Collector Transformers for Renewable Power Generation Facilities

Reliable and Competitive Solutions

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Introduction

In recent years, we have witness an energy transition in power generation sources around the world. A perfect example of this is the United States of America, which has seen a remarkably fast change towards the use of renewable power generation sources. The decarbonization trend in the electrical industry is led not only by energy users, such as large corporations, but also by state and local governments with bold clean energy goals. However, the development and operation of renewable projects faces great challenges and risks that must be mitigated. This article describes how Prolec GE supports the success of its customers by providing them with effective solutions for the renewable industry.

Challenges developers and proprietors of renewable projects are facing

A renewable energy generation project encounters various challenges such as financing, obtaining permits, bringing power from a remote site to transmission lines, demanding project completion times, and strict cost and quality control of deliverables. One of the key components of the project is the substation's main transformer. This unit is supposed to raise the voltage from 34.5 kV to a transmission voltage level that can range from 115 kV to 500 kV.

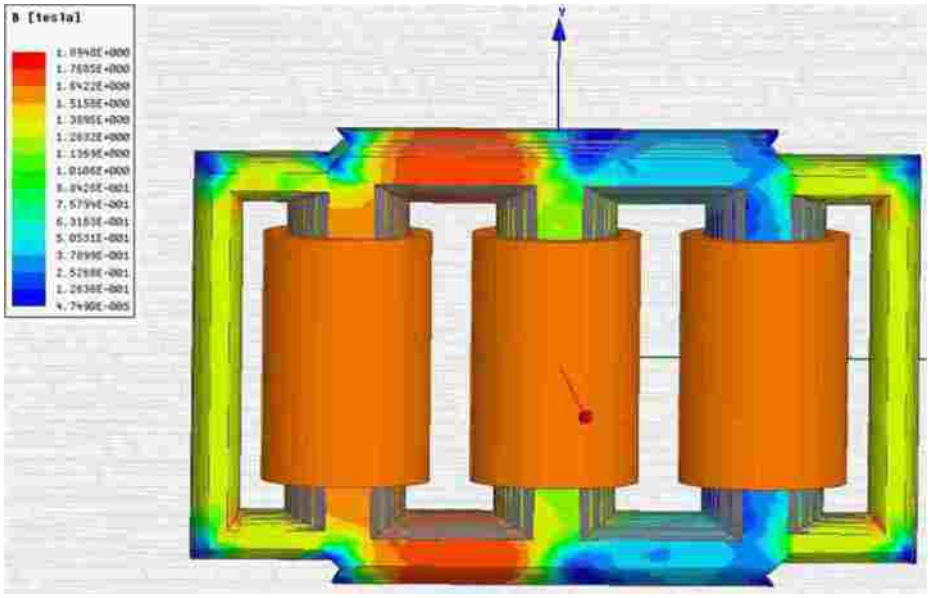
Some of the specific challenges faced by this transformer:

- Customized design based on the specifications for each project
- Both, the project's initial cost and the cost throughout the life of the same, must be highly competitive
- Transformer reliability (should the equipment fail; the entire solar farm will stop operations)
- Transformer delivery time (one of the longest in the project)
- Customer support to qualify for tax credits for the transformer (PTC and ITC)
- Shipment of large and heavy equipment to remote areas

When talking about renewable industry there are specifically 3 main elements with which Prolec GE responds to the challenges faced by the customer: Technical Experience, Strong Processes and Safe Harbor Business Schemes.

Technical experience that ensures compliance of Standards and customer requirements at a competitive price

Prolec GE works with a team of approximately 100 people with an average experience of 15 years in transformer design in order to guarantee all of the Standard requirements and the customers' technical specifications are duly met. Our Design team is highly specialized in electrical, mechanical and control design. Some of their tools are a combination of internal developments and specialized Finite Element and 3D CAD software that comprehensively ensure the optimal operation of the transformer. The main tool to ensure a competitive total cost of materials is the Design Optimizer. This software uses algorithms (property of Prolec GE) to iterate among thousands of different designs in order to find the best balance between materials and losses.



With the main goal of producing new competitive and reliable products, Prolec GE works with a Technology team in both areas, Technology Development and Product Development. The Technology Development team experiments with new materials, processes and simulation models to produce new knowledge, materials, and devices that provide superior performance and reliability characteristics to the transformer. These new technologies turn into design and manufacturing guidelines and are implemented into Product Development processes. Finally, the Design Engineering team makes sure the benefits of these products and practices in new transformers are maximized.

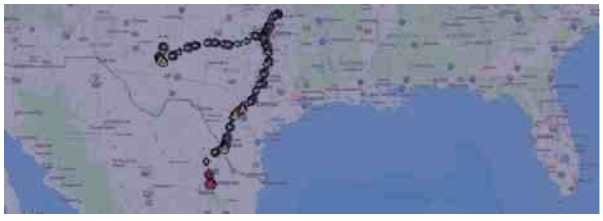
Strong processes that ensure product reliability

In order to efficiently take energy from wind and solar farms and bring it to urban centers, energy producers are increasingly connecting to higher voltage levels (EHV or Extra high voltage 345-550 kV).

Supply Chain: Prolec GE uses special Extra High Voltage materials and components and works with the best renown manufacturers in the industry. Through strategic agreements, it guarantees competitive supply and costs.

Manufacturing and Testing: The collector transformer is manufactured at the Apodaca plant in Mexico. This facility is the largest transformer factory in America, and, in the Power area, it works with 3 laboratories for different voltage levels. The manufacturing and testing capacity is up to 1000 MVA and 550 kV, which perfectly meets the scope of renewable energy transformers (up to 400 MVA and 500 kV). Under normal conditions, customers come visit and witness the final tests in the Laboratory. An alternative to visiting in person is to make use of the high definition cameras and a remote assurance system that we have installed and that allows consultants make sure that the equipment meets all Standard and specification tests.

Transportation and Installation: The importance of meeting the start-up deadlines for solar and wind projects is imperative (End-User Contracts and tax incentives). Prolec's Logistics and Service Team takes care of all transportation details, including GPS monitoring of the unit until it reaches its destination, as well as the landing and installation of the same. This last process is critical to ensure the correct operation and useful life of the unit.



Safe Harbor scheme Maximizes Tax Benefits

Customers in the renewable industry looking to take advantage of the PTC and ITC tax credits find Prolec GE as the right partner to meet all government requirements. The alliances with our suppliers allow us to offer short delivery times in the manufacture of customized transformer components, with which customers are able to maximize the return on their investment. The experience of manufacturing hundreds of transformers for the Safe Harbor scheme has led us to refine the manufacturing processes, as well as the documentation of evidence and storage of components and units.

Thanks to our clients trust, we are proud to say we are the leading manufacturer of Renewable Energy Transformers in the United States Market.

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