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Flex-Power Services

Flexibility Improvements for Power Plants – Site Assessment

The global energy market is rapidly changing due to increasing renewable power generation and decreasing power prices in the electricity markets in many countries. This leads to new operating profiles with higher flexibility requirements for many fossil power plants. To answer this demand, Siemens developed Flex-Power Services™ to offer you solutions for a wide range of aspects of the changed operational requirements, such as power on demand and grid services.*

To minimize the gap between the original intended operation mode and actual requirements, Siemens can evaluate the current demands on your plant and develops specific solutions tailored to your needs.

Siemens experts in discussion with customer

Our service
Siemens can offer several options designed to provide more operational flexibility and improved efficiency of the whole plant.

A customized improvement recommendation can help you analyze and optimize the interaction of your hardware and software as well as your manual operation. The implementation can provide your plant an individual economic advantage in the market. In general, the first step is a site assessment, which starts with a plant walk down. Detailed analyses are required in order to provide tailormade recommendations for improvements specific to your power plant's needs. Based on these recommendations, experienced Siemens engineers analyze the plant in detail and discuss their general findings with the plant management and operational personnel. Their goal is to evaluate:

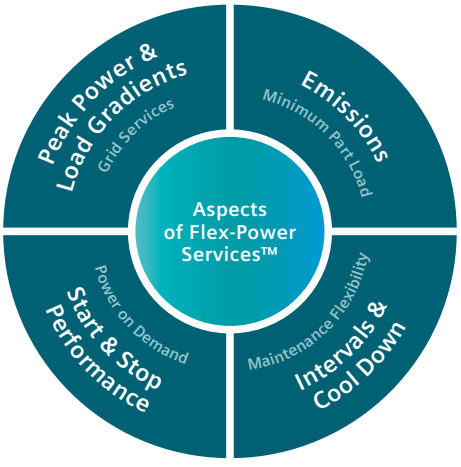
- Requirements and tasks
- Operational limitations
- Future operational scenarios
- Historic operation regimes

The engineers also attend and assess a typical plant start-up to determine individual optimization potentials taking into account operator needs and the plant control system.

Back in the office Siemens experts analyze the collected information and identify options for providing more operational flexibility through, e.g.

- Faster start-ups
- Faster load ramps
- Enhanced operating regimes, e.g. lower part load operation

Flex-Power Services™



* Flex-Power Services is a registered trademark of Siemens AG, Germany.

siemens.com/power-generation-services

Site assessments have already been performed in numerous steam or combined cycle power plants.

As a result, we provide you with a comprehensive report outlining potential improvement areas and recommended measures. One possible outcome of the report may be a recommended modification of the steam turbine start-up sequence.

This site assessment report may also provide useful information to help plant management assess the potential economics of the recommended upgrade options.

Implementation
We provide our recommendations and engineering expertise based on your stated needs. You may decide to implement all recommendations, or just those you consider the most desired.

Some of our recommendations can be an individually developed solution, but in most cases they will be part of the Siemens Flex-Power Services product portfolio.

Examples are:
- Start-up time improvements: Designed to improve cold, warm and/or hot start-up times (e.g. steam turbine enhancements like Fast Release, Degassed Conductivity, Hot Start on the Fly)
- Reduced minimum part-load and faster load ramps: Can help support grid stability and participation in control reserve markets (e.g. gas turbine enhancements like Wet Compression, Fast Load Gradient)

To implement all the recommended improvements or your chosen package, the following steps may be required:
- Mechanical/thermal calculations
- Optimization of parameters and limits
- Creation of new function diagrams: Improvement of the step sequences and criteria based on your and our operation and maintenance experience
- Improvement of Siemens instrumentation and plant control e.g. the implementation of the new calculated parameters, limits and sequences
- Implementation in the power plant including commissioning and tuning as required: This step may also include hands-on training for operational personnel and documentation of the implemented measures.

Your benefits
Carrying out a site assessment can provide you with recommended and preferred options for upgrading your power plant in a cost effective way to help increase its operational flexibility.

The implementation of the recommended improvements determined within a site assessment can result in the following benefits:
- More economical use of available lifetime
- Faster start-ups and shut-downs
- Improved load ramps
- Reduced minimum part load
- Increased reliability and availability
- Increased flexibility and profitability

References
As of 2017, Siemens has executed over 60 site assessments where we implemented the determined measures afterwards. Our expertise on plant optimization is based on more than 25 years of experience that we can put to work for you.

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