



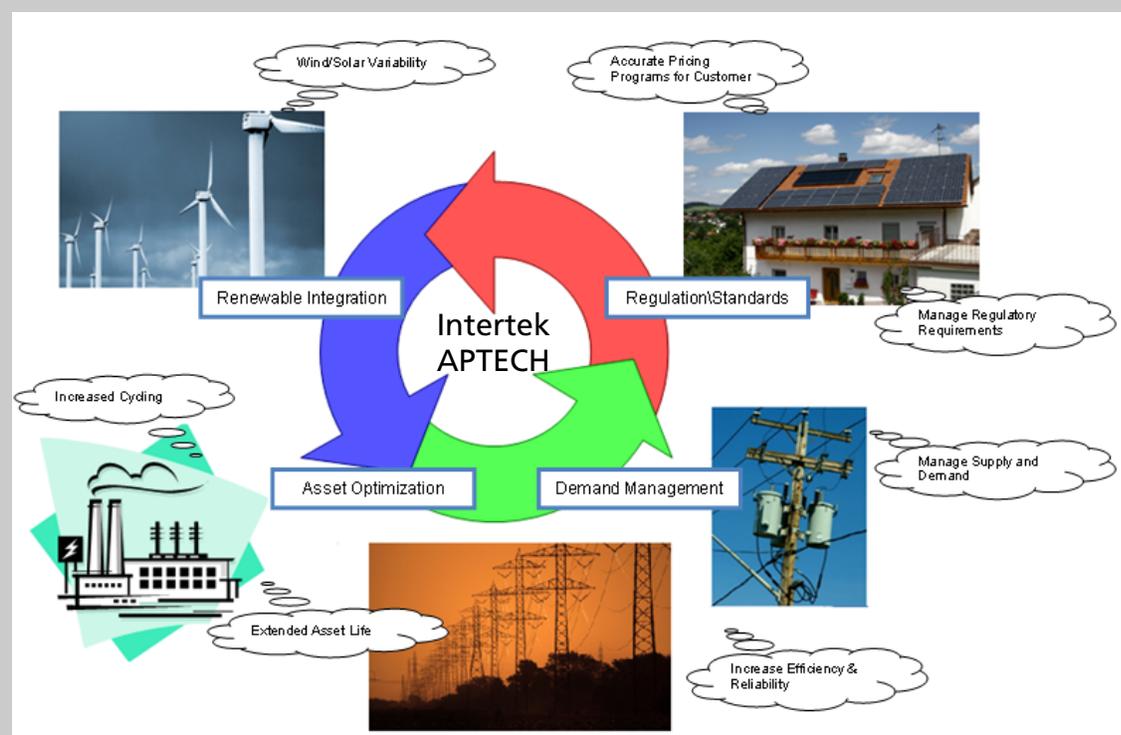
Embrace Smart Grid and Renewable Energy



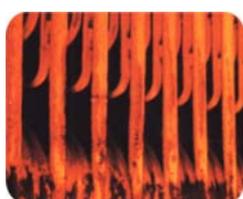
Utilities across the world are embracing Smart Grid and Renewable Energy. These initiatives bring old and new challenges to the forefront. Regulators, utilities, and consumers have to realize that the expense of upgrading the grid is very high and there are several challenges to cope with. World energy consumption will triple by 2050; green energy is going to take center stage; the aging infrastructure and high energy prices, together are going to create complex and expensive problems in the near term.



The Smart Grid is incomplete unless "Delivery Management" and "Demand Management" are integrated with "Asset Optimization" which is more and more important given increased "Renewable Integration". Intertek APTECH provides tools to Utilities to get **proactive** about equipment maintenance, realizing both current and future maintenance and capital expenses as well as **optimizing** a utility portfolio with high penetration of renewables.



While current requirements for ancillary power are adding variability in power plant generation, the introduction of wind and solar have exacerbated this variability, resulting in increased cycling at power plants. This increased cycling is adding several millions of dollars in future maintenance cost related to "cycling", as well as increasing the need to accurately optimize the renewables integrated fleet of power plants that



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includes this high “cycling cost”. These issues are driving Intertek APTECH’s “cycling” related power plant business.

Utilities need to examine the fixed and variable cycling costs, and price ancillary service requirements and demand response (with the inclusion of distributed generation) in order to be able to respond to minute by minute variations in power generation.

We have been analyzing these costs since 1989 and have examined cycling costs at over 400 power plants in the USA, Canada, Australia, and Europe in all types of power plants. Intertek APTECH has major studies underway with Xcel Energy, Constellation ,TVA, CPS Energy San Antonio, as well as with utilities in Spain and Ireland, to determine cycling costs and cost to load cycle these units to the lowest generation the plant’s can make and still stay on line. This so-called load cycling to minimum load is costly business for a power plant and it often drives costs much higher. We have also found that higher ramp rates in moving MW generation output faster as well as bidirectional cycling costs much more than we perceived earlier.

Our work is being used in rate cases to recover these costs in Colorado, Florida, Texas (ERCOT), and Minnesota as well as in power purchase and sales contracts throughout the world.

We have also been making major advancements in the development of our proprietary Unit Commitment model - Cycling◆Adviser™ and are using it to evaluate the value of power from Hoover Dam. Hoover is capable of ramping from 0 MW to maximum capacity within minutes. We developed Cycling◆Adviser to optimize production costs in minute by minute or hourly periods to study 10-day to yearly time horizons. Cycling◆Adviser allows us to determine the economic value of Hoover power for utilities including the opportunity cost of reduced cycling costs.