LCPDelta

Distributed Power Service

About LCP Delta

Our mission is to enable a better, faster energy transition for all

Founded in 2004 and based across the UK, France, Norway, the Netherlands and beyond, LCP Delta provide data-driven research, consultancy, technology products and training services to companies investing in and navigating the energy transition.

We are a diverse team from a variety of backgrounds including engineers, data analysts, environmentalists and more.

LCP Delta is a mission driven organisation - all of us want to make a difference to the energy transition and accelerate the path to a low carbon future.

The energy market is becoming increasingly complex. As consumers become more empowered and as energy systems around the world decarbonise, there is a need to understand both the generation and demand side to effectively navigate the rapid changes occurring.

We know it's a complicated topic, and we're here to help.

Andy Bradly, Partner, LCP Delta

LCP Delta was formed through the merger of Delta-EE and LCP Energy to bring together deep generation and consumer-side expertise, to provide our clients with a single partner to help them on their journey and provide them with a 360° view across the energy spectrum.

Andy Bradley
Partner
andy.bradley@lcp.com

Jon Slowe
Partner
jon.slowe@lcp.com

200+
Global clients

6
offices

110+
Colleagues

LCP Delta provides the best advice, support and tools to enable the energy sector to drive the energy transition

Subscription research services

Our portfolio of subscription research services offer in-depth insights across the energy transition landscape. We have been undertaking primary research with organisations active in the energy transition since 2004 – we have an unparalleled international network of contacts we can draw on. Each service focuses on a particular aspect of the energy transition.

Market and strategic advisory consulting

We provide support across the full energy value chain with bespoke research, insight, forecasts and advice tailored to them. Our consultancy offerings draws on expertise and data from across LCP Delta, from strategic market entry analysis through to detailed half-hourly revenue forecasting.

We support our clients in four ways

Technology & data

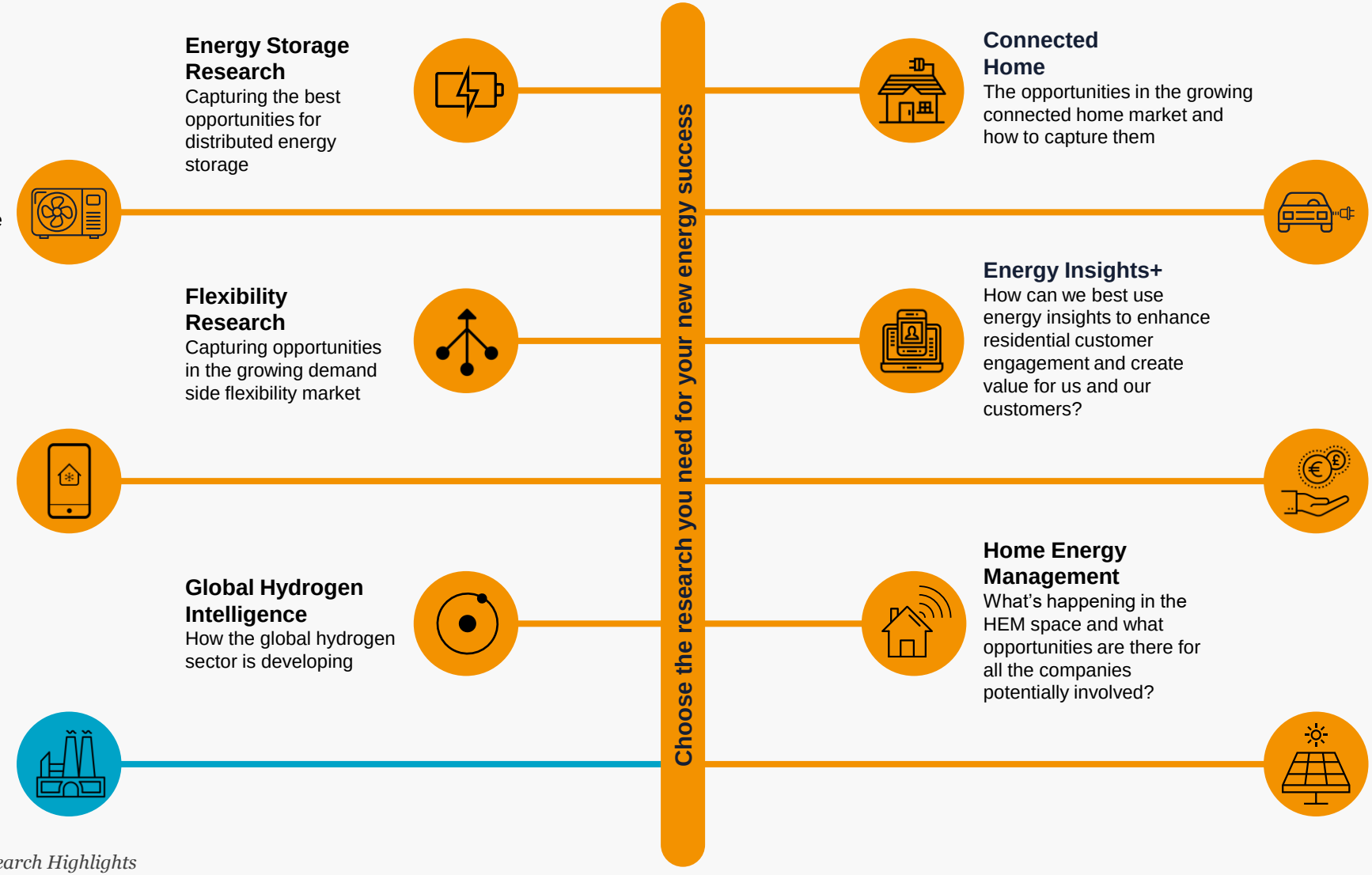
Data integration and analysis is at the heart of the energy transition. However, sourcing and navigating complex, wide-ranging datasets is challenging. At LCP Delta, we combine and curate proprietary and public datasets to provide you with a single source of truth across the energy spectrum and make this data interactive using our cutting-edge technology.

Training

Our training helps professionals quickly develop their new energy knowledge, accelerating their impact for organisations who want to capture opportunities. We provide meaningful, concise and easy to understand short courses.

Subscription Research Services

Use a combination of our subscription research services, bespoke consultancy projects and training services to gather the information you need to ensure your business's success in the energy transition.



Energy Storage Research
Capturing the best opportunities for distributed energy storage

Decarbonisation of Heat
Gain a holistic understanding of the future of the heating sector from a product and policy point-of-view

Flexibility Research
Capturing opportunities in the growing demand side flexibility market

Heating Business
How to evolve from selling individual products and commodities to become a successful home energy solution provider

Global Hydrogen Intelligence
How the global hydrogen sector is developing

Distributed Power
How to succeed in the global distributed power market

Connected Home
The opportunities in the growing connected home market and how to capture them

EV Charging
How to best develop position and activities to succeed in the rapidly growing eMobility market

Energy Insights+
How can we best use energy insights to enhance residential customer engagement and create value for us and our customers?

New Energy Business Model
Understand, identify and implement the most promising commercial opportunities from the increasing disruption in the energy sector

Home Energy Management
What's happening in the HEM space and what opportunities are there for all the companies potentially involved?

Solar PV
Understanding the growth of solar PV across Europe

Distributed Power Service Scope of Research

Researching the topics you need to know about

- Which countries have the biggest market opportunities now?
- Which customer segments should we focus our sales on, in which countries?
- How well positioned are we – on a national, regional and global level?
- What are the emerging opportunities that we should focus on?
- How will markets develop in the future, and what are the key factors affecting this?
- What are the opportunities for gas engines in data centres?
- What are the opportunities for gas engines in microgrids?
- How will an evolution towards a hydrogen fuelled economy impact the gas engine market?
- How will emission regulations shape the distributed power market in the future?
- What are the opportunities for gas engines as distributed energy and renewables grow?

How Our Research Helps Your Business

The service enables you to be successful in global gas engine markets by providing data, analysis, insights and opinion on the markets, opportunities, customer types and competitor types.

> *"LCP Delta's quality of customer engagement and information gathering has been excellent."*
>
> **– Leading Investment Company**

Benefits

- Enables you to make the best strategic decisions on which countries to focus your sales efforts on
- Helps you identify the most promising energy user segments and applications, so that you can best focus your sales efforts
- Allows you to understand your business positioning on a global and country-level scale and react as appropriate
- Enables you to understand and plan effective market entry in emerging distributed power applications

Example clients

- Gas engine manufacturer
- CHP packagers
- Energy suppliers

Distributed Power Service: Existing Deliverables

Providing industry-leading insights, data and forecasts on the global distributed power market for over 10 years.

Reports with easy-to-digest graphics – market drivers, spark spread forecasts, policy analysis

+

Spreadsheets with historic data and forecasts

Existing country reports

1. Argentina
2. Australia
3. Brazil
4. Bangladesh
5. Canada
6. China
7. France
8. Germany
9. India
10. Indonesia
11. Israel
12. Italy
13. Japan
14. Malaysia
15. Mexico
16. Myanmar
17. Nigeria
18. Pakistan
19. Poland
20. Russia
21. Thailand
22. Turkey
23. UK
24. USA

In depth high level country reports

Region 1: Europe
Region 2: CIS
Region 3: Africa
Region 4: S. America
Region 5: Middle East
Region 6: SEA

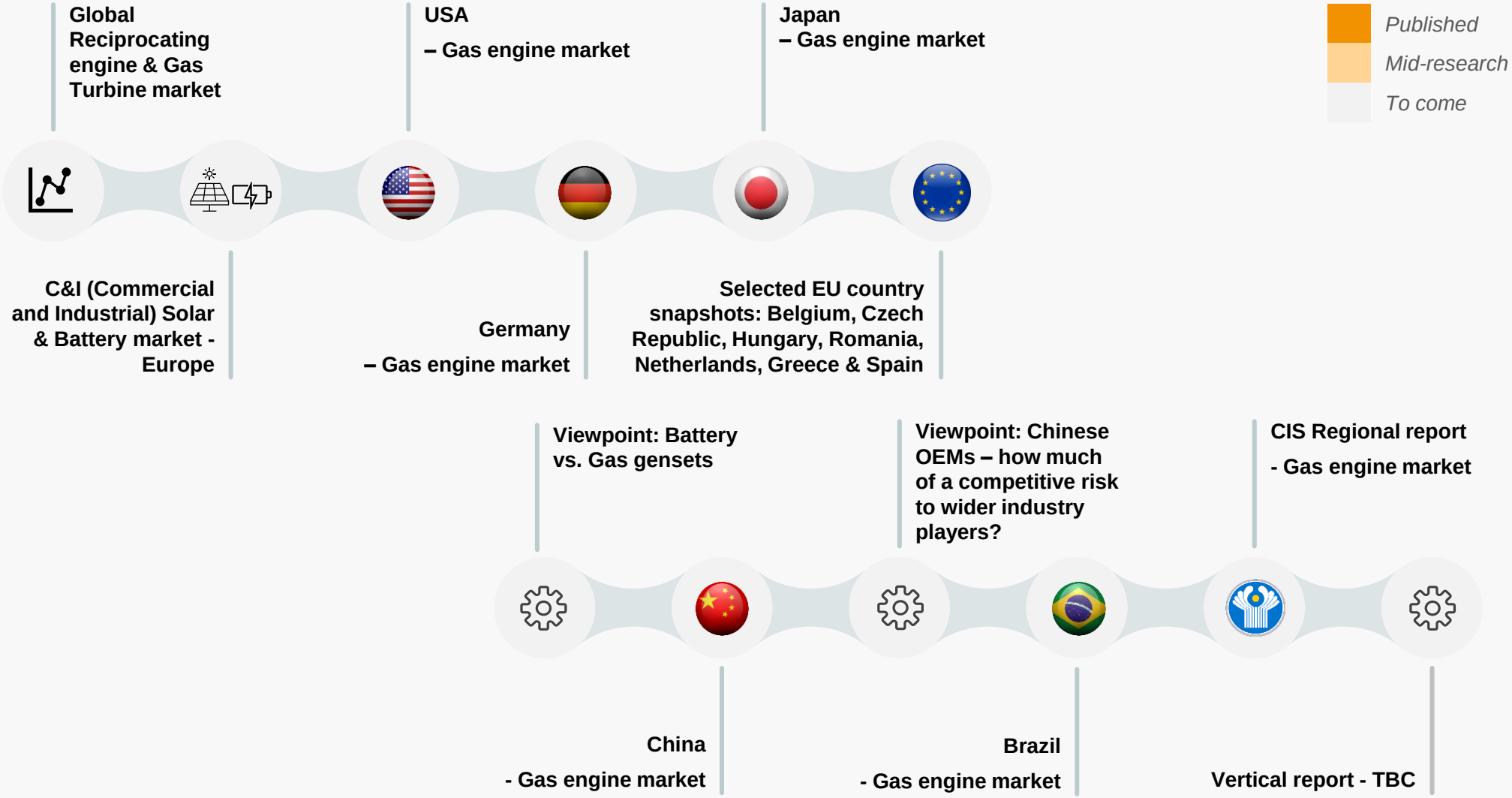
In-depth topical reports

- Data Centres Report (2020)
- Hydrogen for Power Report (2021)
- Microgrids and Gas Engines (2022)
- Alternative Fuels for Power (2023)

High level country reports

Non-exhaustive coverage of localised distributed power systems from around the world, with in-depth information provided on ~370 projects.

2024 Delivery schedule



Distributed Power Research Examples

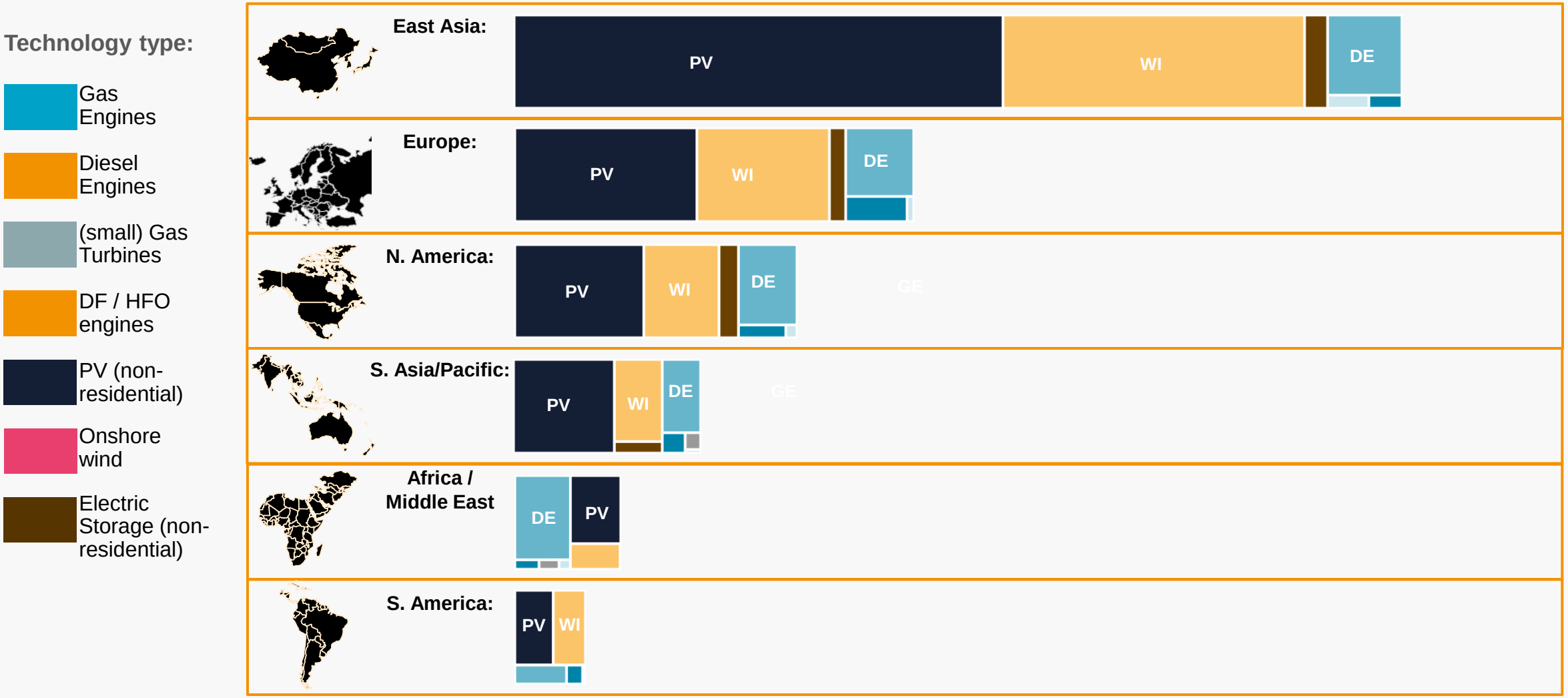
LCPDelta

2023 Global Distributed Power Market report

Distributed Power Service

Executive Summary (3/6): 2022 Distributed Power Market

Regional annual installed capacity



Note: This chart illustrates annual installed capacity, and not the cumulative installed base.

LCP Delta

Key Application trends: CHP

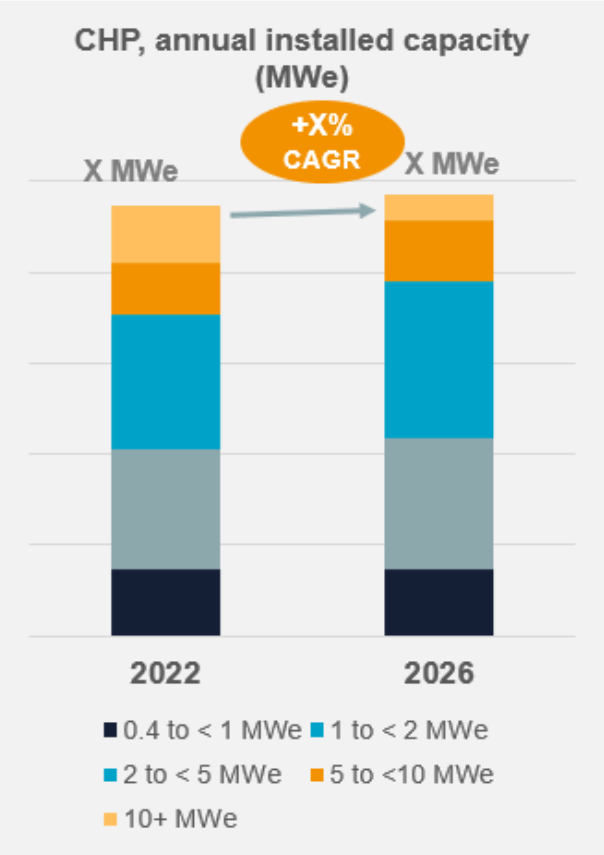
X% CAGR for cogeneration engines with growth in most markets to 2026

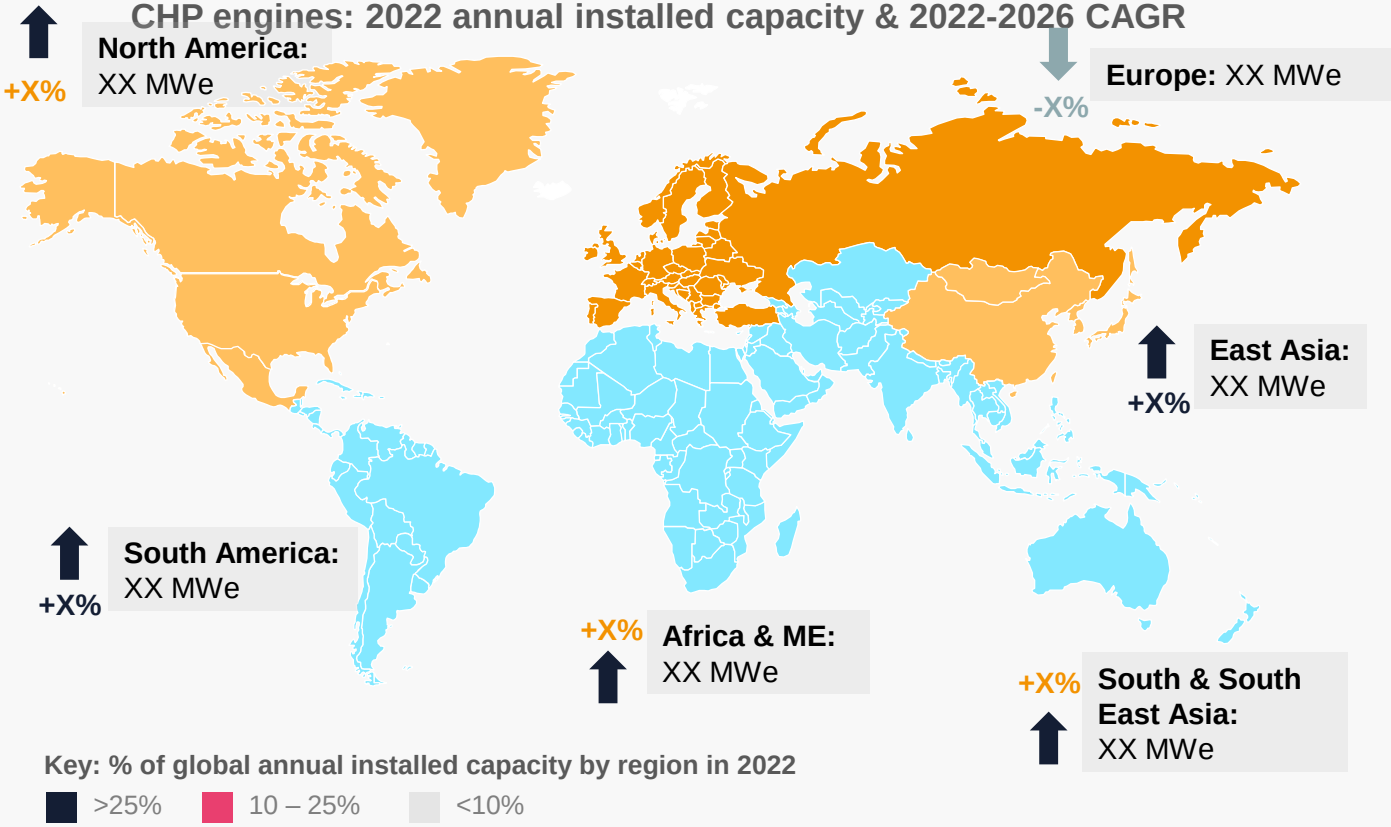
The CHP market will remain strong out to 2026. The decline we expect to see in Europe's market will be compensated by growth in other regions.

Top 2022 Markets & trends to 2026

- Germany
- USA
- Japan
- Russia*
- Italy
- China

*We have not yet updated the Russia gas engine report, but we have revised down our forecast for the country based on various barriers, such as European and American OEMs no longer selling engines here, and reduced exports of products from Russia due to sanctions in Europe and NA.





LCPDelta

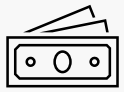
2022 Microgrids and Gas Engines report

Distributed Power Service

Barriers to Microgrid Development

These barriers are present in the majority of microgrid markets

Some of the barriers are regional in nature (e.g. regulatory barriers) while others have a more universal impact (e.g. the high costs of investment).



High upfront costs

While microgrids can often result in long-term cost savings and other benefits, significant upfront investment costs often deter potential customers from investing in microgrids. Decreasing costs of DERs and new business models are helping to overcome this barrier.

Regulatory framework

While policies impacting microgrids tend to be country / state specific, overall there is a general lack of supportive regulatory frameworks for microgrids, creating uncertainty for microgrid developers, customers, financiers and grid operators.

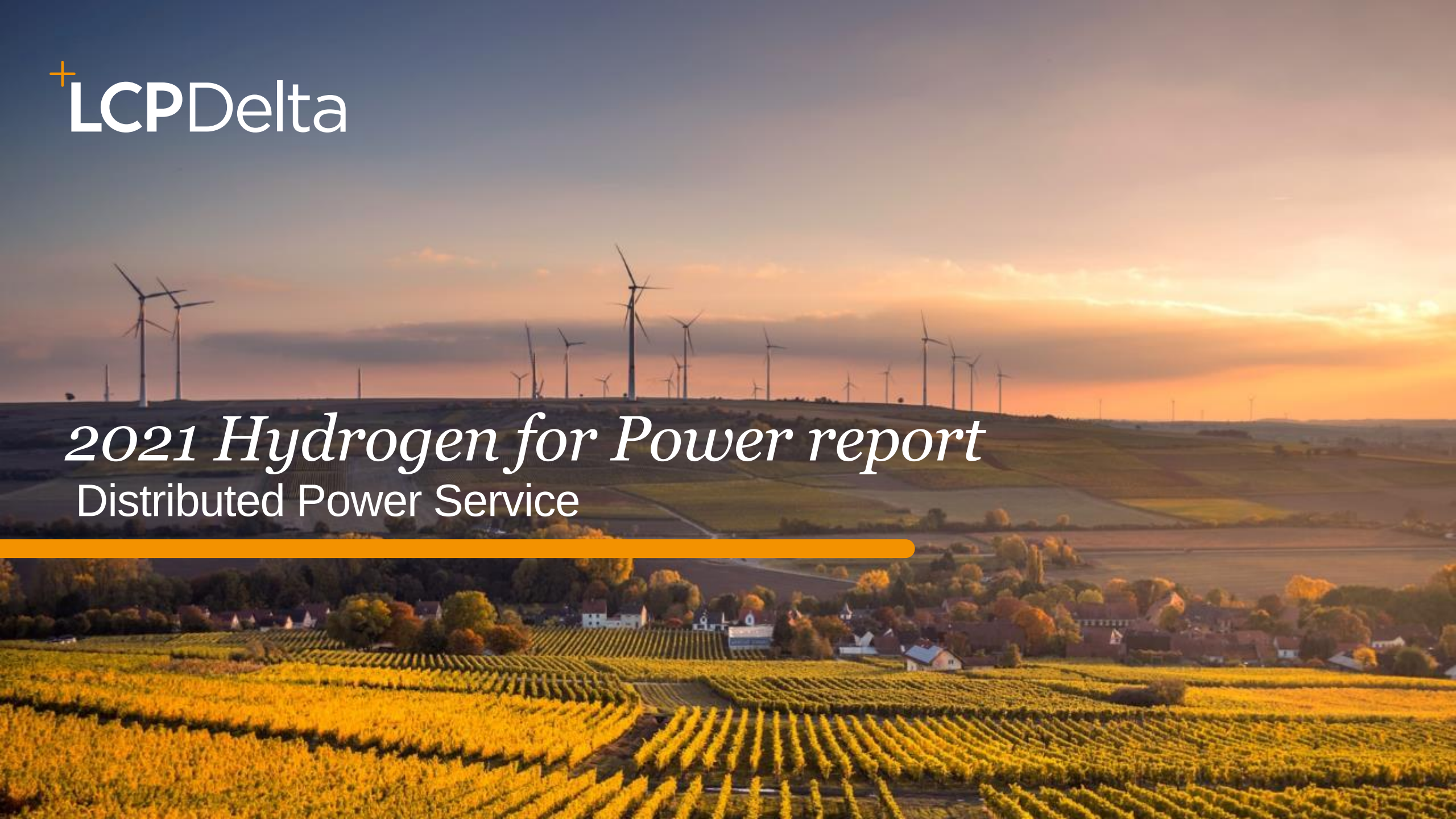
Complex design

The current lack of a standard design process and the formation of microgrids from existing DERs usually results in each microgrid being of a bespoke (and often complex) design which raises costs. This barrier can vary from project to project – with different systems having different levels of complexity.

Utilities [resistant to change]

Some energy companies view microgrids as an opportunity, but many still view them as a threat to their traditional business model. This results in some utilities blocking their deployment and connection to the grid thereby stifling the industry's growth.

LCPDelta



2021 Hydrogen for Power report

Distributed Power Service

EXTRACT from the 2021 Hydrogen for Power report)

Hydrogen strategies and national energy plans

Transport is receiving the most support from governments globally

Hydrogen use is prioritised for transport and industrial processes across most countries, with Japan and China showing a larger interest for power applications

The countries in this strategy review were selected based on their potential for hydrogen engines, as they install high volumes of gas engines annually and have shown a strong interest in developing low carbon hydrogen.

Some key take-aways based on the review:

- There is a **strong, unified focus on using hydrogen in the transport industry**. Within China & Japan this also includes smaller passenger vehicles, whereas in Europe and USA the focus is on heavy-duty transport.
- **Hydrogen for industrial processes is another big priority**, as it's the largest consumer of grey hydrogen today. Despite China and Japan not prioritising hydrogen for industries within their policies, private investment from industries in low carbon hydrogen is already taking place.
- **Hydrogen for building heating is a lower priority**, with the UK showing a large interest to decarbonise its natural gas based residential heating.
- **Power applications are considered secondary** in most countries, only playing a role towards 2030. China and Japan have placed a higher weight on their power sectors, mainly by using stationary fuel cells.

Strategy sector focus by country

European Hydrogen Strategy – Main stages

LCPDelta

2020 Data Centres report

Distributed Power Service

EXTRACT from the 2020 Data Centre report)

Case Study 1 – Gas engines in trigeneration mode

Changping Data Centre, China

CNPC's Changping data centre was commissioned in 2013 and became China's first data centre to use gas engines onsite to provide power, cooling and heating

Operational year

2013

Installed gas engine capacity

16.7 MWe

Gas Engines

5 Jenbacher J620 engines

Total efficiency

85%

Owner: China National Petroleum Corporation

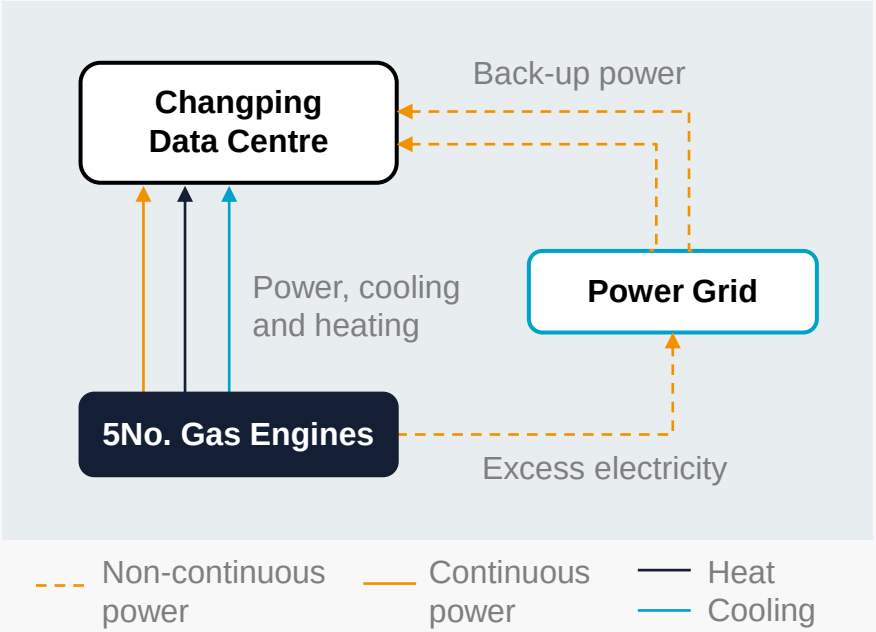
Developer & operator: Beijing Natural Gas Group

Prime power: 5No. x 3.34 MWe Jenbacher engines with total power rating of 16.7 MWe.

Back-up power: Two mains connections to the electricity grid.

Heating: 12.75 MWth for heating office space, although this only operates ~2,500 hours / year.

Cooling: 15 MWth for data centre cooling. Electric cooling installed for back-up cooling



Benefits

- CCHP systems replaces 34,900 tons of coal power generation with natural gas – saving 61,800 tons of CO_2 and 50,100 tons of SO_2 annually compared to electric cooling, gas boiler for heating and grid power.
- Triple supply (gas engines + 2No. grid connections) makes the data centre more reliable than traditional dual power supply through grid connection plus diesel back-up.

EXTRACT from the 2020 Data Centre report (more details available to subscribers)

Gas Engine Installed Capacity – Continuous Power

Temporary gas engines where grid connection is delayed

We expect the annual installations of gas engines in data centres within continuous power applications to grow from xxx MWe in 2018 to xxx MWe in 2025.

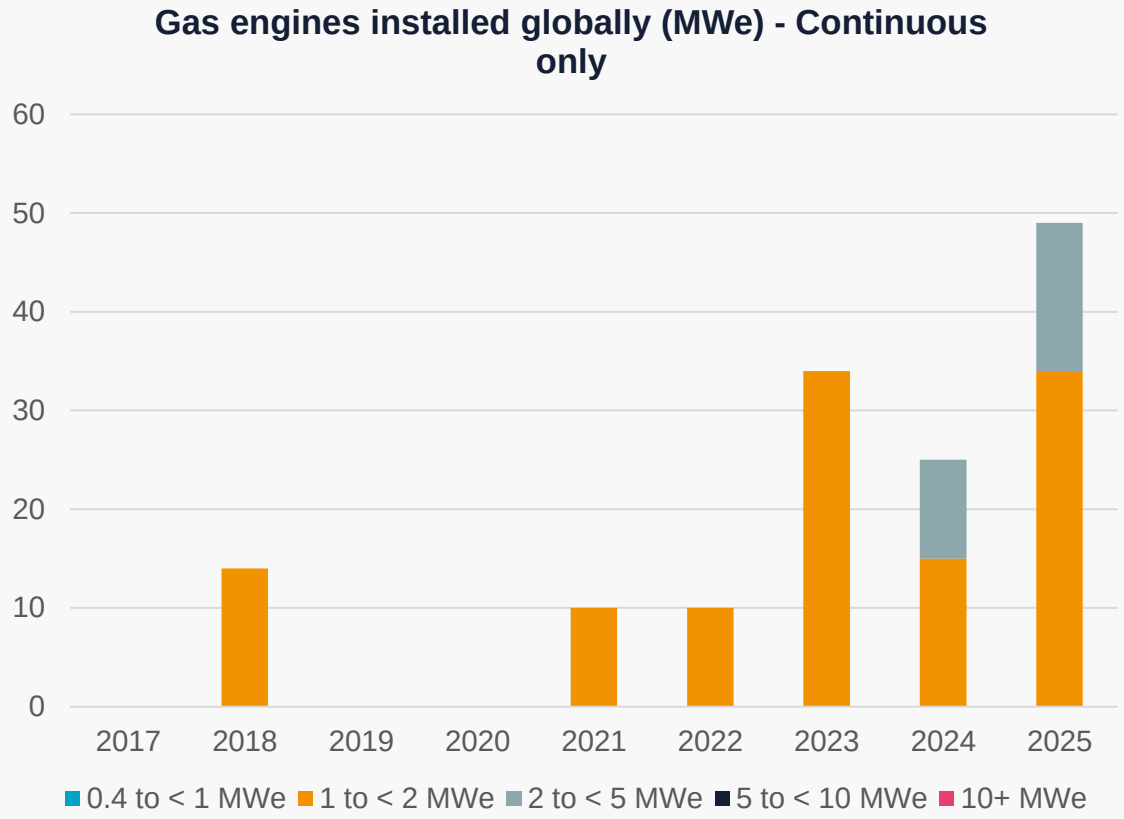
Growth opportunities

Typically used where the electricity grid is weak or congested (and there is a good natural gas grid) as grid connection could delay project start.

A reduced number of data centres in Europe have already used gas engines to provide continuous power. Europe will continue providing opportunities where grids are saturated, although CCHP will offer a more permanent solution. South Asia / Pacific will also be a growing market for temporary continuous power. We don't expect continuous growth going forward, but rather a case by case opportunity.

Customer types undertaking projects

The customer type most likely to use gas engines for continuous power is colocation data centres, as these typically want to be located nearby city hubs and delays in projects will make them loose out on customers.



LCPDelta

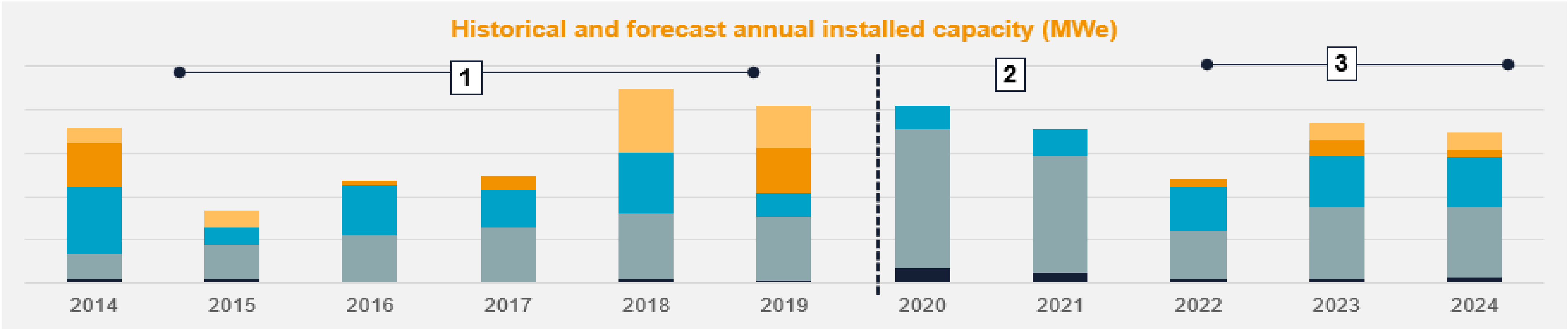
Country Report Extracts

Distributed Power Service

Gas Engine Installed Capacity – by Engine Size

"Green" gas market boom in 2020-2021

Landfill gas and biogas projects driving market growth in the 2015-2021, but will have less influence in the market post-2022.



1. Market growing post-2015

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

2. Investment in CHP shrinks with COVID, but biogas and landfills flourish

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

3. Decline in the "green" gas market, but a recovery of CHP equalises market numbers

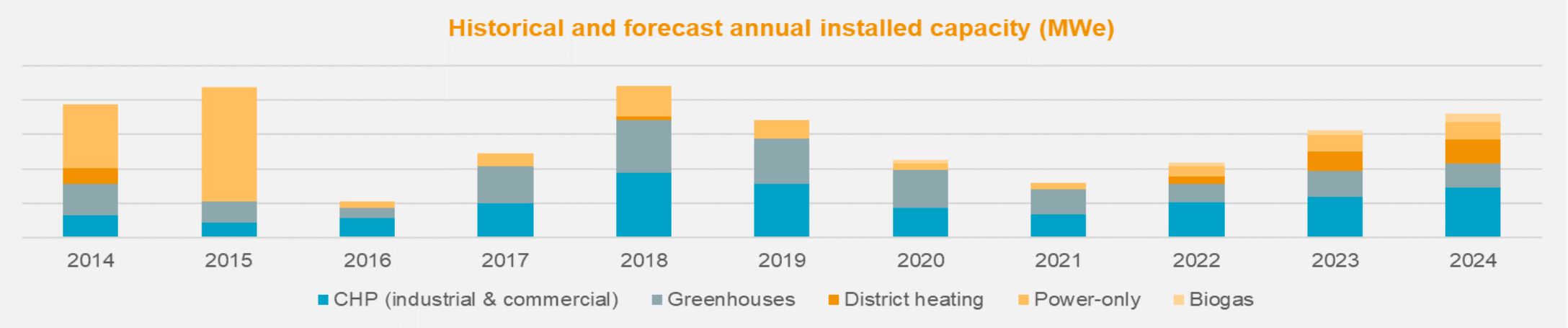
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxx

EXTRACT from the 2020 Russia country report (more details available to subscribers)

Gas Engine Installed Capacity – by Application

The majority of deployed engines are in CHP mode

Landfill gas and biogas projects driving market growth in the 2015-2021, but will have less influence in the market post-2022.



1. Cogeneration in greenhouses and industries makes up the majority of the market

xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx

2. Market decline as a result of weaker currency and decline in the demand for new greenhouses

xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx

3. Market recovery along with improved economy and some new opportunities

xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx

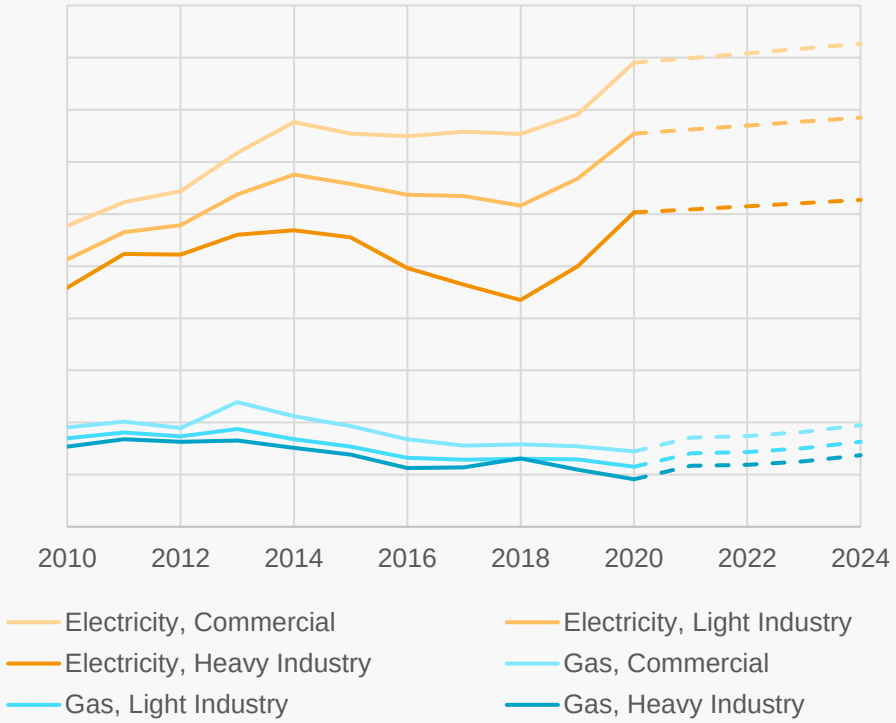
EXTRACT from the 2020 Germany country report (more details available to subscribers)

Energy Prices

Strong increase in electricity prices after 2018

Electricity prices increased sharply as a result of the EU ETS carbon price increases. Gas prices will reverse their downwards trend from 2021 when the Fuel Emissions Trading Act is introduced

Historical and forecast average electricity & gas prices (€ / kWh)



Electricity

Electricity continues to be characterised by low wholesale prices and some of the largest non-commodity' costs (including levies associated with the 'Energiewende' and VAT) in Europe. In 2010, wholesale electricity prices represented ~60% of the retail price (excluding VAT & recoverable levies). By 2019, this had dropped to ~22%, mainly due to the high renewables surcharge. The spike in electricity prices between 2018-2020 is mainly due to the rising carbon prices under the EU ETS scheme.

Gas

Gas prices have been falling in Germany since 2014. Moderate prices increases are expected to 2024 as the National Fuel Emissions Trading Act will be introduced from 2021 and will apply to all gas distributors. Despite the increasing gas price trends, we don't expect this increase to have a major impact on gas engine sales.

Existing and Upcoming Insights

Release date	Report title	Description
Q4 2023	Alternative Fuels for Power Generation	This report will explore the development of the market for alternative fuels to natural gas (hydrogen, ammonia, synthetic natural gas) in the distributed power generation market, with a focus on gas engine technology.
Q1 2023	Global Distributed Power Market Statistics report	An annual statistical report summarising market sizing and forecasts to 2026, segmented by size band, for 6 global regions – covering gas engines, diesel engines, dual-fuel engines, oil engines, gas turbines (up to 30MWe), solar PV, wind turbines, and electrical energy storage.
Q3 2022	Microgrids and Gas Engines	This 2-part report series looks at the 'fundamentals' of the microgrids market (drivers, components, commercial landscape) as well as regional and country specific insights, and explores the opportunity for gas engines sales into the global microgrid market.
Q3 2021	Hydrogen report	A report that examines how a transition to hydrogen as a fuel for power generation would affect gas engines. Indicatively, the report answers how hydrogen could be used in these applications, when we expect these developments to happen, and which countries / regions will be leading the transition.
Q3 2021	Energy as a Service Viewpoint	An introduction to C&I energy services and the role gas engines can play in this space.
Q3 2020	Data Centre report	An overview of the data centre market and how it covers its energy needs. Current and future market size for diesel and gas engines, technology comparison and business models.
Updated regularly	Country reports	Market size and sales forecasts for gas engines, in-depth analysis of market trends (incl. energy price forecasts, policy, and other drivers / barriers: 1. Australia 2. Argentina 3. Bangladesh 4. Brazil 5. Canada 6. China 7. France 8. Germany 9. Italy 10. India 11. Indonesia 12. Israel 13. Japan 14. Malaysia & Myanmar 15. Mexico 16. Nigeria 17. Pakistan 18. Poland 19. Russia 20. Thailand 21. Turkey 22. The United Kingdom 23. The United States of America

Contact us

Leon Gielen
Head of Business Development Asia
+31 (0) 617935006
leon.gielen@lcp.com

About LCP Delta

LCP Delta is a trading name of Delta Energy & Environment Limited and Lane Clark & Peacock LLP. References in this document to LCP Delta may mean Delta Energy & Environment Limited, or Lane Clark & Peacock LLP, or both, as the context shall require.

Delta Energy & Environment Limited is a company registered in Scotland with registered number SC259964 and with its registered office at Argyle House, Lady Lawson Street, Edinburgh, EH3 9DR, UK.

Lane Clark & Peacock LLP is a limited liability partnership registered in England and Wales with registered number OC301436. All partners are members of Lane Clark & Peacock LLP. A list of members' names is available for inspection at 95 Wigmore Street, London, W1U 1DQ, the firm's principal place of business and registered office. Lane Clark & Peacock LLP is authorised and regulated by the Financial Conduct Authority and is licensed by the Institute and Faculty of Actuaries for a range of investment business activities.

LCP and LCP Delta are registered trademarks in the UK and in the EU. Locations in Cambridge, Edinburgh, London, Paris, Winchester and Ireland.

https://www.lcp.uk.com/emails-important-information contains important information about this communication from LCP Delta, including limitations as to its use.

Disclaimer and use of our work

This work has been produced by LCP Delta under the terms of our written agreement with the Subscriber (Client) for the Client's sole use and benefit, subject to agreed confidentiality provisions, and for no other purpose. To the greatest extent permitted by law, unless otherwise expressly agreed by us in writing, LCP Delta accepts no duty of care and/or liability to any third party for any use of, and/or reliance upon, our work. This document contains confidential and commercially sensitive information. Should any requests for disclosure of information contained in this document be received, LCP Delta request that we be notified in writing of the details of such request and that we be consulted and our comments taken into account before any action is taken.

Where this report contains projections, these are based on assumptions that are subject to uncertainties and contingencies. Because of the subjective judgements and inherent uncertainties of projections, and because events frequently do not occur as expected, there can be no assurance that the projections contained in this report will be realised and actual events may be difference from projected results. The projections supplied are not to be regarded as firm predictions of the future, but rather as illustrations of what might happen. Parties are advised to base their actions on an awareness of the range of such projections, and to note that the range necessarily broadens in the latter years of the projections.