ABB HVDC Life Cycle Service
Maximize Performance, Extend Lifetime
Index

- Current situation of HVDC service
- ABB HVDC life cycle service introduction
- ABB HVDC service portfolio and references
- Summary
# Current situation of HVDC service

## Installed Base

### Projects before 2007

<table>
<thead>
<tr>
<th>Project</th>
<th>kV</th>
<th>MW</th>
<th>Year</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gezhouba – Shanghai</td>
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<td>1200</td>
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<tr>
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<td>3000</td>
<td>2003</td>
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<tr>
<td>BitB Lingbao</td>
<td>360</td>
<td>2005</td>
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<td>Valve</td>
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<td>3000</td>
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### Projects since 2008 past warranty

<table>
<thead>
<tr>
<th>Project</th>
<th>kV</th>
<th>MW</th>
<th>Year</th>
<th>Scope</th>
</tr>
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<tbody>
<tr>
<td>Guizhou – Guangdong II</td>
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<td>4000</td>
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<td>BitB Heihe</td>
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<td>Valve</td>
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<td>BitB Lingbao II</td>
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<td>Valve, C&amp;P</td>
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<tr>
<td>Jingmen – Shanghai II</td>
<td>500</td>
<td>3000</td>
<td>2011</td>
<td>DCY</td>
</tr>
<tr>
<td>Hulunbei – Liaoning</td>
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<td>3000</td>
<td>2010</td>
<td>Valve, DCY</td>
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<tr>
<td>Baoji – Deyang</td>
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<td>DCY</td>
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<tr>
<td>Xiangjiaba – Shanghai</td>
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<td>Turn Key</td>
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<tr>
<td>Qinghai – Tibet</td>
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<td>2012</td>
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### Projects since 2008 under warranty

<table>
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<th>MW</th>
<th>Year</th>
<th>Scope</th>
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</thead>
<tbody>
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<td>Jinping – SuNan</td>
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<td>Turn Key</td>
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<tr>
<td>BitB Gaoling II</td>
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<td>2012</td>
<td></td>
<td>Valve</td>
</tr>
<tr>
<td>Hami – Zhengzhou</td>
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<td>8000</td>
<td>2014</td>
<td>Valve, DCY</td>
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<tr>
<td>Xiuodu – ZheXi</td>
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<td>8000</td>
<td>2014</td>
<td>Valve, Trans</td>
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<td>Nuozhadu – Guangdong</td>
<td>800</td>
<td>5000</td>
<td>2014</td>
<td>Trans</td>
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<tr>
<td>HVDC Light Zhoushan</td>
<td>200</td>
<td>1000</td>
<td>2014</td>
<td>N/A</td>
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<tr>
<td>HVDC Light Xiamen</td>
<td>320</td>
<td>1000</td>
<td>2015</td>
<td>Wall bushing</td>
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</table>

### Projects on going

<table>
<thead>
<tr>
<th>Project</th>
<th>kV</th>
<th>MW</th>
<th>Year</th>
<th>Scope</th>
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</thead>
<tbody>
<tr>
<td>Yunnan-Guangxi</td>
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<td>Valve</td>
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<tr>
<td>Ningdong-Zhejiang</td>
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<td>8000</td>
<td>2016</td>
<td>DCY, Trans</td>
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<tr>
<td>BitB Luxi</td>
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<td>2*1000</td>
<td>2016</td>
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<tr>
<td>Jinbei-Nanjing</td>
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<td>DCY</td>
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<td>Valve</td>
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<td>Changji-Guquan</td>
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<td>Valve, DCY</td>
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<td>BitB Light Yu-E</td>
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<tr>
<td>Zhalute-Qinzhou</td>
<td>800</td>
<td>10000</td>
<td>2018</td>
<td>DCY</td>
</tr>
</tbody>
</table>

(The year means project in operation)
Current situation of HVDC service

Customers’ strategy

Online Monitoring
- To collect operation data online
- To analyze data online and remote

Factory based maintenance
- Less periodic inspections
- Factory based maintenance to prevent problems and risks in advance

Concentrated & Professional Maintenance Team
- Concentrated and professional team to manage the total maintenance

Lean Management
- By giving lean targets in evaluation system to push improvement in human resource allocation, financial management, materials management and etc. to make the installation, operation and maintenance of power system more stable and efficient

November, 2016
Index

- Current situation of HVDC service
- ABB HVDC life cycle service introduction
- ABB HVDC service portfolio and references
- Summary
ABB HVDC life cycle service introduction

HVDC station’s life cycle
# ABB HVDC life cycle service introduction

## Contents

<table>
<thead>
<tr>
<th>Phase</th>
<th>Services</th>
</tr>
</thead>
</table>
| **ACTIVE PHASE** | - Selection & Dimensioning  
- Training  
- Spare parts  
- Simulation & Optimization  
- Installation & Commissioning  
- Support & Remote service  
- Maintenance/Site service |
| **STABLE PHASE** | - Training  
- Spare parts  
- Simulation & Optimization  
- Support & Remote service  
- Maintenance/Site service  
- Upgrade |
| **LIMITED PHASE**| - Support & Remote service  
- Maintenance/Site service  
- Spare parts  
- Upgrade  
- Evolution & Replacement |
| **OBSOLETE PHASE**| - Evolution & Replacement  
- Recycling |

November, 2016
Current situation of HVDC service

ABB HVDC life cycle service introduction

ABB HVDC service portfolio and references

Summary
ABB HVDC service portfolio and references
Service Products

- Training
- Service agreements
- Maintenance
- Repairs
- Extension, upgrades & retrofits
- Installation and commissioning
- Spares & consumables
- Advanced services
- End of life services
- Replacements
- Engineering & Consulting
- Installation and commissioning
ABB HVDC service portfolio and references

Service agreement

Tailor-made service agreements – HVDC Care:

- Engineers on customer sites
- Customer value
- ABB value
Minimum waiting time with maximum spare parts support:

- Strategic stock, according to condition assessment and service agreement
- Emergency purchasing
- Recommendation on spare parts plan and storage
ABB HVDC service portfolio and references Replica

Dedicated product for CEPRI, university, research institute and O&M unit

- C&P Logic verification
- UHVDC C&P and converter valve training
- Engineering support, fault replay & study
- AC-DC simulation and study
ABB HVDC service portfolio and references
AHC for HVDC
Replacement of Competitor's Wall Bushing

- “Service agreement” to identify opportunities at first place
- Total solution including proposal, logistic, execution
The many good reasons for carrying out a technical modernization include:

- Extending system lifetime
- Higher availability and reliability
- Better cost efficiency
- Improved performance
- Increasing operating efficiency
- Solving potential spare part problems
- Easier technical support
- Additional features to handle addition of renewable energy in the system
**Customer’s need**
- Prolong life of the 40-year-old station
- Boost transmission capacity to 3800 MW

**ABB’s response**
- Turnkey upgrade of the Celilo station including valves, MACH C&P system, transformers, filters etc.

**Customer’s benefits**
- Secure reliability of power supply to California
- Optimized use of existing infrastructure
- Lower losses
GS500: Gezhouba-Shanghai ±500kV 3GW Upgrading

Key Parameters
- Transmission Distance (km): 1045
- Rating: 500kV 1.2GW will be updated as 500kV 3GW transmission line capacity upgrading to 3GW has been finished
  Sending station: Classic HVDC 3GW
  Receiving station: VSC HVDC 3GW
- Similar Performance: TG500

Customer: State Grid Corporation of China (SGCC)
Index

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Summary

Trend of HVDC service

- Outsourced maintenance
- Convergence of IT/OT (AHC, CMMS, Cloud, etc)

ABB’s long term partnership with customers to maximize performance and extend lifetime of HVDC installations

- Leader of technology
- Local organization and resources
- Advanced service products
- Rich service references
Our service team in China

Service station distribution

- 5 service stations: Beijing, Shanghai, Guangzhou, Yichang, Yibin,

Contact us

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- Wechat: ABB高压直流服务
Power and productivity for a better world™