



ENGINEERS 4 EUROPE

# Engineers for Europe Monitoring Report I

## Do We Know Our Engineers?



Issue I, Edition 2020



**eani**

Fédération Européenne d'Associations Nationales d'Ingénieurs  
European Federation of National Engineering Associations  
Föderation Europäischer Nationaler Ingenieurverbände



## **Engineers for Europe Monitoring Report 1**

# ***Do We Know Our Engineers?***

***A detailed analysis of data needs and data availability concerning engineering professionals in six pilot countries (Edition 2020)***

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***Editor***

**May 2020**

# ENGINEERS *for* EUROPE (E4E)

## Preface

The Engineers Europe Advisory Group (EEAG) was launched in Brussels on 11 September 2018 with the aim to promote the engineering profession. The EEAG consists of signatories which are professional organizations of engineers, employer associations and institutions of higher education in engineering. A list of signatories is added to this report.

The EEAG immediately launched an initiative to deepen the knowledge on the engineering profession, to improve the engineering education, to bridge the skills gap and enhance engineering careers. The project is called “Engineers for Europe” or E4E. A list of partners is added to this report.

One of the five main outcomes of the project<sup>1</sup> will be the Engineers Europe Monitor, a data platform set up to keep track of the engineering profession. The EEM will be piloted in six countries.<sup>2</sup>

Work on the E4E Monitor is preceded by a detailed analysis (mapping) of data availability and resulting data needs in the six countries, described in the current report. The report lists available sources and data sets still lacking. The mapping has focused on five key aspects of the life of an engineering professional:

- Engineering population
- Personal background
- Initial and continuing education
- Career development and mobility
- Labour conditions

The report contains first findings on these five aspects for the six pilot countries. A more complete picture will be provided in the 2021, 2022 and 2023 edition. The mapping in the report will help to design country specific surveys in conjunction with existing surveys organised by member organizations. Four types of the Engineers for Europe Survey are scheduled to be organised, when needed, in six pilot countries:

1. Students Surveys (BEST)
2. Graduates Surveys (BEST – FEANI)
3. Employers Surveys (REHVA)
4. Active Engineers Surveys (FEANI)

The report is the result of desk research, partner- and expert hearings, analyses, writing and editing, carried out by the Editing Team, supported by Partner Correspondents. Desk research was conducted in June-September 2019. Hearings were held in September-November 2019. Analyses, writing and editing is to take place from December 2019 to April 2020. The report will be published in May 2020.

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<sup>1</sup> The other four outcomes are the E4E Competences Compass, the E4E Micro-credentials Register, the E4E Competence Badge and the E4E Matching App.

<sup>2</sup> France, Germany, Ireland, Italy, Portugal and Poland.

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*What data do we have on type and level of engineering studies among the various cohorts (age groups) in the upcoming and active engineering population? What is known about the uptake and potential of continuing education?*

## 6. Career development and mobility

*What information do we have on the professional trajectories of the various categories of engineering professionals? Do we know whether they spend part of their career in other sectors (public, private, research, education) or in other countries, in Europe and elsewhere?*

## 7. Labour conditions

*Do we have information on the employment status of engineers? Are average salary levels known? What about work life balance issues? Is their social security guaranteed?*

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## 1. Introduction

The Engineers for Europe project (E4E) Knowledge Alliance partnership draws its strength from being built bottom up by national associations of engineers (FEANI), complemented by engineering students (BEST) and employers (REHVA). These professionals from the world of work and business have joined forces with partners from academia in an Erasmus+ Knowledge Alliance to ensure that results will benefit both education and professional life. Academic partners include universities of applied sciences, research universities and associations thereof. They combine knowledge of curriculum design, teaching, learning assessment (HEIs) with day-to-day grassroots knowledge and experience of the world of work (membership organizations with FEANI, BEST, REHVA). The purpose behind the E4E project is to complete our knowledge and insights on engineering professionals in Europe and to make this knowledge and insights serve directly the quality of engineering education and the innovative capacity of the engineering workforce. An online platform, reports and leaflets will make this knowledge easily accessible and digestible. Bridging tools will connect education and practice towards innovation. New services will incite the engineering professionals to take their careers in their own hands.

This report is part of a three-fold series of Monitor Studies that focus on the following key aspects of a professional engineer's life:

- Do We Know Our Engineers?
- Engineering Education in Practice
- What Engineers Want

The study “Do We Know Our Engineers?” constitutes a needs analysis from which the E4E partners will build the E4E Monitor, analyzing the needs and informing decision-makers in academia, industry and the public sector. It will be completed by the next annual editions in 2021, 2022 and 2023.

## **2. Methodology**

This report was prepared by an extended data collection and analysis. Available data from Germany, France, Italy, Ireland, Portugal and Poland were gathered and included into this report. Data were mainly provided by FEANI National Members, who have access to different sources in their native language and conduct themselves surveys amongst the national engineering population. The main aim was to answer the following questions for the selected countries:

### **Population of engineers**

This chapter aims to map the population of engineers in the different pilot countries in terms of their number and specialization according to the different group ages and draws the main trends.

### **Personal background**

This chapter examines the personal background of engineers, focusing on selected sub-topics: their gender and origins, their socio-economic environment, social mobility and the educational attainment level of their parents, their personal situation.

### **Initial and continuing education**

This chapter aims to explore the available data on the type and level of engineering studies amongst the various age groups in the upcoming and active engineering population and to collect information about the uptake and potential of continuing education. Several sub-topics have been selected to draw a relevant picture of the engineering education: the status of the higher education institutions, continuing education, apprenticeships and internships, courses of specialisation, training for professional and soft skills in HEIs.

### **Career development and mobility**

This chapter scrutinizes the different professional trajectories of the various categories of engineering professionals, to identify whether they spend part of their career in other sectors (public, private, research, education) or countries, in Europe and elsewhere. It also examines the time spent in the same position, the trends in specialisation, unemployment and professional insertion, as well as access to positions with responsibilities.

### **Labour conditions**

This chapter aims to examine the available information on the employment status of engineers, their average salary levels, the existing issues on work-life balance, their advantages and guarantees (e.g. for social security), the flexibility in their work environment, the perceived conviviality and satisfaction.

### **3. Population of engineers**

#### **France**

In France, in 2018, the overall population of engineers was estimated at 1.060 million. IESF (Ingénieurs et Scientifiques de France – FEANI French association) counted around 850.000 active engineers, 40.000 new graduates and 10.000 retiring engineers. The engineering category the most represented in the country is the industrial one (with 324.250 engineers in 2018) followed by electrical/gas/water/waste management engineering and construction/civil engineering (54.297 and 50.900). A trend upward is noted in agricultural and industrial engineering. Focusing on engineering learners, in the academic year 2017-2018, 141.966 learners were counted in engineering cycles and 158.774 learners in engineering education, which represent a trend upward comparing to the year before. In general, the number of engineering diplomas tends to increase over the years, from 30.000 per year in 2002 to 40.000 in 2017. However, most diplomas of high engineering schools are generalist without indicating a potential specialty. That explains the lack of data regarding students and graduates. The main sources for data are the surveys conducted by IESF and governmental/public data.

#### **Ireland**

In Ireland, a census in 2016 estimated the population of engineers at 42.771. This number might be widely underestimated, and engineers could even reach 95.000 as many of them, while filling in job titles, do not always include the term “engineer” or a related term. The category the most represented in the country is civil engineering (with 11.000), followed by mechanical and electrical engineering (with 8.333 and 7.143). A trend upward is noted in civil, mechanical, electrical and chemical engineering. More detailed data on the number of students and their speciality are not available. The analysis of discipline-specific trends for students is complicated by the common/general entry route. The main sources for data are the surveys conducted by Engineers Ireland.

#### **Portugal**

In Portugal, overall in 2017-2018, there were 194.600 active engineers, 291.600 graduates and 66.748 students. An increase was noted in the percentage of higher education professionals, a trend which also extended to engineering activities with an annual growth of over 4 or 5% in most categories in recent years. The categories the most represented are the civil engineers (with 45.000), then followed by the electrical engineers, the mechanical and the computer engineers (33.100, 28.500 and 28.300). There is a strong trend upward for biomedical engineers in the past years (about 29%), as well as for aerospace, computer and naval engineers. The main sources are coming from DGEEC (Higher Education Graduates per school year) and PORDATA (Employment by profession).

#### **Germany**

The overall number of engineers in Germany is about 2.36 million (data from Mikrozensus 2017). The categories the most represented in 2017 are the civil engineers (476.900) and the mechanical engineers (455.000), followed by the computer and electrical engineers (418.900



and 409.800). A trend upward is noted for civil, environmental, chemical, computer and industrial engineers. Some numbers are available on the number of students in engineering programs. The most represented in 2018 are computer engineering (227.124), mechanical engineering (185.183), civil engineering and architecture (117.037) and electrical engineering students (81.934). The main sources for data are Mikrozensus and Statistisches Bundesamt.

## **Italy**

In Italy, overall in 2018, there were 765.000 graduates in engineering, 80.000 self-employed professional engineers and 30.000 freelance engineers. In 2017, there were 47.413 new graduates in engineering with a trend upward of 7% compared to 2016, with more than half being in bachelor's degrees and the rest being in master's degrees. For bachelor's degrees, the categories the most represented are industrial, IT and civil and environmental engineering. For master's degrees, the categories the most represented are mechanical, construction and managerial engineering. Data are missing regarding the number of engineering learners in academic years, the specialization for active engineers and the trends for the different categories. The main sources are coming from the Fondazione CNI Centro Studi.

## **Poland**

According to Eurostat, in 2018 in Poland, the number of scientists and engineers per 1.000 inhabitants was 22.18 (compared to 31.23 in 2010), considering that the Polish population was of 37.98 million. This number does not reflect the real situation, because many Polish engineers work and live outside Polish borders. About 18 million Poles live outside the country. In Poland, there is a general lack of engineers, and universities are trying to fill these deficits. The situation is made difficult by the fact that qualified employees, such as engineers or IT specialists, can easily find a job in Germany for example. Students of engineering and technical faculties constitute 9.7% of all students in Poland. According to the data of the Central Statistical Office, the number of students at technical universities increased only slightly from 289.300 in 1999 to 301.400 in 2015. The most popular fields of studies for first degree (bachelor's, engineering) and single master's degree in the academic year 2019-2020 according to the total number of applications (over 8.000) are first and foremost IT, then construction, logistics, production management and engineering, automation and robotics, biotechnology and mechanics and machine building. For many years, IT has been the faculty the most frequently chosen (almost 33.000 students have applied for this faculty in 2019). There is a trend upward in this area, as well as in logistics, mathematics and data analysis, whereas the number of students is decreasing in automation and robotics and mechanics and machine building. There is however a lack of useful data on non-active graduates. It can be noted that Poland's post-1989 demographics were lower, which affected the number of students. On the other hand, however, studies became the choice of most high school graduates. Thus, in 2018, 44% of young adults in Poland reached higher education ("Education at a glance 2019"). Amongst them, young people are increasingly choosing engineering studies.

## **4. Personal background**

### **France**

In France, the gender balance in the engineering field tends to improve. In 2012, there were 25% women in engineering positions, and in 2017 they reached 28-29%. In general, there are very few women in NTIC, electronics and aerospace. They are more present in agriculture, chemistry and life sciences. In terms of socio-economic origins, 61% of active engineers have fathers from high social classes (CEOs, liberal and superior intellectual professions, executive positions). It is considered that an individual has more chances to become an engineer when a parent was one as well: one engineer out of six in 2014 has a father working as an engineer. It was also noted that there are around 15% of engineering diplomas delivered to foreigners. Considering the personal situation of the active engineers, some data are available according to the age groups. For engineers between 30 and 34 years old, 23% are in a relationship with another engineer. There is a high proportion of women over 45 without a conjoint partner, and around 33% of male engineers from 55 to 59 have partners without a professional activity. On the topic of personal background, some data are unavailable, mainly regarding the highest education level of parents, the trends in social mobility, and overall very few data on origins and the socio-economic status. The main sources for data are the surveys conducted by IESF and governmental/public data.

### **Ireland**

In Ireland, the gender balance is far from achieved, as women comprise only 13% of the new entrants and graduates in engineering, whereas female students are much more numerous in STEM studies (around 40%) in 2018. The gap is the largest in civil & building, electrical & electronic, mechanical & manufacturing engineering. As for their origins, 86% of active engineers are Irish nationals (in 2016). Many data gaps exist in Ireland on the personal background of engineers. There is no data regarding the highest education level of parents, the socio-economic status, the trends in social mobility and the personal situation of engineers. The main sources for data are the surveys conducted by Engineers Ireland.

### **Portugal**

In Portugal, in terms of gender balance, there are 77,2% of male engineers and 22,8% of female engineers (in 2017-2018). Regarding their origins, 90,7% engineering students are Portuguese, 5% come from Portuguese speaking countries. Commonly, engineering students come from a background with parents with a basic level of education. Less than 20% of engineering students have parents who reached high school and higher education, while active engineers have parents who reached higher education at 50%. As for the socio-economic status, a majority of engineering students are from the middle class, with a family monthly net income between 721 and 2.880 EUR. Regarding, social mobility, according to a survey on students' socioeconomic conditions, the percentage of families increasing their qualifications (35,7%) was four times more than the national homologous weight (9,8%). The situation of children from parents with basic education has improved over time, especially as from the 1970s. Regarding the personal background, more detailed data are available on engineering students rather than on active engineers, but related to the period 2005-2011. The main sources are DGEEC, PORDATA, DGES (Higher Education Students socioeconomic survey), Eurostat, ICOR 2005/2011, FFMS (Social Mobility in Portugal).

## **Germany**

In Germany, the gender balance is not yet achieved, with around 23 % of female engineering students (2018) and 17,7% of active female engineers (Mikrozensus 2017). There is however no data on the current trend towards a potential improvement of the gender balance. As for the origins, it was noted that there are around 18,2% of foreign students and 367.100 foreign active engineers (2017). Many data lack on the personal background of engineers, mainly regarding the highest education level of parents, the socio-economic status, the trends in social mobility and the personal situation of engineers. The main sources for data are Mikrozensus and Statistisches Bundesamt.

## **Italy**

In Italy, regarding the gender balance, there are 28% of graduated women in 2017, which is an increase compared to the number in 2014 (26,2%). Very few master's degrees are delivered to women in safety, marine and electronic engineering. As for the origins of engineers, 11.825 diplomas were delivered to foreign students by Italian universities in 2018. 14,3% of students have at least one graduated parent, 20,4% have both parents graduated and 60,3% have none. On active engineers, data are missing on their origins and socio-economic status. Data also lack regarding the personal situation and trends in social mobility. The main sources are coming from the Fondazione CNI Centro Studi and Alma Laurea.

## **Poland**

In Poland, in 2017, there is 48% of female engineers and scientists against 52% of male. The percentage of women at technical universities has increased significantly, with 36% of female students in higher technical schools. According to a report on Women at Technical Universities in 2019, the number of women in technical faculties is increasing from year to year. In ten years, the proportion of women in polytechnics increased from 31% to 37%. Moreover, the number of women who want to continue their scientific careers is also growing. The number of doctoral students is increasing, up to 41%. There are still very few women in many faculties run by technical universities, such as electrical engineering (6,7%), automation and robotics (9,1%), or mechatronics (9,5%). Most females are in biotechnology (76,8%), architecture (71,4%) and chemical technology (69,6%). As for the origins of engineers, the only information available is the number of foreign students in general. In the academic year 2019/2020, there are almost 85.000 foreign students in all Polish universities. There is a lack of useful data regarding the highest education level of parents, the trends in social mobility, the socio-economic status and personal situation of engineers.

## **5. Initial and continuing education**

### **France**

In French engineering education, there is a pre-eminence of preparatory classes to access to engineering schools. Most students go in public schools, which are welcoming more than twice the number of students compared to private schools. Engineering diplomas can last three or five years, but many graduates and active engineers (around one-third) have a second equivalent diploma, which is considered to be an asset in the career. Apprenticeships are not that widespread in the French engineering education system – 14,6% for initial training in 2017-2018 – though the practice tends to grow. Apprenticeships for initial training are the most frequent in private schools. Preparing a doctorate is however quite widespread in engineering, with 16.600 graduates in doctoral studies in 2018, and more than half of them (900) preparing their doctorate out of a doctoral contract and in a professional framework. 8.900 other engineering graduates are declaring they are continuing their studies. Together, these two groups of 25.500 engineers represent two-thirds of the graduates of the year. As for continuing education, in 2017, universities, public engineering schools and the CNAM (Conservatoire National des Arts et Métiers) are training 447.600 interns in continuing education, against 436.300 in 2016 and 454.200 in 2007, outlining a trend upward. On this topic about education, data are missing regarding courses for specialization and training for professional and soft skills. The main sources for data are the surveys conducted by IESF and governmental/public data.

### **Ireland**

Regarding the Irish level of education for engineers, there are 3.865 graduates from levels 7 and 8 courses in 2017, which represent a 1% increase since 2016 but a 15% decrease since 2012. As for graduates from levels 9 and 10, they were estimated at 1.031 in 2017, which represent a steady increase in this postgraduate level in recent years, up to 9% since 2016 and 40% since 2012. Considering the practice of apprenticeships, an increase of 9% of apprentices has been noted from 2016 and 2017 and of 81% since 2012. New forms of apprenticeships have been developed led by industry consortia with higher education institution partners. Continuing education has also been invested by engineering organizations to focus on upskilling and reskilling employees in collaboration with educational institutions. However, offers for apprenticeships remain low, as well as measures targeting female talents. Data lack regarding the status of the higher education institutions, the courses of specialization and training for professional and soft skills. The main sources for data are the surveys conducted by Engineers Ireland.

### **Portugal**

In Portugal, more than half engineering students have reached the EQF level 7 (54,5%), while 41,8% are in Level 6 and only 3,7% are in Level 8 (2017-2018). Students are for a vast majority at university (65,7%) while 34,3% attend Polytechnic schools. There are several data gaps regarding engineering education in Portugal, mainly on the practice of apprenticeship and internship, the courses of specialization and training for professional and soft skills in higher education institutions. The main source is DGEEC 2017/2018.

## **Germany**

There is a lack of useful data regarding initial and continuing education in Germany.

## **Italy**

Some data on the number of graduates from bachelor's and master's degrees were already noted in the chapter on the population of engineers. Furthermore, 80,4% of students who have obtained a bachelor's degree go to further studies in order to obtain a master's degree. 11,7% of graduated students go to the level of the Master, and 6,3% go to postgraduate studies. Regarding the practice of apprenticeships and internships in the country, 13,7% of students benefit from an apprenticeship and 11,6% from an internship. There are other categories mentioned as well in the national data: Stage (27%), Vocational Training (4%) and Professional Training (2,7%). Data are missing regarding the trends in these above-mentioned categories and on the status of the higher education institutions. The main sources are coming from the Fondazione CNI Centro Studi and Alma Laurea.

## **Poland**

In Poland, most adults pursue a master's degree, with seven out of ten young tertiary-educated adults having a master's degree. In spite of high attainment at master's level, only few go on to pursue a doctorate and the vast majority of postgraduate students are women. On the level of education, the data available in Poland concern the overall population and not specifically the engineering one. The same applies for continuing education. According to the Adult Education Survey, 26% of adults participated in continuing adult learning and training in 2016. Regarding training for professional and soft skills, some data are available, again for the overall population. Almost one out of two tertiary-educated adults in Poland has participated in formal and/or non-formal education and training compared to less than one-fifth of adults with upper secondary education. Distance learning plays an important role in the provision of non-formal training opportunities. This is particularly the case in Poland, where 47% of adults participating in non-formal education and training programs are enrolled in a distance-learning course. Training within the company is more often informal than institutionalized, and the direction of knowledge flow is in line with employees' seniority: more experienced employees pass on knowledge to younger ones. This is particularly important considering the need to accumulate knowledge in the organisation and to minimise the risk that, with the outflow of older workers, there will be a loss of competence resources. As the main sources on this topic come from the OECD, specific data on engineers are lacking. Data are also missing as regards the course of specialization and level of education.

## **6. Career development and mobility**

### **France**

In France, the unemployment rate for engineers is quite low comparing to other professions, with 3,4% for active engineers including graduates seeking their first job, and 2,5% if the later are excluded (in 2018). There are usually more periods of unemployment for women when they change jobs, especially when they are over 50 years old. Regarding professional insertion, an improvement has been noted with 14% graduates in job search at the end of 2017 against 18% at the end of 2016. Most graduates find work approximately two months after graduation (82% in 2017). At the end of their career, 75% of engineers have been through three types of activity, but only 16% end their career with one type of activity. Mobility is therefore quite easy and frequent, especially for the age group 30-39, with no period of unemployment between two employers for 80% of cases. As for the international mobility, 39% have at least one experience abroad and around 15% of French engineers are working abroad in 2018. Access to positions with responsibilities grows with the number of years of experience, reaching a rate of 50% at the end of the career. 40% of women consider that their gender has an impact on their career development. There are however very few data on the trends in specialization. The main sources for data are the surveys conducted by IESF and governmental/public data.

### **Ireland**

In Ireland, the employment rate is high for engineers, with 95% in 2016 in all broad disciplines comparing to 89% in 2011. There is an enormous demand for engineers across the economy, especially in civil and building engineering and in medium-sized engineering businesses. More than 6.000 job openings for engineers were planned in 2019. The demand is particularly high for engineers with three to five years' experience. As for mobility, foreign workers are more likely than Irish workers to migrate again in the future. Data is missing regarding the time spent in the same position, the trends in specialization and the access to positions with responsibilities. The main sources for data are the surveys conducted by Engineers Ireland and Irish careers portals.

### **Portugal**

Regarding career development and mobility, some data are available on the employability of graduates in the training sector - which was of 68,9% - and on the internationalization rate of 22,6%, in 2016. As for the professional insertion of graduates, 96,8% graduates with a second cycle diploma find a job, 42,8% are professionally inserted at the end of their degree and 84,5% after six months. According to data provided by IEFP (Institute for Employment and Professional Training), the number of registered higher education unemployed has been decreasing since 2016 (431 in 2016, 381 in 2017 and 340 in 2018). There are no data regarding the time spent in the same position and access to positions with responsibilities. Detailed information on the unemployment rate is lacking as well. The main sources are IST (Instituto Superior Técnico) and IEFP.

### **Germany**

There is a lack of useful data regarding career development and mobility for engineers.

## **Italy**

In Italy, the unemployment rate updated in 2018 is of 4% for active engineers. As for professional insertion, 88,9% of graduates find a job in maximum five years after graduation. New hires are the most important for engineers between 25 and 34 years old. Regarding the number of engineers working abroad, it relates to 9% of graduated students. There are no data available on the time spent in the same position, trends in specialization and access to positions with responsibilities. The main sources are coming from the Fondazione CNI Centro Studi.

## **Poland**

In Poland, there is a strong increase in employment opportunities for those holding a bachelor's degree (63,8% of workers), those with a master's degree (80,7%), as well as for Bachelor-qualified engineers (76,5%) and Master-qualified engineers (85,3%). The unemployment rate for graduates from second cycle studies at technical faculties in 2017 is of 5,5 %, and 47% of them had professional experience in full-time or self-employment before graduation. In a report from 2019 of the Warsaw University of Technology, 77,6% of the respondents are employed based on a contract of employment, contract or work order, while 8,2% of the respondents do not work and do not look for a job because they want to continue their studies. A majority of graduates found a job while still studying. Over 41% of graduates declared that they did not have to look for their first job: it was offered to them. In Poland, engineers are becoming more and more mobile. For career development and higher earnings, they are ready both to move to another province and to migrate abroad, especially to Germany or Scandinavian countries. According to a survey of Bergman Engineering employment agency published in autumn 2014, 75% of contract engineers are open to job offers implying a relocation. Some data are missing regarding the time spent in the same position and the trends in specialization, as well as more details on engineers working abroad.

## **7. Labour conditions**

### **France**

In France, the average salaries for engineers vary according to the age and gender. It goes from 34.800 EUR to 48.700 per year for men, and from 33.000 to 45.000 EUR for women. The remuneration is higher for those with diplomas in administration and management. Almost all engineers benefit from employment security, as 93% have a permanent contract or are civil servants. More than half of engineers work 45 hours per week, which is more than the regular basis. Some data are available regarding the age of retirement and pensions. The medium age is 63 years old for retirement, with an average pension of over 50.000 EUR per year, but only 36% give up all professional activities. IESF has also conducted surveys to have an estimation of the perceived conviviality at work and the criteria considered by engineers to assess the quality of life at work. Overall, conviviality and satisfaction at work are considered with high rates. Flexibility in work time organization is considered as important in the work-life balance, and there is a growing number of beneficiaries of telework, including 19% of engineers in 2018. Data are missing on this topic regarding social security and other advantages, as well as the work-life balance for engineers. The main sources for data are the surveys conducted by IESF and governmental/public data.

### **Ireland**

In Ireland, the average salaries vary according to the experience, from 33.750 EUR at the beginning of the engineering career to 89.000 EUR per year after more than 30 years' experience. A Chartered Engineer can expect to earn 5.000 EUR per year more than an untitled engineer with the same number of years of experience. It takes more than 20 years of experience before this salary gap closes. The salaries have tended to increase since 2014, particularly for young engineers. 19% of engineers can benefit from health insurance by their employers. 5% is the typical contribution by the employer to the pension scheme of an engineer with 11-15 years' experience. The vast majority of employed engineers and technicians works full-time, estimated at 96% in 2016. As for work-life balance and benefits, data are available regarding maternity leave (69% engineers receive full pay for at least 26 weeks of maternity leave) and paternity leave (63% engineers receive full pay for at least two weeks of paternity leave). However, there are big variations according to the engineering sector. Some data lack regarding the perceived conviviality and satisfaction, the time of work per week, the flexibility in work time organization and the types of contracts. The main sources for data are the surveys conducted by Engineers Ireland.

### **Portugal**

Regarding labour conditions, there is a lack of useful data in Portugal. The only data available relate to the average salary of 1.834 EUR per month (which approximately corresponds to 22.000 EUR per year) in 2016, and to the 2019 rate, which goes from 4,59 EUR/hour for unqualified engineers and construction workers, to 10,87 EUR/hour for workers in building construction and engineering. The main sources are IST and Instituto Nacional de Estatística (INE).



## **Germany**

There is a lack of useful data regarding the labour conditions for engineers in Germany.

## **Italy**

In Italy, the salaries vary from 1.700 EUR per month after graduation (approximately 20.400 EUR per year), up to 2.500 EUR five years after graduation (approximately 30.000 EUR per year). The remuneration is higher for engineers in marine engineering, safety engineering and mechanical engineering. Most engineers work 40 hours per week, and 20% are working part-time. Most engineers work with permanent contracts (54,4% in 2018), then come the fixed-term contracts, apprenticeships and temporary contracts. Social security is available for engineers hired in public or private sectors, as well as for self-employed professional engineers. Data are lacking in terms of perceived conviviality and satisfaction, work-life balance and flexibility in work time organization. The main sources are coming from the Fondazione CNI Centro Studi.

## **Poland**

In Poland, the average salaries vary from 3.000 PLN (approx. 660 EUR) per month to 5.000 PLN (approx. 1.100 EUR) according to the years of experience. According to the National Salary Survey of Sedlak & Sedlak in 2016, the highest salaries were earned by graduates from technical faculties in software engineering, electronics and automation, electrical and power engineering and mechanics and metallurgy. Engineers expect an increase of 6% on average every year. Engineers' salaries grow the fastest in the first years of work. The biggest increase in remuneration is observed amongst employees between three and four years of professional experience. However, this trend is slowing down for people with at least six years of professional experience. These are the most likely to value their knowledge and skills below market offers. Women in Poland earn less than men and the gap widens faster with educational attainment than the average across OECD countries. While women with upper secondary education earn 80% as much as men with the same level of attainment, tertiary-educated women earn 71% as much as tertiary-educated men in Poland, according to OECD indicators. Regarding the types of contracts, up to 20% of engineers are freelancers, according to estimates of the engineering and recruitment company Bergman Engineering. Contracts are becoming particularly popular amongst flexible forms of cooperation. A contract engineer earns on average 20-30% more than a worker on a permanent basis. More than 95% of civil engineers are employed with a contract of employment and 23% of women work in this position. In Poland, civil engineers – amongst additional non-salary benefits – receive private medical care (32%), a company phone for private purposes (29%), financing of sports practice (28%) and life insurance (24%). Moreover, 13% receive a bonus every month. Regarding working conditions, adults with upper secondary education work 42 hours per week on average. A majority of them has a full-time job, while only a small part of the engineering population works part-time or is self-employed. After graduation, about 10% pursue their studies and only 1% is starting a family. Data are however missing regarding flexibility in work time organization and perceived conviviality.

## **8. Conclusion**

The presented data will be the foundation for future work packages in the E4E project proposal and more particularly for the E4E Monitor. The aim in mapping the available data for the selected pilot countries was to identify the data gaps and the data needs, which will be addressed through the E4E Surveys. Considering the different pilot countries, it can already be noticed that the availability of national data is uneven in terms of content and degree of detail. A wider range of relatively specific data is provided by France and Ireland, mainly through the surveys conducted by the National engineering associations, while data from Italy and Portugal are more restrained and even almost inexistent for some categories in the German case. In Poland, there is quite extensive information available through official sources, reports and surveys, but the data often concern the general Polish population, and not the engineering one specifically, and are often based on the educational background and level of the population. Some data gaps can nonetheless be found in most of the pilot countries on the same specific topics (though not exhaustive). This matter will have to be further investigated in the future editions of this report - perhaps through the diversification of the sources - and tackled in the E4E Surveys, in order to go towards a Monitor of engineering professionals as complete as possible and continuously updated with new data.

## 9. Tables

### France

#### Population of Engineers

<b>OVERALL POPULATION</b>		
	<b>Key data found</b>	<b>Source</b>
Number-Students	2017-2018: 158.774 learners in engineering education (Bac - Bac +5)  141.966 in engineering cycle (Bac +3 - Bac +5)	Chiffre du mois n°85-CDEFI
Number-Graduates	40.000 new graduates	IESF - 29e enquête nationale sur les ingénieurs 2018
Number – Active engineers	1.060.000 engineers 850.000 active engineers 10.000 retiring	IESF - 29e enquête nationale sur les ingénieurs 2018
Trend	A trend upward that will probably not stop according to the forecasts until 2026. Projection of the most important increase in the higher education for non-university engineering schools: +22,4%	MESRI-SIES, April 2018
<b>CIVIL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2017-2018: BTP (Construction industry) - Architecture: 9.927 <ul style="list-style-type: none"> <li>in engineering cycle: 9.400</li> </ul>	Chiffre du mois n°85-CDEFI
Number - Active engineers	BTP: 50.900 for – 65-year-olds (except doctors and retired engineers)  Génie civil (Civil Engineering) : 1.320	IESF - 29e enquête nationale sur les ingénieurs 2018  Répertoire IESF
Trend	Stable	
<b>MECHANICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2017-2018: 14.808	Chiffre du mois n°85-CDEFI

	<ul style="list-style-type: none"> <li>in engineering cycle: 13.450</li> </ul>	
Number - Active engineers	5.464	Répertoire IESF
Trend	Unknown	
<b>ELECTRICAL/GAS/WATER/WASTE MANAGEMENT ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2017-2018: Electronics/Electricity: 18.650 <ul style="list-style-type: none"> <li>in engineering cycle: 17.118</li> </ul>	Chiffre du mois n°85-CDEFI
Number - Active engineers	54.297	IESF - 29e enquête nationale sur les ingénieurs 2018
Trend	Stable, a little upward (2017)	
<b>STRUCTURAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	132	Répertoire IESF
Trend	Unknown	
<b>GEOTECHNICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	9	Répertoire IESF
Trend	Unknown	
<b>ENVIRONMENTAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	1.613	Répertoire IESF
Trend	Unknown	
<b>CHEMICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2017-2018: 4.939 <ul style="list-style-type: none"> <li>in engineering cycle: 4.507</li> </ul>	Chiffre du mois n°85-CDEFI

Number - Active engineers	9.478	Répertoire IESF
Trend	Unknown	
<b>BIOMEDICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	50	Répertoire IESF
Trend	Unknown	
<b>AEROSPACE ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	1.423	Répertoire IESF
Trend	Unknown	
<b>AGRICULTURAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2017-2018: 11.193 • in engineering cycle: 9.644	Chiffre du mois n°85-CDEFI
Number - Active engineers	15.200 for – 65-year-olds (except doctors and retired engineers)	IESF - 29e enquête nationale sur les ingénieurs 2018
Trend	Trend upward (2017)	
<b>INDUSTRIAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2017-2018: 33.460 • in engineering cycle: 27.407	Chiffre du mois n°85-CDEFI
Number - Active engineers	32.250 for – 65-year-olds (except doctors and retired engineers)	IESF - 29e enquête nationale sur les ingénieurs 2018
Trend	Trend upward (2017)	
<b>NUCLEAR ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	460	Répertoire IESF
Trend	Unknown	

<b>IT ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	10.233	Répertoire IESF
Trend	Unknown	
<b>ELECTRONIC ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	6.510	Répertoire IESF
Trend	Unknown	

## Personal background

<b>STUDENTS</b>		
	<b>Key data found</b>	<b>Source</b>
Gender	<p>2012: around 25% women 2017: around 28-29% women</p> <p>38.560 women in engineering cycle</p> <p>Very few women in NTIC, electronics, aerospace. More in agronomy and agri-food (58%), chemistry and life sciences (60%)</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018</p> <p>Les effectifs en cycle ingénieur 2017-2018 MESRI-SIES</p> <p>IESF Enquête 2014</p>
<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Gender	<p>2007: 23.270 men / 7.750 women</p> <p>2017: 28.400 men/ 11.300 women</p>	IESF - 29e enquête nationale sur les ingénieurs 2018
Origin	2016: 5.355 engineering diplomas delivered to foreigners: 14,8%	Chiffres du mois n°83 : Les ingénieurs diplômés de 1990 à nos jours - CDEFI

ACTIVE ENGINEERS		
	Key data found	Source
Socio-economic status	61% have fathers from high social classes (CEO, liberal and superior intellectual professions, executives). More chances to become an engineer when a parent was one as well: one engineer out of six in 2012-2014 school years has a father who is engineer (more than the % of engineers in society)	IESF Enquête 2014
Gender	20% women in 2012 28,5% women in 2017	IESF - 29e enquête nationale sur les ingénieurs 2018
Personal situation (family, children)	Age group 30-34: 23% of engineers in a relationship with another engineer. High proportion of women over 45 years old without a conjoint: 20%  1/3 of men engineers from 55 to 59 years old have partners without professional activity.	IESF Enquête 2014

### Initial and continuing education

STUDENTS		
	Key data found	Source
Level of education	Success rate slightly higher for women.	IESF Enquête 2014
Status of HEIs	Preeminence of preparatory classes to access to engineering schools: 47,6% (69,8% if we include preparatory classes integrated to engineering schools). Rise of the number of BTS (advanced technical certificate) or DUT (university degree of technology): 20%  2017-2018: Rise of 1,6% in the number of students in public schools compared to 2016-2017.  Out of 13.452 learners, 8,5% are in FIP (Formations d'Ingénieurs en Partenariat – Engineering Trainings in Partnership).  Total number of students in public schools: 108.685 (in engineering cycle: 101.765)  Total in private schools: 50.089 (in engineering cycle: 40.201)	IESF Enquête 2014  Chiffre du mois n°85-CDEFI

Apprenticeships /Internships	14,6% in apprenticeship for initial training (mostly in private schools).	Les effectifs en cycle ingénieur 2017-2018 MESRI-SIES
<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Level of education	<p>16.600 preparing a doctorate, with a majority with a status of employee (900 preparing a doctorate out of doctoral contract and in a professional framework); 8.900 are continuing their studies</p> <p>11% diplomas in management, marketing, administration.</p> <p>Second diplomas more current for engineers in economics and management, chemistry, physics (more than 50%). Less than 1/3 in informatics, communication, mechanics, industrial automation.</p> <p>1/3 of graduates with at least another diploma Bac+5. 80% consider that this extra diploma is an asset in their career.</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018</p> <p>IESF Enquête 2014</p>
Status of HEIs	<p>Paid doctorates: 55% in the public sector.</p> <p>2016: 72,9% of engineering diplomas delivered by public schools. Schools under MESRI (Ministry of Higher Education, Research and Innovation): 19.000 engineers/year (55%) Schools under other ministries or local authorities: 6.000 diplomas (17,4%).</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018</p> <p>Chiffre du mois n°83 – CDEFI</p>
Continuing education	<p>17% of doctorates have obtained their degree more than 5 years before. 25% for those pursuing other courses.</p>	IESF - 29e enquête nationale sur les ingénieurs 2018
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Level of education	38% of all engineers with a 2 <sup>nd</sup> diploma - level Bac + 5 and beyond.	IESF - 29e enquête nationale sur les ingénieurs 2018
Continuing education	In 2017, universities, public engineering schools and the CNAM (Conservatoire national des arts et métiers) are training 447.600 interns in continuing education, against 436.300 in 2016 and 454.200 in 2007.	Depp – « Repères et références statistiques sur les enseignements, la formation et la recherche 2019 »



## Career development and mobility

STUDENTS		
	Key data found	Source
Unemployment	9.800 (1%)	IESF - 29e enquête nationale sur les ingénieurs 2018
GRADUATES		
	Key data found	Source
Time in the same position	Age group 30-35: 16% with only 1 type of activity 60% with 3 types of activity	IESF - 29e enquête nationale sur les ingénieurs 2018
Work abroad	< 30: 17.7% 30-39: 17.9 %  For engineers less than 30 years old working abroad: half starts working and has never worked as an engineer in France. 20% of departures abroad are for transfer.  10% of 2017 graduates work abroad	IESF - 29e enquête nationale sur les ingénieurs 2018  Chiffre du mois n°85-CDEFI
Unemployment	Polls 2017: 0.9% Polls 2018: 1%	IESF - 29e enquête nationale sur les ingénieurs 2018
Professional insertion	Improvement of the professional insertion: 18% of graduates in job search at the end of 2016 against 14% at the end of 2017.  82% of the 2017 graduates found work 2 months after graduation.	IESF - 29e enquête nationale sur les ingénieurs 2018  Chiffre du mois n°85-CDEFI
Positions with responsibilities	Age group 30-34: less than 15% with leading positions.	IESF - 29e enquête nationale sur les ingénieurs 2018
ACTIVE ENGINEERS		
	Key data found	Source
Time in the same position	75% with 3 types of activity at the end of their career.  Mobility quite easy and frequent, especially for the age group 30-39.  More than 80% of cases: no period of unemployment between two employers.  Reasons for change (most frequent): better opportunities and dissatisfaction in the current job.	IESF - 29e enquête nationale sur les ingénieurs 2018  IESF Enquête 2014

	<p>Ruptures of contracts are rare for the age group 30-39 (more current for 54-60).</p> <p>30-39: ½ changed employer at least once in the last 5 years.</p>	
Work abroad	<p>Total : 15-16% (CH, USA, DE, UK) Progression towards Asia, a trend which is stabilizing. Weak trends towards Africa.</p> <p>Age group 30-39: 17.9% Age group 40-49: 14.9% Age group 50-64: 11% Age group +50: Around 50% departures are for transfers.</p> <p>39% of engineers with at least one experience abroad.</p> <p>63%: all the career spent in France.</p>	IESF - 29e enquête nationale sur les ingénieurs 2018
Unemployment	<p>Low unemployment rate: 3.4% (with graduates seeking their first job) against 2,5% (without).</p> <p>Unemployment rate rises after 50 years old: 4.6% (in 2014)</p> <p>Unemployment rates for engineers is quite low compared to the rates for all professions in France.</p> <p>More period of unemployment for women when changing jobs, especially after 50 years old.</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018</p> <p>IESF Enquête 2014</p>
Professional insertion	<p>40%: no difficulties 15%: difficulties on all profiles</p> <p>41% in job-search on 31/12/2016 found a job in February-March 2017 (60% were less than 30 years old).</p> <p>Professional insertion depends on the engineering area. Agronomy and chemistry: the lowest and most feminine rates.</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018)</p> <p>IESF Enquête 2014</p>
Positions with responsibilities	<p>50% with high responsibilities at the end of their carriers.</p> <p>Age group 40-44: 20% with leading positions Age group 50-54: around 40% Age group 60-64: around 50% Age group 70-74: + 55%</p> <p>Impact of being a woman on the career development: around 40% consider there is no impact, 40% consider there is some negative impact</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018</p> <p>IESF Enquête 2014</p>

	<p>2/3 of men from the age group 45-49 with hierarchical responsibilities.  3/4 of engineers for all responsibilities.  Maximum of responsibilities reached at the same age by women, but with less probability (55% for hierarchical responsibility and 62% for all responsibilities).</p>	
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## Labour conditions

GRADUATES		
	Key data found	Source
Average salaries	20-25: 34.800 (m.) / 33.000 (f.) EUR 25-30: 39.300 (m.) / 37.200 (f.) EUR 30-35: 48.700 (m.) / 45.000 (f.) EUR	IESF - 29e enquête nationale sur les ingénieurs 2018
Types of contracts	65% permanent contracts 1-2%: civil servants Around 25%: fixed-term contracts 10%: others	IESF - 29e enquête nationale sur les ingénieurs 2018
ACTIVE ENGINEERS		
	Key data found	Source
Average salaries	Average: 56.400 EUR per year (trend downward for - 50 years old from 2008 to 2017)  Women: 47.000 EUR p.a Men: 60.000 EUR p.a (gross)  More remuneration for those with diplomas in administration/management	IESF - 29e enquête nationale sur les ingénieurs 2018
Time of work/week	45 hours per week: 55%	IESF - 29e enquête nationale sur les ingénieurs 2018
Childcare facilities	Importance of such facilities in the quality of life at work: 15%	IESF - 29e enquête nationale sur les ingénieurs 2018
Conviviality	83%	IESF - 29e enquête nationale sur les ingénieurs 2018
Flexibility in work time organization	Importance in the quality of life at work: - Free organization: 48% - Telework: around 20% - Free time for other activities: around 4%	IESF - 29e enquête nationale sur les ingénieurs 2018

	<p>Telework: in growth, usually under 5 days per month Beneficiaries of telework: 19%</p> <p>46% of employers have set an agreement regarding telework (against 32% in 2014).</p>	
Types of contracts	<p>93% with permanent contracts or civil servants</p> <p>96% are employees, incl. 96% with an executive status (2014)</p> <p>More fixed-term and precarious contracts for women.</p>	<p>Chiffre du mois n°85-CDEFI</p> <p>IESF Enquête 2014</p>
Age of retirement and pensions	<p>50% above 50.000 EUR (net) / year for 60-64 years old More than 55.000 EUR as from 65 years old</p> <p>Medium age of retirement: 63 years old Only 36% give up all professional activities As from 65 years old, the majority is fully retired 70-74 years old: around 30% are still with an activity (though reduced). They are 14% after 80 years old.</p> <p>Pension at 60-64 years old without other activities: 50.206 EUR per year.</p>	<p>IESF - 29e enquête nationale sur les ingénieurs 2018</p>

## Ireland

### Population of Engineers

<b>OVERALL POPULATION</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	<p>Total students sitting in higher level STEM subjects for the Junior Certificate: 115.967 in 2018: +3%</p> <p>Total students sitting in ordinary level STEM subjects for the Junior Certificate: 44.135 in 2018</p> <p>Total students sitting in higher level STEM subjects for the Leaving Certificate: 84.048 in 2018.</p>	Engineering 2019 - Engineers Ireland
Number - Active engineers	42.771 engineers	Engineering 2018 - Engineers Ireland
Trend	<p>In the past five years, the total number of STEM students sitting at higher level has increased by 11%, while the overall increase in Junior Certificate students was 4.6%.</p> <p>As a proportion of all new entrants in higher education, engineering has remained relatively stable at 9%.</p>	Engineering 2019 - Engineers Ireland
<b>CIVIL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	863 new entrants in 2017 Trend: +48% in 5 years - 5% compared to 2016	Engineering 2019 - Engineers Ireland
Number - Graduates	<p>Graduates from Level 7 and 8 courses: 669 in 2017 Trend: - 55% in 5 years -13% compared to 2016</p> <p>Graduates from Level 9 and 10 courses: 167 in 2017 Trend: +26 % in 5 years +21 % compared to 2016</p>	Engineering 2019 - Engineers Ireland
Number - Active engineers	<p>11.000 in 2018</p> <p>4.840 in 2016</p>	<p>Engineering 2019 - Engineers Ireland</p> <p>Engineering 2018 - Engineers Ireland</p>
Trend	+10% on a 5-year trend	Engineering 2018 - Engineers Ireland

<b>MECHANICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	934 new entrants in 2017 Trend: - 12% in 5 years -13% compared to 2016	Engineering 2019 - Engineers Ireland
Number - Graduates	Graduates from Level 7 and 8 courses: 1.094 in 2017 Trend: +7% in 5 years +11% compared to 2016  Graduates from Level 9 and 10 courses: 132 in 2017 Trend: +154 % in 5 years +8 % compared to 2016	Engineering 2019 - Engineers Ireland
Number - Active engineers	8.333 in 2016	Engineering 2018 - Engineers Ireland
Trend	+8% on a 5-year trend	Engineering 2018 - Engineers Ireland
<b>ELECTRICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	Electrical and Electronics:  742 new entrants in 2017 Trend: -36% in 5 years -13% compared to 2016	Engineering 2019 - Engineers Ireland
Number - Graduates	Electrical and Electronics:  Graduates from Level 7 and 8 courses: 1.297 in 2017 Trend: +1% in 5 years -10% compared to 2016  Graduates from Level 9 and 10 courses: 197 in 2017 Trend: -3 % in 5 years +5 % compared to 2016	Engineering 2019 - Engineers Ireland
Number - Active engineers	7.143 in 2016	Engineering 2018 - Engineers Ireland
Trend	+3% on a 5-year trend	Engineering 2018 - Engineers Ireland
<b>GEOTECHNICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	Geoscientists: 1.261 (2010)	Engineering Labour Force
Trend	Unknown	

<b>ENVIRONMENTAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	Environmental protection technology 2017: New entrants: 10 2016: New entrants: 16 2015: New entrants: 16	New entrants by Institution, Gender and field of Study ( <a href="https://hea.ie/statistics-archive/">https://hea.ie/statistics-archive/</a> )
Number - Graduates	Environmental protection technology 2017: 96 2016: 48 2015: 84	All Graduates by Level and Field of Study ( <a href="https://hea.ie/statistics-archive/">https://hea.ie/statistics-archive/</a> )
Trend	Trend upward	
<b>CHEMICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	100 new entrants in 2017 Trend: +5% in 5 years -26% compared to 2016	Engineering 2019 - Engineers Ireland
Number - Graduates	Graduates from Level 7 and 8 courses: 94 in 2017 Trend: +4% in 5 years -20% compared to 2016  Graduates from Level 9 and 10 courses: 222 in 2017 Trend: +96 % in 5 years +38 % compared to 2016	Engineering 2019 - Engineers Ireland
Number - Active engineers	4.840 in 2016	Engineering 2018 - Engineers Ireland
Trend	+10% on a 5-year trend	Engineering 2018 - Engineers Ireland
<b>AGRICULTURAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	Food processing: 2017: 182 2016: 178 2015: 150	New entrants by Institution, Gender and field of Study ( <a href="https://hea.ie/statistics-archive/">https://hea.ie/statistics-archive/</a> )
Number - Graduates	Food processing: 2017: 401 2016: 339 2015: 309	All Graduates by Level and Field of Study ( <a href="https://hea.ie/statistics-archive/">https://hea.ie/statistics-archive/</a> )
Trend	Trend upward	
<b>INDUSTRIAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>

Number - Students	Manufacturing and processing 2017: 64 2016: 152 2015: 126	New entrants by Institution, Gender and field of Study ( <a href="https://hea.ie/statistics-archive/">https://hea.ie/statistics-archive/</a> )
Number - Graduates	Manufacturing and processing 2017: 415 2016: 455 2015: 390	All Graduates by Level and Field of Study ( <a href="https://hea.ie/statistics-archive/">https://hea.ie/statistics-archive/</a> )
Number - Active engineers	2.141 industrial and production engineers (2010)	Engineering Labour Force
Trend	Unstable trend upward and downward	

## Personal background

STUDENTS		
	Key data found	Source
Gender	<p>41% of women in Junior Certificate higher level STEM in 2018 (increase of 2% in 5 years)</p> <p>43% of women in Leaving Certificate higher level STEM in 2018 (increase of 2% in 5 years)</p> <p>Number of female students: higher level biology (62%), chemistry (57%), physics (29%)</p> <p>Women comprise 13% of new entrants and graduates (undergraduate and postgraduate), just one in eight.</p> <p>Apprenticeships: just 4% or 8 out of 211 are women.</p> <p>Larger gap: Civil &amp; Building, Electrical &amp; Electronic, Mechanical &amp; Manufacturing</p>	Engineering 2019 - Engineers Ireland
GRADUATES		
	Key data found	Source
Gender	13% of graduates (Level 7-10) are women	Engineering 2019 - Engineers Ireland



ACTIVE ENGINEERS		
	Key data found	Source
Origin	<p>86% are Irish nationals (2016)</p> <p>Foreign workers: a small but significant portion of Ireland's engineering-related workforce: 8%. 4% of engineers are non-EU citizens, while 3% of engineering technologists and technicians are non-EU citizens (a total of about 1.800 workers who are non-EU citizens). (2011)</p>	Engineering occupations - CareersPortal

### Initial and continuing education

STUDENTS		
	Key data found	Source
Apprenticeships/ Internships	<p>The total population of apprentices has increased by 9% in the past year and by 81% in the past five years. There are now 11.273 apprentices. There has been a particularly strong growth in apprenticeships relating to plumbing, carpentry, electrical and mechanics.</p> <p>New forms of apprenticeships have been developed in the past five years led by industry consortia with higher education institution partners. Five of these apprenticeships were launched in 2017:</p> <ul style="list-style-type: none"> <li>- Insurance Practice,</li> <li>- Industrial Electrical Engineering,</li> <li>- Polymer Processing Engineering,</li> <li>- Manufacturing Technology,</li> <li>- Manufacturing Engineering</li> </ul> <p>They include on-the-job learning (approx. 70%) and on-campus learning (approx. 30%). Apprenticeships are generally placed at Level 7 on the NFQ with a B.Eng. award upon completion after 2-3 years. There are currently 211 apprentices registered on these programs and the first cohort graduated in 2018.</p>	<p>Engineering 2018 - Engineers Ireland</p> <p>Engineering 2019 - Engineers Ireland</p>
GRADUATES		
	Key data found	Source
Level of education	3.865 Graduates from Level 7 and Level 8 courses. A 1% increase since 2016, but a 15% decrease over the past five years. (2017)	Engineering 2019 - Engineers Ireland

	1.031 Graduates from Level 9 and Level 10 courses. A steady increase in this postgraduate level in recent years, up to 9% in the past year and 40% in the past five years. (2017)	
Continuing education	Engineering organizations have been investing in upskilling/reskilling current employees (66%) and in collaborating with education institutions (64%). However, comparatively, few have been offering apprenticeships (26%) or specifically targeting female talents (23%).	Engineering 2019 - Engineers Ireland

## Career development and mobility

ACTIVE ENGINEERS		
	Key data found	Source
Work abroad	Foreign workers are more likely than Irish workers to migrate again in the future.	Engineering occupations - CareersPortal
Unemployment	<p>August 2011: 14,5%, i.e. 300.000 actively looking for work in the first quarter of 2011.</p> <p>Increase of the duration of unemployment for workers: on average 20 months. No official statistics on unemployment among engineers. Engineers Ireland reported a high level of unemployment for engineers and related technicians and technologists.</p>	Engineering Labour Force
Professional insertion	<p>Enormous demand for engineers across the economy. More than 6,000 job openings for engineers will be created in 2019.</p> <p>Civil &amp; Building Engineers are among the most in demand with 59% of organizations surveyed looking to hire these engineers in 2019. Meanwhile Mechanical &amp; Manufacturing Engineers and Electrical &amp; Electronic Engineers are sought by 39% and 35% engineering companies, respectively.</p> <p>The public also believe that there are plenty of job opportunities in the engineering sector in Ireland (62% agree).</p> <p>Employment rate in 2016: 95% (comparing to 89% in 2011) in all broad disciplines.</p> <p>The manufacturing industry is the largest recruiting field, employing 30% of all engineers.</p> <p>Engineers with 3-5 years' experience are in particularly high demand.</p> <p>Recruitment is particularly strong in medium-sized engineering businesses.</p>	Engineering 2019 - Engineers Ireland

## Labour conditions

GRADUATES		
	Key data found	Source
Average salaries	Engineering salaries continue to rise. A graduate engineer can expect to earn 33.750 EUR, 21% more than five years ago (or 5.000 EUR).	Engineering 2019 - Engineers Ireland
ACTIVE ENGINEERS		
	Key data found	Source
Average salaries	<p>January 2019:            1-2 years' experience: 33.750 EUR            6-10 years' experience: 50.000 EUR            More than 30 years' experience: more than 89.000 EUR</p> <p>Increase of salaries since 2014, particularly for younger engineers.</p> <p>A Chartered Engineer can expect to earn 5.000 EUR per year more than an untitled engineer with the same number of years of experience. It takes more than 20 years of experience before this salary gap closes. At this point, Chartered Engineers who become Fellows of Engineers Ireland can expect to earn an additional 15.000-20.000 EUR per year.</p>	Engineering 2019 - Engineers Ireland
Social security	19% benefit from health insurance by their employer.	Salary survey 2019 - Engineers Ireland
% working part-time	The vast majority of employed engineering professionals and technicians works full-time (96%) - 2016	Engineering occupations - CareersPortal
Work-life balance	<p>69% engineers receive full pay for at least 26 weeks of maternity leave</p> <p>63% engineers receive full pay for at least 2 weeks of paternity leave</p> <p>Big variations according to the engineering sector.</p>	Salary survey 2019 - Engineers Ireland
Pension	5% is the typical contribution by the employer to the pension scheme of an engineer with 11-15 years' experience.	Salary survey 2019 - Engineers Ireland

## Portugal

### Population of Engineers

OVERALL POPULATION		
	Key data found	Source
Number - Students	66.748	DGEEC 2017/2018
Number - Graduates (c1, I)	291.600	PORDATA
Number - Active engineers (c2, II)	194.600	DGEEC 2017/2018
<p><b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of over 5% in recent years).</p>		
CIVIL ENGINEERING		
	Key data found	Source
Number - Students	5.900	DGEEC 2017/2018
Number - Graduates (c1, I)	54.100	PORDATA
Number - Active engineers (c2, II)	45.000	DGEEC 2017/2018
<p><b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 4% in recent years).</p>		
MECHANICAL ENGINEERING		
	Key data found	Source
Number - Students	14.263	DGEEC 2017/2018
Number - Graduates (c1, I)	45.600	PORDATA
Number - Active engineers (c2, II)	28.500	DGEEC 2017/2018
<p><b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 8% in recent years).</p>		

<b>ELECTRICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	10.969	DGEEC 2017/2018
Number - Graduates (c1, I)	52.900	PORDATA
Number - Active engineers (c2, II)	33.100	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 7% in recent years).		
<b>STRUCTURAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
In Portugal, structural engineering activities are integrated into the civil engineers' practices.		
<b>GEOTECHNICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2.253	DGEEC 2017/2018
Number - Graduates (c1, I)	3.100	PORDATA
Number - Active engineers (c2, II)	1.900	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 8% in recent years).		
<b>ENVIRONMENTAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	551	DGEEC 2017/2018
Number - Graduates (c1, I)	20.700	PORDATA
Number - Active engineers (c2, II)	13.000	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 5% in recent years).		

CHEMICAL ENGINEERING		
	Key data found	Source
Number - Students	3.701	DGEEC 2017/2018
Number - Graduates ( <i>c1, I</i> )	25.000	PORDATA
Number - Active engineers ( <i>c2, II</i> )	15.600	DGEEC 2017/2018
<p><b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 4% in recent years).</p>		
BIOMEDICAL ENGINEERING		
	Key data found	Source
Number - Students	2.443	DGEEC 2017/2018
Number - Graduates ( <i>c1, I</i> )	4.600	PORDATA
Number - Active engineers ( <i>c2, II</i> )	2.900	DGEEC 2017/2018
<p><b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (sharp annual growth of about 29% in recent years).</p>		
AEROSPACE ENGINEERING		
	Key data found	Source
Number - Students	961	DGEEC 2017/2018
Number - Graduates ( <i>c1, I</i> )	1.600	PORDATA
Number - Active engineers ( <i>c2, II</i> )	1.000	DGEEC 2017/2018
<p><b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (sharp annual growth of about 14% in recent years).</p>		

<b>COMPUTER ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	19.492	DGEEC 2017/2018
Number - Graduates ( <i>c1, I</i> )	45.280	PORDATA
Number - Active engineers ( <i>c2, II</i> )	28.300	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (sharp annual growth of about 14% in recent years).		
<b>NUCLEAR ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
In Portugal, there are no nuclear engineers.		
<b>FOREST ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	203	DGEEC 2017/2018
Number - Graduates ( <i>c1, I</i> )	3.600	PORDATA
Number - Active engineers ( <i>c2, II</i> )	2.300	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 2% in recent years).		
<b>MATERIALS ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	842	DGEEC 2017/2018
Number - Graduates ( <i>c1, I</i> )	4.400	PORDATA
Number - Active engineers ( <i>c2, II</i> )	2.700	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 7% in recent years).		

NAVAL ENGINEERING		
	Key data found	Source
Number - Students	Missing data	
Number - Graduates (c1, I)	270	PORDATA
Number - Active engineers (c2, II)	190	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 15% in recent years).		
SURVEYING ENGINEERING		
	Key data found	Source
Number - Students	114	DGEEC 2017/2018
Number - Graduates (c1, I)	1.300	PORDATA
Number - Active engineers (c2, II)	800	DGEEC 2017/2018
<b>Trend:</b> Increase in the percentage of higher education professionals, trend also extended to engineering activities (annual growth of about 4% in recent years).		

**COMMENTS :**

(c1) – Assumptions :

- I. The distribution of active higher education professionals was, in 2005, identical to the corresponding higher education graduates' distribution;
- II. Each year, the percentage of engineers in the active higher education population's annual variation is identical to the percentage of engineering graduates.

YEAR	GRADUATES	ENG. GRADUATES	%	HE ACTIVE POPULATION	VARIATION	ENG. VARIATION	ACTIVE ENG.
2005	69 987	10 239	14,6%	674 500			98 678
2006	72 061	9 810	13,6%	702 200	27 700	3 771	102 449
2007	84 154	13 194	15,7%	718 800	16 600	2 603	105 052
2008	85 791	14 751	17,2%	761 300	42 500	7 307	112 359
2009	78 589	10 749	13,7%	785 300	24 000	3 283	115 642



<b>2010</b>	81 257	9 966	12,3%	819 700	34 400	4 219	119 861
<b>2011</b>	81 675	10 099	12,4%	891 800	72 100	8 915	128 776
<b>2012</b>	85 031	10 524	12,4%	926 000	34 200	4 233	133 009
<b>2013</b>	84 513	10 378	12,3%	945 100	19 100	2 345	135 354
<b>2014</b>	80 430	9 976	12,4%	1 076 300	131 200	16 273	151 628
<b>2015</b>	81 953	10 043	12,3%	1 133 300	57 000	6 985	158 613
<b>2016</b>	73 086	9 710	13,3%	1 195 800	62 500	8 304	166 916
<b>2017</b>	77 034	9 729	12,6%	1 232 500	36 700	4 635	171 551
<b>2018</b>	79 849	10 127	12,7%	1 304 000	71 500	9 068	<b>180 619</b>

## Personal background

<b>STUDENTS</b>		
	<b>Key data found</b>	<b>Source</b>
Socio-economic status (Family monthly net income) <i>(c1)</i>	< 720 EUR: 15%; From 721 to 2.880 EUR: 66%. > 2.880 EUR: 19%.	DGES – 2005
Gender <i>(c1)</i>	Female: 23,3% Male: 76,7%	DGEEC 2017/2018
Origin <i>(c1)</i>	Portugal: 90,7%; Portuguese speaking countries: 5% European Union: 2,5%; Others: 1,8%.	DGES – 2005
Highest education level of parents <i>(c1)</i>	Higher Education: 15,7% High School: 16,4% Basic: 47,9%.	DGES – 2005
Trends in social mobility <i>(c1)</i>	According to a students' socioeconomic conditions survey (source s3), a percentage of higher qualifying families (35,7%) was four times higher than the national homologous weight (9,8%).	
Personal situation (family, children) <i>(c1)</i>	Singles: 92,9% In unmarried couple: 1,9% Married: 4.7% Divorced/widowed: 0.5% With children : 4.4%	DGES – 2005

<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Socio-economic status (Average gross monthly earnings of highly skilled workers)	2018: Average: 1.632,30 EUR Minimum (Public Administration): 743,30 EUR Maximum (Utilities): 1.869,20 EUR	PORDATA (basis data)
Gender	Female: 25% Male: 75% <b>(c2-I)</b>	DGEEC 2017/2018
Origin	Portugal: 275.600 Portuguese speaking countries: 5.400 European Union: 5.700 Others: 2.300 <b>(c2-II)</b>	PORDATA (basis data)
Highest education level of parents	Higher Education: 50%; High School: 35% Basic: 15%	Eurostat, ICOR 2005/2011
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Origin	Portugal: 172.200; Portuguese Speaking Countries: 3.400 European Union: 3.600 Others: 1.400	PORDATA (basis data)
Highest education level of parents	Higher Education: 50% High School: 33% Basic: 17%	Eurostat, ICOR 2005/2011
Trends in social mobility	<i>“There is no great difference between birth cohorts of children, in addition to decreasing the likelihood of not passing basic. This clearly happens over time, with the exception of the children of parents with higher education, for whom it was almost nil, even among born in the 1940s. The situation of children of parents with basic education has improved over time, especially from the 1970s.”</i> (excerpt from the study "Social Mobility in Portugal", published by the Francisco Manuel dos Santos Foundation - FFMS) (s5).	

**COMMENTS :**

*(c2) – Data on the entire population with higher education*

*(c3) - Assumptions :*

- I. *Given a trend of slight decrease in female weight, percentages were estimated slightly higher than those in the student population in 2018;*
- II. *Estimate based on 2018 foreign resident population data.*

## Initial and continuing education

<b>STUDENTS</b>		
	<b>Key data found</b>	<b>Source</b>
Level of education	EQF Level 6: 27.906 (41,8%) EQF Level 7: 36.361 (54,5%) EQF Level 8: 2.481 (3,7%)	DGEEC 2017/2018
Status of HEIs	Polytechnic: 22.923 (34,3%) University : 43.825 (65,7%)	DGEEC 2017/2018

## Career development and mobility

<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Shift between public and private sector	Employability in the training sector: 68,9% (2016)	IST
Work abroad	Internationalization : 22,6% (2016)	IST
Professional insertion	2016: 96,8% for graduates with a second cycle diploma  Professional insertion at the end of the degree: 42,8%  Professional insertion after 6 months: 84,5%	IST
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Unemployment	According to data provided by IEFP (Institute for Employment and Professional Training), the number of registered higher education unemployed has been decreasing for three years (431 in 2016, 381 in 2017 and 340 in 2018).	

## Labour conditions

ACTIVE ENGINEERS		
	Key data found	Source
Average salaries	2016: 1.834/month EUR  January 2019: from 4,59 EUR/hour (unqualified civil engineers and construction workers) to 10,87 EUR/hour (workers in building construction and engineering).	IST  INE

## Germany

### Population of Engineers

<b>OVERALL POPULATION</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Active engineers	2.36 million workers in engineering-related occupations (2017)	Mikrozensus
Trend	Upward	
<b>CIVIL ENGINEERING &amp; ARCHITECTURE</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 117.037	Statistisches Bundesamt
Number - Graduates	2018: 22.343	Statistisches Bundesamt
Number - Active engineers	2017: 476.900	Mikrozensus
Trend	Upward	
<b>MECHANICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 185.183	Statistisches Bundesamt
Number - Graduates	2018: 35.623	Statistisches Bundesamt
Number - Active engineers	2017: 455.000	Mikrozensus
Trend	Downward	
<b>ELECTRICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 81.934	Statistisches Bundesamt
Number - Graduates	2018: 15.082	Statistisches Bundesamt

Number - Active engineers	2017: 290.600	Mikrozensus
Trend	Stable	
<b>GEOTECHNICAL ENGINEERING (GERMAN: BERGBAU/HÜTTENWESEN)</b>		
	<b>Data found</b>	<b>Source</b>
Number - Students	2018: 3.074	Statistisches Bundesamt
Number - Graduates	2018: 539	Statistisches Bundesamt
Number - Active engineers	2017: 9.800	Mikrozensus
Trend	Stable	
<b>ENVIRONMENTAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 8.727	Statistisches Bundesamt
Number - Graduates	2017: 1.603	Statistisches Bundesamt
Number - Active engineers	2017: 31.500	Mikrozensus
Trend	Upward	
<b>CHEMICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 9.005	Statistisches Bundesamt
Number - Graduates	2017: 1.603	Statistisches Bundesamt
Number - Active engineers	2017: 87.700	Mikrozensus
Trend	Upward	
<b>BIOMEDICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
This category is not applicable in Germany.		
<b>AEROSPACE ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 7057	Statistisches Bundesamt
Number - Graduates	2017: 1.523	Statistisches Bundesamt
Number - Active engineers	N.A.	
Trend	Unknown	

<b>COMPUTER ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 227.124	Statistisches Bundesamt
Number - Graduates	2018: 27.104	Statistisches Bundesamt
Number - Active engineers	2017: 418.900	Mikrozensus
Trend	Upward	
<b>AGRICULTURAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 27.269	Statistisches Bundesamt
Number - Graduates	2017: 6.103	Statistisches Bundesamt
Number - Active engineers	N.A.	
Trend	Unknown	
<b>INDUSTRIAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 70.691	Statistisches Bundesamt
Number - Graduates	2018: 12.923	Statistisches Bundesamt
Number - Active engineers	2017: 143.300	Mikrozensus
Trend	Upward	
<b>NUCLEAR ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	2018: 3	Statistisches Bundesamt
Number - Graduates	2017: 3	Statistisches Bundesamt
Number - Active engineers	N.A.	
Trend	Unknown	

## Personal background

STUDENTS		
	Key data found	Source
Gender	2017: 177.575 female students (23 %)	Statistisches Bundesamt
Origin	2017: 140.337 foreign students (18,2 %)	
ACTIVE ENGINEERS		
	Key data found	Source
Gender	2016: 404.600 female engineers (17,7 %)	Mikrozensus
Origin	2016: 325.200 foreign engineers (14,2 %)	Mikrozensus

## Initial and continuing education

Lack of useful data

## Career development and mobility

Lack of useful data

## Labour conditions

Lack of useful data



## Italy

### Population of Engineers

<b>OVERALL POPULATION</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	765.000 graduates in engineering 47.413 new graduates in 2017	Fondazione CNI Centro Studi (2017)
Number - Active engineers	80.000 self-employed professional engineers 30.000 freelance engineers	Fondazione CNI Centro Studi (2017)
Trend	Trend upward in the number of new graduates	Fondazione CNI Centro Studi (2017)
<b>CIVIL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	Civil and environmental engineering: 4.640 Bachelor diplomas delivered  Civil engineering: 2.625 Master diplomas delivered  Construction engineering: 2.890 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>MECHANICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	2.907 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>ELECTRICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	531 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	

<b>CHEMICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	730 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>BIOMEDICAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	1.021 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>AEROSPACE ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	Aerospace and aeronautical: 707 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>COMPUTER ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	7.210 Bachelor diplomas delivered 1.594 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>INDUSTRIAL ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	12.783 Bachelor diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	
<b>NUCLEAR ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Graduates	Energy and nuclear: 994 Master diplomas delivered	Fondazione CNI Centro Studi (2017)
Trend	Unknown	

## Personal background

STUDENTS		
	Key data found	Source
Socio-economic status	14,3% of students have at least one graduated parent, 20,4% have both parents who graduated and 60,3% have none.	Alma Laurea
GRADUATES		
	Key data found	Source
Gender	28% of graduated women in 2017 Number of graduated women in engineering increased from 2014 to 2017.  Very few master's degrees delivered to women in safety engineering, marine engineering and electronic engineering.	Fondazione CNI Centro Studi
Origin	11.825 diplomas delivered to foreign students by all Italian universities in 2018.	Fondazione CNI Centro Studi

## Initial and continuing education

STUDENTS		
	Key data found	Source
Level of education	80,4% of students who have obtained a bachelor's degree attend further studies in order to obtain a master's degree.  11,7% of graduated students attend Master studies.  6,3% of graduated students attend postgraduate studies (PhD).	Alma Laurea 2018
Apprenticeships/ Internships	13,7% Apprenticeship 11,6% Internship 27% Stage 4% Vocational Training 2,7% Professional Training	Fondazione CNI Centro Studi

## Career development and mobility

<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Work abroad	9 % of graduated students in engineering	Fondazione CNI Centro Studi (2018)
Professional insertion	88,9% of graduates find a job in 5 years after graduation New hires: 4,4% (under 25 years old)	Fondazione CNI Centro Studi (2018)
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Unemployment	4% of unemployed active engineers	Fondazione CNI Centro Studi (2018)
Professional insertion	New hires: 25-34 years old: 49,6% 35-44 years old: 25,8% 45-54 years old: 13,3% 55-64 years old: 4,7% Over 65 years old: 2,2%	Fondazione CNI Centro Studi (2018)

## Labour conditions

<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Average salaries	1.700 EUR after graduation	Fondazione Centro Studi CNI
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Average salaries	Up to 2.500 EUR in 5 years after graduation More remuneration for those with diplomas in marine engineering, safety engineering and mechanical engineering.	Fondazione Centro Studi CNI

Social security	A social security for engineers hired in public or private sector. A social security for self-employed professional engineers.	INPS INARCASSA
Time of work/week	40 hours per week: 89%	Fondazione Centro Studi CNI
% working part-time	Working part-time: 20%	Fondazione Centro Studi CNI
Types of contracts	54,4% Permanent contracts 19,4% Fixed-term contracts 13,7% Apprenticeship 12,2% Temporary Contracts 0,5% Others	Fondazione Centro Studi CNI

## Poland

### Population of Engineers

<b>OVERALL POPULATION</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	1999: 289.300 students at technical universities 2015: 301.400 students at technical universities 2019: 235.000 students at technical universities 56.700 students at agricultural universities	wPolityce.pl Glosnauzcycielski
Number - Graduates	2014: 557,8 per 1.000 inhabitants (in all areas). Out of this number, 12,4% are from engineering, manufacturing and construction; 6,7% are from science, mathematics and computing.	Eurostat
Number - Active engineers	2018: 22,18 scientists and engineers per 1.000 inhabitants (compared to 31,23 in 2010).	Obserwator Finansowy
Trend	Downward	
<b>CONSTRUCTION</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	11.776	Studia.pl
Trend	Stable	
<b>MECHANICS AND MACHINE BUILDING</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	8.104 applications from students	Studia.pl
Trend	Downward	
<b>LOGISTICS</b>		
	<b>Key data found</b>	<b>Source</b>
Number - Students	11.202 applications from students	Studia.pl

Trend	Upward	
<b>PRODUCTION MANAGEMENT AND ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number – Students	9.329 applications from students	Studia.pl
Trend	Unknown	
<b>AUTOMATION AND ROBOTICS</b>		
	<b>Key data found</b>	<b>Source</b>
Number – Students	8.936 applications from students	Studia.pl
Trend	Downward	
<b>BIOTECHNOLOGY</b>		
	<b>Key data found</b>	<b>Source</b>
Number – Students	8.455 applications from students	Studia.pl
Trend	Unknown	
<b>COMPUTER ENGINEERING</b>		
	<b>Key data found</b>	<b>Source</b>
Number – Students	32.680 applications from students	Studia.pl
Trend	Upward	

### Personal background

<b>STUDENTS</b>		
	<b>Key data found</b>	<b>Source</b>
Gender	2019: 36% of students in higher technical schools are women	Women at Technical Universities - Report 2019 (Kobiety na Politechnikach)

	Percentages of women: 14,6% of IT students 76,8% of biotechnology students 71,4% of architecture students 69,6% of chemical technology students 6,7% of electrical engineering students 9,1% of automation and robotics students 9,5% of mechatronics students  A trend upward: in 10 years, the proportion of women in polytechnics increased from 31% to 37%.	Dziennik.pl Builderpolska
Origin	2019-2020: almost 85.000 foreign students (6,37 %) in all Polish universities	Pulshr
<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Gender	61% of engineering, manufacturing, and construction graduates are men.  71% of postgraduate students in the 2012-2013 academic year are women.  Increase of female doctoral students, representing 41%.	Eurostat (2016) Rynekpracy.pl Builderpolska
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Gender	Engineers and scientists: 52% of men, 48% of women	Eurostat (2017)

### Initial and continuing education

<b>GRADUATES</b>		
	<b>Key data found</b>	<b>Source</b>
Level of education	Number of postgraduate students in the academic year 2012-2013 from technical universities: 14.279	Rynekpracy.pl
<b>ACTIVE ENGINEERS</b>		
	<b>Key data found</b>	<b>Source</b>
Level of education	Seven out of ten young tertiary-educated adults have a master's degree (all fields of study).	Education at a Glance: OECD Indicators



	25 – 64-year-olds with a doctorate: 0,6% (all fields of study).	(OECD, 2019)
Continuing education	2016: 26% of adults participated in continuing adult learning and training.	Adult Education Survey
Training for professional and soft skills	One out of two tertiary-educated adults in formal and/or non-formal education and training, and only one-fifth with upper secondary education.  47% of adults in distance-learning courses.	Education at a Glance: OECD Indicators (OECD, 2019)

### Career development and mobility

GRADUATES		
	Key data found	Source
Unemployment	5,5% for graduates of 2 <sup>nd</sup> degree studies (Master of Engineering) in technical faculties	Economic Future of Graduates (2017)
Professional insertion	47% of graduates of 2 <sup>nd</sup> degree studies (Master of Engineering) had work experience in full-time or self-employment before graduation.  Warsaw University of Technology - report from 2019: 77,6% of the respondents are employed, while 8,2% of the respondents do not work and do not look for a job because they want to continue their studies.  Over 41% of the graduates declared that they did not have to look for their first job: it was offered to them.	Economic Future of Graduates (2017)  Politechnika Warszawska
Work abroad	75% of contract engineers are open to job offers implying a relocation.	Survey - Bergman Engineering employment agency - Autumn 2014

## Labour conditions

GRADUATES		
	Key data found	Source
Average salaries	<p>Master's Engineers: 5.300 PLN gross (1.160 EUR approx.), which is 1.050 PLN higher than a Master's salary.</p> <p>Average salary in the national economy: 4.047.21 PLN gross (885 EUR approx.).</p>	National Salary Survey of Sedlak & Sedlak (2016)
Types of contracts	<p>Graduates of 2<sup>nd</sup> degree studies (Master of Engineering) in technical faculties:</p> <p>Full-time job: 67,6 % Part-time job: 10 % Self-employment: 6,2 %</p>	Economic Future of Graduates (2017)
Work-life balance	<p>Percentage of time after graduation, which an average graduate from a Master of Engineering spends on:</p> <ul style="list-style-type: none"> <li>- further studies: 10%</li> <li>- taking care of a child: 1%</li> <li>- other: 12,9 %</li> </ul>	Economic Future of Graduates (2017)
ACTIVE ENGINEERS		
	Key data found	Source
Average salaries	<p>3.000 PLN gross per month (660 EUR approx.) - with one year or less of professional experience 4.000 PLN (875 EUR) - with two and three years of experience 5.000 PLN (1.100 EUR) - after another year or two.</p> <p>Highest salaries:</p> <ul style="list-style-type: none"> <li>- 8.560 PLN for software engineers (1.870 EUR)</li> <li>- 8.400 PLN for project managers (1.840 EUR)</li> <li>- 6.600 PLN for site managers (1.445 EUR)</li> <li>- 6.000 PLN for product engineers (1.300 EUR)</li> </ul> <p>About 6% of increase on average every year.</p> <p>The biggest increase in remuneration is between three and four years of professional experience: about 20%.</p> <p>Women with upper secondary education earn 80% as much as men with the same level of attainment. Tertiary-educated women earn 71% as much as tertiary-educated men.</p>	<p>National Salary Survey of Sedlak &amp; Sedlak, in 2016</p> <p>Study on the effectiveness of the recruitment agency and the needs of candidates – Bergman Engineering January 2017</p> <p>Education at a Glance: OECD Indicators (OECD, 2019)</p>

Time of work/week	Approx. 42 hours per week on average for adults with upper secondary education.	Education at a Glance: OECD Indicators (OECD, 2019)
Types of contracts	Freelancers: up to 20%  Contracts are very popular in Poland.  A contract engineer earns on average 20-30% more than a worker on a permanent basis.	CentrumRekrutacyjne
Social security/pension	For civil engineers: private medical care (32%), life insurance (24%). More advantages: a company phone for private purposes (29%), financing of sports practice (28%) and life insurance (24%). 13% receive a bonus every month.	Muratorplus.

## Annex I: Engineers Europe Advisory Group Signatories

### 27 Signatories of the EEAG Letter of Intent



## Annex II: Engineers for Europe Project Partners

### “Engineers for Europe” (E4E)



#### Consortium Partners



#### Associated partners

