



WOMEN IN THE REFRIGERATION INDUSTRY

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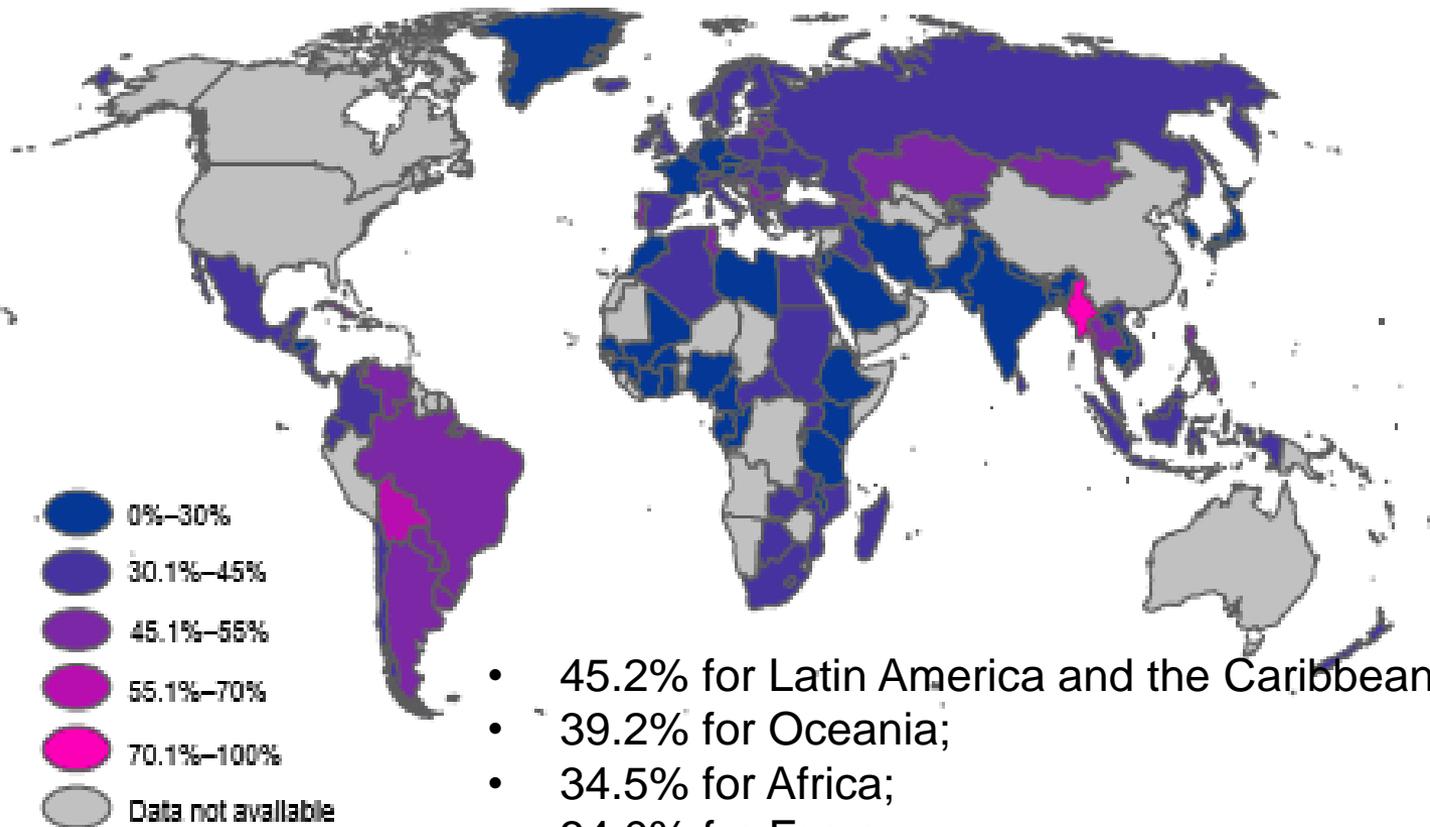
Introduction

- The IIR estimates that there are **3 billion** refrigeration, air-conditioning & heat pumps **systems in operation worldwide**
- By the middle of this century, people worldwide will use more energy for cooling than heating
- Almost **12 million people** employed in the **refrigeration sector**
- The US **employment in RACHP is projected to grow by 21%** from 2012 to 2022 compared to 11% for other professions
- Women are visibly under-represented in the industry:
 - 10% of the IIR commission members** (41 women to 369 men)
 - <10%** of participants in the IIR Congress 2015 were female
 - 12% of the Global Cold Chain Alliance** members

Demonstrate current status of women representation in the industry & propose actions based on 1st and 2nd IIR Women in Refrigeration workshop at ICR2015 and GL2016

Women in Science

Source: UNESCO Institute for Statistics, October 2012



Women in Engineering

- UNESCO (2010) records show that women engineers are 10 – 20%

Country	Women %	References	Country	Women %	References
Australia	9.8	Engineers Australia, 2012	Netherlands	5.5	Eurostat, 2014
Brazil	14.2	Maria Rosa Lombardi, 2005	New Zealand	13.0	IPENZ, 2013
Canada	22.3	Status of Women Canada, 2012	Norway	6.2	Eurostat, 2014
China	~ 40.0	In STEM; Engineer Live, 2013	Romania	5.5	Eurostat, 2014
Denmark	18.0	Eurostat, 2012	Russia	40.9	ParisTech Review, 2010
Estonia	68.0	The Globe and Mail, 2013	South Africa	10.0	IGU/UNESCO, 2013
France	23.0	Eurostat, 2012	South Korea	< 15.0	Sci Dev Net, 2014
Germany	13.0	Eurostat, 2012	Spain	5.4	Eurostat, 2014
India	12.0	IGU/UNESCO, 2013	Sweden	26.0	IGU/UNESCO, 2013
Italy	14.0	Eurostat, 2012	Switzerland	5.7	IGU/UNESCO, 2013
Japan	<15.0	Sci Dev Net, 2014	Turkey	1.8	Eurostat, 2014
Kenya	8.0	IGU/UNESCO, 2013	United Kingdom	8.7	IGU/UNESCO, 2013
Malaysia	10.6	Unesco 2015	United States	15.0	CareerBuilder, 2014

- IGU/UNESCO (2013) - Women engineering university students:
 30% in the US and Europe; 35% in India; 15% in South Africa;
 60% Persian Gulf countries

Women in Refrigeration

- Limited official records of women representation in the refrigeration industry globally
- Women represent 1.2% of HACR employees in the US & 1.7% Canada
- Initiatives of relevant industry associations:
 - **Women in HVACR (USA)**
Networking opportunities, mentoring & education
 - **The Cryogenic Society of America**
Women in cryogenics cover story
 - **UK ACR Journal**
Interviews with women working in the industry (career path & perspectives)
- IIR carried out a survey with National Refrigeration Associations worldwide to determine the women representation in the industry



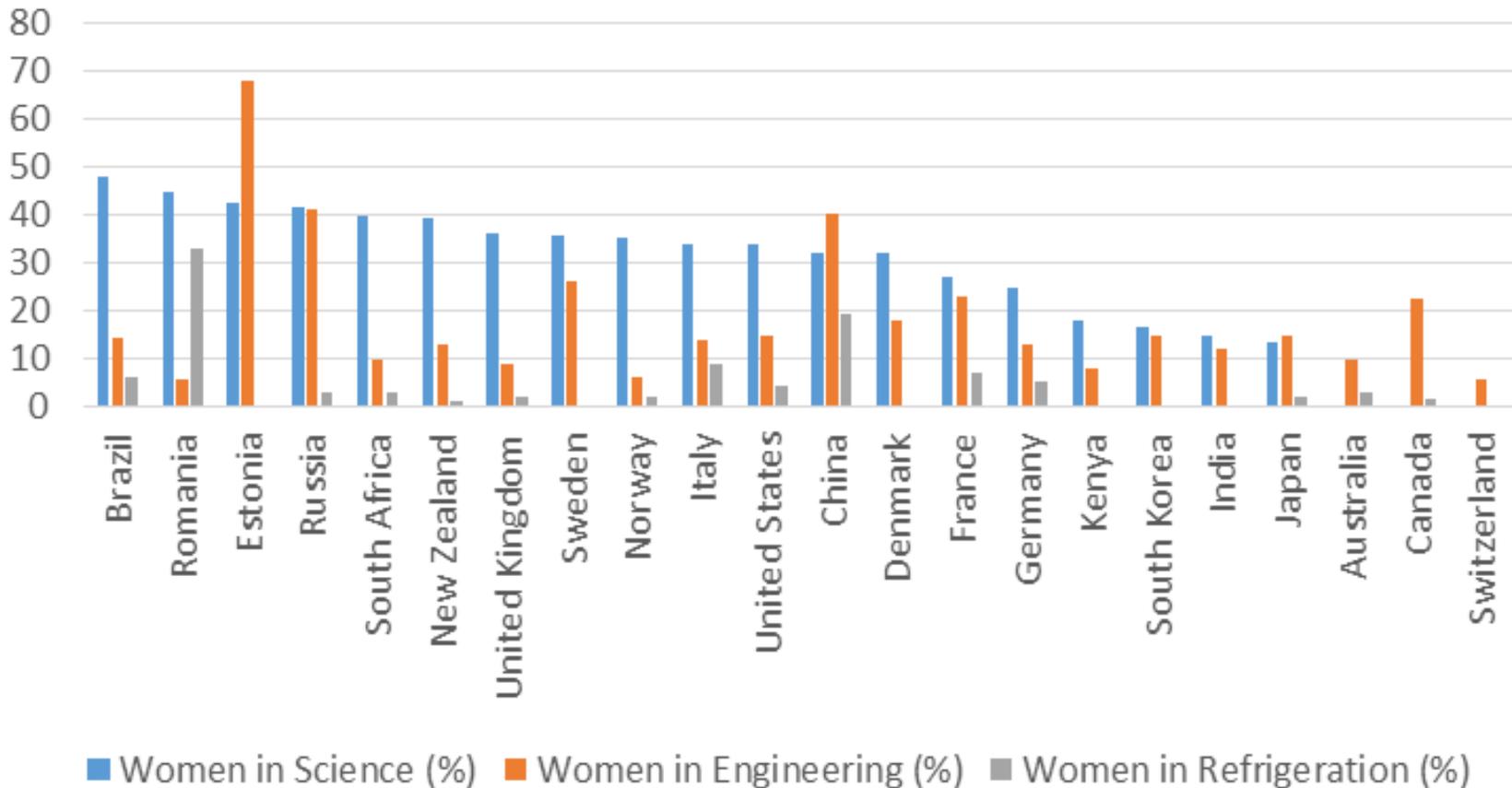
Survey from National Organisations

- 18 associations replied to the IIR survey on women members registered in 2014- 2015

Country	Association Name	%
Australia	Australian Institution of Refrigeration, Air conditioning and Heating	3.1
Brazil	Brazilian Association of Refrigeration, Air conditioning, Ventilation and Heating	6.3 (not reliable)
Canada	The Heating, Refrigeration, Air conditioning Institute of Canada	1.7
China	Chinese Association of Refrigeration	19.5
Congo	Congolese Association of Refrigeration Technicians and Air Conditioning	0.1
France	French Association of Refrigeration	7.0
Germany	German Refrigeration and Air conditioning Association	5.3
Italy	Italian Association for Air Conditioning, Heating and Refrigeration	8.8
Japan	Japan Society of Refrigerating and Air Conditioning Engineers	2.3
New Zealand	Institute of Refrigeration, Heating and Air Conditioning Engineers of New Zealand	1.0
Norway	Foundation for Scientific and Industrial Research of the Norwegian Institute of Technology	2.2
Russia	Russian Association of Engineers for Heating, Ventilation, Air-Conditioning, Heat Supply and Building Thermal Physics	3.0 (not reliable)
USA	American Society of Heating, Refrigerating and Air Conditioning Engineers	4.3
United Kingdom	Institute of Refrigeration	2.0
Romania	Refrigeration Technicians General Association in Romania	33.0
South Africa	South African Institute of Refrigeration and Air conditioning	2.8

Combined Data

- UNESCO reports of Women in Science (chart) & Engineering (table 1) + Women in Refrigeration (IIR survey)



IIR Women in Refrigeration - Feedback

- 2nd IIR Women in Refrigeration Workshop at GL2016 in UK

- Issues around attracting more young people into refrigeration:
 1. Lack of specific degrees in refrigeration
 2. Recognising the need for young people at all levels
 3. Remuneration and status of refrigeration
 4. Research needed: PhD in Women in Engineering
 5. Make increasing use of social media
 6. Use stories about helping people/solving problems
 7. National/educational campaigns/ideas
 8. Rebrand the industry

IIR Women in Refrigeration



1st IIR Women in Refrigeration Workshop at
ICR2015, Yokohama, Japan &
GL2016, Edinburgh, Scotland



Women in refrigeration promoted during
the IIR conference in Ohrid, 2017

Conclusions

- The IIR estimates that 4 workers out of 1,000 have a job linked to the manufacturing, installation and servicing of refrigeration equipment
- Women are under-represented in Engineering (10 - 20%)
- On average only 6.1% of women are members of national refrigeration associations

Conclusions

- Future initiatives to encourage women into the industry:

- Setting up a “**Woman in Refrigeration**” IIR sub-working group as part of a “**Career in Refrigeration**” working group which has been launched in February 2016 by the IIR STC (IIR Working Group, 2016).

- Having **more women** represented on each IIR working group and commission. In 2016, Prof **Judith Evans** and Dr **Catarina Marques** have been respectively appointed as the new president of the IIR Commission C2 on food science and engineering and the chairman of the “Career in Refrigeration” IIR working group

- **Increase visibility** by promoting refrigeration to the young generation including other minority groups. The IIR is part of the Management Committee of the **Exposition on Refrigeration** at the La Cité des Sciences et de l'Industrie (in Paris, France) planned 2018 which has the main objective to **promote refrigeration to kids** from primary, secondary and high schools.

Conclusions

- Future initiatives to encourage women into the industry:

- IIR **WIR** SWG involved as adviser with **AFBE-UK** in the **Africa Catalyst Project**. Aims to develop a databank of women in engineering & technology across the African Nations that will guide in developing programmes towards increasing the participation of women in science and engineering education and also retention in engineering workforce.

- IIR and UNIDO's **Member States** should boost women in the refrigeration industry in order to reverse the **growing shortage** of **engineers** worldwide has become a threat to global development, revealed a UNESCO report. As the world needs **creative engineering** solutions to face its biggest challenges, from poverty to climate change.

QUESTIONS?

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