



Daikin and Midea were among a strong contingent of multi-national exhibitors at the Climatización & Refrigeración trade fair.

Spain's HVAC Market Improving

By W.S. Comstock

MADRID—Spanish suppliers and engineers attending the Climatización & Refrigeración trade fair here February 28 to March 3 shared an optimistic outlook for 2017 as Spain's labor market has shown steady improvement and manufacturing has risen to its highest level since 2012. Economists see Spanish GDP growing 2.5% in 2017. "We are steadily climbing back," said Maria Valcarce, the exhibition director. Exhibitors for the 2017 show totaled close to 700, with 360 from abroad,

and attendance surpassed 49,900 professionals.

According to the Spanish Air Conditioning Equipment Manufacturers Association (AFEC), market growth for large equipment for the commercial and industrial sectors in 2015 was 22.3% compared with 2014. 2016 performance showed similar gains. Residential sales have also posted gains due to the stronger economy and unusually warm summers in Spain.

"Two tendencies are driving the building market

today," said Paul Gerard O'Donohoe with TAYRA S.L., an engineering services firm in Madrid: "green building design and use of passive technologies such as ground source heat pumps." Like all of the European Union, Spain is charged with the EU's 20-20-20 goals (20% increase in energy efficiency, 20% reduction of CO₂ emissions and 20% renewables by 2020). "The biggest push is coming from the end users who are conscious of life-cycle cost. Their philosophy is that green means

building efficiency. If you have 'greenness' you have efficiency. The bigger firms also recognize that 95% of their costs are people and that healthier buildings means a healthier company and happier employees," said O'Donohoe.

One of the companies introducing new products was TROX. "Together with designers and architects we have completely redesigned ceiling, wall, staircase, and floor diffusers and grilles that meet demanding ventilation and acoustic requirements while providing improved maintenance and aesthetic design elements," said Javier Aramburu, TROX's technical director in Spain. A new plenum box includes an airflow measurement system and has an easy to install and remove cover plate that helps building commissioners check if the airflow is correct. One new diffuser, invisible, which can be installed so that the diffusers are hidden behind standard micro perforated ceiling plates, lets architects design spaces meeting aesthetic considerations while employing new air movement technologies.



Lennox announced its rebranding as LENNOX EMEA for all refrigeration and air-conditioning activity in Europe, the Middle East, and Africa. Oscar Noguera of KEYTER Technologies displays the Keyter Versia Key RH 1090, a compact reversible heat pump for treatment of primary air and for installation in the false ceiling of commercial buildings.

In a new diffuser for VAV systems, TROX replaced the damper inside the plenum box with a piston to improve adjustment of air within the box and acoustic performance.

As at other European exhibitions, TROX promoted X-CUBE, an air-handling unit with unlimited configuration options. “We want to go beyond air control to take on total air environmental quality,” Aramburu explained. The X-CUBE is a complete air-handling solution, everything from a single source: air-handling units and components.

The X-CUBE is not just a control system for air flow but also control of temperature and humidity. “Nowadays everyone wants systems solutions, not products and components.” The X-CUBE provides filtering, heating and cooling, and heat recovery as well as humidification and dehumidification for volume flow rates of up to 86 000 m³/h (50,618 cfm).

The Spain-based manufacturer INDITER is seeing demand for its products. The company produces heat exchangers for air conditioning, commercial and industrial refrigeration, and automotive applications. “We brought equipment to the exhibition to show a strong focus on solutions with adiabatic conditions,” said Francisco Munoz Carreno, the company’s export manager. “In very warm conditions such as continental weather areas in the summer time, an example of this could be the south of Spain where traditional dry coolers are not able to achieve the necessary duty power when external

temperatures exceed 40 to 45°C (104 to 139°F). Our products can take advantage of moisture by using various adiabatic devices. We can offer several alternatives depending on local regulations and the availability of water.” The company says its dry coolers with adiabatic panels are cost competitive with cooling towers and avoid risks of *legionella*. “Another advantage is the units are compact, allowing designers and installers to better adjust to the layout of the application,” said Munoz.

Prominently displayed on a corner of the stand was an INDITER dry cooler adjusted with EcoMESH, a mesh and water spray system that can improve performance while reducing energy consumption by up to 44%. The water spray provides an adiabatic cooling effect on the incoming airstream. Before the fan draws the ambient air through the finned coil, the air is pre-cooled adiabatically when traversing a humidification pad, evaporating water in the air and increasing cooling capacity. The life-span of the equipment is increased because the unit’s coils are not wetted. Because the water is sprayed onto the adiabatic panels, EcoMESH provides adiabatic conditions with low pressure drop.

For Daikin, offering an extensive range, starting with split units for the residential market going up to the largest centrifugal chiller, is its strength in the Spanish market. “Price is always a consideration in Spain, but at Daikin we

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promote energy efficiency and value, good service and after-sales,” said Luis Mena, Daikin’s Director General in Spain. “We work with our customers to defend our price premium.” Mena, who also heads the Spanish manufacturers’ association, said hot summers and pent up demand from Spain’s economic crisis, are driving their sales, mainly on the residential side, but commercial sales also show positive growth. “The past two years show green growth even if not a return to the double-digit growth of before the crisis.”

At the front of the Daikin stand, the company exhibited its R-32 Multi Split Inverter system with hybrid domestic hot water (DHW) production. The unit has a hybrid heat pump and gas boiler module for hot water production, providing a solution for hot water production for both domestic uses and heating through low temperature radiators or underfloor heating and cooling with wall units.

Depending on the efficiency of the heat pump and cost of energy, the system can switch from electricity to gas. When the temperatures are extremely low, the heat pump runs on gas. For cooling, the unit uses R-32 refrigerant. “R-32 is the clear future of refrigerants in Spain,” said Mena. “Like R-410A, R-32 has an ozone depletion potential of zero, but it has only one third the GWP of R-410A.”

Lennox continued its emphasis on the European market by announcing a rebranding as LENNOX EMEA, encompassing all refrigeration and air-conditioning activity in Europe, the Middle East, and Africa carried out by the LENNOX International group. The company will use the product brands HK Refrigeration and Friga-Bohn for refrigeration and Lennox for HVAC. “The range of applications covered by our products and solutions is relatively broad in sectors associated with comfort, certain industrial processes, food preservation and more generally, the cold chain,” said Ricardo Freitas, newly appointed VP and General Manager of Lennox EMEA. In HVAC, LENNOX offers reversible rooftop air-conditioning and air-handling systems, a range of chillers, heat pumps and an array of terminals associated with water systems. The group’s product offerings are oriented toward the use of low GWP fluids. “Listening to the customer and providing them with solutions is our focus,” said Freitas. “We need to help them comply with technical regulations as the landscape constantly changes and many options are available. Sales is a process not an end.” The company showed its eCO2Boost transcritical system, what the company calls a supermarket and hypermarkets all-in-one solution with a booster rack that enables all low and chill temperature requirements to be covered with CO₂. Freitas said

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the company is especially strong in its CO₂ offerings. The booster configuration allows the system to be optimized by stepping compression, which improves operating conditions of the compressors. eCO2Boost is designed based on a single frame that includes all low and chill temperature compression assemblies, the liquid receiver and all refrigerating and control components that enable the system to operate (high-pressure control, heat exchanger control, oil management, etc.). eCO2Boost can also accommodate heat exchangers to recover heat for sanitary hot water and heating. In slightly warmer climates, the efficiency of the eCO2Boost transcritical system can be optimized using parallel compression or external subcooler solutions.

KEYTER Technologies is a Spanish group of industrial companies that delivers HVAC engineering and product solutions throughout Europe. The company displayed the Keyter Versia Key RH 1090, a compact reversible heat pump for the treatment of primary air and for installation in the false ceiling of commercial buildings. Designed with low flammability R-452B refrigerant and low 676 GWP, the units have a single circuit equipped with a DSH compressor from Maneurop, featuring intermediate discharge valves and a Variable Refrigerant Capacity circuit. The supply and exhaust ventilation includes variable speed plug fans.

Another product range the company displayed was the Keyter Langia Key ZB HFO line of reversible chillers and heat pumps. These are water-water compact units for comfort applications for use as a water heat pump. It is designed for use with the hydrofluoroolefin (HFO) refrigerant R-1234ze. "We create these for the Northern European market where the higher cost of the R-1234ze refrigerant is not a deterrent," said Oscar Noguera. "They are designed for places where

water is readily accessible and are especially suited for geothermal and radiant floor applications."

INTARCON, Keyter's sister company for the refrigeration market, displayed its Ecomarket range of compact refrigeration plants using a subcritical CO₂ cycle with double-suction pressure for cooling at positive and negative temperatures. These plants are designed to meet refrigeration needs in supermarkets, as well as industrial and catering establishments, and are specially adapted to hot climates such as in Spain and Northern Africa. They also allow for the centralization of the refrigeration output of a series of exhibitor services, such as glass cabinets, refrigerated cabinets, wall-mounted and island freezers, cold stores, and workroom evaporators and handling rooms.

EUROFRED displayed its Nocria X air-conditioner units. They feature a triple ventilation system, front and side, producing a silent airflow, allowing any room to be conditioned while avoiding temperature contrasts.

ASHRAE's Spain Chapter displayed ASHRAE publications and promoted ASHRAE membership. "There is a real thirst for technical information by Spanish engineers as the country emerges from the financial crisis," said Andrés Sepúlveda, the chapter president. "The multinationals all refer to the ASHRAE standards, which creates demand as they increase their activities in Spain and as Spanish companies expand into the European and North African markets."

Climatizacion takes place alongside GENERA, Spain's trade fair for innovation in renewable energies and energy efficiency for buildings. The event presented products and services from 76 companies and was visited by 10,961 professionals from 54 countries. The biennial Climatizacion next occurs in Madrid Feb. 26 to March 1, 2019. ■

Smart Design at Chillventa

By W.S. Comstock

NUREMBERG, Germany—Regulations and refrigerants were hot topics for the 30,000 attendees of Chillventa, a biennial trade fair.

Attendees at the fair held in October were anticipating the agreement reached in Kigali, Rwanda, for 197 parties to the Montreal Protocol to gradually limit their production and use of HFCs. In February 2017, the EU adopted a proposal to ratify the Kigali amendment to the Montreal Protocol regarding a global phase-down of hydrofluorocarbons (HFCs)—the majority of which are used as

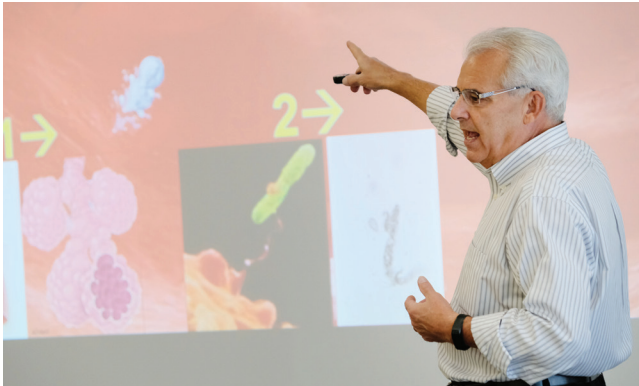
refrigerants in refrigeration and air-conditioning systems. Ratification by the EU alone could trigger the entry into force.

Under the amendment, first reductions in developed countries are due in 2019. Most developing countries will freeze the level of HFC quantities in 2024, and a few countries will follow in 2028.

The EU has already taken action to reduce HFCs under the F-gas regulations, and is encouraging other countries to take early action as well. According to the new F-gas regulation,

by 2030 EU member states must gradually reduce their CO₂ equivalent of emissions F-gases by nearly 80%. All energy-related products (ErP) are subject to the energy-efficiency requirements of the ErP Directive, which also stipulates thresholds for water chillers.

Many exhibiting companies responded to these developments as well as taking their cues from the EU's Ecodesign Directive, which seeks to reduce greenhouse gas emissions and other adverse environmental impacts throughout the life cycle of products, with an emphasis on design and development.



W.E. (Bill) Pearson II, Member ASHRAE, (left) presented the ASHRAE Learning Institute course on Standard 188-2015, *Legionellosis: Risk Management for Building Water Systems*. At right, Swegon displayed its GOLD series of air-handling units with heat exchangers during Chillventa.

In addition to the exhibits, experts led more than 120 presentations and discussed the latest in product developments and innovative solutions for energy efficiency and savings.

"The international refrigeration sector discussed topics such as climate targets and climate policy, trends in household appliance refrigeration, the organic Rankine cycle, EPEE gapometer, market surveillance and high-temperature heat pumps, to name just a few," said Rainer Jakobs, Ph.D, Member ASHRAE, coordinator of the Chillventa supporting program.

One company that highlighted changes in refrigerants was Danfoss. It emphasized the importance of continuous transformation in the cooling industry, highlighting aspects of digitalization, as well as development of products and skills in the industry.

Danfoss introduced a new condensing unit, Optyma™ Plus Inverter with speed control, authorized for use in refrigeration applications with moderate temperatures and for the lower GWP environmentally friendly refrigerant R-407A/F. The Optyma™ Plus Inverter can be used to lower operating costs by 20%-30% compared to alternative technologies. Danfoss' visitors also took in calculation and selection software Coolselector® 2. This software is a complete selection and calculation tool for experts in the cooling industry.

Emerson presented new products and integrated solutions at Chillventa with the theme "Better Serve a Connected World." Emerson focused its efforts on addressing critical customer challenges like: big data/ analytics, global reach, omni channel capabilities, research & technology and functional support, with issues such as energy efficiency, population growth and lower emissions intersecting markets.

Emerson strengthened its leadership in residential heat pumps by providing solutions for new construction, and retrofit. Emerson also promoted smart electronic solutions to help chiller manufacturers meet time-to-market for eco-design with additional benefits such as enhanced system performance and operation, reduced system downtime, and improved field services and customization opportunities.

In the commercial refrigeration segment, Emerson presented the Cox EazyCool Unit, the Smart scroll for food service, the scroll with CoreSense and digital modulation and injection control, and the iProAcademy web-based developers' platform. In the residential heating segment, Emerson presented integrated solutions for unitary variable speed applications, the XHV-dedicated heating compressor for mid-tier heat pumps, and control solutions for combined heat and

power and hybrid heat pumps. In the Commercial AC and heating market, Emerson presented smart solutions for ease of variable speed system integration into chillers and scroll compressors optimized for part-load efficiency in chillers.

Wieland Thermal Solution showcased its newly developed WRKS safety heat exchanger, a cost-effective air/water hot-water heat pump that is low in maintenance. The heat exchanger, installed directly in the hot-water tank, saves energy through direct condensation. The WRKS operates with minimal temperature differences due to direct contact with the water in the tank, preventing heat loss. The heat pump, therefore, achieves peak COP values measured according to EN 16147. Wieland also showed a wide range of optimized designs of enhanced surface tubes for shell-and-tube heat exchangers.

Systemair GmbH exhibited its new SyScroll Air EVO air-cooled water heat pumps, which have been designed and optimized to operate with R-410A refrigerant and inverter-driven scroll compressors. With inverter technology, it is possible to cover with only two sizes a very wide capacity range both in cooling (from 20 to 35 kW) and heating (from 20 to 34 kW) operation. All units are equipped with a single inverter driven three-phase scroll compressor. Efficient Energy GmbH offered

its answer to the EU F-Gas Directive—water as a refrigerant. The company's eChiller series works by direct evaporation of water in a vacuum-tight system that is hydraulically decoupled from the cooler and refrigeration point via braze plate heat exchangers. The eChiller comprises two identical modules that use the natural refrigerant water (R-718). It works through a three-step process: water enters the evaporator; a small portion evaporates and drains energy from the remaining water, causing it to cool. The water vapor is compressed by the turbo compressor, which operates at up to 90,000 rpm, causing the vapor pressure and temperature to rise. The compressed water vapor condenses in the condenser, heating the cooling water.

MagFree—a project conducted by Cooltech Applications, a French company founded in 2003 and the first in the world to industrialize a magnetic refrigeration system (MRS)—aims to replace F-Gas-based compressors for the refrigeration and air conditioning markets. In 2014, Cooltech Applications was given a grant by the European Union through the CIP Eco-Innovation program to conduct the MagFreeG Project, a 30-month project aiming to commercialize and deploy magnetic cooling throughout Europe. MRS is the first industrialized gas-free magnetic cooling

system offering a green alternative to existing gas-based compressors for commercial refrigeration equipment like display cases, beverage coolers or refrigerated cabinets.

The European Partnership for Energy and the Environment presented its “Gapometer,” a tool showing three steps to achieving HFC phasedown in Europe: Step one: Employ new equipment with lower GWP alternatives (move away from R-404A and wider use of flammable refrigerants) and smart design that allows less refrigerant charge and low leakage; Step Two: Retrofit existing equipment with lower GWP alternatives (early retrofit of R-404A) and employ leak prevention; Step Three: address reclaimed refrigerant recovered during retrofit of existing equipment.

Chemours debuted its latest innovation in refrigerant technology—the Opteon™ XL series—during Chillventa. The product offers the industry a refrigerant with “very low GWP to help further decrease CO₂-equivalents to their lowest level in new equipment designs.” Classified as mildly flammable (ASHRAE/ISO Class 2l), Chemours offers XL products that “allow much higher charge sizes than other more flammable refrigerants and can be safely used when following applicable codes and standards. Based on hydrofluoroolefin (HFO) technology, they offer similar properties and increased performance compared to current HFCs they are designed to replace.”

LU-VE focused on smart design with Emeritus, a new range of condensers and dry coolers created through collaboration with Milan Polytechnic University. Emeritus offers almost four times the capacity compared to dry operation; more than 45% capacity compared to current D&S system reduction of DTL operation; up to -6dB(A) reduction of sound level at equal capacity; reduced water consumption annually; energy savings through a control system optimizing machine function based on operating conditions; up to 50% reduced footprint and a reduced quantity of liquid refrigerant.

Lennox presented its eComfort series air-cooled chiller and heat pump, offering reduced energy bills and high efficiencies year-round that exceed European energy-efficiency requirements for 2021. The eComfort series also offers operation and maintenance facilities through connectivity of the hydraulic system, a compact and low profile with full integrated hydraulic module, and efficient acoustic comfort with low and adjustable sound levels. The company also offered LennoxCloud, the remote supervision system of Lennox units. The system can check live data trends, store data analysis and troubleshoot customer units.

The mood at the fair was upbeat. Exhibitors were pleased because the event grew in terms of exhibit space by 13% and attendance was up 5% compared to the previous fair in 2014. The next Chillventa takes place in Nuremberg, Oct. 2018. ■

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