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CONSIGLIO NAZIONALE INGEGNERI

Women in Italian engineering

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Introduction

The number of women in the Engineering sector is progressively increasing in Italy: the share of graduates in this discipline in 2017 was 25%, while in the early 2000s it was only 16%. Currently it is estimated that 19% of the total population with a degree in engineering are women.

A comparison with the main European countries highlights how Italy is at the top in terms of women's propensity to enter engineering studies, in line with significant progress in terms of women's presence in the STEM (Science, Technology, Engineering, Maths) disciplinary areas.

The cultural obstacles that still make the technical disciplines, engineering in particular, feel more hostile to women than to men, are gradually disappearing. We are far from achieving fairness and gender equality - as it will be highlighted later on, especially in terms of employment rates and pay gap - even if Italy has entered a positive trend that needs to be further encouraged.

The number of women enrolled in the Professional Register of Engineers is also moderately increasing. There are currently almost 37,000 female engineers belonging to the professional Order, 15.3% of the total number of engineers enrolled, while they were 12% in 2012. This is a crucial resource for the evolution, development and innovation of the profession. 10 Provincial Orders are chaired by a woman engineer: an appreciable result, but more needs to be done.

Understanding the evolution of the female presence in the engineering sector is not merely a statistical analysis. Behind those numbers there is much more, in the awareness that more women in the labor market means more well-being, more social balance, more growth but, above all, more equity in terms of opportunities: something that is often missing in our country. It is enough to look at the data on gender gaps to understand the extent of the phenomenon and to understand how far we still have to go.

This phase of increasing women's access to the engineering sector and, more generally, to STEM disciplines must be taken into account. From the CNI's point of view, it is not a matter of ensuring policies that "protect" or represent women in the labor market in a "distinctive" way. On the contrary, it is a matter of appreciating the scope of this change, which concerns the entire community

without distinction; thus offering, for example, services useful for the practice of the profession and welfare tools that encourage work-life balance. Finally, a better understanding of how much and how the presence of women is changing the engineering sector can contribute to better focusing instruments and policies that provide equal opportunities offered by the labor market. This is a principle that would certainly make our country more competitive.

The female universe

According to an estimate elaborated by the Study Centre of the National Council of Engineers on ISTAT (Italian Statistics Institute) data, there are about 765 thousand engineering graduates in Italy. Of these, little less than **150 thousand**, equal to **19.1%**, are women.

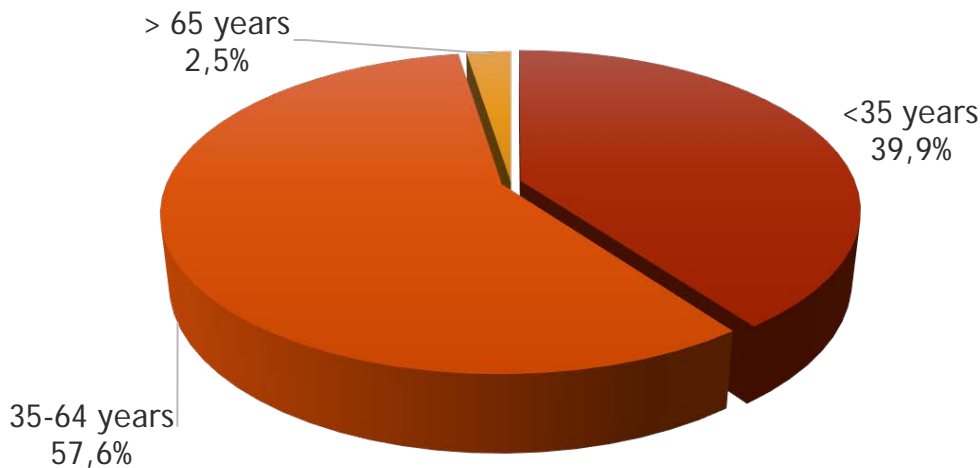
Women with
engineering
degree in Italy

146.230

Source: CNI Study Centre elaboration on Miur Statistics Office data, 2019.

This is an extremely young universe, since only in the last few decades the number of women engineering graduates has gained important dimensions: only 2.5% are over 65 years old, while 4 out of 10 are under 35 years old.

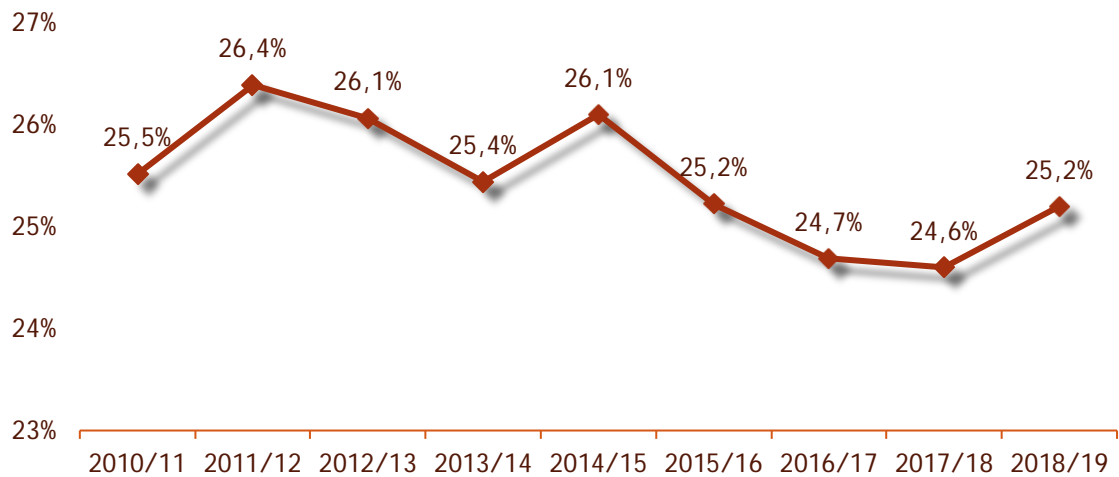
Women with engineering degree in Italy by age (val.%)



Academic background

The profession of engineer, traditionally male-dominated, has recorded, in the last decade, a process of feminization that has led the female component to become about a quarter of those attending university courses in engineering.

Quota of women attending in engineering degree courses A.y. 2010/11 - 2018/19 (val.%)

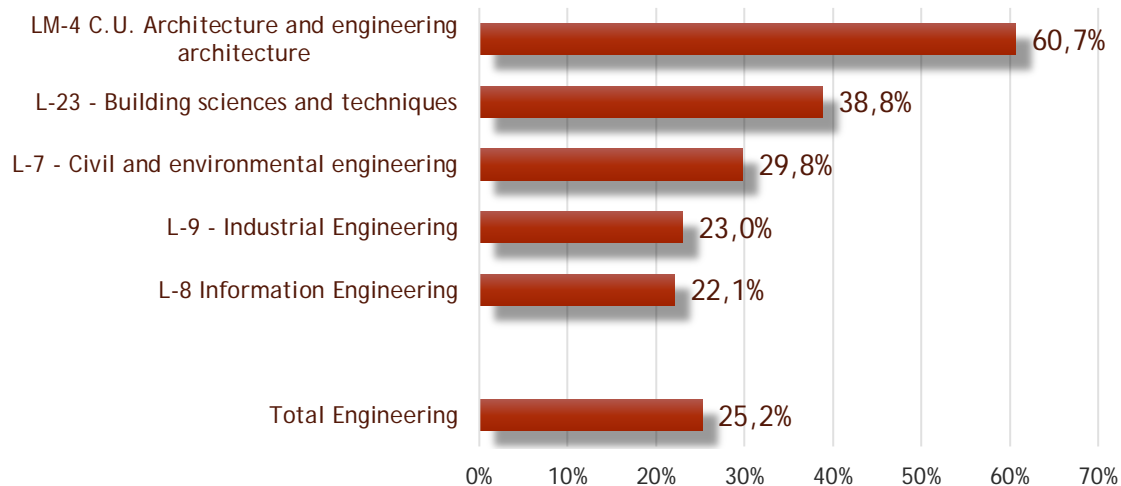


Source: CNI Study Centre elaboration on Miur Statistics Office data, 2019.

The area that is most popular among women is the civil and environmental sector so much that, in single-cycle master degree courses; they now represent the majority of matriculated students: almost 61%.

On the other hand, the percentages of women in courses in the industrial sector (23%) and information (22.1%) are significantly lower.

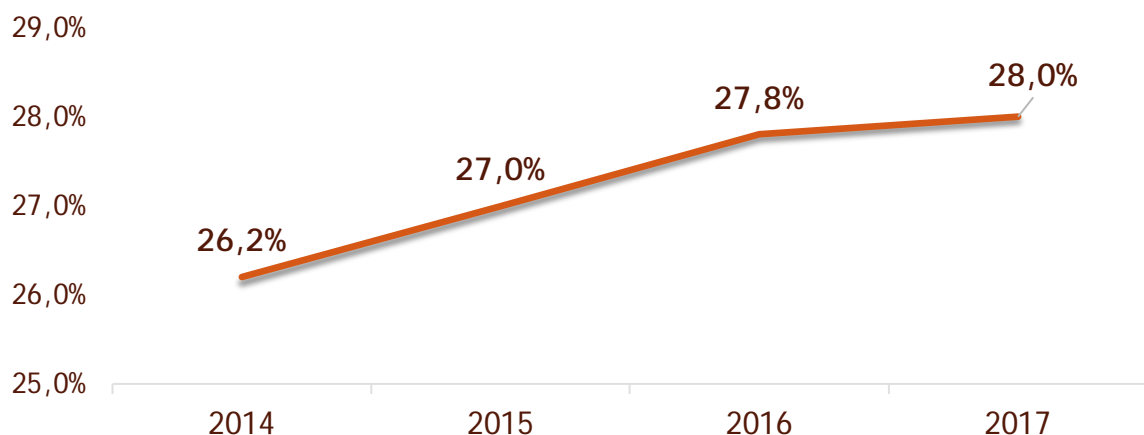
Quota of women attending in engineering degree courses by degree classes a.y. 2018/2019 (val.%)



Source: CNI Study Centre elaboration on Miur Statistics Office data, 2019.

The cross-reference of matriculation data with those of graduates would seem to highlight how women achieve better results in the course of studies than men. Otherwise, it would not be explained how the female component among engineering students, equal to about a quarter of matriculated students, grows to 25.9% among first level graduates, up to 30.5% among master graduates (the overall average, between first and second level, is 28%).

Quota of women graduates in Engineering in the total (val.%)*. 2010-2017

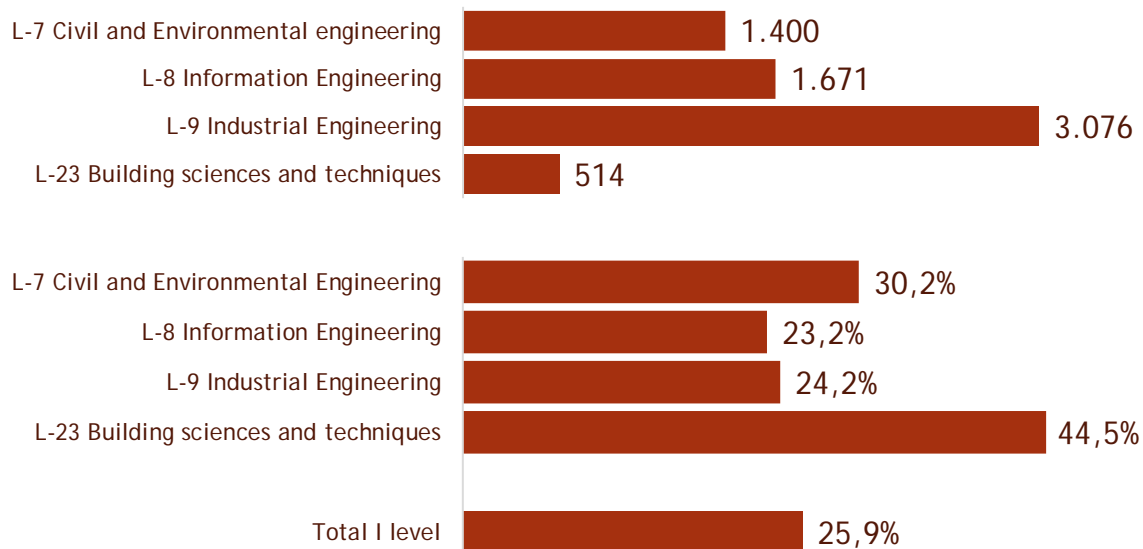


Please note: the 105 graduates and 2 graduates of the old system are excluded since data by gender are not available.

Source: CNI Study Centre elaboration on Miur Statistics Office data, 2019.

As far as Bachelor degrees are concerned, women represent 44.5% of the "three-year" graduates of the Building Science and Technology degree class and 30.2% of those in Civil and Environmental Engineering, 23.2% in Information Engineering and 24.2% in Industrial Engineering.

Number and quota of women graduates (Bachelor Engineering degree), by degree class. Year 2017 (val.%)

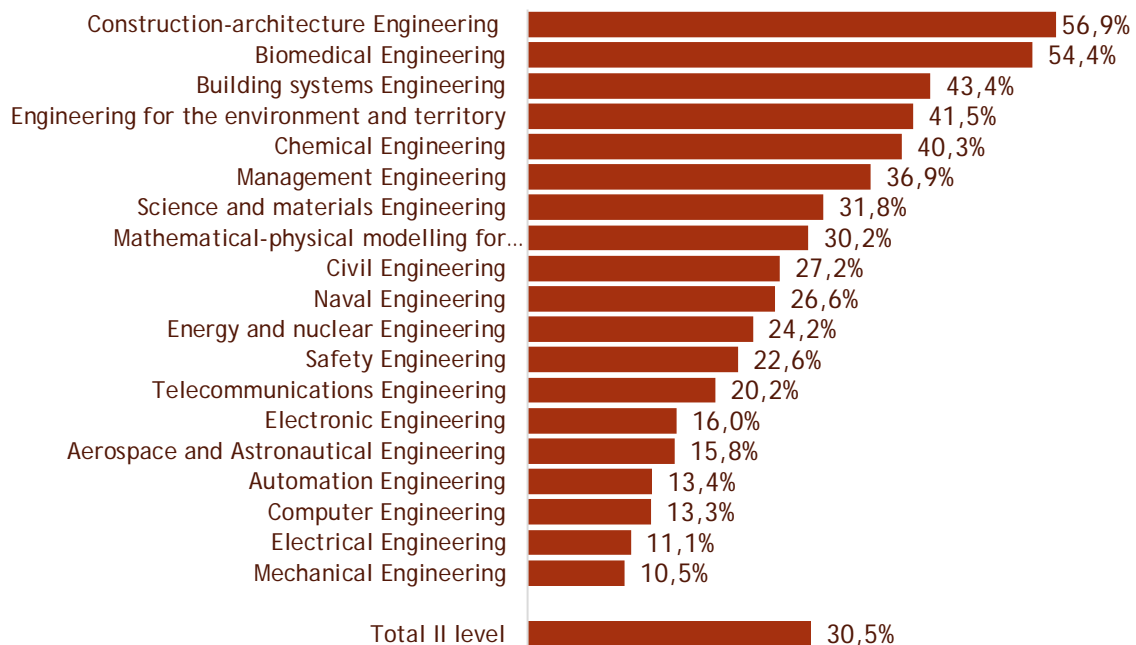
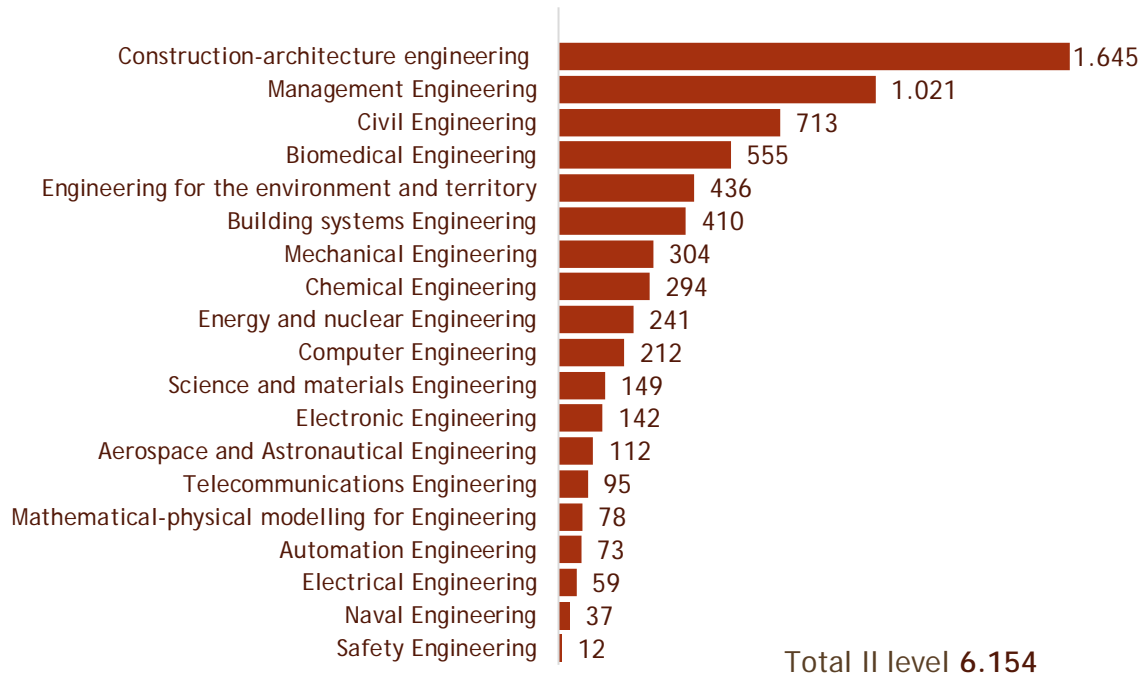


Please note: the 105 graduates and 2 graduates of the old system are excluded since data by gender are not available.

Source: CNI Study Centre elaboration on Miur Statistics Office data, 2019.

Considering master degrees, the presence of women becomes even higher among the graduates of the degree classes LMCU4 - Construction Engineering - Architecture single-cycle classes (56.9%, but in 2016 it was 58.6%) and LM-21 - Biomedical Engineering, although in the latter there was a decrease that brought the share of female graduates to 54.4%, whereas in 2016 it was close to 60%. On the contrary, in Mechanical, Electrical, Computer and Automation Engineering courses, the share of women is less than 15%.

Numbers and quota of women graduates in engineering master degrees. Year 2017 (val.%)



1. Source: CNI Study Centre elaboration on Miur Statistics Office data, 2019.

Labor market

74% out of almost 150,000 women graduated in engineering in Italy is employed. The number of women employed is compared to the entire female population with a degree in engineering, including those who are no longer of working age.

**% employment rate
of women
graduated in
engineering in Italy**

74%

Source: CNI Study Centre elaboration on ISTAT data, 2019

Although a degree in engineering is one of the most usable titles in the labor market, a remarkable gap between men and women still persists, both in terms of employment and pay.

The unemployment rate one year after graduation in engineering is in fact 8.2% for women and 5.5% for men. The total unemployment rate for women with a master degree in Italy is 19%.

Unemployment rate in 2018 for university graduates one year after graduation

**Women with master
degree in engineering**

8,2%

**Men with master degree
in engineering**

5,5%

Please note. single-cycle master degree courses are not considered

Source: CNI Study Centre elaboration on ALMALAUREA data, 2019

The situation improves significantly 5 years after graduation, though a gap of more than one and a half percentage point with males still remains: the female unemployment rate in engineering is in fact less than 4%, compared to 2.3% for men.

Unemployment rate in 2018 for master graduates 5 years after graduation

Women with master degree in engineering	3,9%
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Men with master degree in engineering	2,3%
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Please note. single-cycle master degree courses are not considered

Source: CNI Study Centre elaboration on ALMALAUREA data, 2019

The "Gender pay gap" is peculiarly evident in Italy: five years after graduation in engineering women receives in average 1,600 euros net monthly, while men receive nearly 1,800 euros per month.

It should be noted, however, that comparing the data with the average of all female graduates, female engineers earn about 300 euros net per month more than the others, showing a smaller gap with men. The gender pay gap in the engineering sector, in fact, is 90% (women's pay is 90% of that of men) compared to a national average of 80%.

Net monthly salary 5 years after graduation (in euros)

Women with master degree in engineering	1.607
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<i>Total women with master degree</i>	1.309
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Men with master degree in engineering	1.792
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Source: CNI Study Centre elaboration on ALMALAUREA data, 2019

Professional Register/Order

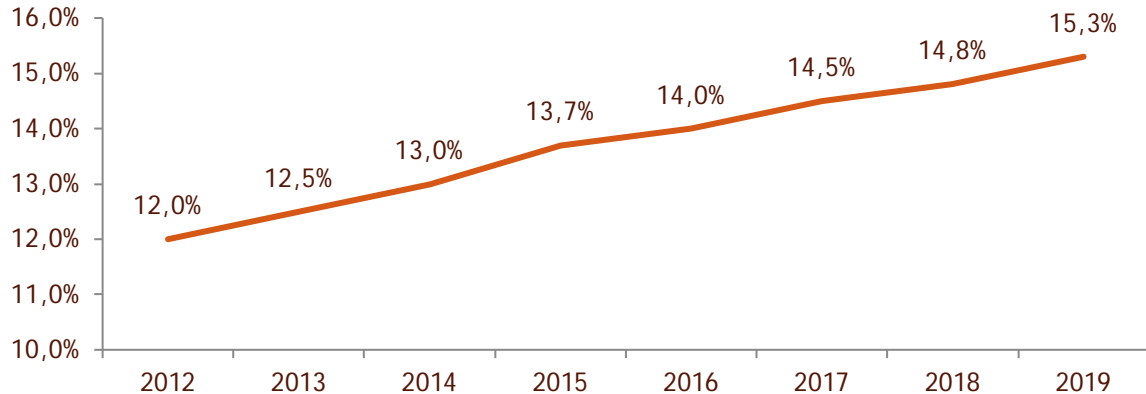
The number of enrollments of women in the Register of Engineers has constantly increased in the last years: in 2019, women represented 15.3% of total engineers enrolled, compared to 14.8% the previous year. Currently there are 36,939 women registered in the professional Register, almost 1,400 more than the 35,580 registered in 2018.

**Women enrolled in the
Italian Professional
Register of Engineers**

36.939

Source: CNI Study Centre elaboration

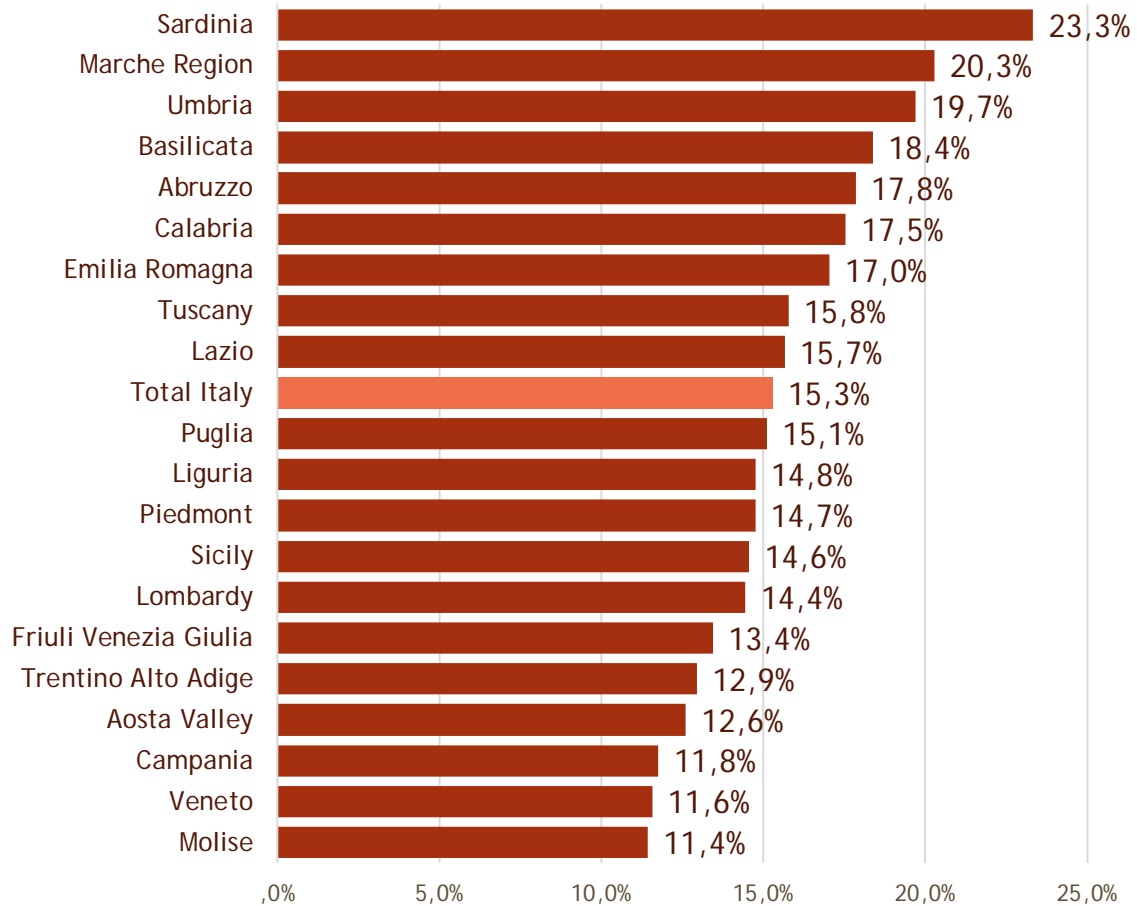
Quota of women enrolled in the professional Register of Engineers (Section A + Section B). Year 2019



Source: CNI Study Centre elaboration

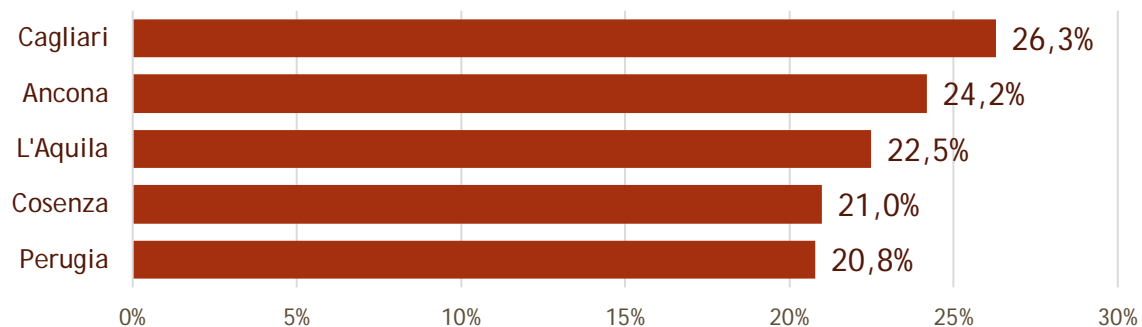
Sardinia is the region where the presence of women in the professional Order is the most important: in 2019, in fact, women represent 23.3% of Sardinian enrollments, with the highest peak recorded in Cagliari, the provincial Order with the highest percentage of women in Italy (26.3%).

Quota of women enrolled in the Register of Engineers by region. Year 2019 (val. %)



Source: CNI Study Centre elaboration

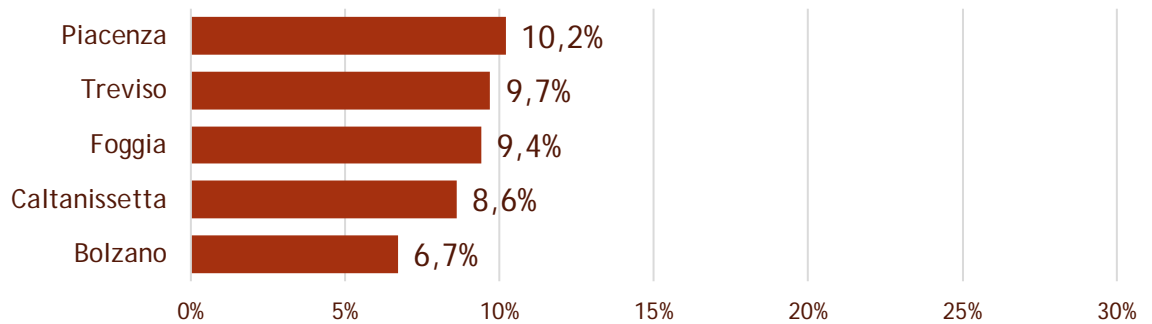
The 5 Orders with the highest proportion of women enrolled



Source: CNI Study Centre elaboration

There are 4 professional Orders (Treviso, Foggia, Caltanissetta and Bolzano) in which the percentage of women is still less than 10%. However, the data suggest that the situation is destined to change in the coming years with an increase of women enrollments in all the provincial Orders.

The 5 Orders with the lowest proportion of women enrolled



Source: CNI Study Centre elaboration

In addition to increasing in number, women are beginning to hold management positions within the Professional Orders, much more frequently than in the past.

**Women Council
Members of
Professional Orders**

285

Equal to

21,3%

Of Council Members

2,7

**By Orders
(on average)**

Data updated to 10 April 2019

Source: CNI Study Centre elaboration

In only 3 Professional Orders there are no female representatives.

**Board of Councilors
of the Orders without
women**

3

(Caltanissetta, Chieti, Terni)

Data updated to 10 April 2019

Source: CNI Study Centre elaboration

The Provincial Order with, in proportion, more women among its councilors is that of Vercelli (44.4%), although in absolute values the Orders of Turin, Trent and Frosinone have 6 women among their councilors, the highest number recorded among all the Provincial Orders.

**Highest proportion of
women in the Board
of Councilors**

44,4%

(Vercelli)

Data updated to 10 April 2019

Source: CNI Study Centre elaboration

**Highest number of
women in the Board
of Councilors**

6

(Frosinone, Turin, Trent)

Data updated to 10 April 2019

Source: CNI Study Centre elaboration

Finally, in 10 Professional Orders, equal to 9.4% of the Orders, a woman took the position of President of the Order: Alessandria, Arezzo, Asti, Cremona, Foggia, Oristano, Parma, Pisa, Rome and Trieste.

Women “President”

12

(Alessandria, Arezzo, Asti, Brindisi, Cremona, Foggia, Oristano,
Parma, Pisa, Rome, Trieste and Viterbo)

Equal to

9,4%

Of the Orders

Data updated to 10 April 2019

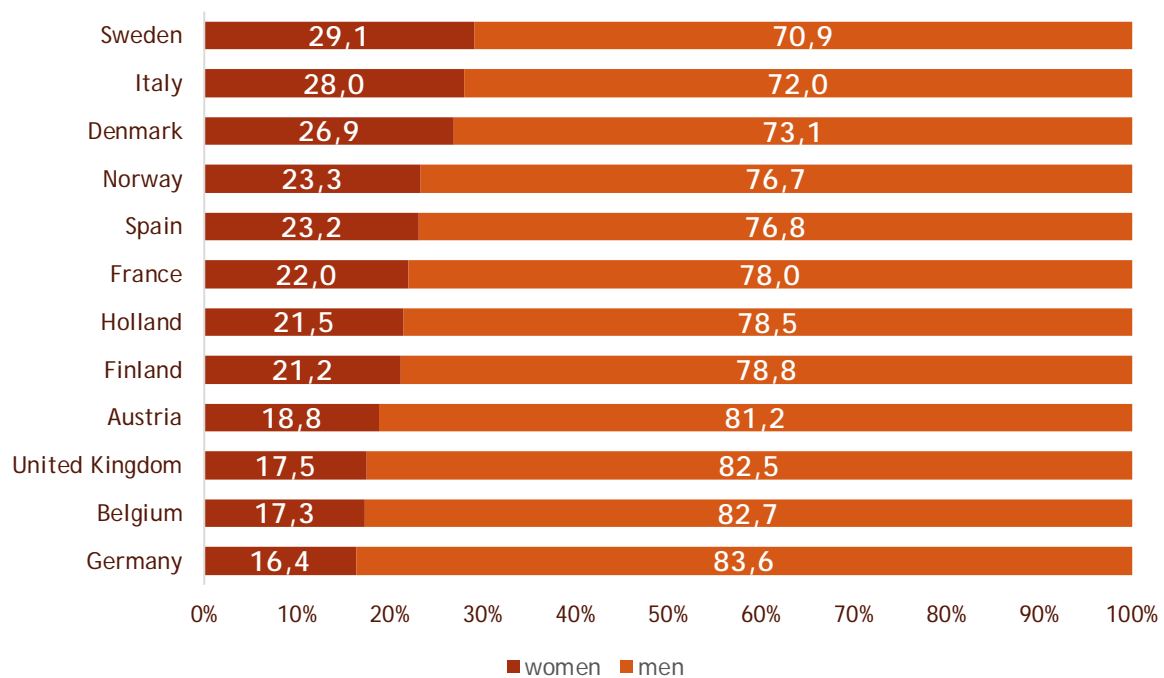
Source: CNI Study Centre elaboration

A comparison with Europe

In comparison with the main European countries, Italy shows encouraging signs in terms of the presence of women in the engineering sector.

The significant acceleration in the number of female graduates in recent years has contributed to Italy recording one of the highest percentages of women graduates in engineering compared to the total number of graduates in this discipline. The percentage (28%) of women graduates in Engineering in Italy is second only to Sweden, where in 2017, the share was 29.1%. In countries such as Germany (16% female graduates), France (22%), Austria (18.8%) and the United Kingdom (17.5%), the rate of feminization of engineering graduates is definitely lower than in Italy.

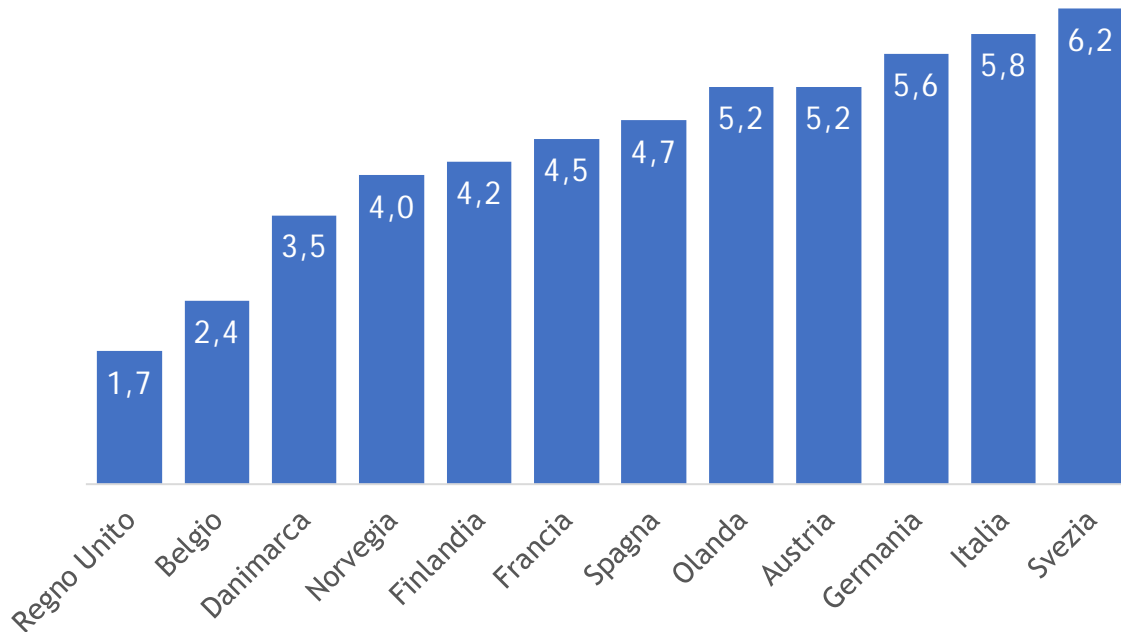
Engineering graduates in 2017 by gender (val. %)



Source: CNI Study Centre elaboration on EUROSTAT data

Values drop considerably if the number of engineering graduates is compared to the overall number of graduates (in all disciplines). In 2017, Italy's share was 5.8%, a small percentage itself, but one of the highest among the main European countries; Germany is slightly below, the Netherlands and Austria 5.2%, while the Scandinavian area, Belgium and the United Kingdom are significantly below these values. This is the effect of a phenomenon that has its roots in the recent past, for which STEM disciplines have long been almost exclusive to men; but the data available today indicate that, especially in Italy, a positive process has been triggered.

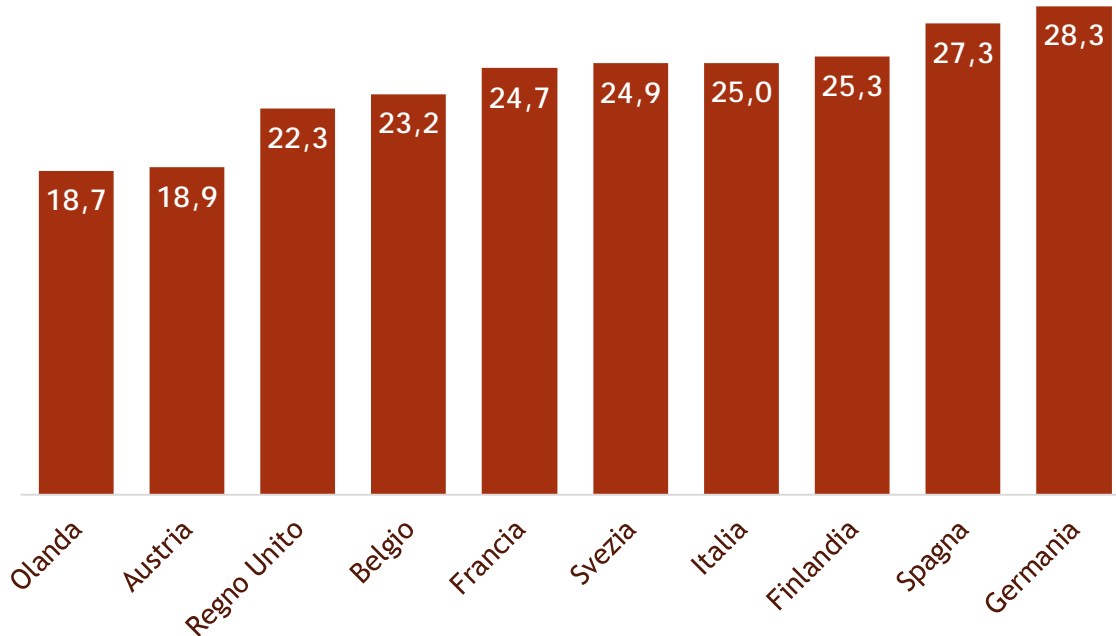
Share (%) of women graduates in Engineering in 2017 out of total graduates in 2017



Source: CNI Study Centre elaboration on EUROSTAT data

Finally, the estimate of employment levels in the Engineering sector highlights how Italy is not so far from the rest of European countries. Eurostat data allow to elaborate an employment rate proxy: 25% of those currently employed in the different engineering sectors in Italy are women, in line with what happens in the main countries we normally compare to. Better results (but not with great gap) are recorded in Germany and Spain.

Estimate of the share (%) of women employed in the Engineering sector out of the total employed in the sector (2018 data)



Source: CNI Study Centre elaboration on EUROSTAT data

Considering the employment level, women represents a quarter, or slightly more, of the engineering total workforce in a large number of the European countries. From this point of view, Italy's delays appear, in some ways, common to most European countries. This is, of course, still the effect of a phenomenon for which for a long time technical and scientific subjects have essentially been a responsibility of men.

All the available data, however, highlight an improving trend, also and above all for our country. On the contrary, in some cases, in Italy there is a real inversion of the trend. If the share of women graduates in engineering has increased from 16%, in the early 2000s, to the current 25%, it means that a positive process has been triggered.

This text was co-written by Emanuele Palumbo and Francesco Estrafallaces, who also managed the data collection and processing.