

January 25, 2016

## **TC 8.3 RESEARCH SUBCOMMITTEE MINUTES OF MEETING IN ORLANDO, FL**

TC 8.3 Research Subcommittee met on January 25, 2016, in Orlando, FL. A list of minute recipients and attendees is attached. (Attachment 1)

### **1. Review of Minutes from June 29, 2015 meeting in Atlanta, GA.**

The minutes were reviewed and no changes were requested by the subcommittee members.

### **2. Application Guide for Absorption Cooling/Refrigeration using Recovered Heat – RTAR Development**

Paul Sarkisian reported as follows:

RTAR was developed by Rajesh Dixit, Paul Sarkisian and Bill Ryan. Subcommittee members reviewed RTAR write-up.

The title was changed to: “Application Guide for Absorption Chillers and Heat Pumps”.

Main committee suggested to change the title to: “Design Guide for Absorption Chillers and Heat Pumps”.

Main committee voted on RTAR acceptance: 7-0-0 CV with amended title.

Paul Sarkisian agreed to submit RTAR to ASHRAE.

Jurgen Scharfe agreed to participate in the furthering of the effort.

The RTAR is attached as Attachment 2.

### **3. Simulation Studies in Absorption and Co-generation Applications to Buildings – RTAR Development**

Bill Ryan, who offered to develop the pre-RTAR, was absent.

Tim Wagner reported that there has been no effort given to this RTAR to date.

#### **4. Other Business**

Discussion: Possibility of research on gas fired heat pumps in current energy markets.

Would an RTAR adding gas fired heat pumping be of interest?

Discussion was continued in main committee.

Suggested title: "Design Guide for Thermally Activated Heat Pumps".

Tim Wagner volunteered to develop a first RTAR draft.

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**Attachment 1****MINUTES RECIPIENTS AND ATTENDANCE LIST**

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**Research Topic Acceptance Request Cover Sheet**

(Please Check to Insure the Following Information is in the RTAR)

- A. Title
- B. Executive Summary
- C. Background
- D. Research Need
- E. Project Objectives
- F. Expected Approach
- G. Relevance and Benefits to ASHRAE
- H. Anticipated Funding Level and Duration
- I. References


Date: \_\_\_\_\_

Title: \_\_\_\_\_

**Application Guide for Absorption Chillers and Heat Pumps**

RTAR # \_\_\_\_\_  
(To be assigned by MORTS)

Results of this Project will affect the following Handbook Chapters, Special Publications, etc.:

**The results of this project will be an updated application guide to be sold to ASHRAE members or the HVAC industry**

Research Classification:  
Basic/Applied Research  
Advanced Concepts  
Technology Transfer


Responsible Committee: TC 8.3

Date of Vote: Planned for January 25<sup>th</sup>, 2016 (Orlando, FL)

For	*	
Against	*	
Abstaining	*	
Absent or not returning Ballot	*	
Total Voting Members		

**RTAR Authors**

Lead: **Rajesh Dixit**

Others: **William Ryan, Paul Sarkisian**

Co-sponsoring TC/TG/MTG/SSPCs (give vote and date)

**Expected Work Statement Authors**

Lead: **TC 8.3 members/guests**

Others:

Potential Co-funders (organization, contact person information):

Has an electronic copy been furnished to the MORTS?  
Has the Research Liaison reviewed the RTAR?

Yes	No

\* Reasons for negative vote(s) and abstentions

RTAR # \_\_\_\_\_

**Title:**

Application Guide for Absorption Chillers and Heat Pumps

**Executive Summary**

Describe in summary form the proposed research topic, including what is proposed, why this research is important, how it will be conducted, and why ASHRAE should fund it (50 words maximum)

Absorption technology has become critical to sustainable design by assisting carbon emission reducing CHP systems, exploiting waste heat streams, meeting the new DOE source based Zero Energy design criteria, and in tying ASHRAE into an international HVAC industry that uses absorption system more widely than in the US.

## Background

Provide the state of the art with key references (at the end of this document) substantiating it (300 words maximum)

Numerous strands in state of the art sustainable development have led to an increased importance of absorption technology

Combined heat and power systems have long been recognized as the most efficient method for powering and heating commercial buildings. However, maximizing the efficiency and the carbon reduction potential requires the productive use of CHP heat throughout the year, including during the cooling season. Absorption chillers provide the best avenue for cooling production driven by the waste heat from a CHP system.

Recent technical and social developments have made the need for CHP with cooling, referred to as trigeneration, more acute. The development of new smaller generation technologies more attuned to building applications such as microturbines and fuel cells has made CHP for individual buildings more practical. The dramatic effect of trigeneration on the source energy efficiency and carbon footprint of buildings is becoming more critical. And, interest in CHP in the developing world, where climates tend to be cooling dominated, have made trigeneration an essential approach to carbon reduction in future years.

The low penetration of absorption cooling in the US today has left the American design community largely unaware of the significance of absorption technology overseas and inexperienced with proper absorption system application, just as US design firms move to compete in a more global market. This new design guide is important to ASHRAE members in maintaining their position in the global design community.

## Research Need

Use the state of the art described above as a basis to specify the need for the proposed effort (250 words maximum)

The 1990's application guide is limited and obsolete as it only references single effect steam and double effect steam type water cooled lithium bromide-water absorption chillers. It does not explain the other types of absorption chillers that are commonly applied in the HVAC industry for cooling applications, such as single effect hot water for CHP (combined heat and power), direct fired chillers (internationally used for commercial comfort cooling), exhaust gas, waste heat, solar driven and multi-energy types that are increasingly being developed and deployed. The guide also does not include lithium bromide-water absorption heat pumps (type I and type II) that are used internationally for new district and process heating applications.

The new guide would address the advantages absorption cooling and heat pumping can bring to sustainable building design, provide calculation techniques to understand source based zero energy designs on multi-energy sourced absorption cooled or heat pumped building, and describe techniques to aid in building designs that address the growing international importance of absorption in providing cooling to developing regions with chronically insufficient electrical capacity.

The old guide needs to be revamped urgently to ensure that it aligns with global industrial energy trends. The new guide would address all types of absorption chillers and heat pumps and will be an updated useful reference to ASHRAE members worldwide and play an important role in new sustainable building systems.

Ref:

DOE Building Technologies Office, *A Common Definition for Zero Energy Buildings*, 2015

U.S. DOE and U.S. EPA, *Combined Heat and Power: A Clean Energy Solution*, 2012



## Project Objectives

Based on the identified research need(s), specify the objectives of the solicited effort that will address all or part of these needs (150 words maximum)

The main objective is to develop a totally new application guide and not revise the existing guide. The existing guide is obsolete.

There is no laboratory research involved as this RTAR is for creation of a new application guide for which the various subject matter experts would have to contribute their time and effort. The subject matter experts would provide the updated information and expert knowledge on development of the guide.

Even though there is no laboratory or experimental research involved, the guide is expected to take substantial amount of time and energy of various members.

In the end, members of ASHRAE and HVAC industry would benefit from it by deploying new applications and helping to save energy and water.

**Expected Approach**

Describe in a manner that may be used for assessment of project viability, cost, and duration, the approach that is expected to achieve the proposed objectives (200 words maximum).

Lab testing  Computations  Surveys  Field tests  Analyses and modeling  
 Validation efforts  Other (specify) ( )

The effort to develop the new guide may take up to 3 years for completion. It may contain approximately 300 pages. The estimated cost is expected to be \$ 150k.

**Relevance and Benefits to ASHRAE**

Describe why this effort is of specific interest to ASHRAE, its impact, and how it will benefit ASHRAE and the society. How does it align with ASHRAE Strategic Plans and Initiatives? How does it advance the state of the art in this area in general? Are there other stakeholders that should be approached to obtain relevant information or co-funding? (350 words maximum)

The proposed application guide will benefit members of the Society in that it educates for a better understanding and awareness of how absorption systems can be applied for improvements in energy efficiency for cooling, heating, and waste heat utilization in a wide range of applications. With its emphasis on practical application of absorption technology, the guide should help remove some of the confusion of ASHRAE members as to best practice practical application issues related to absorption.

The commercial, industrial and retail HVAC&R consulting/contracting communities looking to reduce overall energy consumption rates will thus benefit from the proposed work. As such, this effort directly supports the sustainability goals ASHRAE has set forth for itself.

This work will result in increased revenues for ASHRAE through the sale of the Application Guide, likely in a bound version as well as in searchable DVD format.

**Anticipated Funding Level and Duration**

Funding Amount Range: \$

\$150,000

Duration in Months: 36

**References**

List the key references cited in this RTAR

This work will involve a lot of collaboration between ASHRAE members and the industry (example equipment manufacturers, universities, etc.).

Now that you have completed the RTAR process, RAC is interested in getting your feedback and suggestions here on how we can improve the process.

**Feedback to RAC and Suggested Improvements to RTAR Process**