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The Conscious Citizen

Virtuous Behaviors, Digital Technologies
and Renewable Sources as a Solution to the Energy Crisis

Deloitte Observatory on Sustainability and Innovation Trends

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Today, the planet is facing its first global energy crisis,¹ which is rooted in the dynamics of the post-pandemic recovery, in the escalation of geopolitical tensions in the Old Continent, in the climate change effects that could limit the use of renewable sources,^a and, last but not least, in an international energy strategy still mainly tied to fossil fuels.

This situation is very sensitive for a country like Italy, which is still notably dependent on third parties for purchasing energy commodities and features a not very sustainable real-estate assets. The crisis is driving a substantial rise in electricity rates, inevitably impacting citizens' daily lives.

To better understand the aforementioned dynamics and the "change agent" role played by individuals, Deloitte has launched an Observatory through which it regularly monitors citizens' sustainable behaviors.

The findings of the Deloitte Observatory indicate, first and foremost, that citizens demand greater support from institutions in mitigating rising energy prices. Such intervention should occur both through the development of suitable measures to regulate energy prices and the formulation of a clear energy strategy capable of ensuring greater energy supply as well as decarbonizing the whole energy system.

Secondly, the Observatory maps citizens' transition toward more conscious and ethical behaviors and lifestyles, including power consumption patterns. Indeed, it appears that people seek to derive benefits from adopting virtuous behaviors. As a result, they are becoming increasingly interested in innovative digital solutions that can optimize their homes' consumption and energy efficiency and show increasing openness to renewable sources and to co-generation approaches.

^a Climate variability can result in significant fluctuations in the share of electricity from renewables fed into the grid. Think, for example, of the impact of drought on the ability to generate hydroelectric power.



New Virtuous Habits to Counter High Energy Costs

Citizens are experiencing first-hand the consequences of an unforeseen energy crisis that will likely continue in the coming months, impacting everyday life considerably.

The rise in electricity prices can be traced to several concurrent circumstances, both endogenous and exogenous, which have led to unexpected imbalances in demand and supply patterns in the electricity and energy commodity markets, such as the natural gas one.

The current energy crisis goes back to the fall of 2021 - when the EU recorded lower Russian gas supplies and below-average storage levels^b - and has been exacerbated by escalating geopolitical tensions between Russia and Ukraine.² In the case of Italy, the energy mix also played a significant role: the share of fossil fuels, although reduced over time since 1990, is still substantial and accounts for 80% of the total - with natural gas alone making up 44%.³

Rising energy prices are inevitably affecting people's daily lives. Indeed, over the past year, high utility bills have become a primary concern for citizens and have increased energy poverty, especially in the weaker segments of the population.

The expenditure that households allocate to purchasing electricity and heating grew progressively during the first decade of the 2000s, mainly due to increased spending on electricity.⁴ This trend intensified further in the following decade. Today, because of high energy prices, 8.1% (vs 6.9% in the EU) of Italian households are unable to heat their homes adequately,⁵ and 6.5% (vs 6.4% in the EU) are behind in paying their energy bills.⁶

^b 77% in October 2021 versus 91% in the 2026-20 five-year period ([Reuters](#), Dec. 14, 2021).

Considering the price conditions offered to customers in the price-regulated energy market monitored by the Italian Regulatory Authority for Energy, Networks and Environment (ARERA),^c this is what citizens pay for:

- Electricity: 0.5311 €/KWh, including 0.4349 €/KWh for energy charge.^d Compared to the last quarter of 2021, the end price has increased by 79% and the energy cost alone almost doubled (+96%).⁷
- Natural gas: 1.51 €/KWh, of which 1.35 €/KW is the amount paid for the commodity.^e Again, a comparison with 2021 shows significant increases of 56% and 130%, respectively.⁸

The increasing impact of energy costs on household budgets forces citizens to change their lifestyles and underlying consumption patterns. According to the Deloitte Observatory, nearly 8 out of 10 people have already adopted virtuous behaviors to curb energy consumption. Yet, more than 6 out of 10 complain that they do not perceive tangible benefits from these actions due to the constant increase in energy prices.

The economic aspect is relevant and inevitably impacts the main variables people consider important and decisive in choosing their electricity provider. Indeed, the choice seems based on conventional criteria: convenience in both absolute (price competitiveness, 52%) and relative terms (incentives and discounts, 35%) and service transparency (clear bills, 47%) are the main drivers of choice, especially for Gen X individuals and Baby Boomers.^f

Also relevant, but secondarily, are ratings on the quality and range of supply (e.g., availability of renewables and reliability of the provider) and customer service.

When considering the share of the population interested in evaluating a new provider (75%), the main driver of interest is the possibility of gaining access to renewable power, as indicated by more than 1 in 2 Italians. In addition, Italians also look favorably at other independent power supply companies (20%) and "tech giants" (19%); this attitude is something new, observed especially among the younger generation.

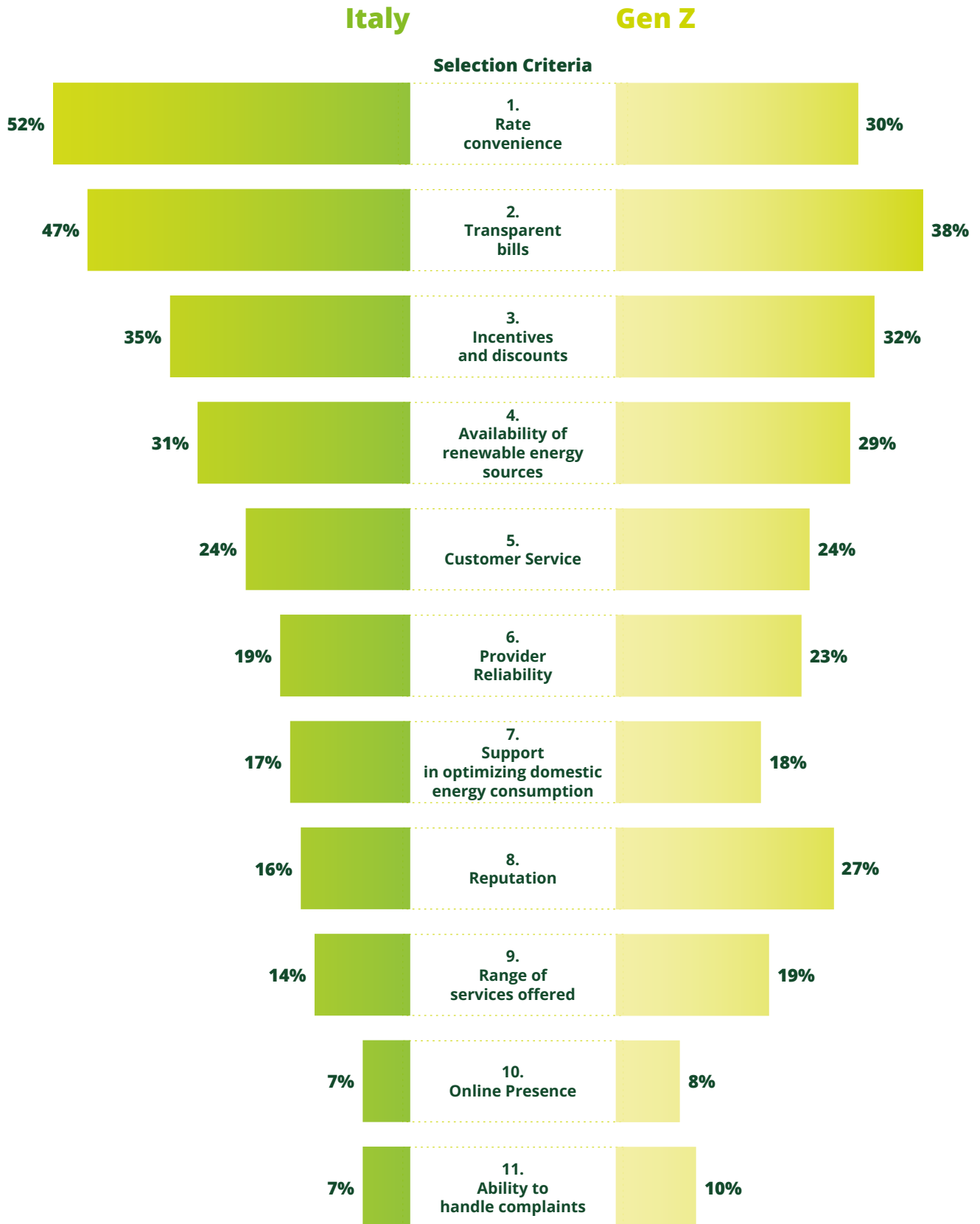
^cARERA is an independent body established under Law No. 481 of 1995. It is a collegial body composed of a chairperson and four members who serve for seven years and cannot be re-elected. The Authority carries out regulatory and monitoring activities in electricity supply, natural gas distribution, water services and the waste cycle. Within this scope, it has jurisdiction over: network access, adjustment of energy rates charged within the regulated market, energy market performance and functioning, and consumer protection.

^dPower supply price for a household with a 3-kW meter and an annual consumption of 2,700 kWh. Please note that as of the last quarter of 2021, the system charge has been cancelled for electricity utilities (Official Journal, [Legislative Decree No. 130 of 27 September 2021](#)). This measure was extended throughout 2022 and will also be in effect in Q1 2023 (Official Journal, ["Legislative Decree No. 197 of 29 December 2022"](#)).

^eSupply price for a household with an annual consumption of 1,400 m³.

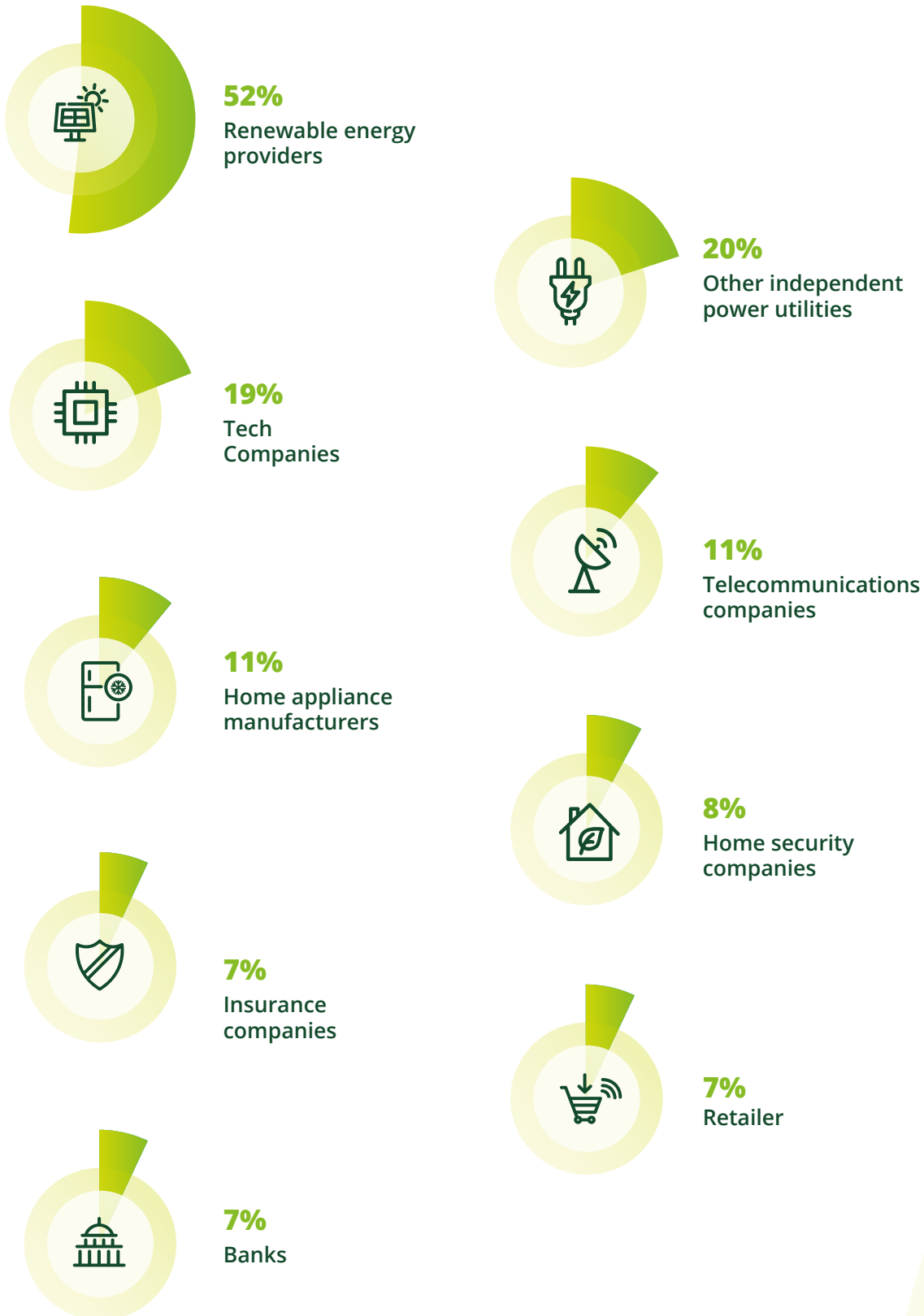
^fGeneration Z (Gen Z) means those born between 1996 and 2009. Millennials include those born between 1981 and 1995. Generation X (Gen X) comprises individuals born between 1966 and 1980. Finally, Baby Boomers are those born between 1946 and 1965.

Figure 1 | Main criteria for choosing an electricity provider



Q.: What are the criteria you follow when choosing your electricity provider?
 Deloitte, "The Conscious Citizen" Observatory, 2023

Figure 2 | Openness to new electricity providers



Q.: What are the criteria you follow when choosing your electricity provider?
Deloitte, "The Conscious Citizen" Observatory, 2023



The Central Role of Institutions

Given the current situation, people agree that active and firm interventions are needed from national and supranational institutions, each for their area of responsibility, to innovate the existing approach to managing the current crisis.

Nearly 8 in 10 respondents, who are increasingly aware of the volatility and impact of energy commodity prices on their disposable income, voice the need for intervention by supranational institutions, in particular the EU, through the introduction of some forms of EU regulation of electricity prices and through changes in the electricity market management models.

In this regard, the Presidency of the EU announced that an agreement had been reached on measures to mitigate current electricity prices,⁹ specifically:

- A 10% cut in electricity consumption, with 5% during peak hours, between December 2022 and March 2023, leaving Member States free to choose the most appropriate ways to achieve this goal.
- A temporary cap on the revenues of inframarginal electricity producers (180 €/MWh), which generate electricity from less expensive sources, including renewables.
- A temporary levy (with a rate of at least 33%) on companies in the oil and gas industry for extra-profits earned in 2022.

On the other hand, almost 8 out of 10 citizens demand from national institutions the definition of a clear energy strategy that can, on the one hand, increase our country's competitiveness and improve the security of energy supply (77%) and, on the other hand, ensure a gradual decarbonization of the national energy system through the transition to an energy mix where renewables play a primary role (79%).

Also critical to people is the introduction of new measures and support to keep electricity and natural gas costs as low as possible. While the special levy on extra-profits earned by energy companies is considered a fair move by nearly 6 out of 10 citizens, only 28% of respondents believe that the current measures are sufficient to counter the inflationary pressures associated with electricity prices.



Innovation and Digital Technologies to Drive More Energy-Conscious Behaviors

In the context described, the only alternative available to citizens who want to curb high utility bills and limit their impact on the environment is to reconsider their lifestyles and consumption habits from a more sustainable perspective and increasingly make use of innovative and digital solutions capable of ensuring complete control over energy consumption and optimizing inefficiencies.

The main areas of action, as identified by the Deloitte Observatory, can be classified into three macro-categories depending on the depth of the intervention and the associated investment:

- Simple actions involving no financial outlay
- Initiatives that can be implemented with little investment
- Structural interventions

The evidence collected by the Deloitte survey suggests that the majority of energy optimization initiatives belong to the first category and include, for example, turning on lights only when strictly necessary (75%), limiting hot water usage (54%), reducing the number of appliances on standby (48%) and choosing the best energy rate available (28%) - which is consistent with what also emerged concerning the criteria for choosing one's energy provider.

In addition, the Deloitte Observatory points out that these behaviors are complemented by initiatives that are less widespread but have higher technological content and require little financial investment, such as installing low-energy light bulbs (e.g., LED or fluorescent bulbs) (67%), switching to new high-energy class appliances (36%), and installing adjustable and programmable thermostats (21%) or power consumption meters (18%), which provide real-time data on home electricity consumption. However, although interest in this solution is growing, its adoption among people remains quite low. Indeed, only 7% are holistically approaching the energy management issue, thus suggesting greater interest in interventions in very specific areas that are not yet fully integrated.

Finally, nearly 2 out of 10 citizens - especially in the higher-income population - have undertaken structural improvements on their homes, trying to make them as efficient as possible through evolutionary design and materials that enhance thermal insulation and energy savings. Also decisive in this respect have been government programs in the form of tax breaks, such as the building renovation bonus¹⁰ and the "110% Superbonus".¹¹

Figure 3 | Actions for optimizing home energy consumption



Q.: Which of the following actions have you taken to optimize electricity consumption?
 Deloitte, "The Conscious Citizen" Observatory, 2023

Innovating the Home to Promote Savings and Energy Efficiency

Today, new smart-living concepts not only allow to make residential spaces more comfortable and functional but also help and support people in adopting virtuous behaviors, thus potentially revolutionizing their lives. A "smart space" is designed in such a way as to provide an optimal environment at all times, enabling individuals to have more control over their homes and also making it easier for them to perform specific tasks through automation.

Smart-living solutions are very flexible and versatile. Indeed, they can be deployed in already existing buildings, thus narrowing the technological gap between the original building and the latest sustainable innovations, and even in new, state-of-the-art ones. Moreover, different types of intervention are possible depending on the specific context, the client's needs in terms of expected experience, the renovation plan (if any), and the type of digital solution chosen: from "softer" solutions, which harness the potential of individual objects connected via a gateway and an Internet connection, to more pervasive ones where the focus is on an integrated approach throughout the whole living unit.

The amount required to cover installation and implementation costs depends on multiple variables, such as the type of equipment chosen, the number of systems to be automated, and the size of the dwelling. However, these costs may be partially or entirely offset by financial benefits and other advantages, including energy savings and improved quality of life.

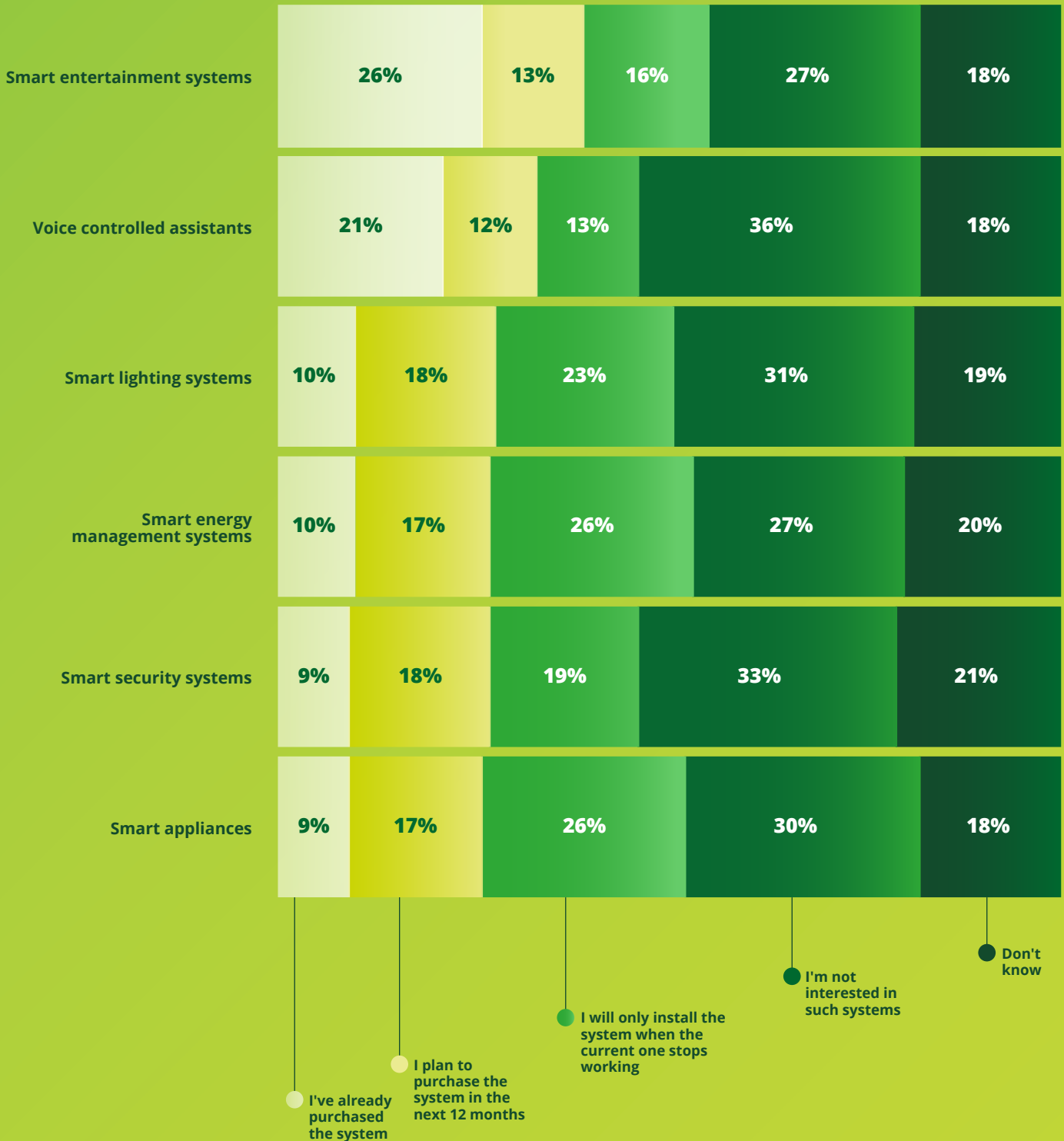
Although today, smart-home solutions sometimes qualify for tax reliefs¹² and are increasingly accessible and affordable thanks to technology advancements, their adoption is still limited but set to grow in the coming years. Leading market estimates also confirm this statement: nowadays, the Italian smart-living market is worth \$972 million, up 7.8% from 2021, and is expected to reach \$1.6 billion in 2026. Although these figures depict a booming market with great potential, Italy still suffers from a considerable gap compared to the major European countries, notably the United Kingdom (\$7.9 billion) and Germany (\$6.9 billion).¹³

According to the Deloitte Observatory, the highest adoption rates are for voice-activated home assistants in their multiple forms (21%) and entertainment systems (26%). This is due to their broad availability on the market, a lower price than other solutions, the shorter average life of the appliance, which favors replacement, and the intended use. Conversely, the other "connected" home automation systems have lower adoption rates, which respondents said do not exceed 10%. However, about 2 in 5 individuals express their intention to purchase them in the next 12 months or to replace the current solution when its life cycle ends.

The citizens' interest is focused primarily on structural solutions, which are then complemented by other more immediate, targeted initiatives already implemented to optimize energy consumption, upgrade living spaces, and promote the adoption of a more thoughtful and conscious lifestyle.

Examples include smart and connected lighting systems – which, in addition to energy-saving light bulbs, manage other home fixtures (e.g., blinds, windows, etc.) automatically and individually -, next-generation and energy-efficient appliances, and other solutions for energy management and energy use optimization.

Figure 4 | Adoption of the main smart-home systems



Q.: Concerning solutions intended to make the home smarter and more sustainable, which of the answers above best describes the level of adoption for each solution?
 Note: Percentage may not total 100% due to rounding
 Deloitte, "The Conscious Citizen" Observatory, 2023

Focus

Cyber Security: What Are the Threats to Smart Living?

Smart-home solutions are our future: well-being, comfort, adaptability, consumption optimization, and security are just some of the main benefits they guarantee for individuals. However, as the number of connected devices grows, a troublesome and long-standing issue emerges, i.e., cyber security.

As a matter of fact, the proliferation of devices and sensors within the home dramatically expands the potential area of attack and the possible discovery of critical

vulnerabilities by hackers, thereby exposing users to a range of privacy and security breaches right in the place that is most important to an individual.

The most common malware-based threats include sensitive data theft, hacking into and/or tampering with Internet traffic and online communications, and fraudulent saturation of available bandwidth. For example, Smart TVs can be an easy target for cyber attacks: hackers could lock the device and ask for a ransom to reactivate

it, take control of the TV, steal login credentials and then resell them, or even install all kinds of viruses and Trojans horse to contaminate the domestic network.

Citizens are aware of this issue and show a high level of maturity about it: more than 8 out of 10 respondents not only feel concerned about the possible impacts on their privacy but also consider this issue as one of the main factors hindering greater diffusion and use of these digital solutions.





The Significance of Renewable in the National Energy Mix

By now, most of the public is aware of environmental issues, which increasingly permeate our society's culture. Today's real challenge is mainly about creating an environment where the growing attention and awareness about climate change and its effects translate into a call for people to stand up and do their part through tangible actions as soon as possible.¹⁴

According to the Deloitte Observatory, to safeguard their future and that of new generations, Italian citizens unanimously (97%) emphasize the importance of having a fair and increasing share of energy generated from renewable sources.

In the public's view, renewables provide environmental and economic benefits. At this particular moment in history, great emphasis is placed on their role in diversifying energy sources and the country's energy mix, encouraging a

reduction in reliance on imported fossil fuels (48%). These are critical aspects in ensuring a faster energy independence for Italy, which would positively impact the nation's economic fabric.

Secondly, the public believes that increased deployment of renewables would ensure the achievement of environmental benefits attributable to decarbonization and emissions reduction (42%), consistently with the vision of the European Commission and the guidelines of the REPowerEU plan.

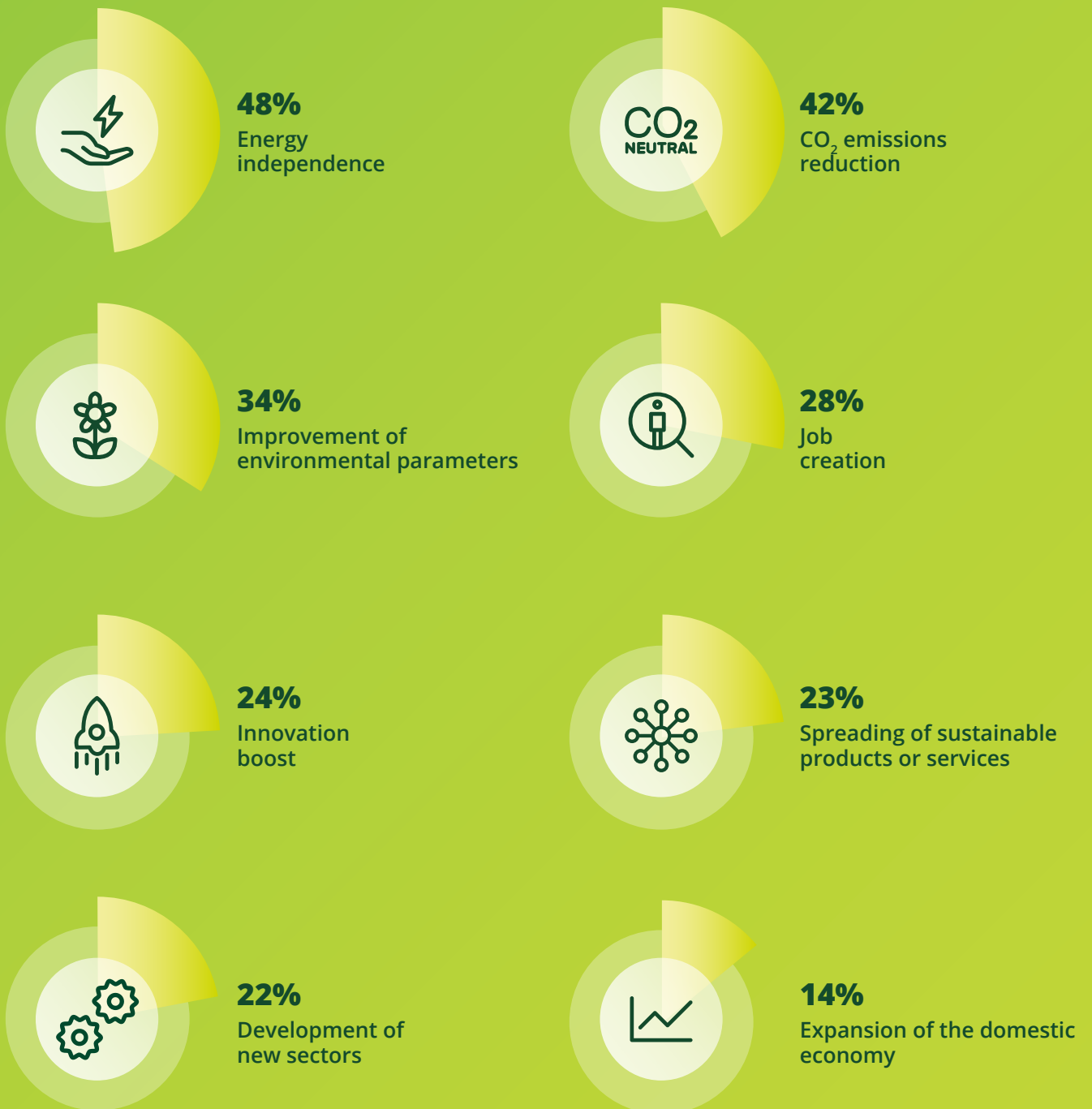
The benefits associated with positive externalities on the dynamics of the domestic economy resulting from increased deployment of renewables are less immediate but still relevant, according to the sample surveyed. These include increased employment (32%), a stimulus to companies' sustainable innovation processes (24%), the spreading of products supporting

sustainable lifestyles (23%), the creation of new markets (e.g., hydrogen) (22%), and increased GDP (14%). In this regard, Deloitte estimates that the transition to a net-zero economy should result in a net positive benefit in 2070, which can be estimated as follows:

- a positive annual GDP difference of 1.8% (730 billion euros) and 3.3% (115 billion euros) for Europe¹⁵ and Italy,¹⁶ respectively;
- employment growth of about 5 million workers in Europe and 470,000 in Italy.

Such evidence in support of renewables is also reinforced by the perception of nearly 6 out of 10 citizens, who see Italy as having an advantage in the green transition over other countries, given the relative scarcity of fossil fuels locally and the abundance of renewables.

Figure 5 | The benefits of renewable energy sources



Q.: What are, in your opinion, the major effects of an increased availability of renewables?
Deloitte, "The Conscious Citizen" Observatory, 2023

Focus

Italy's Energy Situation

In 2022, Italy's electricity demand was 316,827 GWh, down slightly from 2021 (-1.0%). This demand was met via production from Non-Renewable energy sources for 55.3% (up by 4 p.p. from 2021) and via Renewables ones for 31.1%. The remaining share (13.6%), on the other hand, was fulfilled by energy imported from neighboring countries, mainly Switzerland (36%) and France (37%).¹⁷

Non-Renewable energy production is based primarily on thermal power plants, where natural gas accounts for more than 80%, followed by coal (8.3%).¹⁸ However, both are resources Italy imports from abroad: in 2021, for example, 96% of the natural gas used in Italy⁸ was imported from countries such as Russia (40%) and Algeria (31%).¹⁹

On the other hand, electricity generation from Renewable sources stands at 98.4 TWh, down 13% from 2021. Hydropower is the main contributor (28%), followed by photovoltaics (28%), wind (21%), biomass (17%), and finally, geothermal energy (6%).

While the energy generated by wind power in 2022 slightly decreased compared to 2021 (-1.8%), photovoltaics, on the other hand, rose sharply with a double-digit growth (+11.7%).²⁰

- Focusing on photovoltaics - as Italy benefits from 30-40% more solar irradiation than the European average²¹ - 2,482.29 new MW were installed in 2022, reaching a total cumulative power of 25,047.81 MW, up 11% from the previous year. The number of installed systems is 1,221,045, 87% of which have an average capacity of less than 12 KW.²²
- As for wind-generated energy, the installed power in Italy was 11.85 GW in 2022 (+4.7% compared to the previous year) and was generated by 5,985 plants, mainly located in southern Italian regions. To an even greater extent than for photovoltaics, the distribution of installed wind power is highly concentrated. Indeed, 90% of the total is produced by 6% of the power plants with an average capacity above 10 MW.²³

While data show a gradual shift toward clean and renewable energy sources, considerable efforts are required from both the public and private sectors to meet the challenging goals that Italy has set with the new "Plan for Ecological Transition" (PTE).²⁴ For example, the PTE mandates the phasing out of coal in energy generation by 2025 and the increased use of renewable sources, which must meet at least 72% of national energy requirements by 2030 and reach close to 100% in 2050.

⁸Approximately 73 billion cubic meters.



Focus

REPowerEU: the EU's contribution toward energy independence

The new geopolitical order and the energy market in Europe have forced an acceleration of the transition to clean energy and greater energy independence for Europe from unreliable suppliers and fossil fuels.

The EU has endorsed the REPowerEU plan based on the Fit for 55 proposals to manage these challenges.²⁵ The plan sets out a series of short- and medium-term measures (to be completed by 2027) to increase the resilience of the EU energy system. There are four building blocks to the plan:

- Energy savings, with a further 5% reduction in energy consumption by 2030: these should be added to the 9% reduction proposed in the "Fit for 55" package and pursued through improved energy efficiency. Action in this area should ensure an overall decrease in natural gas consumption of 30% by 2026;
- Reduction by two-thirds in the dependence on Russian gas by the end of 2022 and achievement of zero dependence by 2027 through the diversification of imports in terms of geographical markets and physical state (e.g., LNG); increased extraction from countries that are part of the EU; and recourse to alternative solutions, such as hydrogen and biomethane in the medium term;
- A rapid transition to clean energy sources through the promotion of renewables, which are to reach no less than 45% of the overall energy mix by 2030. That will require: installing over 320 GW of solar photovoltaic capacity by 2025 and 600 GW by 2030, streamlining the licensing procedures for wind power plants in "renewable energy zones"; doubling the deployment rates for heat pumps (to 10 million in the next five years) and electrolyzers; and, finally, accelerating the transition processes toward greater use of hydrogen (doubling the number of dedicated clusters, building the necessary infrastructure, and fostering new partnerships);
- Smart investments – providing a further 210 billion euros - in addition to those already budgeted for the "Fit for 55" package. To raise these resources, the European Commission will rely on the remaining portion of the loans from the Recovery and Resilience Facility (approx. 225 billion euros) of the NextGenerationEU program, the auctioning of ETS certificates currently held in the Market Stability Reserve (approx. 25 billion), and other sources of funding from, among others, the Cohesion Policy, the Common Agricultural Policy, the Connecting Europe Facility, the InvestEU program, and the Innovation Fund.



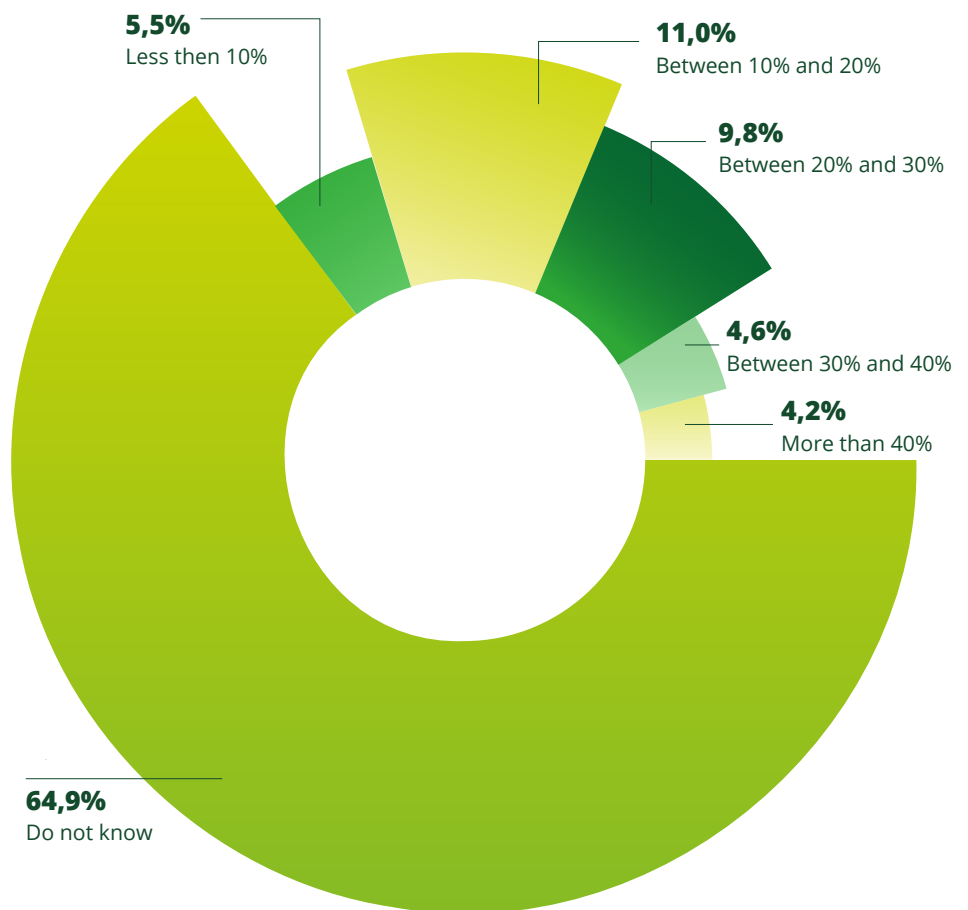
The Incidence of Renewable Energy Sources on Utility Bills: Current Status and Prospects

The Deloitte Observatory warns of some elements, mainly on the supply side, that could slow down the transformation of the national energy model through renewables.

First, there is an issue with awareness and information: about 2 out of 3 citizens are unfamiliar with their supplier's energy mix and, consequently, with the importance the supplier places on renewables.

A more in-depth look into the share of people who say they know their provider's energy mix shows that the incidence of renewable sources is still low: about 1 in 2 citizens say this level does not exceed 20%. That is partly due to the logic behind choosing an electricity provider: its primary driver is price affordability, while the availability of alternative sources to fossil fuels, although important, is not yet a priority.

Figure 6 | The incidence of renewable energy sources on utility bills



Q.: Do you know what percentage of your provider's electricity is from renewable sources?
 Deloitte, "The Conscious Citizen" Observatory, 2023

A second aspect is related to the level of maturity of the supplier and its offering. Those who cannot set up their own cogeneration plant but are sensitive to environmental issues may choose to rely on a specialized provider capable of ensuring electricity from renewable sources, thus reducing both carbon dioxide emissions and spending on their bills.

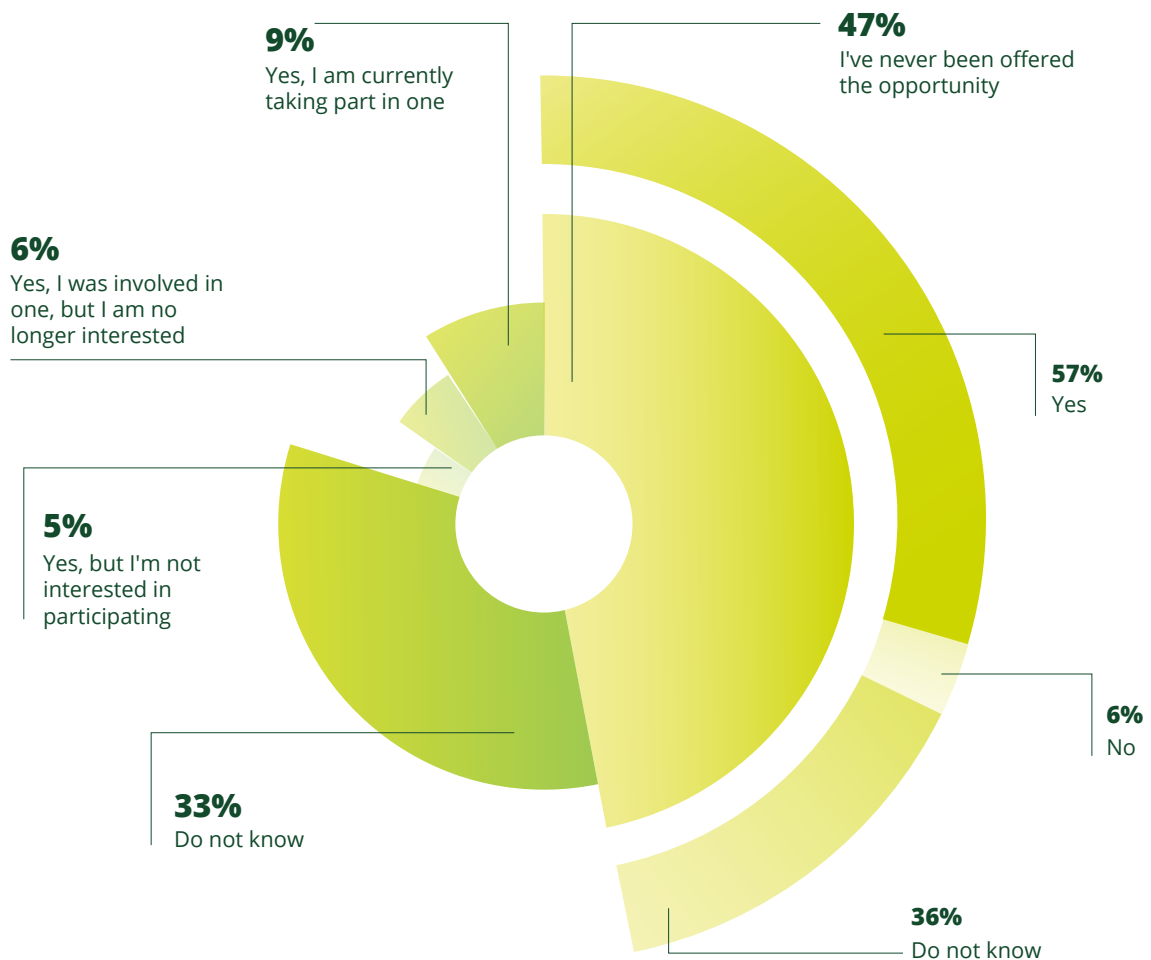
According to data from the Deloitte Observatory, only 2 out of 10 citizens have been offered by their supplier to participate in the purchase of certified green energy,^h despite a far greater potential interest (47%) and a not negligible proportion of undecided (33%). In recent years, there has been a proliferation of bids for 100% renewable energy supply;

however, to make a difference in terms of increasing the production of such energy and contributing to the country's energy transition, domestic demand needs to grow considerably, thus leading utility companies to change their production patterns.

Figure 7 | Green energy programs: availability and participation

Availability of green energy programs

Interest in participating



Q1: Has your current electricity provider offered you the opportunity to participate in the purchase of electricity generated exclusively from renewable sources?

Q2: If your current electricity provider offered you the opportunity to participate in the purchase of electricity generated exclusively from renewable sources, would you accept?

Note: Percentage may not total 100% due to rounding
 Deloitte, "The Conscious Citizen" Observatory, 2023

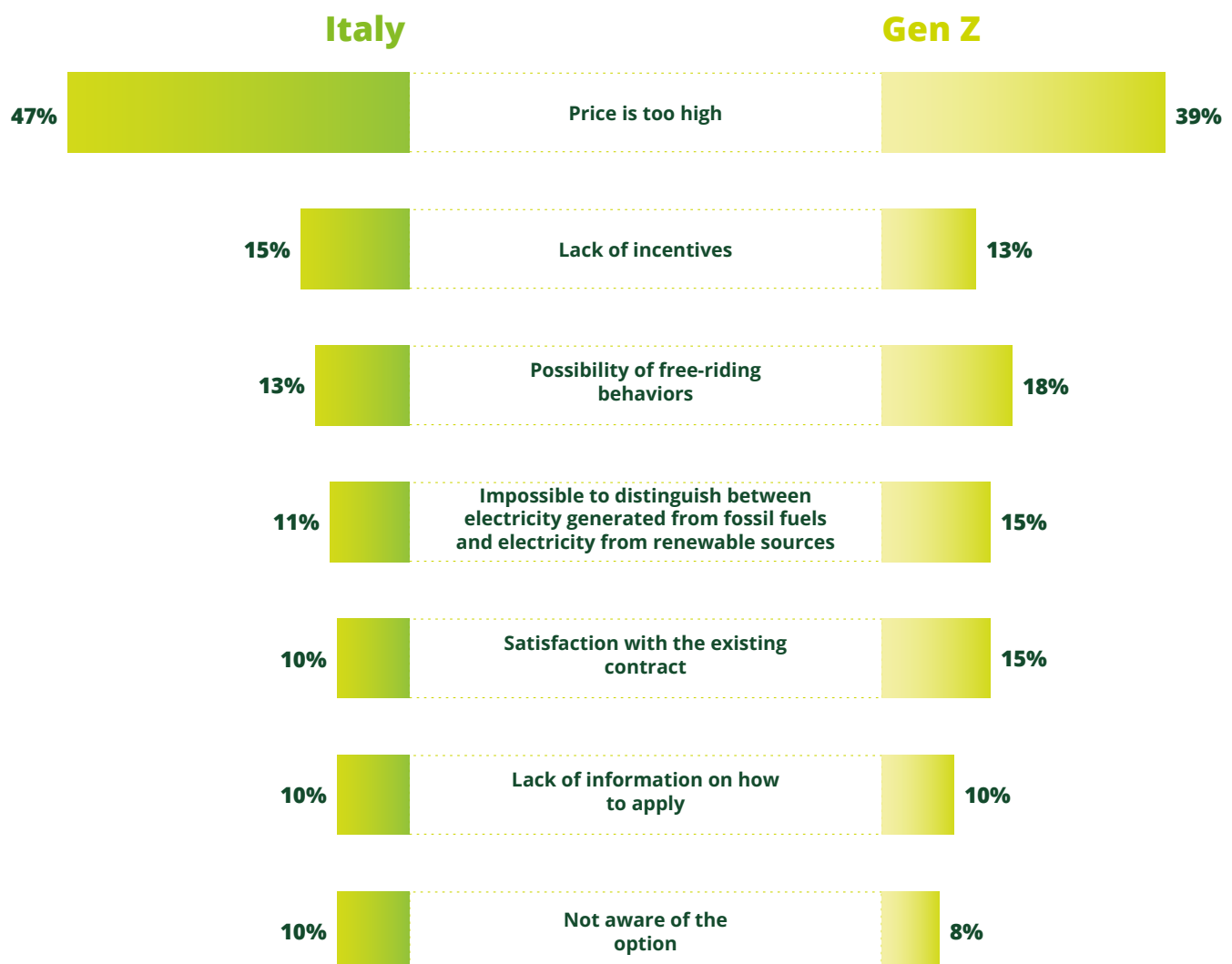
^h Certifications, which ensure maximum reliability on the origin of energy, include the Guarantee of Origin (GO), the Renewable Energy Certificate System (RECS), and the Certificate of Origin of Renewable Energy Sources (CO-FER). Additional relevant and reliable certificates include DT66 and ISO 9001.

Finally, there are barriers of an economic nature, which in today's scenario with double-digit inflation (+11.6% year-on-year),²⁶ cannot be overlooked. As revealed by the Deloitte Observatory, the eco-friendly products and services currently on the market are still perceived as too expensive and difficult to obtain compared to traditional solutions.²⁷

On average, 1 in 2 citizens still finds green energy suppliers too expensive. In addition, 15% complain about the absence of suitable incentives to encourage and support change.

Besides, the portion of those willing to pay a premium price for a 100% green energy supply is relatively small. For example, 32% of the people surveyed are unwilling to face increases in their bills in case of supply from renewables alone; more than 40% would consider a maximum increase that does not exceed 10% of the average expenditure. Some differences emerge, however, in terms of "generational" attitude: the younger generation places the least emphasis in relative terms on economic barriers, also showing a greater propensity to spend and greater concern about free-riding behaviors against them.

Figure 8 | Main obstacles to the signing of contracts for energy supply from renewable sources only



Q.: Why are you not interested in electricity supply from renewable sources only?
 Deloitte, "The Conscious Citizen" Observatory, 2023

The Contribution of Prosumers to the Energy Transition

The transition to renewables implies a radical change in the national energy production and distribution system: from only a few large power plants to a vast number of, sometimes very small, generation units; from unidirectional energy flows to multidirectional flows into an increasingly large, complex network with numerous interchange nodes.

Nowadays, the support of various incentive programs launched by the Government, the gradual simplification of procedures and administrative processes, and constant technological advancesⁱ are turning investment by households in renewable generation systems into an increasingly cost-effective option, benefiting not only individuals but also society as a whole. These dynamics are positively impacting the nationwide deployment of on-grid and off-grid photovoltaic and wind power systems for residential use; through these, citizens can make a tangible contribution to the green transition and also promote their energy independence, as they are free to choose between self-consumption or sale of the energy produced by their systems.^j

The approach to an increasingly distributed power generation, where the place of consumption and the place of production often coincide, and the increasing digitalization of the places of consumption (e.g., smart meters, home automation solutions, electric cars, etc.) are paving the way for a new energy paradigm where the end user is no longer a simple and passive contributor but becomes an active "prosumer" (formed from the words 'producer' and 'consumer') who is evolving into a "transumer" thanks to the increasing opportunities of the sharing economy.²⁸

Citizens are increasingly taking the lead in managing energy flows, playing a central role in the residential market for renewable energy sources. Moreover, the "prosumer" phenomenon is not a fad but rather the expression of a genuine, spontaneous and shared interest in protecting the planet.

In Europe, the number of prosumers is multiplying, and by 2050 there will be about 264 million.²⁹ When looking at estimates of installed capacity for power generation today: Germany is the leading country with more than 21 GW, followed in order of importance by Italy (7.04 GW), France (3.62 GW), Spain (2.98 GW) and Belgium (2.54 GW). Furthermore, prosumers' technical potential for electricity generation^k shows that on a European level, the share of electricity generated by citizens could reach between 30% and 70% of the total, with solar and wind power being the highest contributors. Against this background, Italy, with its relative abundance of renewables, would stand above the EU average with a share above 60%.³⁰

ⁱ Consider, for example, accumulators, the use of new, more efficient and high-performance materials, and the role of digital technology.

^j The most popular and practiced sales options nationwide include on-site exchange (net metering) and dedicated withdrawal. The on-site exchange involves the use of an offsetting system through which the electricity generated and fed into the grid at a certain point in time is exchanged for that drawn and consumed at a different point in time, resulting in a refund for the electricity being consumed that is equal to the amount of power fed into the grid. Dedicated withdrawal, on the other hand, consists of selling to Gestore Servizi Energetici the electricity fed into the grid by the system based on simple procedures and applying fair market rates.

^k The technical potential for electricity production refers to the electricity produced if prosumers used all space and resources to generate electricity from renewable sources. The estimate does not consider the economic feasibility of the technologies underlying renewable sources.

The above trends also emerge strengthened by REPowerEU plan, thanks to three initiatives it contains:

- A proposal for mandatory installation of photovoltaic panels on new buildings. Specifically, 2029 should be targeted for residential buildings, while the time horizon could be narrowed in the case of buildings for commercial use. At the same time, the EU would require member states to streamline the administrative process for granting installation permits, reducing waiting time to a maximum of three months.
- An invitation for member state governments to make it easier for their citizens to adopt solutions for generation from renewables by defining suitable incentives and tools to support them and adjusting administrative requirements (e.g., one-stop-shop).
- The creation and implementation of a robust framework that integrates solar panel installations with storage systems and heat pumps, which are expected to reach 10 million units in the next five years.



Figure 9 | The benefits for prosumers



Cogeneration: Prosumers' Preferred Options

Geothermal systems, along with solar panels - both thermal and photovoltaic^m - are the most common technologies in citizens' homes and are also attracting increased interest from Italian citizens in this particular historical moment. According to the Deloitte Observatory, the spread of cogeneration systems is likely to increase in the future based on the interest expressed by citizens: 17% of respondents consider installing them in the next 12 months, whereas 55% look at these solutions with interest but over a longer time span.

Focusing on solar technologies alone, a much-debated topic in recent years concerns the role and potential of residential storage systems, which allow electricity produced through solar radiation to be stored and used when needed, thus enabling the mitigation of intermittency. Although these systems are still not widespread, the panel surveyed shows a definite interest in them, as evidenced by 15% of citizens who intend to adopt these systems in the next 12 months

and 47% who will carefully consider their adoption in the coming years.

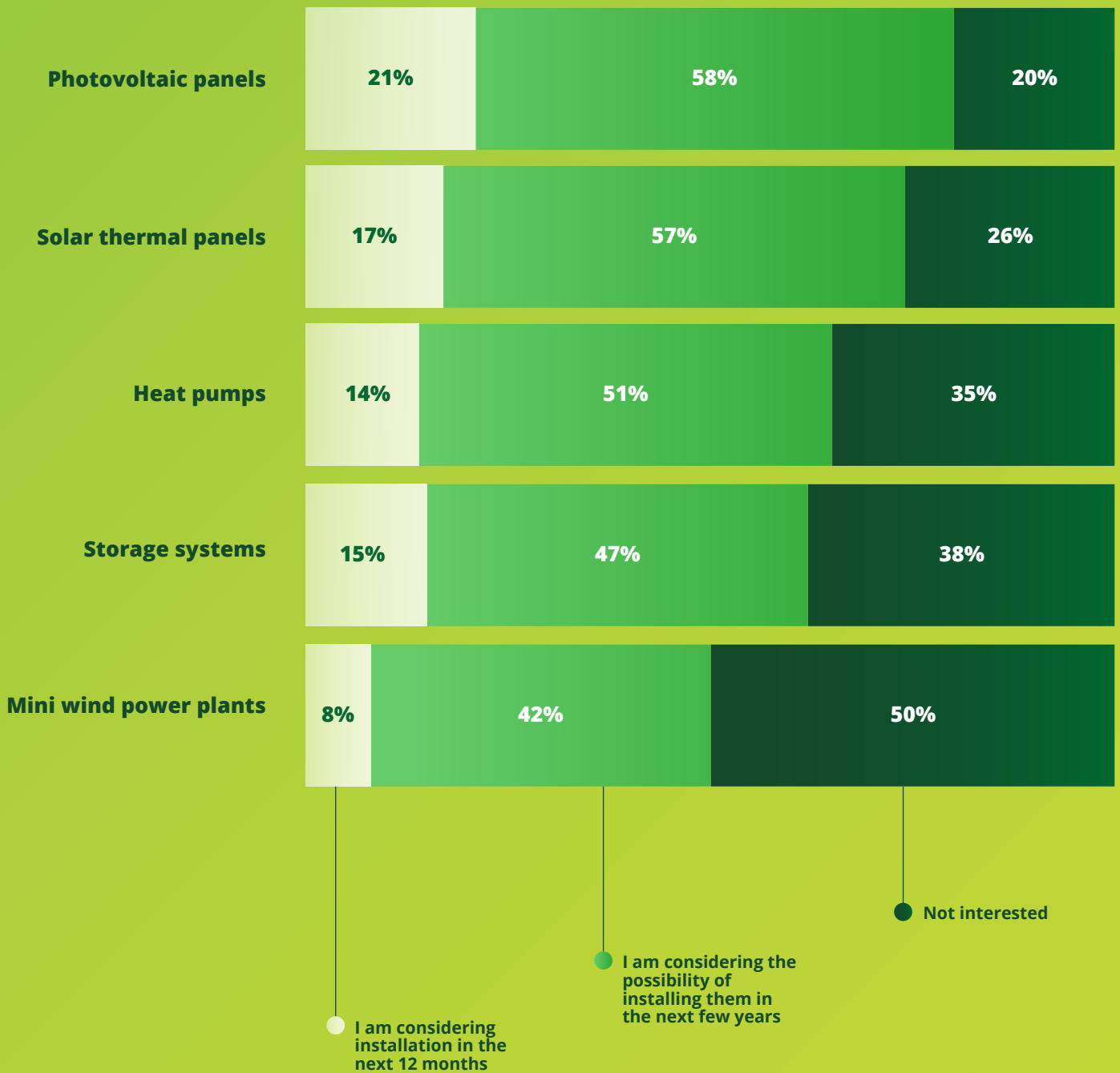
Harnessing wind - as a renewable and clean energy source - through mini wind power plantsⁿ appears to be the least popular option and the least interesting one, according to half of the sample surveyed. While this form of generation provides access to an all-inclusive rate, and the system can operate both day and night, it has several non-negligible limitations: costs throughout the life cycle of this technology are still relatively high, it requires huge space, it generates noise and landscape pollution, and finally, its intermittency must be considered, along with geographical constraints.

^lSolar thermal panels, also known as solar collectors, make it possible to produce domestic hot water from solar radiation, promoting the reduction of CO₂ emissions and energy expenditure. The hot water thus produced can be used in everyday life and to support heating systems.

^mPhotovoltaic panels consist of cells whose material allows them to capture solar radiation and convert it into electricity, which can be used to power, among the others, household appliances.

ⁿSmall wind power generation means the generation of electricity from wind power through wind turbines (vertical or horizontal axis turbines) less than 30 meters high, which can be connected to the power grid (on-grid) or stand-alone. A mini-wind system averages up to 20 kW, while a micro-wind system is limited to 500W.

Figure 10 | Distributed generation and mini renewable energy systems



Q.: Consider the building where you usually reside. Which of the options above best describes your intention to adopt any of the renewable electricity generation systems?

Note: Percentage may not total 100% due to rounding
 Deloitte, "The Conscious Citizen" Observatory, 2023

Focus

"Energy Communities" as a Welfare Tool to Support the Green Transition

Energy self-generation from renewable sources is a growing trend also in Italy due to the possibility of implementing collective production and consumption schemes with different levels of complexity. One example is that of Energy Communities. These can be defined as an open and voluntary association among multiple stakeholders⁹ that decide to work together, establish a legal entity and acquire one or more shared - not necessarily owned - facilities for the production and self-consumption of energy from renewable sources using a model based on sharing.¹⁰

Energy Communities, already envisaged by the European RED II (Art. 21 and 22, 2018/2001/EU)⁹ and EMI (2019/944)¹¹ directives, have only recently been officially introduced in Italy via the enactment of Decreto Milleproroghe 162/2019 (Article 42/2) and its implementing measures such as ARERA's Resolution 318/2020/R/eel and the Decree of the Ministry of Economic Development of 16 September 2020.

Before the enactment of this Decree, in Italy, it was already possible for various entities to team up and finance the installation of a shared system based on renewables, but they could not sell such energy to third parties. The Gestore Servizi Energetici (GSE) grants financial contributions⁵ to these communities for 20 years after the system's installation.³¹

Today, there is a total of 100 Energy Communities registered under various configurations in Italy that have been established in the last three years. Between June 2021 and May 2022 alone, 39 new renewable Energy Communities were registered, in addition to 20 collective self-consumption configurations.³² These figures are expected to rise in the short term, partly thanks to the resources allocated by the Government through the National Recovery and Resilience Plan (2.2 billion euros) to facilitate the installation - primarily by small municipalities, microenterprises, and households - of about 2,000 MW of new generation

capacity and contribute to reducing greenhouse gas emissions by about 1.5 million tons of CO₂ annually.³³ In addition to these, there are also EU call for tenders; they are part of the LIFE Program and have a total budget of nearly 5.5 billion euros for the 2021-2027 period - up 57.5% from the 2014-2020 budget.³⁴

The official introduction of Energy Communities is significantly boosting the modernization of the national energy system, which must gradually adapt to the distributed management paradigm with a focus on zero-mile energy supply and smart grids. In addition, these new configurations drive innovation and bring new opportunities through several benefits and positive externalities for the entire national system, not only in terms of green transition but also territorial and social cohesion.

⁹For example, citizens, businesses and local government agencies.

¹⁰The cogeneration system can be either shared, as in the case of a solar power plant, or individual, such as a photovoltaic system installed on the roof of a house.

¹¹With this directive, implemented by Legislative Decree No. 199/2021, the EU introduces the "Renewable Energy Community"(REC) notion, recognizes a legal standing to associations, and introduces the figure of the prosumer.

¹²On the other hand, this directive introduces the concept of "Citizen Energy Community" (CEC) from a regulatory point of view.

¹³For each kWh of shared electricity, the following is awarded: a unit fee (determined as the sum of the transmission rate for low-voltage utilities and the highest value of the variable component of the distribution rate for "other low-voltage uses" contracts) and a premium tariff (100 €/MWh for self-consumption groups and 110 €/MWh for Energy Communities).

Figure 11 | The benefits of Energy Communities



Conclusions

Our country is facing a difficult historical moment due to the consequences of the pandemic and geopolitical tensions in the Old Continent. In recent months, the energy crisis, inflation and high utility bills have become a significant concern for Italian citizens and are impacting their daily lives and consumption choices, which are increasingly driven by cost-effectiveness in absolute and relative terms.

In the current scenario, citizens have no option but to shift their lifestyles and consumption habits to a more sustainable approach, making use, where possible, of innovative and digital solutions that can ensure complete control of energy consumption and optimize any inefficiencies.

In this regard, smart-living concepts represent a potential solution because of their flexibility, adaptability to existing contexts, and ability to maximize the benefits of increasingly virtuous behaviors. Although the maturity level of Italians is still low in this area, especially when it comes to more complex systems, growth is expected in the coming months thanks to further technological developments and incentives introduced by the Government.

At the same time, citizens are pressing for a green transition in our country to take place as soon as possible to reduce Italy's dependence on fossil fuels and capitalize on the relative abundance of naturally available renewable sources. This wish also reflects in the energy choices made by citizens, who are increasingly vital players and change agents in the green transition process. Indeed, people are assuming a central role in the residential renewable energy market either by entering into energy supply contracts that provide 100% clean electricity or through cogeneration wherever possible. In this respect, the current situation, characterized by high energy price volatility, has catalyzed citizens' attention to solar panel technology and geothermal systems that can guarantee greater energy independence and savings on their bills.

To manage the contingent situation and ensure the smoothest possible ecological transition, the efforts of citizens must be adequately encouraged and supported by the intervention of supranational and national institutions, which should provide active support for the transition, each within their respective areas of competence and responsibility. On the one hand, the EU is called to introduce

adequate electricity price regulation and develop new electricity market management models consistent with the decarbonization goals of the "European Green Deal". On the other hand, the national Government needs to put in place a clear energy strategy to deal with the current critical issues and facilitate the country's green transition in the spirit of the European NextGenerationEU program.

The "Conscious Citizen" Observatory: Previous Releases



The Conscious Citizen

Understanding the Meaning of Sustainability to Drive Innovative Strategies in Support of a Rapid Green Transition

The first release of the Deloitte Observatory "The Conscious Citizen" carries out a comprehensive analysis on the Italian population's perception on climate change and the practices adopted in daily life to counter it. The Observatory deep dive also the citizens' expectations on the companies' and institutions' contribution in the green transition and in the sustainable innovation process.



Methodological Notes

The data in this report refer to the Deloitte's "The Conscious Citizen" Observatory.

The overall objective of the survey was to explore and monitor the sentiment and opinions of the Italian population on innovation and sustainability to interpret its evolution and concretely assess the spread and extent of innovative and sustainable practices adopted.

The sample analyzed consists of 2,000 respondents interviewed using the CAWI methodology. More specifically, the target population comprises individuals aged 18 to 75 years residing in Italy, with quotas set - according to the ISTAT system - by geographical area, gender, and age group.

Authors

Andrea Poggi

Senior Partner

Innovation Leader Deloitte North and South Europe

apoggi@deloitte.it

Angelo Era

Senior Partner

Energy, Resources & Industrials Industry Leader Deloitte Central Mediterranean

avera@deloitte.it

Research & Editorial

Luca Bonacina

Manager

Clients & Industries – Eminence & Market Insights

lbbonacina@deloitte.it

Marzia Casale

Manager

Clients & Industries – Eminence & Market Insights

mcasale@deloitte.it

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