**Results Matrix for the Geothermal Financing and Risk Transfer Program**

The resources included in ME-G1005 for a total of US$54.3 million (financed by the *Clean Technology Fund)* include: (i) Risk mitigation for geothermal projects in the early stages of exploration, GRT/TC-14424-ME and GRT/TC-17351-ME (US$51.5 million); and (ii) Technical assistance to support program execution and other implementation costs, GRT/TC-14423-ME (US$2.8 million).

The specific objective of ME-G1005 is to develop exploration of geothermal projects that permit financial closure for subsequent plant construction and operation.

The new, revised matrix differs with the current program matrix in that: (i) Component 2 and its correspondent Output (Loans granted to geothermal projects by the program at any stage of development) and target (2) is eliminated and (ii) the Outcomes that were related to Component 2 are moved to be Impact indicators under the new matrix.

**New / Revised Results Matrix for the Geothermal Financing and Risk Transfer Program**

|  |  |
| --- | --- |
| **Objective** | The program objective is to increase power production from geothermal sources so as to contribute to the diversification of the energy matrix and reduce dependency on fossil fuels and greenhouse gas (GHG) emissions in Mexico. To this end, the program intends to scale up investment in geothermal power generation projects by making available a range of financial mechanisms tailored to meet the specific needs of each project’s stage of development. This will include risk mitigation mechanisms, as well as various forms of financing for exploration, drilling, field development, and construction and operation phases of private geothermal projects.  The specific objective of ME-G1005 is to develop exploration of geothermal projects that permit financial closure for subsequent plant construction and operation. |

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| **Indicators** | **Unit** | **Baseline** | **Year 1**  **2016** | **Year 2**  **2017** | **Year 3**  **2018** | **Year 4**  **2019** | **Year 5**  **2020** | **Year 6**  **2021** | **Year 7**  **2022** | **Year 8**  **2023** | **Year 9**  **2024** | **End of program target[[1]](#footnote-2)1** | **Description/Means of verification** |
| **Outputs** | | | | | | | | | | | | | |
| Contingent recovery resources provided to geothermal projects with CRG resources from the program | Number of projects (wells) using NAFIN-  approved CRGs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 4 | Target is inclusive of all projects financed, both successful and failed.  Source: Program report from NAFIN. Estimations consider that a beneficiary project that is successful during early exploration stages may be eligible for program support in the production drilling  phase. |

| **Indicators** | **Unit** | **Baseline** | **Year 1**  **2016** | **Year 2**  **2017** | **Year 3**  **2018** | **Year 4**  **2019** | **Year 5**  **2020** | **Year 6**  **2021** | **Year 7**  **2022** | **Year 8**  **2023** | **Year 9**  **2024** | **End of program target** | **Description/Means of verification** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Outcomes** | | | | | | | | | | | | | |
| Total geothermal projects financed at any stage by the program that reach financial closure for plant construction | Number | 0 |  |  |  |  |  | 1 | 1 | 0 | 0 | 2 | Includes the total number of projects that have secured full financing for plant construction in the year indicated. Due to the long maturities associated with these projects, projects financed from early exploration may not reach this phase until past the timeframe of monitoring (see target Y10).  Source: Program report from NAFIN. |
| **Impacts** | | | | | | | | | | | | | |
| Total geothermal projects financed at any stage by the program that are in operation (producing electricity) | Number | 0 |  |  |  |  |  |  |  |  | 2 | 2 | Includes the total number of projects in operation in the indicated year. Due to the long maturities associated with these projects, projects financed from early exploration may not be fully operational until past the timeframe of monitoring (see target Y10).  This impact is contingent on obtaining the financing resources.  Source: Program report from NAFIN. |
| Geothermal power generation capacity installed in projects financed at any stage by the program | MW | 0 |  |  |  |  |  |  |  | 15 | 15 | 30 | Includes only capacity ready for production[[2]](#footnote-3) Due to the long maturities associated with these projects, capacity resulting from projects financed from early exploration may not be installed until past the timeframe of  monitoring (see target Y10).  This impact is contingent on obtaining the financing resources. |
| Electricity production from projects financed at any stage by the program | GWh/year | 0 |  |  |  |  |  |  |  | 110.38 | 220.75 | 331.13 | Source: Program report from NAFIN. Estimations based on expected capacity installed, an average production factor in Mexico of 24 hours/day, 365 days/year.  This impact is contingent on obtaining the financing resources. |
| Greenhouse gas (GHG) emissions avoided by geothermal projects financed at any stage by the program | ktCO2e/year | 0 |  |  |  |  |  |  |  | 64.24 | 128.24 | 192.48 | Tons of GHG emissions that will be reduced or avoided once the plants financed by the program are commissioned.  Source: Estimations made following IDB methodology, based on installed capacity (see indicator above), envisaged production, and an average conversion factor of  0.582 tCO2/MWh for electricity generation in Mexico.  ktCO2e = kilotons of CO2 equivalent  This impact is contingent on obtaining the financing resources. |
| Additional financing from third parties mobilized to develop geothermal projects financed at any stage by the program | US$ millions | 0 |  |  |  |  |  |  |  |  |  | 190 | Volume of third-party direct finance leveraged by the program. Includes all financing from sources other than IDB/CTF (government, NAFIN, financial institutions, and private or public capital contributions).  Source: Program report from NAFIN. Estimations based on a 70:30 debt-to-equity ratio (for the production stage), investment costs of US$5 million per well and US$2 million to US$4 million per MW installed. |
| Total geothermal capacity installed in Mexico | MWe | 909[[3]](#footnote-4) |  |  |  |  |  |  |  |  |  | 1.108[[4]](#footnote-5) | Source: SENER, Balance Nacional de Energía. |
| Electricity production from geothermal sources in Mexico | GWh/year | 6.148[[5]](#footnote-6) |  |  |  |  |  |  |  |  |  | 6.921 | Source: Public information from the Energy Regulatory Commission (CRE) and CFE.  Estimations based on the average production factor in Mexico. |
| GHG emissions in the Mexican energy sector | MtCO2e | 503.8[[6]](#footnote-7) |  |  |  |  |  |  |  |  |  | 814 | Source: IDB estimations based on [Estrategia Nacional de Cambio](http://www.semarnat.gob.mx/archivosanteriores/informacionambiental/Documents/06_otras/ENCC.pdf) [Climático](http://www.semarnat.gob.mx/archivosanteriores/informacionambiental/Documents/06_otras/ENCC.pdf) [National Climate Change Strategy] (ENACC) and [Sector contribution to emissions,](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) [Mexico's Fifth National](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) [Communication to the UNFCCC.](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) The baseline GHG in 2024 and 2030 is 900 MtCO2e/year and 996 MtCO2e/year, respectively, and the potential for emissions abatement in 2024 and 2030 is 86 MtCO2e/year and  172 MtCO2e/year, respectively, according to [Contribución sectorial a las emisiones, Quinta Comunicación al UNFCCC.](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) MtCO2e = megatons of CO2  equivalent |
| Percentage of renewable energy in the energy matrix | % of generation | 19[[7]](#footnote-8) |  |  |  |  |  |  |  |  |  | 27[[8]](#footnote-9) | Source: Public information from the CRE and CFE. |

**Current RESULTS MATRIX for the Geothermal Financing and Risk Transfer Program**

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| **Objective** | The program objective is to increase power production from geothermal sources so as to contribute to the diversification of the energy matrix and reduce dependency on fossil fuels and greenhouse gas (GHG) emissions in Mexico. To this end, the program intends to scale up investment in geothermal power generation projects by making available a range of financial mechanisms tailored to meet the specific needs of each project’s stage of development. This will include risk mitigation mechanisms, as well as various forms of financing for exploration, drilling, field development, and construction and operation phases of private geothermal projects. |

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| **Indicators** | **Unit** | **Baseline** | **Year 1**  **2016** | **Year 2**  **2017** | **Year 3**  **2018** | **Year 4**  **2019** | **Year 5**  **2020** | **Year 6**  **2021** | **Year 7**  **2022** | **Year 8**  **2023** | **Year 9**  **2024** | **End of program target1** | **Description/Means of verification** |
| **Outputs Component 1** | | | | | | | | | | | | | |
| Contingent recovery resources provided to geothermal projects with CRG resources from the program | Number of projects (wells) using NAFIN-  approved CRGs | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 4 | Target is inclusive of all projects financed, both successful and failed.  Source: Program report from NAFIN. Estimations consider that a beneficiary project that is successful during early exploration stages may be eligible for program support in the production drilling  phase. |
| **Outputs Component 2** | | | | | | | | | | | | | |
| Loans granted to geothermal projects by the program at any stage of development | Number of NAFIN-  approved loans | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | Values based on loan agreements financed with program resources. Figures consider loans at any stage of development, including insured loans, soft loans, and/or refinancing of projects that move on from early exploration to production drilling and construction stages. Does not include CRGs already monitored by another indicator.  Source: Program report from NAFIN. |

1 End-of-program target and target Y10 are cumulative figures.

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| **Indicators** | **Unit** | **Baseline** | **Year 1**  **2016** | **Year 2**  **2017** | **Year 3**  **2018** | **Year 4**  **2019** | **Year 5**  **2020** | **Year 6**  **2021** | **Year 7**  **2022** | **Year 8**  **2023** | **Year 9**  **2024** | **End of program target**1 | **Description/Means of verification** |
| **Outcomes** | | | | | | | | | | | | | |
| Total geothermal projects financed at any stage by the program that reach financial closure for plant construction | Number | 0 |  |  |  |  |  | 1 | 1 | 0 | 0 | 2 | Includes the total number of projects that have secured full financing for plant construction in the year indicated. Due to the long maturities associated with these projects, projects financed from early exploration may not reach this phase until past the timeframe of monitoring (see target Y10).  Source: Program report from NAFIN. |
| Total geothermal projects financed at any stage by the program that are in operation (producing electricity) | Number | 0 |  |  |  |  |  |  |  |  | 2 | 2 | Includes the total number of projects in operation in the indicated year. Due to the long maturities associated with these projects, projects financed from early exploration may not be fully operational until past the timeframe of monitoring (see target Y10).  Source: Program report from NAFIN. |
| Geothermal power generation capacity installed in projects financed at any stage by the program | MW | 0 |  |  |  |  |  |  |  | 15 | 15 | 30 | Includes only capacity ready for production.2 Due to the long maturities associated with these projects, capacity resulting from projects financed from early exploration may not be installed until past the timeframe of  monitoring (see target Y10). |
| Electricity production from projects financed at any stage by the program | GWh/year | 0 |  |  |  |  |  |  |  | 110.38 | 220.75 | 331.13 | Source: Program report from NAFIN. Estimations based on expected capacity installed, an average production factor in Mexico of 24 hours/day, 365 days/year. |

2 For practical purposes, the analysis assumes 30 MW development in two geothermal power generation plants, with an average 15MW installed capacity each.

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| **Indicators** | **Unit** | **Baseline** | **Year 1**  **2016** | **Year 2**  **2017** | **Year 3**  **2018** | **Year 4**  **2019** | **Year 5**  **2020** | **Year 6**  **2021** | **Year 7**  **2022** | **Year 8**  **2023** | **Year 9**  **2024** | **End of program target**1 | **Description/Means of verification** |
| Greenhouse gas (GHG) emissions avoided by geothermal projects financed at any stage by the program | ktCO2e/year | 0 |  |  |  |  |  |  |  | 64.24 | 128.24 | 192.48 | Tons of GHG emissions that will be reduced or avoided once the plants financed by the program are commissioned.  Source: Estimations made following IDB methodology, based on installed capacity (see indicator above), envisaged production, and an average conversion factor of  0.582 tCO2/MWh for electricity generation in Mexico.  ktCO2e = kilotons of CO2 equivalent |
| **Impacts** | | | | | | | | | | | | | |
| Additional financing from third parties mobilized to develop geothermal projects financed at any stage by the program | US$ millions | 0 |  |  |  |  |  |  |  |  |  | 190 | Volume of third-party direct finance leveraged by the program. Includes all financing from sources other than IDB/CTF (government, NAFIN, financial institutions, and private or public capital contributions).  Source: Program report from NAFIN. Estimations based on a 70:30 debt-to-equity ratio (for the production stage), investment costs of US$5 million per well and US$2 million to US$4 million per MW installed. |
| Total geothermal capacity installed in Mexico | MWe | 9093 |  |  |  |  |  |  |  |  |  | 1.1084 | Source: SENER, Balance Nacional de Energía. |

3 Total capacity at end-2016 (SENER). SENER, [*Prospectiva de Energías Renovables 2017-2031*](https://www.gob.mx/cms/uploads/attachment/file/284342/Prospectiva_de_Energ_as_Renovables_2017.pdf) [Renewable Energies Outlook 2017-2031].

4 This target would not necessarily reflect a direct program contribution.

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| **Indicators** | **Unit** | **Baseline** | **Year 1**  **2016** | **Year 2**  **2017** | **Year 3**  **2018** | **Year 4**  **2019** | **Year 5**  **2020** | **Year 6**  **2021** | **Year 7**  **2022** | **Year 8**  **2023** | **Year 9**  **2024** | **End of program target1** | **Description/Means of verification** |
| Electricity production from geothermal sources in Mexico | GWh/year | 6.1485 |  |  |  |  |  |  |  |  |  | 6.921 | Source: Public information from the Energy Regulatory Commission (CRE) and CFE.  Estimations based on the average production factor in Mexico. |
| GHG emissions in the Mexican energy sector | MtCO2e | 503.86 |  |  |  |  |  |  |  |  |  | 814 | Source: IDB estimations based on [Estrategia Nacional de Cambio](http://www.semarnat.gob.mx/archivosanteriores/informacionambiental/Documents/06_otras/ENCC.pdf) [Climático](http://www.semarnat.gob.mx/archivosanteriores/informacionambiental/Documents/06_otras/ENCC.pdf) [National Climate Change Strategy] (ENACC) and [Sector contribution to emissions,](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) [Mexico's Fifth National](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) [Communication to the UNFCCC.](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) The baseline GHG in 2024 and 2030 is 900 MtCO2e/year and  996 MtCO2e/year, respectively, and the potential for emissions abatement in 2024 and 2030 is  86 MtCO2e/year and  172 MtCO2e/year, respectively, according to [Contribución sectorial a las emisiones, Quinta Comunicación al UNFCCC.](http://unfccc.int/resource/docs/natc/mexnc5s.pdf) MtCO2e = megatons of CO2  equivalent |
| Percentage of renewable energy in the energy matrix | % of generation | 197 |  |  |  |  |  |  |  |  |  | 278 | Source: Public information from the CRE and CFE. |

5 Gross generation at end-2016. SENER, [Prospectiva de Energías Renovables 2017-2031](https://www.gob.mx/cms/uploads/attachment/file/284342/Prospectiva_de_Energ_as_Renovables_2017.pdf) [Renewable Energy Outlook 2017-2031].

6 Mexico's Fifth National Communication to the UNFCCC. Data from 2010.

7 Energy Information System, Electricity Sector, 2017, [Generación bruta de energía por tecnología](http://sie.energia.gob.mx/bdiController.do?action=cuadro&amp;cvecua=IIIA1C05) [Gross power generation by technology].

8 Scenario 450 *Prospectiva de Energías Renovables 2012-2026* [Renewable Energy Outlook 2012-2026].

1. End-of-program target and target Y10 are cumulative figures [↑](#footnote-ref-2)
2. For practical purposes, the analysis assumes 30 MW development in two geothermal power generation plants, with an average 15MW installed capacity each. [↑](#footnote-ref-3)
3. Total capacity at end-2016 (SENER). SENER, [*Prospectiva de Energías Renovables 2017-2031*](https://www.gob.mx/cms/uploads/attachment/file/284342/Prospectiva_de_Energ_as_Renovables_2017.pdf) [Renewable Energies Outlook 2017-2031]. [↑](#footnote-ref-4)
4. This target would not necessarily reflect a direct program contribution. [↑](#footnote-ref-5)
5. Gross generation at end-2016. SENER, [*Prospectiva de Energías Renovables 2017-2031*](https://www.gob.mx/cms/uploads/attachment/file/284342/Prospectiva_de_Energ_as_Renovables_2017.pdf) [Renewable Energy Outlook 2017-2031]. [↑](#footnote-ref-6)
6. Mexico's Fifth National Communication to the UNFCCC. Data from 2010. [↑](#footnote-ref-7)
7. Energy Information System, Electricity Sector, 2017, [*Generación bruta de energía por tecnología*](http://sie.energia.gob.mx/bdiController.do?action=cuadro&amp;cvecua=IIIA1C05) [Gross power generation by technology]. [↑](#footnote-ref-8)
8. Scenario 450 *Prospectiva de Energías Renovables 2012-2026* [Renewable Energy Outlook 2012-2026]. [↑](#footnote-ref-9)