

# Protonic Ceramic Fuel Cell (PCFC) Industry Research Report 2024

<https://marketpublishers.com/r/P9B8730511B6EN.html>

Date: April 2024

Pages: 123

Price: US\$ 2,950.00 (Single User License)

ID: P9B8730511B6EN

## Abstracts

A protonic ceramic fuel cell (PCFC) is a fuel cell based on a ceramic electrolyte material that exhibits high protonic conductivity at elevated temperatures.

PCFCs share the thermal and kinetic advantages of high temperature operation at 700 degrees Celsius with molten carbonate and solid oxide fuel cells, while exhibiting all of the intrinsic benefits of proton conduction in proton exchange membrane fuel cells (PEMFC) and phosphoric acid fuel cells (PAFC). The high operating temperature is necessary to achieve very high electrical fuel efficiency with hydrocarbon fuels. PCFCs can operate at high temperatures and electrochemically oxidize fossil fuels directly to the anode. This eliminates the intermediate step of producing hydrogen through the costly reforming process. Gaseous molecules of the hydrocarbon fuel are absorbed on the surface of the anode in the presence of water vapor, and hydrogen atoms are efficiently stripped off to be absorbed into the electrolyte, with carbon dioxide as the primary reaction product. PCFCs have a solid electrolyte, so that the membrane cannot dry out as with PEM fuel cells, and liquid cannot leak out as with PAFCs.

According to APO Research, The global Protonic Ceramic Fuel Cell (PCFC) market was valued at US\$ million in 2023 and is anticipated to reach US\$ million by 2030, witnessing a CAGR of xx% during the forecast period 2024-2030.

Asia is the largest area for Protonic Ceramic Fuel Cell (PCFC), with a market share over 50%. Among the major fuel cells types, Proton Exchange Membrane Fuel Cells (PEMFC) account for nearly 60% market share. Following Proton Exchange Membrane Fuel Cells (PEMFC), both Molten Carbonate Fuel Cells (MCFC) and Solid Oxide Fuel Cells (SOFC) account for more than 14% market share.

## Report Scope

This report aims to provide a comprehensive presentation of the global market for Protonic Ceramic Fuel Cell (PCFC), with both quantitative and qualitative analysis, to help readers develop business/growth strategies, assess the market competitive situation, analyze their position in the current marketplace, and make informed business decisions regarding Protonic Ceramic Fuel Cell (PCFC).

The report will help the Protonic Ceramic Fuel Cell (PCFC) manufacturers, new entrants, and industry chain related companies in this market with information on the revenues, sales volume, and average price for the overall market and the sub-segments across the different segments, by company, by Type, by Application, and by regions.

The Protonic Ceramic Fuel Cell (PCFC) market size, estimations, and forecasts are provided in terms of sales volume (MW) and revenue (\$ millions), considering 2023 as the base year, with history and forecast data for the period from 2019 to 2030. This report segments the global Protonic Ceramic Fuel Cell (PCFC) market comprehensively. Regional market sizes, concerning products by Type, by Application, and by players, are also provided. For a more in-depth understanding of the market, the report provides profiles of the competitive landscape, key competitors, and their respective market ranks. The report also discusses technological trends and new product developments.

## Key Companies & Market Share Insights

In this section, the readers will gain an understanding of the key players competing. This report has studied the key growth strategies, such as innovative trends and developments, intensification of product portfolio, mergers and acquisitions, collaborations, new product innovation, and geographical expansion, undertaken by these participants to maintain their presence. Apart from business strategies, the study includes current developments and key financials. The readers will also get access to the data related to global revenue, price, and sales by manufacturers for the period 2019-2024. This all-inclusive report will certainly serve the clients to stay updated and make effective decisions in their businesses. Some of the prominent players reviewed in the research report include:

Ballard

Toshiba

PLUG Power

FuelCell Energy

Hydrogenics

Doosan Fuel Cell

Horizon

Intelligent Energy

Hyster-Yale Group

Nedstack

Pearl Hydrogen

Sunrise Power

### Protonic Ceramic Fuel Cell (PCFC) segment by Type

PEMFC

DMFC

PAFC

SOFC

MCFC

AFC

### Protonic Ceramic Fuel Cell (PCFC) segment by Application

Portable

Stationary

Transport

## Protonic Ceramic Fuel Cell (PCFC) Segment by Region

North America

U.S.

Canada

Europe

Germany

France

U.K.

Italy

Russia

Asia-Pacific

China

Japan

South Korea

India

Australia

China Taiwan

Indonesia

Thailand

Malaysia

Latin America

Mexico

Brazil

Argentina

Middle East & Africa

Turkey

Saudi Arabia

UAE

## Key Drivers & Barriers

High-impact rendering factors and drivers have been studied in this report to aid the readers to understand the general development. Moreover, the report includes restraints and challenges that may act as stumbling blocks on the way of the players. This will assist the users to be attentive and make informed decisions related to business. Specialists have also laid their focus on the upcoming business prospects.

## Reasons to Buy This Report

1. This report will help the readers to understand the competition within the industries and strategies for the competitive environment to enhance the potential profit. The report also focuses on the competitive landscape of the global Protonic Ceramic Fuel Cell (PCFC) market, and introduces in detail the market share, industry ranking,

competitor ecosystem, market performance, new product development, operation situation, expansion, and acquisition. etc. of the main players, which helps the readers to identify the main competitors and deeply understand the competition pattern of the market.

2. This report will help stakeholders to understand the global industry status and trends of Protonic Ceramic Fuel Cell (PCFC) and provides them with information on key market drivers, restraints, challenges, and opportunities.

3. This report will help stakeholders to understand competitors better and gain more insights to strengthen their position in their businesses. The competitive landscape section includes the market share and rank (in volume and value), competitor ecosystem, new product development, expansion, and acquisition.

4. This report stays updated with novel technology integration, features, and the latest developments in the market

5. This report helps stakeholders to gain insights into which regions to target globally

6. This report helps stakeholders to gain insights into the end-user perception concerning the adoption of Protonic Ceramic Fuel Cell (PCFC).

7. This report helps stakeholders to identify some of the key players in the market and understand their valuable contribution.

## Chapter Outline

Chapter 1: Research objectives, research methods, data sources, data cross-validation;

Chapter 2: Introduces the report scope of the report, executive summary of different market segments (by region, product type, application, etc), including the market size of each market segment, future development potential, and so on. It offers a high-level view of the current state of the market and its likely evolution in the short to mid-term, and long term.

Chapter 3: Detailed analysis of Protonic Ceramic Fuel Cell (PCFC) manufacturers competitive landscape, price, production and value market share, latest development plan, merger, and acquisition information, etc.

Chapter 4: Provides profiles of key players, introducing the basic situation of the main companies in the market in detail, including product production/output, value, price, gross margin, product introduction, recent development, etc.

Chapter 5: Production/output, value of Protonic Ceramic Fuel Cell (PCFC) by region/country. It provides a quantitative analysis of the market size and development potential of each region in the next six years.

Chapter 6: Consumption of Protonic Ceramic Fuel Cell (PCFC) in regional level and country level. It provides a quantitative analysis of the market size and development potential of each region and its main countries and introduces the market development, future development prospects, market space, and production of each country in the world.

Chapter 7: Provides the analysis of various market segments by type, covering the market size and development potential of each market segment, to help readers find the blue ocean market in different market segments.

Chapter 8: Provides the analysis of various market segments by application, covering the market size and development potential of each market segment, to help readers find the blue ocean market in different downstream markets.

Chapter 9: Analysis of industrial chain, including the upstream and downstream of the industry.

Chapter 10: Introduces the market dynamics, latest developments of the market, the driving factors and restrictive factors of the market, the challenges and risks faced by manufacturers in the industry, and the analysis of relevant policies in the industry.

Chapter 11: The main points and conclusions of the report.

Chapter 11: The main points and conclusions of the report.

## Contents

### 1 PREFACE

- 1.1 Scope of Report
- 1.2 Reasons for Doing This Study
- 1.3 Research Methodology
- 1.4 Research Process
- 1.5 Data Source
  - 1.5.1 Secondary Sources
  - 1.5.2 Primary Sources

### 2 MARKET OVERVIEW

- 2.1 Product Definition
- 2.2 Protonic Ceramic Fuel Cell (PCFC) by Type
  - 2.2.1 Market Value Comparison by Type (2019 VS 2023 VS 2030) & (US\$ Million)
  - 2.2.2 PEMFC
  - 2.2.3 DMFC
  - 2.2.4 PAFC
  - 2.2.5 SOFC
  - 2.2.6 MCFC
  - 2.2.7 AFC
- 2.3 Protonic Ceramic Fuel Cell (PCFC) by Application
  - 2.3.1 Market Value Comparison by Application (2019 VS 2023 VS 2030) & (US\$ Million)
  - 2.3.2 Portable
  - 2.3.3 Stationary
  - 2.3.4 Transport
- 2.4 Global Market Growth Prospects
  - 2.4.1 Global Protonic Ceramic Fuel Cell (PCFC) Production Value Estimates and Forecasts (2019-2030)
  - 2.4.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Capacity Estimates and Forecasts (2019-2030)
  - 2.4.3 Global Protonic Ceramic Fuel Cell (PCFC) Production Estimates and Forecasts (2019-2030)
  - 2.4.4 Global Protonic Ceramic Fuel Cell (PCFC) Market Average Price (2019-2030)

### 3 MARKET COMPETITIVE LANDSCAPE BY MANUFACTURERS



- 3.1 Global Protonic Ceramic Fuel Cell (PCFC) Production by Manufacturers (2019-2024)
- 3.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Manufacturers (2019-2024)
- 3.3 Global Protonic Ceramic Fuel Cell (PCFC) Average Price by Manufacturers (2019-2024)
- 3.4 Global Protonic Ceramic Fuel Cell (PCFC) Industry Manufacturers Ranking, 2022 VS 2023 VS 2024
- 3.5 Global Protonic Ceramic Fuel Cell (PCFC) Key Manufacturers, Manufacturing Sites & Headquarters
- 3.6 Global Protonic Ceramic Fuel Cell (PCFC) Manufacturers, Product Type & Application
- 3.7 Global Protonic Ceramic Fuel Cell (PCFC) Manufacturers, Date of Enter into This Industry
- 3.8 Global Protonic Ceramic Fuel Cell (PCFC) Market CR5 and HHI
- 3.9 Global Manufacturers Mergers & Acquisition

## **4 MANUFACTURERS PROFILED**

### 4.1 Ballard

- 4.1.1 Ballard Protonic Ceramic Fuel Cell (PCFC) Company Information
- 4.1.2 Ballard Protonic Ceramic Fuel Cell (PCFC) Business Overview
- 4.1.3 Ballard Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
- 4.1.4 Ballard Product Portfolio
- 4.1.5 Ballard Recent Developments

### 4.2 Toshiba

- 4.2.1 Toshiba Protonic Ceramic Fuel Cell (PCFC) Company Information
- 4.2.2 Toshiba Protonic Ceramic Fuel Cell (PCFC) Business Overview
- 4.2.3 Toshiba Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
- 4.2.4 Toshiba Product Portfolio
- 4.2.5 Toshiba Recent Developments

### 4.3 PLUG Power

- 4.3.1 PLUG Power Protonic Ceramic Fuel Cell (PCFC) Company Information
- 4.3.2 PLUG Power Protonic Ceramic Fuel Cell (PCFC) Business Overview
- 4.3.3 PLUG Power Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)

- 4.3.4 PLUG Power Product Portfolio
- 4.3.5 PLUG Power Recent Developments
- 4.4 FuelCell Energy
  - 4.4.1 FuelCell Energy Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.4.2 FuelCell Energy Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.4.3 FuelCell Energy Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.4.4 FuelCell Energy Product Portfolio
  - 4.4.5 FuelCell Energy Recent Developments
- 4.5 Hydrogenics
  - 4.5.1 Hydrogenics Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.5.2 Hydrogenics Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.5.3 Hydrogenics Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.5.4 Hydrogenics Product Portfolio
  - 4.5.5 Hydrogenics Recent Developments
- 4.6 Doosan Fuel Cell
  - 4.6.1 Doosan Fuel Cell Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.6.2 Doosan Fuel Cell Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.6.3 Doosan Fuel Cell Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.6.4 Doosan Fuel Cell Product Portfolio
  - 4.6.5 Doosan Fuel Cell Recent Developments
- 4.7 Horizon
  - 4.7.1 Horizon Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.7.2 Horizon Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.7.3 Horizon Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.7.4 Horizon Product Portfolio
  - 4.7.5 Horizon Recent Developments
- 4.8 Intelligent Energy
  - 4.8.1 Intelligent Energy Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.8.2 Intelligent Energy Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.8.3 Intelligent Energy Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.8.4 Intelligent Energy Product Portfolio
  - 4.8.5 Intelligent Energy Recent Developments
- 4.9 Hyster-Yale Group
  - 4.9.1 Hyster-Yale Group Protonic Ceramic Fuel Cell (PCFC) Company Information

- 4.9.2 Hyster-Yale Group Protonic Ceramic Fuel Cell (PCFC) Business Overview
- 4.9.3 Hyster-Yale Group Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
- 4.9.4 Hyster-Yale Group Product Portfolio
- 4.9.5 Hyster-Yale Group Recent Developments
- 4.10 Nedstack
  - 4.10.1 Nedstack Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.10.2 Nedstack Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.10.3 Nedstack Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.10.4 Nedstack Product Portfolio
  - 4.10.5 Nedstack Recent Developments
- 4.11 Pearl Hydrogen
  - 4.11.1 Pearl Hydrogen Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.11.2 Pearl Hydrogen Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.11.3 Pearl Hydrogen Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.11.4 Pearl Hydrogen Product Portfolio
  - 4.11.5 Pearl Hydrogen Recent Developments
- 4.12 Sunrise Power
  - 4.12.1 Sunrise Power Protonic Ceramic Fuel Cell (PCFC) Company Information
  - 4.12.2 Sunrise Power Protonic Ceramic Fuel Cell (PCFC) Business Overview
  - 4.12.3 Sunrise Power Protonic Ceramic Fuel Cell (PCFC) Production, Value and Gross Margin (2019-2024)
  - 4.12.4 Sunrise Power Product Portfolio
  - 4.12.5 Sunrise Power Recent Developments

## **5 GLOBAL PROTONIC CERAMIC FUEL CELL (PCFC) PRODUCTION BY REGION**

- 5.1 Global Protonic Ceramic Fuel Cell (PCFC) Production Estimates and Forecasts by Region: 2019 VS 2023 VS 2030
- 5.2 Global Protonic Ceramic Fuel Cell (PCFC) Production by Region: 2019-2030
  - 5.2.1 Global Protonic Ceramic Fuel Cell (PCFC) Production by Region: 2019-2024
  - 5.2.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Forecast by Region (2025-2030)
- 5.3 Global Protonic Ceramic Fuel Cell (PCFC) Production Value Estimates and Forecasts by Region: 2019 VS 2023 VS 2030
- 5.4 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Region: 2019-2030
  - 5.4.1 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Region:

2019-2024

5.4.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Value Forecast by Region (2025-2030)

5.5 Global Protonic Ceramic Fuel Cell (PCFC) Market Price Analysis by Region (2019-2024)

5.6 Global Protonic Ceramic Fuel Cell (PCFC) Production and Value, YOY Growth

5.6.1 North America Protonic Ceramic Fuel Cell (PCFC) Production Value Estimates and Forecasts (2019-2030)

5.6.2 Europe Protonic Ceramic Fuel Cell (PCFC) Production Value Estimates and Forecasts (2019-2030)

5.6.3 China Protonic Ceramic Fuel Cell (PCFC) Production Value Estimates and Forecasts (2019-2030)

5.6.4 Japan Protonic Ceramic Fuel Cell (PCFC) Production Value Estimates and Forecasts (2019-2030)

## **6 GLOBAL PROTONIC CERAMIC FUEL CELL (PCFC) CONSUMPTION BY REGION**

6.1 Global Protonic Ceramic Fuel Cell (PCFC) Consumption Estimates and Forecasts by Region: 2019 VS 2023 VS 2030

6.2 Global Protonic Ceramic Fuel Cell (PCFC) Consumption by Region (2019-2030)

6.2.1 Global Protonic Ceramic Fuel Cell (PCFC) Consumption by Region: 2019-2030

6.2.2 Global Protonic Ceramic Fuel Cell (PCFC) Forecasted Consumption by Region (2025-2030)

6.3 North America

6.3.1 North America Protonic Ceramic Fuel Cell (PCFC) Consumption Growth Rate by Country: 2019 VS 2023 VS 2030

6.3.2 North America Protonic Ceramic Fuel Cell (PCFC) Consumption by Country (2019-2030)

6.3.3 U.S.

6.3.4 Canada

6.4 Europe

6.4.1 Europe Protonic Ceramic Fuel Cell (PCFC) Consumption Growth Rate by Country: 2019 VS 2023 VS 2030

6.4.2 Europe Protonic Ceramic Fuel Cell (PCFC) Consumption by Country (2019-2030)

6.4.3 Germany

6.4.4 France

6.4.5 U.K.

6.4.6 Italy

6.4.7 Russia

6.5 Asia Pacific

6.5.1 Asia Pacific Protonic Ceramic Fuel Cell (PCFC) Consumption Growth Rate by Country: 2019 VS 2023 VS 2030

6.5.2 Asia Pacific Protonic Ceramic Fuel Cell (PCFC) Consumption by Country (2019-2030)

6.5.3 China

6.5.4 Japan

6.5.5 South Korea

6.5.6 China Taiwan

6.5.7 Southeast Asia

6.5.8 India

6.5.9 Australia

6.6 Latin America, Middle East & Africa

6.6.1 Latin America, Middle East & Africa Protonic Ceramic Fuel Cell (PCFC) Consumption Growth Rate by Country: 2019 VS 2023 VS 2030

6.6.2 Latin America, Middle East & Africa Protonic Ceramic Fuel Cell (PCFC) Consumption by Country (2019-2030)

6.6.3 Mexico

6.6.4 Brazil

6.6.5 Turkey

6.6.5 GCC Countries

## **7 SEGMENT BY TYPE**

7.1 Global Protonic Ceramic Fuel Cell (PCFC) Production by Type (2019-2030)

7.1.1 Global Protonic Ceramic Fuel Cell (PCFC) Production by Type (2019-2030) & (MW)

7.1.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Market Share by Type (2019-2030)

7.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Type (2019-2030)

7.2.1 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Type (2019-2030) & (US\$ Million)

7.2.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Value Market Share by Type (2019-2030)

7.3 Global Protonic Ceramic Fuel Cell (PCFC) Price by Type (2019-2030)

## **8 SEGMENT BY APPLICATION**

## 8.1 Global Protonic Ceramic Fuel Cell (PCFC) Production by Application (2019-2030)

8.1.1 Global Protonic Ceramic Fuel Cell (PCFC) Production by Application (2019-2030) & (MW)

8.1.2 Global Protonic Ceramic Fuel Cell (PCFC) Production by Application (2019-2030) & (MW)

8.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Application (2019-2030)

8.2.1 Global Protonic Ceramic Fuel Cell (PCFC) Production Value by Application (2019-2030) & (US\$ Million)

8.2.2 Global Protonic Ceramic Fuel Cell (PCFC) Production Value Market Share by Application (2019-2030)

8.3 Global Protonic Ceramic Fuel Cell (PCFC) Price by Application (2019-2030)

## **9 VALUE CHAIN AND SALES CHANNELS ANALYSIS OF THE MARKET**

9.1 Protonic Ceramic Fuel Cell (PCFC) Value Chain Analysis

9.1.1 Protonic Ceramic Fuel Cell (PCFC) Key Raw Materials

9.1.2 Raw Materials Key Suppliers

9.1.3 Protonic Ceramic Fuel Cell (PCFC) Production Mode & Process

9.2 Protonic Ceramic Fuel Cell (PCFC) Sales Channels Analysis

9.2.1 Direct Comparison with Distribution Share

9.2.2 Protonic Ceramic Fuel Cell (PCFC) Distributors

9.2.3 Protonic Ceramic Fuel Cell (PCFC) Customers

## **10 GLOBAL PROTONIC CERAMIC FUEL CELL (PCFC) ANALYZING MARKET DYNAMICS**

10.1 Protonic Ceramic Fuel Cell (PCFC) Industry Trends

10.2 Protonic Ceramic Fuel Cell (PCFC) Industry Drivers

10.3 Protonic Ceramic Fuel Cell (PCFC) Industry Opportunities and Challenges

10.4 Protonic Ceramic Fuel Cell (PCFC) Industry Restraints

## **11 REPORT CONCLUSION**

## **12 DISCLAIMER**

## I would like to order

Product name: Protonic Ceramic Fuel Cell (PCFC) Industry Research Report 2024

Product link: <https://marketpublishers.com/r/P9B8730511B6EN.html>

Price: US\$ 2,950.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/P9B8730511B6EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:  
Last name:  
Email:  
Company:  
Address:  
City:  
Zip code:  
Country:  
Tel:  
Fax:  
Your message:

**\*\*All fields are required**

Customer signature \_\_\_\_\_

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970