PikeResearch
Cleantech Market Intelligence

Research Report

EXECUTIVE SUMMARY:
Energy-Efficient Buildings: Europe

ESCO Market Dynamics, Performance Contracting, Energy Efficiency Retrofits, Green Building Certification, Financing Structures, Market Analysis, and Forecasts

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Published 1Q 2011

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Section 1

EXECUTIVE SUMMARY

1.1 Energy-Efficient Buildings in Europe

Significantly less than 1% of existing building space in Europe is "nearly zero-energy" at present. Yet, all new building construction and major renovation in Europe will be required to meet "nearly zero-energy" standards by the end of 2020 and the deadline for public buildings is the end of 2018. While this may seem to be an impossible task, nearly zero-energy buildings have been built in many countries throughout Europe for more than a decade.

As a percentage of the 30 billion square meters of existing building space in Western and Eastern Europe, certified green building space will increase from less than 1% in 2010 to more than 2% in 2016. Most of this growth will occur in new construction, which adds slightly less than 1% to existing building space in Europe each year. However, much of this certified space will not be nearly zero-energy.

In Europe, there is almost three times as much residential building space compared to tertiary space (commercial plus public). To date, many promotional programs for energy efficiency have focused on residential and public buildings. The largest markets for energy efficiency in European buildings are in Germany and France. In fact, the combined market of the rest of Europe, including Eastern Europe and Russia, is comparable to the market of either Germany or France.

1.1.1 Germany and France

In Germany, the market is somewhat fragmented by region, with each city and federal state maintaining its own energy policies. Regions where the Green party holds power tend to have progressive energy regulations, at least until the next local elections. Half of the cities in Germany (with the notable exception of Berlin) have already adopted Frankfurt's "Guidelines for Economical Construction 2009," which requires Passive House performance for new construction and major renovation in public buildings. Most of the ESCO industry in Germany is focused on public buildings, as well as on the regions where energy efficiency is a high political priority. Therefore, it seems likely that a substantial shift to Passive House techniques will occur over the next five years in the German ESCO industry. Yet, most major construction companies and ESCOs have not even started this shift, while a few have barely begun.

Throughout much of Europe, but especially in Germany, energy agencies are essential intermediaries between building owners and energy professionals. If an energy related business wishes to expand in Germany (or in most of Europe, for that matter), it is wise to contact the local energy agency of each targeted region within the country.

DGNB is a relatively new program that will be the primary green building certification system in Germany. It is designed to minimize certification cost by using documentation that is already required for building permits. The certification requirements for new and for existing buildings are identical. Unlike some certification programs, the performance bar is not lowered for existing buildings.

In France, the national energy plan, called the "Grenelle de l'Environnement," has aggressive goals to establish France as the least carbon-intensive country in the European

Union by 2020. The plan aims to reduce residential energy consumption by 38% in 2020 compared to 2008. As of the end of 2010, all government buildings are supposed to have undergone an energy audit, to be followed by appropriate energy-reducing retrofits. In addition, new commercial buildings must now consume 50 kWh/m^2/yr or less energy, with all types of new/renovated buildings to follow by the end of 2012.

France is pioneering work in new construction that moves beyond low energy consumption. The country assigns a label, "Bâtiment à Énergie Positive" (BEPOS), to buildings that produce more energy than they consume. All new construction will meet this "Positive Energy Building" requirement by 2020. While discussion is proceeding about how exactly the Grenelle targets will be met, there is general agreement that innovative new programs will be needed to upgrade a large percentage of the existing building stock.

In France, some energy policies are regional, but many are national. An energy-related business wishing to expand in France should contact the national agency ADEME. In terms of the floor space of new construction over the next five years, France will be the clear leader in Europe. More than 2% of all existing space has a green building certification, and a quarter of new French building projects request certification.

1.1.2 Nearly Zero-Energy – Energy Policies

While new and renovated European buildings will use nearly zero-energy by the end of 2020, the detailed definition of this phrase will vary significantly by country. Different building technologies will be prominent in different countries depending on national policy agendas, domestic fuel sources, and negotiations between builders, ESCOs, utilities, property owners, and environmentalists.

Multiple EU directives are driving the market for energy efficiency in European buildings. The 20-20 by 2020 mandate specifies that energy consumption and GHG emissions will be 20% less in 2020 compared to 1990, and that 20% of energy sources will be renewable. Adopted in 2006, the End-Use Efficiency and Energy Service Directives require a series of National Energy Efficiency Action Plans (NEEAPs) to be developed by each EU member state in June of 2007, 2011, and 2014.

The Energy Performance of Buildings Directive (EPBD), adopted in 2002 and updated in 2010, established mandatory energy performance certificate programs, performance-based and rigorous energy codes, and AC/boiler inspections. While many energy performance ratings to date have been secret, the 2010 revision of the EPBD specifies that the ratings must be publicly posted in advertisements for property sale or rental. Recent studies of the market value of energy-efficient buildings in Austria and the Netherlands, described below, were made possible because the energy ratings in those countries were publicly available.

Many innovative energy policies will be enacted over the next decade as member states attempt to meet their 2020 goals, and several tools are available to help with policy development. For instance, the World Business Council for Sustainable Development has developed a modeling tool to predict the effects of potential policy changes on energy consumption and carbon emissions.[1] The International Energy Agency (IEA) has published a summary handbook and detailed report about developing energy policy.[2] Also,

[1] World Business Council for Sustainable Development
[2] *Energy Efficiency Governance*, IEA, 2010

additional guidance for policy development is available at www.buildup.eu and at www.lehr.be.

For the EPBD, the European Parliament originally planned to require nearly zero-energy for building operations by 2012, for all new construction and major renovation, based on the following reasoning:

- To achieve a 20% reduction in the emissions from all buildings by 2020, a reduction by 2% of the original 2010 value would be required each year.
- Approximately 2% of the existing building space in Europe is built or renovated each year. Major renovation typically occurs once in 30 to 50 years.
- The two observations above suggest that if all new construction and renovation met the nearly zero-energy criteria, then this would satisfy the 20-20-20 goal for building operations.

For more than a decade, Passive House construction methods have been used to dramatically and economically reduce the energy use for heating in residential and commercial buildings in Europe. The low residual energy use can be economically supplied by renewable energy sources. Passive House training for residential and commercial construction is now available at various depths, from 3-week workshops to master's degrees.

However, political pressure from the construction and ESCO industries extended the deadline out to 2019 and 2021. Thus, the industry will have a decade to adopt new construction techniques. With these extended deadlines, the 20-20-20 goal could theoretically be met, if energy retrofits in most existing buildings achieve energy reductions of 20% to 40%. It remains to be seen whether new policies will be developed to support energy retrofits on such a broad scale. It also remains to be seen whether near-term upgrades of 20% to 40% will support or hinder future upgrades aiming for additional energy savings.

1.1.3 Efficiency Upgrades

State-of-the-art buildings today have high performance envelopes and very small, inexpensive HVAC systems. They use so little energy for heating and cooling that the cost of an expensive HVAC system, or of an expensive hookup to a heating district, would have an extremely long and unattractive payback period. When a high-performance HVAC system is installed in a conventional building, and later the building envelope is upgraded for high performance, then the large, new HVAC system will suddenly be rendered oversized, inefficient, and obsolete. Not all upgrade sequences are equal. When a series of energy upgrades are performed over time, this could create excellent performance at a reasonable price (with the sequence of envelope, then lighting, then HVAC) or mediocre performance at an outrageous price (with the sequence of HVAC, then lighting, then envelope). There is potential for significant backlash if energy programs promote HVAC upgrades on a massive scale first, and then taxpayers learn that they would need to improve their building envelopes and discard their expensive new furnaces and double-glazed windows, in order to achieve further energy cost savings.

Two-thirds of lighting in the EU is based on older, less efficient technology, even though upgrades have a payback period from a few months to a few years. Lighting upgrades

across the EU could result in annual cost savings of €14 billion and annual emissions savings of 59 million tons of CO_2. Roughly one-third of these potential savings could be realized by simply banning incandescent light bulbs, with a payback around one year. Although they have been banned in 2011 in the United Kingdom, two billion incandescent bulbs are still sold each year in Europe. Barriers to the adoption of more efficient technologies include a lack of awareness among decision makers of both the operational cost of lighting and the benefits of new technologies. Most electricity bills do not include a specific "extra cost from wasteful lighting" entry.

1.1.4 Market Value

Recent studies have investigated the market value of energy efficiency and green building certification, over the past few years. Over the past nine years Andrea Chegut of Maastricht University found that the market premium for BRE-certified buildings in the United Kingdom was 8% for sales, and 16% to 20% for rentals. Premiums for an "Excellent" rating were even higher.[3] Dirk Brounen and Nils Kok of RDM Erasmus University and Maastricht University, respectively, studied 33,000 house sales in the Netherlands and found that 9% to 25% of residential transactions comply with the requirement for an energy rating. Out of these sales, an "A" label received a 12% price premium.[4] For 8,767 flats and 532 offices in Austria, Sven Bienert of KPMG Financial Advisory Services found price premiums for high energy ratings in some regions, but no difference in other regions. In slightly more than a third of locations, typical rent premiums were in the range of 3% to 10%.[5]

The market for energy efficiency in existing buildings is beginning to move from the introductory phase to the growth phase. Over the next 5 years, some of the key factors for continued growth will be communications, coordination, and quality control.[6] For instance, some environmental performance certificate (EPC) programs have suffered from uptake delays because of insufficient quality control and miscommunications. As another example, the positive impact of energy efficiency on property values is just beginning to be understood and publicized, even among green building professionals. Energy agencies and certification organizations such as BRE, HQE, DGNB, national Green Building Councils and the Passive House Institute provide essential communications, coordination, and quality control. Therefore, it is advantageous for energy-related businesses to work closely with these organizations, as well as to target local regions where such organizations are particularly active.

1.2 Report Focus

This Pike Research report focuses on the largest members of the European Union, with mention of some of the other members, plus neighboring countries Russia, Switzerland, and Norway. The ESCO markets in Denmark and Sweden are small but growing very quickly, while the markets in Italy and Spain are somewhat larger and also growing quickly. In absolute terms, Pike Research expects the largest market growth to be in France, followed by Germany, as these large existing markets continue to expand.

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[3] *The Value of Green Buildings: New Evidence from the United Kingdom*, Andrea Chegut, Maastricht University, International ERES Meeting, June 23, 2010.
[4] *On the Economics of EU Energy Labels in the Housing Market*, Dirk Brounen and Nils Kok, RICS, June 2010.
[5] *Greening Property Valuation in Europe* (IMMOVALUE), Sven Bienert, KPMG Financial Advisory Services, 2007.
[6] *Market Development for Advanced Housing Renovation*, Edward Prendergast et al, IEA Task 37, April 2010.

While debate continues in the United States about the political importance of carbon emissions or energy independence, multiple European directives have established carbon emissions reduction as a high political priority. These directives are very important drivers for the energy efficiency industry in Europe. Therefore, this report includes information about the effects of energy efficiency on carbon emissions.

1.3 Report Terminology

This report is predominantly written in American English, with a few instances of British English. For example, building space where people live is generally labeled "residential," or occasionally, "domestic." Privately owned non-domestic building space such as office and retail is generally labeled "commercial," and the combination of this space with publicly owned space is called "tertiary."

In European studies of residential buildings, the word "house" includes detached single units, semi-detached units such as a duplex or fourplex, and terraced units (American townhouses). The word "house" is distinguished from the word "flats," which are single-level units in multi-story buildings. Although it differs from standard American English, Pike Research uses this terminology in this report, to match conventional European usage.

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SCOPE OF STUDY

Pike Research has prepared this report to provide participants at all levels of the market for energy efficiency in buildings in Europe with a practical study of the market. Participants include manufacturers and vendors of hardware and software; providers of design, installation, services, education, and certification; building owners, builders, and advisors; and policy makers and analysts. The report's major objective is to determine the state of the industry and likely future growth of the market. It provides a review of major market segments, demand drivers, market barriers, and opportunities.

The report's purpose is not to provide an exhaustive technical or competitive assessment of the technologies and industries covered, but rather, a strategic examination from an overall tactical business perspective. Pike Research strives to identify and examine new market segments to aid readers in the development of their business models. The forecast period extends through 2016.

SOURCES AND METHODOLOGY

Pike Research's industry analysts utilize a variety of research sources in preparing Research Reports. The key component of Pike Research's analysis is primary research gained from phone and in-person interviews with industry leaders, including executives, engineers, and marketing professionals. Analysts are diligent in ensuring that they speak with representatives from every part of the value chain, including but not limited to technology companies, utilities and other service providers, industry associations, government agencies, and the investment community.

Additional analysis includes secondary research conducted by Pike Research's analysts and the firm's staff of research assistants. Where applicable, all secondary research sources are appropriately cited within this report.

These primary and secondary research sources, combined with the analyst's industry expertise, are synthesized into the qualitative and quantitative analysis presented in Pike Research's reports. Great care is taken in making sure that all analysis is well supported by facts, but where the facts are unknown and assumptions must be made, analysts document their assumptions and are prepared to explain their methodology, both within the body of a report and in direct conversations with clients.

Pike Research is an independent market research firm whose goal is to present an objective, unbiased view of market opportunities within its coverage areas. The firm is not beholden to any special interests and is thus able to offer clear, actionable advice to help clients succeed in the industry, unfettered by technology hype, political agendas, or emotional factors that are inherent in cleantech markets.

NOTES

CAGR refers to compound average annual growth rate, using the formula:

CAGR = (End Year Value ÷ Start Year Value)$^{(1/steps)}$ – 1.

CAGRs presented in the tables are for the entire timeframe in the title. Where data for fewer years are given, the CAGR is for the range presented. Where relevant, CAGRs for shorter timeframes may be given as well.

Figures are based on the best estimates available at the time of calculation. Annual revenues, shipments, and sales are based on end-of-year figures unless otherwise noted. All values are expressed in year 2011 U.S. dollars unless otherwise noted. Percentages may not add up to 100 due to rounding.

Published 1Q 2011

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