



Business Case for
Natural Refrigerants

04/09/2018 – Singapore

HCFC PHASE OUT MANAGEMENT PLAN AND KIGALI AMENDMENT IN INDONESIA

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OUTLINE

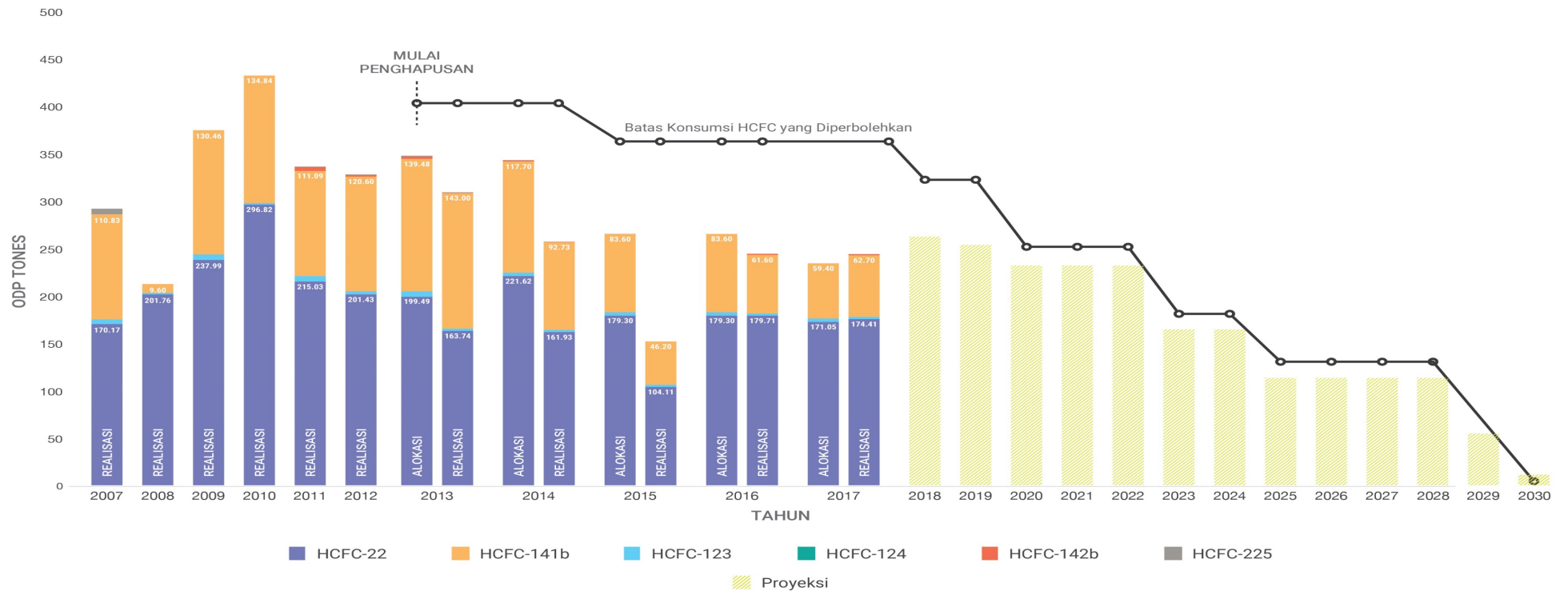
1. HCFC PHASE OUT MANAGEMENT PLAN IN INDONESIA STAGE I AND STAGE II
2. TARGET AND ACTUAL HCFCs CONSUMPTION IN INDONESIA
3. CHALLENGES IN IMPLEMENTING HPMP STAGE I AND STAGE II
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5. COMMON APPLICATIONS OF HFCs IN INDONESIA
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HCFCs PHASE OUT MANAGEMENT PLAN IN INDONESIA

1. **HPMP STAGE I** : To phase-out HCFCs up to 10% of baseline by 1 January 2015 and additional 20% of baseline by 1 January 2018, that have been achieved by:
 - conversion of technology from HCFCs to HFC-32 and Cyclopentane in RAC manufactures;
 - control the import quota of HCFCs; and
 - banned the import of HCFC-22 base of RAC equipment

2. **HPMP STAGE II** : To phase out HCFCs up to 37.5% of baseline by 1 January 2020 and 55% of baseline by 1 January 2023. The phase out target will be achieved by:
 - conversion of HCFC-141b in PU panel production to Cyclopentane and HFO;
 - control the quota of the import of R-22 for servicing of RAC; and
 - enhancing RAC technician capacity – providing 2R and 3R machine, and develop national standard of competence for RAC technicians.

TARGET AND ACTUAL HCFCs CONSUMPTION IN INDONESIA



CHALLENGES IN IMPLEMENTING HPMP STAGE I AND II IN INDONESIA

CHALLENGES IN HPMP STAGE I – MANUFACTURE SECTOR

- The alternative technology that was proposed during negotiations were not easily adoptable by the market due to market competition from high GWP technologies
- Difficulties in sourcing components/input materials mainly because these technologies were relatively new.
- Business continuity of enterprises in certain cases would have been adversely affected and hence, only a few enterprises participated
- Regulatory and market constraints – two primary factors that affected industry conversion costs

CHALLENGES IN HPMP STAGE II – SERVICING SECTOR

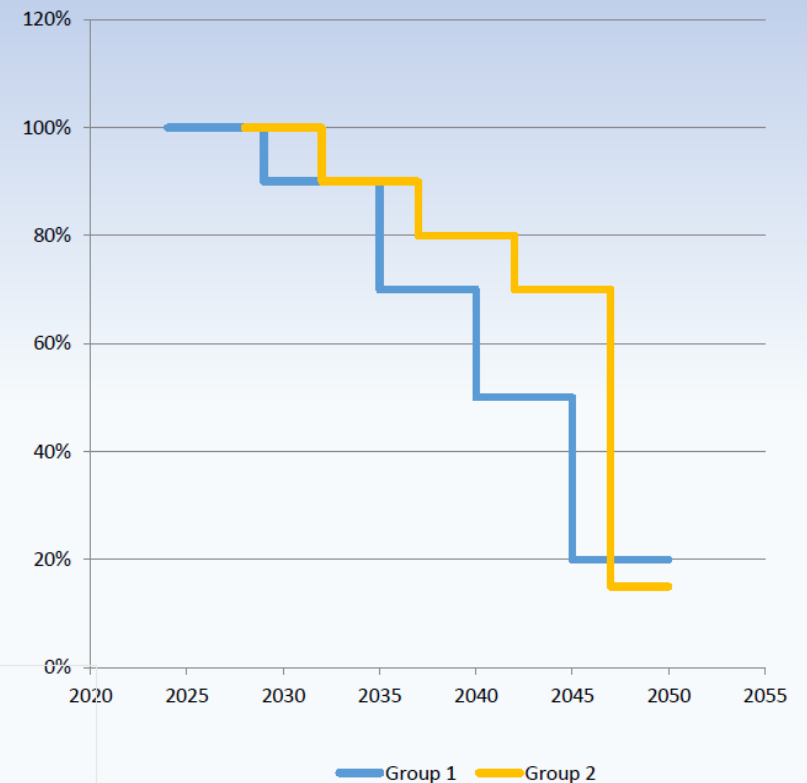
- Technician knowledge and skills need to be upgraded: technicians are not trained formally, but from learning by doing
- Good practice of servicing needs appropriate tools and equipment
- Poorly paid, no incentives for technician doing good practice of servicing

HFC Phase-down Schedule for Developing Countries

Group 1	Baseline (Production & Consumption)	2024	2029	2035	2040	2045
Most developing countries	HFC (Avg 2020-2022) + 65% of HCFC baseline*	100%	90%	70%	50%	20%
Group 2	Baseline (Production & Consumption)	2028	2032	2037	2042	2047
Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and UAE	HFC (Avg 2024-2026) + 65% of HCFC baseline*	100%	90%	80%	70%	15%

Group 1 Compliance Start: 2024 20% Tail: 2045
 Group 2 Compliance Start: 2028 15% Tail: 2047

Reduction Steps for Developing Countries



* HCFC baseline for A5 Parties is equal to average of 2009-2010

FUTURE PLAN OF INDONESIA WHEN RATIFY KIGALI AMENDMENT

BASELINE YEARS	2020,2021 AND 2022	
BASELINE CALCULATION	Average consumption of HFCs in 2020, 2021 and 2022, plus 65% of HCFC baseline consumption	
Reduction Steps		
Freeze	2024	
Step 1	2029	10%
Step 2	2035	30%
Step 3	2040	50%
Step 4	2045	80%

COMMON APPLICATIONS OF HFCs IN INDONESIA

Applications	HCFC	HFC
Refrigerant		
• Residential and light commercial air-conditioning	HCFC-22	HFC-410A, HFC-32
• Mobile air-conditioning		HFC-134a
• Domestic refrigerator		HFC-134a
• Commercial refrigeration	HCFC-22	HFC-134a, HFC-404A
• Industrial refrigeration	HCFC-22	HFC-134a, HFC-407C, HFC-410A, 507A
Foam blowing agent		
• Polyurethane foam	HCFC-141b	HFC-245fa, HFC-365mfc/227ea
• Extruded polystyrene foam	HCFC-22/142b	HFC-134a/152a
Solvent	HCFC-141b	HFC-225
Fire suppression agent	HCFC-123	HFC-227ea, HFC-236fa

POSSIBLE ALTERNATIVES REFRIGERANTS TO HFCs

- Several possible alternatives refrigerants to HFCs for several applications have been identified
- However learning from the implementation of HPMP, the decision of alternative refrigerant will be decided by the industries which technology will work for their own companies.
- There is an urgency to identify commercially and economically (cost competitive) viable alternative technologies for relevant applications

FUNDING AVAILABILITY FOR INDONESIA

- 80th Excom Meeting approved MLF funding to carry out Enabling Activities through World Bank as the Implementing Agency.
- Indonesia also welcomes any other funding or support opportunities for demo projects if it is appropriate and required for national industries.

Food Retail



Sealed integral



Condensing unit



Large centralised pack

0.1 to 0.5 kg

Typical charge:

1 to 10 kg

20 to 200 kg

4th generation and non-fluorocarbon options (GWP):

R-290, propane (3)
R-744, CO₂ (1)
HFO-1234yf (5)

R-448A, R-449A (1400)
R450A, R-513A (600)
? R-454C, R-455A (146)
? R-744, CO₂ (1)
? HFO-1234yf (5)

R-744, CO₂ (1) transcritical or cascade
R-290 (3) integrals, water cooled
R-448A, R-449A (1400)
? R-454C, R-455A (146)

Food Service



Sealed integral

Condensing unit

0.1 to 0.5 kg

Typical charge:

1 to 10 kg

4th generation and non-fluorocarbon options (GWP):

R-290, propane (3)
R-744, CO₂ (1)
HFO-1234yf (5)

R-448A, R-449A (1400)
R450A, R-513A (600)
? R-454C, R-455A (146)
? R-744, CO₂ (1)
? HFO-1234yf (5)

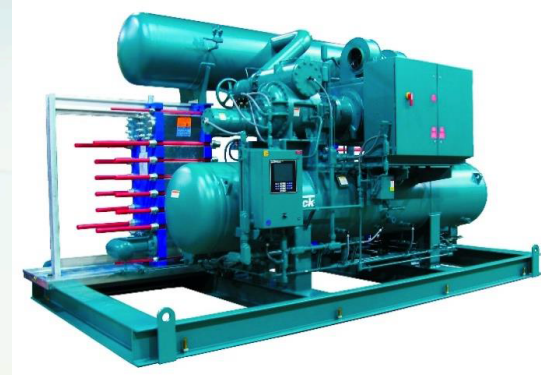
Food and Drink Manufacture and Cold Stores



Large pumped system



Small / medium DX



Chiller + secondary fluid

250 to 5000 kg

Typical charge:

10 to 100 kg

100 to 2000 kg

4th generation and non-fluorocarbon options (GWP):

R-717, ammonia (0)
R-744, CO₂ (1)

R-448A, R-449A (1400)
R450A, R-513A (600)
? R-454C, R-455A (146)
? R-744, CO₂ (1)

R-717, ammonia (0)
HFO-1234ze (7)
HFO-1233zd (4)
R-514A (9)

Food Transport



Road vehicles



Intermodal containers

1 to 8 kg

Typical charge:

4 to 8 kg

4th generation and non-fluorocarbon options (GWP):

R-452A, (2140)
R-744, CO₂ (1)
? R-454C, R-455A (146)

PU Foam

CFC-11

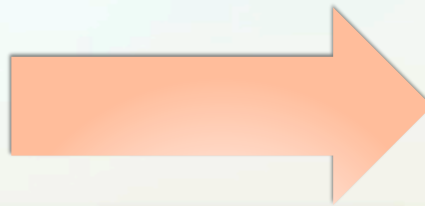
Cyclopentane

HCFC-141b

HFO-1233z
d

HFC-245fa;
HFC-365mfc/
227ea

HFO-1336m
ZZ



Solvents

HCFC-141b



HFC-245fa

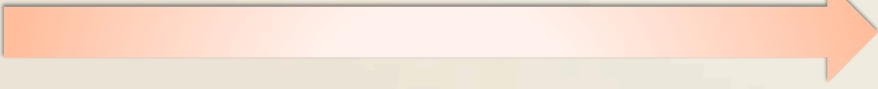


HFO-1233zd

HFC-365mfc

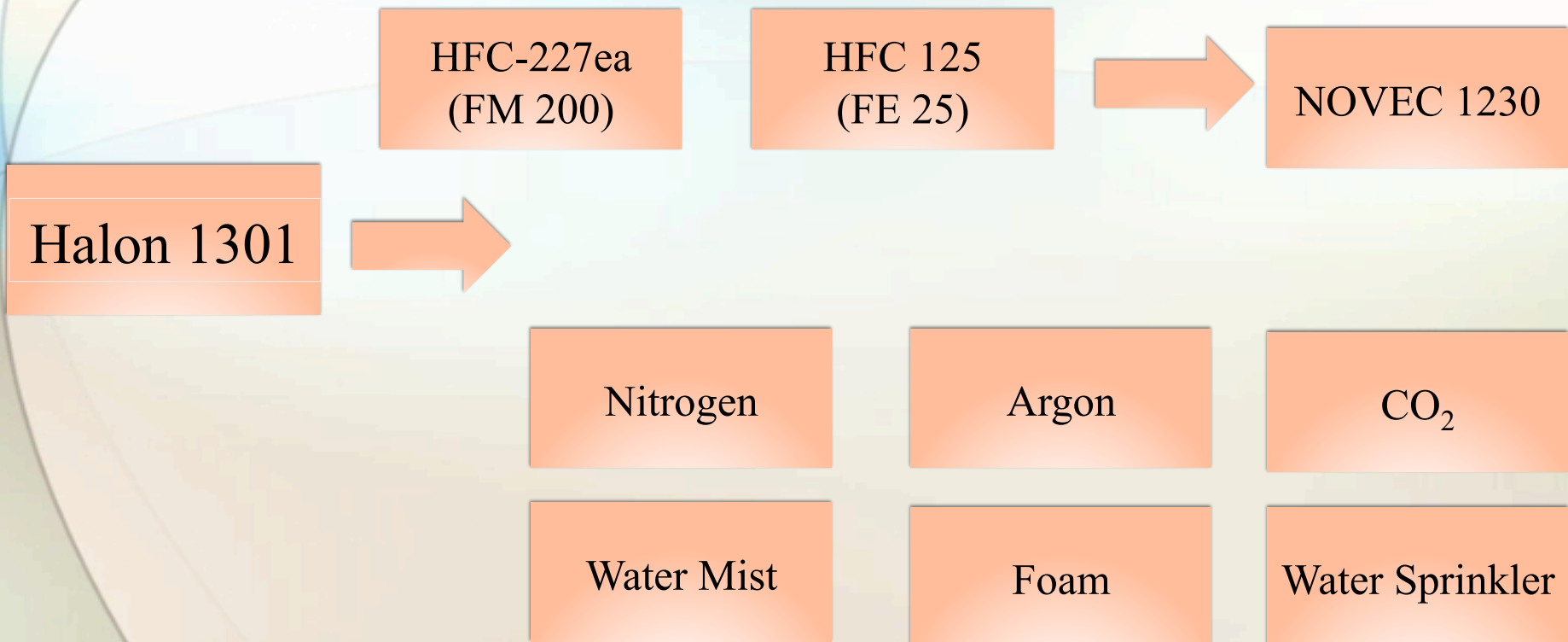
HFO-1336mz
z

HCFC-225c
a/cb



?

Fixed Fire Extinguishing System





FUTURE WORKS REQUIRED AS PART OF ENABLING ACTIVITIES

1. **Do the ground work:**
 - ✓ HFC consumption data by sector
 - ✓ Growth scenarios to project Indonesia baseline
 - ✓ Understanding of regulatory framework
2. **Thorough assessment** of the implications of Kigali Amendment on Indonesia economy and industry
3. **Identification of economically viable** HFC phasedown strategy (informed by modeling)

Proposed approach:

Development of a technology pathway to identify commercially and economically (cost competitive) viable HFCs phase down scenarios taking into account the actual and projected state of alternatives and alternative technologies for relevant applications/ subsectors



ATMO
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Thank you for listening!

