Certification and Licensing of Servicing Practices in India's Refrigeration and Air-Conditioning Sector

Introduction

India's refrigeration and air-conditioning (RAC) sector is experiencing rapid growth fuelled by population expansion, urbanization, and the escalating heat caused by climate change. While crucial for providing cooling access, this surge in demand for air-conditioning is presenting urgent challenges related to the environmental impact of refrigerants and the strain on the electricity grid due to high energy demand.

Refrigerants are commonly used as working fluids in refrigeration and air conditioning equipment, like home air conditioners, refrigerators, heat pumps, vehicle air conditioners, commercial and industrial cooling equipment, and food processing and storage facilities, among others. Most refrigerants currently used have high global warming potential (GWP), especially the hydrofluorocarbons (HFCs), which are thousands of times more potent greenhouse gases than carbon dioxide (CO_2). Older refrigerators and air conditioners pose an even greater risk to the environment since they can contain ozone-depleting substances such as chlorofluorocarbons (CFCs) and hydrofluorocarbons (HCFCs) as refrigerants, which are also potent greenhouse gases. The primary refrigerants currently used in India are HCFCs and HFCs, subject to a global phaseout and phasedown under the Montreal Protocol. The HCFC phaseout in India has begun earnestly and will broadly conclude by 2030[1]. The HFC phasedown in India is yet to start by 2028 and will conclude in 2047 as per the Kigali Amendment to the Montreal Protocol, ratified in September 2021[2].

NRDC

teri
The Energy and Resources Institute

RATA
The Refrigeration & Air Conditioning Trades Association Ltd.

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In India, on average, 40% of newly produced virgin refrigerants are used for servicing each year[3]. Proper servicing and maintenance of RAC equipment, with good service practices (GSPs) and the right tools, play a crucial role in maintaining the efficiency and sustainability of cooling units. These measures will be instrumental in reducing direct carbon emissions from refrigerants and indirect carbon emissions from electricity used to power these units. Notably, the inefficiencies in air conditioners and refrigerant leakages during installation and servicing are primarily due to improper servicing practices by untrained servicing personnel. Therefore, supporting the training and skilling of RAC technicians is a key factor for sustainable cooling growth and a vital measure to ensure the safety of workers who handle the often flammable refrigerant gases. They must be informed, prepared and trained to handle alternative refrigerants, ensuring India's smooth and successful transition from HCFCs and HFCs to non-ODS low-GWP refrigerants while meeting its Montreal Protocol commitments. In addition to minimizing refrigerant leaks, it is also essential to maximize the end-of-life recovery and reclamation of refrigerants, which is referred to as Lifecycle Refrigerant Management (LRM). An upskilled and trained technician will be quintessential to ensuring an effective LRM system is developed in India. It is estimated that by adopting proper LRM practices, nearly 90 billion metric tons of CO_2 can be avoided globally[4].

The informal sector currently dominates the RAC servicing sector in India, which is driven by seasonality and consumer cost sensitivity for these services[1]. Currently, over 75% of RAC service technicians in India need to be formally trained and certified[5]. However, even those who are relatively trained need more preparation for the challenges of evolving technologies. Adherence to common GSPs, such as leak testing and precise refrigerant charging, varies across different segments of the cooling sector. Commercial air-conditioning technicians tend to possess updated skills and tools compared to their informal counterparts, which constitute most of the servicing workforce.

This factsheet highlights the current landscape of skilling initiatives in the RAC sector and defines the broad contours of a technician training and licensing program. It describes a step-by-step approach to setting up a trade licensing program and recommends setting one up for room air conditioners (AC), particularly given its expected growth in the country.

1 The informal sector (or the informal economy) consists of unregistered and small, unincorporated private enterprises engaged, at least partly, in producing goods and services for the market (https://unevoc.unesco.org/home/TVETipedia+Glossary/lang=en/show=term/term=Informal+sector)

Overview of Current Initiatives on Technician Training

The current landscape of upskilling initiatives for RAC service technicians in India reflects a concerted effort between governmental and private sectors to support the development of this sector. Some of the most prominent initiatives are listed below.

- The India Cooling Action Plan integrates technician training and certification with livelihood enhancement and social safety requirements.
- Government-led initiatives such as the Skill India Mission and the National Skill Development Corporation (NSDC) provide structured vocational training to skilled technicians with essential technical proficiencies.
- Private enterprises collaborate with industry associations and educational institutions to deliver tailored training programs catering to specific industry needs.
- Recognition of Prior Learning (RPL) initiatives, including those within the Pradhan Mantri Kaushal Vikas Yojana (PMKVY), facilitate industry-relevant certification for individuals with prior experience. PMKVY is the flagship scheme of the Ministry of Skill Development and Entrepreneurship. This Skill Certification Scheme aims to enable Indian youth to take up industry-relevant skill training that will help them secure a better livelihood. Various implementation models for RPL, such as RPL camps and online RPL, receive incentives from Project Implementing Agencies designated by the Ministry of Skill Development and Entrepreneurship.
- RAC servicing training is offered through the HCFC Phase-out Management Plan supported by the Ozone Cell, Ministry of Environment, Forest and Climate Change, Government of India. As of December 2022, 11,276 technicians have received HPMP Stage-I training, and 17,000 have received Stage-II training[6].

Overall, training programs in India's RAC servicing sector are facilitated through three primary channels: central government, state government and private sector initiatives. Central and state government programs, such as those provided by Industrial Training Institutes (ITIs), offer comprehensive vocational training tailored to individuals seeking careers in the servicing sector. Moreover, short-term refresher programs, such as those organized by the Ozone Cell under the Montreal Protocol, focus on familiarizing technicians with emerging refrigerants and technologies.

State government programs, while varied and often delivered in regional languages, are typically implemented rather than devised by state authorities. Table 1 summarizes the features of five government training programmes aimed at training servicing sector technicians.

Table 1: Features of government training programmes[7]

Instituted by	Name of the training programme	Training implementers	Training duration	Training curriculum year published	Training equipment focus	Practical training? (Yes/No)	Training assessment? Yes/No)
Ozone Cell, MoEF&CC	GIZ HPMP II	GIZ–Ozone Cell/ Training partners	2 days	2013/2018	Room AC	Yes	No
MSDE and MoEF&CC	ESSCI RPL	ESSCI/Training partners	3 days	2018/2018	Room AC	Yes	Yes
MSDE	DGT CTS	Directorate General of Training/ITIs	2 years	2014/ 2018	Room AC, Car AC, Commercial cooling equipment	Yes	Yes
Ministry of MSME	MSME RACHA	MSME Technology Centre/Central Tool Room & Training Centre	4 months	Not specified	Room AC, Microwave oven, Washing machine	Yes	Yes
Department of SDE, Government of Maharashtra	DVET Mechanic Refrigeration and Air-conditioning	Department of Vocational Education and Training/ Private Institutes	6 months	2006/ 2016	Room AC	Yes	Yes

Private sector initiatives primarily consist of short-duration courses conducted by Original Equipment Manufacturers (OEMs) and industry associations. These initiatives prioritize skill enhancement and provide specialized training on company-specific equipment for service technicians. While private-sector training plays a significant role, this factsheet underscores the importance of government programs, as they establish a foundation for standardization and can influence private-sector training through policy mandates.

Figure 1: Classification of RAC Technicians Training Initiatives in India

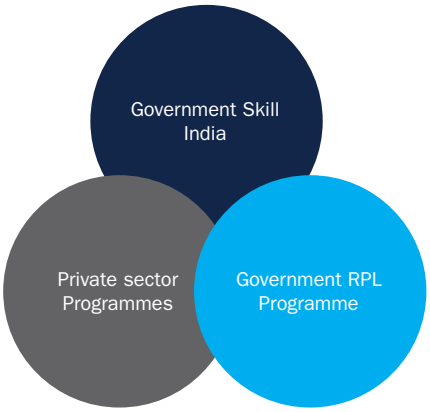
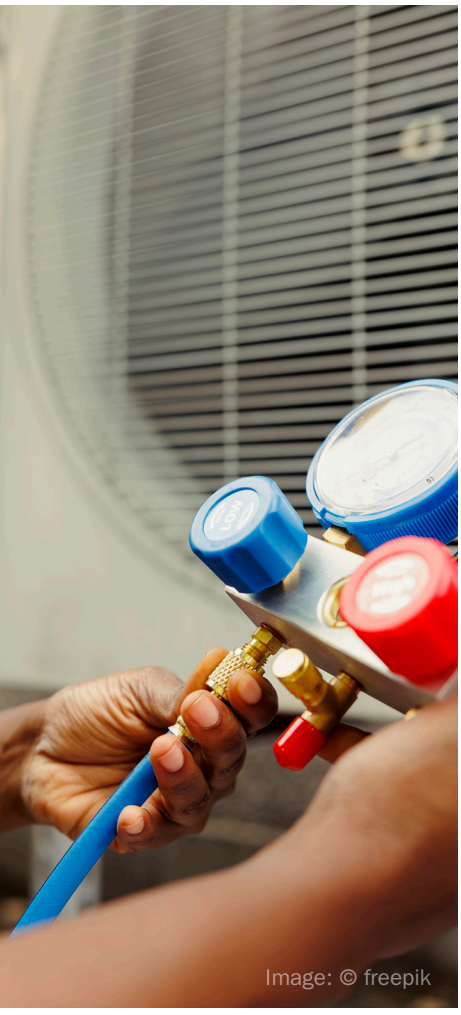


Figure 1 shows the classification of upskilling RAC service technicians in India. The three circles represent the key initiatives: Government Initiatives (Skill India, Recognition of Prior Learning – RPL) and Private Sector Programs (offered by Industry Associations and Educational Institutions). The overlap between these circles signifies technicians who benefit from a combination of programs. For instance, the area where the Government and RPL circles intersect represents technicians receiving both structured training and certification for their prior experience. Similarly, the overlap between private and RPL circles highlights technicians with experience who gain industry-specific training alongside RPL certification. The centremost area, where all three circles converge, represents technicians with the most comprehensive upskilling experience. This multi-pronged approach aims to ensure a well-trained workforce equipped to meet the evolving needs of the RAC service sectors.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Servicing in Room AC Sector

The market size for India's room AC servicing sector is substantial and continues to expand rapidly. Per 2022 estimates, the sector employs approximately 350,000 technicians in formal and informal enterprises, catering to the diverse needs of residential, commercial and industrial consumers[8]. Service workshops are considered formal when registered with relevant government authorities (e.g., manufacturers' service centres and larger authorized service workshops). Most room AC servicing workshops in India operate in the informal sector. By 2037, it is estimated that the market will witness a significant boost, with an anticipated workforce requirement of over 2 million skilled technicians to meet the escalating demands for installation, maintenance, and repair services for cooling equipment[9].

In the formal sector, technicians often possess higher skill levels through structured vocational training programs, certification courses and on-the-job experience offered by reputable institutions, industry associations and employers. These technicians have comprehensive skills and knowledge of advanced technologies, safety protocols and efficient troubleshooting techniques, enabling them to cater to complex installations and maintenance tasks for commercial and industrial clients. On the other hand, in the informal sector, skill levels among technicians vary widely from basic to intermediate. Many technicians acquire skills through apprenticeships, self-learning, or informal training from experienced peers, resulting in a diverse landscape of expertise. While some informal technicians demonstrate proficiency in servicing room AC units, others may lack the specialized knowledge required for handling sophisticated equipment or adhering to stringent industry standards.

Recognizing the skill disparities across the formal and informal sectors is essential for devising tailored upskilling interventions that address technicians' specific needs and capacities at different proficiency levels. This will ultimately foster a more skilled and competent room AC service industry workforce.

Trade Licensing and Certification for Room AC Technicians

A comprehensive framework for trade licensing and certification can enhance the skillset and professionalism of room AC technicians in India. Such an initiative can include developing online educational content, partnering with local training agencies for hands-on practice, and establishing certification centres to ensure standardized testing. Successful candidates can receive the "RAC Trade Certificate — Level 1 Room AC Installer," for example, which is for entry-level technicians in the field and can be tied to warranty conditions imposed by OEMs. A nodal monitoring agency can be appointed to oversee the process, ensuring continuous learning, consumer protection, and the advancement of technical expertise across the industry. In addition to a nodal agency, the execution of such a trade licensing program will need an institutional framework that comprises training providers, accrediting bodies, industry partners and government agencies responsible for overseeing program implementation. Meanwhile, the nodal agency will serve as the central coordinating body, ensuring cohesion and alignment across all aspects of the upskilling initiatives at the national level.

The government of India has initiated a framework for room AC service technicians. Electronic Sector Skills Council of India (ESSCI) is responsible for implementing the recently launched ESSCI Certification Scheme for room ACs[10]. The scheme standardizes the training and certification processes. It also allows experienced technicians with prior learning to get certification based on their existing skills and knowledge. The ESSCI scheme is expected to collaborate with various industry players to ensure that the training and certification are aligned with current industry needs.

Setting up a program such as the ESSCI certification scheme is a welcome step in the right direction. It will help technicians improve their skills, making them more competitive in the job market and ensuring a high-quality service in the room AC sector. A strong implementation of the scheme will go a long way in meeting the growing servicing needs of the RAC sector in India. Mentioned below is a step-wise guide that could help in designing and strengthening the implementation of the scheme:

CREATE ONLINE EDUCATIONAL VIDEOS

- **Content:** Develop detailed instructional videos covering:
  - **Installation of Room AC:** Step-by-step guide for installation and servicing.
  - **Site Survey:** How to assess the site for installation.
  - **Tools & Equipment:** Necessary tools and how to use them.
  - **Safety Measures:** Essential safety protocols during installation.
- **Languages:** To reach a wider audience, ensure videos are available in English, Hindi, and other major regional languages of India (Tamil, Telugu, Kannada, Bengali, etc.).
- **Medium:** Upload these videos on online platforms such as YouTube, Skill India, and other educational portals for easy access.

PARTNER WITH LOCAL TRAINING AGENCIES

- **City-based Centres:** Identify/appoint agencies in every major city to provide hands-on training centres where learners can practice what they have seen in the videos.
- **Predefined Criteria for Centres:**
  - **Technical Expertise:** The centres must have trained staff capable of teaching and guiding installation processes.
  - **Facility Requirements:** Service centres with necessary infrastructure and equipment for Split AC installation.
- **Incentives:** The government can subsidise these centres or provide financial incentives to train the candidates.

STEP 3

ESTABLISH CERTIFICATION CENTRES

- **Certification Process:** Some training centres should be appointed as certifying agencies to evaluate the candidates.
- **Testing Method:** Create a structured certification process:
  - Practical video submission or on-site evaluation of the installation by candidates.
  - An online test assessing technical knowledge.
- **Monitoring:** Ensure each certification test is documented through video recordings uploaded to an online portal for review.
- **Assessment Portal:** Develop an online portal to facilitate tests and record practical demonstrations.

STEP 4

ISSUE RAC TRADE COMPETENCY CERTIFICATE (LEVEL 1)

- **Certification Based on Results:** The government awards the "RAC Trade Certificate—Level 1 Room AC Installer" to candidates who pass the certification test.
  - Certificate validity should be associated with a renewal process to encourage continuous learning.

STEP 5

INVOLVE ORIGINAL EQUIPMENT MANUFACTURERS (OEMS)

- **OEM Participation:** All OEMs should upgrade their warranty systems within a year to make the warranty applicable only when a licensed and certified technician installs the AC.
- **Marketing and Consumer Awareness:**
  - Launch nationwide campaigns to educate customers about the new warranty terms.
  - Highlight the benefits of hiring certified installers for safety, warranty protection, and quality service.

STEP 6

ESTABLISH A NODAL MONITORING AGENCY

- **Governing Body:** Form a nodal agency comprising representatives from the government, industry and RAC trade associations.
- Roles of the Agency:
  - Oversee and ensure the smooth functioning of the training and assessment processes.
  - Monitor data regarding certification to identify areas where additional training is needed.
  - Collaborate with Industrial Training Institutes (ITIs) and other training institutions to promote upskilling.

With these steps, the following strategies can be adopted to begin the implementation of the program:

- **Stakeholder Engagement***:* Engage stakeholders, including industry representatives, service technicians and state-level authorities, to participate in the certification process.
- **Social Media Outreach**: Develop content related to Room Air conditioner servicing and distribute it through social media platforms such as YouTube to reach a wider audience. Provide informational videos and resources to educate technicians and consumers about the certification program.
- **Link Warranty with Trade Certification:** Contact industry partners to explore the possibility of linking warranty services with trade licensing. To encourage technicians to undergo certification, offer extended warranty benefits for certified technicians.
- **Public Sector Hiring**: Promote hiring only certified technicians in all government and Public Works Departments, public sector organizations, and other institutional users and service organizations.
- **Certification Renewal Process**: Include requirements for continued education, such as a plan to renew technicians' certificates at regular intervals, which ensures they maintain their skills and adapt to evolving technologies.

Way Forward

The factsheet outlines a step-wise approach to advancing professionalism, improving service quality, and driving sustainable growth in India's Room AC service sector. It focuses on trade licensing, certification and specialized training to build a skilled workforce. To further enhance the RAC industry, the following steps could be considered the next phase of further skilling the workforce and moving the RAC servicing sector to an organized profession.

- **Expand Certification for Advanced Skills:** Building on the success of the initial certification, additional levels of certification could be introduced for more advanced skills in air-conditioning, ventilation, and refrigeration (chillers, VRFs, mobile air-conditioning, cold-chain, etc). This expansion will offer professionals opportunities to deepen their expertise and advance their careers. These more advanced upskilling training programs will have to be based on a thorough gap assessment of the curricula of the existing programs and then designing modular training programs that cater to varying skill levels and job roles. These will also need to ensure that the upskilling initiatives are accessible and relevant to technicians at all stages of their careers.
- **Introduce RAC Graduation Program:** Collaborate with engineering and polytechnic colleges across India to introduce specialized RAC academic programs. Developing a comprehensive curriculum with input from government, trade associations, and industry experts will prepare students for careers in this field and contribute to a skilled workforce in air-conditioning, ventilation, and refrigeration. Such a program will need to be designed to provide participants with a well-rounded education that prepares them for leadership roles and specialized careers within the RAC industry. A graduate program could be designed for undergraduate students, particularly those pursuing mechanical or electrical engineering degrees. It can integrate specialized RAC courses into their existing curriculum, allowing them to gain focused expertise in RAC systems alongside their primary studies. This approach ensures that graduates have a competitive edge and are well-prepared to meet the specific demands of the RAC sector upon completing their degrees.

An organized and professionally run skilling program will empower the RAC workforce, enhance consumer trust, and boost employment opportunities domestically and internationally by addressing skill gaps and fostering industry-academia-government collaboration. The success of such initiatives will require collaboration among stakeholders, overcoming funding and regulatory barriers, and continued investment in training and infrastructure to ensure the sector's long-term competitiveness and resilience.

Endnotes

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