

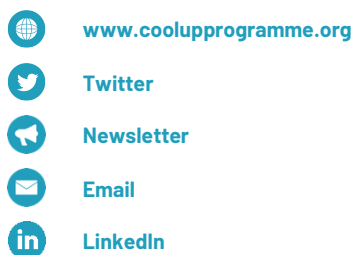


# FINANCE MARKET ASSESSMENT LEBANON

October 2022



# Finance Market Assessment Lebanon



Supported by:



based on a decision of  
the German Bundestag

Cool Up is part of the International Climate Initiative (IKI). Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection supports this initiative on the basis of a decision adopted by the German Bundestag.

The information and views set out in this publication are those of the authors and do not necessarily reflect the official opinion of the International Climate Initiative or Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection.

This deliverable was prepared by the authors for the sole use of the Cool Up programme. The work presented in this deliverable represents the authors' professional judgement based on the information available at the time this report was prepared. Cool Up consortium partners are not responsible for a third party's use of, or reliance upon, the deliverable, nor any decisions based on the report. Readers of the report are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the report, or the data, information, findings and opinions contained in the report. The views expressed in this publication are those of the authors and do not necessarily represent those of the governments of Egypt, Jordan, Lebanon, Türkiye, and Germany.

## Publisher

---

Guidehouse Germany GmbH  
Albrechtstr. 10C  
10117 Berlin, Germany  
+49 (0)30 297735790  
[www.guidehouse.com](http://www.guidehouse.com)  
© 2022 Guidehouse Germany GmbH

## Authors

---

### Lead authors:

Sanjeev Tamhane, Zuhail Ürgüplü Sanal (Frankfurt School of Finance and Management)



### Contributing authors:

Alokananda Nath (Frankfurt School of Finance and Management)

### Review:

Sorina Mortada (Lebanese Centre for Energy Conservation)  
Jan Grözinger, Nesen Surmeli-Anac, Jakob Hoffmann  
(Guidehouse)

---

**Date**                      October 2022

**Contact**                      Contact us at [info@coolupprogramme.org](mailto:info@coolupprogramme.org).  
Visit us on the web at [www.coolupprogramme.org](http://www.coolupprogramme.org).

# Table of Contents

---

- Acronyms ..... 1**
- Summary..... 3**
- 1. Introduction ..... 5**
  - 1.1. The Cool Up programme ..... 5
  - 1.2. Aim and scope of this report ..... 6
  - 1.3. Kigali Amendment..... 6
- 2. Overview ..... 8**
  - 2.1. Setting the scene..... 8
  - 2.2. Macroeconomic overview ..... 8
    - 2.2.1. Electricity consumption..... 9
  - 2.3. Policy landscape ..... 10
  - 2.4. Cooling Sector overview ..... 10
- 3. Methodology..... 12**
  - 3.1. Definitions ..... 12
  - 3.2. Building segments and equipment types in scope of the Cool Up programme ..... 13
    - 3.2.1. AC sector..... 13
    - 3.2.2. Commercial refrigeration sector ..... 14
  - 3.3. Data collection approach ..... 14
- 4. Summary of key findings and recommendations ..... 15**
- 5. Finance Landscape..... 16**
  - 5.1. RAC Value Chain Finance ..... 16
    - 5.1.1. Import..... 17
    - 5.1.2. Manufacture ..... 17
    - 5.1.3. Distribution..... 17
    - 5.1.4. Retail Sale..... 18
  - 5.2. Banking Sector Overview ..... 19
    - 5.2.1. Financial Sector Backdrop (Financial Market Structure)..... 19
    - 5.2.2. Recent Trends in wider Green Finance in the Country ..... 22
    - 5.2.3. Significant non-finance Organization..... 22
    - 5.2.4. Overview of RAC finance initiatives (incl. sources of finance)..... 23
    - 5.2.5. Government and Public Support Programme ..... 24
- 6. Opportunities for Financing of Sustainable Cooling Technologies ..... 26**
  - 6.1. Sources of finance, financing mechanisms and business models ..... 26
    - 6.1.1. Financing Mechanisms ..... 26
  - 6.2. Drivers, barriers, opportunities..... 31
    - 6.2.1. International FIs and programmes ..... 31
    - 6.2.2. Initial findings (based on interviews with commercial banks in Lebanon) ..... 31
- 7. Bibliography ..... 33**

# Figures

---

**Figure 1:** Financing different stages of technology development through commercialization ..... 16

**Figure 2:** RAC value chain in Lebanon ..... 18

**Figure 3:** Distribution of loan among economic sectors (January – September 2020) .....20

# Tables

---

**Table 1:** Schedule of phase-down of HFC consumption in Cool Up partner countries ..... 7

**Table 2:** Distribution of bank credit by sector .....20

**Table 3** RAC Finance initiatives.....24

**Table 4:** Financing products for financing energy efficiency .....26

**Table 5:** Indicative financing mechanisms for end-user groups .....27

**Table 6:** Sources of finance for energy efficiency projects ..... 27

## Acronyms

---

ABL	Association of Banks in Lebanon
AC	Air Conditioning
AFD	French Development Agency
BDL	Banque du Liban
CBJ	Central Bank of Jordan
CBL	Central Bank of Lebanon's
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
ENI CBC	European Neighborhood Instrument - Cross Border Cooperation
EPC	Energy Performance Contracting
ESCO	Energy Services Companies
ESMES	Energy Smart Mediterranean School Network
ESSN	Emergency Social Safety Net
GEFF	Green Economy Financing Facility
HVAC	Heating, Ventilation and Air Conditioning
IDAL	Investment Development Authority
IDR	Issuer Default Rate
IFC	International Finance Cooperation
IFIs	International Financial Institutions
IKI	International Climate Initiative
IMELS	Italian Ministry of the Environment, Land, and Sea
IMF	International Monetary Fund
IMF	Independent Municipal Fund
LCEC	Lebanese Center for Energy Conservation
LEA	Lebanese Environmental Action
LEEREFF	Lebanon Energy Efficiency and Renewable Energy Finance Facility
LFIs	Local Financial Institutions
Libnor	The Lebanese Standards Institution
MDB	Multilateral Development Banks
MEPS	Minimum Energy Performance Standards
NDB	National Development Banks
NEEAP	National Energy Efficiency Action Plan
NEEREA	National Energy Efficiency and Renewable Energy Action

PV	Photovoltaic
RAC	Refrigeration and Air Conditioning
RCREEE	Regional Center for Renewable Energy and Energy Policy
RE	Renewable Energy
REEE	Renewable Energy and Energy Efficiency
S&L	Standards and Labelling
SCT	SEPA Credit Transfer
SME	Small and Medium Enterprise
UNDP	United Nations Development Programme
WB	World Bank

## Summary

---

This report provides an assessment of the finance sector in Lebanon with reference to the Refrigeration and Air Conditioning (RAC) sector. The discussion covers an economic overview of the Country, giving a broader perspective. The finance sector in Lebanon comprises commercial banks and nonbanking financing companies, including a banking regulator (Banque du Liban). The report also analyses the financing of green projects and green infrastructure. The Cool Up Programme evaluated different financing approaches and mechanisms for financing sustainable cooling solutions applicable to end-user groups – individual consumers and commercial and public sectors. Apart from the desktop research from the secondary sources of information, a few interviews have been used to gather the information from the primary sources.

### Finance Sector overview

There are more than 45 commercial banks in Lebanon until 2020, of which about 16 banks are large and medium ones. Their share in total bank credit more than doubled to account for almost a third of total bank credit to the private sector. The sectoral distribution of bank credit underwent a radical structural change in the past decade. Personal loans granted mainly to finance all forms of consumer spending were multiplied by a factor of 7 in the period from 2000 to 2012 and by a factor of 11 in 2000 to 2018.<sup>1</sup>

Over the past three years October 2019 – October 2022, Lebanon has been facing several crises, including a) economic and financial crisis; b) Covid-19; and c) the explosion at the Port of Beirut (in August 2020). The economic crisis has had the largest negative impact. By the time the crisis erupted in October 2019, the economy was facing four extraordinary challenges:

- ▶ First, public sector debt had reached such elevated levels that a default had become a question of when, not if.
- ▶ Second, the banking sector, having lent three-quarters of deposits to the government, had become functionally bankrupt and increasingly illiquid.
- ▶ Third, the productive economy had experienced virtually no growth for an entire decade – a development with acute socio-political implications.
- ▶ Finally, and most importantly, the country was politically rudderless: there was no president between 2014 and 2016, there were multiple and lengthy delays in cabinet formation, and the 2018 parliamentary elections took place but only after a five-year delay. The Hariri government that was in place when the crisis hit in 2019 became impotent to such an extent that it lacked power to deliver on any of the reforms required as a condition for foreign support.

Furthermore, since October 2019, the banking sector ceased the lending, rejected the deposits, and barred the depositors from accessing their savings accounts. Instead, banks imposed strict USD withdrawal limits and prohibited transfers abroad, in addition, they endured a segmented payment system that distinguished between older (pre-October 2019) dollar deposits and new inflows of “fresh dollars.” As a result, the reputation of Lebanese banks was damaged, and hundreds of branches were closed. The Lebanese citizens have lost their trust in the banking system and are increasingly opening bank accounts abroad for their businesses or dealing with money transfer agencies. In fact, some companies are now paying salaries through money transfer agencies. Furthermore, these agencies are also offering currency exchange, credit cards and tax payment services, and they are setting up wedding gift registries.

To stabilise the Country’s economy, a specific economic, social, and financial reform program has to be implemented, with broad challenges and demands and a base to pursue stable and sustainable prosperity. According to the International Monetary Fund (IMF), Lebanon’s economy should include five strong points

---

<sup>1</sup> Lana El Tabch (2018): The Lebanese Economy in 2018. Chamber of Commerce, Industry, and Agriculture of Beirut and Mount-Lebanon. Available online at <https://www.ccib.org.lb/uploads/60ffd8610c5a1.pdf>.



in order to transform specific policies to address the Country's economic and financial challenges, which include:

- ▶ Fiscal reforms to safeguard sustainable debt
- ▶ Fortify the restructuring, recovery, and confidence of the financial sector
- ▶ Reorganise the energy sector and public companies aiming to provide better services
- ▶ Reinforce banking frameworks to strengthen transparency and accountability
- ▶ Built-up a creditable exchange rate system.

### **Financing of the RAC value chain**

Most commercial banks facilitate the financing of the RAC value chain in Lebanon. The Lebanese refrigeration and air conditioning (RAC) market is import-dominated and there is some local assembly and minor local manufacture. Most room air conditioning systems are split systems. The commercial refrigeration market depends on products from Italy, Turkey, Greece, and Germany. Lebanon has no large-scale manufacturing base for room air conditioners and freezers. On the other hand, Lebanon has the most modern malls and supermarkets with retail outlets for various goods, including domestic appliances. Whereas distribution segment related to domestic appliances mainly comprises warehousing and transportation. Commercial banks provide import finance as well as support SME units manufacturing (mainly assembling) commercial refrigeration systems. All financing is conventional corporate finance following balance sheet lending. Apart from financing new projects, banks also meet working capital needs. The financing of retail customers is through credit card finance or personal loans.

### **Green finance**

National Energy Efficiency and Renewable Energy Action (NEEREA) is implemented through all Lebanese commercial banks under the leadership and management of BDL. The technical support and capacity building activities are done by the LCEC to develop the know-how among all players. The Intermediate Circular 236 (Nov 25, 2010) allows the commercial banks to use their "Obligatory reserves" towards NEEREA mechanism to facilitate financing in green sectors. On the other hand, the Green Economy Financing Facility (GEFF) is a program of EBRD that supports homeowners and businesses in investing in green technologies.

### **Opportunities for financing sustainable cooling technologies**

The Cool Up programme evaluated financing approaches suitable for financing sustainable cooling options for each group of end-users in Lebanon. These were primarily integrated through the experience of local experts and international experience in energy efficiency financing, including vast literature on the subject.

Leasing and positive list are two prominent approaches that could be used for commercial end-users in Lebanon. Positive list is easy to implement mechanism for commercial banks that needs minimum training to loan officers. ESCO approach and bulk procurement could be used for public sector organisations. Commercial banks can play significant role in providing finance, developing as well as offering new products (tailored to meet requirements of end-users of sustainable cooling technologies). On the other hand, banks can work closely with technology providers and end-users to facilitate interesting business models.

### **In conclusion**

The Cool Up programme needs to work closely with financing institutions/banks, end-users, technology providers and other stakeholders in Lebanon. Once technology selection is completed by the Cool Up programme, the next steps would include securing data from the stakeholders mentioned, to initiate feasibility studies of sustainable cooling technology options. The Cool Up Programme envisages facilitating new financing products for financing sustainable cooling technologies. Besides, training and capacity building of loan officers of commercial banks will also be explored as appropriate.

# 1. Introduction

---

With energy demand expected to increase 50% by 2040,<sup>2</sup> Middle East and North Africa (MENA) countries are facing a range of climate-change related challenges. The region's energy challenges include rapidly growing populations, urbanisation, and a heavily strained energy infrastructure. Cooling in air conditioning (AC)-equipped households already represents a major source of energy consumption in the region, and many of the space cooling and refrigeration system systems in use have a low energy efficiency. There is large potential for energy saving, new equipment installed have often lower efficiency than the best available technology. The use of cooling systems is expected to grow further as, with the standard of living improving, more households are using, often inefficient, AC systems. Furthermore, climate change is expected to significantly impact the region with temperatures rising an average of 2°C by 2050 and increased humidity, creating increased need for intensive cooling.

## 1.1. The Cool Up programme

The Cool Up programme promotes accelerated technological change and early implementation of the Kigali Amendment to the Montreal Protocol and Paris Agreement in Egypt, Jordan, Lebanon, and Türkiye. The programme focuses on enabling natural refrigerants and energy efficient solutions to mitigate the effects of rising cooling demand. The Cool Up approach is based on four pillars: reducing cooling demand, phasing down hydrofluorocarbons (HFCs), replacing and recycling inefficient equipment and refrigerants, and training and raising awareness.

The programme's cross-segment approach focuses on residential and commercial AC sector and on the commercial refrigeration sector.

The programme aims to develop lasting institutional capacity and increase the deployment of sustainable cooling technologies in the market. To enable a cooling market transformation towards sustainable cooling technologies, the Cool Up programme will:

- ▶ Enhance cross-sectoral dialogue between national actors to build ownership to support long-term impact.
- ▶ Develop policy actions to create a supportive regulatory environment.
- ▶ Develop financial mechanisms and funding structures to enable the cooling market transition.
- ▶ Support the commercial deployment and dissemination of existing and emerging technologies with natural refrigerants.
- ▶ Provide resources for capacity development on sustainable cooling in the four partner countries.

In MENA countries, cooling constitutes a major source of energy consumption; it produces indirect greenhouse gas (GHG) emissions and contributes to ozone depletion and global warming. The Cool Up programme seeks to address this challenge in its partner countries by mitigating the adverse impacts of refrigerants through promoting accelerated technological change and facilitating early implementation of the Kigali Amendment and Paris Agreement.

The programme is divided into three pillars:

- ▶ Policy and regulation
- ▶ Technology and markets
- ▶ Financing and business models

---

<sup>2</sup> BP Energy Economics: BP Energy Outlook 2018 Edition. Available online at <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2018.pdf>.

## 1.2. Aim and scope of this report

This finance market assessment report is the first in a series of reports that will be produced by the Cool Up programme. It aims to provide an overview of the banking and finance sector in Lebanon with reference to RAC space laying the foundation for further work to be used within the programme and to facilitate informed decision makers for all public and private sector stakeholders. This report will lead further work in the area of financing of sustainable cooling technologies under the Cool Up programme in the partner countries – Egypt, Jordan, Lebanon and Türkiye.

This finance market assessment report presents compilation of limited data available on direct financing of RAC sector (primarily AC in residential and non-residential buildings and commercial refrigeration). While the report primarily focuses on financing aspects, it briefly summarises the cooling sector status and the current policy landscape and outlines several types of policies and regulations (e.g., international protocols, national strategies, laws and standards, and code policy).

- ▶ Chapter 2 provides a brief country economic overview followed by high level summaries of the policy and cooling sector status.
- ▶ Chapter 3 elaborates definitions used in this report, sector focus (what areas are covered under air conditioning and refrigeration). This section states the methodology adopted to prepare this report and associated limitations and boundaries.
- ▶ Chapter 4 gives an overview about the value chain associated with the RAC sector and our understanding of financing of individual elements of the value chain. summarises the banking sector in Lebanon and details various green financing schemes. The report discusses roles of non-finance organizations in support of climate change and energy efficiency.
- ▶ Chapter 5 outlines various financing approaches which could be explored further for sustainable cooling technologies in three prominent end-use sectors such as residential, commercial, and public sectors. Cool Up has selected these approaches as these have been reportedly used for energy efficiency projects in many developing countries.
- ▶ Chapter 6 provides conclusive summary and recommendations

## 1.3. Kigali Amendment

Most cooling systems rely on refrigerants with high global warming potential (GWP), leading to high direct emissions from the refrigerant circuit. Adopted in 1987, the Montreal Protocol phases down consumption and production of ozone-depleting substances (ODS)—most notably hydrochlorofluorocarbons (HCFCs)—in a stepwise manner, with different timelines for developed and developing countries (referred as Article 5 countries). Recognising the threat of fluorinated gases, specifically HFCs, to global climate change, in 2016, the international community decided in Kigali (Rwanda) on an amendment to the Montreal Protocol. Jordan has become the first country in the Middle East to ratify the Kigali Amendment to phase down HFCs. The Kigali Amendment entered into force on 1 January 2019 and implements a global HFC phase-down to reduce HFC production and consumption by more than 80% over the next 30 years.

For the Cool Up partner countries—Egypt, Jordan, Lebanon, Türkiye<sup>3</sup> – the same HFC phase-down schedules apply under the Kigali Amendment (see [Table 1](#)).

The baseline is determined as the country's average consumption of HFCs for 2020, 2021, and 2022 plus 65% of the baseline for HCFCs.

---

<sup>3</sup> These countries are considered developing (Article 5) countries under the Montreal Protocol. Article 5 countries follow different phase-out schedules than industrialized countries.

**Table 1:** Schedule of phase-down of HFC consumption in Cool Up partner countries

Freeze consumption 2024-2028	
<b>Phase down</b>	10% of the baseline for 2029-2034
<b>Phase down</b>	30% of the baseline for 2035-2039
<b>Phase down</b>	50% of the baseline for 2040-2044
<b>Phase down</b>	80% of the baseline for 2045

The upcoming years represent numerous opportunities and challenges for cooling sector conversions and the introduction of sustainable and future-proof alternatives to ODS and HFCs.

In many countries in past years, HCFC replacement led to the introduction of HFCs in major cooling applications. However, with the reduction schedule for HFCs in the Kigali Amendment, HFCs no longer represent a sustainable alternative to ODS. Enabling the uptake of sustainable alternatives, such as natural refrigerants, prevents a switch from HCFCs to HFCs and from HFCs to environment friendly low GWP alternatives. This direct replacement early in the transition process is called leap frogging and creates opportunities for emissions reductions, energy savings, and investments in future-proof technology.

In the last decade, natural refrigerants, and climate-friendly measures (referred as not-in-kind technologies)<sup>4</sup> have been researched extensively. Examples of such not-in-kind technologies are being commercially introduced worldwide (e.g., passive cooling of buildings). Additionally, technical solutions to boost system efficiency have been identified and established for applications relying on natural refrigerants.

---

<sup>4</sup>Systems that do not rely on a vapor compression cycle using a gaseous refrigerant.

## 2. Overview

---

### 2.1. Setting the scene

Lebanon is experiencing significant economic and political unrest, which has affected all markets. A sustained economic crisis, ongoing since 2019 and further perpetuated by an explosion at the Port of Beirut in 2020, has worsened with the onset of the COVID-19 pandemic. Under current circumstances, there has been negative economic growth and few new construction activities in Lebanon, diminishing growth in the air conditioning (AC) and refrigeration markets.

The country has a Mediterranean climate with hot, dry summers that require cooling. Cooling degree days in Lebanon are two times higher than heating degree days and can exceed 1300 a year.<sup>5</sup> In 2018, cooling energy consumption made up approximately 32% of total Lebanese electricity consumption, with the residential sector constituting 50% of total cooling consumption. Despite its recent economic challenges, Lebanon is expected to see a 75% increase in final energy consumption in buildings by 2030.<sup>6</sup> Cooling and dehumidification are the highest energy-consuming end uses in the Lebanese building sector.

### 2.2. Macroeconomic overview

2020 and 2021 are exceptional years and do not represent a normal operation. This report is based on data that represents the historical, usual operation conditions but that also considers the recent economic challenges where appropriate.

Lebanon has been experiencing economic depression and political challenges in recent years due to monetary emergency, the COVID-19 pandemic, and the Port of Beirut blast. Actual GDP decreased by 20% in 2020. Inflation increased to triple digits while the exchange rate keeps losing value. Poverty is rising rapidly.<sup>7</sup> As per the World Bank, monetary and financial turmoil continue to drive crisis conditions, with interactions between the exchange rate, narrow money, and inflation a key dynamic.<sup>8</sup>

The recent economic challenges in Lebanon are directly affecting the purchase power of Lebanese households. Purchasing new equipment can be considered a financial burden. For instance, the cost of an average AC unit would equal double the Lebanese minimum wage. Under these circumstances and the severe economic challenges in Lebanon (including negative economic growth and little new construction activities), the usual key drivers for the AC and refrigeration market are (partly) absent, resulting in a declining AC market; this is especially affecting split systems among low-income populations. The market now relies on maintaining current systems rather than selling new systems.<sup>9</sup>

Electricity tariffs in Lebanon are heavily subsidised. The average cost to produce 1 kWh in 2010 was EUR 0.18<sup>10</sup> and the average selling price of 1 kWh by Electricity of Lebanon (EDL) was LBP 138, equivalent to EUR 0.083 at the official exchange rate. In addition to this subsidy since the end of 2019 till December 2021 resulted in a loss of around 90% of the value of the Lebanese currency. Consequently, the value for 1 kWh sold can now be considered less than EUR 0.009 while the cost of production, heavily dependent on fuel

---

<sup>5</sup> ASHRAE. "Climatic Data for Climatic Data for Building Design Standards: ANSI/ASHRAE Addendum a to ANSI/ASHRAE Standard 169-2013." 2020.

<sup>6</sup> International Renewable Energy Agency. "Renewable Energy Outlook Lebanon: Based on Renewables Readiness Assessment and REmap analysis." 2020. [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA\\_Outlook\\_Lebanon\\_2020.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Outlook_Lebanon_2020.pdf).

<sup>7</sup> The Heritage Foundation. "2021 Index of Economic Freedom." [https://www.heritage.org/index/pdf/2022/countries/2022\\_IndexofEconomicFreedom-Lebanon.pdf](https://www.heritage.org/index/pdf/2022/countries/2022_IndexofEconomicFreedom-Lebanon.pdf).

<sup>8</sup> The World Bank: The World Bank in Lebanon. Available online at <https://www.worldbank.org/en/country/lebanon>.

<sup>9</sup> Expert Interviews

<sup>10</sup> Lebanese Center for Energy Conservation. "The National Renewable Energy Action Plan for the Republic of Lebanon 2016-2020." Lebanese Republic Ministry of Energy and Water, 2016. <https://climatechange.moe.gov.lb/viewfile.aspx?id=245>.

All data given in USD in the original source has been converted to EUR. 1 USD has been converted to 0.90 EUR, based on, European Central Bank, "Euro foreign exchange reference rates"

imports, remains the same. This results in more than 0.17 EUR/kWh of combined losses on EDL and the Lebanese economy.

Electricity supply in Lebanon is significantly lower than demand. The average generated power in 2019 reached 1,670 MW while the average demand reached 2,615 MW. The gap between peak demand and peak generation in the same year reached 1,537 MW. Electricity demand keeps growing while the electricity supply keeps decreasing due the high demand for fuel imports.<sup>11</sup>

All regions in Lebanon experience electricity shortages; these shortages reach 12 hours of blackout per day in normal years and 18–20 hours within the current situation.

### 2.2.1. Electricity consumption

The electricity demand pattern is mainly driven by economic growth, population growth, and climate change.

Lebanon has seen a fluctuation in the energy consumption over the years. The *First Energy Indicators Report of the Lebanese Republic* published in 2018<sup>12</sup> establishes three major axes of energy consumption at the end user level in Lebanon: the building sector, the industrial sector (accounting only for industrial process), and the transport sector. In 2018, the majority of Lebanon's electricity was consumed by the building sector, with a total consumption of about 19.5 TWh, or 86% of the total electricity consumption (compared to 78% in 2014).<sup>13</sup>

The residential sector has been the largest consumer of electricity, accounting for approximately 30% of Lebanon's overall electricity demand in 2014, followed by the commercial sector (retail, wholesale, malls, ...), which accounted for 27% of Lebanon's total demand for electricity in 2014.<sup>14</sup>

Cooling and dehumidification are the highest-consuming usages in the building sector (residential and non-residential). Cooling and dehumidification in the building sector combined constituted 40% of the total electricity demand in Lebanon in 2014, of which around 19% of the share was reached in the residential sector, 11% in the commercial sector and 8% by the health and educations sector.<sup>15</sup>

In 2018, the cooling in the building sector (residential and non-residential) accounted for around 7,250 GWh, which is equivalent to around 32% of the total Lebanese electricity consumption (compared to 40% in 2014). The residential sector consumption in cooling constituted 50% of the total cooling consumption of the building sector in 2018.<sup>16</sup>

The National Cooling Plan Lebanon identifies about 53% of the total electricity demand for cooling from unitary air conditioning (UAC) and about 18% from commercial refrigeration.<sup>17</sup>

International Renewable Energy Agency (IRENA) in *Renewable Energy Outlook Lebanon*<sup>18</sup> (2020) has predicted an increase of about 75% in the final energy consumption of buildings (to reach 36 TWh) by 2030. This growth in energy demand is attributed to increased demand in the building sector, including cooling and heating demands.

---

<sup>11</sup> Lebanese Center for Energy Conservation, "Internal database"

<sup>12</sup> Lebanese Center for Energy Conservation. "The First Energy Indicators Report of the Republic of Lebanon." Lebanese Republic Ministry of Energy and Water. [https://lcec.org.lb/sites/default/files/2021-02/Indicators%20Report\\_VF.pdf](https://lcec.org.lb/sites/default/files/2021-02/Indicators%20Report_VF.pdf).

<sup>13</sup> Lebanese Center for Energy Conservation (internal database)

<sup>14</sup> Ibid

<sup>15</sup> Ibid

<sup>16</sup> Ibid

<sup>17</sup> National Ozone Unit - Lebanon. "Guidance for Integrating Efficient Cooling in National Policies in Lebanon." Lebanese Ministry of Environment, Beirut, Lebanon, 2020. <https://www.undp.org/sites/g/files/zskgke326/files/migration/lb/NCPL.pdf>.

<sup>18</sup> International Renewable Energy Agency, (2020)

## 2.3. Policy landscape

The Government of Lebanon ratified the Kigali Amendment on February 5th, 2020, and has progressed in meeting its commitments relevant to the Montreal Protocol, implementing several relevant programs, laws, and other policy instruments such as codes and standards. For the regulatory analysis, the policy instruments governing the RAC sector in Lebanon were analysed to identify the key strengths and shortcomings towards phasing down HFCs, using natural refrigerants and reducing cooling demand. The regulatory analysis covers the four categories of policy instruments that hierarchically include the following categories: a) International Protocols and commitments, b) National Plans and Strategies, c) Laws and bylaws relevant to the RAC and building sector, and d) Standards and codes.

Lebanon has been working to meet its international commitments, implementing a staged approach to comply with the adjusted control schedule for Annex-C Group-I substances (HCFCs), and completing HPMP Stage-I (2011 to 2015) activities relating to industry phase-out prior to 2015. These efforts have contributed to a decrease in HCFC consumption in the country. The Stage II (2016 to 2025) of the HPMP was approved in 2016 and focuses on RAC industries and the RAC servicing sector. Furthermore, several other national policies such as the 2<sup>nd</sup> National Energy Efficiency Action Plan (NEEAP 2016-2020) and a National Cooling Plan (2021) were developed. Lebanon also published an updated NDC in 2021 with new commitments of emissions reductions. Most of those national plans have been either successfully implemented or under implementation. However, lack of funding appears as a major barrier to implementation.

Lebanon has developed several laws that govern ODS phase out, enhancing energy efficiency and environmental protection. This includes -for example- Environment protection law, Waste Management Framework Law, and the Decree No. 3277/2016 which regulates the import of materials included in the Montreal Protocol and its amendments. Lack of enforcement is the main challenge that the sector faces and that is mostly due to a lack of awareness amongst end-users as well as a scarcity of resources at enforcing authorities. For example, some entities, such as the Industrial Research Institute (IRI), have the competences to test the safety of equipment and other types of tests ratified by laws while others, such as the customs offices lack the needed system/software for the customs to apply for instance decree 167/2017 related to tax incentives on green equipment.

Lebanon is at a different stage of development and implementation with regards to MEPS and energy labels. Mandatory standards are limited to compact fluorescent lamps and solar water heaters. MEPS for refrigerators, AC split units and heat pumps are under development and mostly focus on systems performance, instead of focusing on specific uses of natural refrigerants and sustainable cooling. Standards are developed by LIBNOR (The Lebanese Standards Institution) and mainly issued as voluntary standards. A standard must be translated into a Governmental Decree to become mandatory. Such a Decree should also define the enforcing entities (monitoring, inspection, and judicial police). This process mandates skill development and capacity building across all involved entities. Awareness raising among end-users is also needed to increase their understanding of using natural refrigerants, specifically to calm their safety concerns.

In general, Lebanon has been successful in implementing several national plans to comply with the Montreal Protocol (MP) and its commitments, however, the country has room to improve achieved success and faces challenges around lack of enforcement, availability of funding and capacity buildings programs for various stakeholder groups.

Based on this analysis, some key policy recommendations have been derived to support the preparation of policy frameworks that guide the transition towards sustainable cooling and natural refrigerants use. A detailed report with a full analysis and list of policy recommendations is available on the [Cool Up website](#).

## 2.4. Cooling Sector overview

The Lebanese AC market is dominated by imports. Imported cooling products include whole split units and systems and detached parts that are typically assembled locally. Though the Lebanese air conditioning

market declined between 2017 and 2020 due to the economic crisis, the market is expected to grow as soon as the economic situation stabilizes.

The main market drivers for sales have been economic growth (affordability), extreme weather conditions, and new construction activities before the economic downturn. The demand for different AC technologies is driven by installations in new buildings, new installations in existing buildings (to increase the share of air-conditioned rooms), and the replacement of dysfunctional AC systems. In the new construction sector about 85% of all new apartments, 90% of new retail buildings and 95%--100% of other non-residential buildings such as hotel, office, and healthcare buildings have been installing AC systems (before the economic crisis). In existing residential buildings about 50% of the floor area is not air conditioned, yet there is substantial market growth potential for the cooling market in Lebanon once the economy starts growing again.

Currently installed equipment and new units installed have lower efficiency than the best available technology. There is a large potential for energy savings. AC systems installed in the building stock have an energy efficiency ratio (EER W/W) in the range of 2.0-2.8 (existing buildings). This is significantly below the efficiency of the technologies with the best available efficiency range in Lebanon. Comparing this to the best available efficiency on an international level, major increases in efficiency is possible, especially in the split system and central ducted segment.

The commercial refrigeration market is import-dominated with the most significant commercial refrigeration segments in corner stores, restaurants, and small and large supermarkets. Large brand name companies often provide equipment to stores and supermarkets. The market currently relies on the maintenance services of commercial refrigeration systems rather than the sales of new systems. The economic challenges have shifted large sectors to use more efficient equipment to reduce electricity consumption. In general, both the growth of the AC sector and the refrigeration sector are driven by new construction, economic growth, and increased population and urbanisation.

Currently Lebanon imports all refrigerants used in the cooling and refrigeration sectors. The predominant refrigerants used in the existing AC sector are R22 and R410A; in central systems R134a is also used. In new AC systems, the predominant refrigerant is R410A, also R32 is applied. In new central systems, apart from R410A, R1234ze and a small amount of R600a is used. In the commercial refrigeration sector, the predominant refrigerants used in existing equipment are R22 and R134a. In new condensing commercial refrigeration systems, the predominant refrigerants are R404A and R134a, small amounts of R22 are still used in new systems. Although the market is dominated by high global warming potential refrigerants, some natural refrigerant solutions are currently being used in central chillers. However, the use of natural refrigerants at a commercial scale has not yet been introduced. Lebanon can overcome these challenges and develop a natural refrigerant market by leveraging its work through the Cool Up program to expand technical knowledge, improve energy efficiency and sustainable cooling technology options, and build technical capacity that can be useful to stakeholders during and after the country's recovery.

In summary, the overall market for cooling equipment in Lebanon is expected to continue to grow once the economic crisis is overcome. A growth would require introducing sustainable cooling technologies and natural refrigerants early on as a direct replacement to prevent potential lock-in effects to harmful refrigerants. Perceived key challenges to the uptake of natural refrigerants include safety issues and associated costs.



## 3. Methodology

---

The first step in developing the finance assessment report is to define boundaries of this report. This report has focussed on generic financing of the refrigeration and air conditioning (RAC) sector and not specific financing situations. This report has used widely accepted nomenclature and financing terms which are elaborated in this section.

On the other hand, It is essential to understand what RAC sector is being referred to in this report. The following set of measures were used to guide programme activities to maintain clarity in definitions, data scope, and limitations of the study.

### 3.1. Definitions

The Cool Up Programme uses the following definitions:

Financial institutions:

- ▶ Financial institutions include commercial banks, investment banks, insurance companies, brokerage firms, and specialised local financing institutions (at national or provincial levels).
- ▶ International financial institution (IFI): An International Financial Institution (IFI) is a financial institution established (or licensed) by more than one country and is therefore subject to international law. Their owners or shareholders are generally national governments, but other international organizations and other organizations may also emerge as shareholders. Bilateral financial institutions are technically IFIs.<sup>19</sup>
- ▶ A multilateral development bank (MDB) is an institution created by a group of countries that provides financing and professional advice to enhance development.
- ▶ RAC sector:
  - ▷ Refrigeration: Domestic, commercial, industrial, and transport refrigeration
  - ▷ AC: Residential and commercial AC manufacturing (including chiller)
  - ▷ Servicing sector for RAC
- ▶ Air conditioning (often referred to as AC, A/C, or air con) is a process to remove heat and moisture from the interior. It is used in domestic and commercial environments.
- ▶ The commercial refrigeration scope includes stationary systems used to store and display food and beverages in retail (supermarkets, shops) and food service (restaurants, hotels) but not for processes. The United Nations Environment Programme (UNEP) defines commercial refrigeration systems as systems that usually include standalone, condensing, or centralised units that do not generally exceed a capacity of 200 kW and keep temperatures between -25°C and 8°C.<sup>20</sup>
- ▶ Commercial refrigeration cold storage includes commercial-scale cold storage rooms, usually equipped with condensing or centralised units with capacities of up to 200 kW. These applications serve as storage for food and beverage products and differ from industrial-scale cold storage, which is used for the processing and storing food or in the manufacturing process of petrochemicals, chemicals, and pharmaceuticals. Such systems range in size from 5 MW to 30 MW.<sup>21</sup>
- ▶ Synthetic refrigerants are substances of anthropogenic origin (they do not occur naturally). These include HCFCs and HFCs, among others.
- ▶ Natural refrigerants are non-synthetic refrigerants that can be found in nature.

---

<sup>19</sup> Dictionary.com. "Definitions for international financial institutions."  
<https://www.definitions.net/definition/international+financial+institutions>.

<sup>20</sup> Definition based on United Nations Environment Programme, "Presession Documents: Workshop on Hydrofluorocarbon Management"

<sup>21</sup> United Nations Environment Programme, "2018 Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee"

- ▶ Energy efficiency ratio (EER) W/W measures the energy efficiency of cooling devices in watts (W). A higher EER rating corresponds to higher energy efficiency.
- ▶ Residential building sector consists of single and multifamily buildings.
- ▶ Non-residential building sector includes public and private offices, education, health and social, hotel and restaurant, wholesale and retail trade, and other buildings (e.g., sports facilities). Industrial, agricultural and fishery buildings and warehouses are not included.
- ▶ Sustainable cooling is affordable, safe, and satisfies the user needs with the lowest possible environmental impact. This specifically implies the absence of environmentally harmful refrigerants (such as fluorinated gases), a low energy demand (including a high efficiency), and at least readiness for a fully renewable energy supply.
- ▶ Direct greenhouse gas (GHG) emissions are related to refrigerant losses on each appliance (refrigerant leakage, operational and at disposal after end of life).
- ▶ Indirect GHG emissions are those related to the generation of the electricity used for cooling.

## 3.2. Building segments and equipment types in scope of the Cool Up programme

### 3.2.1. AC sector

Building segments: Focuses on residential buildings that cover single-family and multifamily buildings and on non-residential buildings, i.e., on public and private offices, education, health and social, hotel and restaurant, wholesale and retail trade, and other buildings (e.g., sports facilities).

Equipment types (AC systems): Although there are many different technologies installed in the market, they can be clustered into the following key technology segments, which are used to depict the market characteristics.<sup>22</sup> AC systems can generally be divided into central and decentral systems.

- ▶ Ducted air conditioning provides cooling (or heating) through a system of ducts. The central unit consists of a compressor, condenser, and an air handling unit, normally located in the attic or basement. Cool (or hot) air is distributed through a series of ducts and vents to the building. These systems are also called central air conditioning systems, which can be broadly segregated into two types, i.e., split central air conditioners (duct split) and packaged central air conditioners.<sup>23</sup>
- ▶ Splits units: Single split systems consist of an indoor and an outdoor unit and provide AC for one indoor zone.
- ▶ Multi-split and variable refrigerant flow (VRF) systems: Multi-split systems consist of one outdoor and several indoor units. VRF systems are sophisticated multi-split systems. Several outdoor units can support many indoor units (up to 64), and the indoor units can be regulated individually.
- ▶ Packaged units (e.g., rooftop): All components are enclosed in a single box. Packaged units are typically located outside (rooftop, terrace) and provide cooling by delivering conditioned air to one or more indoor zones.
- ▶ Chillers: Central cold generation units as part of a central AC system, which can be categorised into three groups:
  1. Compression water-cooled chillers
  2. Compression air-cooled chillers

<sup>22</sup> United Nations Environment Programme (UNEP) Ozone Secretariat, "FACT SHEET 7 Small Self Contained Air Conditioning" (UNEP Ozone Secretariat, Bangkok, 2015)

United Nations Environment Programme (UNEP) Ozone Secretariat, "FACT SHEET 8 Small Split Air Conditioning" (UNEP Ozone Secretariat, Bangkok, 2015)

United Nations Environment Programme (UNEP) Ozone Secretariat, "FACT SHEET 9 Large Air-Conditioning (air-to-air)" (UNEP Ozone Secretariat, Bangkok, 2015); United Nations Environment Programme (UNEP) Ozone Secretariat, "FACT SHEET 10 Water chillers for air conditioning" (2015)

United Nations Environment Programme, "2018 Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee"

<sup>23</sup> CIELO. "Ducted vs. Ductless Air Conditioning Systems." <https://www.cielowigle.com/blog/ducted-vs-ductless-airconditioning-systems/>.

### 3. Sorption (absorption or adsorption) chillers

Chillers are connected to distribution water or delivery systems (fan coil units or air handling units).

#### 3.2.2. Commercial refrigeration sector

Cool Up focuses on the commercial refrigeration sector. Domestic and industrial refrigeration are not included in the Cool Up programme scope.

Building segments: Focuses on corner stores, restaurants, supermarkets, and hotels, including areas for cold storage.

Equipment types (commercial refrigeration systems): Covers the three main types of equipment:<sup>24</sup> standalone equipment, condensing units, and centralised systems (for supermarkets). The different equipment types are used in different building segments:

- ▶ Most medium to large supermarkets prefer to use centralised systems because they are usually more energy efficient than condensing units and plug-in cabinets. The size of the sales area of supermarkets that use a centralised refrigeration system range from 400 m<sup>2</sup> to up to 20,000 m<sup>2</sup>.
- ▶ Condensing units are commonly used in medium and small stores and can often be found in fast food outlets, restaurants, bars, and convenience stores. In comparison to a centralised system, they allow fewer cabinets to be connected to the system, take up less space, and are usually easier to install.
- ▶ Standalone refrigeration systems are typically self-contained systems such as ice cream freezers, display cases, and vending machines. They are often referred to as plug-in units because they are closed systems, which do not require extensive installation.

### 3.3. Data collection approach

The data for this report was collected from various primary and secondary sources.

**Primary data** was gathered through expert interviews (in-person and / or over phone / virtual meeting). Limited interviews were conducted due to the political situation and challenges being faced by the finance sector during January – December 2021. The interviews were conducted primarily with banking sector officials from banks in Lebanon.

**Secondary data** was obtained from a diverse set of publications covering banking sources e.g., Central Bank (Banque du Liban), Chamber of Commerce, Industry and Agriculture of Beirut & Mount Lebanon, multilateral institutions such as The World Bank, IMF and EBRD. Cool Up accessed national documents (e.g., the National Cooling Plan Lebanon)<sup>25</sup> as also other policy documents.

Data on financing of RAC sector is not available as the sector does not receive adequate focus. Besides, banks and financial institutions are not required to categorize finance in to this category. Due to the current socio-economic situation mentioned previously this report acknowledges data gaps and data from different sources that results in discrepancies.

---

<sup>24</sup> United Nations Environment Programme (UNEP) Ozone Secretariat. "FACT SHEET 4 Commercial Refrigeration." UNEP Ozone Secretariat." Bangkok, 2015.

<sup>25</sup> National Ozone Unit – Lebanon, 2020

## 4. Summary of key findings and recommendations

Lebanon has a well-established financial infrastructure with 45 commercial banks and a large branch network. Most commercial banks are organised to support all cross-sections of customers from retail individuals, MSMEs and large corporate encompassing all sectors operational in Lebanon. However, recent crises, including the Covid-19 pandemic, economic and financial crisis, and explosion in August 2020, have led to the stoppage of lending and the non-acceptance of deposits.

The sectoral distribution of bank credit underwent a radical structural change in the past decade. Personal loans granted mainly to finance all forms of consumer spending were multiplied by a factor of 11 in the period from 2000 to 2018. Their share in total bank credit more than doubled to account for almost a third of total bank credit to the private sector. Bank lending to other sectors of activity fell in relative terms from 2000 to 2019. Loans to the trade and services sectors still take up the largest portion of bank credit, but these loans constitute nearly 34.4% of the total in 2019 compared with nearly 44 % in 2000. Thus, banks financed trade and services and other sectors prior to the financial crisis.

Both Government and financial institutions support green financing, including energy efficiency and renewable energy projects. The local financial institutions extended credit lines for eco-friendly sectors after BDL issued circulars that relaxed conditions and promoted financing. The National Energy Efficiency and Renewable Energy Action (NEEREA) provides concessional financing to the private sector for RE and EE. IFIs have also financing programmes for undertaking green projects. Thus, commercial banks have adequate familiarity with financing EE projects and green projects.

Regarding the RAC value chain financing, it must be recognised that the Lebanese RAC market is import-dominated. Most room air conditioning systems are split systems and are imported; on the other hand, the commercial refrigeration market is mostly dominated by imported products (from Italy, Turkey, Greece, and Germany). Lebanon has no large-scale manufacturing base for room air conditioners and freezers. Commercial banks provide import finance and support SME units manufacturing (mainly assembling) commercial refrigeration systems. Commercial banks under normal circumstances (prior to the current crisis) provide personal loans to acquire domestic appliances to household individuals. All financing is conventional corporate finance following balance sheet lending.

Financing approaches suitable for financing sustainable cooling options were evaluated for each group of end-users in Lebanon. These were primarily integrated through the experience of local experts and international experience in energy efficiency financing, including vast literature on the subject.

Leasing and positive list are two main approaches that could be used for commercial end-users in Lebanon. A positive list is an easy-to-implement mechanism for commercial banks that need minimal training for loan officers. ESCO approach and bulk procurement could be used for public sector organisations. Templates for EPCs has been prepared with the BEEP project co-funded by the EU and the LCEC is the local partner from Lebanon. Commercial banks are willing to support sustainable cooling technologies and welcome working with the Cool Up programme.

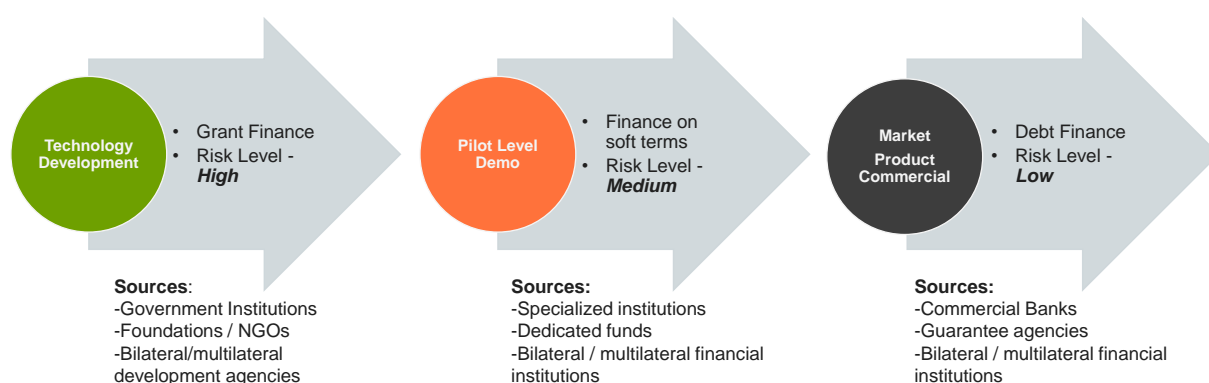
Once the political situation stabilises and the economic environment improves, the Cool Up programme needs to work with stakeholders. These organisations include technology providers, end-user organisations, commercial banks, and associations/chambers of industries. Upon selection of sustainable cooling technology options to be developed under the Cool Up programme, enhanced stakeholder consultations are expected to commence (e.g., securing CAPEX and OPEX from technology providers and understanding expectations of end-users on operating performance and other aspects such as acceptance of technology options).

## 5. Finance Landscape<sup>26</sup>

### 5.1. RAC Value Chain Finance

Financing of cooling solutions is not a widely recognized topic as it is an inadequately defined and is not tracked across the world. Besides, cooling solutions have broad spectrum to suit different applications (small and large in scale with wide cross-section of application sectors such as residential and commercial sectors (for space cooling), food, health, supermarkets, restaurants, hotels, (for refrigeration).<sup>27</sup> Therefore, financing mechanisms or financing approaches for cooling solutions also vary according to applications and sectors. On the other hand, type of end-user (beneficiary) and nature of financing organization also govern funding needs and nature of financing instruments. It may be observed that both private sector financing as well as public sector funding play respective roles. Public private partnership (PPP) approach is also possible for certain type of large projects (covering large districts of residential, commercial or government owned buildings).

Conventional financing instruments can broadly be categorized into a) grants; b) equity; c) debt; and d) guarantee products (risk mitigation instruments). Each of these instruments are applicable as per the stage of technology development and commercialization. While grants are needed for technology development projects, conventional debt is by and large applicable for commercialization phase of a product / technology. Financing “sustainable cooling solutions” also encompass broad range of financing approaches. It may be noted that applications of most sustainable cooling technologies result in to direct reduction of energy use (or improved energy efficiency). Hence, often it is prudent to select approaches that may suit energy efficiency projects.



**Figure 1:** Financing different stages of technology development through commercialization

Cool Up focuses on generic financing solutions and not specific solutions in this report. Generic financing solution are those which deal with general areas of business. Specific solutions are those which relate to a situation in a business or organisation at a point of time. Being the finance market assessment phase, the report is primarily focusing on conventional commercially available RAC technologies. Refrigeration and air conditioning (RAC) market in Lebanon is dominated by imports. There are a few assembly workshops that manufacture and supply display refrigerators and freezers. Retail distribution and sale plays significant role in the value chain of RAC products. Overview of financing of the value chain of the RAC Sector provides details of a) financing stakeholders (financing agencies), b) financing products and c) processes. Individual players in the RAC value chain broadly remain the same for different customer

<sup>26</sup> The discussion under this section, especially the banking sector and financing schemes, has reference to the period prior to crisis (prior to July 2019)

<sup>27</sup> Miller, Alan, Alice Uwamaliya, Ben Hartley, and Clotilde Di Rossi Schio. “Financing Access to Cooling Solutions – Knowledge brief.” Sustainable Energy for All, 2020. <https://www.seforall.org/system/files/2021-04/Financing-Cooling-SEforALL.pdf>.

segments such as residential and small commercial customers. As there are no exports from Lebanon in RAC sector, the programme has focused on the other aspects of the value chain.

The value chain of air conditioners and commercial refrigeration systems in Lebanon broadly comprises:

- ▶ Import (complete systems components and refrigerants)
- ▶ Manufacture (mainly assembly and fabrication)
- ▶ Distribution (including warehousing)
- ▶ Retail sale / commercial sale

The following paragraphs outline each stage in the value chain and the associated financing.

### 5.1.1. Import

Most room air conditioning systems are split systems and are imported from China, United Emirates, Spain, and Italy. A few companies assemble components of air conditioning systems locally in Lebanon. Similarly, the Lebanese commercial refrigeration market is mostly dominated by products from Italy, Turkey, Greece, and Germany. R22 and R134a are still the main refrigerants in the existing cooling equipment in Lebanon. The country does not manufacture any refrigerant locally.

Thus, financing of import plays significant part in RAC value chain in Lebanon. There are at least three entities associated with the process of financing of import they include a) the importer - the entity receiving the goods or services; b) the exporter - the entity selling goods or services; and c) the financing institution. Once the agreement between the importer and the exporter is completed, the financing institution initiates steps to release appropriate funds to support the transaction.

Prior to 2019, The financing institution used to ensure that the fund is aligned with the local currency. Most commercial banks in Lebanon offered import finance in the form of Letter of Credit and trade finance. It may be observed that, commercial banks may also help an exporter with pre-export finance and provide working capital loan as per its eligibility. However, with the current exchange rate crisis, the banking sector is in highly need of hedging instrument to reduce the exposure of Lebanese currency risk and to reduce the rate of banking losses and enhance banking liquidity.

### 5.1.2. Manufacture

Lebanon has practically, no large-scale manufacturing base for room air conditioners and freezers. As mentioned earlier, most of the air conditioners (single split type) are imported as whole units. However, some of the importing entities assemble their products locally. Such assembly shops are small in numbers (mainly SME units).

Often SME units need the long-term finance to acquire machinery and equipment as well as working capital finance. Financing of assembly units is usually undertaken based on the credit history and the balance sheet size. Such assembly units may not need external finance (finance from banks) hence there Cool Up may not play any role in manufacture stage in the Lebanon.

### 5.1.3. Distribution

Distribution in Lebanon for RAC sector mainly relates to transport of goods from the port (point of import) to retail outlets / customer sites and associated warehousing needs. Distribution of room air conditioners need finance and is supported through conventional financing channels (commercial banks). Goods and equipment are transported from port to storage warehouses. These goods and equipment further get transported to different dealers appointed by respective RAC sector companies in Lebanon. In the case of large projects (e.g. space cooling of an auditorium) equipment such as chillers, air handling equipment, evaporators and condensers are sent directly to the site. Dealers in turn transport these goods to retail outlets and shops. All these activities which relate to warehousing and transportation form backbone of distribution. These expenses are funded out of cash or borrowings (e.g., working capital finance).

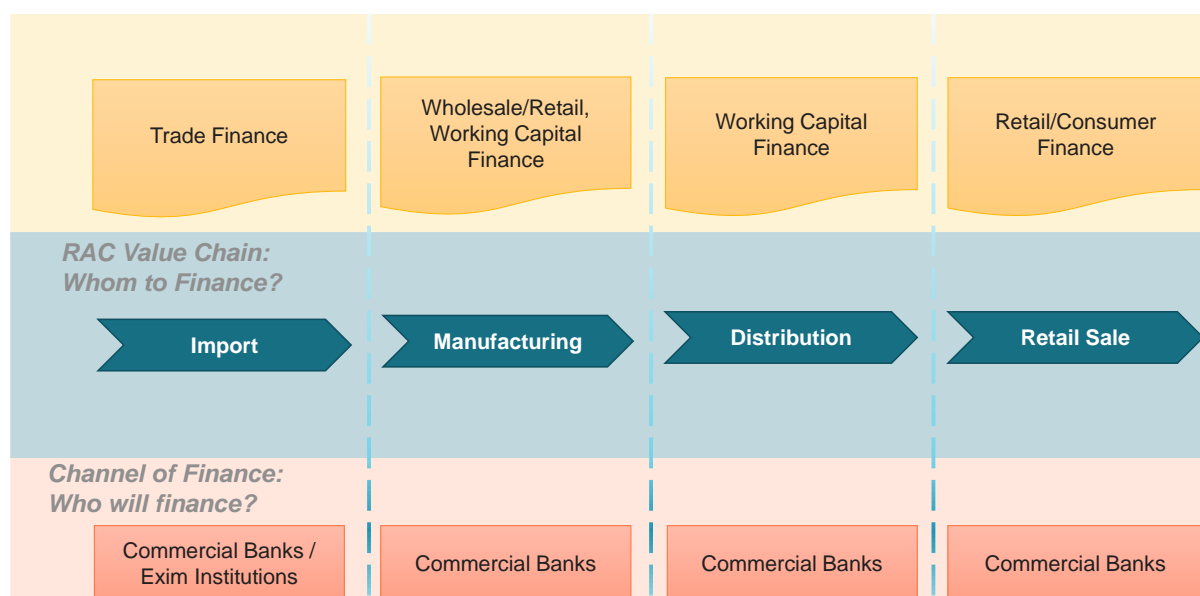
### 5.1.4. Retail Sale

Lebanon has most modern malls as well as supermarkets with retail outlets for variety of good including domestic appliances. Most room air conditioners are sold through retail outlets which include company showrooms, supermarkets, and shops. Residential (individuals) consumers visit these retail outlets and purchase domestic appliances on cash or on credit.

**Financing retail operations** is often a part of corporate finance, a forte of commercial banks. Retailing operations cost is a part of the working capital requirement. Working capital is the fund invested in current assets and is needed to meet day-to-day expenses. Commercial banks provide various finance facilities for operations of a retail agency, such as cash credit, overdraft, bill finance and working capital loans. Working capital finance depends on the cash cycle of that company, credit terms and terms of sales and is short term finance. Banks require collateral for working capital finance (including hypothecation, lien, pledge of equity shares etc.).

Retail sales of appliances can be enhanced by offering attractive finance to consumers. Financing an individual customer to purchase home appliances by providing credit is another aspect of retail operations. The focus is on terms of credit / loan and the process associated (including collateral needs). In many countries (not applicable in Lebanon), sales agencies utilise "trade discounts" on products to meet a part of the interest cost and hence offer lower interest loans or interest-free loans to customers to acquire appliances. Such schemes are applicable to residential customers and small commercial establishments such as shops, small offices, restaurants, etc. New channels of online sales are also emerging as new options.

The following diagram illustrates all elements associated with the financing of the value chain of RAC products (as applicable for residential and small commercial customers):



**Figure 2:** RAC value chain in Lebanon

**Commercial customers (Large):** Large commercial customers (such as large companies, large departmental stores, and hotels) are served directly by dealers, trading companies or manufacturers (direct sale). Most commercial refrigeration and air conditioning systems are sold through direct sales through enquiries. Financing such systems are provided through medium-term loans (equipment loans) with 3 to 5 years' tenure. Loans are secured through collaterals such as hypothecation of the equipment or guarantees. Most commercial banks offer equipment loans for commercial refrigeration products in Lebanon. **Leasing** is an alternative way to finance when a company does not want to own (and not reflected in the balance sheet). HVAC consultants play an essential role in selling large central space cooling projects (chiller-based systems).

## 5.2. Banking Sector Overview

### 5.2.1. Financial Sector Backdrop (Financial Market Structure)

Lebanon, once dubbed “the Switzerland of the east” for its robust banking system, as it has fallen a long way. Since 2019, Lebanon’s banks have been the target of protests, Molotov cocktail strikes and angry graffiti. Throngs of depositors blame corruption and mismanagement in the banking industry for the loss of their lifetime savings. Many have endured unannounced withdrawal ceilings, limits on movement of their own money and prolonged bank shutdowns. In March 2020, Lebanon’s economy tanked after it defaulted on about \$31bn of Eurobonds in the wake of an acceleration of capital outflows.

As the country spiralled into a deep recession, the Lebanese currency lost 94 per cent of its value, wiping out savings, purchasing power and triggering social unrest. Lebanon’s financial system has been facing major challenges in getting hold of dollars demanded by depositors or to even pay off debts).<sup>28</sup>

According to BlomInvest, the total number of banks operating in Lebanon dropped from 65 in 2018 to 61 in March 2022. Also, number of commercial banks alone plummeted from 49 to 46 in March 2022, of which about 16 banks are leading banks. Those AIFA banks, (medium and large banks) having customer deposits of \$2 billion fell from 16 banks in 2018 to 15 banks till the end of March 2022. Some of the leading banks include Bank Audi, BLOM Bank, BankMed, Banque Libano-Française, Byblos Bank, Credit Libanais and Bank of Beirut. A few foreign banks have operations in Lebanon. Similarly, banks branch network decreased by 232 branches to reach 848 branches in Lebanon by end of March 2022 with 210 branches closed down after the October revolution.

On the international market, foreign subsidiaries and Lebanese banks’ branches abroad followed the same trend of the national market as its numbers shrunk from 76 by the end of 2018 to only 52 branches by the end of March 2022. Different groups of the Lebanese banks have liquidated their foreign assets over the past years amid constraints imposed by the regulators in the countries where they were operating, or to overcome the challenges resulting from the crisis that hit Lebanon.

The sectoral distribution of bank credit underwent a radical structural change in the past decade. Personal loans granted mainly to finance all forms of consumer spending were multiplied by a factor of 7 in the period from 2000 to 2012. Their share in total bank credit more than doubled to account for almost a third of total bank credit to the private sector. However, in 2019, personal loans decreased by over 8% from their value in 2018 and account for 30.3% of total bank credit. Bank lending to other sectors of activity fell in relative terms from 2018 to 2019. Loans to the trade and services sectors still take up the largest portion of bank credit, but these loans constitute nearly 30.77% of the total during the period Jan-Sept 2020 compared with nearly 44 % in the year 2000. The fall in the share of loans to construction and industry was also significant. **Table 2** provides distribution of bank credit as per sectors of economy during period 2015 – 2020 (till end Sept 2020):

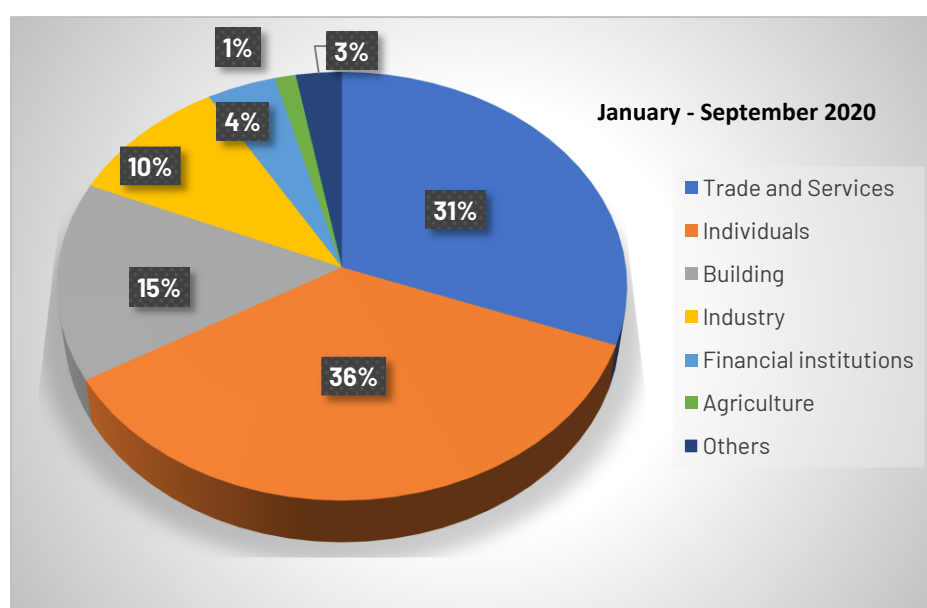
---

<sup>28</sup> The World Bank. “The World Bank in Lebanon.”



**Table 2:** Distribution of bank credit by sector<sup>29</sup>

Value in Billion LBP	2015	2016	2017	2018	2019	Sep-20
<b>Trade and Services</b>	30.287	31.346	34.110	35.704	29.622	21.010
<b>Individuals</b>	26.447	29.662	32.332	31.876	28.142	24.419
<b>Buildings</b>	15.470	17.414	17.267	16.813	14.898	10.214
<b>Industry</b>	9.533	9.517	10.304	11.498	9.672	6.882
<b>Financial institutions</b>	4.934	5.169	5.452	4.681	3.725	2.915
<b>Agriculture</b>	1.021	1.146	1.184	1.190	1.136	892
<b>Others</b>	2.245	2.527	2.846	3.054	2.584	1.938
<b>Total</b>	89.937	96.781	103.495	104.816	89.779	68.270

**Figure 3:** Distribution of loan among economic sectors (January - September 2020)<sup>30</sup>

**Figure 3** provides distribution of credit among the sectors of economy for the period January - September 2020. It may be observed that trade and services received highest credit (31%) after personal loans (36%). Buildings construction sector received almost 15% of the total credit. Industry sector is not dominant one in Lebanon. This is significant to note, as the Cool Up programme may explore interventions in Industry sector.

However, the current crisis has pushed banks into adverse performance, as seen in Lebanon's Economic Indicators. This started with the default of the Government on the payment of Lebanese Eurobonds that negatively affected the banking sector, along with many events that have downgraded Lebanon long term foreign currency issuer default rate (IDR) from B to CCC to C in 2018, 2019, and 2020.

Some of the main issues through the Lebanese crisis are the withdrawal limits and the constraint of transfers abroad. Furthermore, while political elites stocked away billions of dollars overseas, the trust of the citizens was shattered and hence, households stopped using the banking institutions to keep their savings as before. According to the World Bank (WB), in 2019 the Country ranked second in the region for bank branches per 100,000 people, guarding around \$150 billion in deposits. Nevertheless, as reported by

<sup>29</sup> Chamber of Commerce Industry and Agriculture of Beirut and Mount-Lebanon: Economic Report 2020. [https://ccib.org.lb/uploads/Economic%20Report%202020\\_English%20Version\\_1.pdf](https://ccib.org.lb/uploads/Economic%20Report%202020_English%20Version_1.pdf)

<sup>30</sup> Ibid.

the Association of Banks in Lebanon (ABL), since the end of 2018, around 180 bank branches have closed and currently there are approximately 919 branches in operations over the Country. In consequence, the number of employees in the banking sector has decreased by around 5,900.<sup>31</sup>

During 2020, Lebanon's Government defaulted on its foreign debt, circumstance that makes it harder for the Government to rapidly get international support through donors or credit lines. Through talks with the International Monetary Fund (IMF), the Lebanese Government is trying to find solutions and agreements on restructuring the banking sector.

Therefore, Moody's Investor Services provided a C Rating to the Sovereign Credit on the Lebanese banking system because of political instability in 2021. Furthermore, the rating agency warned of consequences for Lebanon's economic system if the Central Bank of Lebanon's (CBL) foreign currency reserves were depleted. The association between Lebanese banks and correspondent banks was severed. In addition, the poverty rate increased from 37% in 2019 to 45% in 2020, which required the WB on January 2020 to back the Country with the Emergency Crisis and COVID-19 Response Social Safety Net Project (ESSN). This approval aims to support with \$246 million USD for emergency cash transfers targeting around 786,000 individuals for three years.<sup>32</sup>

Nowadays, a weak real consumption aggregate is still present in the Lebanese market due to the drop in real incomes of households and at the same time a lack of investment in the Country is present, aiming to levels almost equal to the one given during the civil war. Furthermore, the government spending is not being sufficient to compensate the private spending because of the fiscal fragility and austerity exigencies.

At the banking sector level, a deterioration in the credit quality of the loan portfolio is prevailing due to the economic conditions and recession, which may lead to future impact in the bank's operations. Moreover, a decline in the balance sheet of loans and deposits of the banks operating in the Country has been noted, but at a lower measure compared to last year.

To stabilise the Country's economy, an exhaustive economic, social, and financial reform program must be implemented, with broad challenges and demands but also as a base to pursue stable and sustainable prosperity. According to the International Monetary Fund (IMF), Lebanon's economy should include five strong points in order to transform specific policies to address the Country's economic and financial challenges which include:<sup>33</sup>

- ▶ Fiscal reforms to safeguard sustainable debt and at the same time promote social spending and reconstruction strategies.
- ▶ Fortify the restructure, recovery, and confidence of the financial sector.
- ▶ Reorganise the energy sector and public companies aiming to provide better services without depleting state assets.
- ▶ Reinforce banking frameworks to strengthen transparency and accountability.
- ▶ Built up a creditable exchange rate system.

It is worth to mention, that in April 2022 IMF has reached a SLA ( Staff level agreement) on economic policies with Lebanon for 4 year extended fund facility; which included the following 5 key pillars:

---

<sup>31</sup> France24. "Lebanon's 'zombie banks' downsize to weather crisis." February 20, 2022. <https://www.france24.com/en/live-news/20220220-lebanon-s-zombie-banks-downsize-to-weather-crisis>.

<sup>32</sup> Tala Nasrallah. "Moody's: Lebanon's Sovereign Credit Rating is at C amid a Steep Economic, Financial, and Social Crisis." Blominvest Bank SAL - Economic Digest, February 3, 2021. <https://blog.blominvestbank.com/39191/moodys-lebanons-sovereign-credit-rating-is-at-c-amid-a-steep-economic-financial-and-social-crisis/#:~:text=and%20Social%20Crisis-,Moody's%3A%20Lebanon's%20Sovereign%20Credit%20Rating%20is%20at%20C%20amid%20a,likely%20to%20exceed%2065%25%E2%80%9D>.

<sup>33</sup> International Monetary Fund. "IMF Staff Concludes Virtual Mission on Lebanon." News release. February 11, 2022. <https://www.imf.org/en/News/Articles/2022/02/11/pr2233-lebanon-imf-staff-concludes-virtual-mission>.

- ▶ Restructuring the financial sector to restore banks' viability and their ability to efficiently allocate resources to support the recovery;
- ▶ Implementing fiscal reforms that coupled with the proposed restructuring of external public debt will ensure debt sustainability and create space to invest in social spending, reconstruction and infrastructure;
- ▶ Reforming state-owned enterprises, particularly in the energy sector, to provide quality services without draining public resources;
- ▶ Strengthening governance, anti-corruption, and anti-money laundering/combating the financing of terrorism (AML/CFT) frameworks to enhance transparency and accountability, including by modernizing the central bank legal framework and governance and accountability arrangements;
- ▶ Establishing a credible and transparent monetary and exchange rate system

Reforms in these areas along with significant external financing are mandatory to meet the objectives in the coming years.

There is a great need for the Government to invest in supporting Lebanon's society to boost spending in a sustainable way. The Government needs to reinforce transparency, and develop policies focusing on financial, social, and economic challenges of the Country.

### 5.2.2. Recent Trends in wider Green Finance in the Country

The following three major programs and financing facilities exist for the green sector (prior financial crisis):

**Lebanon Energy Efficiency and Renewable Energy Finance Facility (LEEREFF):** LEEREFF is a dedicated credit line for sustainable energy investments in Renewable energy, Green Buildings and Energy Efficiency in business and industry. Investments in energy efficient or renewable energy technologies result in to lower energy costs. On the other hand, these business sectors also get access to better technologies. Besides they contribute to lowering of energy demand. Banque du Liban (BDL) provides interest rate subsidies for the LEEREFF.

The **National Energy Efficiency and Renewable Energy Action (NEEREA)** is a national financing mechanism for supporting energy efficiency and renewable energy projects in Lebanon. This mechanism provided loans on soft terms (subsidized loans) to private sector entities for EE and RE projects. NEEREA is implemented through all Lebanese commercial banks under the leadership and management of BDL. LCEC provides the technical support and capacity building activities of the programme. These activities are supported under the contract signed between the BDL and the LCEC called as "Technical Support Consultancy Services Agreement in Energy Efficiency and Renewable Energy". It may be observed that Intermediate Circular 236 (Nov 25, 2010) allows the commercial banks to use their "Obligatory reserves" towards NEEREA.

**The Green Economy Financing Facility (GEFF)** is a program of EBRD that supports homeowners and businesses to invest in green technologies and operates through 140 local institutions. In Lebanon, GEFF works with Bank Audi to bring the program objectives. Under this program Bank Audi is providing loan facilities for renewable energy (solar PV, solar heating systems), energy efficiency including HVAC) and other efficient resource use such as water and waste management. This facility is up to USD 300,000 for pre-approved technologies and up to \$15 million for projects assessed by facility consultants.<sup>34</sup>

### 5.2.3. Significant non-finance Organization

(contributing to Sustainable Energy and Climate Change Mitigation efforts)

---

<sup>34</sup> Bank Audi. "Finance Green Solutions." <https://www.bankaudi.com.lb/business-banking/usd-200-million-to-finance-your-green-solutions>.

Apart from commercial banks and financial institutions, non-finance organisations do play important role to support energy efficiency and renewable energy development in Lebanon. LCEC is the leading organisation in this segment and the following paragraph provides an overview of LCEC:

**The Lebanese Center for Energy Conservation (LCEC)** is the entity responsible for leading the efforts in the development of EE and RE through policy development and implementation of projects. Multiple projects funded by development financial institutions have been implemented such as **ESMES (the energy smart Mediterranean schools network project) in partnership** with ENI CBC Med Programme and focuses on the optimisation of energy consumption in public schools through innovative, monitoring-based renewable energy and energy efficiency (REEE) pilot actions. The total budget is equal to EURO 3.3 million out of which 2.9m are funded from the EU.<sup>35</sup> **The National Heat pumps Project of Lebanon launched in May 2019** was born from the cooperation<sup>36</sup> between the Italian Ministry of the environment, land, and SEA (IMELS) and LCEC. It aims to introduce heat pumps for space heating and cooling and offers partial grants to end beneficiaries using Italian heat pumps while an option for financing the remaining through a NEEREA loan.<sup>37</sup>

#### 5.2.4. Overview of RAC finance initiatives (incl. sources of finance)

The local financial institutions started to extend credit lines for eco-friendly sectors after BDL issued circulars that relaxed conditions and promoted financing. Circular 236 reduced the obligatory reserve requirements on loans to environment-friendly projects; this amounted to USD 1.47 billion. Circular 346 extended this scheme mentioning details of a new stimulus package by adding USD 331.7Million.<sup>38</sup> Circular 313 promoted loans for eco-friendly projects particularly solar PV and energy efficiency at concessional rates. Commercial banks have also offered products backed by NEEREA and other development institutions such as UNDP. Apart from energy efficiency and solar, other non-energy areas as per the BDL circular are solid waste, wastewater treatment, recycling, ecotourism, organic agriculture and landscaping projects are usually offered under eco-loans. The environmental loans are subsidised by the Government and aim to start new projects or support existing ones so that they become sustainable. The conditions issued to the bank, as per the Investment Development Authority (IDAL), the maximum cost implicated on the beneficiaries (including interests and commissions prior to the introduction of state support) should not be more than the interest on treasury bonds' returns for 2 years (if loan currency in LBP) or an average of LIBOR for 3 months + 6% (if in USD or EURO).<sup>39</sup>

The commercial banks have offered various schemes under such state incentives and some have actively marketed them. An indicative list of credit lines offered are summarised below:

---

<sup>35</sup> Lebanese Centre for Energy Conservation. "The Energy Smart Mediterranean Schools Network projects (ESMES)." <https://lcec.org.lb/our-work/partners/ESMES>.

<sup>36</sup> This cooperation dates to January 2013 when the Mediterranean Development of Support schemes for solar Initiatives and Renewable Energies (MED-DESIRE Project) was launched. As a result of this cooperation, LCEC started drafting a national solar ordinance, which is currently being finalized. On July 7, 2016, a technical cooperation agreement on sustainable development was signed in Rome by IMELS and LCEC. The objective of the agreement, which will remain in force for 3 years and can be extended for a further 3 years, is to strengthen bilateral relations between Italy and Lebanon in the field of sustainable development and the fight against climate change.

<sup>37</sup> Lebanese Centre for Energy Conservation. "IMELS National Heat Pumps Project." <https://lcec.org.lb/our-work/partners/HP>.

<sup>38</sup> United Nations Development Programme. "Climate Finance Loan Schemes: Existing and Planned Loan Schemes in Lebanon." 2014. <https://climatechange.moe.gov.lb/viewfile.aspx?id=216>.

<sup>39</sup> Investment Development Authority of Lebanon. Loan Financing Brochure.

**Table 3:** RAC Finance initiatives

Bank	Credit Line	Loan Amount	Grace Period (months)	Maturity (months)	Interest Rate (monthly)
<b>Bank Audi (with EBRD + GEFF)</b>	Financing for Green Solutions	USD 300,000 (individual pre-approved tech) USD 15MM (projects assessed by facility consultant)	To match the cash flow of projects; subject to credit approval		Competitive on credit assessment; can benefit from BDL environment/EE subsidised rates
<b>Byblos Bank</b>	Environmental Loan (Personal)	Up to LBP 30MM	12	84	1.295
<b>IBL Bank</b>	Energy/Environment Loan	100% project value	6-24	120	3.75% - 50%*1YTB
	UNDP Green Loan	Risk collateral < USD 100,000			NEEREA financing scheme
	Solar Loan	USD 20,000		60	Libor (1 year) - 0.52%; or 2.5%
<b>BBAC</b>	Eco Business Loan	Unlimited	24 months	120	
<b>Credit Libanais</b>	BDL Green Loan	unlimited	24 months	120	

### Kafalat Energy

Kafalat Energy is an initiative formed as a partnership between the European Union and Kafalat SAL to finance SMEs to address energy constraints faced by them. This programme provides SMEs with loan guarantees for investments in Energy Efficiency and Renewable Energy. The EU support enabled the extension of resources to increase the maximum loan amount and extend the duration of the guarantee and the grace period. The programme provides loans up to LBP 500 million with a 10-year repayment with grace period of up to 1 year for implementing energy efficiency projects. The programme provides guarantee cover of up to 75% of the loan.

### Cedar Oxygen Fund

Cedar Oxygen (CO) was established early 2020 as a private and independent initiative to address the pressing social and economic difficulties of the Lebanese manufacturers. It is an impact investment fund of USD 175 million formed in consultation with the Central Bank of Lebanon (BDL) and Association of Lebanese Industrialists. Depreciation of LBP created several challenges for manufacturers such as limited access to hard currencies and international payment facilities. The fund has disbursed 32 loans until June 2022 of which many are green projects in the areas of energy efficiency and renewable energy. It may be observed that the screening criteria of the fund integrates ESG principles into the investment analysis and decision-making process.

### 5.2.5. Government and Public Support Programme

Based on the guidance of the National Cooling Plan in Lebanon launched in May 2021, there is a proposal for a Funding and Financing Mechanism to support the intended market transformation towards energy-efficient and low GWP appliances targeted at the AC and refrigeration focus sectors.

The Funding and Financing Mechanism refers to a consistent set of measures to accelerate that transition, which covers the following key elements:

- ▶ An import levy on imported appliances and refrigerants linked to the energy efficiency and label classes of, initially, ACs and refrigerators, and the carbon content of refrigerants;
- ▶ An incentive mechanism based on carbon credits on the purchase of climate-friendly and efficient appliances linked to the return of old, inefficient cooling appliances sent for environmentally sound disposal;

- ▶ Financial mechanisms, like soft loans and a baseline and credit program, whereby soft loans are used to support the private sector investment, while the baseline and credit program cover the cost of a recycling and disposal facility;
- ▶ Available funding sources from national and international programs.

The Lebanese banking sector had recognised the importance of green financing prior to 2019 (the financial crisis), and the Central Bank played a major role in promoting sustainable finance via creating awareness, promoting a green economy, and issuing related circulars to encourage green lending as it is considered the wheel of its economy.

## 6. Opportunities for Financing of Sustainable Cooling Technologies

### 6.1. Sources of finance, financing mechanisms and business models

Banks in Lebanon have faced challenges after the Covid 19 pandemic, especially after the blast in August 2020. The financial crisis commenced in late 2019; as a result, depositors were locked out of most of their savings, banks have stopped lending to the private sector. According to the World bank, Lebanon ranked the second in the region for bank branches. However, until early 2022, and about 25% of the bank staff either resigned or have lost their jobs. In a nutshell, the banking sector doesn't lend, and it doesn't make a profit. Given the situation, the following discussion has been presented with an assumption of normal economic conditions in the Country.

Sustainable Cooling Options (Technologies and Products) are primarily RAC products and equipment with high energy efficiency (EE) and low GWP. Thus, a room air conditioner using natural refrigerant and having high energy efficiency can be classified as a sustainable cooling appliance. Similarly, a space cooling system with high-efficiency chillers and a radiant cooling system can be termed a sustainable cooling technology/system. The following passage describes financing aspects related to sustainable cooling options.

Financing energy efficiency has been discussed widely over the years, and there is a substantial amount of literature. Financing Sustainable Cooling Options (Technologies and Products) can be broadly considered an extension of financing energy efficiency. Besides, the focus is on financing the RAC sector, including RAC products and equipment. This document focuses on financing three principal end-user segments, a) residential, b) commercial, and c) public sector concerning RAC products.

Financing of energy efficiency products and projects also uses these financing products. The following table provides an overview of different financing products applicable to energy efficiency products/projects in the sectors under discussion.

**Table 4:** Financing products for financing energy efficiency

Financing Products	Residential	Commercial	Public Sector
Grant	•	•	•
Credit (conventional debt)	•	•	•
Short Term Debt	•	•	
Long Term Debt	•	•	•
Lease (Rental)	•	•	•
Credit Guarantee		•	•
Partial Credit Guarantee		•	•
Pension Funds (Bonds)	•	•	•
Bonds (Green Bonds)	•	•	•

**Source:** Manual of Financing Mechanisms and Business Models for Energy Efficiency, Basel Agency for Sustainable Energy (BASE) (2019)

#### 6.1.1. Financing Mechanisms

This section maps an overview of financing mechanisms, incentives and business models designed to encourage investments in energy efficiency in the residential, commercial, and public sectors. The discussion mainly refers to the RAC segment. Principal sources of finance in Lebanon include commercial banks, leasing companies and international financial institutions (IFIs). The banking sector overview has already provided information on the commercial banks in Lebanon. Regarding IFIs, the Cool Up programme

takes a view of all 4 countries together and not one Country in isolation. The role of IFIs is provided in the following box:

International financial institutions (IFIs): The role of international financial institutions (IFIs) in sustainable development financing (and sustainable energy) in developing countries and transitional economies cannot be disputed. Sustainable finance banks and FIs offer new products such as renewable energy (RE), energy efficiency (EE), microfinance and low-income housing. This promotes sustainable development and helps partner banks to differentiate themselves. The most important characteristic of these institutions is high (AAA) credit ratings and a broad membership of borrowing and donor countries. These institutions operate independently but have shared objectives of poverty reduction and improving people’s living conditions, promoting regional cooperation, and contributing to sustainable development.

The Cool Up programme has primarily taken cognizance of international practices in the finance and banking sector together with international practices, to identify effective mechanisms for residential, commercial, and public segments.

The following table summarises indicative financing mechanisms applicable for end-user groups in Lebanon (highlighted in orange areas). These approaches / mechanisms have been elaborated in the following pages in this section:

**Table 5:** Indicative financing mechanisms for end-user groups

Financing Mechanisms	Residential	Commercial	Public Sector
Credit Guarantee	•		
Dealer Financing (Debt finance)	•		
Positive list (white list)	•	•	
Revolving green credit	•		
Energy Performance Contract / ESCO			•
Pay for service (Cooling as a service)		•	
Leasing		•	
Bulk Procurement			•
Municipal Financing models			•
Pay per service	•	•	

The following table provides a list of all sources of finance for energy efficiency projects:

**Table 6:** Sources of finance for energy efficiency projects

Sources of Finance	Residential	Commercial	Public Sector
Commercial Banks	•	•	
Development Banks	•	•	
Non-banking Financing Companies	•	•	
Micro Finance Institutions		•	
Private Equity Funds/Venture Capital		•	
Housing Finance Institutions	•		



Sources of Finance	Residential	Commercial	Public Sector
Leasing Companies	•	•	
Guarantee Agencies/ Institutions	•	•	•
Crowd Funding Institutions	•	•	
National Financing Institutions	•	•	•
Bilateral Financing Institutions	•	•	•
International Financing Institutions	•	•	•

Source: Manual of Financing Mechanisms and Business Models for Energy Efficiency, Basel Agency for Sustainable Energy (BASE) (2019)

### Financing mechanisms and business models for the residential sector

- ▶ **Loans and green credit lines**
- ▶ **Guarantees**
- ▶ **Dealer financing**



Local commercial banks (and local financial institutions) are considered the primary lending source for the residential sector, as they have a better handle on local market conditions. The type of financing provided by FIs for this sector is i) credit loans, green loans, ii) guarantees, and iii) dealer financing for green products.

For commercial banks to provide credit/green loans and guarantees following options are considered:

- ▶ Financial regulator / the central bank can motivate banks to provide environmentally friendly products with easier access to capital; by using a combination of regulation, guidelines, taxation, fiscal and non-fiscal incentives, and award schemes.
- ▶ Appliance standards and labelling programs can enhance the effectiveness of the green credit line to finance appliances that provide clear environmental benefits.

#### Green Credit Lines

Green credit lines are dedicated loans to finance specific climate-friendly appliances of individual residential customers. These loans can attract individuals to upgrade to better efficient and climate friendly appliances (and hence replace their old ones). A commercial bank (participating in the green credit line programme) provides consumers loans on agreed terms for a specific tenure. The bank typically assesses the client's accounts or assets to determine creditworthiness and takes an agreed asset pledged as collateral until the loan is repaid. IFIs usually provide green credit lines to local commercial banks. Green credit lines are suitable for overcoming the upfront cost barriers in financing EE products. The **positive list of green appliances** can also facilitate the due diligence of green loans.

#### Guarantees

The guarantee provided by an institution can help expand the loan financing of commercially viable EE investments in the residential sector. It can also help increase awareness of climate-friendly appliances and acts as a risk mitigation option. The guarantees are designed to reduce the FIs' perceived risks in the short term and improve their technical and financial confidence in lending to specific EE appliances in the long term.

The guarantees to local FIs are usually provided by IFIs, governments, or utility providers through public policy EE investment programmes backed by IFIs or government resources. These guarantees are offered to participating FIs that initiate the relevant transactions with borrowers seeking commercial loans. Financial assistance agreements lay out the eligibility criteria and guarantee support for a loan portfolio.

This type of financing gives FIs incentives to lend as they are partially compensated for potential losses. It proved helpful when the banking system functions well and allows for market and sector development through supported EE lending.

**Dealer financing** is provided directly by technology service providers/technology suppliers and indirectly by FIs. It is considered common in the Country when suppliers encourage consumers to buy their products with monthly instalments and a minimum proportion of down payment. However, these service providers/suppliers must be supported by LFIs or a third-party financial institution to be able to cover their consumer credit tenor and to be able to grow their portfolio.

## Financing mechanisms and business models for the commercial sector

- ▶ **Pay per service model**
- ▶ **Leasing**
- ▶ **White certificates / white list**



Climate change is expected to be a significant driver of cooling demand, with increasing temperatures projected for Lebanon. This will affect the increase in sales and stocks for air conditioning chillers and refrigeration chillers.

Following the current crisis that the Country is facing, Lebanon is expected to have strong economic growth, increasing the demand for RAC products in supermarkets and retail shops.

The ideal funding mechanism in line with the current situation of Lebanon's limited financial resources is addressed as below:

### Pay per service model

Another type of mechanism for this segment is the "pay per service" model funded directly by an entity offering the utility (cooling as a service) or ESCOs (Energy services companies) as this model will encourage the consumer to buy the service since the price is tied to performance. Under this arrangement, the service provider undertakes to provide cooling needed for space or commercial refrigeration to the end-user (commercial organisation). The service provider mobilises equipment, and hence the end-user organisation is not required to invest in the fixed assets. It encourages the provider to give the best service to its customers.

### Leasing

Leasing is another type of fund supported directly/indirectly by banking institutions, MDB (multilateral development banks, and NDB (national development banks), to facilitate the leasing process for technology providers. Leasing is a potential financing mechanism to encourage consumers to replace their old equipment with new RAC products or simply lease and install green environment products. Government has a major role in this mechanism, as it can generate a favourable legal and tax environment and offer payment guarantees to reduce the mitigation risk from the end-user.

### White certificates

White certificates exist in Lebanon in different arrangements. For example, during the implementation of the second NEEAP, new measures were taken to deal with setting minimum energy performance Standards (MEPS) for 5 types of equipment (air conditioners, lamps, refrigerators, televisions, washing machines) for the building, industry, and public sectors. The main target groups of these regulations and measures are suppliers, consumers, and manufacturers. Libnor (The Lebanese Standards Institution) implements them along with Ministry of industry, ministry of economy and trade, Ministry of energy and water, IRI, and LCEC.

It is worth mentioning that creating the right enabling environment from a policy, governance and incentives perspective is critical to driving investments into climate-friendly solutions in the RAC sector.

- ▶ A third party is recommended to evaluate the borrower's project to obtain an outside input into the formulation of their green loans, and there are several levels and types of reviews:
  - ▶ Consultant reviews or second party opinion
  - ▶ Verification to focus on alignment with internal standards
  - ▶ Certification while being certified by a third-party certifier

## Financing mechanisms and business models for the public sector

- ▶ **Bulk procurement**
- ▶ **Municipal financing model**
- ▶ **Energy performance contracts**



The public RAC sector demand is expected to peak in 2030.<sup>40</sup> Most public sector projects are financed through resources of international development banks such as the World Bank. As such multilateral development banks (MDBs) use concessional loans, and risk mitigation instruments to finance public sector projects.

### Bulk procurement

Bulk procurement is highly recommended and very common in the Lebanese public sector. Large companies usually apply for tenders issued by the government/public sector. This will allow the public sector to choose the best quality with less cost while it helps create sustainability in the market, passing on resulting savings to end-users. Bulk procurement has a positive impact since it increases and improves the domestic manufacturing capacity and fosters competition, funded by government agencies, and supported by MDB for further technical assistance. The most source of financing for bulk procurement is credit guarantees and concessional loan models to help the Government access new commercial financing sources and scale-up bulk procurement programs. At the same time, MDB plays a major role in providing technical assistance and scaling up financial instruments for the program's design.

### Municipal financing model

The municipal financing model is another financing mechanism for the public sector. Municipal finance in Lebanon depends mainly on funds channelled by the national Government through independent municipal fund and taxes. Currently, municipalities have limited access to revenues. There are challenges such as inadequate skill to develop standardised project documents / tender or bid documents. Therefore, local municipalities with weak credit or little-to-no borrowing capacity rely on international donor agencies and funding for energy efficiency. Type of finance instruments/intervention: Subsidized loan/ dedicated credit-line; guarantees/risk-sharing facilities; Grants schemes and PPP co-investment schemes.

BDL Circular No. 399 – issued in October 2015 – tailored NEEREA extends mechanism to finance environmentally-friendly projects in villages and rural areas. Another municipality friendly BDL financial mechanism, the Lebanese Environmental Action (LEA) for Water, Air, and the Environment, offers subsidised loans for projects improving air and water quality, including wastewater treatment plants, rainwater collection, landscaping, and traditional roof tiling and stone cladding systems.

### Energy performance contracts

Another type of funds for the public sector is the Energy performance contracts supported by FIs by providing financing facilities to ESCOs (loans, leaseback). The Lebanese Government can support EPC by simplifying local regulations, enabling agencies to offer technical support to facilitate large-scale implementation of energy-efficiency projects; such funds can be dedicated to schools, hospitals, and other utilities, noting that there is a huge potential in these sectors in Lebanon.

<sup>40</sup> Based on the NCPL report issued in May 2021 (Kigali cooling efficiency program-UNDP)

It is worth mentioning that Lebanon is characterised by one of the best financial mechanisms in the region, NEEREA.<sup>41</sup> The characteristics of NEEREA are various:

- ▶ The loan amount can be as low as 2,000 USD and as high as a ceiling of 20 million USD,
- ▶ Low-interest rate from 1.075% reaching 0.3%.
- ▶ The repayment period for existing projects is up to 10 years (with additional 2 years grace period), while the repayment period for a new project is 14 years (including 4 years grace period).
- ▶ Green loans are provided through Lebanese commercial banks to reach the end-user directly.

More than 17 Lebanese banks are involved in the NEEREA mechanism. Still, the most important aspect of NEEREA is that it is a fully national mechanism. The incentives of NEEREA are based on incentives created and offered by the Central Bank of Lebanon (BDL).

## 6.2. Drivers, barriers, opportunities

### 6.2.1. International FIs and programmes

Local financial institutions (LFIs) have a major role at the economic development level of the Country, as some banks provide facilities for different kinds of economic activities that are controlled by the central bank (BDL-Banque du Liban) to keep the price level steady and control the rates of foreign exchange. The demand for green building and construction materials will push banks toward growing their green financing investment portfolio.

International financial institutions (IFIs) & Multilateral Development banks: at this critical phase, the Country needs IFIs (i.e., EBRD, AFD, EIB, World Bank...) funding resources and expertise for energy activities and scaling-up green entrepreneurship while providing financing loan facilities through local FIs, or through direct investment for the private sector to promote sustainable energy supply and enhance the quality and efficiency of public service delivery.

Development Agencies such as UNDP are active in the Country to provide financial and technical support under the Montreal Protocol. For example: in early 2021, Lebanon, through UNDP, received financial assistance from the K-CEP in the form of three technical assistance projects to improve energy efficiency capacities, in the cooling sector, in the Country and to achieve the K-CEP goals. The purpose of these TAs is to support Lebanon in developing policies, standards, and the appropriate regulatory framework and to integrate energy efficiency interventions into the current work underway within the overall Montreal Protocol Programme by providing complimentary training and capacity building in energy efficiency to Refrigeration and Air Conditioning (RAC) technicians and engineers. This "Pilot Programme on RAC equipment Certification" follows the MEPS and S&L application as a result of the 1st Tranche implementation and the National Cooling Plan, in terms that the project will partner with one RAC local manufacturer providing co-finance to apply the testing protocols and performance procedures developed by the project, analyse its efficacy, and propose further improvements.

### 6.2.2. Initial findings (based on interviews with commercial banks in Lebanon)

Banks are keen to develop and introduce new financing products for financing sustainable cooling solutions in Lebanon, by providing more affordable, efficient and sustainable solutions for end-users. These include some of the most efficient fans, air conditioners and refrigerators; measures to reduce the need for cooling through insulation, shading, reflectivity or ventilation; and using collective effort to deliver more sustainable products, services, policies and financial solutions to meet cooling needs and provide cooling benefits. Beyond achieving the basic needs for cooling, these same sustainable cooling solutions also deliver significant benefits across the economy of the country, companies and the population at large.

Banks have previous experience in financing renewable energy and energy efficiency improvement projects. These loans were at lower interest rates and had a long tenure of more than 10 years. Banks did work with IFIs such as EBRD, AFD and IFC and are familiar with green financing. Banks need protection

---

<sup>41</sup> NEEREA is the National Energy Efficiency and Renewable Energy Action, a highly efficient financing mechanism developed by the Central Bank of Lebanon (BDL) back in November 2010. The concept of having a national action called "NEEREA" was developed in the National Energy Efficiency Action Plan (NEEAP) for Lebanon for the years 2011-2015. NEEREA is one of the fourteen initiatives of the first NEEAP for Lebanon. It is worth noting that the Council of Ministers (CoM) of Lebanon approved the NEEAP 2011-2015 on 10 November 2011 (Decision No. 26)

against currency fluctuations under the present circumstances. Before 2019, commercial banks in Lebanon financed various sectors, including agriculture, industry, tourism, and real estate. According to the banks that the Cool Up interviewed, the substantial potential exists for growth in the following green sectors:

- ▶ Solar PV generation and storage
- ▶ Energy-efficient buildings
- ▶ Recycling (circular economy) and ecotourism
- ▶ Bio-gas, especially for the agriculture sector.

## 7. Bibliography

- ASHRAE. "Climatic Data for Climatic Data for Building Design Standards: ANSI/ASHRAE Addendum a to ANSI/ASHRAE Standard 169-2013." 2020.
- Bank Audi. "Finance Green Solutions." <https://www.bankaudi.com.lb/business-banking/usd-200-million-to-finance-your-green-solutions>.
- BBAC Bank. "Our Story." <https://www.bbacbank.com/about-us/our-story>.
- Blom Bank. "Investor Relations Financial Results 2020." <https://www.blombank.com/english/profile/overview-and-investor-relations-financial-results-2020>.
- BP Energy Economics. "BP Energy Outlook 2018 Edition." <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2018.pdf>.
- Chamber of Commerce Industry and Agriculture of Beirut and Mount-Lebanon: Economic Report 2020. [https://ccib.org.lb/uploads/Economic%20Report%202020\\_English%20Version\\_1.pdf](https://ccib.org.lb/uploads/Economic%20Report%202020_English%20Version_1.pdf)
- CIELO. "Ducted vs. Ductless Air Conditioning Systems." <https://www.cielowigle.com/blog/ducted-vs-ductless-airconditioning-systems/>.
- Corporate Finance Institute. "Annual Report 2020 Bank Audi and Overview of Top Banks in Lebanon." <https://corporatefinanceinstitute.com/resources/careers/companies/top-banks-in-lebanon/>.
- IBL Bank. "IBL Bank 2018 Annual Report." 2018. <https://www.ibl.com.lb/library/assets/Gallery/IBL/AnnualReports/Annual-2018-Web-2.pdf>.
- International Monetary Fund. "IMF Staff Concludes Virtual Mission on Lebanon." News release. February 11, 2022. <https://www.imf.org/en/News/Articles/2022/02/11/pr2233-lebanon-imf-staff-concludes-virtual-mission>.
- International Renewable Energy Agency. "Renewable Energy Outlook Lebanon: Based on Renewables Readiness Assessment and REmap analysis." 2020. [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA\\_Outlook\\_Lebanon\\_2020.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Outlook_Lebanon_2020.pdf).
- Investment Development Authority of Lebanon. Loan Financing Brochure.
- Lana El Tabch. "THE LEBANESE ECONOMY IN 2018." Chamber of Commerce, Industry, and Agriculture of Beirut and Mount-Lebanon, 2018. <https://www.ccib.org.lb/uploads/60ffd8610c5a1.pdf>.
- Lebanese Center for Energy Conservation. "The First Energy Indicators Report of the Republic of Lebanon." Lebanese Republic Ministry of Energy and Water. [https://lcec.org.lb/sites/default/files/2021-02/Indicators%20Report\\_VF.pdf](https://lcec.org.lb/sites/default/files/2021-02/Indicators%20Report_VF.pdf).
- Lebanese Center for Energy Conservation. "The National Renewable Energy Action Plan for the Republic of Lebanon 2016-2020." Lebanese Republic Ministry of Energy and Water, 2016. <https://climatechange.moe.gov.lb/viewfile.aspx?id=245>.
- Lebanese Centre for Energy Conservation. "IMELS National Heat Pumps Project." <https://lcec.org.lb/our-work/partners/HP>.
- Lebanese Centre for Energy Conservation. "The Energy Smart Mediterranean Schools Network projects (ESMES)." <https://lcec.org.lb/our-work/partners/ESMES>.
- France24. "Lebanon's 'zombie banks' downsize to weather crisis." February 20, 2022. <https://www.france24.com/en/live-news/20220220-lebanon-s-zombie-banks-downsize-to-weather-crisis>.
- Meteotest. Meteororm Software: Worldwide irradiation data. Meteororm. <https://meteororm.com/en/>.
- Miller, Alan, Alice Uwamaliya, Ben Hartley, and Clotilde Di Rossi Schio. "Financing Access to Cooling Solutions – Knowledge brief." Sustainable Energy for All, 2020. <https://www.seforall.org/system/files/2021-04/Financing-Cooling-SEforALL.pdf>.
- National Ozone Unit - Lebanon. "Guidance for Integrating Efficient Cooling in National Policies in Lebanon." Lebanese Ministry of Environment, Beirut, Lebanon, 2020. <https://www.undp.org/sites/g/files/zskgke326/files/migration/lb/NCPL.pdf>.
- Tala Nasrallah. "Moody's: Lebanon's Sovereign Credit Rating is at C amid a Steep Economic, Financial, and Social Crisis." Blominvest Bank SAL - Economic Digest, February 3, 2021. <https://blog.blominvestbank.com/39191/moodys-lebanons-sovereign-credit-rating-is-at-c-amid-a-steep-economic-financial-and-social-crisis/#:~:text=and%20Social%20Crisis-,Moody's%3A%20Lebanon's%20Sovereign%20Credit%20Rating%20is%20at%20C%20amid%20a,likely%20to%20exceed%2065%25%E2%80%9D>.
- The Heritage Foundation. "2021 Index of Economic Freedom." [https://www.heritage.org/index/pdf/2022/countries/2022\\_IndexofEconomicFreedom-Lebanon.pdf](https://www.heritage.org/index/pdf/2022/countries/2022_IndexofEconomicFreedom-Lebanon.pdf).

The World Bank. "The World Bank in Lebanon." <https://www.worldbank.org/en/country/lebanon>.

United Nations Development Programme. "Climate Finance Loan Schemes: Existing and Planned Loan Schemes in Lebanon." 2014. <https://climatechange.moe.gov.lb/viewfile.aspx?id=216>.

United Nations Environment Programme (UNEP) Ozone Secretariat. "FACT SHEET 10 Water chillers for air conditioning." 2015.

United Nations Environment Programme (UNEP) Ozone Secretariat. "FACT SHEET 4 Commercial Refrigeration." UNEP Ozone Secretariat." Bangkok, 2015.

United Nations Environment Programme (UNEP) Ozone Secretariat. "FACT SHEET 7 Small Self Contained Air Conditioning." Bangkok, 2015.

United Nations Environment Programme (UNEP) Ozone Secretariat. "FACT SHEET 8 Small Split Air Conditioning." Bangkok, 2015.

United Nations Environment Programme (UNEP) Ozone Secretariat. "FACT SHEET 9 Large Air-Conditioning (air-to-air)." Bangkok, 2015.

United Nations Environment Programme. "Pre-session Documents: Workshop on Hydrofluorocarbon Management." 2015.

United Nations Environment Programme. "2018 Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee: 2018 Assessment." United Nations Environment Programme, Kenya, 2019. [https://ozone.unep.org/sites/default/files/2019-04/RTOC-assessment-report-2018\\_0.pdf](https://ozone.unep.org/sites/default/files/2019-04/RTOC-assessment-report-2018_0.pdf).