Appendix A: Example of quantifying the impact of a solar PV incentive policy

This appendix provides an example of quantifying the impact of a grid-connected rooftop solar PV incentive policy. The example shows how to carry out an ex-ante assessment following the steps outlined in Chapters 8 and 9 by developing an ex-ante baseline and policy scenario, and estimating the various sustainable development impacts of the policy.

The Government of India has a target to achieve 100 GW solar capacity by 2022. The target is divided into large-scale centralized power plants (50 GW) and distributed smaller-scale projects: 40 GW of rooftop solar (mainly used by industrial, commercial and residential consumers) and 10 GW of grid-connected tail-end plants. This example focuses on grid-connected solar rooftop programmes that support 40 GW installation by 2022.

For previous steps related to the same example, see Tables 4.1, 4.2, 5.2, 6.3, 7.5 and 8.1.

Chapter 8, Section 8.1: Define the quantitative assessment boundary and period

Table A.1 shows the set of impact categories, specific impacts and indicators included in the quantitative assessment boundary. The assessment period is 2016–2025.

TABLE **A.1**

Impact categories, specific impacts and indicators included in the quantitative assessment boundary

Impact category	Specific impacts	Indicator to quantify
Climate change mitigation	Reduced GHG emissions from grid-connected fossil fuel–based power plants	GHG emissions (tCO_2e/year)
Air quality/health impacts of air pollution	Reduced air pollution from grid-connected fossil fuel–based power plants	Emissions of $PM_{2.5}$, PM_{10}, SO_2 and NO_x (t/year); number of deaths due to air pollution
Energy	Increased electricity generation from solar PV	Solar installed capacity (MW); % solar of total installed capacity; % solar of total installed capacity of renewable energy sources
Access to clean, affordable and reliable energy	Increased access to clean, affordable and reliable energy	Number of houses/buildings/facilities with access to clean energy resulting from the policy
Capacity, skills and knowledge development	Increase in training for skilled workers in solar-relevant sectors	Number of new skilled trainees and workers on the ground
Jobs	Increased jobs in the solar installation, operations and maintenance sectors	Number of new jobs resulting from the policy
	Increased jobs in the solar panel manufacturing sector	Number of new jobs resulting from the policy
	Decreased jobs in fossil fuel sectors	Number of jobs reduced resulting from the policy

TABLE **A.1,** continued

Impact categories, specific impacts and indicators included in the quantitative assessment boundary

Impact category	Specific impacts	Indicator to quantify
Income	Increased income for households, institutions and other organizations due to reduction in energy costs	Savings in annual electricity bill for households and businesses ($/year)
Energy independence	Increased energy independence from reduced imports of fossil fuel	Reduction in coal imports resulting from the policy (t/year)

Chapter 8, Section 8.2: Choose assessment method for each indicator

The first step is to choose an assessment method for each indicator – the scenario method, comparison group method or deemed estimates method (which is a subset of the scenario method); this is outlined in Section 8.2. In this example, the scenario method is used for certain indicators and the deemed estimates method for others. To apply the scenario method, baseline values and policy scenario values are needed for each indicator over the assessment period. To apply the deemed estimates method, only the estimated change from the policy is quantified, without separately estimating baseline and policy scenario values.

Chapter 8, Section 8.3: Define the baseline scenario and estimate baseline values for each indicator

Section 8.3.1: Select a desired level of accuracy and complexity

This example uses a combination of constant baseline scenarios and simple trend baseline scenarios for different indicators. Where the deemed estimates method is used, no baseline values are presented.

A lower level of accuracy, commensurate with IPCC Tier 1 methods, was determined to be appropriate. For example, national-level data such as the national average grid emission factor, country-wide rates of solar PV as a percentage of total installed capacity, and national air pollution data can be considered as representative within the impact category assessment boundaries.

Section 8.3.2: Define the most likely baseline scenario for each indicator

A key assumption about what is most likely to occur in the absence of the solar PV policy is that the households installing solar PV systems would have used grid-connected electricity in the absence of the solar PV policy.

Other policies

The baseline scenario takes into account India's National Solar Mission, which calls for 100,000 MW of new solar capacity. Of the 100,000 MW of solar power to be achieved by 2022, 40,000 MW is to be met by grid-connected rooftop solar systems (included in the policy scenario), and the remaining 60,000 MW is to be met by ground-based solar systems (included in the baseline scenario).

No other policies or subsidies are assumed to exist for rooftop grid-connected solar PV systems. No other financial incentives, such as soft loans or capital grants for solar PV panels/systems, are assumed to be available.

The Government of India is also implementing the Off-Grid and Decentralized Solar Applications scheme to promote solar home lights, solar street lights, power plants, solar pumps, and mini and micro grids in rural areas of the country, where a significant proportion of the population does not have access to electricity. The programme also has an emphasis on concentrating solar thermal (CST) technology. The objective and target user group under the off-grid policy are different from those of the solar PV incentive policy. Therefore, the off-grid incentive policy has not been considered for assessment.

Non-policy drivers
Table A.2 lists key drivers for each impact category being assessed that is included in the baseline scenario.

Section: 8.3.3: Define the methods and parameters needed to estimate baseline values

Each indicator has its own estimation method and list of parameters. These are shown in Table A.6.

Selected parameters included are listed in the Table A.3.

TABLE **A.2**

Drivers and assumptions for the solar PV incentive policy

Impact category	Drivers and assumptions in the baseline scenario
Climate change mitigation	No change in emission limits from power plants and vehicles, and no change in compliance rates
Health impacts of air pollution	No change in particulate matter limits from power plants, power generators or vehicles, and no change in compliance rates
Air pollution	No change in air emission limits from power plants, power generators or vehicles, and no change in compliance rates
Renewable energy generation	No change in renewable energy targets, including the proportion of the target to be met by solar
Access to clean, reliable and affordable energy	No significant change in household income, production cost of solar systems, or number of solar companies; no change in homeowners' awareness of, and ability to invest in, solar PV systems
Skilled labour and worker training	No change in access to, or awareness of, opportunities for solar PV industry training
Job creation	No change in employment rate for skilled or unskilled labour
Income	No significant change in average household income or inflation rate
Energy independence	No change in the cost of fossil fuels or economic incentives for renewable energy

TABLE **A.3**

Parameters needed to estimate baseline values and data to be collected

Impact category	Parameters and data
Climate change mitigation	Grid electricity emission factor in India Installed capacity of solar rooftop systems due to solar PV incentive policy
Air quality/health impacts of air pollution	Emissions of $PM_{2.5}$ and PM_{10} from stationary power plants, as reported by the Central Pollution Control Board, state pollution control boards and/or the National Environmental Engineering Research Institute or Reported levels of $PM_{2.5}$ and PM_{10} in India (micrograms per cubic metre of air – $\mu g/m^3$) $PM_{2.5}$ and PM_{10} that is attributable to power generation (%)
Air quality/health impacts of air pollution	Emissions of SO_2 and NO_x from stationary power plants, as reported by the Central Pollution Control Board, state pollution control boards and/or the National Environmental Engineering Research Institute or Reported levels of SO_2 and NO_x in India SO_2 and NO_x that are attributable to power generation (%)
Energy	Total installed capacity of solar systems before implementation of the policy (MW)
Access to clean, reliable and affordable energy	Baseline values are not separately calculated because, within the assessment boundary, the households that are assumed to adopt the policy already have access to energy and are simply replacing fossil sources with solar PV.
Capacity, skills and knowledge development	Baseline values are not separately calculated because, within the assessment boundary, only the incremental increase in skilled labour associated with adoption of the policy is assessed.
Jobs	Baseline values are not separately calculated because, within the assessment boundary, only the incremental increase in job creation associated with adoption of the policy is being assessed.
Income	Average expenditure on grid electricity or Average cost of grid-connected electricity consumed for residential and institutional use (Rs)
Energy independence	Baseline values are not separately calculated because, within the assessment boundary, only the incremental change in energy independence due to the policy is evaluated.

Section 8.3.4: Collect data for each indicator

Data are collected for each parameter required for calculations. These are shown in Table A.6.

Section 8.3.5: Estimate baseline values for each indicator

Baseline values are calculated over the assessment period. These are shown in Table A.6.

Chapter 9, Section 9.1: Define and describe the policy scenario for each indicator

The following assumptions describe the policy scenario:

- The policy is implemented in India over the period 2016–2022.
- The policy aims to install 40,000 MW of rooftop solar PV by 2022. Table A.4 shows the

TABLE **A.4**

Policy's intended electricity generation over the assessment period

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Installed rooftop solar PV capacity (MW)	200	4,800	5,000	6,000	7,000	8,000	9,000	0	0	0
Cumulative installed rooftop solar PV capacity (MW)	200	5,000	10,000	16,000	23,000	31,000	40,000	40,000	40,000	40,000
Electricity generation from rooftop solar PV (1,000 MWh/year)	265.320	6,633	13,266	21,225.6	30,511.8	41,124.6	53,064	53,064	53,064	53,064

annual and cumulative projected installed capacity of solar PV systems in each year. The table also shows the corresponding electricity generated in each year from the solar PV. Each MW of installed solar PV generates 1,327 MWh of electricity per year.

Chapter 9, Section 9.2: Estimate policy scenario values for each indicator
Policy scenario values are calculated over the assessment period. These are shown in Table A.6.

Chapter 9, Section 9.3: Estimate the net impact of the policy on each indicator
The net impact of the policy is calculated for each indicator over the assessment period. These are shown in Table A.6.

Table A.5 presents a summary of the net impact of the policy across all impact categories included in the quantitative assessment.

TABLE **A.5**

Summary of quantitative results for impact of solar PV incentive policy on all impact categories included in the assessment

Impact category	Indicator quantified	Estimated impact (cumulative, 2016–2025)
Climate change mitigation	GHG emissions from the electricity grid ($MtCO_2e$)	Reduction of 307 $MtCO_2e$
Air quality/health impacts of air pollution	$PM_{2.5}$ emissions from the electricity grid (t)	Reduction of 1,177,996 t $PM_{2.5}$
	PM_{10} emissions from the electricity grid (t)	Reduction of 2,437,234 t PM_{10}
	SO_2 emissions from the electricity grid (t)	Reduction of 4,265,161 t SO_2
	NO_x emissions from the electricity grid (t)	Reduction of 4,062,057 t NO_x
	Number of premature deaths per year in India resulting from air pollution from coal plants	Reduction of 32,304 premature deaths
Energy	Renewable energy installed capacity (MW)	Increase of 40,000 MW of renewable energy capacity
Access to clean, affordable and reliable energy	Increase in number of houses/buildings/facilities with access to clean energy resulting from the policy	Increase of 5,741,889 houses/ buildings/facilities with access to clean energy
Capacity, skills and knowledge development	Number of new skilled trainees and workers on the ground because of the policy	Increase of 40,060 new skilled trainees and workers
Jobs	Change in jobs resulting from the policy (number of jobs)	Net increase of 821,102 jobs
Income	Savings in annual electricity bill for households and businesses ($)	Savings of $27,855 million
Energy independence	Reduction in coal imports (t)	Reduction of 57,770,140 t of coal

TABLE **A.6**

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 1	Climate change mitigation
Indicator	GHG emissions from the electricity grid ($MtCO_2e$/year)
Specific impact	Reduced GHG emissions from grid-connected fossil fuel–based power plants
Assessment method	Deemed estimates method
Equation	GHG emissions reduced from the solar PV ($MtCO_2e$/year) = electricity generated from rooftop solar PV (MWh) × coal generation emission factor (tCO_2e/MWh)/1,000,000
Parameters needed	Electricity generated from new solar PV (MWh): see Table A.4 Coal generation emission factor = 0.945 tCO_2e/MWh (for new coal power plants; emission factor assumed to stay constant over the assessment period)
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and that no new diesel- and gas-based power plants will be added in future. Therefore, it is assumed that other fossil fuel–based installed capacity (i.e. 9% of total grid, from diesel and gas) will not change in the baseline and policy scenarios.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Reduction in GHG emissions from the policy ($MtCO_2e$/year)	0.25	6.27	12.54	20.06	28.83	38.86	50.15	50.15	50.15	50.15	307

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 2	Air quality/health impacts of air pollution
Indicator 1	$PM_{2.5}$ emissions from the electricity grid (t/year)
Specific impact	Reduced $PM_{2.5}$ emissions from grid-connected fossil fuel–based power plants
Assessment method	Scenario method
Equation	Reduction in $PM_{2.5}$ emissions = baseline $PM_{2.5}$ emissions – policy scenario $PM_{2.5}$ emissions where baseline $PM_{2.5}$ emissions = total fossil fuel–based installed capacity of the grid (MW) in baseline scenario × $PM_{2.5}$ emission factor (t/MW), policy scenario $PM_{2.5}$ emissions = total fossil fuel–based installed capacity of the grid (MW) in the policy scenario × $PM_{2.5}$ emission factor (t/MW)
Parameters needed	Installed capacity (MW) (see below) and $PM_{2.5}$ emission factor = 4.8 t/MW per year
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and that no new diesel- and gas-based power plants will be added in future. Therefore, it is assumed that other fossil fuel–based installed capacity (i.e. 9% of total grid, from diesel and gas) will not change in the baseline and policy scenarios.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Baseline values: installed capacity of coal-based power plant (MW)	184,274	197,976	211,677	225,379	239,081	252,783	266,485	260,571	247,422	250,106	-
Policy scenario values: installed capacity of coal-based power plant (MW)	184,074	192,976	201,677	209,379	216,081	221,783	226,485	220,571	207,422	210,106	-
Baseline values: $PM_{2.5}$ emissions (t/year)	885,293	951,120	1,016,947	1,082,774	1,148,600	1,214,427	1,280,254	1,251,841	1,188,671	1,201,568	-
Policy scenario values: $PM_{2.5}$ emissions (t/year)	884,332	927,099	968,904	1,005,906	1,038,103	1,065,496	1,088,085	1,059,672	996,502	1,009,399	-
Reduction in $PM_{2.5}$ emissions from the policy (t/year)	961	24,021	48,042	76,868	110,497	148,931	192,169	192,169	192,169	192,169	1,177,996

Abbreviation: -, not applicable

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 2	Air quality/health impacts of air pollution
Indicator 2	PM_{10} emissions from the electricity grid (t/year)
Specific impact	Reduced PM_{10} emissions from grid-connected fossil fuel–based power plants
Assessment method	Scenario method
Equation	Reduction in PM_{10} emissions = baseline PM_{10} emissions – policy scenario PM_{10} emissions where baseline PM_{10} emissions = total fossil fuel–based installed capacity of the grid (MW) in baseline scenario × PM_{10} emission factor (t/MW), policy scenario PM_{10} emissions = total fossil fuel–based installed capacity of the grid (MW) in the policy scenario × PM_{10} emission factor (t/MW)
Parameters needed	Installed capacity (MW) (see below) and PM_{10} emission factor = 9.9 t/MW per year
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and that no new diesel- and gas-based power plants will be added in future. Therefore, it is assumed that other fossil fuel–based installed capacity (i.e. 9% of total grid, from diesel and gas) will not change in the baseline and policy scenarios.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Baseline values: PM_{10} emissions (t/year)	1,831,640	1,967,834	2,104,027	2,240,221	2,376,415	2,512,608	2,648,802	2,590,016	2,459,319	2,486,003	-
Policy scenario values: PM_{10} emissions (t/year)	1,829,652	1,918,135	2,004,630	2,081,185	2,147,800	2,204,475	2,251,211	2,192,425	2,061,728	2,088,412	-
Reduction in PM_{10} emissions from the policy (t/year)	1,988	49,699	99,398	159,037	228,615	308,133	397,591	397,591	397,591	397,591	2,437,234

Abbreviation: -, not applicable

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 2	Air quality/health impacts of air pollution
Indicator 3	SO_2 emissions from the electricity grid (t/year)
Specific impact	Reduced SO_2 emissions from grid-connected fossil fuel–based power plants
Assessment method	Scenario method
Equation	Reduction in SO_2 emissions = baseline SO_2 emissions – policy scenario SO_2 emissions where baseline SO_2 emissions = total fossil fuel–based installed capacity of the grid (MW) in baseline scenario × SO_2 emission factor (t/MW), project SO_2 emissions = total fossil fuel–based installed capacity of the grid (MW) in the policy scenario × SO_2 emission factor (t/MW)
Parameters needed	Installed capacity (MW) (see below) and SO_2 emission factor = 17.4 t/MW per year
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and that no new diesel- and gas-based power plants will be added in future. Therefore, it is assumed that other fossil fuel–based installed capacity (i.e. 9% of total grid, from diesel and gas) will not change in the baseline and policy scenarios.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Baseline values: SO_2 emissions (t/year)	3,205,370	3,443,709	3,682,048	3,920,387	4,158,726	4,397,065	4,635,403	4,532,528	4,303,808	4,350,506	-
Policy scenario values: SO_2 emissions (t/year)	3,201,891	3,356,736	3,508,102	3,642,073	3,758,649	3,857,831	3,939,619	3,836,743	3,608,023	3,654,721	-
Reduction in SO_2 emissions from the policy (t/year)	3,479	86,973	173,946	278,314	400,076	539,233	695,785	695,785	695,785	695,785	4,265,161

Abbreviation: -, not applicable

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 2	Air quality/health impacts of air pollution
Indicator 4	NO_x emissions from the electricity grid (t/year)
Specific impact	Reduced NO_x emissions from grid-connected fossil fuel–based power plants
Assessment method	Scenario method
Equation	Reduction in NO_x emissions = baseline NO_x emissions – policy scenario NO_x emissions where baseline NO_x emissions = total fossil fuel–based installed capacity of the grid (MW) in baseline scenario × NO_x emission factor (t/MW), policy scenario NO_x emissions = total fossil fuel–based installed capacity of the grid (MW) in the policy scenario × NO_x emission factor (t/MW)
Parameters needed	Installed capacity (MW) (see below) and NO_x emission factor = 16.6 t/MW per year
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and no new diesel- and gas-based power plants will be added in future. Therefore, it is assumed that other fossil fuel–based installed capacity (i.e. 9% of total grid, from diesel and gas) will not change in the baseline and policy scenarios.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Baseline values: NO_x emissions (t/year)	3,052,734	3,279,723	3,506,712	3,733,702	3,960,691	4,187,681	4,414,670	4,316,693	4,098,865	4,143,339	-
Policy scenario values: NO_x emissions (t/year)	3,049,420	3,196,891	3,341,049	3,468,641	3,579,666	3,674,125	3,752,018	3,654,041	3,436,213	3,480,687	-
Reduction in NO_x emissions from the policy (t/year)	3,313	82,832	165,663	265,061	381,025	513,555	662,652	662,652	662,652	662,652	4,062,057

Abbreviation: -, not applicable

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 2	Air quality/health impacts of air pollution
Indicator 5	Number of premature deaths per year in India resulting from air pollution from coal plants
Specific impact	Reduction in premature mortality in India from reduced fossil fuel electricity generation
Assessment method	Scenario method
Equation	Reduction in premature deaths per year = expected premature deaths in baseline scenario – expected premature deaths in policy scenario
Parameters needed	Installed capacity (MW) (see below) and premature deaths = 0.81/MW installed capacity per year
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and that no new diesel- and gas-based power plants will be added in future. Therefore, it is assumed that other fossil fuel–based installed capacity (i.e. 9% of total grid, from diesel and gas) will not change in the baseline and policy scenarios. The total health risk for mortality is quantified using the relative risk functions and exposure level for $PM_{2.5}$. The premature deaths per MW applied for this example are based on previously published literature and are extrapolated for simplification.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Baseline values (cumulative)	148,821	159,886	170,952	182,018	193,084	204,149	215,215	210,439	199,820	201,988	-
Policy scenario values (cumulative)	148,659	155,848	162,876	169,096	174,509	179,114	182,911	178,135	167,515	169,683	-
Reduction in premature deaths (cumulative)	162	4,038	8,076	12,922	18,575	25,036	32,304	32,304	32,304	32,304	32,304

Abbreviation: -, not applicable

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 3	Energy
Indicator	Renewable energy installed capacity (MW)
Specific impact	Increased renewable energy generation from more solar generation
Assessment method	Scenario method
Equation	Total renewable energy installed capacity (MW) = renewable energy capacity in baseline scenario – renewable energy capacity in policy scenario
Parameters needed	Baseline values of total renewable energy without the policy (MW) Policy scenario values of total renewable energy with the policy each year (MW)
Assumptions	See Table A.4

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Baseline values: total renewable energy without the policy (MW) (cumulative)	42,649	54,674	72,739	89,804	105,870	120,935	135,000	139,613	144,226	148,839	-
Policy scenario values: total renewable energy with the policy (MW) (cumulative)	42,849	59,674	82,739	105,804	128,870	151,935	175,000	179,613	184,226	188,839	-
Increase in renewable energy capacity (MW) (cumulative)	200	5,000	10,000	16,000	23,000	31,000	40,000	40,000	40,000	40,000	40,000
Percentage increase in renewable energy capacity (%)	0	9	14	18	22	26	30	29	28	27	-

Abbreviation: -, not applicable

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 4	Access to clean, affordable and reliable energy
Indicator	Increase in number of houses/buildings/facilities with access to clean energy resulting from the policy
Specific impact	Increased access to clean electricity
Assessment method	Deemed estimates method
Equation	Number of installations = total installed capacity target in eligible sector (i.e. residential, institutional, industrial, commercial and government)/ standard solar rooftop installation size for each type of installation/1,000
Parameters needed	Standard solar rooftop system size for each type of installation (kW) Total installed capacity target in eligible sector (i.e. residential, institutional, industrial, commercial and government) (MW)
Assumptions	The solar PV incentive policy sets target for eligible sectors. Total new installations are estimated using a standard size and target of the eligible category.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Residential (number of households)	24,000	576,000	600,000	720,000	840,000	960,000	1,080,000	0	0	0	4,800,000
Institutional (number of buildings)	240	5,760	6,000	7,200	8,400	9,600	10,800	0	0	0	48,000
Industrial (number of facilities)	3,375	81,000	84,375	101,250	118,125	135,000	151,875	0	0	0	675,000
Commercial (number of buildings)	1,050	25,200	26,250	31,500	36,750	42,000	47,250	0	0	0	210,000
Government (number of buildings)	44	1,067	1,111	1,333	1,556	1,778	2,000	0	0	0	8,889
Increase in number of houses/buildings/facilities with access to clean energy resulting from the policy (houses/buildings)	28,709	689,027	717,736	861,283	1,004,831	1,148,378	1,291,925	0	0	0	5,741,889

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 5	Capacity, skills and knowledge development										
Indicator	Number of new skilled trainees and workers on the ground because of the policy per year										
Specific impact	Increase in training for skilled workers in solar-relevant sectors										
Assessment method	Deemed estimates method										
Equation	Target for new skilled trainees and workers on the ground per year										
Parameters needed	Target for new skilled trainees and workers on the ground per year										
Assumptions	The solar PV incentive policy includes targets to train new workers to support the policy goals.										
Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Number of new skilled trainees and workers on the ground because of the policy per year	460	5200	6000	8400	8000	8000	4000	0	0	0	40,060

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 6	Jobs
Indicator	Change in jobs resulting from the policy (jobs/year)
Specific impact	Increased jobs in the solar panel manufacturing, construction and installation, and operation and maintenance sectors Reduced jobs in fossil fuel sectors
Assessment method	Deemed estimates method
Equation	Total jobs = total capacity (MW) × jobs per MW
Parameters needed	Jobs per MW = manufacturing (11 jobs/MW, of which 40% are domestic); installation (13 jobs/MW); operation and maintenance (3.5 jobs/MW); fossil fuel sector (1 job/MW) Installed capacity (MW)
Assumptions	It is assumed that 70% of planned capacity will likely come from new fossil fuel–based power plants.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Solar panel manufacturing	879	21,097	21,976	26,371	30,766	35,162	39,557	0	0	0	175,808
Construction and installation	2,640	63,360	66,000	79,200	92,400	105,600	118,800	0	0	0	528,000
Operation and maintenance	702	16,848	17,550	21,060	24,570	28,080	31,590	0	0	0	140,400
Fossil fuel sector	–139	–3,143	–3,103	–3,555	–3,984	–4,393	–4,789	0	0	0	–23,106
Net change in jobs (jobs/year)	4,082	98,162	102,423	123,076	143,753	164,448	185,158	0	0	0	821,102

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 7	Income										
Indicator	Savings in annual electricity bill for households and businesses ($/year)										
Specific impact	Increased income for households, institutions and other organizations due to reduction in energy costs										
Assessment method	Deemed estimates method										
Equation	Savings on electricity bill = total electricity generated from solar rooftop by sector (kWh) × tariff by sector ($/kWh)										
Parameters needed	Total units generated (kWh) (see Table A.4) Tariff: household and institutional ($0.08/kWh); commercial ($0.12/kWh)										
Assumptions	The annual escalation in tariff is assumed to be 4%.										
Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
National reduction in electric bills (million $/year)	27	566	1,178	1,960	2,930	4,107	5,512	4,586	3,815	3,174	27,855

TABLE **A.6,** continued

Calculations of baseline values, policy scenario values and the net impact of the policy on the indicators included in the assessment

Impact category 8	Energy independence
Indicator	Reduction in coal imports (t/year)
Specific impact	Increased energy independence from reduced imports of coal
Assessment method	Deemed estimates method
Equation	Reduction in coal imports = electricity generated from new solar PV (MWh) × coal consumption per unit of electricity (t/MWh) × coal import ratio (%)
Parameters needed	Electricity generated from new solar PV (MWh/year) (see Table A.4) Coal consumption per unit of electricity (t/MWh) = 0.74 t/MWh Coal import ratio (%) = 24%
Assumptions	It is assumed that, in the baseline scenario, new coal-based power plants will be added equivalent to the rooftop solar PV capacity addition due to the proposed policy, and that no new diesel- and gas-based power plants will be added in future. It is also assumed that the coal reduction will have a proportional impact on imports and domestic coal. It is further assumed that coal efficiency and the coal import ratio will stay the same for the next 10 years.

Assessment period	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Cumulative impact**
Reduction in coal imports from the policy (t/year)	47,121	1,178,021	2,356,042	3,769,667	5,418,896	7,303,729	9,424,166	9,424,166	9,424,166	9,424,166	57,770,140