Gender-In

Gender in Environmental Sciences and Engineering

Panagiota Rouni, Mechanical Engineer, PhD.
Lecturer in Mechanical Engineering School, member of Gender Equality Committee, National Technical University of Athens
prouni@mail.natua.gr

Integrating Gender in Research on Climate, Energy and Mobility
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Greece – STEM Education (Male/Female)

Female secondary education graduates : more than **50%.**

Studies Categories (ISCED)	Total	Male	% Male	Female	% Female
Physics	3676	2316	**63**	1360	**37**
Chemistry & Geology	4900	1824	**37**	3076	**63**
Mathematics & Statistics	8468	4473	**53**	3995	**47**
ICT	7179	5522	**77**	1657	**23**
Engineering	39440	24779	**63**	14661	**37**
General Total in Higher Education	**190962**	**81604**	**43**	**109358**	**57**

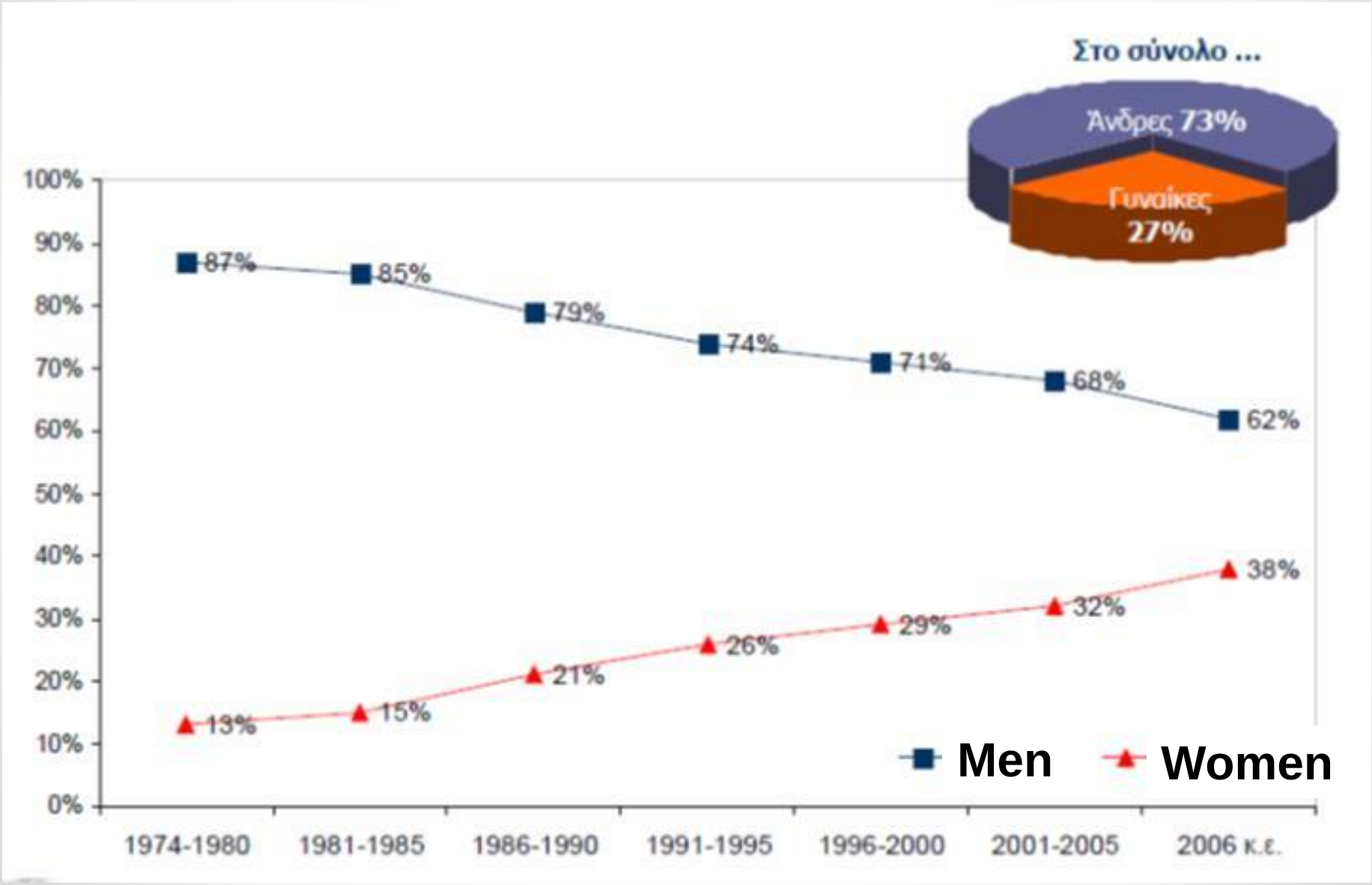
Women are more likely to successfully graduate bachelor in all fields than men (slight difference). So it is in Greece.

Greece: Women in Engineering

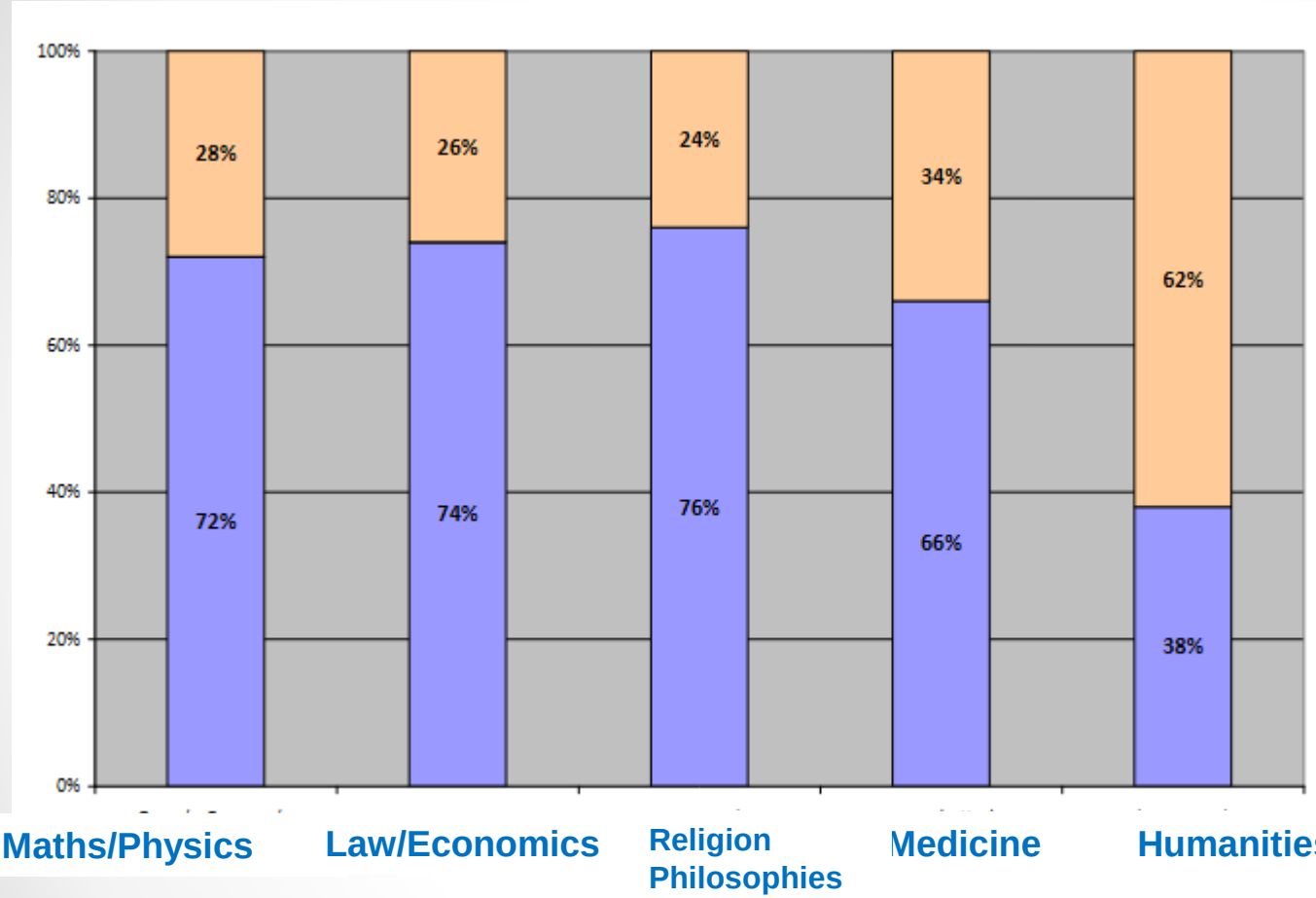
- Female secondary education graduates **:** more than **50%.**
- Female students in Technical Universities **: Average 38%.**
- **Architecture**: 80%, Civil Engineering: 50%, Chemical Engineering:60%, Electrical & Computer Engineers: 35%, Mechanical Engineers: 20%.
- Low percentage of women in Councils, Committees, Board of Institutions, Government and Local authorities and in Business & Higher Administration .
- Few enterprises by women in STEM sector
- Few women in Academia although equal presentation in lower research positions

Women, including migrant and refugee women, have to find adequate and dynamic jobs for personal and social development and accelerating innovation

Greece: Women in Engineering



Greece: Women in Academia (NKUA)

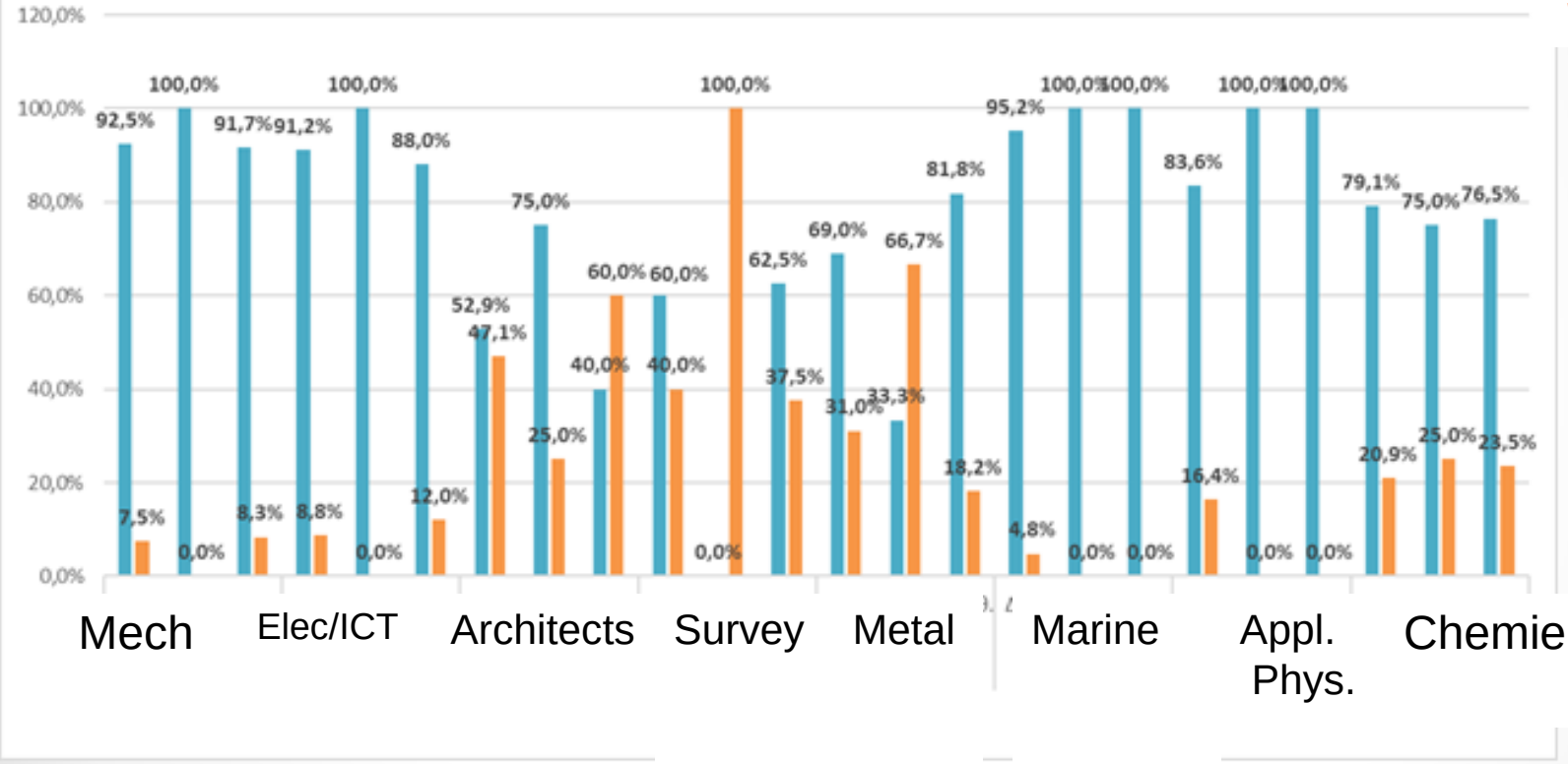


ΕΛΛΗΝΙΚΗ ΕΤΑΙΡΕΙΑ ΓΥΝΑΙΚΩΝ ΠΑΝΕΠΙΣΤΗΜΙΑΚΩΝ

https://www.elegyp.gr

While there has been some progress towards improving women's representation in decision-making and leadership positions, women represent less than 25% of heads of institutions in the higher education sector in 2019. In 2019, just over 3 in 10 board members were women (31.1%) and under one-quarter of board leaders (24.5%) were women at European level. In Greece it is 16%. In Engineering Schools it is ~5% except Architectural School which is ~50%.

National Technical University of Athens 2020-21
Teaching/Research Personnel in Charge (Directors)



Women

Men

Engineering & Environmental studies in Greece

Engineering studies are among the ones with higher competition.

Especially, Electrical & Computers Engineering Schools in Athens and Thessaloniki collect the students with the higher grading in the national exams. Engineering professions have well established professional fields in Greece, although there is low awareness of students that new fields are connecting with Engineering studies (Renewable Energy Sources, evaluation of CO2 impact, new materials for plastic replacement etc).

In Greece there are 7 Environmental Schools in Greek Universities. Three of them are in Technical Universities and in order a student to enter, there is high competition. The rest are situated in smaller cities and there is lower competition. Low awareness of students about professional fields of environmental studies could be blamed for.

Climate change, protection of the environment, industrial development according nature respect require cooperation of more scientific fields and interdisciplinary culture and teams. Diversity is essential for innovation and implementation.

Gender in Higher Education & Professionals

Academia:

Female graduates have already reached the 50% of all graduates in EU (average for 27 countries) and so in Greece.

According SHE FIGURES for 2018, women represented 48.1% of doctoral graduates at the European level. In Greece it is 47,5%.

Important gender gaps persist in specific broad fields of study.

At both the European and country levels, women doctoral graduates were over-represented in the field of Education and under-represented in the broad fields of Information and Communication Technologies and Engineering, Manufacturing & Construction.

Professionals :

Women were less represented among the population of employed scientists and engineers at the European level (41.3%).

Given the strategic importance of technology (tech) industry to the EU economy, these data indicate that greater effort is needed to increase women's participation in this field.

A new indicator shows that **women represent less than a quarter (24%) among self-employed professionals in Science and Engineering (S&E) and Information & Communication Technologies (ICT). In Greece this indicator is 22,8%.**

Gender in Higher Education & Professionals

Women remained under-represented in most STEM fields, with little or no progress since 2015. Data from 2018 show that, at European level, women continue to be under-represented among Doctoral graduates in the narrow STEM fields:

- Physical Sciences : 38.4%, (Greece: 49.2%)
- Mathematics & Statistics: 32.5%, (Greece 31,4%)
- ICT : 20.8%, (Greece 31%)
- Engineering & Engineering Trades : 27%, (Greece: 33,7%)
- Manufacturing & Processing : 41%, (Greece: 40%)
- Architecture & Construction :37.2%, (Greece: 45.6%)

Between 2015 and 2018, there was progress towards women's representation among Doctoral graduates mainly in ICT in Greece (10% increase)

In contrast, women represent more than half of Doctoral graduates in the fields of Biological & Related Sciences (60%) and Environment in 2018 56% (EU average).

In Greece Biological & Related Sciences is 63.5% and Environment is 50%

Female students in ICT Engineering

The development of technological sciences has increased the immediate need for sufficient human resources to fill these positions. The participation of women in technocratic professions is even nowadays quite limited. The dynamic presence of women in the technological industries could reverse this situation and provide a partial solution to the problem.

A research (Diploma thesis) in School of Electrical and Computer Engineering of the National Technical University of Athens compare the percentages of female students over the last decade (2010-2020) and there was a slight increase of female students participation especially after the Computer engineering was including in the title.
The research showed that in recent years female students reach only the 20% of the students at this School.
This is a severe under-representation of women in modern sciences and technologies and good practices may be implemented to increase this percentage.

Initiatives for this reason in Greece is quite few, coming mainly from NGOs and each one is addressing to a limited number of girls. Most of the large events promoting ICT are addressed to all pupils without gender sensitivity. This type of policy has easier implementation and is more accepted by the society but seems to have very low impact in ameliorating female percentages in these high promised field.

Good practices for more girls in ICT

Encouraging girls to study ICT and Engineering

- ✓ In Poland, there are the initiatives ‘Girls as Engineers!’ and ‘Girls Go Science!’, organised in association with the Conference of Rectors of Polish Technical Universities (KRPUT), which aim to introduce and promote STEM education among girls. Since their introduction in 2003, more than 150,000 girls have participated in these programmes.
- ✓ In Italy, the University of Modena and Reggio Emilia, the European Women Management Development Association, and the University of Bologna organise the ‘Digital Girls’ (Ragazze Digitali) Summer Camp, which is is open to girls in their second, third and fourth years of high school, free of charge.
- ✓ In Germany, the ‘Girls Day’ initiative has been in place since 2001, where girls in grades 5 to 10 are invited to visit companies, universities and research institutions. Since then, it has reached around 1.5 million girls, with 100,000 girls and 10,000 organisations participating each year. Since 2010, the corresponding ‘Boys’ Day’ initiative provides boys with opportunities to learn about careers in which men are currently under-rep-resented. Survey results with participating girls in 2018 found that 70% had learned about professions they cared about, with 41% stating that they would like to do an internship or apprenticeship in the company they had visited.

Good practices for more girls in ICT

- ✓ At European level, the EU Code Week initiative aims to introduce people of all ages (particularly school children) to programming in order to help to ‘demystify’ technology skills and show how technology can be applied in creative ways to solve problems. Schools across the EU are invited to participate as an opportunity for students to ‘explore digital creativity and coding’. Code week was launched in 2013 and has grown significantly over time. In 2015, there were 570,000 participants from 46 countries, increasing to 4.2 million participants from more than 80 countries in 2019. Of these, 49% of participants were women or girls.

- ✓ In the Netherlands, Girls Day is run by the Dutch National Expert Organisation on Girls/ Women and Science/Technology (VHTO). More than 300 organisations take part in the initiative each year, including technology companies, research institutes and higher education institutions, reaching more than 9,500 girls aged 10-15.. Activities include tours, workshops, quizzes and meetings with women STEM professionals to try and foster an interest in STEM subjects among girls.

Good practices for Gender inclusion in Engineering studies

- ✓ In Germany, the Women's and Gender Research Network (NRW) developed proposals (in both German and English) to integrate gender studies in a subject-specific way within degree courses for 55 subjects, including areas within the fields of Humanities, Social Sciences, Mathematics, Natural Sciences, Medicine, Engineering, Sport, Arts and Agricultural Studies. This work was part of the research project 'Gender in Bachelor and Master courses – integrate women's and gender studies into the curriculum', supported by the Ministry of Culture and Science of the German State of North Rhine-Westphalia .

- ✓ The EU-funded Baltic Gender Project, which involved partners from eight scientific institutions in Germany, Estonia, Lithuania, Sweden and Finland, aimed to develop approaches for gender-sensitive teaching in the area of Marine Sciences & Technology, with wider applications for gender-sensitive STEM teaching and gender-sensitive marine research. Within its approach to gender-sensitive teaching, it focuses on the inclusion of gender in curricula and gender-sensitive teaching set-ups.

Gender in Environmental studies

Environmental aspects in Engineering fields could make engineering studies more appealing to women .
Changing the perception of Engineering professions by the society and especially by girls and female students who don't like the stereotype of 'aggressive impact of Engineering over nature'.
For the environmental problems in Greece society blames two categories of people politicians & engineers. Both of them previous decades took, with no second thought, decisions with negative impact in the cities' structures, in the agriculture development, in the environment and in life quality in general, in order to catch the development race.
World priorities changed, environmental factor was considered seriously, but Greece development approaches continued in the same direction: no environmental concern. So, science and engineering offered alternative solutions to development, energy and environmental issues, but Greece was not able to follow.

Engineers - the ones society blames- are the ones who can give the solution. They have the knowhow to evaluate the environmental risk and design appropriate solutions. They also can work on implementation of positive environmental solutions (Renewable Energy sources, saving energy systems etc) and decrease of the financial and social cost of these solutions. Women engineers can play an important role in this direction.

Gender in Environmental studies

To be sensitive about environmental issues and nature of course are not qualities that only women engineers have, but it is true that women, according questionnaires' research, value more than men environment and nature. Women wonder about the environmental impact in more situations than men according researchers.

On the other hand, it is also true that contemporary women's engineering work, in general, does not introduce a clear diversity in environmental issues, at least in Greece. Engineering is a male dominated profession in Greece as in most countries even the most modern ones (Scandinavian etc). Women in the profession had to follow the established way of designing and constructing to progress and their studies were based in concepts of famous –men- engineers of previous generations.

Research in 2005, concluded that female students in Greece require environmental subjects (also bioengineering subjects) to be included in their engineering studies and are more keen to choose a diploma thesis or a Master programme in Environmental field.

Gender in Environmental Issues

There is a variety of factors which could include Gender in Environmental Issues :

- participation in policy-making, in decision- making positions, in climate change research and technology development, as well as in international negotiations.
- impact of climate change on women and men,
- contributions in energy consumption and pollution (CO_2 by cars)
- perceptions of climate change and
- preference of solutions for mitigation and adaptation.

Women and men living in Europe contribute differently to greenhouse gases and pollution according researches. These gender differentials in the consumption of services and goods can be explained, inter alia, by:

- gendered socialisation and the social roles assigned to, and performed by, women and men.
- the higher the income, the higher the CO_2 emissions

The portfolio of options women and men have for converting to a low carbon lifestyle and investing in energy efficiency or renewable energy installations is shaped by their education, gender roles, division of the household and income.

Gender in Environmental Issues

Developing information tailor-made for women might be one way to fill the knowledge gaps.

In EU, women have, on average, 17 % less disposable income than men to invest in more effective and environmental sensitive solutions (electrical cars, house renovation etc)

Women want to have more information about energy efficiency to help them to implement changes in their behavior and in their homes;
Men are more interested in the technological and financial measures and instruments that governments can provide.

This ‘double bind’ of relatively low paid work outside the home, and responsibility for most domestic tasks within it, exposes women to a number of environmental problems. People on low incomes and in relative poverty are more likely to be exposed to high levels of pollution and other negative environmental effects.

Gender in Environmental Issues

Professional women can play a positive role in Environmental Issues: There are women architects who already implement Bioclimatic solutions in the designs (building, cities etc).

More women in ICT could find easier acceptable ICT application for Smart homes and Smart cities.

More women with STEM, Engineering & architectural background in RES design implementation and/or Policy committees could lead to better weighted decisions which could increase acceptance from locals and nature protection societies.

More women in different engineering fields could offer the necessary diversity in order women feel free to think ‘outside the box’ and innovate.

Women engineers can play the role of ‘ambassadors’ of engineering and of new environmental solutions (RES, smart cities etc) in schools and in local level.

EDEM EU projects for Environment & Engineering

- **WOMENG 'Creating cultures of success for women engineers',** (2004-2005).

Last years, EDEM has been active not only on gender issues but also in environmental ones participated in projects and organizing conferences and seminars about Energy Saving, Renewable Energy Sources etc.

- **ALTENER** 'Women and Renewable Energy Sources - RES DISSEMINATION', (2001-2002).
  EDEM organized a 200-hour training seminar of women engineers on Renewable Energy

'Women declare their active role for the protection of the Environment - The gender perspective on the Environment', funded (57000€) by Greece and EU (May 2012 - April 2014).

Tree types of action:

- Research about Gender perspective on the Environmental issues (management of water resources, urban design, green energy, recycling etc.
- Visits at 4 high schools presenting positive engineering environmental solutions – (renewable energy sources, recycling, saving energy, bioclimatic design etc.) and discussing with students their local environmental problems and their future professional plans.
- **Mentoring for female students** who wanted to study engineering and for women engineers who wanted to plan a career in the environmental sector.

Women Engineers as ambassadors of environmental issues at high schools

National project **'Women declare their active role for the protection of the Environment - The gender perspective on the Environment'**

Rhodes' 1st High School

Agios Ioannis Rentis' High School

Women Engineers as ambassadors of environmental issues at high schools

National project **'Women declare their active role for the protection of the Environment - The gender perspective on the Environment'**

Veria's 3rd High School

Kaisariani High School