



Business Case for  
Natural Refrigerants

11-12/04/2018 – Beijing

# Smarter Standards: Vital for Natref Market Success

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# Environmental Investigation Agency



37th Meeting of the Open-Ended Working Group of the Parties to the Montreal Protocol  
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## Transitioning HFCs in India

Why Multinationals Must Support India's Kigali Amendment Goals

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## THE NEED FOR SMARTER STANDARDS AND CODES IN COOLING

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**EXECUTIVE SUMMARY**

Several safety standards and building codes are blocking the uptake of low global warming potential (GWP), energy efficient alternatives to hydrofluorocarbon (HFC)-based cooling around the world. This briefing provides an introduction and overview of some key standards organizations with respect to refrigeration and air conditioning (RAC), how they are impacting the commercialization of low-GWP alternatives, and how these standards can be modified to both allow greater use of natural refrigerants and continue to protect human health and the environment. Smarter standards that allow for safe use of low-GWP alternatives should be based on valid assumptions backed by rigorous research and data and take into account the full range of modern safety technologies and warning systems.

### STANDARDS AND CLIMATE AMBITION UNDER AN HFC PHASE-DOWN

Most refrigerants used today are synthetic fluorinated supergreenhouse gases called hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs), which are hundreds to thousands of times more damaging to the climate than carbon dioxide (CO<sub>2</sub>). In November 2016, the 197 countries of the Montreal Protocol agreed to negotiate an agreement to adopt a global phase-down of HFCs in 2016. An ambitious phase-down improvements and prevent 0.5 degrees Celsius of warming by 2100? Several developing countries are looking to leapfrog HFC use altogether as they phase-out HCFCs.

Standards and standards-making bodies are a critical link to making low-GWP alternatives available for public and enabling countries to leapfrog HFCs. These standards, developed by

## BUILDING A STRONG FOUNDATION FOR CONTINUED SUCCESS

The Montreal Protocol in its 30th year

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## PUTTING THE FREEZE ON HFCs:

A GLOBAL DIGEST OF AVAILABLE CLIMATE-FRIENDLY REFRIGERATION AND AIR-CONDITIONING TECHNOLOGIES

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## PATHWAY TO ADOPTION

of a Global HFC Phase-Down in 2016

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## Bringing the U.S. Fridge Market into the 21st Century

Low-GWP Technology in Domestic Refrigeration

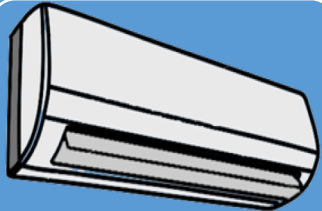
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# Types of Standards and Codes



## Refrigerants Standards

- ASHRAE 34 & ISO 817: Classifying flammability and toxicity



## Equipment Standards

- IEC 60335-2-40 - AC appliances for air-conditioning for household and similar purposes

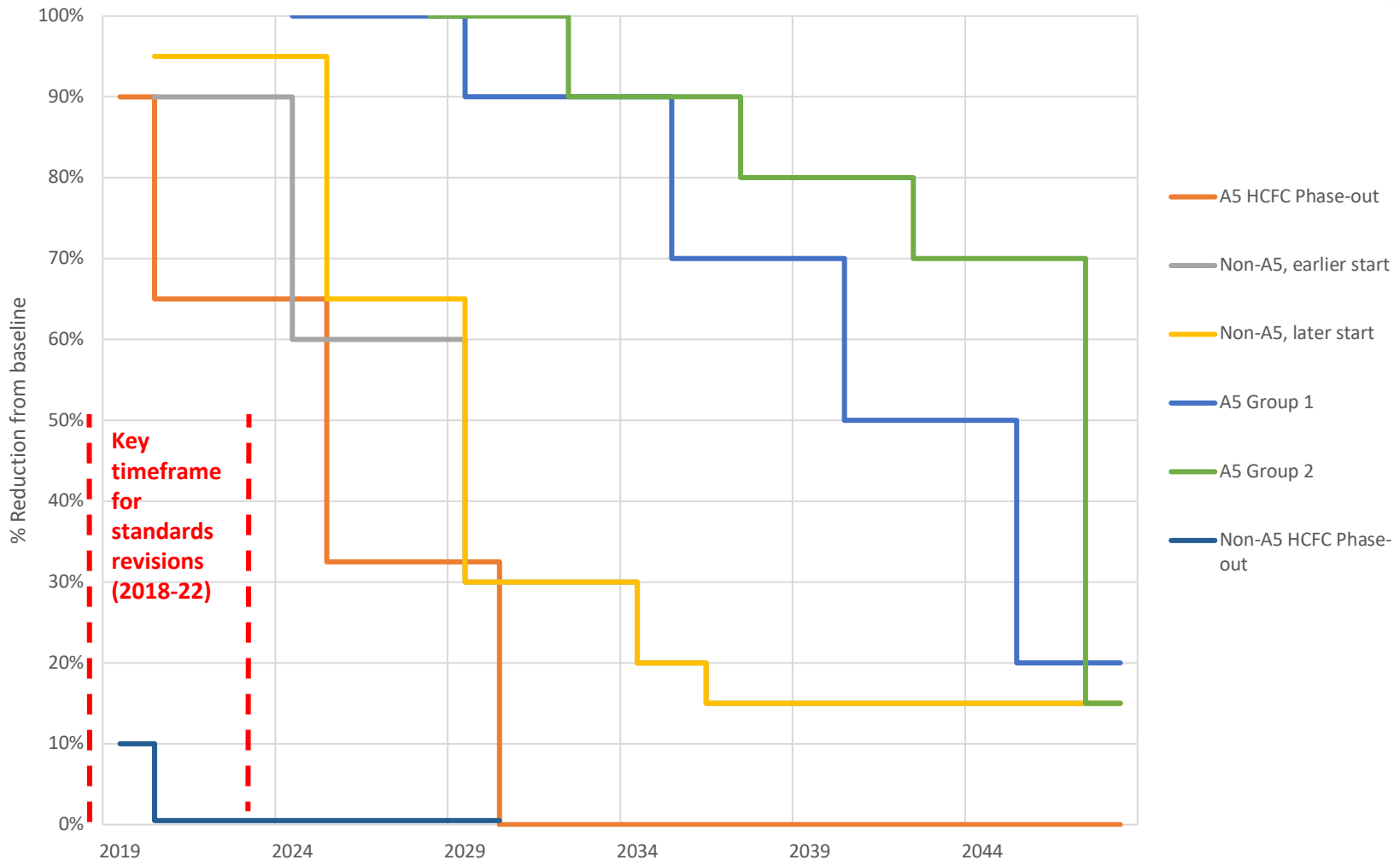


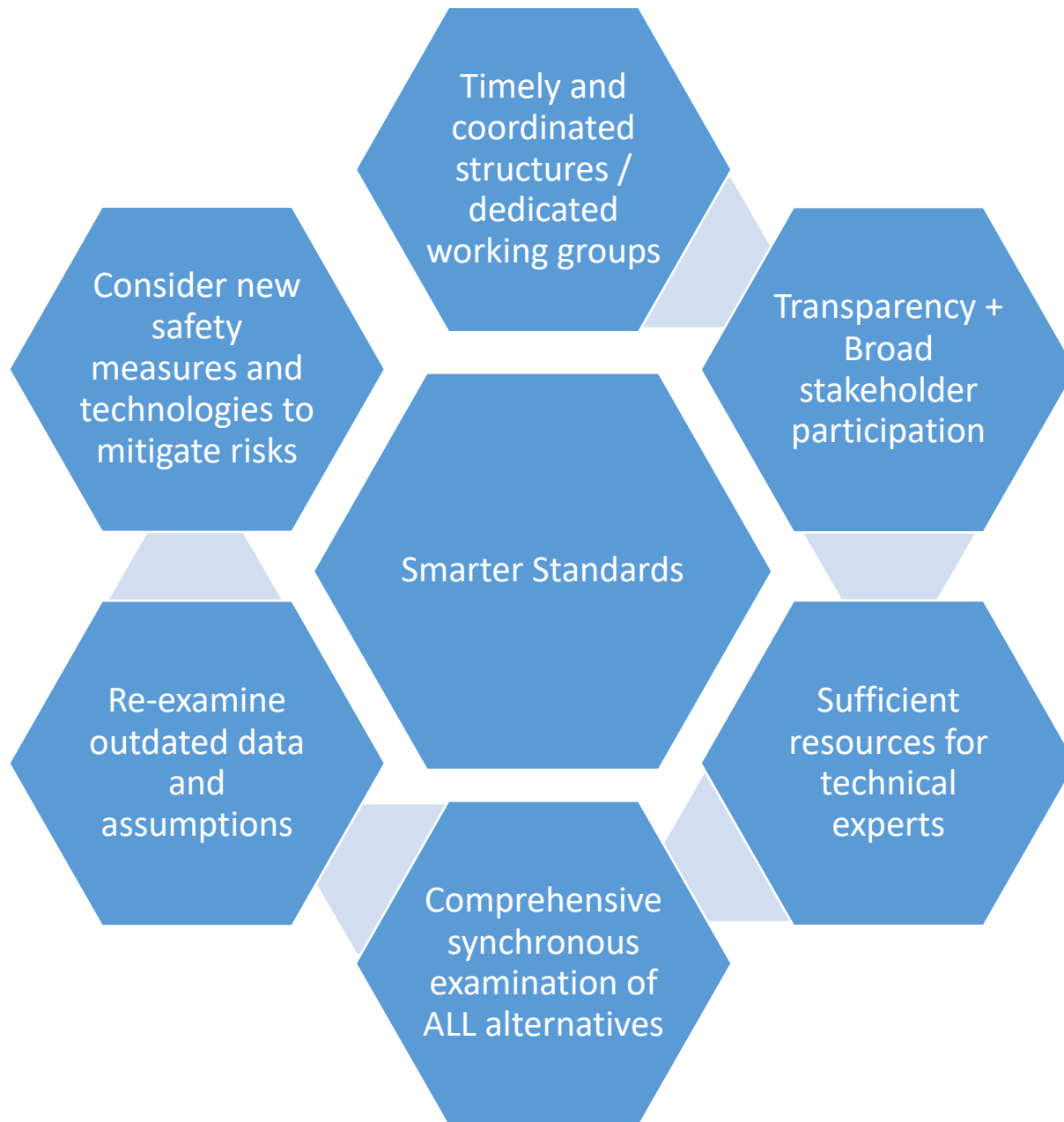
## Building Codes and Standards

- National Building Code of India (NBC)

\*These are the key types pertinent to this presentation. Additional standards and codes exist in production, manufacturing, transport, storage that are outside of the scope.

# Standards and Montreal Protocol Commitments





# Challenges



Ensuring standards work is timely and comprehensive:

Limited participation by A5 countries

Insufficient resources for experts

Limited scope of work of certain standards bodies

Prioritization of certain refrigerants over others

Need for continued international cooperation and capacity building!

# Revised Standards: Unlock Energy Efficiency



- Flammable low-GWP alternatives tend to be more efficient
- Example of standards success: Domestic Refrigerators
  - There was 57 gram charge size for hydrocarbons in U.S. market under UL250
  - Overly restrictive compared to 150 grams globally under IEC 60335-2-24
  - Nearly a billion hydrocarbon refrigerators globally, hardly any in the U.S.
  - New standard (UL 60335-2-24) approved April, 2017 to harmonize with IEC
  - 6-10% efficiency gains from HCs in 10 million new refrigerators sold annually in the United States
- Need remains to allow expanded charge sizes for commercial refrigeration and air conditioning end uses



# Path forward: Hydrocarbons in Room AC



- UL 484 Task Group recommendations
- Ongoing IEC WG 16 process and timeline
- Opportunities for Chinese industry to engage



# UL484 Task Group on Flammable (A2/A3) Refrigerants



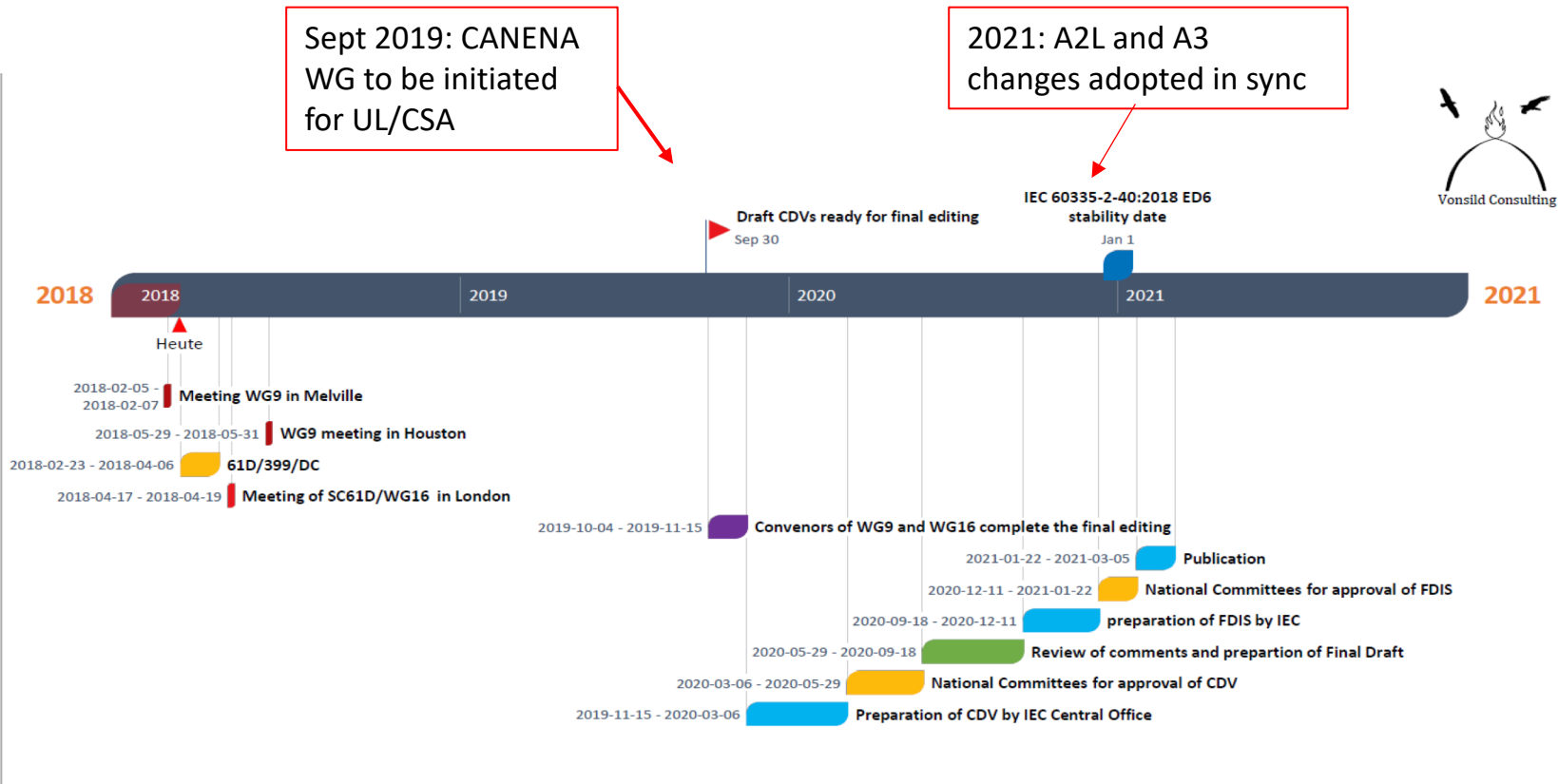
- TG chaired by EIA concluded this month
- Several discussions held between April 2017 and March 2018
- Recognizing UL 484 standard will be phased out, further discussion of revised charge limits for A2 and A3 refrigerants → most effectively addressed UL 60335-2-40/ CAN CSA 22.2 No. 60335-2-40.
- This US and Canada harmonized IEC based standard replaces UL 1995, UL 484, UL 474 and equivalent CSA standards.
- Industry is currently focused on 3rd Edition of UL 60335-2-40/ CAN CSA 22.2 No. 60335-2-40: when published will fully enable A2L refrigerants in HVAC products
- Not yet revised for inclusion of A2/A3 refrigerants.

# Way forward in the U.S: Consensus Recommendations of UL 484 TG



- The industry remain actively engaged in IEC SC61D/WG16.
- AHRI, AHAM, and ASHRAE continue to support and expedite on-going and planned research for the purposes of safely advancing A2/A3 refrigerants.
- Once IEC WG16 proposal reaches an appropriate level of maturity and stability (CDV stage), the industry should leverage that as a starting point for a new CANENA WG to adopt those concepts into UL 60335-2-40/ CAN CSA 22.2 No. 60335-2-40.

# U.S. Timing within IEC WG9/16 context

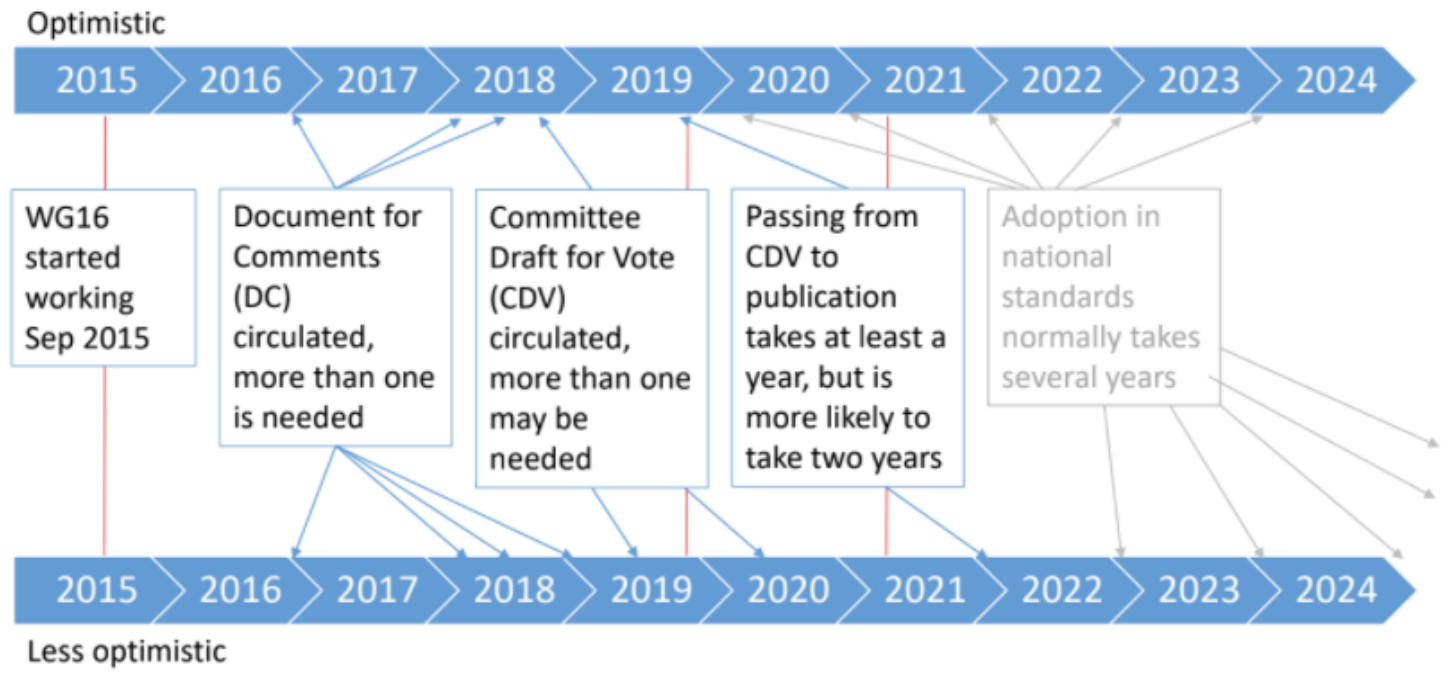


# WG 16 Activity

<p><b>29</b> Experts</p>	<p><b>283</b> Documents</p>	<p>Meets every <b>3</b> months</p>	<ul style="list-style-type: none"> <li>• 2015 September, London, UK</li> <li>• 2015 December, Frankfurt, Germany</li> <li>• 2016 March, Chenzhen, China</li> <li>• 2016 June, Copenhagen, Denmark</li> <li>• 2016 September, London</li> <li>• 2016 December Hangzhou, China</li> <li>• 2017 March, Copenhagen, Denmark</li> <li>• 2017 June, Wilmington, Delaware, US</li> <li>• 2017 September, Aachen, Germany</li> <li>• 2018 January, Chengdu, China</li> <li>• 2018 April, London, UK</li> <li>• 2018 June, Brugge, Belgium</li> <li>• 2018 September, Stratford, UK</li> </ul>
<p><b>12</b> Countries</p> <p>AU, BE, CN, DE, DK, GB, IN, IT, JP, KR, SE, US</p>	<p><b>2</b> Document for Comments released +1 small DC</p>	<p><b>10</b> Meetings held <b>3</b> More Meetings planned</p>	

# IEC/SC61D/WG16

## Time scale



Notes: Standardisation work is based on consensus, and timing is very difficult to predict, and worst case is much longer than the above.



# Opportunity for Chinese Companies

Remain actively  
engaged in IEC  
SC61D/WG16

Members of AHRI  
and AHAM share  
support for forming  
CANENA WG on  
A2/A3 refrigerants  
in 2019

Consider early  
adoption of a  
national standard  
in China based on  
WG16

# Path forward: Hydrocarbons in Refrigeration



- Household refrigeration in the U.S.
  - Finalization of EPA SNAP Rule
- Light Commercial refrigeration under IEC and UL
  - IEC 61C WG 4 progress and timeline
  - Incorporation of IEC proposal in North America



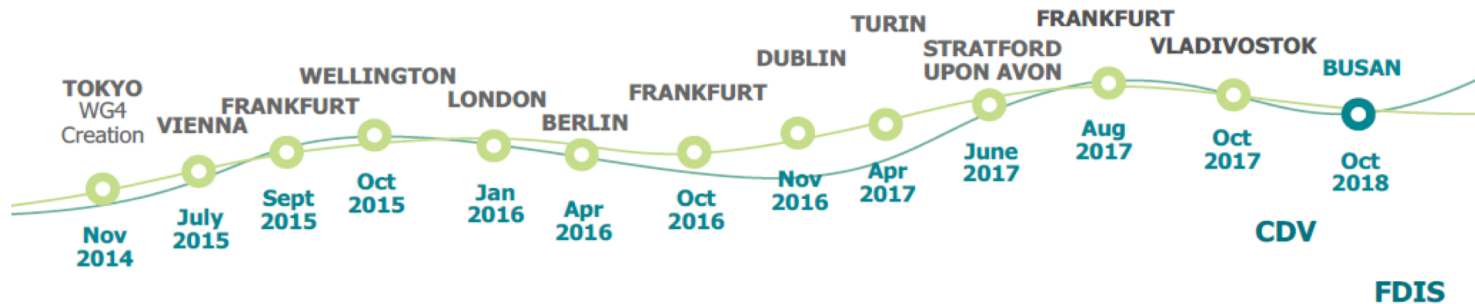
# Household Refrigeration in U.S.

- September 2017: EIA petitioned EPA to incorporate new UL standard for charge size
- November 2017: EPA SNAP 'Direct Final' Rule to incorporate 150 gram charge size from UL 60335-2-24
- Broad support including from industry, however
- Two adverse comments must now be addressed by EPA
- Final EPA SNAP rule is forthcoming with no major changes expected

# Light Commercial Refrigeration: IEC 61C WG4 Timeline (500gram proposal)



**Time scale for including the WG4 proposal  
into the IEC 60335-2-89:**



# Light Commercial Refrigeration: Incorporation of IEC proposal in North America



- January workshop in Washington DC established timeline for industry group looking to adopt anticipated IEC changes in to US/Canadian standards
- IEC SC61C WG4 CDV proposal for 500gram charge size in standalone equipment under UL 60335-2-40 to be finalized this month
- Goal to have UL/CSA proposal draft based in IEC CDV by end of 2018
- New standard will also require EPA SNAP approval for U.S. market



# Conclusions



























- Progress being made on standards, including in U.S.
- Engagement by Chinese industry that produces most of world's ACs has helped!
- Continued engagement needed to champion safety and efficiency of hydrocarbons
- Influence through active membership in U.S industry associations
- Engage IEC voting countries not part of WG4 and WG16 to support
- Political strategy at Montreal Protocol: maintain priority as an agenda item through continuing updates

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Table II: Assessment of Availability of Hydrocarbon (A3) Refrigerants under Key Standards

Equipment Type	Applicable Standards	Availability Under Current Standards	Availability of Hydrocarbons Based on Proposed Standard Revisions*	
			2018	2022
Domestic refrigeration	IEC 60335-2-24	Domestic refrigerators and freezers using hydrocarbons expected to be universally available. All standards now harmonized.		
	UL 60335-2-24			
	EN 60335-2-24			
Standalone Commercial Refrigeration	IEC 60335-2-89	Current charge sizes limit use in larger standalone equipment. WG proposal for expanding charge to 500g expected approval in 2018-19.		
	UL 60335-2-89	Current charge sizes limit use to smaller standalone equipment, preventing cost effective use in larger equipment. Adoption of IEC TC61C WG4 proposal feasible, however may be delayed for U.S. market adoption.		
	EN 60335-2-89	Current charge sizes limit use to smaller standalone equipment, preventing cost effective use in larger equipment. Adoption of WG4 proposal likely given EC standards mandate.		

Equipment Type	Applicable Standards	Availability Under Current Standards	Availability of Hydrocarbons Based on Proposed Standard Revisions*	
			2018	2022
Room AC (window units and mini-split)	IEC 60335-2-40	Hydrocarbons available only for small units. More widely available under optimistic scenario if WG 16 revisions complete by 2020.		
	UL 60335-2-40	Currently not available. Adoption of IEC proposal feasible, however timeline uncertain.		
	EN 60335-2-40	EN likely to adopt IEC revision per WG16. Potentially available in 2022 if WG16 complete by 2020 and adopted by EN.		
Multi-split and Ducted AC	IEC 60335-2-40	Not available and not currently within the scope of current WG16 proposals		
	UL 60335-2-40	Currently not available and not in current scope of WG16 proposal.		
	EN 60335-2-40	Not currently within the scope of current WG16 proposals		
Chillers	IEC 60335-2-40 / ISO 5149	Feasible to install chillers outside or on rooftop, however barriers to use in buildings.		
	UL1995/UL 60335-2-40	Not allowed under UL1995. HCs limited to M1 charge under second revision of UL 60335-2-40.		
	EN 378	Feasible to install chillers outside or on rooftop, however barriers to use in buildings.	