

# MAKING THE SWITCH

to Vista<sup>®</sup>, Vista<sup>®</sup> Green, or Vista<sup>®</sup> SD  
Underground Distribution Switchgear



# Introduction

As many utilities steadfastly serve their end-customers, they simultaneously face a spectrum of challenges with their underground distribution switchgear. Evolving environmental issues, training staff on maintenance processes, and efforts to limit operations and maintenance budgets contribute to reliability issues while wasting utilities' time and money.

If you are trying to mitigate multiple challenges simultaneously to improve your system and better serve your customers, your existing switchgear may not be the ideal fit for your application.

This guidebook is designed to help you learn more about Vista, Vista Green, and Vista SD Underground Distribution Switchgear and how they can ease common challenges you may encounter.



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# What Challenges Do You Need to Solve?



## **You need to underground more of your grid.**

Climate change and urban-area growth in your service territory are challenging your use of overhead gear, making undergrounding a higher priority. Moreover, when your crews interact with overhead gear, they are exposed to medium voltage or possible arc-flash events, both of which create safety concerns. Your oil-insulated switchgear may also be less flexible to integration within hybrid systems.



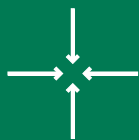
## **Your new staff requires continual training on tedious switchgear maintenance.**

You likely have oil-insulated switchgear on your system that requires frequent maintenance. If you experience high staff turnover, you must constantly train new crew members on tedious operation and maintenance procedures.



## **Your oil-insulated switchgear leaks constantly or has oil-quality issues.**

If you use oil-insulated switchgear, you are likely dealing with leaks and condensation getting into the gear regularly. This poses safety risks to your crews, who must fix leaks before they can refill the gear. If your switchgear leaks, it also must be addressed with environmental remediation procedures and costly clean-ups.



## **Your existing switchgear can't meet space constraints.**

Existing vaults and pad designs are costly and time-consuming to expand to fit equipment larger than your existing oil-insulated switchgear inside it. You require switchgear that can fit and be easily installed in tight spaces.



## **You need switchgear that can handle your increasing load demands.**

As load currents increase, higher continuous current levels are required. However, your existing oil-insulated switchgear may not meet these higher ratings, creating undue stress on the switches, protection devices, and the gear's main bus and its ability to handle multiple cables per phase. The other option, expanding your existing switchgear fleet, may be costly and space-prohibitive.

# The Shortcomings of Oil-Insulated Switchgear

Use the following table to evaluate comparative switchgear in contrast to Vista, Vista Green, and Vista SD switchgear.

Evaluation Category	Switchgear Options	
	Oil-insulated Switchgear	Vista, Vista Green, or Vista SD Underground Distribution Switchgear
	Cons	Pros
<b>Environmental Exposure</b>	Oil inside gear susceptible to moisture and contamination	Sealed designs mitigate moisture and contamination from getting inside gear
<b>Maintenance</b>	Must regularly train staff on tedious, hands-on maintenance procedures	No mechanical maintenance required, so less time and effort required to train staff
	Frequent and routine maintenance and testing required, increasing operation and maintenance costs	Low maintenance, reducing operation and maintenance costs
	Oil in tank must be routinely refilled, increasing leak risk	Insulating gases are in a hermetically sealed tank, so no refilling required*
<b>Operational Ease</b>	Higher operator error and safety risks from frequent, involved maintenance	Low maintenance, reduces operator error margin and safety risks
	Arc resistance not available	Arc resistance built into design*
	Requires fuse replacement after operation, exposing operators to medium voltage	No fuses means less operator exposure to medium voltage
	Switches open and close, but lack grounding	Three-position integral switch can be open, closed, or grounded*
	Multiple-step operation	One-turn operation
	Small viewing window means operators struggle to see gear status	Large viewing window provides operators more visibility to clear visible gap to check gear status
<b>Design Quality</b>	Tanks are manually-welded, creating room for sealing errors	Tanks are robotically welded*, providing a repeatable, high-quality consistent weld
	May use mild-steel tanks, which can corrode	Stainless steel tanks* for corrosion resistance
<b>Customization</b>	Limited design, delivery, and post-sale customization	Highly customizable at design, delivery, and retrofit stages

\* Applies to Vista and Vista Green switchgear only.



# What Are Vista, Vista Green, and Vista SD Switchgear?

## Vista Underground Distribution Switchgear

helps utilities solve reliability challenges on medium-voltage distribution systems up to 38 kV. One unit supports up to six load-interrupter switch and resettable fault-interrupter “ways” and has complete protective coordination that minimizes outages. The switchgear can be operated by one person in a few simple steps and features a sealed design to improve operator safety.

## Vista Green Underground Distribution Switchgear

Vista Green switchgear is an eco-friendly alternative for utilities solving reliability challenges on medium-voltage systems up to 38 kV. This switchgear has the same feature, design, and reliability benefits of Vista switchgear, but uses a 3M™ Novec™ 4710 Insulating Gas<sup>1</sup> and CO<sub>2</sub> mixture instead of SF<sub>6</sub> gas. With this alternate gas having a 97% lower CO<sub>2</sub>e than SF<sub>6</sub> gas, Vista Green switchgear helps utilities meet corporate sustainability goals.

## Vista SD Underground Distribution Switchgear

is another alternative for utilities—solving reliability challenges in tight spaces or at high altitudes—on medium-voltage distribution systems up to 29 kV. This device also supports up to six load-interrupter switch and resettable fault-interrupter “ways” and improves reliability with a more complete protective coordination scheme using solid-dielectric material. Vista SD switchgear is particularly advantageous in vault applications with its highly visible breaks, flexible design, and front-facing terminations.

\* Vista, Vista Green, and Vista SD switchgear are available in multiple installation styles. Visit [sandc.com/vistautilities](http://sandc.com/vistautilities) to learn more.

<sup>1</sup>3M and Novec are trademarks of 3M Company.



Pad-mounted style Vista switchgear\*



Multi-way vault-mounted style Vista SD switchgear\*



## Did You Know?

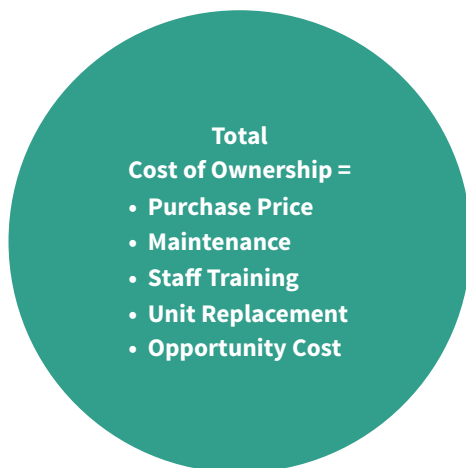
A “way” is a compartmentalized section of a Vista, Vista Green, or Vista SD switchgear device capable of performing switching and/or fault interruption for three-phase applications. For example, a “three-way” Vista switchgear unit could support one switch and two fault interrupters, or any permutation of these three.



# Is Vista, Vista Green, or Vista SD Switchgear Worth the Investment?

Many utilities mistakenly only compare the up-front price of oil-insulated switchgear to Vista, Vista Green, or Vista SD switchgear, overlooking the supplemental costs that add up over time. If you are weighing the value of purchasing Vista, Vista Green, or Vista SD switchgear now, it is important to consider its total cost of ownership compared to other options and what an investment in either solution will help you save over time.

<p><b>Routine Maintenance</b></p> <p>After factoring in maintenance costs, such as changing fuses or replacing oil every few years, for the lifetime of your gear those expenses can nearly double the original purchase price. However, Vista, Vista Green, and Vista SD switchgear are virtually maintenance-free after you pay the purchase price. The designs of Vista, Vista Green, and Vista SD switchgear are hermetically sealed, so there are no refilling processes or costs.</p>	<p><b>Staff Training</b></p> <p>Training your crews on the maintenance required to keep your oil-insulated switchgear in good shape, including fuse-handling and safety procedures, is tedious and costly. Because Vista, Vista Green, and Vista SD switchgear are fuseless, dead-front, and virtually maintenance-free, your crews only have to remember to do one simple turn of the operating lever to operate the gear.</p>
<p><b>Unit Replacement</b></p> <p>All oil-insulated switchgear undergoes wear and tear throughout its life, eventually leading to unit replacement. Environmentally vulnerable gear incurs more wear and tear, increasing the need to replace it sooner. Designed for environmental resiliency, Vista, Vista Green, and Vista SD switchgear are built to withstand extensive wear and tear throughout their lifespan.</p>	<p><b>Opportunity Cost</b></p> <p>The hidden costs associated with owning oil-insulated switchgear, such as testing and monitoring, create missed opportunities to dedicate funds and teams to other important projects. Because you only pay the purchase price for Vista, Vista Green, and Vista SD switchgear, the money you don't spend on training, maintenance, parts replacement, or oil refilling can be used elsewhere.</p>



**Oil-Insulated Switchgear  
Total Cost of Ownership**



**Vista, Vista Green, and Vista SD  
Underground Distribution Switchgear  
Total Cost of Ownership**



# Vista, Vista Green, and Vista SD Switchgear Misconceptions

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## **Vista, Vista Green, and Vista SD switchgear are too complex for my line crews to operate.**

Vista, Vista Green, and Vista SD switchgear could be misconstrued as complex because of their more advanced technology compared to oil-insulated switchgear. However, technological advancement does not mean operational ease must be sacrificed. Vista, Vista Green, and Vista SD switchgear have a simple operation and an easy-to-see switchgear status indicator.



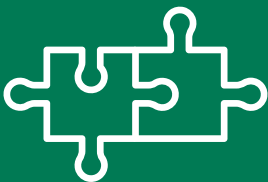
## **Vista, Vista Green, and Vista SD switchgear cost more than comparative switchgear.**

Switchgear with a lower up-front cost is compelling. However, this cost is deceiving compared to what you will pay for maintenance over the long term. As environmental-damage, fuse-replacement, and other routine maintenance fees stack up over time, you end up paying twice as much for your oil-insulated switchgear. Because Vista, Vista Green, and Vista SD switchgear are environmentally resilient and fuseless, they are virtually damage-resistant and maintenance-free, meaning you pay no hidden fees for them over time.



## **All switchgear using insulating gas requires my crew to refill them.**

Insulating-gas options exist that don't require refills, simplifying your maintenance process. Vista and Vista Green switchgear's insulating gases are hermetically sealed inside a tank. This means the time your crews would spend refilling gas can be dedicated to other projects.



## **Solid dielectric is the latest and greatest technology and therefore the best fit for my application.**

While the industry is moving toward emissions-free solutions, solid dielectric switchgear may not be the best fit for your application or budget. Vista and Vista Green switchgear have certain features—like higher ratings, a three-position switch, and different insulating gas options—that may better fit your application while giving you the best value for your money.



# Vista, Vista Green, and Vista SD Switchgear Standards You Need to Know

## **C37.74—Institute of Electrical and Electronics Engineers (IEEE), “Standard Requirements for Subsurface, Vault, and Padmounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems up to 38 kV”**



This principal standard for Vista, Vista Green, and Vista SD Underground Distribution Switchgear includes definitions, ratings, and procedures for performing design and production tests and construction requirements for subsurface, vault, and pad-mounted load-interrupter and fused load-interrupter switchgear.

## **C37.60—Institute of Electrical and Electronics Engineers (IEEE) “Standard Requirements for High-Voltage Switchgear and Controlgear - Part 111: Automatic Circuit Reclosers and Fault Interrupters for Alternating Current Systems Up to 38 kV”**

This principal standard for Vista, Vista Green, and Vista SD Underground Distribution Switchgear applies to pad-mounted, dry-vault mounted, and submersible single or multi-pole alternating current automatic circuit reclosers and fault interrupters for rated maximum voltages up to 38kV.

## **Canadian Safety Association (CSA) and UL Standards**

Unlike dry-type transformers or other indoor standard electrical equipment, there are no UL standards for Vista, Vista Green, or Vista SD switchgear. However, an authority having jurisdiction may want to inspect your switchgear for a nationally recognized testing laboratory (NRTL) mark. If you're working with an expert supplier, they can provide CSA or UL-labeled equipment.



## **National Electrical Manufacturer's Association (NEMA) 3R and Ingress Protection (IP) 14—Environmental Standards**



These standards define switchgear protected from rain and accidental human contact. Vista and Vista SD switchgear are submersible beyond the standards defined by NEMA or IP. Vista, Vista Green, and Vista SD switchgear tanks are submersible to more than 3 meters (10 feet). This means the switchgear performs significantly better compared with indoor gear in extreme weather events, such as flooding. The switchgear units also have protective locking and access restriction in case untrained persons encounter them.



## **International Electrotechnical Commission (IEC) 62271-200 “High-Voltage Switchgear and Controlgear - Part 200: AC Metal-Enclosed Switchgear and Controlgear for Rated Voltages Above 1kV and Up to and Including 52kV”**

This standard specifies requirements for prefabricated metal enclosed switchgear and controlgear for alternating current of rated voltages above 1kV and up to and including 52kV for indoor and outdoor installation, and for service frequencies up to and including 60Hz.



### **Pro-Tip**

Global standards for switching and protection equipment for utility applications may vary. An expert supplier can confirm which standards apply to the equipment in your region.



# Why the Switchgear Supplier You Choose Matters

Choosing a switchgear supplier with mastery in key competencies is critical to a successful project.

As you're researching different options, add each supplier to the table below. Rank them on a scale of 0 (no capability) to 3 (full capability) in each competency. The one with the highest score reveals the most capable switchgear supplier.

Competency	Supplier 1	Supplier 2	Supplier 3
<p><b>Understanding Your Challenges</b>            Many suppliers listen to your challenges, but a supplier that understands them stands out. Does the supplier consider challenges you may not be aware of? Does the supplier share best practices from other utility projects to foresee and mitigate challenges for your project?</p>			
<p><b>Understanding Switchgear Standards That Affect You</b>            A good supplier knows industry switchgear standards. However, an expert supplier understands how standards vary depending on your service territory or where the gear is installed on your system. Can your supplier help you determine whether its switchgear meets relevant standards while customizing solutions to your specific requirements?</p>			
<p><b>Availability &amp; Flexibility</b>            A supplier's direct interaction with you helps them develop a deep understanding of your challenges to customize a unique solution, but not all suppliers make themselves available for you. Does the supplier work with you directly to discuss solutions, or do you find yourself browsing their product catalog on your own?</p>			
<p><b>Customization at all Stages</b>            You may need custom switchgear to meet your system standards and requirements. However, not all suppliers offer design, delivery, and post-sale support customization. An expert supplier can not only custom-design a unique switchgear solution for your service areas, but also customize delivery and post-sale support to you.</p>			
<p><b>Gear Design You Can Trust</b>            Many suppliers claim their switchgear's design is high-quality even though they have low-quality production processes in place. For example, not using robotic welding processes during production increases leak risk, leading to a continual need to refill the gear's oil or insulating gas in the field. Can your supplier prove the effectiveness of its gear design?</p>			
<p><b>Long-Term Support &amp; Consultancy</b>            Short-term support comes standard with switchgear projects, but not all suppliers offer long-term support. However, the most valuable guidance often comes after a project is finished. Can the supplier provide on-site support and help you troubleshoot issues after your project is complete?</p>			



# Buying Vista, Vista Green, or Vista SD Switchgear: Who Do You Need to Involve?

Title	Role	Motivation	Their Potential Questions	Answers
<b>Line Crews</b>	Install, operate, and maintain switchgear	Confidently install and operate gear	How do I install and operate the gear? Can the gear be operated remotely? How much maintenance does the gear need? Do I need to refill the gear's insulating gases in the field? Is the gear live-front or dead-front? Is the gear safe to operate and maintain?	Vista, Vista Green, and Vista SD switchgear can be newly installed or retrofitted simply. Both are operated in one turn of the operating lever. Automated features enable remote operation and monitoring. Because both are fuseless, maintenance is lowered. The insulating gases in Vista and Vista Green switchgear are hermetically sealed, so there is no need to refill them in the field. Vista, Vista Green, and Vista SD switchgear are dead-front, so crews are not exposed to medium voltage during operation or maintenance.
<b>Protection and Standards Engineers</b>	Provide expertise on protection and engineering standards	Confirm gear meets industry standards	Is the gear customizable? Does the gear meet industry standards? Does the gear have overcurrent protection?	Vista, Vista Green, and Vista SD switchgear meet industry standards while being highly customizable. Overcurrent protection comes standard with manual devices and can be enhanced further with other automated options.
<b>Distribution Planners</b>	Plan and coordinate switchgear project distribution activities	Execute switchgear project efficiently	Where should the gear be installed? How customizable is the gear? Can the gear be retrofitted?	Vista, Vista Green, and Vista SD switchgear can be added throughout a system, including flood-prone areas, for greater segmentation. The gear is highly customizable to meet system requirements. Vista SD switchgear is retrofit-friendly because of its flexible cable orientation.
<b>Environ and Safety Team</b>	Ensure switchgear is safe for the environment	Reduce environmental risks	What is the gear's environmental impact? Which gear has the lowest carbon footprint?	The insulating gases in Vista and Vista Green switchgear are hermetically sealed, so they do not require refilling, which may in turn cause leaks that require environmental remediation. Vista SD switchgear uses solid-dielectric insulating material, and Vista Green switchgear uses an eco-friendly insulating gas with a drastically less CO <sub>2</sub> e. Vista Green switchgear has the lowest carbon footprint.
<b>Leadership Team</b>	Consider long-term goals and approve decisions supporting them	Maximize profitability	How does this gear align with and support business goals? How does the gear benefit us from a competitive standpoint?	Vista, Vista Green, and Vista SD switchgear align with business goals by reducing operator safety risks and operation and maintenance costs. Because the gear is more customizable and advanced than comparative options, the gear is purpose-built to solve challenges now and as the grid advances. Vista Green switchgear also helps utilities meet corporate sustainability goals by using an eco-friendly insulating gas.
<b>Regulators</b>	Set rates for and regulate activities of utilities	Keep rates affordable for ratepayers	Will the gear increase rates? Does the gear's insulation technology meet our gas use regulations?	Vista, Vista Green, and Vista SD switchgear are designed for resiliency and are submersible to withstand harsh environments. This keeps the lights on for ratepayers and lowers the need for unit replacement, reducing capital costs to keep rates low. Vista and Vista Green switchgear's insulating-gases are hermetically sealed inside the tank to greatly reduce leak risk, and Vista SD switchgear's solid-dielectric material poses no leak risk at all.



# Conclusion

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With an ever-evolving grid come new and complex challenges that every utility will inevitably encounter. However, with multiple underground distribution switchgear options available with enhanced features to tackle widespread grid challenges, utilities do not need to settle for switchgear that may not meet their application needs.

Integrating an underground distribution switchgear option that can solve a plethora of challenges enables utilities to refocus their valuable time and energy on other critical grid projects.

To learn more about how Vista, Vista Green, and Vista SD Underground Distribution Switchgear can solve complex utility challenges, visit [sandc.com/vistautilities](https://sandc.com/vistautilities).



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