MEIDEN

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Ms. Carey Bylin
Manager, Energy Section
Industrial Strategies Division
California Air Resources Board
1001 I Street, Sacramento, CA 95814

Dear Ms. Bylin,

Meiden is a 120+ year old infrastructure manufacturing company with 44 facilities in 22 countries. We have made switchgear for over 50 years for many/most applications and have produced both SF6 Gas Insulated and Vacuum Insulated Switchgear. We know both types well.

The arguments that have been made against vacuum switchgear concerning costs and difficulties to migrate away from SF6 are somewhat valid, at least in small parts. Some are overstated as seen from our perspective. These opinions may be motivated by self-interests or misinformation.

The reason SF6 is universally popular as an insulation gas is because it is an excellent engineering solution. It is cheap, readily available, well understood and exhibits excellent performance. It is unfortunate that these properties also wear the added stigma of being horrible for the environment. SF6 is a legacy solution void of environmental consideration.

The perspective which highlights an argument of minimal relative harm which SF6 does or can do is not viable. We know it's bad. We know it is a fact of life to have leakage, mishandling and accidents. We have SF6 in our factories for the legacy GIS we manufacture to support our legacy product customers. The risk is not zero. SF6 escapes from switchgear and switchgear operations daily, globally.

Carbon Tetrachloride and HVAC Fluorocarbons (HCFC, Freon) were also cheap, available and familiar solutions in other applications. Governments globally discontinued use of them. It is our responsibility to seek better industrial solutions which carry ever lower environmental impacts, SF6 must also go. It will be at some cost. And, we will sacrifice, in the near term, a level of familiarity and convenience to do so. In most cases, progress does come with a price tag.

However, the costs are not exponential. In fact, the cost to migrate to Dry Air (DA) Vacuum switchgear actually reduces Total Cost of Ownership (TCO) at the voltage ranges where SF6 can readily be replaced today. This brings us to the discussion of voltages and the limitations of the various gases now offered as replacements for SF6. At this writing the upper range of this technology is 145kV in single break configurations.

Having said this, high voltage needs in transmission level voltages well exceed 145kV and will continue to require alternatives which register greater than zero GHG. To keep perspective, the quantity of HV apparatus over 145kv is a small subset of the population of lower voltage equipment used in T&D. This is to say, the SF6 question does not have to be an all-or-nothing argument. Because it isn't. One step at a time.

Is it true that DA and Vacuum technology has a larger footprint? Yes. How much larger? 0-20% depending on equivalent equipment or equipment that is being replaced. Some ancient equipment still in service is considerably larger than modern DA Vacuum equipment, I digress. Does the DA Vacuum gear require more maintenance? No, it does not. In fact, utilities around the globe have installed the systems only to find it has near zero maintenance costs compared with the GIS it replaces.

Does it somehow have other vices or awful outcomes. No. It's nice, clean, cheap to operate, easy to live with, recyclable equipment. No gas servicing, gas stocks or gas vendors are required, no heaters, no gas reporting, no gas spills or accidents, no gas decommissioning. No toxicity of gas after use. It costs more. But, not much more.

Around the globe does not mean North America, right? In North America there are a significant population of installations dating back about a decade. PG&E, BC Hydro, Vermont and DPL have significant populations of DA Vacuum switchgear operating at up to 72.5kV as long-term users. The technology has an installed base and a quantifiable service history.

Arguments designed to stoke fears of losing our income streams and market positions as vendors or utilities also should not preempt rational discussion. Market disruption is never good for all players in a market. But, the flywheel effect of time, regulations and costs makes most tech migrations gradual. This is changing. Over the last 30 years gradual change has fallen to a level of immediacy that most people over 30 find amazing. The world is changing ever faster now.

Not so with the proposed timelines of current and proposed regulations. Five to Fifteen years may seem sudden to a mindset developed in the last century within power industries. In other markets change comes much more rapidly and brutally. This is not to say the forces now acting on the power industry are insignificant. Renewables, grid storage, micro grids, distributed gen, duck curves…the basic concepts and structure of the grids are morphing into a nearly unrecognizable, new normal.

With these changes should come a perspective which supports our direction as humans, to be more cognizant of how todays environmental decisions will affect those who come behind us. Now is the perfect time to remove SF6, as much as possible, from today's grid. While everything is being re-thought, re-engineered, re-configured, now is the time to do it.

Meiden is not the only company to offer DA Vacuum switchgear at high voltages to world markets. As the clock ticks and more government bodies move to strike SF6, all manufacturers will convert to cleaner and greener offerings. Everyone who is busy complaining will be left behind. The new normal moves forward. SF6 reduction as proposed by CARB is both good and actionable. One voltage class at a time.

Kirk Goodell

Executive Vice President
Meiden Americas