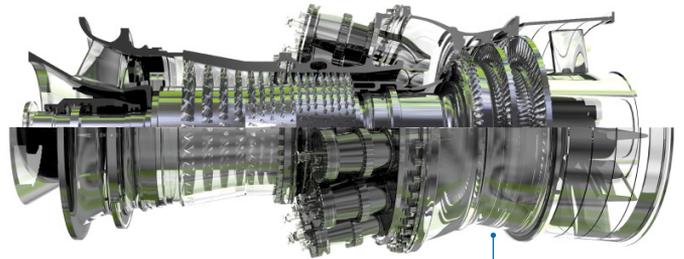




# 7F Advanced Gas Path A Power FlexEfficiency\* Solution

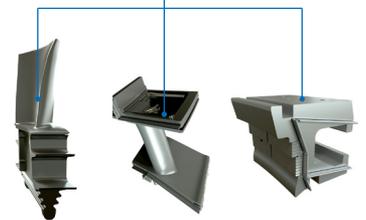
## The Advanced Gas Path Upgrade

GE's 7F Advanced Gas Path (AGP) is an upgrade solution that delivers industry-leading performance and operational flexibility driven by increased output, efficiency, and availability. AGP technology enables GE customers to benefit from lower fuel consumption, and the industry's longest gas path maintenance intervals that extend gas turbine assets and parts life. This solution, which blends hardware innovations with GE's advanced OpFlex\* software, has been adapted from proven GE 7F AGP upgrade technology, which has been qualified for GE's ecomagination portfolio.



## Power FlexEfficiency

The AGP solution exemplifies GE's Power FlexEfficiency, a portfolio of hardware- and software-blended solutions that enables our customers to unleash the full performance, and long-term value of their existing F-class gas turbine assets. Only GE customers are empowered to harness this technology, in tandem with data-driven insights from 100+ million hours of operating data on the world's largest gas turbine fleet. In partnership with our customers, we then apply this knowledge to co-create the solutions that help them best achieve their desired outcomes. That's GE's Power FlexEfficiency.



## Advanced Gas Path Attributes

### Performance Benefits

AGP technology broadens the operating range of 7F assets with industry-leading upgrade performance improvements, including:

- Up to 6% increase in output
- Up to a 2% increase in fuel efficiency
- Up to 32,000-hour gas path maintenance intervals, which can extend outage intervals up to 33%
- Extension of gas turbine assets and parts life out to as much as 96,000 hours

GE's OpFlex\* model-based control software suite can further improve AGP performance:

- Up to 50% reduction in start up time and fuel consumption; significantly reduced start time variation
- Up to 50% reduction in start-up emissions
- Up to 3% additional output increase in cold conditions through enhanced combustion operation
- Turndown to as low as 35% load
- Eliminate visible NO<sub>x</sub> during start up

(See back)

## Technological Advancements

GE has leveraged more than 30 million hours of fleet operational experience in applying design innovations to key gas turbine components, including hot gas path blades, nozzles, and shrouds:

- 3D Aero blade design for better aerodynamic efficiency
- Advanced blade tip shroud designs for improved cooling and sealing efficiencies
- Advanced shroud materials for improved durability
- Singlet nozzle design for cooling efficiency and stress reduction
- Improved nozzle hook sealing for higher firing temperature and increased output

## Customer Successes

GE customers around the globe are currently operating gas turbines with AGP technology to address a wide scope of regional market dynamics:\*\*

- Korea Southern Power Company, Ltd. installed six AGP systems at its Shinincheon plant to generate 130 megawatts (MW) of additional power needed for growing electricity demand, and to expand the region's low reserve margin of power.
- TransCanada Energy Ltd.'s Ravenswood power plant in New York, U.S. expanded its output by 7 percent with the AGP solution, enough to power 10,000 additional households in New York City. TransCanada's MacKay River cogeneration facility in Alberta, CA has improved its operational availability using AGP technology to support its customer's nearly 24-hour-a-day manufacturing cycle. The site has also maintained its low emissions footprint to remain aligned with Alberta's clean energy policies.
- Calpine Corporation's Los Medanos and Pastoria plants in California and Maine, U.S. have experienced a 5.5 percent output increase since installing AGP technology on six gas turbines. This performance has better positioned the plants to bid more competitively for power demand, as well as capitalize on opportunities to capture additional revenue.
- IBERDROLA, Mexico's leading private power generation company, installed AGP upgrades on eight units at its TAMAZUNCHALE and Altamira V plants to manage operational costs, including fuel consumption. Additionally, since deployment of the technology in 2010, the output gained from the upgrades has enabled IBERDROLA to increase its operational revenue by winning more bids for power in the region.
- AGP upgrades on two gas turbines at Duke Energy's Smith Energy Complex in North Carolina, U.S. are generating an output increase of 24 MW and fuel efficiency improvement of approximately 3 percent. Richmond County's growing population and regional business footprint has driven incremental power demand, along with the need for the site to operate more flexibly as market conditions fluctuate.

## Environmental Benefits

ecomagination solutions provide our customers with the ability to meet burgeoning power demands more flexibly, efficiently, and while maintaining a low emissions footprint.

\*Trademark of General Electric Company.

\*\*Gas turbines referenced are GE 7F-3 units.

To learn more about this offering, contact your GE sales representative or visit [powergen.gepower.com](http://powergen.gepower.com).