution only by express authority of BAE Batterien GmbH



# BAE – Top 15 countries 2018

Made in  
Germany



Distribution only by express authority of BAE Batterien GmbH





# BAE – Product portfolio and market segments

Made in  
Germany

## Stationary Applications



- Power plants
- Nuclear power plants
- Power distribution
- Sub stations
- Telecommunication
- Infrastructure systems
- UPS systems

## Renewable Applications



- Photovoltaic power generation
- Small wind energy generator applications
- Stand-alone photovoltaic systems
- Hybrid applications
- Industrial and residential renewable energy systems

## Rail Traffic Applications



- Energy for traction
- Cranking
- Steering
- Security lighting
- On-board power supply

## Motive Power Applications



- Material handling equipment
- Ware house handling equipment

# BAE – Highest quality standards

Made in  
Germany

## Integrated Management System:

- ISO 9001 Continuous **quality control**
- ISO 14001 Complying with all **environmental conditions**
- ISO 18001 Highest **security and health standards**
- ISO 50001 Integrated **energy management system**



## Top quality and reliability are the core elements of the success of BAE products:

- Traditional way of manufacturing
- Use of high quality components



# BAE – Lead Batteries Advantages

Made in  
Germany

More than 100 years innovative and safe energy storage technology

- 1 Low cost upfront and over the lifetime
- 2 Safest energy storage technology
- 3 Simple and cheap transportation
- 4 Ease of installation & commissioning
- 5 Over 99% recycling rate

Lead batteries a long history of  
dependable, reliable use in  
diverse applications





# BAE Batterien GmbH

## *Products and features*



# BAE – Product portfolio and market segments

Made in  
Germany

## Stationary Applications



- Power plants
- Nuclear power plants
- Power distribution
- Sub stations
- Telecommunication
- Infrastructure systems
- UPS systems

## Renewable Applications



- Photovoltaic power generation
- Stand-alone photovoltaic systems
- Hybrid applications
- Industrial and residential renewable energy systems

## Rail Traffic Applications



- Energy for traction
- Cranking
- Steering
- Security lighting
- On-board power supply

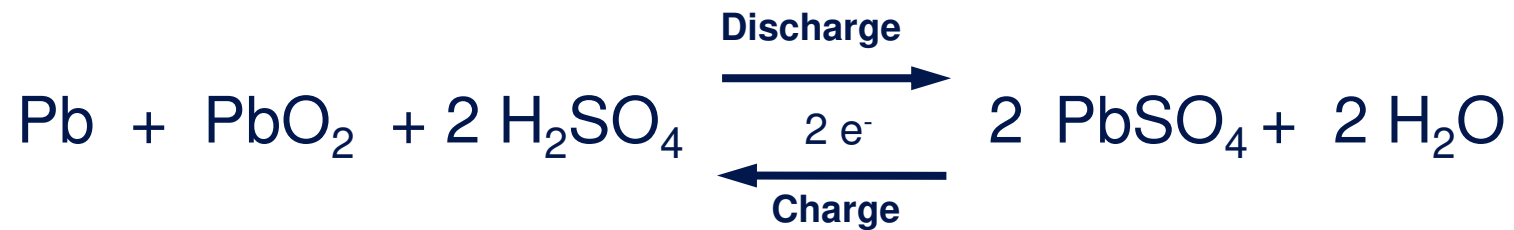
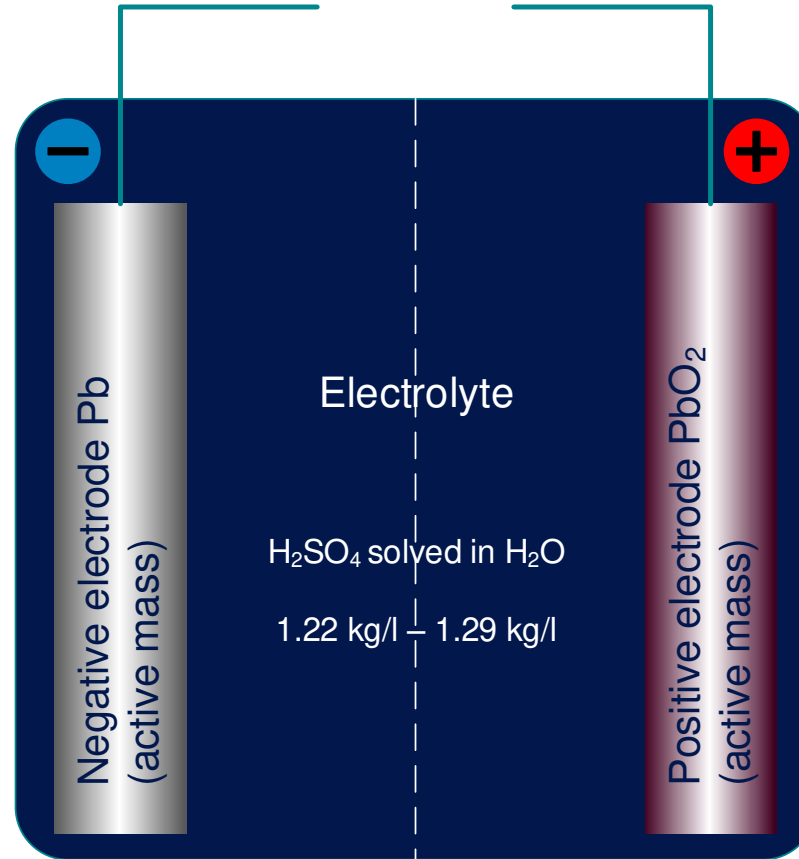
## Motive Power Applications



- Material handling equipment
- Ware house handling equipment

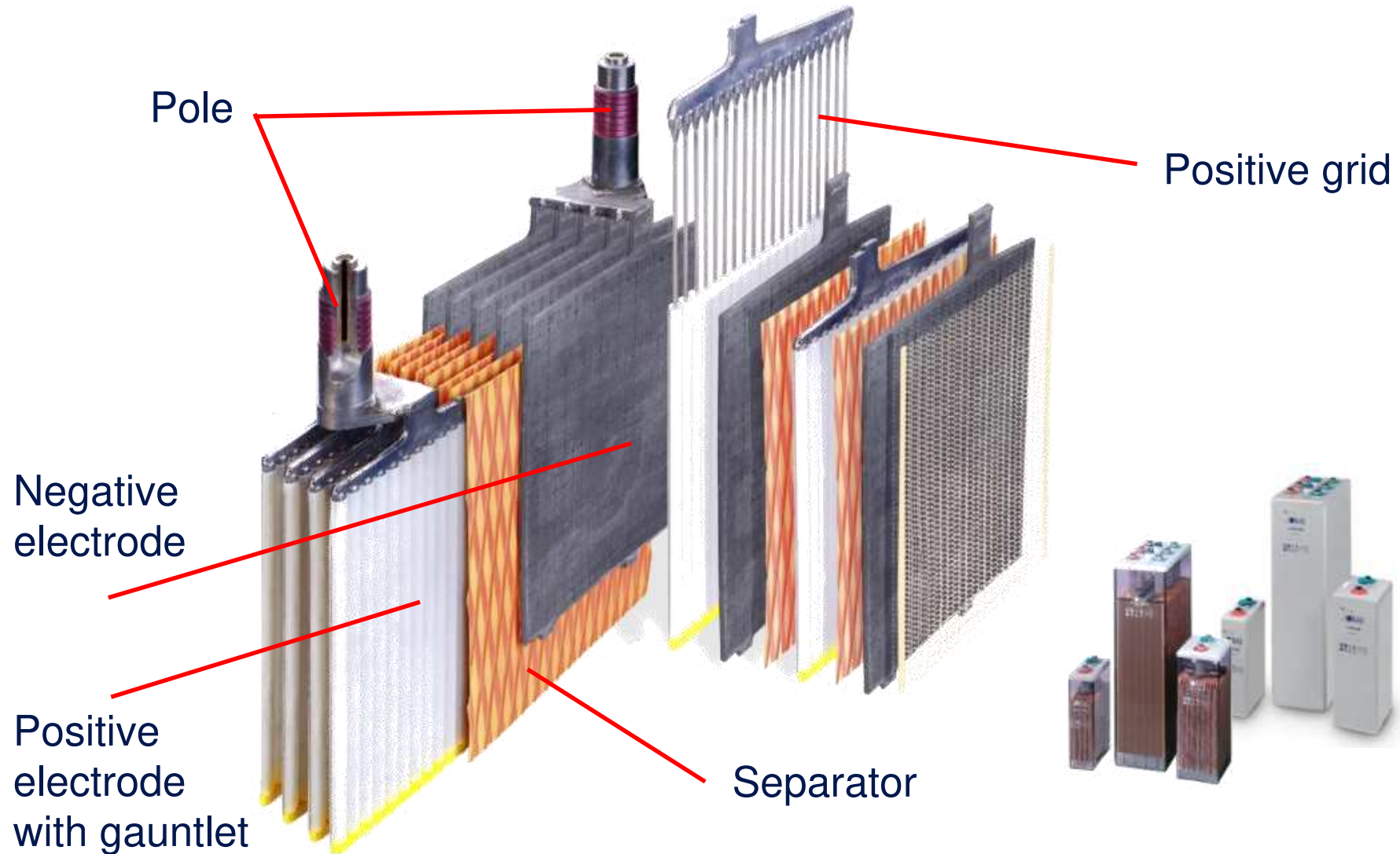
# Lead-acid accumulator

Made in  
Germany



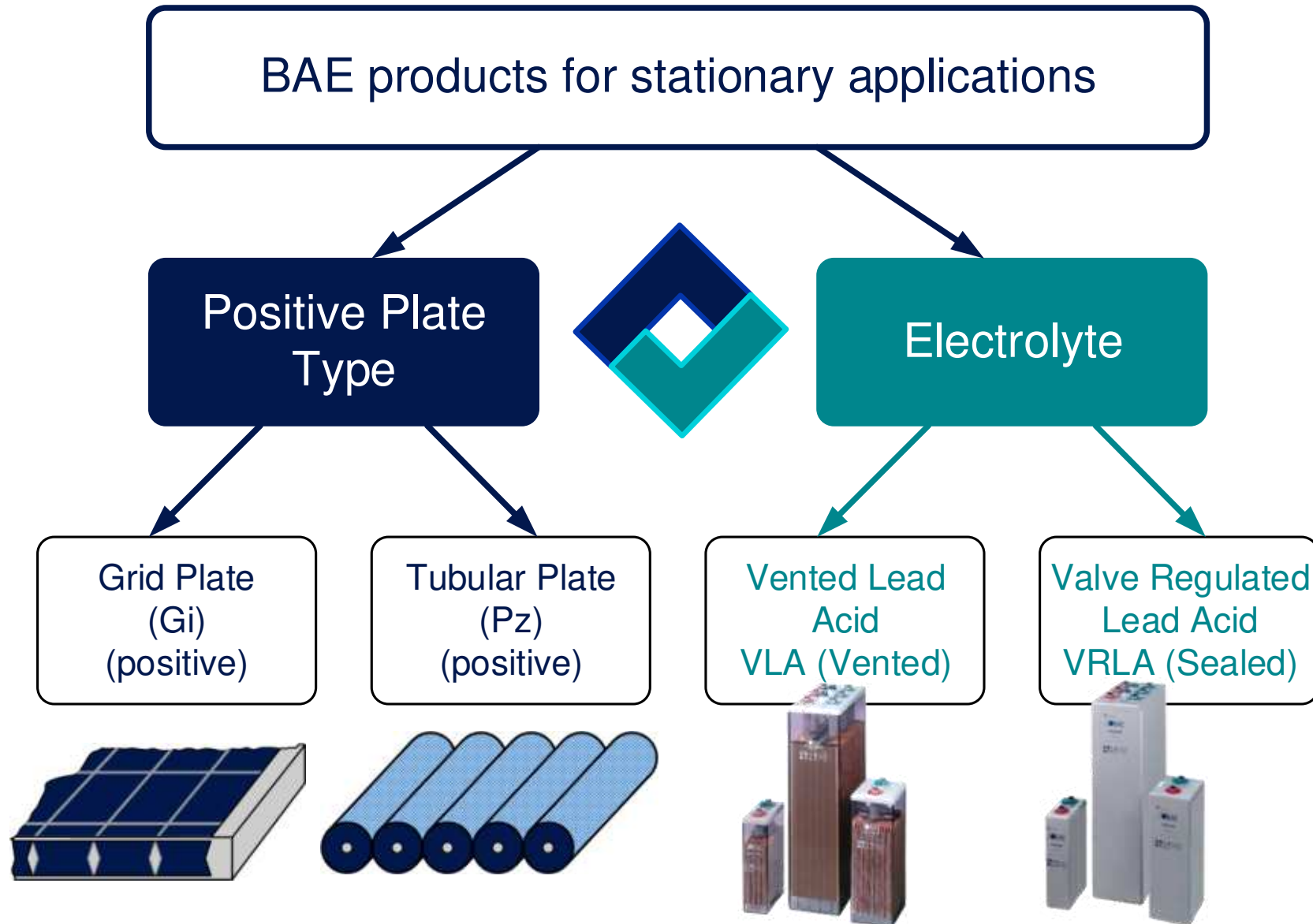
# Lead-acid accumulator

Made in  
Germany



# BAE *SECURA* Product Range

Made in  
Germany





# BAE *SECURA* Product range – Highest Quality

Made in  
Germany

BAE sets the quality standard for battery cells ...

1

High pressure casting

2

Dry filling of red lead

3

Tank formation

4

Use of reinforced woven gauntlets

5

Patented BAE Panzerpol

BAE *SECURA* product range for  
stationary and solar  
applications

# BAE *SECURA* Product Range (VLA)

Made in  
Germany



## Flat plate

BAE *SECURA OGi*

200 to 2400 Ah (C<sub>10</sub>)

BAE *SECURA OGi BLOCK*

25 to 900 Ah (C<sub>10</sub>)

## OGi cell



## OGi block



## Tubular plate

BAE *SECURA OPzS*

100 to 3250 Ah (C<sub>10</sub>)

BAE *SECURA OPzS BLOCK*

50 to 300 Ah (C<sub>10</sub>)

## OPzS cell



## OPzS block



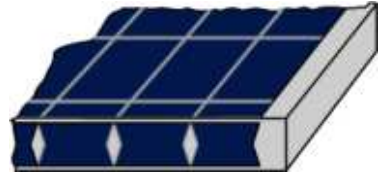
# Overview BAE *SECURA* VLA Batteries

Made in  
Germany

Type \ Characteristics	<i>BAE SECURA OGi BLOCK</i>	<i>BAE SECURA OGi</i>	<i>BAE SECURA OPzS BLOCK</i>	<i>BAE SECURA OPzS</i>
<i>Capacity range (C<sub>10</sub>)</i>	25 – 900 Ah	200 – 2400 Ah	50 – 300 Ah	100 – 3250 Ah
<i>Voltage</i>	2 V, 6 V, 12 V	2 V	6 V, 12 V	2 V
<i>Life-time</i>	16 years	20 years	18 years	20+ years
<i>IEC cycles</i>	-	-	> 1200	> 1500

# BAE *SECURA* Product Range (VRLA)

Made in  
Germany



## Flat plate

BAE *SECURA OGiV BLOCK*

25 to 900 Ah (C<sub>10</sub>)



## Tubular plate

BAE *SECURA OPzV*

100 to 3250 Ah (C<sub>10</sub>)

BAE *SECURA OPzV BLOCK*

50 to 900 Ah (C<sub>10</sub>)

## OGiV block



## OPzV cell



## OPzV block





# Overview BAE *SECURA* VRLA Batteries

Made in  
Germany

Type	<i>BAE SECURA OGiV BLOCK</i>	<i>BAE SECURA OPzV BLOCK</i>	<i>BAE SECURA OPzV</i>
Characteristics			
<i>Capacity range (C<sub>10</sub>)</i>	25 – 900 Ah	50 – 900 Ah	100 – 3250 Ah
<i>Voltage</i>	2V, 6 V, 12 V	2 V, 6 V, 12 V	2 V
<i>Life-time</i>	15 years	18 years	20 years
<i>IEC cycles</i>	-	> 1500	> 1500

# BAE – Product portfolio and market segments

Made in  
Germany

Stationary Applications



Renewable Applications



Rail Traffic Applications



Motive Power Applications



# Renewable Energy - Applications

Made in  
Germany



## BAE Secura PVS and PVV batteries

### *Applications:*

- Rural electrification of remote areas
- Power supply of remote mobile base stations
- Transportable solar systems in containers for temporary power supplies
- Cathodic protection of pipelines



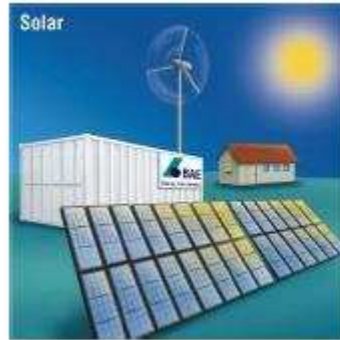
### *Applications:*

- Storing of electrical energy as long-term storage in connection with redox-flow batteries
- Energy store in combination with small wind turbines in photovoltaic systems for residential buildings

# Energy is the driving force

Made in  
Germany

- Renewable power generation from Solar and Wind energy



- General conditions of consumption are challenging
- Constant fluctuation of generation and consumption
- Energy storage system allow to even the odds
- Since RE is a growing market in the whole of Africa, the task of providing and balancing energy becomes more challenging

**Battery storage systems therefore can make a sustainable contribution !**



# BAE *SECURA SOLAR* – Highest Quality

Made in  
Germany

BAE solar batteries reflect outstanding quality by:

- 1 Long cycle life approved acc. to IEC 61427
- 2 Excellent deep discharge capability
- 3 Very good recharge behaviour
- 4 Easy access for measurements
- 5 Patented BAE Panzerpol

**Robustness and reliability are  
characteristic for BAE SECURA  
SOLAR batteries**

# BAE *SECURA SOLAR* Product Range

Made in  
Germany

## Tubular plate

BAE *SECURA PVS SOLAR*

143 to 4420 Ah (C<sub>100</sub>)

BAE *SECURA PVS BLOCK SOLAR*

71 to 431 Ah (C<sub>100</sub>)

BAE *SECURA PVV SOLAR*

157 to 4710 Ah (C<sub>100</sub>)

BAE *SECURA PVV BLOCK SOLAR*

78 to 421 Ah (C<sub>100</sub>)



PVS block



PVS cell



PVV block



PVV cell



# BAE *SECURA SOLAR* Product Range

Made in  
Germany

Electrolyte	<i>Sulphuric acid (liquid)</i>	<i>Sulphuric acid (GEL)</i>
Positive electrode		
<i>Tubular electrode</i>	<b>BAE <i>SECURA PVS SOLAR</i> BAE <i>SECURA PVS BLOCK SOLAR</i></b>	<b>BAE <i>SECURA PVV SOLAR</i> BAE <i>SECURA PVV BLOCK SOLAR</i></b>



# BAE Batterien GmbH

## *References Projects Worldwide*



# BAE – Africa

Made in  
Germany



Distribution only by express authority of BAE Batterien GmbH



# BAE – Solar Reference Project

Made in  
Germany

## Commercial Solar On-Grid System, South Africa



- Installed PV: 60 kW
- Battery: 24 x **BAE SECURA SOLAR 16 PVS 3040** cells
- Inverter: SMA
- Installer: Silicon Engineering
- Year of installation: 2014



The Camphill Village dairy is one of the first in South Africa to be powered by clean energy. The 60 kW photovoltaic system in combination with **BAE SECURA SOLAR 16 PVS 3040** will help the village to use clean electricity for the production of organic milk, cheese and yoghurt products for retail, thus reducing its carbon footprint as well as dependency from the grid.



# BAE – Solar Reference Project

Made in  
Germany

## PV Solar System, Tanzania



- Battery storage: 392.6 kWh (@ C<sub>100</sub>)
- Battery: 24 x **BAE SECURA SOLAR 24 PVS 4560** cells per string
- Total number of cells: 48 (2 strings)
- Installer: Silicon Engineering
- Year of installation: 2014



Two battery banks each of 24 x **BAE SECURA SOLAR 24 PVS 4560** flooded batteries are used as an energy storage system in combination with a PV system in the Serengeti National Park in Tanzania.

# BAE – Stationary Reference Project

Made in  
Germany

## UPS Project – 4 MVA, South Africa



- Battery storage provided: 4.4 MVA
- Battery: 264 x **BAE SECURA 25 OGi 2000** cells per string
- Total number of cells: 1056 (4 strings)
- Discharge time: 15 min
- Installer: Silicon Engineering
- Year of installation: 2015



Four Battery banks each of 264 x **BAE SECURA 25 OGi 2000** cells were installed in iThemba LABS sub-atomic particle accelerator in the Western Cape. The batteries can provide 4.4 MVA of clean power to the laboratories for up to 15 minutes in the event of a complete loss of power.



# BAE – Solar Reference Project

Made in  
Germany

## Residential Solar On-Grid System, Morocco



- Battery: 12 x **BAE SECURA 9 OPzV 900** cells
- Installer: Gaits Industries SARL AU
- Inverter: Kaco
- Year of installation: 2015



The objective of the system is to reduce reliance of the residential property in Casablanca on-grid electricity consumption. The 24 V battery bank consists of BAE **SECURA 9 OPzV 900** “maintenance-free” batteries which feed the night-time loads.

## Solar On-Grid Hybrid System, Nigeria



- Battery: 24 x **BAE SECURA 16 OPzV 2000** cells
- Back-Up Generator: 60 kVA
- Inverter: Studer
- Installer: AL-Sudais Technical Company
- Year of installation: 2015



The on-grid installation operates as a backup system when there is a power outage for several days. The maximum load on the system is around 3.6 kVA. This load consists of one server, an air conditioner to cool the server room and lightings. The server can run for weeks without interruption of service.



# HYBRID ENERGY SUPPLY – CAMP IN THE SERENGETI, 2016 TANZANIA

Made in  
Germany

133kWp solar array and 900 kWh battery bank



- The camp saves up 85% of its diesel costs
- High battery storage capacity due “silent night” operation strategy

# BAE – Asia & Middle East

Made in  
Germany



Distribution only by express authority of BAE Batterien GmbH





# BAE – Solar Reference Project

Made in  
Germany

## Dubai Municipality Safari Park Project, United Arab Emirates



- PV array capacity: 360 kWp
- Battery power: 2.1 MWh (@ C<sub>10</sub>)
- Battery: **BAE SECURA 26 OPzV 3250** cells
- Total number of cells: 288
- Inverter: SMA
- Installer: Value Addition (FZC)
- Year of installation: 2015



12 sets of 24 x **BAE SECURA 26 OPzV 3250** (delivering 3650 Ah @ C<sub>10</sub>) batteries in combination with 360 kWp photovoltaic array are used for water pumping in the Dubai Municipality Safari Park.

## Solar Off-Grid System, Palestine



- Installed PV: 135 kWp
- Battery storage: 900 kWh/day
- Battery: 24 x **BAE SECURA SOLAR 22 PVV 4180** cells
- Total number: 6 x 48 V system
- Partner: MTSC Ltd.
- Year of installation: 2015



The Islamic University in Gaza decided to install off-grid PV solar system to cover the lighting loads in the laboratory building with capacity of 135 kWp and storage capacity 900 kWh/day.



## Solar Off-Grid System, United Arab Emirates



Werkfoto SET GMBH ©

Energy storage by  
BAE *SECURA SOLAR PVV* -  
Maintenance free batteries



Werkfoto SET GMBH ©

CASE STUDY – Transportable off-grid PV stations for temporarily rural electrification of remote villages. The batteries are installed in air-conditioned outdoor cabinet for safe operation of sensitive electrical components in hot areas.

## Solar Hybrid System, Myanmar



- Installed PV: 10.4 kWp
- Battery: 24 x **BAE SECURA SOLAR 9 PVV 1350** cells
- Inverter: SMA
- Genset: 10 kVA
- Partner/Installer: EAM
- Year of installation: 2018

The solar hybrid system meets all the energy of the boulder bay eco resort located on an island near Kawthaung in Tanintharyi region, Myanmar. Solar power charges the batteries during the day to meet primarily evening consumption (guests charging appliances, lights turning on, walkway lights on astro timer & a base load including fridges, freezers etc.).



# BAE – Solar Reference Project

Made in  
Germany

## Telecom Off-Grid System, AIS Thailand



- Installed: 1 site
- Battery: 48 x **BAE SECURA 10 OPzS 1000 LA** cells
- Charger: DELTA
- Installer: PISE
- Year of installation: 2015

The BAE **SECURA OPzS** batteries are installed in battery boxes placed under the shadow of the PV panels. The system serves as a back up for the loads of the telecom station.



# BAE – Latin America

Made in  
Germany



## PV Off-Grid Application in Oil & Gas, Mexico



- Installed PV: 37 kW
- Battery: 24 x **BAE SECURA SOLAR 10 PVV 1500** cells
- Installed systems: more than 30
- Partner: Greenergy
- Year of installation: 2015



The off-grid PV systems with storage either in 24 Vdc or 48 Vdc BAE **SECURA SOLAR 10 PVV 1500** batteries supply the energy to the control and monitoring systems installed at the valves of the pipelines. Devices such as cameras, sensors, opening/closing systems for the pipeline are provided with the energy via the off-grid PV system.

# BAE – Solar Reference Project

Made in  
Germany

## Solar Hybrid Micro Grid for Rural Electrification, Mexico



- Daily energy demand: 219 kWh
- Battery: 12 x 48 V battery banks consisted of: 24 cells **OPzS** or **OPzV**
- Inverter: SMA
- Partner: Greenergy
- Year of installation: 2012



### Project Partner:



Solar Energy Plants (mini grids) for rural electrification of up to 219 kWh daily energy demand. Installed in more than 12 indigenous communities located in states “Nayarit” and “Durango” among others. The batteries are in cyclic operation and the maximum discharge level allowed for the battery banks is 50%.





# BAE – Solar Reference Project

Made in  
Germany

## Solar Off-Grid Hybrid System, El Espino, Bolivia



- Installed PV: 60 kW
- Battery: 24 x **BAE SECURA SOLAR 22 PVS 4180** cells
- Total number: 6 x 48 V system
- Inverter: SMA
- Installer: ENERSOL S.A.
- Year of installation: 2015



Project: “Programa de Electricidad para Vivir Con Dignidad (PEVD)” by the Department for Electricity and Renewable Energies (Ministry of Petroleum and Energy). The project benefits 250 families of indigenous communities in “El Espino” (region of “Santa Cruz”) with access to electricity for residential as well as productive uses.

## Mobile Solar Application, Colombia



- Battery: 24 x **BAE SECURA SOLAR 22 PVV 4180** cells
- Battery setup: Seismic rack (0.7 g), recommended for boats and off-shore applications
- Inverter: Studer
- Partner: Energia y Movilidad S.A.S
- Year of installation: 2018



The goal of the project is to provide reliable energy during operation hours to the boat, increasing efficiency and working environment for the immigration authority on the Amazonas river between the neighbouring countries Peru, Brazil and Colombia. To achieve this, a PV system with BAE battery bank was installed on the boat. The system is supported by a diesel generator in case of cloudy days.



# BAE – Solar Reference Project

Made in  
Germany

## Solar Off-Grid System for Rural Electrification, Colombia



- Battery: 24 x **BAE SECURA SOLAR 16 PVV 3040** cells
- Inverter: SMA
- Partner: Energia y Movilidad S.A.S.
- Year of installation: 2015



PV off-grid installations for the electrification of the Amazonas region, the first phase in 2015 including 4 villages, all with BAE batteries.



**Thank you for your attention!**