

Organic Rankine Cycle (ORC) Market Forecasts to 2034 – Global Analysis By Cycle Type (Subcritical ORC and Supercritical ORC), Turbine Type, Heat Source, Capacity Range, Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Organic Rankine Cycle (ORC) Market is accounted for \$1.1 billion in 2026 and is expected to reach \$2.2 billion by 2034 growing at a CAGR of 9.1% during the forecast period. The Organic Rankine Cycle (ORC) is an energy conversion method that generates electricity from low and moderate heat sources by using organic fluids that vaporize at lower temperatures. Compared to conventional steam-based cycles, ORC systems are better suited for applications like geothermal resources, waste heat recovery, biomass, and solar thermal systems. It operates through key components such as a heat exchanger, turbine, condenser, and circulation pump in a continuous loop. ORC is widely appreciated for its durability, low operational requirements, and efficiency enhancement capabilities. This technology supports cleaner energy production by capturing unused heat and helping lower overall carbon emissions.

According to the International Renewable Energy Agency (IRENA), global installed geothermal power capacity reached 14 GW in 2023, with ORC technology being a key enabler for low-temperature geothermal utilization.

Market Dynamics:

Driver:

Growing demand for waste heat recovery

Rising emphasis on improving energy utilization is accelerating the adoption of waste heat recovery technologies, thereby supporting the growth of the ORC market. Heavy industries like steel, cement, glass, and chemical production release significant amounts of excess heat that often goes unused. ORC technology helps transform this low-temperature heat into valuable electricity, enhancing efficiency and lowering expenses. Supportive government regulations further encourage industries to implement such systems. With increasing energy costs and tighter environmental standards, businesses are focusing on maximizing energy use, making ORC systems an attractive solution for reducing waste and achieving sustainability targets efficiently.

Restraint:

Limited efficiency at very low temperatures

A key limitation of ORC systems is their reduced performance when operating with extremely low-temperature heat sources. While they are suitable for moderate heat recovery, efficiency declines notably when the available heat is too low. This leads to lower electricity generation and diminished overall system effectiveness. Consequently, industries with only minimal heat availability may find ORC solutions less practical or cost-efficient. The decreased output can impact the financial feasibility of such projects, making them less attractive for investment. This limitation restricts the range of applications and may push organizations to consider other technologies better suited for ultra-low-temperature conditions.

Opportunity:

Expansion in geothermal energy applications

Increasing adoption of geothermal energy offers promising growth prospects for the ORC market. Since ORC systems efficiently convert moderate-temperature geothermal heat into power, they are highly suitable for such applications. Many nations are focusing on geothermal energy to strengthen energy security and reduce carbon emissions. ORC technology makes it possible to utilize resources that are not suitable for traditional steam-based systems. With rising investments in renewable energy infrastructure, geothermal projects are gaining momentum globally. This trend is expected to create strong demand for ORC solutions, supporting market expansion in regions with untapped geothermal potential.

Threat:

Stringent environmental and safety regulations

Tight environmental and safety rules pose challenges for the ORC market, especially concerning the characteristics of organic working fluids used in the systems. Certain fluids may face restrictions due to environmental impact or safety concerns like flammability. Meeting changing regulatory requirements often involves additional costs, system modifications, or the use of alternative materials. These factors can delay installations and increase complexity for project developers. As environmental policies become stricter worldwide, companies must frequently adjust to new standards, creating uncertainty and potentially slowing down the adoption and expansion of ORC technology in different applications and regions.

Covid-19 Impact:

The outbreak of COVID-19 affected the ORC market in both negative and positive ways. In the early stages, supply chain interruptions, workforce limitations, and delays in ongoing projects hindered market progress. Industrial activities slowed or stopped, leading to reduced need for energy recovery technologies. Financial uncertainties also caused companies to delay investments. As economies began to recover, attention shifted toward sustainability and efficient energy use. Governments and businesses emphasized environmentally friendly solutions as part of recovery plans, increasing the adoption of ORC systems. This renewed interest is likely to drive future growth, offsetting the temporary decline experienced during the pandemic period.

The subcritical ORC segment is expected to be the largest during the forecast period

The subcritical ORC segment is expected to account for the largest market share during the forecast period owing to its extensive usage and dependable performance in multiple sectors. Operating below the critical pressure level, it offers predictable and stable thermodynamic characteristics. This makes it ideal for harnessing energy from moderate and low-temperature heat sources like geothermal reservoirs, biomass systems, and industrial processes. These systems are relatively simple to implement, require less complex maintenance, and integrate smoothly with existing setups. Due to their affordability, established efficiency, and adaptability, subcritical ORC systems are widely favored by industries aiming to enhance energy efficiency and achieve reliable power generation from waste heat sources.

The remote & off-grid power supply segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the remote & off-grid power supply segment is predicted to witness the highest growth rate, driven by rising demand for decentralized energy systems. Regions without access to established power grids require dependable standalone energy solutions. ORC systems are highly effective in such scenarios, as they can generate electricity using locally sourced heat, including biomass, geothermal energy, and excess industrial heat. Their reliability and low maintenance needs make them suitable for isolated locations such as rural communities, mining operations, and remote facilities. This growing need for independent energy sources is fueling strong expansion in this segment.

Region with largest share:

During the forecast period, the Europe region is expected to hold the largest market share, driven by its commitment to clean energy and efficient resource utilization. The region benefits from developed geothermal and biomass industries, which extensively use ORC systems for power generation. Favorable regulatory frameworks, along with incentives promoting energy efficiency and emission reduction, support market expansion. Governments across European nations continue to invest in sustainable technologies to meet climate goals. These combined elements position Europe as a leading region in the ORC market, maintaining a strong share in global adoption and development.

Region with highest CAGR:

Over the forecast period, the Asia-Pacific region is anticipated to exhibit the highest CAGR, driven by accelerating industrial development and increasing energy requirements. Emerging economies are prioritizing efficient energy use and environmentally friendly technologies to sustain growth. The rise in industrial activities has led to greater adoption of waste heat recovery systems, boosting demand for ORC solutions. Government policies supporting renewable energy and infrastructure expansion further enhance market prospects. Moreover, the growing demand for localized and reliable power generation systems contributes to this rapid growth.

Key players in the market

Some of the key players in Organic Rankine Cycle (ORC) Market include ABB, Access

Energy, AQYLON, Atlas Copco, Baker Hughes, Clean Energy Technologies Inc. (CETY), Climeon AB, Dör Group, ElectraTherm, ENOGIA, Exergy International, Heatlift, Kaishan Group, MAN Energy Solutions, Orcan Energy, Ormat Technologies Inc., TICA and Turboden S.p.A.

Key Developments:

In March 2026, Baker Hughes and XGS Energy announced a strategic collaboration and initial order for Baker Hughes engineering services to advance XGS's planned 150-megawatt geothermal project in New Mexico. The project, once developed, will support the delivery of clean, round-the-clock power to the Public Service Company of New Mexico's (PNM) grid in support of Meta's data center operations in the state.

In December 2025, ABB and HDF Energy have signed a joint development agreement (JDA) to co-develop a high-power, megawatt-class hydrogen fuel cell system designed for use in marine vessels. The project targets use of the system on various vessel types, including large seagoing ships such as container feeder vessels and liquefied hydrogen carriers.

In October 2025, Ormat Technologies and SLB announced an agreement to fast-track the development and commercialization of integrated geothermal assets, including enhanced geothermal systems (EGS). EGS is the next generation of geothermal technology, meant to unlock geothermal energy in regions beyond where conventional geothermal resources exist.

Cycle Types Covered:

Subcritical ORC

Supercritical ORC

Turbine Types Covered:

Radial Turbine

Axial Turbine

Screw & Scroll Turbine

Heat Sources Covered:

- Geothermal
- Biomass
- Waste Heat Recovery
- Solar Thermal
- Other Heat Sources

Capacity Ranges Covered:

- Small-scale (5 MW)

Applications Covered:

- Power Generation
- CHP (Combined Heat & Power)
- Industrial Waste Heat Utilization
- Remote & Off-Grid Power Supply

End Users Covered:

- Oil & Gas
- Chemical & Petrochemical
- Cement & Glass

Paper & Pulp

Food & Beverage

Other End Users

Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden

Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of Africa

What our report offers:

Market share assessments for the regional and country-level segments

Strategic recommendations for the new entrants

Covers Market data for the years 2023, 2024, 2025, 2026, 2027, 2028, 2030, 2032 and 2034

Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

Strategic recommendations in key business segments based on the market

estimations

Competitive landscaping mapping the key common trends

Company profiling with detailed strategies, financials, and recent developments

Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

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Note: Tables for North America, Europe, APAC, South America, and Rest of the World (RoW) Regions are also represented in the same manner as above.

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