ELECTRIFICATION SERVICE - INDIA

Medium Voltage Retrofit Solutions

ABB Electrification Service portfolio provides the right combination to keep your equipment at peak performance.
Retrofitting is a key element.
From roll-in replacement to hard-bus retrofill, our Service organization can help you to replace your old ABB and non-ABB circuit breakers updating your installed base to the latest technology.
This means additional safety, reliability and reduced environmental impact.

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1. Abbreviations and definitions

/CS	Retrofit screw type with insertion and extraction through a rotative handle
CB	Circuit Breaker
ELSE	Electrification Service
LCM	Life Cycle Management
M&D	Monitor and Diagnostics
In	Nominal current according to IEC 62271-200
Isc	Short circuit current according to IEC 62271-200
RiR	Roll-in Retrofit
Pitch distance	Distance between two phases (central to lateral) in the circuit breaker
Vn	Nominal Voltage according to IEC 62271-200

2. Our service portfolio

ABB's Electrification Services portfolio provides a range of offerings far beyond standard product support: from onsite services for risk reducing installation and startup, to availability services to help you proactivelly reduce downtime and meet your service level commitments.

Start-up and maintenance services
- Installation and commissioning
- Training
- Spares and consumables
- Maintenance (preventive, condition-based and predictive)
  – SWAPs maintenance program
- Extended Warranty

Lifecycle services
- Engineering and consulting
- Extensions, upgrades and retrofit
  – Roll-in Retrofit
  – Onefit/ hard-bus retrofill
- Relay Retrofit Program
- Circuit breaker remote racking systems
  – TruckMaster
  – Motorized circuit breaker truck
- Arc flash protection upgrades
- End of life services
- Replacement

Advanced services
- ABB Ability™ Condition Monitoring for switchgear – SWICOM
- ABB Ability™ Condition Monitoring for electrical systems – CMES
- ABB Ability™ Energy and Asset Manager
- ABB Ability™ Life cycle assessment for electrical systems – MySiteCondition
- ABB Ability™ Backup Management for electrical systems – Data Care

Technical support and repairs
- Remote Assistance for electrical systems
  – RAISE
- Collaborative Operations for electrical systems
  – CLOSER
- Onsite and factory repair and maintenance

Support agreements
- ABB Power Care

3. Life cycle management

Life cycle management (LCM) is the process that enables ABB to innovate and manage products and related services throughout the entire business life cycle — effectively and efficiently. It is ABB's goal to pro-tect our customers' investment beyond the life cycle of the underlying platform products.

The ABB life cycle management process originates from:
IEC 62402, the IEC Application Guide about Obsolescence Management, which stresses the importance of managing obsolescence as an integral part of the design, development, production, and in-service support of a product. The extensive, lengthy experience of ABB for the management of products and their life cycle.

Four stages define the life cycle policy for ABB electrification distribution solutions:

1. **Active**
2. **Classic**
3. **Limited**
4. **Obsolete**

Open communication with our customers is continuous, with notifications provided for each status change several months in advance, as well as a minimum of 10 years of support granted from the Classic phase to the beginning of the Obsolete phase.

Please contact ABB Service team to have an assessment on the Life Cycle Status of your installed base and define the best actions to keep your system running.

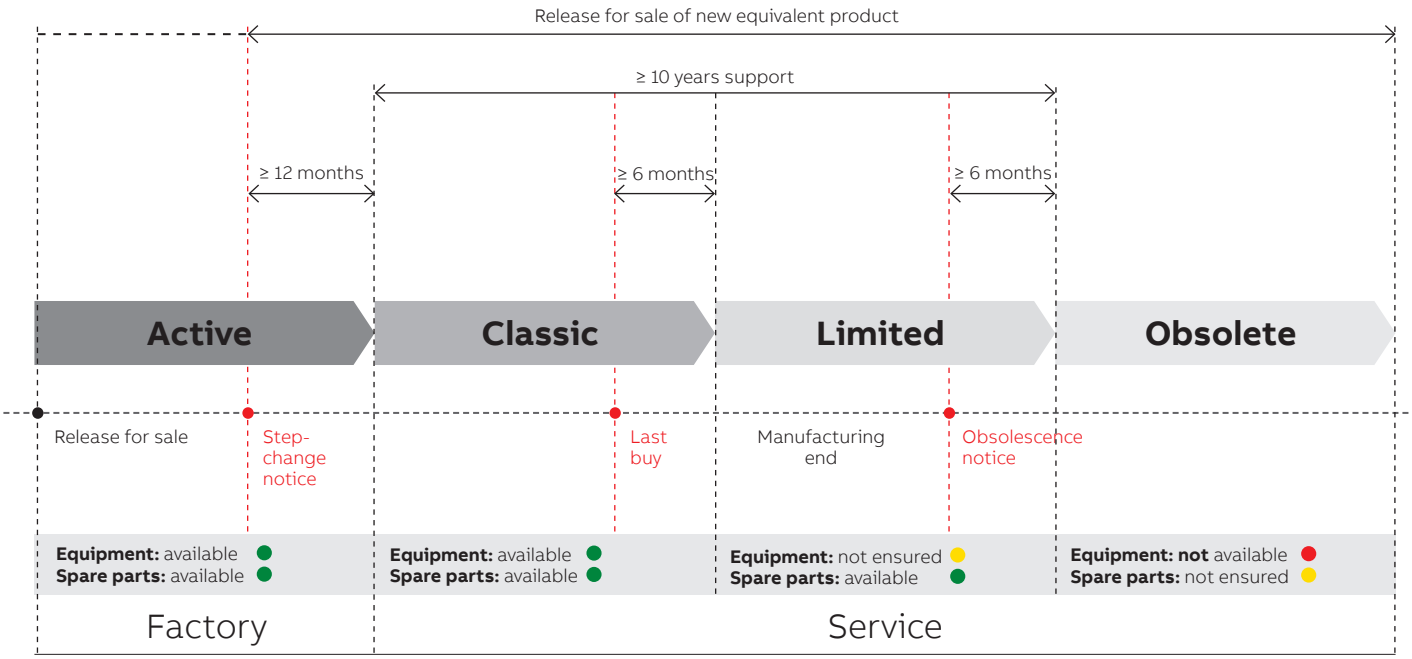


ABB services are at your disposal for making the best use of ABB assets at every life cycle stage.

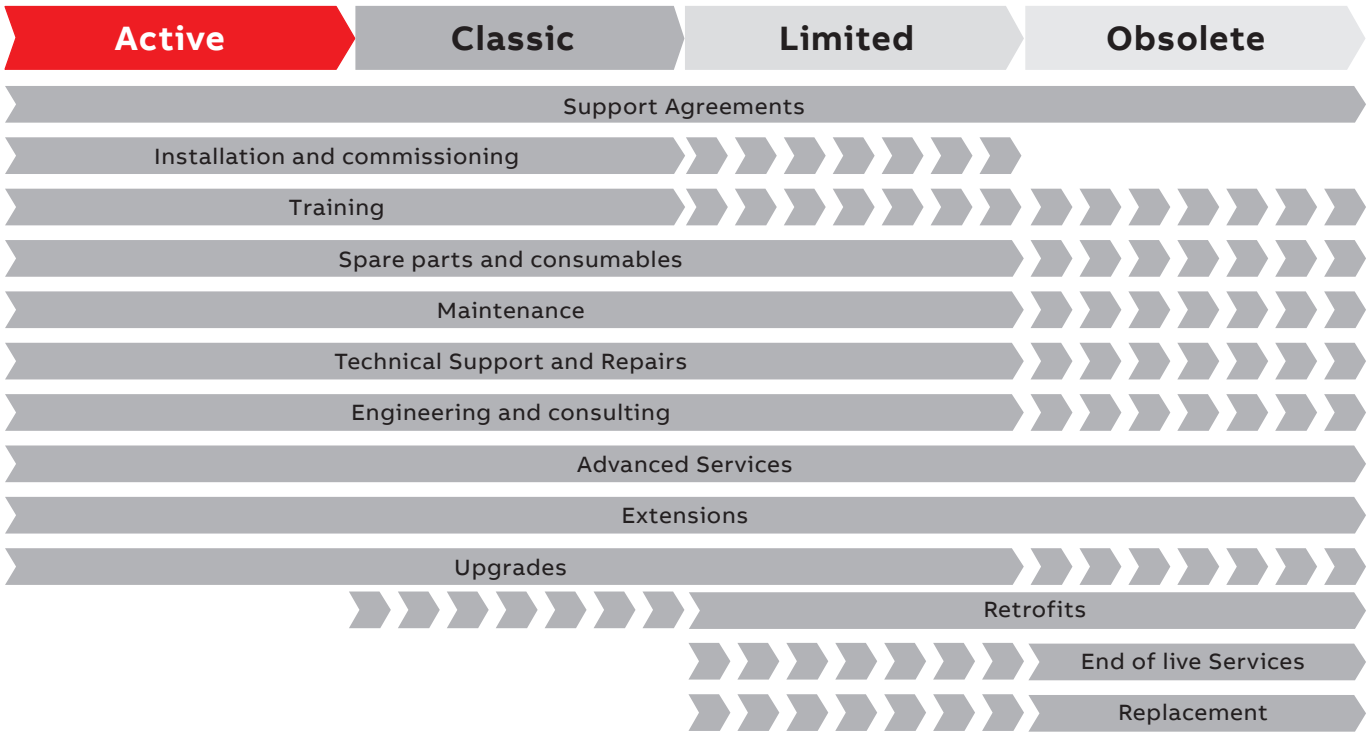
Active
- Long-term support thanks to Power Care customer support agreements
- Extended warranty application
- Worldwide Service competence, ready for prompt actuation
- Certified ABB spare parts ready in stock to guarantee their availability throughout the product lifetime

Classic
- Last Buy opportunity of complete equipment
- Spare parts availability as per active product conditions
- Time to keep equipment healthy via Power Care customer support agreements
- Call for training with wide coverage thanks to worldwide footprint still available.

Limited
- Spare parts fully available
- Retrofit solutions can already be applied
- Power Care customer support agreements designed to keep the service experience as per active products

Obsolete
- Spare parts could be still accessible on request.
- Retrofit solutions are usually available. The use of active products allows a new life to be given to the plants.

Our consultancy services are always available for supporting cost-effective and optimized investments. Special care is given to obtain a soft shift to new applications and solutions.



4. The retrofit concept

Whenever a device is no longer available on the market and/or maintenance is no longer efficient, ABB service team can offer a valid and cost saving solution compared to the full switchgear replacement. Obsolete and limited equipment can be replaced using roll-in retrofit or retrofill kits, which are specifically designed by ABB ELSE team in INDIA to minimize downtime and replace only the noble parts, keeping the original switchgear components that are not worn by time.
ABB Service experts conduct site audits on existing installations to assess the condition of equipment, recommend the proper solution, and support the right investment decision.
Even if IEC does not cover retrofit solutions with a dedicated Standard prescribing type testing, ABB applies the highest safety and reliability requirements to ensure products' quality and safety. In fact, ABB design policy adopts the fundamental philosophy of IEEE C37.591 Standard: […] a converted ([1]) product is a new design and shall be design verified to substantiate that it meets its nameplate ratings as well as applicable standards […]
Circuit breaker retrofits are a cost-effective switchgear modernization solution. The result is an improvement in safety, reliability, maintenance, sustainability and performance.

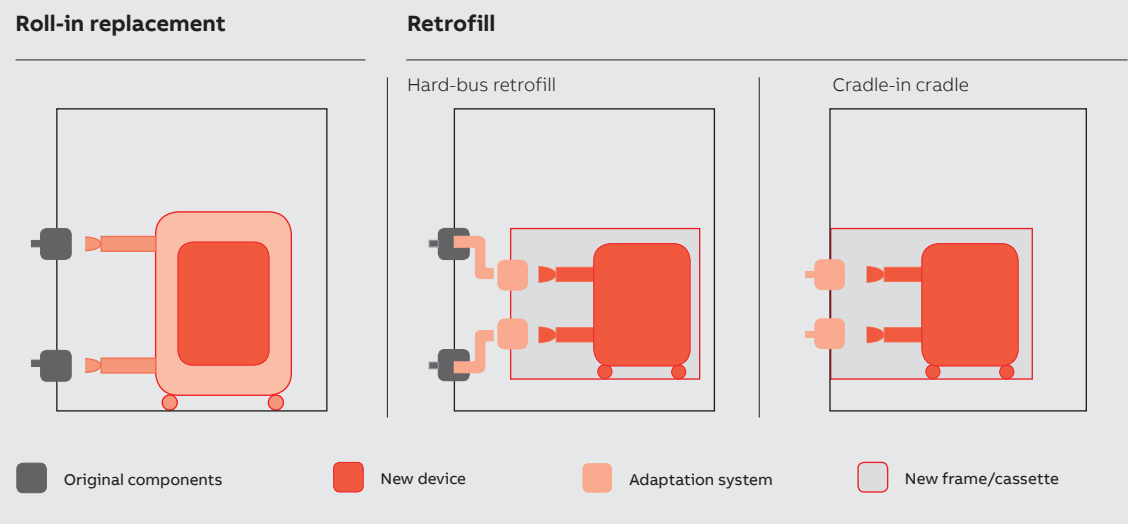
([1]) To be considered as Retrofit

ABB is a full-system provider which includes: Site data collection, Design, Manufacturing, Testing, Installation and commissioning.
With our expertise, both ABB and non-ABB equipment can be retrofitted.

Characteristics of the different technical solutions for retrofit

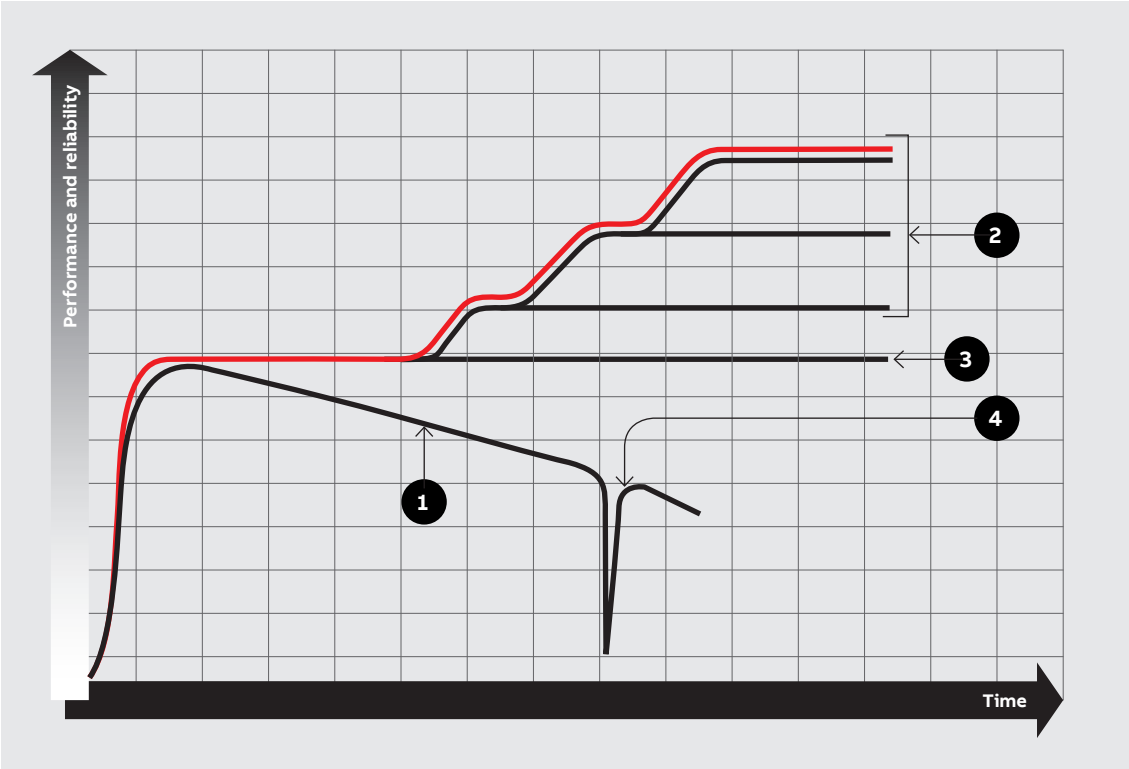
Roll-in Replacement:
- Only new components used
- The new truck carries a standard basic circuit breaker
- High performance and additional features
- Reduced downtime
- Fully type tested
- Plug and play solution

Hard bus Retrofill - Onefit:
- Only new components used
- The new frame hosts a standard circuit breaker
- An additional power circuit makes the connection
- Existing bushings generally remain in place
- Fully type tested



5. Enhance the performance and reliability of your installed base

ABB is offering a full range of solutions to keep your installed base up and running during its entire life cycle.
The SWAPs maintenance program supports you to optimize the maintenance plan for the complete line-up.
SWAPs is a maintenance program based on 5 levels of maintenance (See, Watch, Act, Perform, Secure), where intervals are defined according to the assessment of the equipment environmental and operational conditions, age, previous maintenance performed, and presence of monitoring and diagnostic solutions. The schedule continues till the equipment reaches its end of life, also recommending the right time for relay and circuit breaker retrofit.
When electrical components become obsolete, or a new technology is available, something more than a maintenance program might be required to keep a high efficiency of the installed base. In these cases, upgrade and retrofit solutions enhance the performance and reliability of the full system.



1 No maintenance
2 Upgrade or retrofit solutions
3 Risk and condition-based maintenance
4 Repair

6. Retrofit value proposition

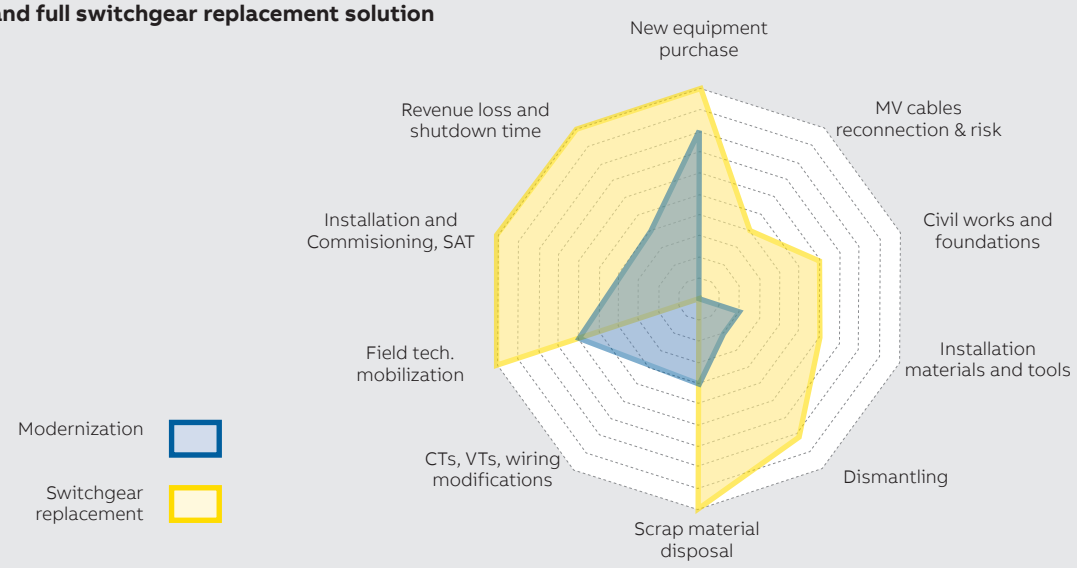
Based on long-time experience and know-how, ABB developed roll-in retrofit and Retrofill solutions specifically tailored to most limited and obsolete medium voltage circuit breakers that were produced by ABB and other manufacturers. This provides the opportunity to eliminate outdated technology like air magnetic or minimum oil, using the latest interrupting technology. The result is a significant improvement in reliability, safety, maintenance, and performance.
Roll-in Retrofit and Retrofill have different benefits for customer. Some of them are common for both solution, some are specific.

Benefits of Roll-in Retrofit and Retrofill (Onefit)

- Last state-of-the-art switching technologies using ABB vacuum or gas SF6 apparatus
- Solution based on type tests according to the latest IEC Standards
- Increase of safety thanks to the available optional features like motorization of the insertion and extraction of the breaker
- Reduction of maintenance cost during the lifetime thanks to the new circuit breaker technology
- Easy implementation of digitalization solution to give access to Asset Manager on cloud solution
- Interchangeability and fast replacement with the existing old circuit breaker
- Safety replacement of the existing interlocks and shutters
- Up to 80% of downtime reduction to install the solution compared to full replacement
- Reduction of totals economic effort (See below picture) compared to the full replacement up to 50%.

ABB service team can support to define the best solution based on technical requirements, available budget and safety improvement required.
Please refer to chapter 7 for more details on how to choose the best solution to renew your installed base.

Total effort comparison between retrofit and full switchgear replacement solution



7. Choose the best solution to renew your old installed base

With our expertise, we can support customer to define the best solution based on the real needs. When the installed base is at the end of life it is possible to choose one of the following options to keep the system up and running:

- Roll-in retrofit
- Retrofill - Onefit
- Full switchgear replacement

The evaluation of the best solution must consider different aspects, as each one has different advantages compared to the others. We can divide the benefits in the following areas: safety, technical, environmental and economic ones. Below tables can help to highlight the different benefits of each solution. It's recommended to contact ABB Service team to perform a tailor-made assessment and define the best investment for the specific case.

Safety benefits

	Risk of internal arc	Internal arc protection	Racking in and out operation	Open and close operations	Interlocks and shutter system
Existing Obsolete CBs	~80% of all electrical accidents are caused by arc flash due to wrong operations, interlock failures, degradation of the insution materials. In old equipment the risk is very high	Old switchgears generally are not tested to withstand an internal arc.	In old CBs the rack-in / out operations are generally performed with open door, exposing the technician to high risk	In old system Switchgear the open and close operations are genrally performed in front of the switchgear	It's common in old switchgear that interlocks and shutter system fails
Roll-in Retrofit (RiR)	Possible failure due to CBs is reduced. The upgrade of the switchgear (shutters, interlocks..) is not in the scope of work of the RiR, it's recommend during installation and commissioning to check the interlocks and shutter system in order to reduce the risk of failure	The upgrade of the switchgear is not in the scope of work so it maintains the orginal Internal arc protection ABB can propose different solution to reduce the effect and durating of an internal arc (e.g UFES solution)	RiR includes the option to motorize the rackin/out (motor on truck or TruckMaster®), to operate the CBs from safaty distance and in some application to change the racking in/out system (e.g with rotative handle)	The realibility of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotly the opening and closing system using ArcSwitch®	The upgrade of the switchgear (shutters, interlocks..) is not in the scope of work of the RiR, it's recommend during installation and commissioning to check the interlocks and shutter system in order to reduce the risk of failure
Onefit Retrofill	The interlocks and shutter system will be replaced, the new ones are according to last international standard reducing the risk of internal arc	Onefit is not changing the orginal Internal arc protection classification of the switchgear, adding the Onefit door provide a protection against internal arc ABB can propose different solution to reduce the effect and durating of an internal arc (e.g UFES solution)	Racking in/out operations are performed with a closed door, the existing system is replaced using rotative handle insertion. Onefit solution includes the option to motorize the rackin/out (motor on truck or TruckMaster®)	The realibility of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotly the opening and closing system using ArcSwitch®	The interlocks and shutter system will be replaced, the new ones are according to last international standard
Switchgear full replacement	The risk of internal arc in new equipment is lower than old one. It's recommened to perform a training on how to operate the switchgear to avoid wrong actions that can couse interanl arc. ABB can propose solution to monitor the partial discharge that could couse and Internal arc (Swicom and PDCom solution)	New switchgear is generally tested against interanl arc. ABB can propose different solution to reduce the effect and durating of an internal arc (e.g UFES solution)	Racking in/out operations are performed with a closed door, the existing system is replaced using rotative handle insertion. Onefit solution includes the option to motorize the rackin/out (motor on truck or TruckMaster®)	The realibility of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotly the opening and closing system using ArcSwitch®	The interlocks and shutter system will be replaced, the new ones are according to last international standard

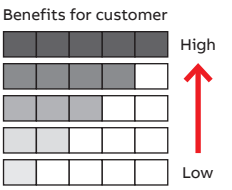
7. Choose the best solution to renew your old installed base

Econonic benefits

	OPEX	CAPEX	Unforeseen costs during installation & commissioning	Unforeseen costs during operation	Installation and commissioning time
Existing Obsolete product	High opex cost to perfom maintenance of the equipment and high cost of spare parts - if available	high risk on unforeseen CAPEX in emergency condition (No budget allocation) due to failures	-	High risks of lost of product and switchgear due to equipment failures (e.g. Internal arc, missing opening/ closing operation, broken interlocks etc.)	-
Roll-in Retrofit (RiR)	Significant reduction of OPEX costs thanks to new type of CBs. Spare parts prices and availabilities are relative to active equipment, price reduction of the spares are around 50% less than obsolte CBs's spares. Spares lead time is short, it's not required to keep an high spare parts stock.	Limit investment - less than 60% compared to switchgear replacement - considering the full scope of work. It's possible to do partial replacement for only critical feeders based on available budget. The replecement can plan according to planned shutdown and not in emergency situation	RiR is a direct replacement solution so very low risk. Maintenance of the switchgear is suggested to ensure the shutters and interlocks functionality	New CBs failure rates is very limited with proper maintenace plan in place. It's possible to implement digital monitoring solutions with up to 40% of maintenance cost reduction (Refer to SWICOM and Asset Manager) lowering the failure rates.	Fast installation and commissioning, less than 1h per unit with only half busbar out of service.
Onefit Retrofill	Significant reduction of OPEX costs thanks to new type of CBs. Spare parts prices and availabilities are relative to active equipment, price reduction of the spares are around 50% less than obsolte CBs's spares. Spares lead time is short, it's not required to keep an high spare parts stock.	Limit investment - less than 50% compared to switchgear replacement - considering the full scope of work. It's possible to do partial replacement for only critical feeders based on available budget. The replecement can plan according to planned shutdown and not in emergency situation	Onefit is designed to fit in the original panel so the risks are limited. The switchgear frame and copper system must be in good condition while interlocks and shutter will be fully replaced	New CBs failure rates is very limited with proper maintenace plan in place. It's possible to implement digital monitoring solutions with up to 40% of maintenance cost reduction (Refer to SWICOM and Asset Manager) lowering the failure rates. The replacement of the interlocks and shutter reduce the possible failure rates of the full switchgear	Avarage installation & commissioning time 6-8h per unit with only half-busbar out of service.
Switchgear full replacement	Significant reduction of OPEX costs thanks to new type of CBs. Spare parts prices and availabilities are relative to active equipment, price reduction of the spares are around 50% less than obsolte CBs's spares. Spares lead time is short, it's not required to keep an high spare parts stock.	High investment required.	High risks due to extra civil works and possible damages of existing MV cables during the replacement	New CBs failure rates is very limited with proper maintenace plan in place. It's possible to implement digital monitoring solutions with up to 40% of maintance cost reduction (Refer to SWICOM and Asset Manager) lowering the failure rates.	Installation & commissioning time not easily valued due to unexped issues during the activity. The I&C time will be much higher than 8h per unit considering also the existing switchgear disposal and civil works required.

Environmental benefits

	Equipment disposal / Circular economy	Materials disposal during normal operation	Dangerous materials	Failure risks with environmental impact	Risk of Fire
Existing Obsolote product	The complete unit will be disposed also in case of small failure due to unavailability/limitation of spare parts. The risk of failure is higher in obsolete products compared to active ones.	Disposal of exhausted dielectric material in the maintenance activities (e.g. oil in oil CBs) or leakage due to end of life of the CBS (e.g. SF6 in SF6 CBs)	Presence of dangerous materials, like asbestos or Oil. SF6 gas could be danger in case is deteriorated.	High risk of failure that can create a enviromnetal impact (e.g SF6 or oil leakage, toxic smokes creation)	High risks of fire in case of oil breaker, or due to partial discharge for deteriorated insulatation materilas, or due to wrong operations with consequence of an internal arc
Roll-in Retrofit (RiR)	No materials disposal, only the existing CBs if no longer usable. The switchgear frame will remain with a reduction of waste in the avarage of 60% to 70% compered to a SWG replacement (based on old SACE switchgear)	New CBs are sealed for life, it's not required any replacement of the dielectric materials. It is possible to use Vaccum CBs	New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure. It is possible to use Vaccum CBs	Reduced risk of failure compared to old CBs. It's possible to implement digital monitoring to reduce the risk of failure including internal arc (SWICOM, PDCOM for partial dicharge, temperature monitoring and Asset manager solutions)	Very low risk for the new CBs
Onefit Retrofill	Some materials disposal, including the existing CBs if no longer usable in other units. The switchgear frame will remain with a reduction of waste in the avarage of 50% to 60% compered to a SWG replacement (based on old SACE switchgear)	New CBs are sealed for life, it's not required any replacement of the dielectric materials. It is possible to use Vaccum CBs	New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure. It is possible to use Vaccum CBs	Reduced risk of failure compared to old CBs and old shutter/interlocks system, It's possible to implement digital monitoring to reduce the risk of failure including internal arc (SWICOM; PDCOM for partial dicharge, temperature monitoring and Asset manager solutions)	Very low risk for the new CBs and CBs's enclosure
Full replacement	The complete existing switchgear will be disposed (around 1000kg of waste for each unit)	New CBs are sealed for life, it's not required any replacement of the dielectric materials. It is possible to use Vaccum CBs	New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure. It is possible to use Vaccum CBs	Reduced risk of failure compared to old switchgear. It's possible to implement digital monitoring to reduce the risk of failure including internal arc (SWICOM, PDCOM for partial dicharge, temperature monitoring and Asset manager solutions)	Very low risk for the new Switchgear



7. Choose the best solution to renew your old installed base

Technical benefits

	International Standard	Standardization of the installed base	Operating sequence	Digitalization and new functionalities	Availability of spare parts
Existing Obsolete product	According to old stadandard	Typically different types and brands of CBs are installed, with different operations sequences, different spares and technologies	Operation sequence available generally with slow cycle	Difficult to digitalize an old obolete system	For Obsolete products the spare parts are not guaranteed
Roll-in Retrofit (RiR)	The retrofit CBs is tested according to the latest IEC (or ANSI) standard : IEC 62271-100, IEC 62271-200 The switchgear will remain tested according to the original standard	The RiR will be 100% interchangeable with existing products. Installing RiR in all the installed base the spare parts related to the mechanisms and the basic CBs will be in common.	It's possible to implement fast cycle and reclosure according to last international standard	The digitalization fo the switchgear can be done during the commissioning of the retrofit. With RiR is easy to implement new functionalities. Revamping of the relays can be offered as optional	Fully availability of the spare parts for the CBs
Onefit Retrofill	The retrofit CBs and the enclosure (onefit) is tested according to the latest IEC (or ANSI) standard : IEC 62271-100, IEC 62271-200 The switchgear will remain tested according to the original standard	The CBs for Onefit is standard used also in ABB switchgear. Installing Onefit to all the installed base will allow to have the all the spare parts in common, one type of CBs interchangebale with the the same CBs with the same rating.	It's possible to implement fast cycle and reclosure according to last international standard	The digitalization of the switchgear can be done during the commissioning of the Onefit. There is the option to offer digital CBs VD4-Digitup in order to renew also the relays and CTs	Fully availability of the spare parts for the CBs and enclosure (Onefit)
Switchgear full replacement	The full switchgear is tested according to the latest IEC (or ANSI) standard: IEC 62271-200.	The CBs used in new SWG is a standard CBs produced in the assembling line, the same used in Onefit	It's possible to implement fast cycle and reclosure according to last international standard	Digital switchgear is an available option, new switchgear can be produced according to the functionalities required	Fully availability of the spare parts for the switchgear

8. Available roll-in retrofit solutions

8.1 HPA ABB/ASEA

Id	Existing CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
1VYN401889-W	HPA 12/1240C	12	1250	40	185	VHA-12S	VD4	VD4-HPA	12.12.40	1VYN301801-BW
1VYN401889-X	HPA 12/1640C	12	1600	40	185	VHA-12S	VD4	VD4-HPA	12.16.40	1VYN301801-BW
1VYN401889-Y	HPA 12/2040C	12	2000	40	185	VHA-12S	VD4	VD4-HPA	12.20.40	1VYN301801-BW
1VYN401889-AA	HPA 12/2540C	12	2500	40	185	VHA-12S	VD4	VD4-HPA	12.25.40	1VYN301801-CJ
1VYN401889-AC	HPA 12/3140C	12	3150	40	185	VHA-12S	VD4	VD4-HPA	12.31.40	1VYN301801-CK

8.2 HCA ABB/ASEA

Id	Existing CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
1VYN401889-AJ	HCA 12/1240	12	1250	40	210	VHE-12S	VD4	VD4-HCA	12.12.40	1VYN301801-DD
1VYN401889-AL	HCA 12/2040	12	2000	40	210	VHE-12S	VD4	VD4-HCA	12.20.40	1VYN301801-DF
1VYN401889-AM	HCA 12/3040	12	2700 (AN)	40	210	VHE-12S	VD4	VD4-HCA	12.30.40	1VYN301801-DG
1VYN401889-AM	HCA 12/3040	12	3000 (AF)	40	210	VHE-12S	VD4	VD4-HCA	12.30.40	1VYN301801-DG

8.3 HKK ASEA

Id	Existing CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
1VYN401889-F	HKK 12/1240	12	1250	40	185	VHE-12	VD4	VD4-HKK	12.12.40	1VYN301801-R
1VYN401889-G	HKK 12/1640	12	1600	40	185	VHE-12	VD4	VD4-HKK	12.16.40	1VYN301801-S
1VYN401889-H	HKK 12/2040	12	2000	40	185	VHE-12	VD4	VD4-HKK	12.20.40	1VYN301801-P
1VYN401889-J	HKK 12/2540	12	2500	40	185	VHE-12	VD4	VD4-HKK	12.25.40	1VYN301801-T

8.4 FG2 Voltas

Id	Existing CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
YN1V407103-GUC	FG2	12	630	40	180	Voltas Switchgear	VD4	VD4-FG2	12.06.40	YN1V307031-DBG
YN1V407103-GUC	FG2	12	800	40	180	Voltas Switchgear	VD4	VD4-FG2	12.08.40	YN1V307031-DBG
YN1V407103-GUC	FG2	12	1250	40	180	Voltas Switchgear	VD4	VD4-FG2	12.12.40	YN1V307031-DBG

8.5 EPX GEC Alstom

Id	Existing CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
YN1V407103-GSJ	EPX	24	630	25	210	GEC Alstom Switchgear	VD4	VD4-EPX	24.06.25	YN1V307031-DEA
YN1V407103-GSJ	EPX	24	800	25	210	GEC Alstom Switchgear	VD4	VD4-EPX	24.08.25	YN1V307031-DEA
YN1V407103-GSJ	EPX	24	1250	25	210	GEC Alstom Switchgear	VD4	VD4-EPX	24.12.25	YN1V307031-DEA

More product information:
abb.com/mediumvoltage
Your contact center:
abb.com/contactcenters
More service information:
abb.com/service

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