

ENERGY EFFICIENCY FOR A BETTER ENVIRONMENT

Although there is now an emphasis on developing smarter and more efficient habits and lifestyles, there remains much to do on several fronts, particularly in relation to industry.

The planet is burning up with fever due to increased emissions of greenhouse gases (GHG), particularly the extremely harmful carbon dioxide (CO₂). Most of these gases come from factories and means of transport, the latter producing 40% of total world emissions. There are now more than a billion vehicles on the world's highways, a figure expected to rise to 1.8 billion in 2025, in addition to boats and aircraft.

The supply of energy and its use are fundamentally important to society because they are key to human progress and development. For this reason, it is imperative to continually improve energy efficiency—to decrease the consumption of energy by machines and devices—since that is the most cost-effective option and one that, in unison with other measures, will prove the most convenient in controlling and



**THERE IS
INCREASED
WORLDWIDE
CONSCIOUSNESS
OF THE IMPACT
OF CONSUMER
BEHAVIOR IN
CHOOSING
RENEWABLE
ENERGY SYSTEMS
AND ACQUIRING
ENERGY-EFFICIENT
PRODUCTS**

stabilising GHG, thereby promoting environmental sustainability and improving energy security.

According to Professor Clara Inés Pardo Martínez at the School of Management and Business of the Universidad del Rosario, energy efficiency also offers benefits to industry such as the reduction of operating costs, productivity growth, enhanced quality, better worker safety, improved utilization of capacity, reduced waste, and prevention of pollution.

Expected improvements in energy efficiency are significant in all countries. In fact, the United Nations Industrial Development Organization (UNIDO) estimates potential energy savings of 23-26% in the manufacturing sector worldwide.

And fortunately, policies to advance the use of renewable energy and technologies for energy efficiency, so far used only sporadically, are just starting to gain traction in government circles.

Germany, for example, is in the process of transforming its energy sector through a program known as Energiewende (energy transition). The idea is to make substantial long-term investments to implement innovative practices in both renewable energy and energy efficiency in all sectors of the economy.

In addition, there is increased worldwide consciousness of the impact of consumer behavior in choosing renewable energy systems and acquiring energy-efficient products. The public now recognizes that consumer behavior is critical to the success of policy planning and implementation, and this is be-

ing emphasised in order to promote smarter and more efficient habits and lifestyles.

More needs to be done in many areas, however, especially in relation to industry. Several studies conducted by Professor Pardo have led to this conclusion. She analyzed tendencies toward energy efficiency both in energy-intensive and energy-non-intensive sectors in Germany and Colombia.

Energy efficiency is measured using indicators that evaluate the energy needed in physical or monetary units (megajoule/euro, for example) to carry out an activity. In her research, Pardo used the analytic method known as data envelopment analysis (DEA) to evaluate energy efficiency indicators within a theoretical production framework in which energy and non-energy (labor or capital) inputs are used to produce goods, recognizing the role of input substitution in achieving energy efficiency.

The same method has been used to calculate the effects of heating technologies on the energy efficiency of industries that produce GHG; to establish goals for reducing energy consumption in the Asia-Pacific area; to analyze energy efficiency in Swedish service industries; and to measure progress toward reaching energy efficiency goals in the economy as a whole.

The results of the study on non-energy-intensive sectors in the two countries show considerable variation in energy efficiency

Factories and transport means produce 40% of the world total of greenhouse gas emissions.



→ The supply of energy and its use are fundamentally important to society because they are key to human progress and development.



“Energy supply is an important variable within the structure of production and a key element in technological development,” says Clara Inés Pardo, professor at the School of Management.

during the sampling period (1998-2005); this variation was primarily a response to labor productivity and capital allocation.

Energy efficiency declined in several of the sectors, indicating that energy savings in non-energy intensive sectors are not a priority in terms of improving production processes, because energy is a less significant cost factor compared to other production inputs.

The research also showed that in several of the sectors, both in Germany and Colombia, energy efficiency is positively associated with labor productivity, business size, and the use of electricity.

Meanwhile, the study of energy efficiency performance comparing intensive sectors in Germany and Colombia over the same period, showed that the great majority of them improved their energy efficiency rates. Professor Pardo comments that “this demonstrates that energy input is an important variable in the structure of production and a key element of technological development.”

A subsequent analysis showed that several factors, including labor productivity, the extent of electricity use, and the size of businesses can also be factors marking the differences in energy efficiency between Colombian and German energy-intensive sectors.

These results illustrate the need to apply different energy policies and incentives for consumers—particularly small and medium-sized businesses in the case of developing countries like Colombia—to use energy efficient machinery and equipment to boost sus-



tainable development, increase the application of better practices, technologies, and innovations, and incentivize investments related to energy conservation in manufacturing industries.

“It is also imperative to carry out further research to identify and understand incentives and obstacles to im-

**ENERGY
EFFICIENCY
IS POSITIVELY
ASSOCIATED
WITH LABOR
PRODUCTIVITY,
THE SIZE OF
BUSINESSES,
AND THE USE OF
ELECTRICITY**

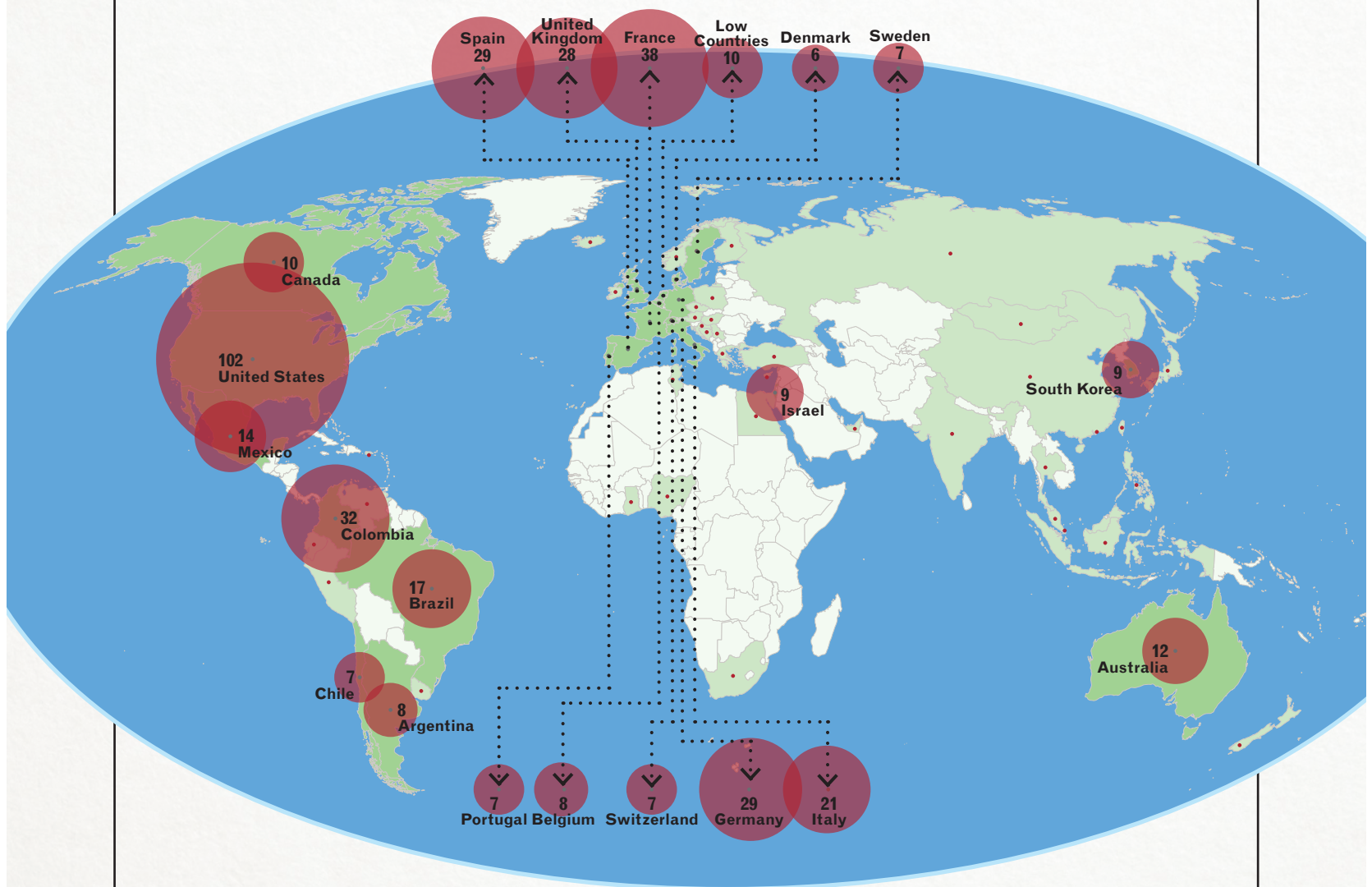
proving energy efficiency in manufacturing industries,” says Professor Pardo.

Einstein used to say that there is a driving force more powerful than steam, electricity or atomic energy: will power. Never a truer word spoken. To stop itself ailing, the planet requires the will of governments to lend a hand and motivate their productive apparatuses to use more efficient energy. ■

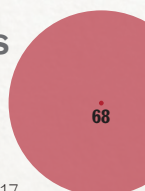
Research Networks

Through its participation in research networks around the world, the **Universidad del Rosario** is part of the world knowledge community. It publishes information with knowledge-producing institutions in 59 countries and collaborates with 32 of the most prestigious universities in Colombia. This joint work by its academic units with other institutions has enabled it to produce 363 scientific products collaborating internationally, and 195 collaborating in Colombia.

NUMBER OF WORLDWIDE NETWORKS WITH WHICH THE UR PARTICIPATES



MORE COUNTRIES



Years: 2011-2015
Source: SciVal, 2017

5	China	2	Norway	1	Egypt	1	New Zealand
5	Japan	2	Poland	1	United Arab Emirates	1	Nigeria
4	South Africa	2	Puerto Rico	1	Philippines	1	Czech Republic
4	Finland	2	Taiwan	1	Ghana	1	Russia
4	Peru	2	Thailand	1	Hong Kong	1	Serbia
3	Greece	1	Austria	1	Hungary	1	Singapore
3	India	1	Bosnia and Herzegovina	1	Iceland	1	Slovakia
3	Turkey	1	Croatia	1	Indonesia	1	Tunisia
3	Venezuela	1	Cyprus	1	Malaysia	1	Uruguay
2	Ireland	1	Ecuador	1	Mongolia		