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#### The IV<sup>th</sup> International Conference ENERGY PERFORMANCE OF BUILDINGS AND RELATED FACILITIES

EUROPEAN SOLUTIONS AND POLICIES FOR SUSTAINABLE URBAN DEVELOPMENT : THEORY AND PRACTICE



Târlea Gratiela

**Eugen Vargolici** 

Buc



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# SUSTAINABLE DEVELOPMENT ECOLOGICAL REFRIGERATION AND AIR CONDITIONING STUDY CASES

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- Study of the Romanian line up to the environment, refrigeration and airconditioning EU legislation with the recommendation of using ecological refrigeration systems.
- Some refrigeration, gas heat pump and air conditioning new study cases are presented.

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# INTRODUCTION



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• Romania signed Kyoto (1997) and Montreal Protocol (1987) and in the same time as a new member of the EU, it has obligations to respect the environmental legislation. CFC's have been replaced in many applications with HFC's (hydro fluorocarbons) and HCFC's (hydro chlorofluorocarbons).

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• On an international level, the role of **non-vapor compression methods such as absorption** (Study case 2), adsorption etc. may have become more important; however, vapor compression cycles are thought to remain the most important candidates.

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For the long term, only five important different refrigerants remain options for the vapor compression cycle in all refrigeration and A/C sectors : ammonia (R-717), carbon dioxide (R-744); hydrocarbons and blends (HCs, HC-290, HC-600a, HC-1270), hydrofluorocarbons (HFCs, unsaturated HFCs (HFOs)) and water (R-718).

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- **ROMANIA, AMMONIA TRADITIONAL USER** Some examples of such objectives are:
- GALIGALO Brasov, TRANSAVIA, AGRONUTRISCO Mihailesti, TUBORG Bucuresti, WAREHOUSE Tulcea, SCANDIA Sibiu, EUROPEAN DRINKS, URSUS Timisoara, URSUS Cluj, MILENIUM Bucuresti, CEFIN Bucuresti, PARMAFOOD Bucuresti; AVICOLA Buzau; Onesti SLAUGHTERHOUSE; BEER FACTORY INTERBREW Ploiesti, LOGISTIC PARK DELHAIZE and many others;
- For industrial refrigeration systems, these objectives were built, mostly, with European support.

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## COP VALUES FOR R717 AND R404A Slaughterhouse- Study Case 1

	<b>R717</b>		R404A		
	-40/-10 °C	-10/ +35° C	-40/+35 °C	-10/+35 °C	0/+45 °C
			(ba	27	
COP	4.10	3.84	1.24	2.78	2.79

#### EUROPEAN SOLUTIONS AND POLICIES FOR SUSTAINABLE URBAN DEVELOPMENT : THEORY AND PRACTICE AMMONIA POULTRY SLAUGHTERHOUSES



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### AMMONIA AS A VERY ECO-EFFICIENT REFRIGERANT ALTERNATIVE

- Ammonia like R404A has advantages and disadvantages which should be take into consideration by the equipments producers.
- Ammonia and hydrocarbons are more often used in industrial and domestic refrigeration systems, but their toxicity, flammability and security are limited to be used in refrigeration plants.
- As it was shown in the paper, ammonia is the best ecological refrigerant alternative (has ODP = 0 and GWP = 0).

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## **ROMANIA, AMMONIA TRADITIONAL USER**

Making analyses on the Romanian market during the last five years, it can be concluded that the most important application where ammonia was used, was in the food industry.

#### First carbon dioxide (R-744) refrigeration system!

Were rebuilt or built many refrigeration systems for warehouses, beer factories, poultry slaughterhouses, soft drinks factories, logistic parks, diary factories, wines factories, ice rings and so on. Each industrial refrigeration plant was made in one/two compression stages, with classical equipments.

• Next figures show the most important types of compressors, condensers, evaporators, used in Romanian ammonia refrigeration plants and a general view of the ammonia industrial refrigeration sector, in the last years.

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#### EUROPEAN SOLUTIONS AND POLICIES FOR SUSTAINABLE URBAN DEVELOPMENT : THEORY AND PRACTICE Bucharest, 24 - 25 May 2012 COMPRESSORS, EVAPORATORS AND CONDENSERS USED IN ROMANIAN AMMONIA REFRIGERATION PLANTS IN THE LAST FIVE YEARS



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## **CONCLUSIONS AND FUTURE WORK**

- Romania, ammonia traditional user;
- The recommendation of using eco- efficient refrigeration systems.
- Romania is a country in transition and also EU-member starting with 2007;
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- AGFR PFACR Cooperation Agreement and Working Group Established to solve problems (certification of the professional competence of companies and specialists working in refrigeration and air conditioning);
- POSDRU- 58665 SECTORIAL PROJECT-FPC FRIGO ECO Training courses;
- National and international level cooperation with similar organizations.

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# Thank you for your attention!

Activities for the Clearing House: develop the web page (www.agfro.ro) for the dialogue with the trade and other interested stakeholders

## http://www.agfro.ro mgtarlea2001@yahoo.com



## EUROPEAN SOLUTIONS AND POLICIES FOR SUSTAINABLE URBAN DEVELOPMENT : THEORY AND PRACTICE Bucharest, 24 - 25 May 2012 Absorption Chiller - Study Case 2



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# Gas Heat Pump (GHP) Study Case 3

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