Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS)

Appraisal Stage | Date Prepared/Updated: 09-Sep-2019 | Report No: PIDISDSA26018
## BASIC INFORMATION

### A. Basic Project Data

<table>
<thead>
<tr>
<th>Country</th>
<th>Project ID</th>
<th>Project Name</th>
<th>Parent Project ID (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>P165235</td>
<td>Thailand HCFC Phase-Out Stage II</td>
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</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Estimated Appraisal Date</th>
<th>Estimated Board Date</th>
<th>Practice Area (Lead)</th>
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<tbody>
<tr>
<td>EAST ASIA AND PACIFIC</td>
<td>23-Sep-2019</td>
<td>27-Jan-2020</td>
<td>Environment, Natural Resources &amp; the Blue Economy</td>
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</table>

<table>
<thead>
<tr>
<th>Financing Instrument</th>
<th>Borrower(s)</th>
<th>Implementing Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Project Financing</td>
<td>Public Debt Management Office</td>
<td>Department of Industrial Works</td>
</tr>
</tbody>
</table>

### Proposed Development Objective(s)

The project development objective is to contribute to reducing HCFC consumption in Thailand.

In doing so, the project will contribute to Thailand’s efforts to meet the 2020 HCFC consumption phase-out obligations of the Montreal Protocol and its Multilateral Fund, as well as the initial requirements of the Kigali Amendment.

### Components

- Component 1: Investment in HCFC Consumption Reductions
- Component 2: Technical Assistance
- Component 3: Project Management
- Component 4: Strengthening of the National Ozone Unit

## PROJECT FINANCING DATA (US$, Millions)

### SUMMARY

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total Project Cost</td>
<td>5.77</td>
</tr>
<tr>
<td>Total Financing</td>
<td>5.77</td>
</tr>
<tr>
<td>of which IBRD/IDA</td>
<td>0.00</td>
</tr>
<tr>
<td>Financing Gap</td>
<td>0.00</td>
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</table>
B. Introduction and Context

Country Context

1. **For much of the last quarter of the twentieth century Thailand was a global leader in economic growth and poverty reduction.** The country’s export-oriented economy provided the foundation for average gross domestic product (GDP) growth of 8.2 percent over this period. This sustained period of strong growth and poverty reduction stood as a model for other countries seeking eradicate poverty in East Asia and elsewhere. This success was fueled by sound macroeconomic policy, openness to trade, financial flows, labor migration and regional integration, investments in both human and physical capital, and policies that facilitated the inclusiveness of economic growth.

2. **However, Thailand’s economic growth slowed down after the Asian crisis of 1997, and even further in recent years, before rebounding in 2015-2016.** Growth fell from an average annual rate of more than 9 percent in the boom years to 5 percent in 2000-07 and less than 3 percent in 2010-16, falling behind its peers in the region and elsewhere, and weakening the sustainability of poverty and shared prosperity gains. Private investment fell from 32 percent of GDP in 1995 to 18 percent in 2016 amid a sluggish global recovery after the 2009 financial crisis, political tensions and uncertainty, and stalled structural reforms. Slower growth can be attributed largely to the non-agricultural sectors, particularly manufacturing. Growth rebounded to an average of 3 percent in 2015-2016, and 3.9 percent in 2017. The recovery has been driven by a return to broad political stability, increased external demand in the face of stronger trading partner growth, continued expansion of tourism arrivals and revenues, and an expansion of agriculture in the face of higher commodity prices and rainfall. Still, economic growth remains significantly lower than during the earlier, transformative high growth decades.
3. **Previous sources of growth in Thailand, based on factor accumulation and exports of low-skill manufacturing products, are no longer yielding the same results and the country is facing a middle-income trap.** Thailand has lost the competitive edge it once enjoyed with respect to peers in the region and elsewhere. This is largely due to the slow pace in the implementation of growth-enhancing reforms and human capital and physical infrastructure investments. Moreover, the creation of low-skilled jobs, which drove much of Thailand’s growth in the past, is unlikely to drive future growth, particularly as low-skilled jobs will increasingly be created in neighboring Association of Southeast Asian Nations (ASEAN) countries, such as Cambodia, Vietnam or Myanmar. Instead, the path for Thailand to revive high growth and transform itself from a middle-income into a high-income economy is likely to entail upgrading its industries and service sector and creating high value-added jobs that require more skills.

4. **For Thailand to ensure a greener growth path, timely and effective policies and close collaboration with the private sector will all be important.** Green growth decouples growth from heavy dependence on resource use, carbon emissions, and environmental damage. It also promotes growth through the creation of new green product markets, technologies, investments, and changes in consumption and conservation behavior. Green growth will be critical for ensuring the availability of resources to ensure the sustainability of future growth. Implementing Thailand’s coordinated green growth aspirations, as articulated in the Twelfth National Economic and Social Development Plan (NESDP) from 2017-2021 and Thailand’s Roadmap to implement its Nationally Determined Contribution (NDC), through policy, financing, and capacity development will help Thai companies develop business models that take advantage of environmentally friendly opportunities.

**Montreal Protocol Context**

5. **Adopted in 1987, the Montreal Protocol on Substances that Deplete the Ozone Layer (MP) legally enforces the phase-out of the production and consumption of ozone depleting substances (ODS).** The treaty’s financial mechanism, the Multilateral Fund for the Implementation of the Montreal Protocol (MLF), has funded the incremental costs of compliance in developing countries since 1991. The MP has contributed to a significant drop in total global production and consumption of ODS used in agricultural, manufacturing and industrial sectors around the world. It has also generated climate benefits as most of these substances are potent greenhouse gases. The MP has been largely effective due to its nature as a trade agreement: Parties to the MP may choose to waive duties on equipment imported to manufacture ozone friendly products and cease use and trade of specific controlled substances. This mechanism has facilitated the transition to non-ODS, lower global warming potential (GWP) alternatives.

6. **Hydrochlorofluorocarbons (HCFCs) are ODS subject to consumption and production control measures of the MP on substances that deplete the ozone layer.** They are mainly used as refrigerants in refrigeration and air-conditioning equipment and as blowing agents for insulation foam. HCFCs are also potent greenhouse gases (GHGs), and consequently have an impact on both ozone depletion and climate change. The phase-out of HCFCs usually presents an opportunity to reduce direct and indirect GHG emissions through using low GWP alternatives and improvement of product design to enhance energy efficiency of the projects, thereby leading to multiple benefits to the global environment.

7. **Thailand ratified both the Vienna Convention on protection of the ozone layer and the MP on substances that deplete the ozone layer on July 7, 1989.** As an Article 5 signatory of the MP, Thailand has fulfilled its obligations to phase out consumption of all controlled substances except for HCFCs. It has committed to freeze consumption of HCFCs in 2013 and to reduce HCFC consumption by 10% in 2015, by
35% in 2020, by 67.5% in 2025, 100% by 2030 while allowing for servicing an annual average of 2.5% during the period 2030 to 2040. The baseline HCFC consumption of Thailand, which is the 2013 freeze consumption level, is 927.6 Ozone Depleting Potential (ODP) tons. The consumption reduction schedule is shown in Table 1 below.

Table 1: MP Obligations for Thailand

<table>
<thead>
<tr>
<th>Montreal Protocol Consumption Levels of Annex C Substances</th>
<th>Maximum Allowable Consumption (ODP tonnes)</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline (2009-2010 average)</td>
<td>927.6</td>
<td></td>
</tr>
<tr>
<td>2013 – Freeze on baseline levels</td>
<td>927.6</td>
<td></td>
</tr>
<tr>
<td>2015 – 90% of the baseline</td>
<td>834.8</td>
<td></td>
</tr>
<tr>
<td>2020 – 65% of the baseline</td>
<td>602.9</td>
<td></td>
</tr>
<tr>
<td>2025 – 32.5% of the baseline</td>
<td>301.5</td>
<td></td>
</tr>
<tr>
<td>2030 – 2.5% of the baseline</td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>2040 – No consumption</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

8. To meet the first two obligations of the MP in 2013 and 2015, the Executive Committee (ExCom) of the MLF approved in 2012 a total grant fund of US $23 million to support implementation of the Stage I HCFC Phase-out Project (HPMP). The grant fund was approved in tranches upon the country meeting the agreed HCFC consumption reduction milestones. Through this support, Thailand extended its commitment to reduce its HCFC consumption to 15% of the baseline level by 2018. The Stage I HPMP Project entailed HCFC phase-out in the foam sector, except for spray foam due to lack of alternatives at that time, and in the residential air-conditioning (RAC) sector.

9. The implementation of the Stage I HPMP Project is scheduled to be completed in December 2019. In fact, investment and technical assistance related to HCFC consumption reductions in the foam and RAC sectors financed from the project has already completed. The remaining activities relate to the Institutional Strengthening of the National Ozone Unit (NOU) to ensure that there is no gap in financing the Unit prior to the approval of Stage II. Stage I has enabled Thailand to comply with the 2013 and 2015 consumption reduction targets. The latest independent verification of HCFC consumption confirmed that HCFC consumption in 2017 reduced to 404 ODP tons (equivalent to 6,724 metric tonnes (MT)). In addition, the Stage I project facilitated the issuance of two ministerial notifications banning the use of HCFC-22 for manufacturing residential A/C for the domestic market and the use of HCFC-141b for manufacturing all polyurethane foam, except spray foam, which became effective on July 1, 2017.

10. With the reduced level of consumption achieved in 2016 and enforcement of the bans in the two sectors, Thailand has been able to achieve and will be able to sustain future consumption at the level below the 2018 target as stipulated in the agreement between the ExCom and Thailand. To ensure full compliance with the next target of 35% reduction by 2020, the ExCom and Thailand agree that there

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1 Pre-blended HCFC-141b is not included, as it is not considered as consumption under the MP
2 Per the MP, the sum of calculated consumption levels from 2030 to 2040 should not exceed 2.5% of the baseline and this quantity is allowed only for the purpose of servicing the remaining fleet of HCFC dependent equipment
is a need for Thailand to implement additional activities to meet the new obligations (Decision 80/72).

11. The Stage II HPMP Project therefore aims to support Thailand to address at least the 35% reductions of HCFC consumption required to be achieved by 2020 as well as help ensure that the country maintains, at a minimum, agreed reductions from Stage I. Taking into account the consumption reduction achieved from the Stage I HPMP Project and Decision 80/72, the Stage II HPMP Project will address the phase-out of HCFC-141b in the spray foam sub-sector, limited intervention in the commercial refrigeration sub-sector to demonstrate the use of low GWP alternatives for this sector, and HCFC-22 phase-out in the A/C servicing sector. Due to the recent adoption of the Kigali Amendment to phase down production and consumption of hydrofluorocarbons (HFCs) as per Decision XXVIII/2 and the new policies of the MLF, Thailand is required to avoid the use of high GWP HFCs and to explore opportunities to address energy efficiency when phasing out HCFCs. This has therefore been integrated into the proposed project’s design.

Sectoral and Institutional Context

12. Thailand’s demand for HCFCs is met through imports as Thailand does not produce any HCFCs. Based on the definition under the MP, the total amount imported within the calendar year is considered as consumption. HCFC consumption in Thailand is primarily attributed to HCFC-22, HCFC-141b, HCFC-123, HCFC-124, and blends of HCFC-225ca and HCFC-225cb. According to the independent verification of HCFC consumption in 2017, there were four HCFCs imported during that year and the total quantity was 404.59 ODP tons or 6,724 MT with HCFC-22 representing 87% of the total imports in MT. Statistical HCFC consumption data for the period 2011 – 2017 is shown in Tables 2 and 3 below.

Table 2: Statistical HCFC Consumption Data in MT (Source: Independent Verification Reports)

<table>
<thead>
<tr>
<th>HCFC (MT)</th>
<th>2009-10 (Avg)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCFC-22</td>
<td>13,029</td>
<td>11,446</td>
<td>16,821</td>
<td>12,318</td>
<td>11,984</td>
<td>10,365</td>
<td>7,921</td>
<td>5,859</td>
</tr>
<tr>
<td>HCFC-141b</td>
<td>1,866</td>
<td>1,620</td>
<td>2,029</td>
<td>2,028</td>
<td>1,830</td>
<td>1,818</td>
<td>1,353</td>
<td>718</td>
</tr>
<tr>
<td>HCFC-142b</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HCFC-123</td>
<td>160</td>
<td>135</td>
<td>199</td>
<td>116</td>
<td>136</td>
<td>143</td>
<td>135</td>
<td>139</td>
</tr>
<tr>
<td>HCFC-124</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HCFC-225ca/cb</td>
<td>55</td>
<td>29</td>
<td>24</td>
<td>38</td>
<td>39</td>
<td>9</td>
<td>28</td>
<td>8</td>
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<tr>
<td>Total</td>
<td>15,111</td>
<td>13,232</td>
<td>19,076</td>
<td>14,504</td>
<td>13,995</td>
<td>12,335</td>
<td>9,436</td>
<td>6,724</td>
</tr>
</tbody>
</table>
Table 3: Statistical HCFC Consumption Data in ODP tons (Source: Independent Verification Reports)

<table>
<thead>
<tr>
<th>HCFC (ODP t)</th>
<th>2009-10 (Avg)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCFC-22</td>
<td>716.57</td>
<td>629.52</td>
<td>925.17</td>
<td>677.51</td>
<td>659.14</td>
<td>570.09</td>
<td>435.64</td>
<td>322.27</td>
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<tr>
<td>HCFC-141b</td>
<td>206.10</td>
<td>178.20</td>
<td>223.19</td>
<td>223.06</td>
<td>201.35</td>
<td>199.95</td>
<td>148.82</td>
<td>78.96</td>
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<tr>
<td>HCFC-142b</td>
<td>0.13</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HCFC-123</td>
<td>3.19</td>
<td>2.69</td>
<td>3.98</td>
<td>2.32</td>
<td>2.72</td>
<td>2.86</td>
<td>2.69</td>
<td>2.78</td>
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<tr>
<td>HCFC-124</td>
<td>-</td>
<td>0.07</td>
<td>0.07</td>
<td>0.10</td>
<td>0.10</td>
<td>0.00</td>
<td>-</td>
<td>-</td>
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<tr>
<td>HCFC-225ca/cb</td>
<td>1.60</td>
<td>0.83</td>
<td>0.70</td>
<td>1.10</td>
<td>1.14</td>
<td>0.25</td>
<td>0.80</td>
<td>0.58</td>
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<tr>
<td>Total</td>
<td>927.58</td>
<td>811.30</td>
<td>1,153.09</td>
<td>904.08</td>
<td>864.45</td>
<td>773.15</td>
<td>587.96</td>
<td>404.59</td>
</tr>
</tbody>
</table>

13. Since July 2017, the Department of Industrial Works (DIW) has prohibited the use of HCFC-22 for manufacturing of residential air-conditioners with cooling capacity lower than 50,000 BTU/hr and the use of HCFC-141b for manufacturing of polyurethane foam, except spray foam. The remaining consumption of HCFC-22 is for manufacturing of larger air-conditioners, commercial refrigerators, and for servicing of existing air-conditioners and refrigeration equipment. HCFC-141b is used for producing spray foam and as solvents for electronic and metal cleaning industry. The significant drop from 2016 is related to the ban of HCFC-141b for all foam applications other than spray foam. HCFC-123 is used for new centrifugal chillers and as a fire extinguishing agent in handheld fire extinguishers. There is still limited use of HCFC-225ca/cb for electronic cleaning processes. HCFC-22 consumption in the manufacturing sector has significantly reduced with the ban of residential A/C using HCFC-22 as a refrigerant with now most of HCFC-22 imported in 2017 (about 97.5%) being used for servicing purposes. Table 4 below provides a summary of HCFC consumption by use.

Table 4: Consumption by Use in Thailand: 2011-2017 (Source: Thailand Stage II HCFC Phase-out Management Plan)

<table>
<thead>
<tr>
<th>Consumption (MT)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCFC-22 Manufacturing</td>
<td>6,867.46</td>
<td>10,153.37</td>
<td>7,317.61</td>
<td>7,180.57</td>
<td>6,326.65</td>
<td>2,834.56</td>
<td>145.90</td>
</tr>
<tr>
<td>HCFC-22 Servicing</td>
<td>4,578.30</td>
<td>6,676.82</td>
<td>4,671.25</td>
<td>4,583.77</td>
<td>4,038.66</td>
<td>5,086.18</td>
<td>5733.58</td>
</tr>
<tr>
<td>HCFC-141b Foam</td>
<td>1,393.40</td>
<td>1,819.48</td>
<td>1,629.72</td>
<td>1,425.60</td>
<td>1,630.00</td>
<td>1,213.23</td>
<td>247.56</td>
</tr>
<tr>
<td>HCFC-141b Solvent</td>
<td>226.83</td>
<td>209.50</td>
<td>187.65</td>
<td>164.15</td>
<td>187.68</td>
<td>139.69</td>
<td>470.30</td>
</tr>
<tr>
<td>HCFC-123 Firefighting</td>
<td>13.08</td>
<td>13.08</td>
<td>13.08</td>
<td>13.08</td>
<td>13.08</td>
<td>13.08</td>
<td>13.08</td>
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<tr>
<td>HCFC-123 Manufacturing</td>
<td>0.00</td>
<td>63.70</td>
<td>31.51</td>
<td>40.39</td>
<td>43.09</td>
<td>39.84</td>
<td>33.40</td>
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<tr>
<td>HCFC-123 Servicing</td>
<td>121.45</td>
<td>122.10</td>
<td>68.88</td>
<td>82.59</td>
<td>86.76</td>
<td>81.74</td>
<td>92.30</td>
</tr>
<tr>
<td>HCFC-124 Servicing</td>
<td>2.99</td>
<td>2.99</td>
<td>4.03</td>
<td>4.41</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>HCFC-225 Solvent</td>
<td>28.65</td>
<td>45.91</td>
<td>37.64</td>
<td>39.35</td>
<td>32.40</td>
<td>27.73</td>
<td>8.27</td>
</tr>
<tr>
<td>Total</td>
<td>13,232.16</td>
<td>19,097.95</td>
<td>13,961.37</td>
<td>13,533.91</td>
<td>12,358.32</td>
<td>9,436.05</td>
<td>6,744.39</td>
</tr>
<tr>
<td>HCFC-141b in pre-blended polyol</td>
<td>0.00</td>
<td>182.23</td>
<td>0.00</td>
<td>101.73</td>
<td>192.03</td>
<td>361.88</td>
<td>23.49</td>
</tr>
</tbody>
</table>

14. Due to the current requirements of international standards pertaining to safety use of mildly and highly flammable refrigerants in large A/C equipment, no low/lower-GWP alternative technologies...
are technically feasible for these systems. Efforts to accommodate these alternatives are underway. The revised standards to allow the use of a larger charge of lower-GWP alternative refrigerants in larger A/C systems are expected to be approved in the next few years.

15. While there is still HCFC-22 used in manufacturing commercial refrigeration equipment, the quantity and its growth are expected to be limited. Most commercial and industrial refrigeration manufacturers in Thailand have shifted to high GWP HFCs for applications where the use of natural refrigerants is not feasible due to safety concerns, and some to natural refrigerants, where feasible. Conversion from HCFC-22 to high GWP HFC technology in this application has become the norm of the industry. This could pose challenging problems for Thailand when the obligations of the Kigali Amendment controlling HFC consumption and production enter into force in 2024.

16. Institutional Context. DIW is the main actor responsible for MP implementation in Thailand. Within DIW, a dedicated team for Montreal Protocol issues make up the NOU, which is the MP focal point for the country. The Chief of the NOU is responsible for all ODS related tasks and day-to-day operations. The NOU Chief is under supervision of the Director of the Hazardous Substance Management Division (HSMD) which oversees both domestic and international matters. The NOU collaborates with the HSMD for issuance of ODS import control regulations including import and export quotas of ODS. The HSMD also serves as a secretary of the National Hazardous Substances Committee which is tasked with making other strategic decisions on ODS policy in Thailand. As the Committee is represented by all line ministries and agencies that have a role in Montreal Protocol implementation, any policy or regulatory measures to phase out ODS that involve cooperation or mandate of other agencies, can be processed through this National Committee.

17. Other stakeholders include those who have been involved in efforts to phase out chlorofluorocarbons (CFCs), halons, and HCFCs, and other ODS in the ongoing ODS program. The NOU leads in HCFC phase out and serves as the main executing agency. Customs has a critical role to play in enforcing import and export quotas of ODS and bans on equipment contained ODS. Because Thailand’s HCFC phase-out strategy is closely linked to policies on climate change and its national strategy on energy efficiency, Stage II carries forward the new partnerships created with the Ministry of Natural Resources and Environment (MONRE) and Ministry of Energy (MOE) built under Stage I. MONRE serves as the National Focal Point to implement the Paris Agreement. Thailand has established a National Climate Change Committee with four subcommittees for, among others, policymaking on climate change. MOE is responsible for establishing policies and standards on energy consumption that the Electricity Generating Authority of Thailand (EGAT) then implements through Thailand’s standards and labelling program. It also provides incentives and technical support to entities that adopt energy efficiency measures.

C. Proposed Development Objective(s)

Development Objective(s) (From PAD)

18. The project development objective is to contribute to reducing HCFC consumption in Thailand.

19. In doing so, the project will contribute to Thailand’s efforts to meet the 2020 HCFC consumption phase-out obligations of the Montreal Protocol and its Multilateral Fund, as well as the initial requirements of the Kigali Amendment.
Key Results

20. The PDO level result indicator is: (a) reduction in HCFC consumption from spray foam and RAC servicing sectors (in ODP tons). This project is expected to reduce 51.53 ODP tons by the end of 2023.

D. Project Description

21. The Stage II phase-out project will address at least the 35% reductions of HCFC consumption required to be achieved by 2020 as well as help ensure that the country maintains at a minimum, agreed reductions from Stage I. For Thailand, this reduction was 10% of its 927.6 ODP tons baseline starting in 2015, which is the same as its second MP obligation– a total of 92.76 ODP tons and 15% of its baseline starting in 2018, equivalent to an additional reduction of 46.38 ODP tons. As of 2017, Thailand has reduced consumption to 404.59 ODP tons, 56.4% lower than the baseline, and therefore below both its 2015 and 2020 maximum allowable consumption levels as per the MP requirements. However, to sustain the achievement attained to date and to phase out the remaining consumption of HCFC-141b in the spray foam sub-sector which is critical for preempting diversion of HCFC-141b to the PU foam applications that have already been banned since July 2017, additional phase-out activities should be implemented without any disruption to maintain the momentum of the successful HCFC phase-out program.

22. The Stage II HPMP Project is proposing to replace HCFCs with low-GWP alternatives. Given that the supply of HFOs, which are low-GWP alternatives for spray foam applications, is still in a nascent stage, particularly in the developing country market, it is not feasible to achieve a complete phase-out of HCFC-141b in this application until 2023 at the earliest. Therefore, the Stage II HPMP will be implemented during the period of 2020 – 2023. Because the current HCFC consumption is still higher than the 2025 reduction target, in addition to the complete phase-out of HCFCs in the foam sector, the Stage II HPMP will demonstrate the use of low GWP alternatives in commercial refrigeration to curb the demand of HCFC-22 and high GWP HFC refrigerants, which will support the HCFC phase-out in the future phase as well as Thailand’s future obligations under the Kigali Amendment. The combination of these phase-out activities will enable Thailand to move towards its 2025 reduction target. The project consists of four proposed components as described below.

Component 1: Investment in HCFC Consumption Reductions (US $2,548,617; OTF: US $1,916,111)

23. The project will finance conversion in the spray foam sub-sector and for demonstrating alternative low-GWP non-ODS technology in the commercial refrigeration sector. This includes:

(a) Provision of sub-grants to beneficiary enterprises in the spray foam sub-sector to carry out HCFC consumption reduction subprojects;

(b) Demonstration sub-project for the conversion of high GWP HFCs used as refrigerants for manufacturing commercial refrigeration equipment.
24. Financial support will be provided to spray foam enterprises\(^3\) consuming HCFC-141b in their production processes (i.e., as a blowing agent). This covers about 71 enterprises and system houses. The project will finance the following costs of conversion to low-GWP hydrofluoro-olefin (HFO) alternatives: (i) handling and storage for HFOs and new foam systems; (ii) trial production and training of spray foam enterprises; and (iii) incremental operating cost of the alternative technologies for a transitional period. For system houses, the project will finance: (i) development and testing of new foam formulation based on HFOs; (ii) cold room for storage of HFOs; and (iii) premixing unit for HFOs and polyols.

25. The approved funding for the conversion in spray foam sub-sector from ExCom is US $1,782,597. Eligible expenditure and maximum funding level for each expenditure item for conversions of HCFC-141b in the spray foam sub-sector are summarized in Annex 3. The maximum eligible funding level\(^4\) of each enterprise is the sum of incremental capital costs and incremental operating costs.

26. In addition, the project will finance a demonstration sub-project with a commercial refrigeration manufacturer (Patana Intercool). The approved funding for this sub-project from ExCom is US $183,514. This will finance incremental capital costs and incremental operating costs, including the following: (i) new product design; (ii) assembly line modification; (iii) safety equipment; (iv) testing, trials, and training for the production of new non-HFC-134a commercial refrigeration appliances; (v) safety certification; (vi) ventilation systems; and (vii) other incremental operating costs.

27. Expenditures to be incurred by this component include goods and incremental operating costs. Activities under this component would be implemented by Government Savings Bank (GSB).

**Component 2: Technical Assistance (US $1,974,000; OTF: US $1,745,455; Project Beneficiaries: US $228,545)**

28. This component is designed to strengthen capacities of relevant government agencies, technical institutes and private entities that engage in HCFC import/export, handling, use, and end-of-use. This includes:

   (a) Strengthening the training capacity of Department of Skills Development (DSD) and vocational technical schools and supporting costs of the training of service technicians on the proper installation and maintenance of HFC-32 residential air-conditioners to enhance market penetration of this technology, which was adopted by the Stage I project, and training to minimize leakage of HCFC-22 from existing HCFC-22 based RAC equipment;

   (b) Policy and standard development to facilitate market transformation in the spray foam sector;

   (c) Public awareness activities to eliminate the use of HCFC-22 and avoid the use of high GWP HFCs;

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\(^3\) In accordance with the ExCom’s decision 60/44(a) that the ExCom will not consider any HCFC based manufacturing capacity installed after September 21, 2007.

\(^4\) According to the ExCom’s guidelines, the eligible funding level for enterprises consuming HCFC-141b more than 20 MT a year is determined by the sum of eligible incremental capital cost and incremental operating cost of not more than US $5/kg of HCFC-141b. The eligible incremental capital cost includes the costs of testing and trial plus 10% contingency. The standard costs for testing and trial are US $500 per spray gun and US $2,000 per enterprise, respectively. For enterprises consuming less than 20 MT a year, the cost-effectiveness threshold is about US $10/kg. However, the final approval from ExCom for this later group of enterprises sector is slightly higher; hence, the cost-effectiveness threshold for them is about US $ 10.52/kg of HCFC-141b.
(d) Activities to strengthen authorities’ understanding of the MP requirements and their enforcement capacity to ensure that there is no diversion of HCFCs to applications where such uses have already been prohibited; and

(e) Technical review and dissemination of the findings on alternative cleaning agents to industries that are still using HCFC-141b for manufacturing and servicing.

29. The training capacity and training support financed under this component includes at least: (1) three training of trainers workshops; (2) sets of training equipment for 12 training centers (six each) of DSD and vocational technical schools (to be financed through a voucher scheme\(^5\)); (3) training for 5,500 service technicians\(^6\); (4) basic tools for service technicians; (5) partial certification of service technicians; (6) technical assistance for the development of a mobile application to enhance accountability and feedback on service technician quality; (7) monitoring and evaluation on the impact of the certification system; (8) institutional strengthening of DSD, DIW, and vocational training schools; and (9) other incremental operating costs.

30. The total funding approved by the ExCom is US $1,745,455 while the estimated cost of implementing all the proposed activities is about US $1,974,000. The difference will be financed in-kind by the beneficiaries. The list of activities and associated costs are shown in Annex 3. A list of training equipment items and their technical specifications to be financed by the Project will be jointly developed by DIW, DSD and Office of Vocational Education Commission (OVEC).

31. Expenditures to be incurred by this component include goods, consulting services, and incremental operating costs (such as workshops, training, travel, communications, and others). Activities under this component would be implemented by DIW.

**Component 3: Project Management (US $313,025; OTF: US $313,025)**

32. This component will provide technical assistance support to the project management units (PMUs) of DIW and GSB, which will continue to provide project management support on a day-to-day basis (building on experiences from Stage I).

33. DIW-PMU will be responsible for the overall management, coordination, monitoring, and reporting of the overall implementation of this project. Its main function will be to assist DIW to implement its HCFC import licensing and quota systems and existing sector-specific regulations put in place under the Stage I project as well as provide technical information for development of new sector-specific regulations to support elimination of HCFC-141b in the manufacturing of spray foam. DIW-PMU will provide guidance to eligible enterprises to prepare sub-project proposals for Component 1. DIW-PMU will also lead the implementation of Component 2 of the project. In addition, DIW-PMU will be responsible for contracting the annual consumption verification auditing firm (for which US $15,000 has been allocated for annual consumption verification for five years from 2018 – 2022).

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\(^5\) DIW, DSD, and vocational technical schools all have successful experience with voucher schemes under the previous ODS Phase-Out Project financed by the World Bank.

\(^6\) The project will finance the cost of training experts (their accommodation, travel, and per diem) and the cost of meals for the 5,500 service technician trainees. Financing support from the project will also provide each trainee that passes the training a key servicing tool (e.g., gauge manifold or torque wrench) for them to adopt good service practice.
34. GSB-PMU will be responsible for the implementation of Component 1 of the project. Its functions include: (i) appraising sub-project proposals; (ii) signing sub-grant agreements with eligible enterprises; (iii) monitoring sub-project implementation; (iv) disbursement of funds to enterprises; and (v) preparation of sub-project completion reports. DIW-PMU will assist GSB-PMU to: (i) confirm enterprises’ eligibility; (ii) review and approve plans for disposing of baseline equipment replaced by the sub-project; (iii) confirm implementation completion including implementation of the disposal plans. Detailed roles and responsibilities of DIW-PMU and GSB-PMU is delineated in the project implementation manual (PIM).

35. Expenditures to be incurred by this component include goods, consulting services, and incremental operating costs (such as workshops, training, travel, communications, and others). Activities under this component would be implemented by both DIW and GSB.

Component 4: Strengthening of the National Ozone Unit (US$ 1,109,338; OTF: US $1,109,338)

36. This component will provide technical assistance to strengthen the capacity of the NOU to fulfill the obligations of the Recipient under the MP. The NOU was established in 1992 within DIW. Its main functions are to monitor import and export of ODS and to report to the UNEP Ozone Secretariat in accordance with Article 7 of the MP. In this regard, the NOU is responsible for establishing import/export quotas of ODS for all importers/exporters on an annual basis and liaising with other government agencies including the Customs Department to ensure the effective control of the border to preempt any illegal shipments of ODS in and out of the country. In addition, the NOU is required by the ExCom to provide progress reports in the implementation of the country program (CP), national ODS phase-out program, on an annual basis.

37. Under this project, the NOU will have additional responsibility to support DIW and the Government of Thailand to proceed with the ratification and implement of the Kigali Amendment, support DIW to draft new policies and regulations, review existing Hazardous Substances Control Act and recommend any adjustment/amendment to ensure compliance with new obligations in relation to HFC control. The current licensing and quota systems will be reviewed and extended to cover HFCs.

38. The NOU is also tasked to carry out public awareness activities, information exchange with stakeholders in the country, including both public and private sectors, and stakeholders in other Article 5 countries within the region. It is required to participate in all international meetings related to the MP, including meetings of the Parties, United Nations Environment Program (UNEP) networks of ozone officer meetings, and other meetings organized by all implementing agencies of the MLF (i.e., United Nations Development Program (UNDP), United Nations Industrial Development Organization (UNIDO) and the World Bank).

39. Expenditures to be incurred by this component include goods, consulting services, and incremental operating costs (such as workshops, training, travel, communications, and others). Activities under this component would be implemented by DIW.
E. Implementation

Institutional and Implementation Arrangements

40. The Government of Thailand appointed the MOI as the responsible agency for the implementation of the Montreal Protocol and its amendments. DIW, under the MOI was, in turn, designated as the national focal point and implementing agency for this project. DIW will oversee project implementation and coordination particularly among government agencies and the industry. DIW will be responsible for providing technical input for engagement of consultants for some technical assistance activities including the PMU. Qualified consultants will be hired to support DIW with overall coordination of the project. The PMU will be housed in DIW and will undertake all day-to-day functions of the Project. DIW-PMU will serve as implementing agency and will manage grant funds for Components 2, and 3 of the Project. DIW-PMU will also undertake responsibility to identify sub-projects for Component 1 and provide guidance and assistance to beneficiary enterprises to prepare technical proposals. The beneficiary enterprises for Component 1 would then secure confirmation of their eligibility of MLF funding for the project from DIW and submit the evidence along with the technical proposals to GSB for its technical and financial appraisal of the sub-projects.

41. In addition, DIW houses the NOU whose main responsibility is to ensure the country’s compliance with its obligations under the MP. The NOU will be responsible for developing procedures for allocating import/export quota to each importer/exporter and recommending to the HSMD annual import/export quotas consistent with Thailand MP obligations and agreements with the ExCom. The NOU will provide support to HSMD in carrying out its responsibilities with regard to monitoring actual imports/exports made by importers/exporters as part of DIW’s obligation pertaining to reporting under Article 7 data and the consumption verification to be conducted by the Project. The import/export of HCFC is also enforced by the Thai Customs Department to ensure that only HCFC shipment with license issued by HSMD is allowed for import/export. These agencies will provide a system of check and balance to ensure effective control of the imports/exports of HCFC. The DIW will be responsible for implementing Component 4 of the Project.

42. GSB will be responsible for activities under Component 1. GSB is currently the financial agent for the HCFC Stage I Phaseout Project. The Retail Customer and Community Organization Support and Operation Department of GSB will effectively support the implementation of the new project. DIW and GSB will be responsible for submission of financial reports and for appointing an external auditor as required by the Bank.

43. The MOF will enter into a US$5.08 million grant agreement with the World Bank. The implementation of Thailand Phase II HPMP will start in early 2020 to ensure full compliance with phase-out obligations and desired project impacts attributed to interventions from the project. Upon receipt of grant proceeds, MOF, DIW and GSB will enter into subsidiary agreements, which describe their roles and responsibilities under the project.

44. Enterprises will submit their subproject proposals to request grant funds for the conversion to GSB with a copy to DIW-PMU. DIW-PMU will determine the eligibility of the enterprises based on their establishment date and compliance with MLF criteria. Once eligibility is confirmed, GSB-PMU will review
the subproject proposals and supporting documents, verify HCFC consumption, appraise and confirm the technical and financial feasibility of the proposals and recommend the appropriate level of funding consistent with the approval of the ExCom. GSB will enter into sub-grant agreements with the beneficiary enterprises and will be responsible for monitoring and reporting implementation progress of sub-grant activities.

45. **A PIM will be prepared to provide guidance on day to day operations.** The guidance covers funding and eligibility criteria, procedures and arrangements for implementing the Project, including procurement, financial management, reporting, sub-grant processing, verification and payment mechanisms, and monitoring and evaluation.

46. **Technical assistance activities will be undertaken under the oversight of DIW-PMU or GSB-PMU** which may partner with various government agencies such as TISI, DSD, OVEC; BMA, Department of Public Works and Town and Country Planning and the Department of Alternative Energy Development and Efficiency (DEDE), among others. The Federation of Thai Industries (FTI) will provide technical information on the technology options to the relevant industry, enterprises and DIW. It will also provide coordination functions to assist its members to conduct HCFC phase-out under the Project.

### F. Project location and Salient physical characteristics relevant to the safeguard analysis (if known)

Conversion activities under the project will be undertaken at the existing facilities of participating spray foam enterprises and system houses which are located mostly in Bangkok and in industrial zones in the neighboring provinces (i.e., Pathumthani, Samutprakarn, Nonthaburi, Chonburi, etc). It is anticipated that approximately 71 spray foam enterprises and system houses would be eligible for project support; however, specific sites of participating spray foam beneficiaries can only be confirmed during project implementation phase. The project will also finance one demonstration sub-project of commercial refrigeration manufacturer at Pattana Intercool Co., Ltd. to convert from HFC-134a to R-290 or R-600a. This enterprise is located inside an industrial park in Pathumthani province (suburb of Bangkok). No land acquisition will be required under the project.

### G. Environmental and Social Safeguards Specialists on the Team

Pamornrat Tansanguanwong, Social Specialist  
Waraporn Hirunwatsiri, Environmental Specialist
<table>
<thead>
<tr>
<th>SAFEGUARD POLICIES THAT MIGHT APPLY</th>
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<tbody>
<tr>
<td>Safeguard Policies</td>
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<tr>
<td>Triggered?</td>
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<tr>
<td>Explanation (Optional)</td>
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</tbody>
</table>

**Environmental Assessment OP/BP 4.01**

Yes

The project will have a positive impact on the global environment as HCFCs are not only ozone depleting substances, but they also are high global warming gases whose global warming potential (GWP) ranges from several hundred to several thousand times that of carbon dioxide. Moreover, the conversion of various HCFC-based manufacturers to alternative, advanced technologies usually leads to improved energy efficiency, particularly in the refrigeration and air-conditioning sectors. Thus, phasing out HCFCs provides two types of potential benefit to the climate.

The project will provide financial and technical support to 71 spray foam enterprises and system houses to convert from HCFC 141b to low-GWP technology. Most of foam enterprises will adopt non-flammable hydrofluoroolefins (HFOs) (HFO-1233zd(E) and HFO-1336mzz(Z)) which are non-ozone depleting substances and with global warming potential of less than 1. The HFOs and CO2 alternatives technologies are not caused significant adverse environmental and human health impact but proper measures need to be in place.

For commercial refrigeration conversion, recognizing that there is very limited non-flammable low-GWP alternative refrigerants, hydrocarbon refrigerants, such as R-600a (Isobutane) or R-290 (Propane), have been selected by the participating commercial refrigeration manufacturer at Pattana Intercool Co., Ltd. as the main replacement option. The technical support to service technician to adopt good practices for installation and maintenance of lower GWP residential A/C and improve service practices for service and maintenance of residual HCFC-22 based residential A/Cs will support the sustainable of the implementation of HCFC phaseout stage I.

The project triggers OP/BP 4.01 because its supports for conversion from HCFC-141b to Low-GWP technology in Spray Foam sub-sector and for one
demonstration project to convert commercial refrigerator manufacturing to R-290 and R-600a technology may generate low to moderate risks to the environment and occupational health and safety. The anticipated impacts will be site-specific and can be mitigated by proper mitigation measures. Therefore, the project is classified as Category B EA according to this policy requirements.

For the spray foam sector, since the participation of the 71 potential foam enterprises and systems houses cannot be confirmed by the project appraisal stage, an environmental management framework (EMF) has been prepared to guide a preparation of sub-project specific Environmental Management Plan (EMP) during project implementation. All the participating enterprises are required to compliance with National, and local law and regulations related to environment/ social/health and safety protection.

For one demonstration commercial refrigeration project, a due diligence review addressing occupational health and safety, fire and exposure risks, has been conducted during preparation. The Environmental Management Plan (EMP) with site-specific measures including appropriate emergency preparedness and response measures consistent with the World Bank Group's Environment, Health and Safety (EHS) Guidelines, has been prepared.

Stakeholders consultation on the draft EMF and on the draft EMP had been carried out on June 19, 2019 which feedbacks from stakeholder have been incorporated into the final EMF and EMP. Disclosure of the final EMF and EMP in country and at the World Bank’s public website’s will be take placed prior to project appraisal.

Similarly to the outcome of the project in Phase I, The outcome of the phaseout in this project is gender neutral. The project will provide equal opportunity for male and female workers to participate in training and other capacity building activities.

Performance Standards for Private Sector Activities OP/BP 4.03  No
<table>
<thead>
<tr>
<th>Topic</th>
<th>Result</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Habitats OP/BP 4.04</td>
<td>No</td>
<td>The project will not affect any protected areas, known natural habitats, or established or proposed critical natural habitats since all the project activities will take place either in existing enterprises facilities or industrial park outside those protected areas and natural habitats.</td>
</tr>
<tr>
<td>Forests OP/BP 4.36</td>
<td>No</td>
<td>The project will not finance activities that would involve any conversions or degradation of critical or non-critical forest areas or related critical natural habitats as defined under the policy.</td>
</tr>
<tr>
<td>Pest Management OP 4.09</td>
<td>No</td>
<td>The project will not finance procurement of pesticides or pesticide application equipment (either directly or indirectly). In addition the project will not affect pest management in a way that harm could be done, nor lead to increased pesticide use and subsequent increase in health and environmental risk.</td>
</tr>
<tr>
<td>Physical Cultural Resources OP/BP 4.11</td>
<td>No</td>
<td>The project will not adversely affects sites with archeological, paleontological, historical, religious, or unique natural values as all project activities will be developed within the existing premise of the project beneficiary enterprises or in an industrial area.</td>
</tr>
<tr>
<td>Indigenous Peoples OP/BP 4.10</td>
<td>No</td>
<td>All project activities will be developed within the existing premise of project beneficiary enterprises or in industrial areas. The potential beneficiary enterprises are not located in an area with indigenous peoples. No indigenous peoples group will be affected.</td>
</tr>
<tr>
<td>Involuntary Resettlement OP/BP 4.12</td>
<td>No</td>
<td>All the project activities will be within the existing premise of project beneficiaries. There will be no land acquisition or involuntary resettlement related impact.</td>
</tr>
<tr>
<td>Safety of Dams OP/BP 4.37</td>
<td>No</td>
<td>The project will not involve any construction or rehabilitation of any dams.</td>
</tr>
<tr>
<td>Projects on International Waterways OP/BP 7.50</td>
<td>No</td>
<td>The project will not involve international waterways.</td>
</tr>
<tr>
<td>Projects in Disputed Areas OP/BP 7.60</td>
<td>No</td>
<td>The project is not located in any known disputed areas.</td>
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</tbody>
</table>
KEY SAFEGUARD POLICY ISSUES AND THEIR MANAGEMENT

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the proposed project. Identify and describe any potential large scale, significant and/or irreversible impacts:

The proposed Thailand HCFC Phase-out (Stage II) Project, which is a continuation of Thailand HCFC Phase-out (Stage I) Project, is classified as a Category B project. It triggers one safeguard policy namely Environmental Assessment (OP/BP 4.01). It is expected that environmental benefits of the Project will outweigh negative impacts as the Project will phase out HCFCs, which are damaging to the ozone layer and global climate as they are ozone depleting and high global warming potential substances. On the negative impact side, the project activities, which support investment in reducing HCFC consumption in the commercial refrigeration and spray foam enterprises, could cause low to moderate negative impacts to the environment and occupational health and safety. Since activities will be carried out in the beneficiaries’ existing facilities, the impacts will be limited to the sites and manageable through proper management practices.

For the spray foam sector, the project will provide technical and financial assistance to eligible manufacturers in the spray foam sector to convert to new foam systems (polyol and blowing agent) based on non-ozone depleting and low global warming potential blowing agents such as HFO-1233zd(E), HFO-1336mzz(Z)) and CO2. An environmental management framework (EMF) consistent with OP/BP 4.01 requirements was prepared by DIW to provide guidance for preparation of subproject environmental management plans (EMPs). During project implementation, eligible beneficiary enterprises seeking funding support from the Project will be required to submit EMPs consistent with the EMF requirements prior to sign sub-grant agreements. Both HFO-1233zd(E) and HFO-1336mzz(Z) are nonflammable substances. HFO-1233zd(E) is considered practically nontoxic by the inhalation route of exposure. HFO-1336mzz(Z) has low acute inhalation toxicity. Due to physical characteristics of the HFOs, the anticipated adverse effect on human health from the conversion subprojects financed by the Project is considered low and manageable through implementation of mitigation measures. The participating enterprises must ensure that safety training is provided to their workers, and relevant requirements on safe storage and handling of blowing agents are followed.

The activity for demonstrating the use of low-GWP non-ODS technology in the manufacturing of small standalone commercial refrigeration equipment/systems will be conducted at the existing facility of Patana Intercool Co., Ltd. that is located inside an industrial park. The subproject will demonstrate safe conversion from HFC-134a based standalone commercial refrigerator technology to R-290 (Propane) and R-600a (Isobutane). The hydrocarbon refrigerants are highly flammable with “A3” category as per American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Standard 34. While conversion to these flammable refrigerants will reduce GWP, it increases fire and exposure risks, occupational health and safety risks. Environment and occupational health and safety impacts associated with these risks are, however, site-specific and can be mitigated by implementation of proper measures.

An EMP with site-specific measures including appropriate emergency preparedness and response measures consistent with country requirements and the World Bank Group’s Safeguards Policies, and EHS Guidelines, was prepared by Patana Intercool Co., Ltd. in order to mitigate those risks and their impacts. Since R-290 and R-600a are highly flammable refrigerants, the project support will include funding for assembly line modification, safety equipment, testing, trials, and training for the production of new non-HFC-134a commercial refrigeration appliances, safety certification and ventilation systems. More specifically, the R-290 or R-600a production line will be equipped with special refrigerant charging unit, leak testing equipment, and monitoring equipment to ensure that concentration of
hydrocarbons in the work area remains at all time lower than the lower explosion limit defined by the international standards. Patana Intercool needs to ensure that all the electrical fittings are spark free. This also requires using only spark free/ solid state electrical components and fittings (e.g., thermostat, fan motor, lighting) apart from specially designed compressor for the refrigerants. Storage and handling of R-290 and R-600a need to follow suggestion in the safety data sheet (SDS), national regulations and relevant international standards requirements. Safety training for manufacturing and servicing is critical to the success and sustainability of this technology. The EMP contains requirements on safety training for staff involved in handling of R-290/R600a.

The project does not trigger any social safeguards policies. The project activities will be carried out within existing locations of project beneficiaries or in spray foam application sites. The Project will not result in any land acquisition, involuntary resettlement, and job loss. Similar to the State I Project, the outcome of HCFC phase-out from this Project is gender neutral. The project will provide equal opportunity for both male and female workers to participate in training and other capacity building activities.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:
The Project contributes positively to mitigating the depleted ozone layer and climate change effects by phasing out HCFCs. The Project will have positive economic and social benefits as it will reduce HCFC emissions and enhance public health by reducing impacts on the ozone layer, and maintain Thailand’s industrial competitiveness as the demand of HCFC based equipment is quickly declining due to the Montreal Protocol’s requirements.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.
N/A

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.
Since spray foam enterprises to be funded by the project could not be confirmed prior to the project appraisal, DIW had prepared an EMF which is consistent with OP 4.01 requirements. The EMF will provide guidance for preparation of subproject EMPs once beneficiary enterprises are confirmed. During project implementation, participating enterprises will prepare an environmental management plan (EMP) following guidance in the EMF and submit it together with sub-project proposal to the GSB-PMU and copy DIW-PMU to request for support. The participating enterprises must ensure that safety training is provided to workers, and relevant requirements on safe storage and handling of blowing agents must be followed. Each participating enterprise will be required to submit EMP monitoring form to the PMU and GSB within 6 months from sub-grant agreement signing. The PMU will randomly conduct site visits to monitor the safeguard implementation compliance periodically, prepare biannually project safeguards progress report that provide an overview of project safeguards implementation status and performance and share with the World Bank in each Project Implementation Support Mission (ISM).

DIW-PMU will serve as an implementing agency of Components 2 – 3, while GSB-PMU that will serve as a financial agent for Component 1 of Thailand HCFC Phase-out (Stage II) Project. Both PMUs are familiar with safeguards implementation and supervision as they were the same PMUs that implement Thailand HCFC Phase-out (Stage I) Project. DIW-PMU will be staffed with a qualified technical consultant who is familiar with the HCFC conversion process, safe handling of hazardous chemicals and blowing agents and their respective health and fire hazards mitigation measures. The technical consultant will be responsible for providing advice to beneficiary foam and
commercial refrigeration enterprises on technical and safeguards aspects.

The EMP with site-specific measures consistent with country requirements and the World Bank Group’s Safeguards Policies and Environment, Health and Safety (EHS) Guidelines, has been prepared to address potential adverse impacts from commercial refrigeration demonstration sub-project which will be carried out at the existing facility of Patana Intercool Co., Ltd. Patana Intercool is a one of the beneficiaries under the foam sector of Thailand HCFC Phase-out (Stage I) Project that converted its foam production line to cyclopentane technology. Therefore, experiences have been established on the EMP preparation and implementation particularly on handling of flammable materials. The company has established environmental and occupational health and safety management system with designated experienced safety officers as required by law. These EHS staff include one Safety Supervisor and one Safety & Environmental Officer that have extensive experiences and trainings dealing with industrial operations particularly flammable/hazardous chemicals and emergency response. In addition, the company plans to apply for environmental management and occupational health and safety standards (ISO 14001 and ISO 18001, respectively) in the near future.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

A stakeholder consultation meeting on the draft EMF for spray foam sector and the draft EMP for the commercial refrigeration demonstration sub-project of Patana Intercool Co., Ltd took place at the DIW on June 19, 2019 to present the Project scope, objectives, activities, the draft EMF and EMP along with their proposed mitigation measures. Participants of the consultation meeting include participants from relevant stakeholders including spray foam enterprises, system houses, chemicals suppliers, representatives from the Polyurethane Group of the Federation of Thai Industries (FTI) and DIW. Feedbacks received from the consultation meeting were incorporated into the final EMF and EMP which were disclosed on the DIW’s website, Patana Intercool’s website, and the World Bank’s public website prior to appraisal.

B. Disclosure Requirements

<table>
<thead>
<tr>
<th>Environmental Assessment/Audit/Management Plan/Other</th>
<th>Date of receipt by the Bank</th>
<th>Date of submission for disclosure</th>
<th>For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>05-Sep-2019</td>
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"In country" Disclosure
Thailand
05-Sep-2019

Comments
The EMF was disclosed locally in DIW’s website (http://www.diw.go.th/hawk/news/haz/EMF.html) on September 5th, 2019. The original EMP for the commercial refrigeration conversion was disclosed locally on Patana Intercool’s website on June 10th, 2019. (http://patanaintercool.com/blog/2019/06/emp-2019)
C. Compliance Monitoring Indicators at the Corporate Level (to be filled in when the ISDS is finalized by the project decision meeting)

OP/BP/GP 4.01 - Environment Assessment

Does the project require a stand-alone EA (including EMP) report?
Yes

If yes, then did the Regional Environment Unit or Practice Manager (PM) review and approve the EA report?
No

Are the cost and the accountabilities for the EMP incorporated in the credit/loan?
Yes

The World Bank Policy on Disclosure of Information

Have relevant safeguard policies documents been sent to the World Bank for disclosure?
Yes

Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?
Yes

All Safeguard Policies

Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?
Yes

Have costs related to safeguard policy measures been included in the project cost?
Yes

Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?
Yes

Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?
Yes

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World Bank

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Lead Environment Specialist

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**APPROVAL**

<table>
<thead>
<tr>
<th>Task Team Leader(s):</th>
<th>Viraj Vithoontien</th>
</tr>
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</table>

**Approved By**

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<tr>
<th>Safeguards Advisor:</th>
<th>Christophe Crepin</th>
<th>09-Sep-2019</th>
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<tr>
<td>Practice Manager/Manager:</td>
<td>Christophe Crepin</td>
<td>09-Sep-2019</td>
</tr>
<tr>
<td>Country Director:</td>
<td>Birgit Hansl</td>
<td>13-Sep-2019</td>
</tr>
</tbody>
</table>
Note to Task Teams: End of system generated content, document is editable from here. Please delete this note when finalizing the document.