



Carrier's training programme to promote the use of natural refrigerants

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CARRIER® EXPERIENCE

Coping with technology evolution

High **GWP** of **HFCs** in focus long before 1st **F-Gas Regulation**

- > Refrigerant charges reduced
- > System tightness improved
- > Training & qualification of service
- > Search for solutions based on natural refrigerants

Looking for long-term solution!



Ammonia systems with secondary refrigerant / waste heat circuits
(> 60 stores in Europe starting 1994)

Propane systems with secondary refrigerant / waste heat circuit
(17 stores in 4 countries starting 1996)

HFC systems with secondary refrigerant circuits MT refrigeration **brine** / LT refrigeration **CO₂** indirect
(6 stores in 2 countries starting 1998)

HFC / CO₂ cascade systems, MT refrigeration **HFC-DX** / LT **CO₂-DX**
(> 340 Hybrid**COOL** stores in Europe starting 2000)

CO₂ / CO₂ refrigeration systems, MT refrigeration **CO₂-DX** / LT **CO₂-DX**
(> 580 **COOLtec** stores in Europe starting 2004)

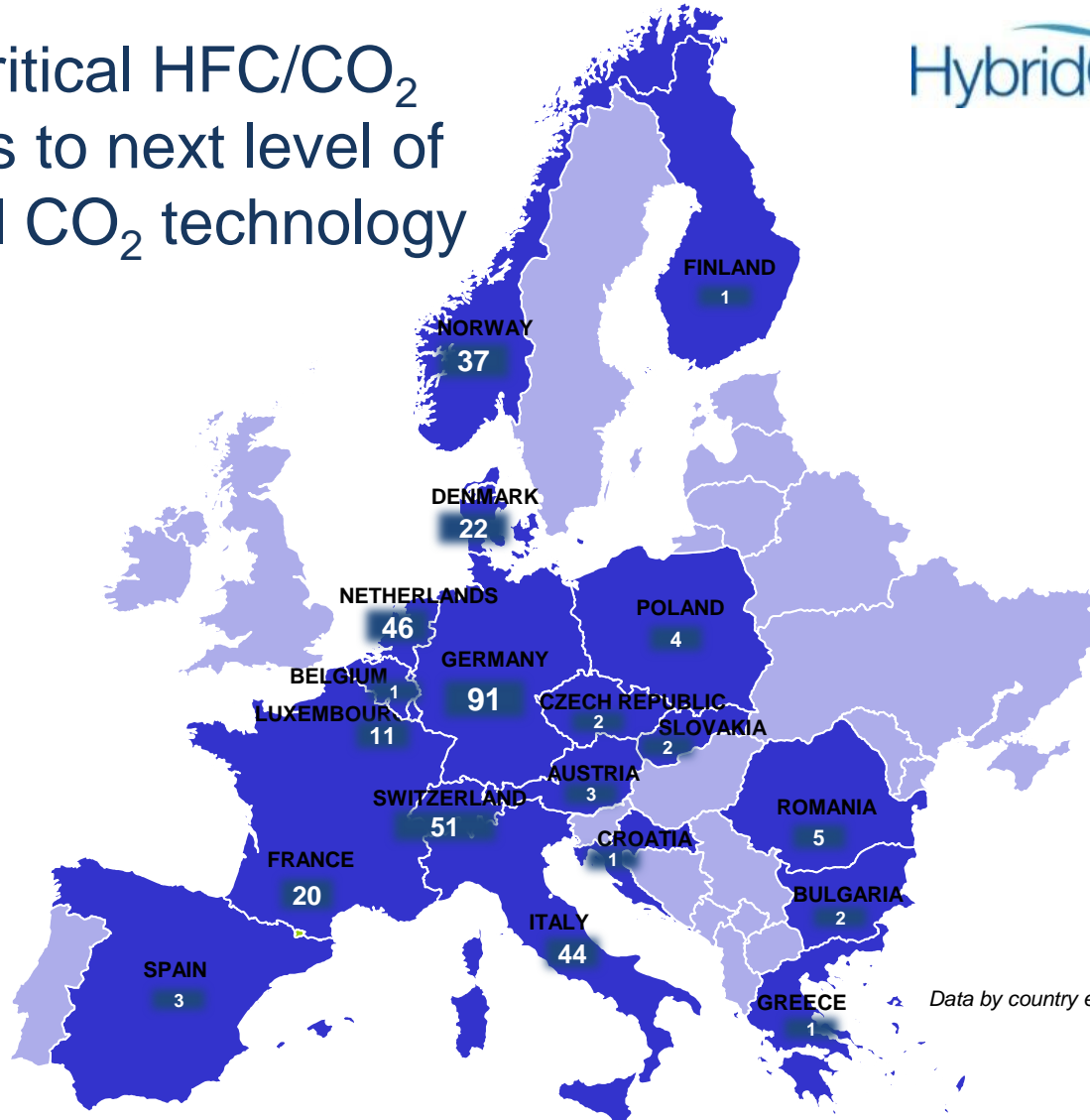
KEEPING UP WITH RAPID GROWTH

Carrier HFC/CO₂ subcritical projects in Europe

From subcritical HFC/CO₂ installations to next level of transcritical CO₂ technology



TOTAL
347



Source: Carrier
Data by country end of April 2013

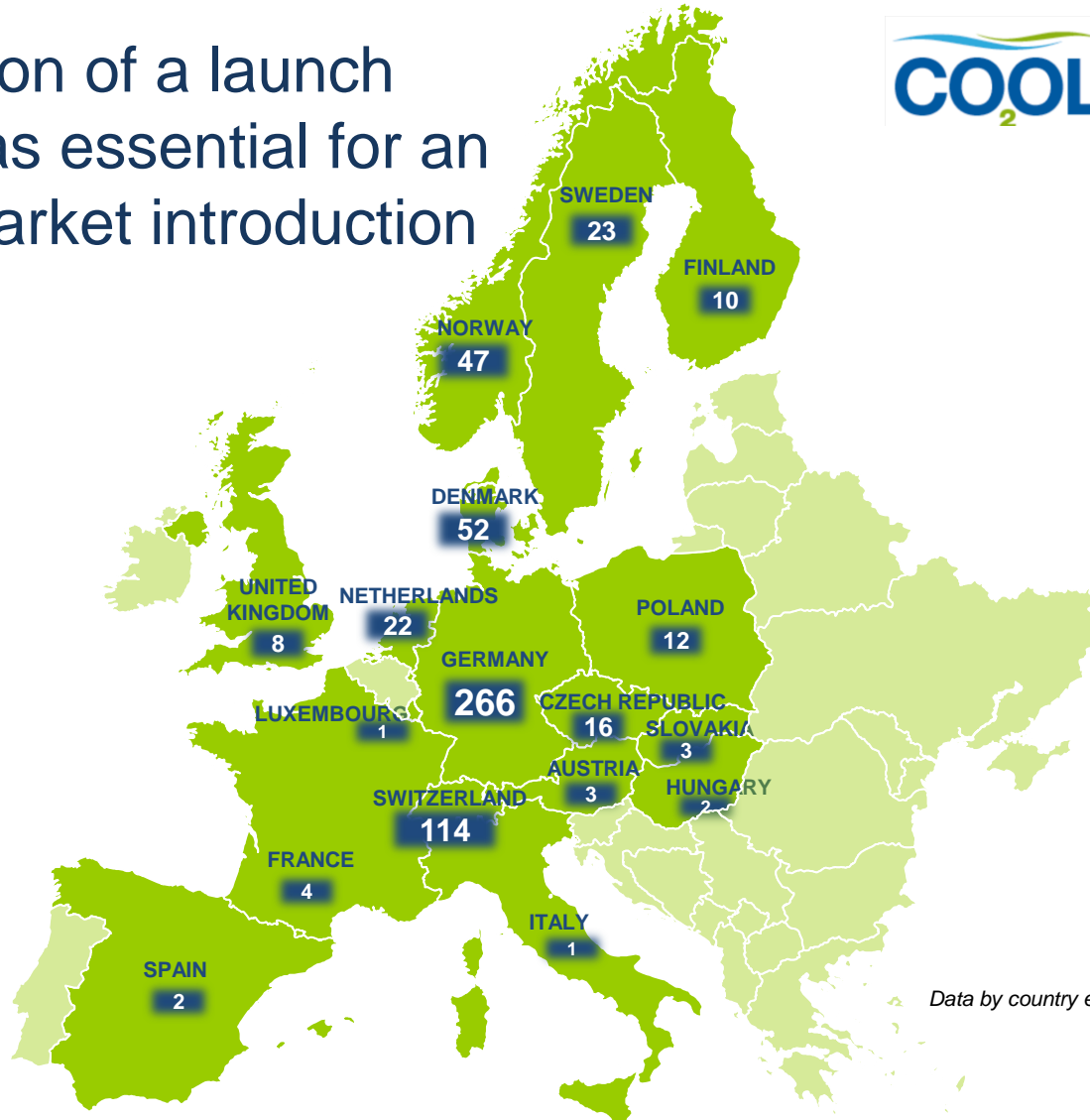
KEEPING UP WITH RAPID GROWTH

Carrier CO₂ transcritical projects in Europe

The definition of a launch strategy was essential for an effective market introduction



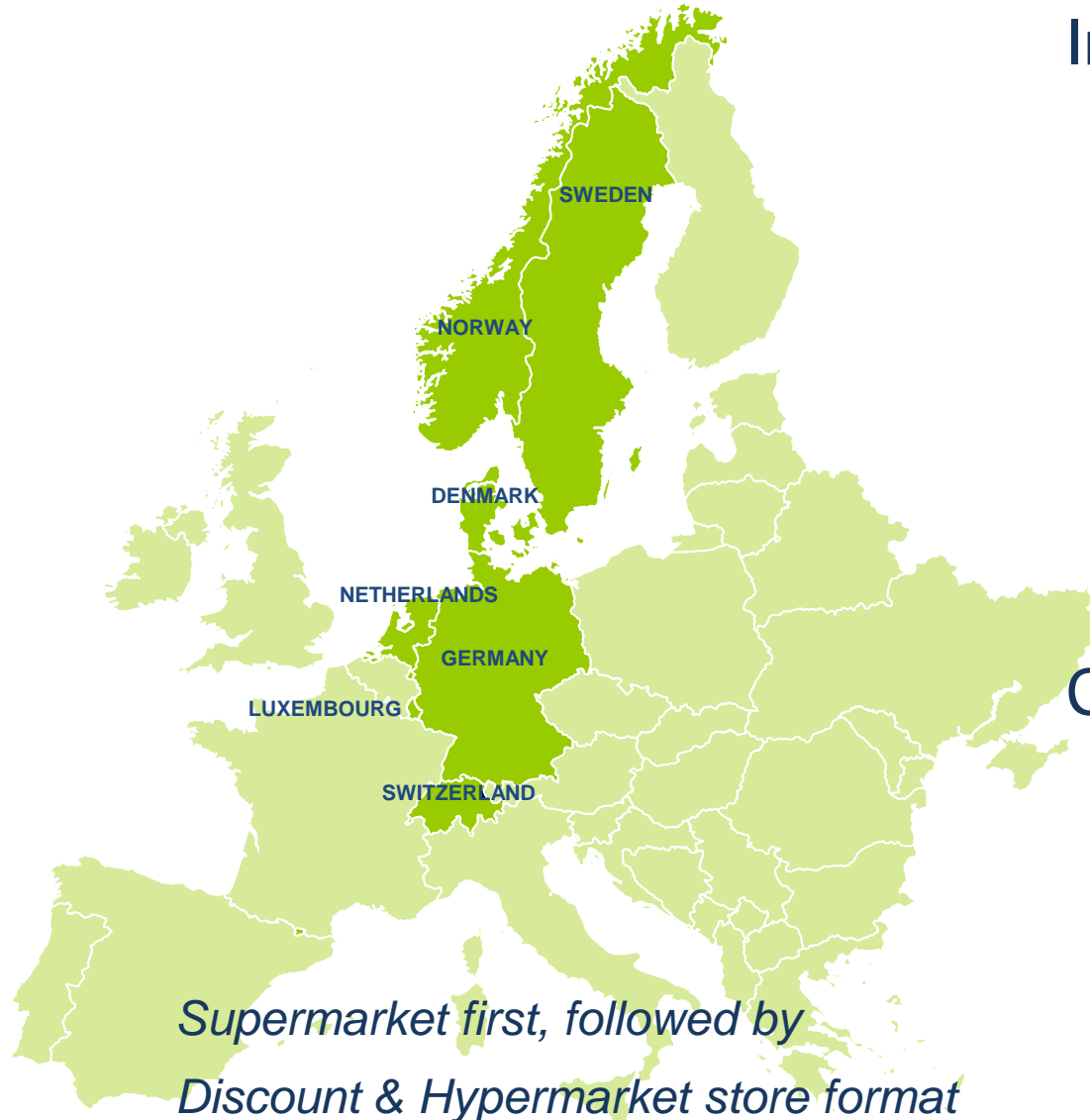
TOTAL
586



Source: Carrier
Data by country end of April 2013

LAUNCH STRATEGY ESSENTIAL

Establish frame conditions in pilot countries



*Supermarket first, followed by
Discount & Hypermarket store format*

In launch countries ensure

Design capabilities

Service capabilities

Central monitoring e*Service

Service contracts

Turnkey approach

Spare parts

Concentrating on

Service coverage

Operating reliability

System efficiency

Spare parts availability

Training key personnel

SERVICE TRAINING FOR CO₂ SYSTEMS

Service & start-up capabilities in pilot countries

Objective

Build local service and start-up capabilities for pilot countries to become independent

Approach

“Train the trainer”/build team of experts with multiple levels (basic for all, expert for few)

Certify “CO₂ Experts” per country

Conduct group training sessions



TRAINING FORMAT

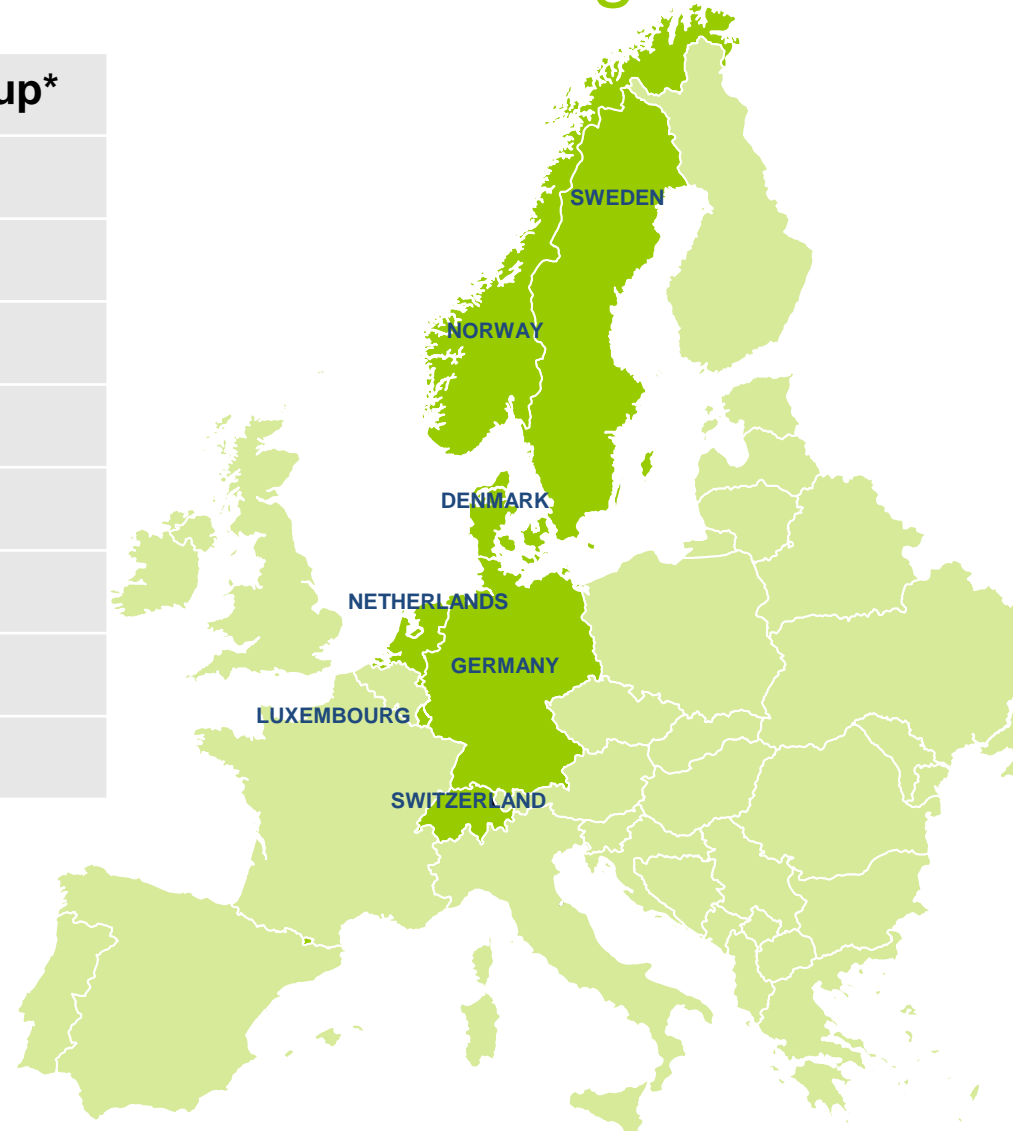
Multiple levels, basic for all, expert for few

<u>Curriculum level</u>	<u>Training focus</u>	<u>Format</u>	<u>Duration</u>
Basic	General introduction to CO2OLtec [®] systems: EH&S / Assembly / MT< application LDS control system	Workshop and on site training conducted by Expert or Central Support	1 x 4 days
Qualified	<ul style="list-style-type: none">- Standard maintenance work, addressing malfunctions, optimization of case controller, train and supervise installation teams,- Prepare start-ups and limited start-up steps	<ul style="list-style-type: none">-1 x Intensive training during commissioning and start-up- Regular coaching by Expert or Central Support	<ul style="list-style-type: none">- 2 to 3 weeks- frequent coaching by Expert
Expert	<ul style="list-style-type: none">- Full start-up, system fine tuning, trouble shooting, implement new systems into the market- Train Qualified level	<ul style="list-style-type: none">- 3 x start-up incl. one start-up alone;-Attend regular workshops (2/yr initially, 1/yr after)- Training given by Central Support and Controls R&D Team specialist	<ul style="list-style-type: none">- 6 to 8 weeks

INITIAL TRAINING REQUIREMENTS

Installations for start-up & service training

Country	Experts	Start-up*
Norway	2	7
Sweden	2	
Denmark	2	
Germany	6	7
Netherlands	2	7
Luxembourg	2	
Switzerland	3	
Sum:	19	21



Start-up by Experts as part of field training conducted by Central support and R&D

EXPERTS TRAIN & SUPPORT LOCAL TEAMS

Knowledge transfer role

Experts

Nominated per country

Build up local service, engineering and processing capabilities for CO₂

Provide support for local service and engineering teams

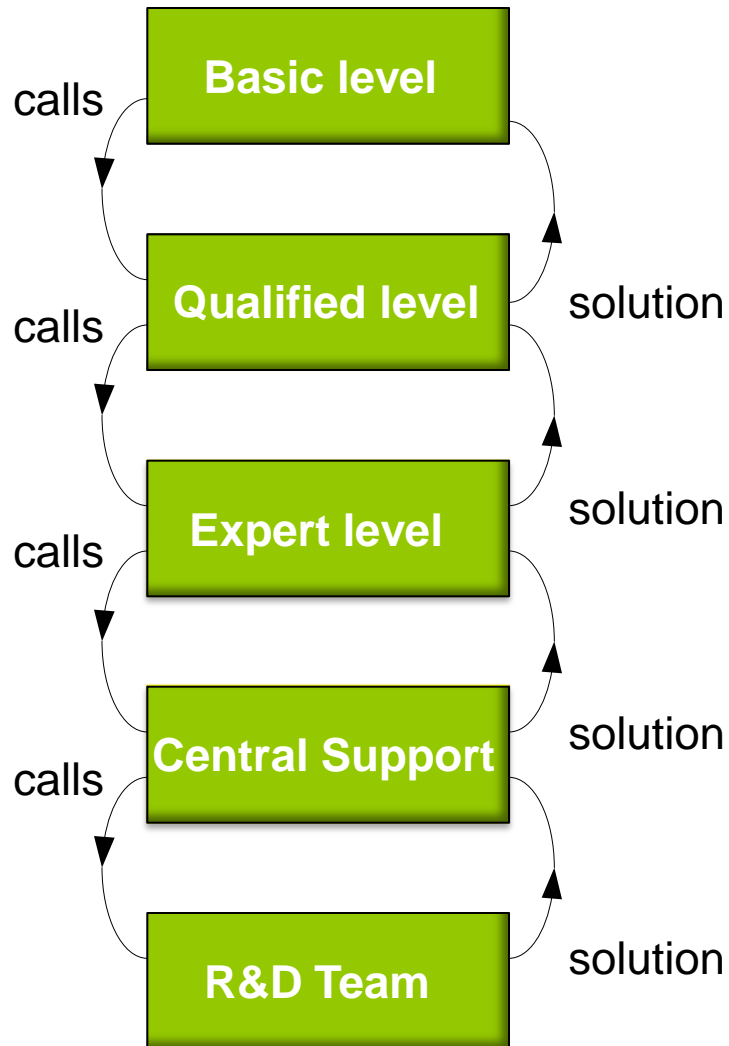
Receive support by central Support and R&D when issues arise

Give feedback to central functions (R&D; Central Support)



“HOTLINE” SUPPORTS SERVICE

Next knowledge level supports previous level



Chain structure ensures:

- No field issue is lost
- All parties are informed
- Feedback is used in future installations

QUICK KNOWLEDGE GENERATION

Fast turnaround of tacit to explicit know-how

Frequent service and design workshops enable teams to:

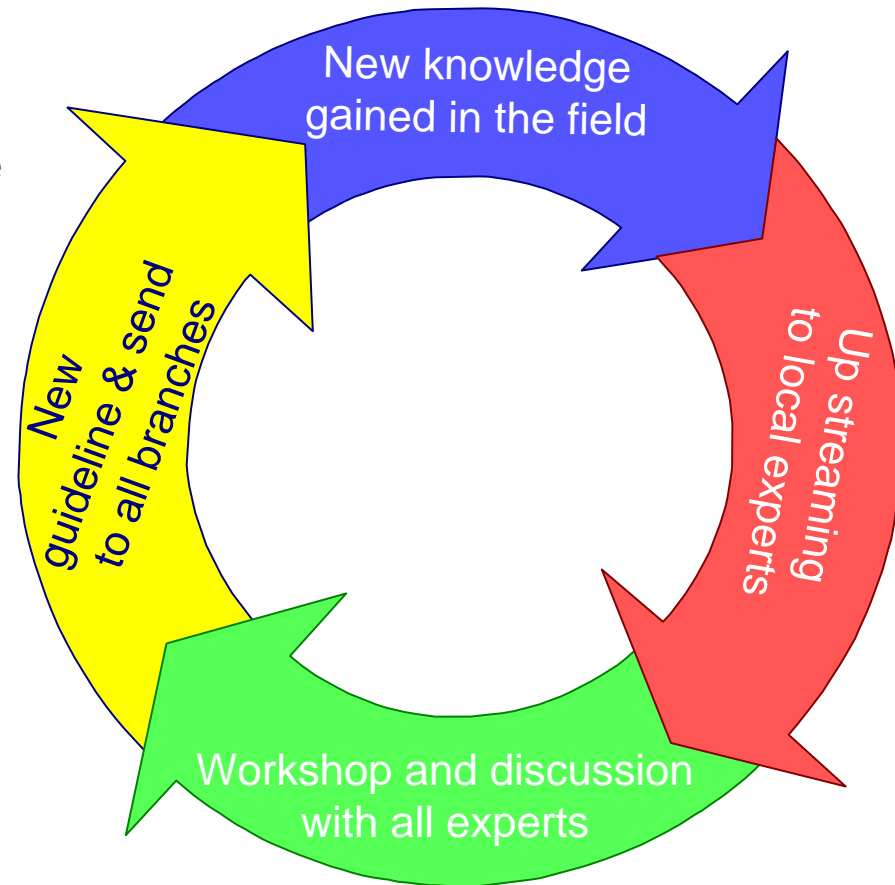
Provide feedback from service to design and vice versa

Analyse field issues

Share best practices

Improve project performance

Decrease service costs



SUMMARY

Comprehensive launch strategy ensures success of technology change

Turnkey approach

Service / start-up capabilities & geographical coverage

Ensuring system reliability and efficiency

Training from basic to expert level

Exchange of knowledge & information up- and downstream

Spare parts availability

Full product range for all food retail store formats





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Thank you for your attention!

Innovative solutions,
naturally...



Carrier has the right refrigerant for every application, but every application will not have the same refrigerant solution.