



Pak Elektron Limited



Oil Filled Distribution and Power Transformers in USA

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Executive Summary



This report provides a comprehensive analysis of oil/liquid filled distribution, and power transformers in the United States market, with a special focus on four major areas: annual sales of liquid filled distribution transformers in the USA, the import percentage of these transformers, the standard distribution and power transformer ratings in the USA, and the prequalification criteria for utilities in California.

Firstly, the report incorporates roughly all the major global, and American local transformer manufacturers, their products, ratings, and specifications. This information provides an excellent opportunity to analyze the products offered by PEL's competitors and identify areas where PEL holds a competitive edge in comparison, leveraging their product line. The first section also features the approximate sales of oil filled distribution transformers in the USA in 2022. A series of consultations were conducted with industry experts to identify the approximate sales and understand the demand for these transformers in the market. Global manufacturers are leading the sales charts, followed closely by domestic manufacturers from the United States and Canada.

Secondly, the report examines the approximate percentage of imports of oil-filled distribution transformers in the USA. Based on the available data it is estimated that the imports account for approximately 25 to 30 percent of the overall procurement of oil-filled distribution transformers. This is a valuable insight for PEL that predicts the dependence on foreign suppliers and potential risks associated with the trade

policies.

Next, the report outlines major electric utilities in California, their types, and standard ratings of oil-filled distribution and power transformers in the United States of America. It delivers details on the typical voltage and power ratings commonly used in the United States and especially in California. This information is valuable for PEL to ensure that their transformers meet these necessary standards and specifications to penetrate the USA market.

Finally, the report outlines the prequalification criteria for California utilities. These criteria serve as a benchmark for utilities to evaluate and select suppliers for their transformer requirements. The report will assist PEL in understanding these requirements and enhance their chances of successful partnerships with the utilities in California.

In conclusion, this report presents valuable insights into the oil-filled distribution transformers market. It covers the approximate annual sales figures, the percentage of imports in procurement, the prequalification criteria for utilities in California, and the standard ratings used by California utilities. This information will guide decision-making processes, enabling PEL to optimize their strategies and capitalize on the opportunities present in this market.

01

Annual Sales of Oil Filled Distribution Transformers

The initial segment of the report provides a comprehensive overview of the major global, and American local transformer manufacturers, their products, ratings, and specifications. The first section also includes valuable insights into the approximate sales of oil filled distribution transformers in the USA in 2022.

Siemens Energy is a multinational organization that offers energy solutions which include energy generation, transmission, and distribution. The company is a spin-off of Siemens AG with its incorporation carried out in 2020. Siemens Energy's operations span across more than 90 countries, and it currently employs a workforce of 92,000 individuals. The company is considered a global market leader within the energy industry and is playing a constructive role in transitioning towards a more sustainable future. Siemens Energy commits to catering to its customers with the most affordable, sustainable, and reliable energy solutions.

Website:
<https://www.siemens-energy.com/us/en.html>

Headquarters:
 Munich, Germany

Email:
support@siemens-energy.com

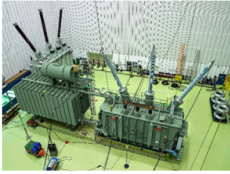



Transformers Manufacturing Facilities in USA:

- Auburn, Alabama
- Decatur, Alabama
- Orlando, Florida

Liquid Filled Distribution Transformers

Visuals	Transformer	Rating	Standards	Specifications
	Pole and pad-mounted distribution transformers	Voltage level of up to 36kV and a rating of up to 2,500kVA.	ANSI & IEEE	Available as single-phase or 3-phase units Siemens Energy also offers pad-mounted distribution transformers with the same ratings as pole-mounted units.
	Standard fluid-immersed transformers	Between 2,500 kVA and 6,300kVA. They offer a maximum voltage capacity of 36kV.	ANSI & IEEE	
	Large fluid-immersed transformers	Power rating from 6.3 up to 30MVA Voltage can go up to 145kV	ANSI & IEEE	

Power Transformers

Visuals	Transformer	Rating	Standards	Specifications
	Generator step-up transformers	Up to 1,300 MVA (3 phases) and 700 MVA (1 phase) System voltages: up to 1,100 kV	IEC & IEEE	
	Unit auxiliary transformer	Ratings: up to 40 MVA, mostly with off-circuit tap changer (NLTC)	IEC & IEEE	
	Plant-feeding transformers for industrial applications	Unit ratings: up to 1,300 MVA (3 phases) System voltages: up to 1,100 kV	IEC & IEEE	
	System-interconnecting transformer in high-voltage substations	Unit ratings: up to 1,300 MVA (3 phases) System voltages: up to 1,100 kV	IEC & IEEE	

Website:
<https://www.hitachienergy.com/us/en>

Headquarters:
 Switzerland

Email:
support@hitachienergy.com

Transformers Manufacturing Facilities in USA:

- Bland, Virginia
- South Boston, Virginia

Liquid Filled Distribution Transformers

Visuals	Transformer	Rating	Standards	Specifications
	Pole-mounted distribution transformers	Single-phase up to 167 kVA Three-phase up to 315 kVA Primary voltage up to 36 kV Secondary voltages up to 480 V	ANSI/IEC standards	Available fluids: mineral oil and ester fluids Cooling type: ONAN
	Pad-mounted distribution transformer	Single-phase up to 250 kVA Three-phase up to 3,000 kVA Primary voltage up to 36 kV Secondary voltages up to 690 V	ANSI/IEC standards	Cooling type: ONAN Available fluids: mineral oil, ester fluids, and silicone
	Ground-mounted distribution transformers	Rated power: up to 10,000 kVA. Rated voltage: up to 36 kV	ANSI/IEC standards	Cooling type: ONAN / ONAF Available fluids: mineral oil and ester fluids (natural and synthetic)
	Substation distribution transformers	Rated power: up to 10,000 kVA. Rated voltage: up to 33 kV	ANSI standards	Cooling type: ONAN / ONAF Available fluids: mineral oil and ester fluids (natural and synthetic)
	Large-Medium distribution transformers	Primary voltage: up to 36 kV	ANSI and IEC standards	Available fluids: mineral oil, dimethyl silicone, esters, and synthetic hydrocarbons Applications: utilities, renewables, oil & gas, industrial and data centers

Visuals	Transformer	Rating	Standards	Specifications
	TXpert™ Enabled distribution transformers	Up to 10 MVA Primary up to 36 kV Secondary up to 5kV and soon 15 kV	ANSI and IEC standards	Applications: utilities, renewables, oil & gas, industrial and data centers

Power Transformers

Visuals	Transformer	Rating	Standards	Specifications
	Core type transformers	Unit ratings: up to 1,500 MVA Primary voltage: up to 1,000 kV		Secondary voltage defined by generator voltage. Load tap changers available Single-phase or three-phase
	Shell type transformers	Unit ratings: up to 1300 MVA Primary voltage: up to 765 kV		Single or three-phase
	HVDC Classic converter transformers	Power rating of 12,000 MW 80 kV - 1,100 kV		
	HVDC Light®	Reaches 1,500 MW and +-500 kV.		It offers numerous environmental benefits, including "invisible" power lines, neutral electromagnetic fields, oil-free cables, and compact converter stations.
	Poly transformers	Up to 500 MVA 400-230-132-110-107 kV as an example Three-phase		
	Mobile transformer	345, 400 and 550 kV systems		
	Substation and system intertie transformers	Ratings up to 1,300 MVA (sometimes higher ratings are required) Primary voltage up to 765 kV and higher Secondary voltage generally <= 230kV or higher depending on the grid configuration		Single- or three-phase

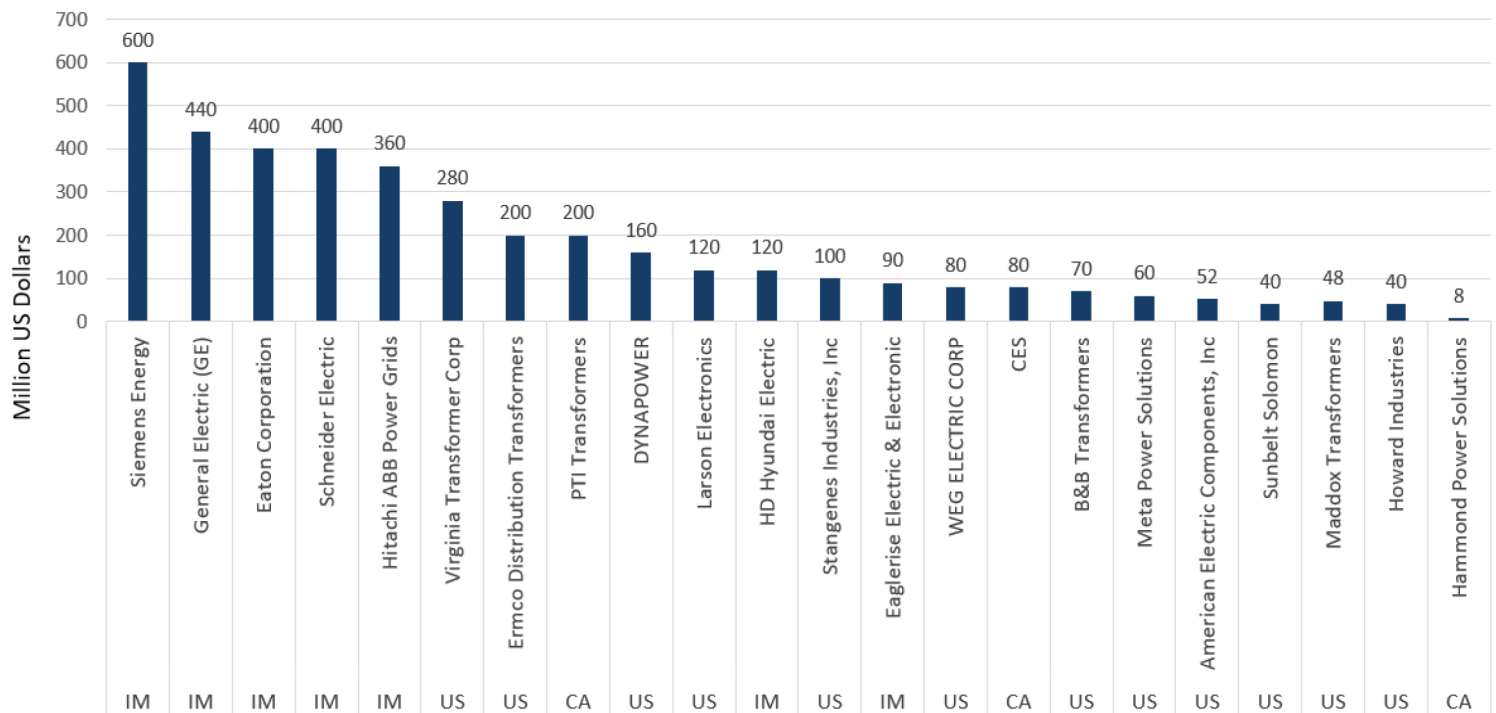
Annual Sale of Oil Filled Distribution Transformers

Based on an extensive literature review and consultations with industry experts, a sales chart has been developed to showcase the approximate annual sale of oil filled distribution transformers in the USA. The data represented in the chart illustrates approximate figures for 2022.

Key Chart:

International Manufacturer	IM
American Manufacturer	US
Canadian Manufacturer	CA

Approximate Annual Sales of oil filled distribution transformers in USA 2022



02

Import Percentage of Oil Filled Distribution Transformers

The second segment of the report examines the approximate percentage of imports of oil-filled distribution transformers in the USA in 2022 with valuable insights into the imports of previous years.

Percentage of Liquid-Filled Distribution Transformers Imported In The USA (Approx)

The transformer industry worldwide is controlled and led by multinational corporations, they provide an extensive range of products and leverage the advantages of economies of scale. Besides these major global companies, the United States has numerous domestic transformer manufacturers that are capable of producing transformers of different power handling capacities, especially liquid & dry-type distribution transformers. The Majority of the manufacturers have strategically established their production facilities in industry- friendly regions that have cost-effective labor and less stringent environmental regulations which is why Mexico has emerged as a major and a quite significant contender in transformer manufacturing. The United States is the major destination for nearly all of the transformer exports of Mexico.

Over the past decade, the global transformer industry has gone through multiple transitions, mergers, and acquisitions that resulted in a reduction of local manufacturers and the emergence of larger players that offer better and wider range of products. During this period many of the manufacturers relocated their production units to offshore destinations such as Columbia, India, and Mexico. This paradigm shift allowed manufacturers to access more local markets that had a rapid increase in demand for electricity.

In the United States, the average utility of a transformer is 38 years. 70% of the USA's transformers are over 25 years old. The United States has an impressive approximate number of 9,000 power plants that generate around 1.2 terawatts of electricity. Additionally, there are approximately 360,000 miles of high voltage transmission lines spread across the nation. Clearly, the United States is maintaining its position to remaining one of the largest markets for transformers around the globe.

In a recent market evaluation conducted by Global Market Insights, it is projected that the global transformer market will reach \$80 billion by the year 2024, with an anticipated compound annual growth rate (CAGR) of 6.5 percent.

As of 2020, around 250 establishments manufactured transformers around the United States and generated an accumulated revenue of around \$5 billion according to Global Market Insights. Around 35% of the USA transformer market was categorized for imports (including all power handling capacities), the major suppliers for these transformers were: Mexico, Canada, and, China, as mentioned in figure 1 below.

Country	2015	2016	2017	2018	2019	2019 YTD (Jun)	2020 YTD (Jun)	SUM*
Mexico	150,696	136,823	145,907	151,687	178,375	85,592	105,622	869,110
China	29,833	3,706	11,465	16,270	9,075	2,069	4,531	74,880
Canada	11,675	10,441	11,776	12,321	13,937	6,672	6,219	66,369
Taiwan	1,121	713	710	2,722	6,430	138	21,873	33,569
United Kingdom	14,049	1,180	358	267	186	25	103	16,143
Poland	-	-	4,896	2,520	3,059	3,053	8	10,483
Hong Kong	6,297	795	40	32	-	-	-	7,164
India	903	5	4,481	1,007	6	5	7	6,409
Germany	1,295	1,117	915	1,140	779	552	605	5,851
Sri Lanka	5,567	-	-	-	-	-	-	5,567

Source: United States International Trade Commission, U.S. Department of Commerce, Bureau of Industry and Security •Excludes 2019 YTD pun) Data

03

Standard Distribution and Power Transformers Ratings

The second segment of the report examines the approximate percentage of imports of oil-filled distribution transformers in the USA in 2022 with valuable insights into the imports of previous years.

California

Electric Utilities

California Electric Utilities witnessed significant changes and developments over some time since the state is committed to renewable energy, sustainability, and grid modernization. Among various electric utilities in California, few major utilities play a vital role in the state's electric distribution. The electric utility sector in California has various types of entities that are:

1. Investor-Owned Utilities (IOUs)

Investor-owned utilities are private companies that are publicly traded and owned by shareholders. IOUs are regulated by the California Public Utilities Commission (CPUC). The three major IOUs in California are:

- a. Pacific Gas and Electric Company (PG&E)
- b. Southern California Edison (SCE)
- c. San Diego Gas & Electric (SDG&E)

2. Municipal Utilities

Municipal utilities are owned and operated by local governments, such as cities or counties. These utilities provide electricity services within their designated jurisdiction. Some notable municipal utilities in California include:

- a. Los Angeles Department of Water and Power (LADWP)
- b. Sacramento Municipal Utility District (SMUD)

3. Electric Cooperatives

Electric cooperatives are member-owned utilities that are operated for the benefit of their members. These utilities are typically located in rural areas and are governed by a board of directors elected by the cooperative's members. Some electric cooperatives in California include:

- a. Anza Electric Cooperative
- b. Plumas-Sierra Rural Electric Cooperative

04

Prequalification Criteria for the Utilities in California, USA

The Final segment of the report sheds light on the supplier requirements by California utilities, the bid, and the application process to become a trustable seller with them.

Prequalification

Criteria for the Utilities in California, USA

California is one of the most populous and technologically advanced states, in fact, California is considered the global leader in technological advancements. In order to be competitive and progressive the state needs an uninterrupted power supply, utilities in California make sure that the functioning is smooth and reliable, to do so the utilities heavily depend on an abundant number of suppliers that are local and overseas.

This section of the report investigates the qualification criteria and process involved in becoming a supplier with California utilities. With a comprehensive overview of the procedures and prerequisites, this section provides information regarding the essential steps that Pel needs to follow to establish itself as a reliable partner within this dynamic industry.

The report discusses the qualification criteria for becoming a supplier for five major utilities in California. These utilities encompass a wide range of considerations, including financial stability, technical capabilities, regulatory compliance, environmental responsibility, and a demonstrated commitment to social and community engagement.

The major five utilities in California are:

- Pacific Gas and Electric Company
- San Diego Gas and Electric Company
- Southern California Edison Company
- Los Angeles Department of Water and Power
- Sacramento Municipal Utility District

Pacific Gas and Electric Company

Supplier Qualification and Requirements

This section dives into the fundamental elements that constitute PG&E's Supplier Qualification and Requirements, shedding light on the key insights that drive the company's supplier management practices. By examining the program's mission, supplier expectations, approval process, and post-qualification activities, we gain valuable insights into how PG&E maintains its high standards of quality and performance. This document explores the core components of PG&E's Supplier Qualification and Requirements program, understanding how the company fosters collaboration and cooperation with its suppliers. Furthermore, it provides valuable insights into the qualification process, assessing supplier capabilities and adherence to industry standards like ISO 9001.

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