

Variable Speed Drives for Power Factor Correction in the Water Sector

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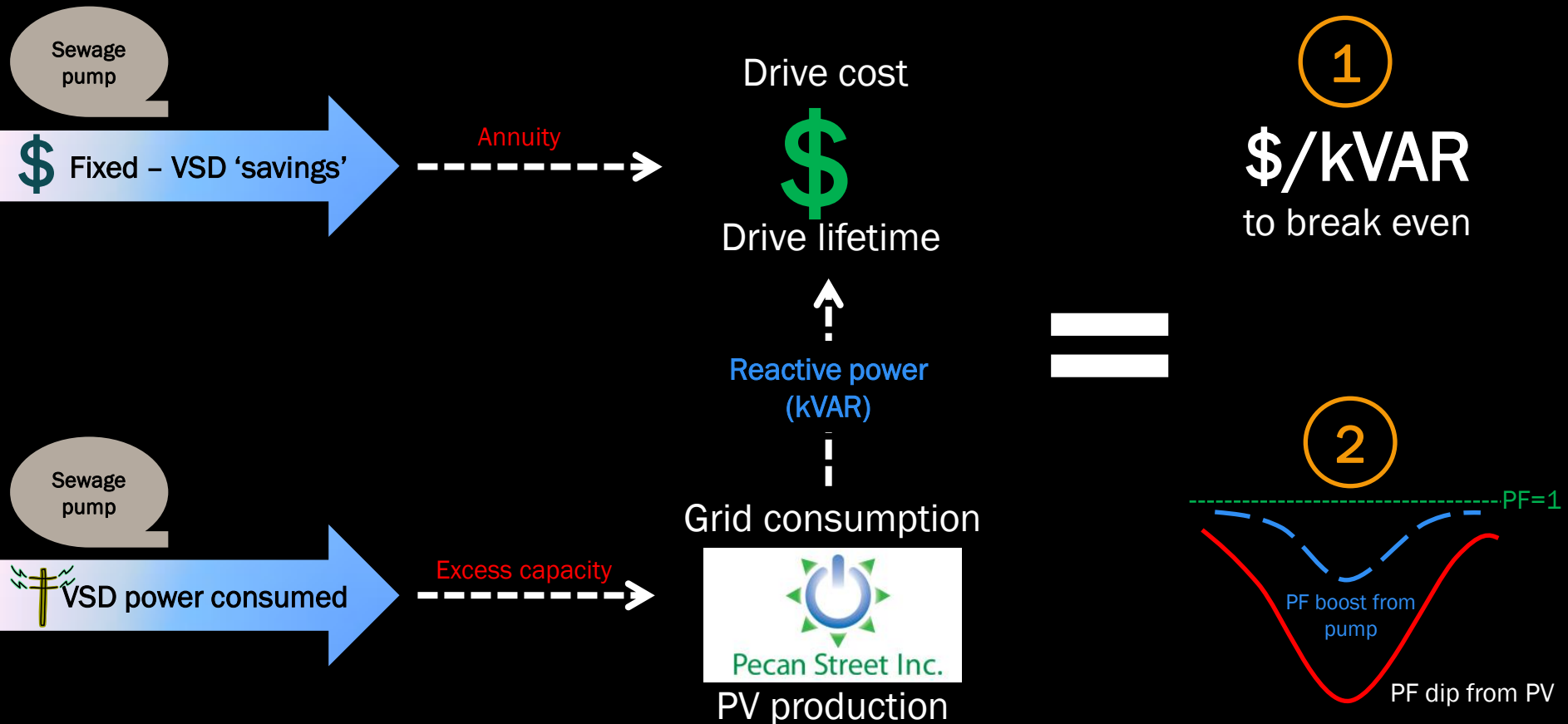
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Motivations

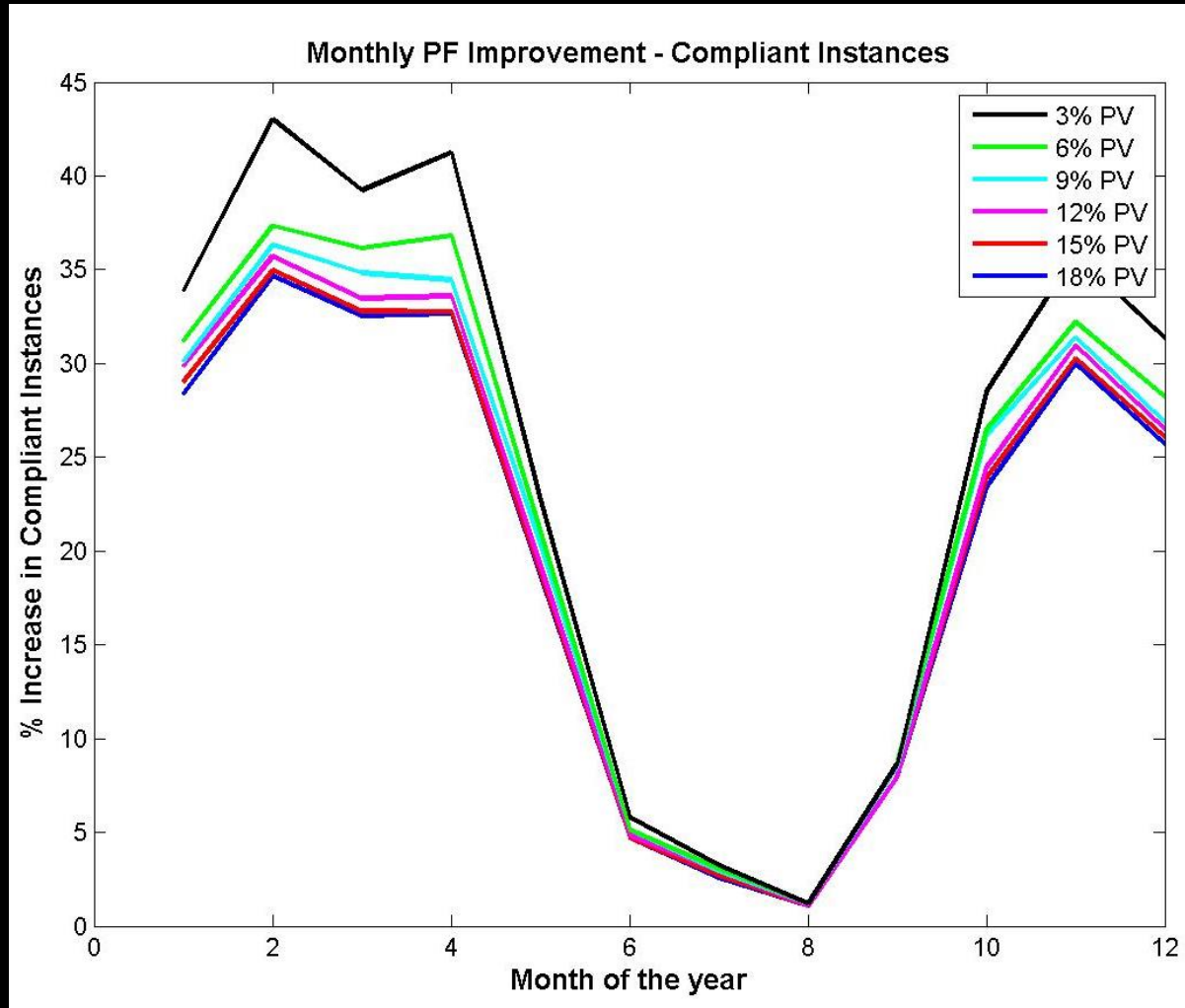
1. Economic ramifications of power quality phenomena
2. Dynamic voltage fluctuations due to growing penetrations of photovoltaic (PV) distributed generation (DG)
3. Potential energy and demand savings from using variable speed drives (VSDs) for centrifugal water pumping
4. Demand charge penalties levied on commercial customers like water utilities for low power factor (PF)



Goals: 1) Utility payment and 2) PF benefit

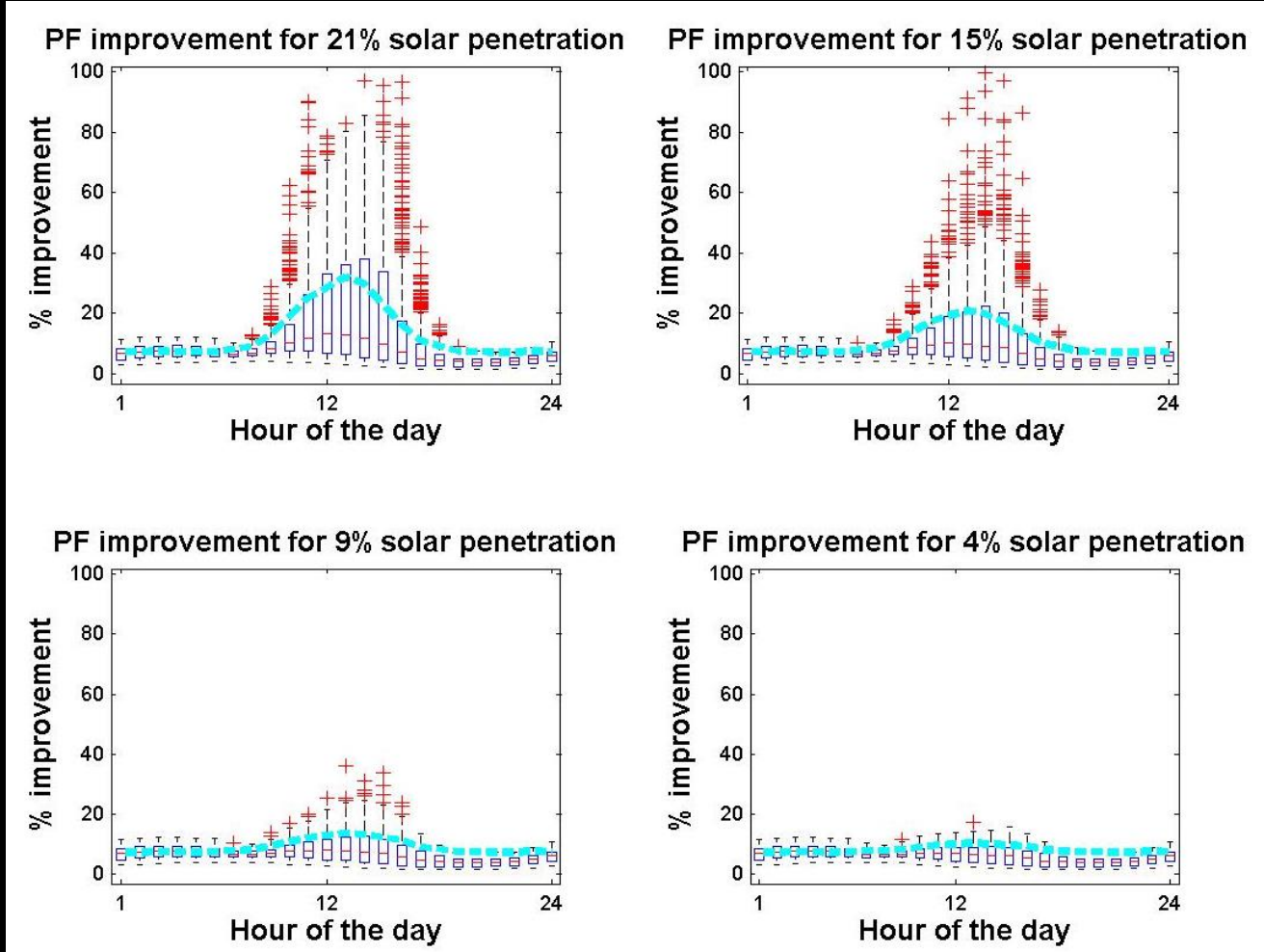


VSD helps, but not enough during the summer

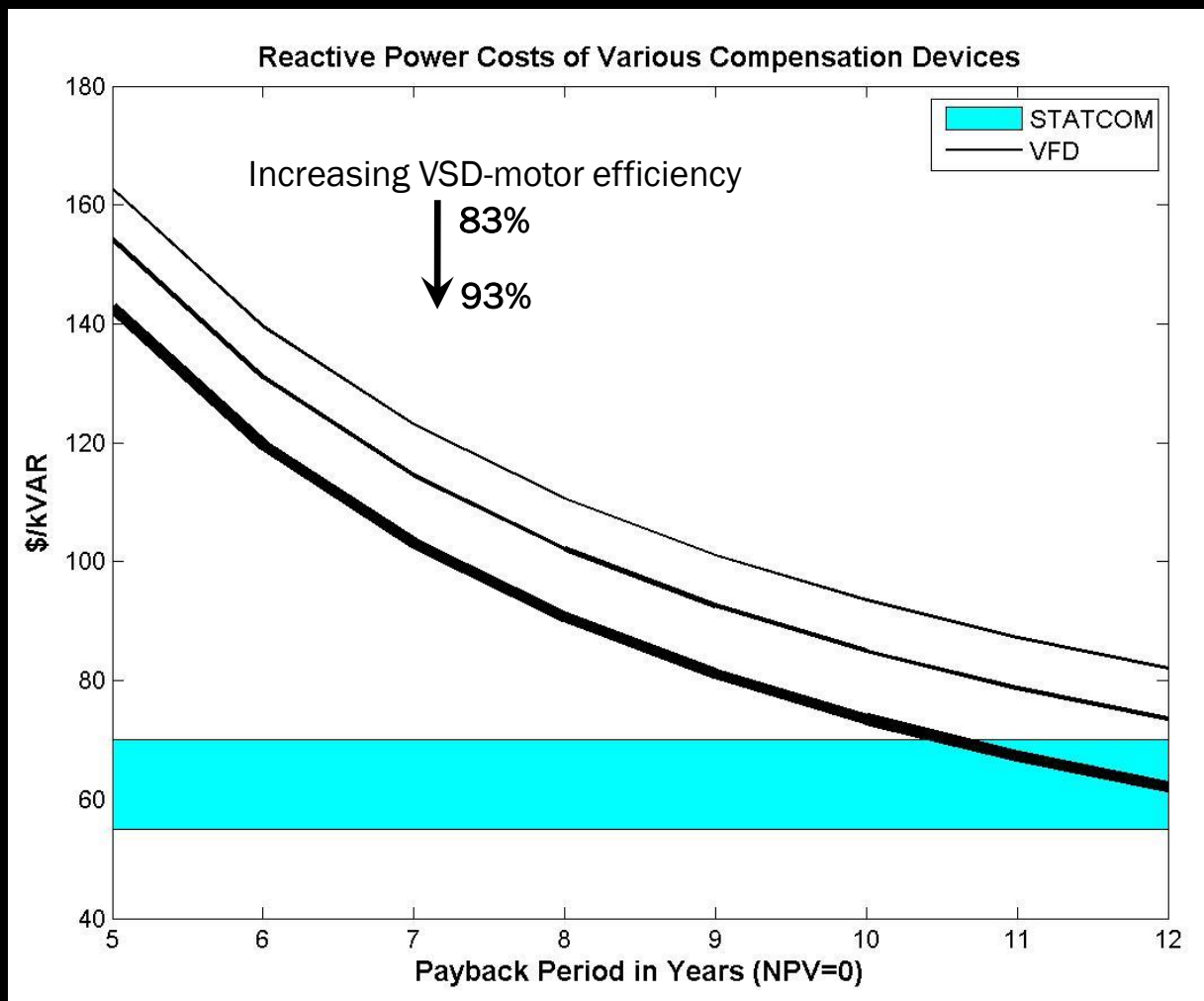


More PV equates to more instances of low PFs

Median % improvement needed for PF = .95



Best case scenario: VSD is competitive at 10.5-yr payback period



Preliminary conclusions

- Solar DG can cause over and under voltage events which necessitates dynamic, flexible solutions
- VSDs don't guarantee energy savings and ensuring safe operation of auxiliary system equipment is a foremost concern
- VSDs could be competitive sources of dynamic reactive power depending on the primary application and investment appetite of commercial customers
- Evolving industry standards could change the game with the introduction of smart inverters

