

INTRODUCTION

The Country Savings Assessments for ceiling fans estimate the potential electricity savings that could be achieved through the implementation of Minimum Energy Performance Standards (MEPS) in line with the U4E [Model Regulation Guidelines for Energy-Efficient Ceiling Fans](#). Despite the availability of market data from a range of economies, a universally applicable relationship between the numbers of fans in use and available macroeconomic indicators remains difficult to ascertain. This is primarily due to inherent market characteristics; namely that they are largely unorganized, informal and segregated. In addition, the local factors, including cultural preferences, are also difficult to determine. Hence the assessment is limited to fourteen countries for which sufficient stock data and reliable projections of annual sales data of ceiling fans were available.

The findings are derived from product characteristics including, but not limited to, the size, air flow, hours of use and efficiency that impact the annual energy use in each country in three different policy scenarios:

- **Business As Usual (BAU)** which assumes no new MEPS are introduced beyond those which already exist (e.g. India and Sudan);
- **Minimum Ambition Scenario** which assumes the implementation of MEPS on 1 January 2023 based on the minimum-level defined in the Guidelines; and
- **High Ambition Scenario** which assumes the implementation of MEPS on 1 January 2023 based on the maximum-level defined in the Guidelines.

OVERARCHING METHODOLOGY

This analysis estimates the total electricity use of ceiling fans in each country by combining estimates of total sales and the annual energy consumption of a typical ceiling fan by year in each country. The analysis uses published stock and sales data and projections from each country to develop a stock model from 2010-2040.

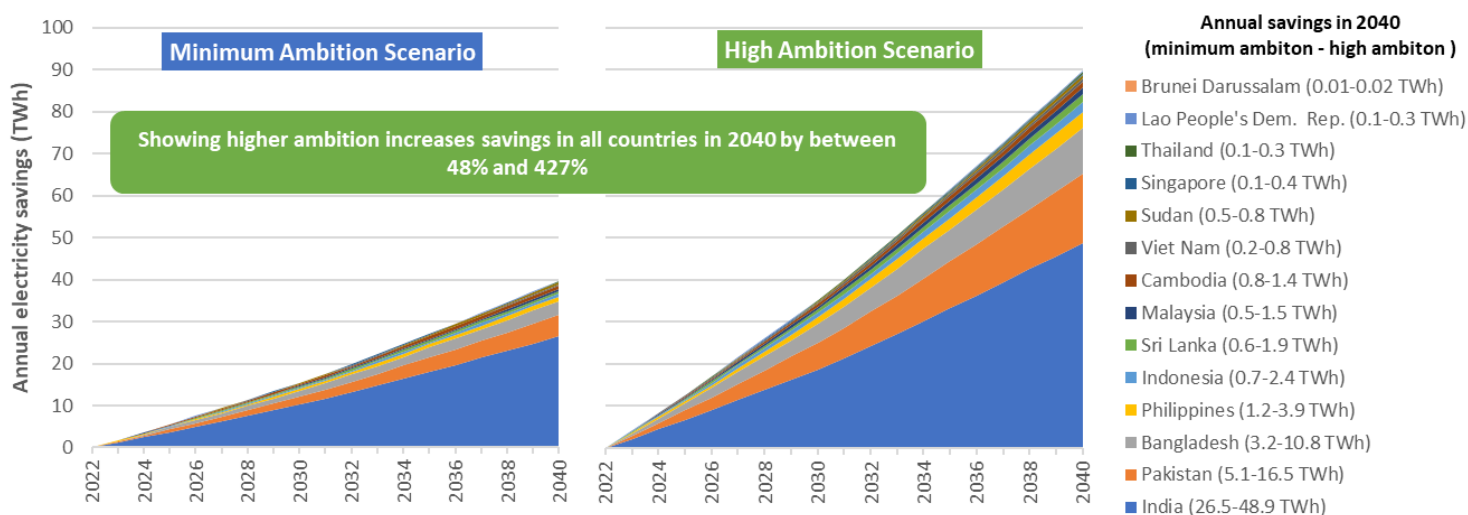
The typical annual energy consumption of products sold over time is derived from published data where available, with a limited use of proxy data when specific data is not obtainable. Future projections of energy consumption are based on typical incremental improvements on baseline values in the BAU and U4E MEPS values in the policy scenarios. The difference in these typical energy consumption values by scenario is the driver of the energy savings presented.

More details on the specific assumptions for product characteristics and the methodology used are provided in the following sections.

SAVINGS SUMMARY BY ENERGY EFFICIENT CEILING FANS IN 2040

Country	Annual savings in 2040				Cumulative savings by 2040		
	Electricity 	Electricity Bills 	 emissions	Passenger cars 	Electricity 	Electricity Bills 	 emissions
	(TWh)	(Million US\$)	(kilo tonnes)	(Thousands)	(TWh)	(Million US\$)	(kilo tonnes)
Bangladesh	3.2	304	2,282	700	29.9	2,810	21,118
Cambodia	0.8	154	693	210	8.1	1,479	6,640
India	26.5	5,374	32,303	10,000	234.1	47,517	285,611
Indonesia	0.7	77	584	180	6.7	713	5,442
Lao People's Democratic Republic	0.1	7	32	10	0.5	64	289
Malaysia	0.5	35	295	91	4.2	322	2,716
Pakistan	5.1	1,129	4,324	1,300	44.7	9,916	37,984
Philippines	1.2	210	980	300	10.4	1,886	8,798
Singapore	0.1	7	66	20	1.2	64	605
Sri Lanka	0.6	108	491	150	5.9	1,018	4,647
Sudan	0.5	12	137	42	3.7	90	1,006
Thailand	0.1	14	60	19	1.0	136	569
Viet Nam	0.2	19	217	67	2.2	181	2,037

SAVINGS IN 2030 and 2040 UNDER MINIMUM AND HIGH AMBITION SCENARIOS



BANGLADESH



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **3 TWh**

Which is over **4%** of the total
current national electricity use



Save electricity
worth over **300 million US\$**

Equivalent to more than **1 power plant [500MW]**

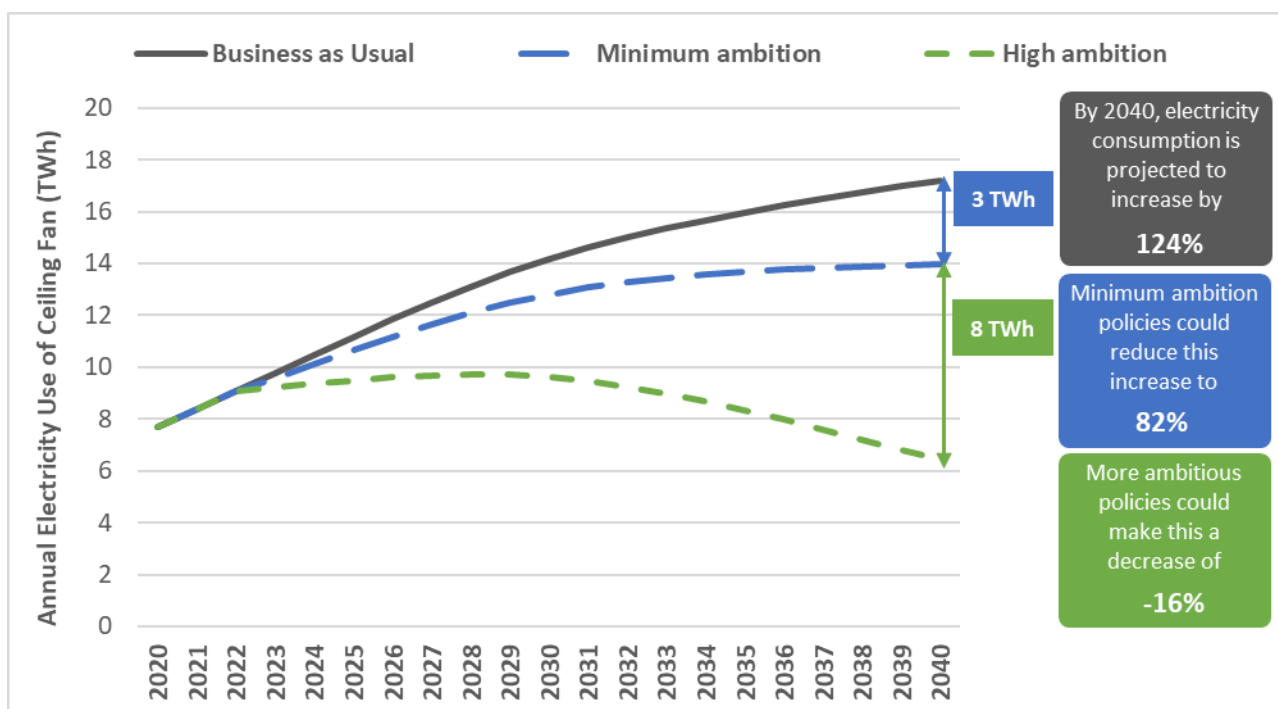


Reduce electricity
CO₂ emissions by **2.3 million tonnes**

Equivalent to over **0.7 million passenger cars**

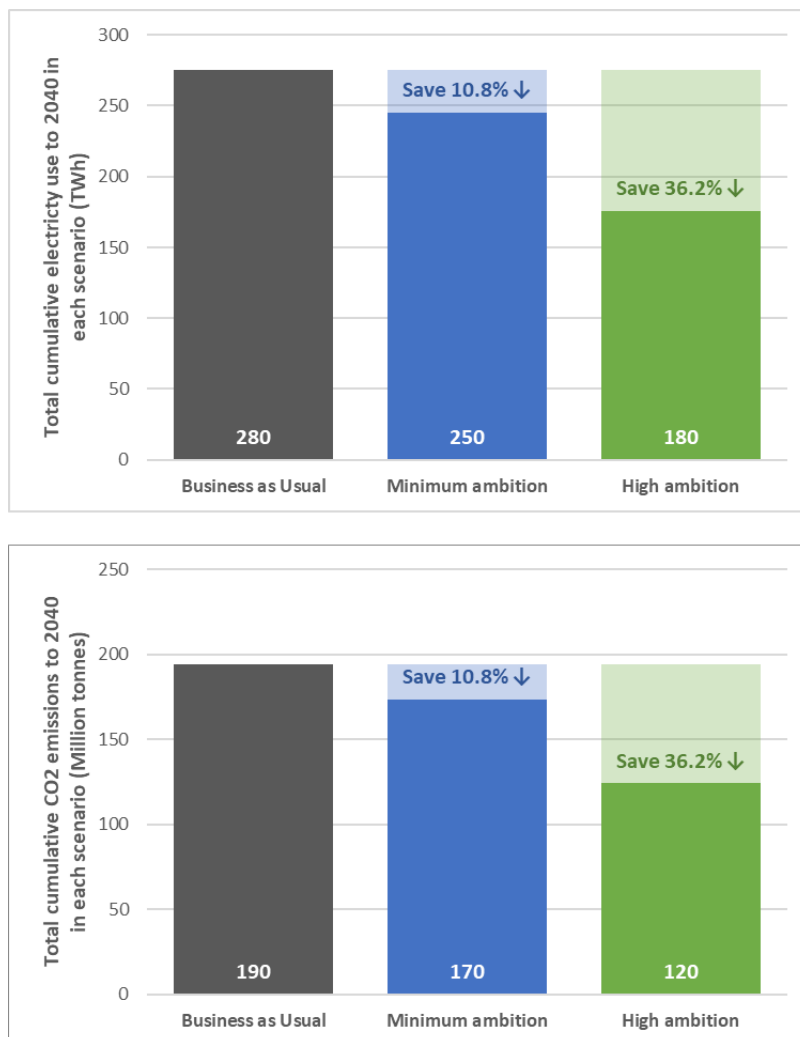


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	166 million
GDP per capita	2,050 US\$
Electrification level	95.0%
CO ₂ emission factor	0.63 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.09 US\$/kWh
Transmission and distribution loss factor	11.4%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Bangladesh	222	1200	3.04 / 4 / 13	1566	114 / 87 / 27	8

For further details on the modelling approach and assumptions please contact: unep-u4e@un.org

CAMBODIA



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **0.8 TWh**

Which is over **5%** of the total
current national electricity use



Save electricity
worth over **200 million US\$**

Equivalent to more than **1 power plant [100MW]**

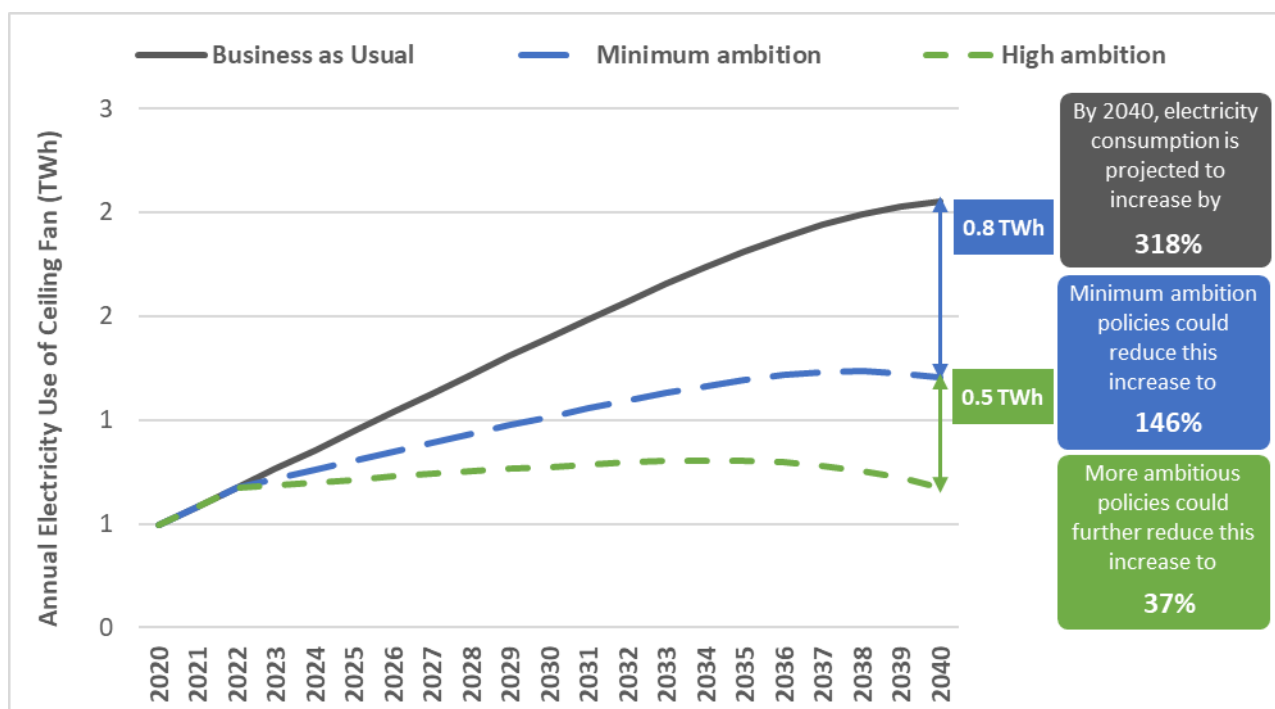


Reduce electricity
CO₂ emissions by **0.7 million tonnes**

Equivalent to over **200 thousand passenger cars**

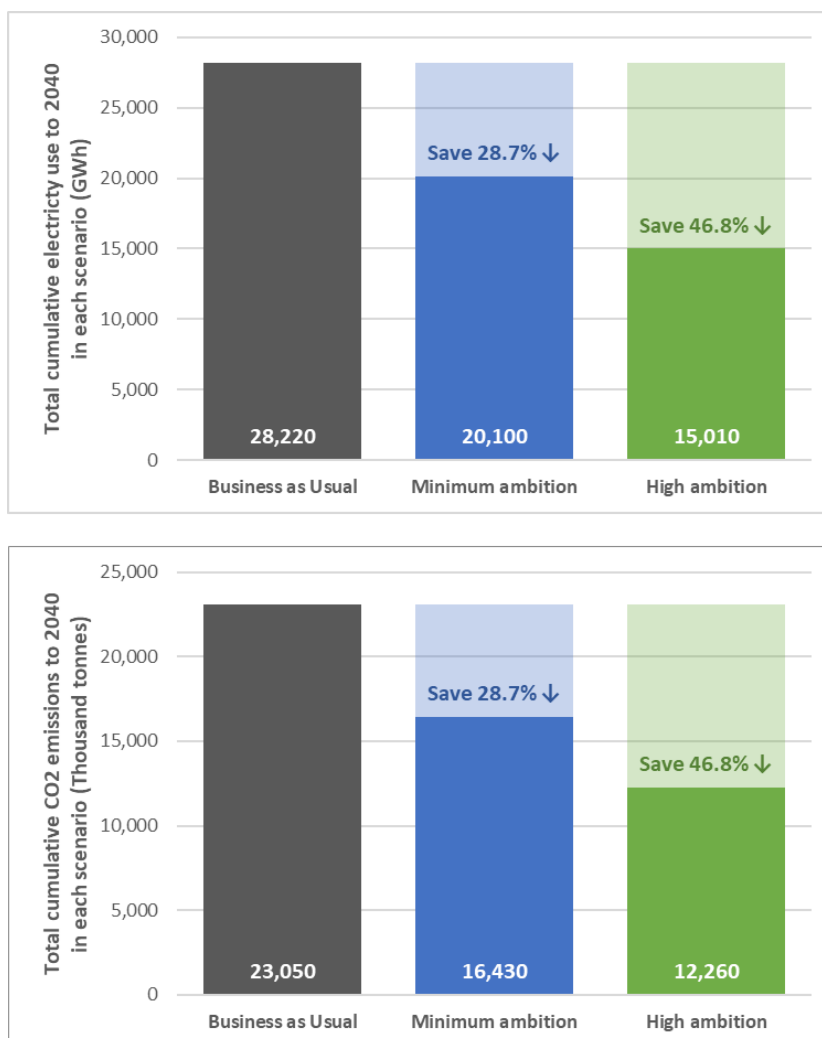


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	16.9 million
GDP per capita	1,609 US\$
Electrification level	78.0%
CO ₂ emission factor	0.63 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.18 US\$/kWh
Transmission and distribution loss factor	23.4%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Cambodia	94	1300	1.88 / 4 / 13	1566	78 / 37 / 11	8

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INDIA



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **26 TWh**

Which is over **2%** of the total
current national electricity use



Save electricity
worth over **5.3 billion US\$**

Equivalent to more than **12 power plants [500MW]**

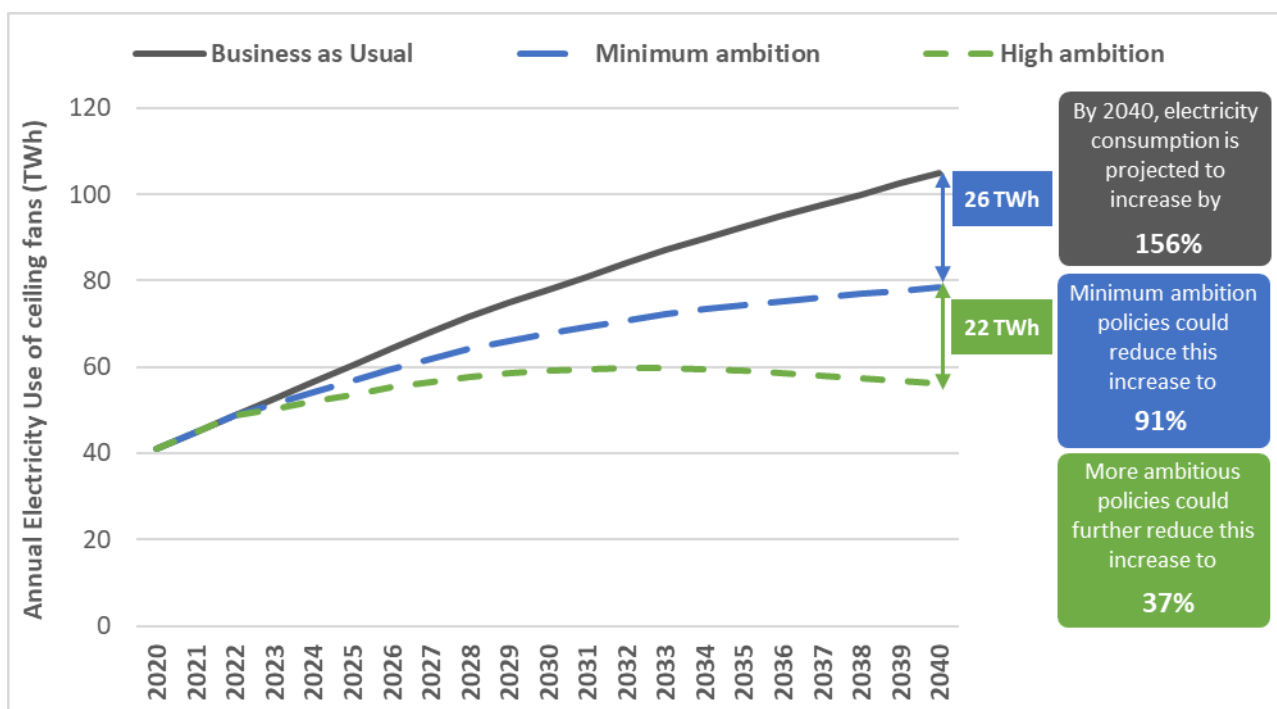


Reduce electricity
CO₂ emissions by **32 million tonnes**

Equivalent to over **10 million passenger cars**

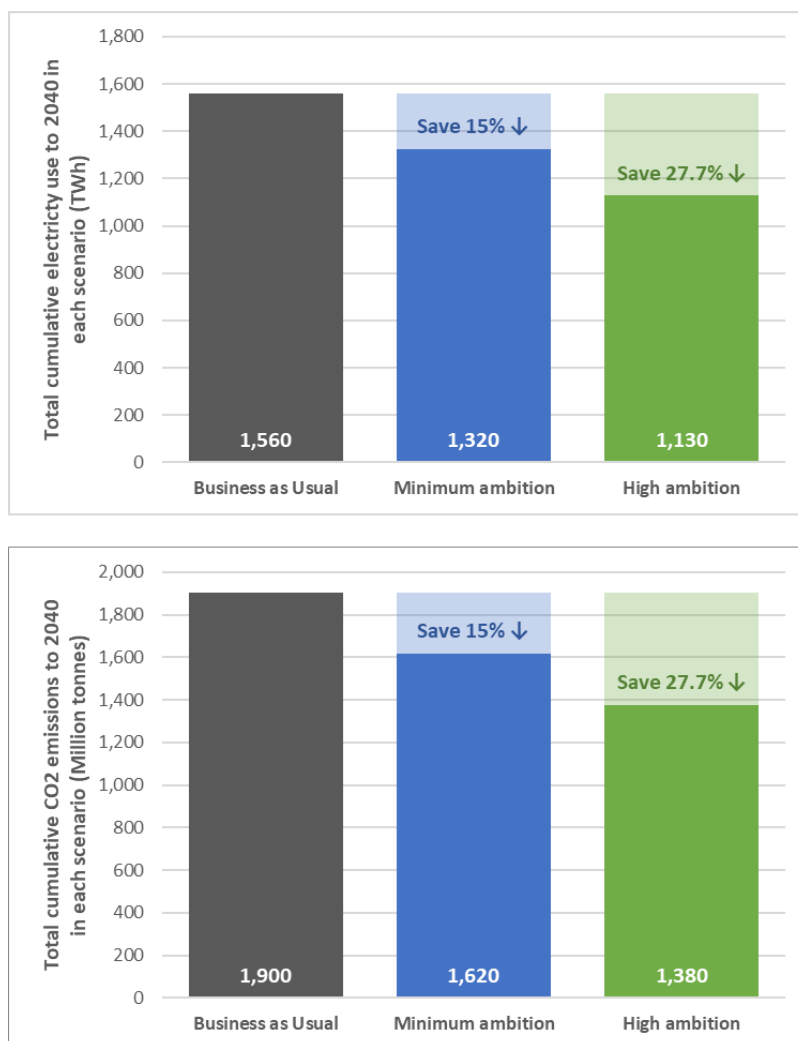


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	1,393 million
GDP per capita	2,007 US\$
Electrification level	99.0%
CO ₂ emission factor	0.98 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.2 US\$/kWh
Transmission and distribution loss factor	19.3%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
India	222	1200	4.82 / 7 / 11	1566	72 / 50 / 32	8

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INDONESIA



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **0.7 TWh**

Which is about **1%** of the total
current national electricity use



Save electricity
worth over **77 million US\$**

Equivalent to
more than **1 power plant [100MW]**

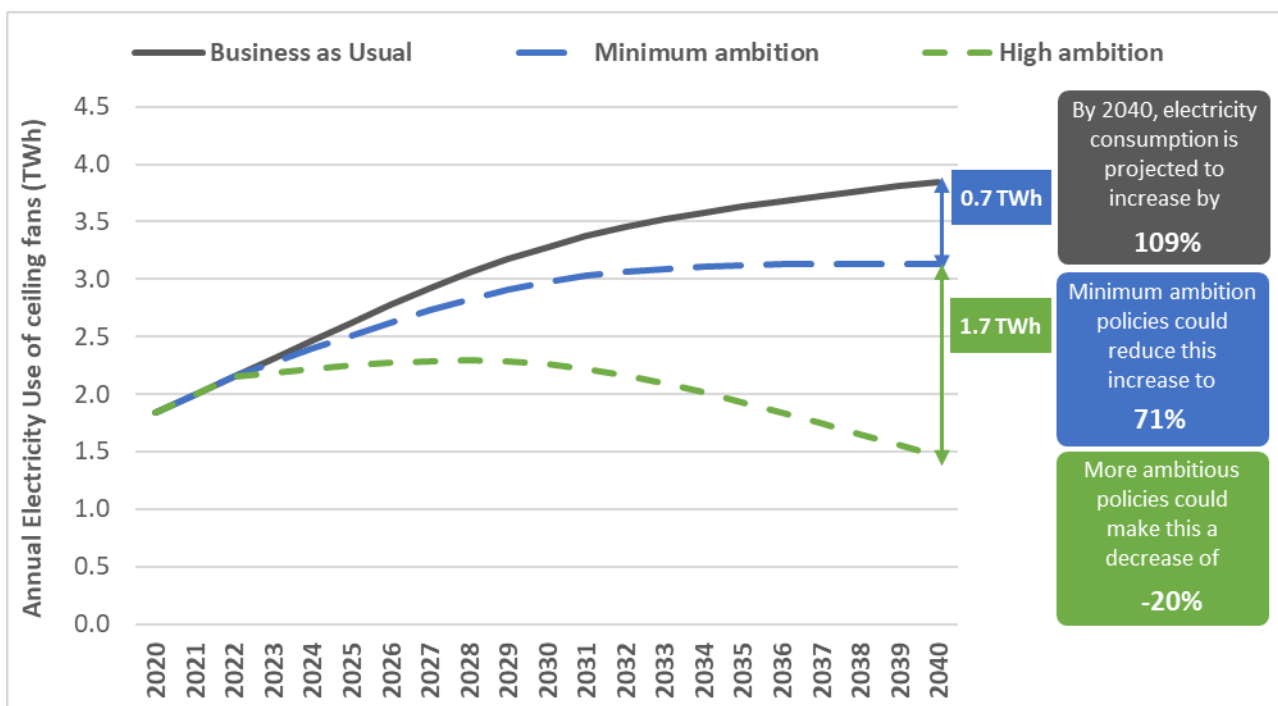


Reduce electricity
CO₂ emissions by **0.6 million tonnes**

Equivalent to
over **180 thousand passenger cars**

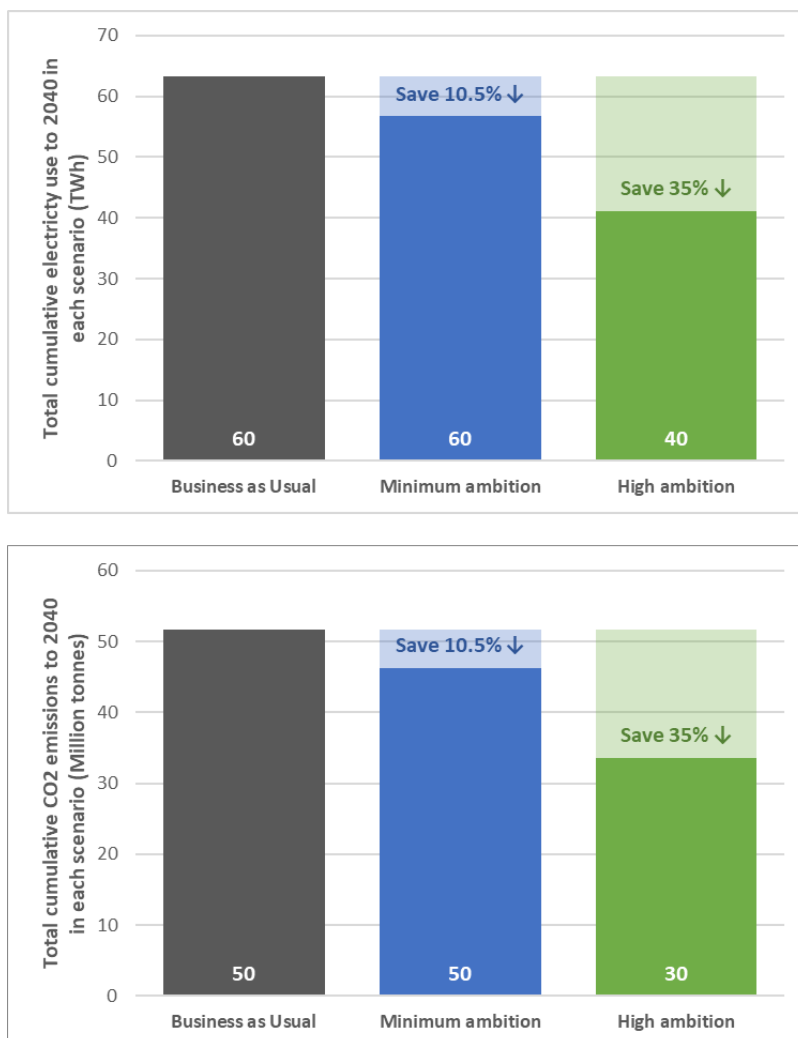


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	276 million
GDP per capita	4,055 US\$
Electrification level	100.0%
CO ₂ emission factor	0.74 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.11 US\$/kWh
Transmission and distribution loss factor	9.4%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Indonesia	216	1200	3.04 / 4 / 13	1566	111 / 85 / 26	8

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LAO PEOPLE'S DEMOCRATIC REPUBLIC



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **54
GWh**

Which is over **1%** of the total
current national electricity use



Save electricity
worth over **7 million
US\$**

Equivalent to more than **2 power plants
[5MW]**

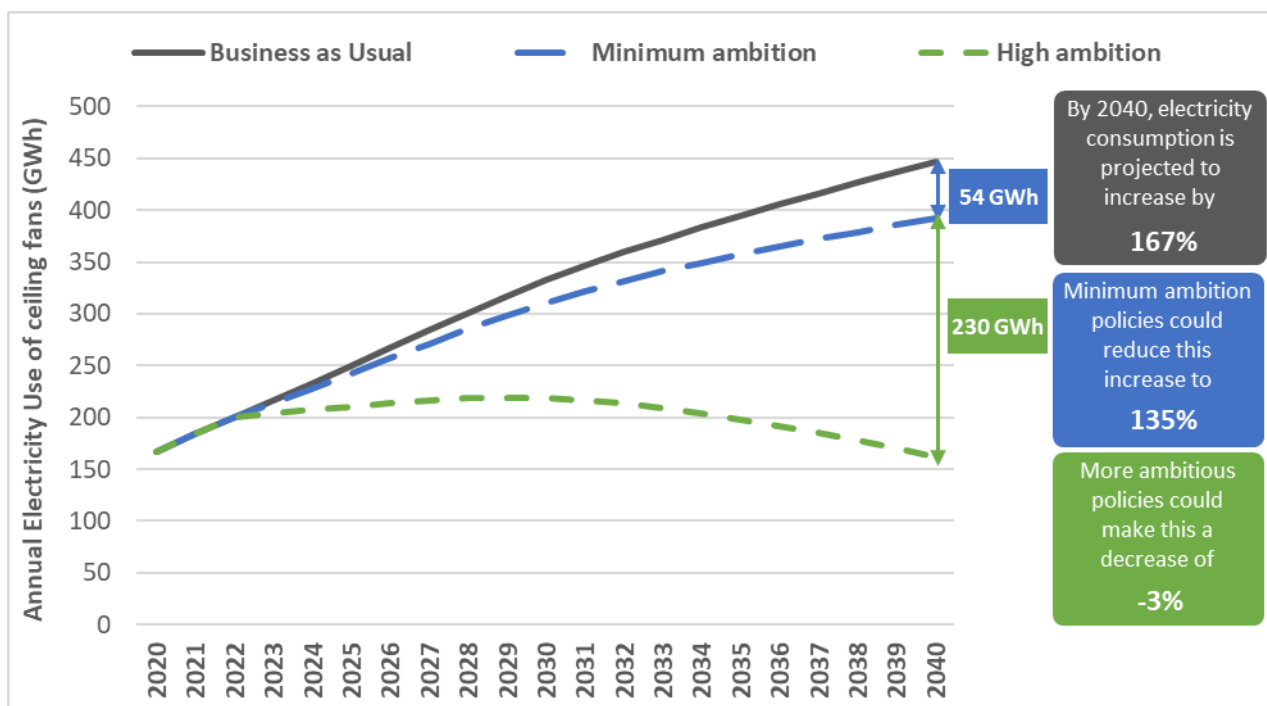


Reduce electricity
CO₂ emissions by **32 kilo
tonnes**

Equivalent to over **10 thousand
passenger cars**

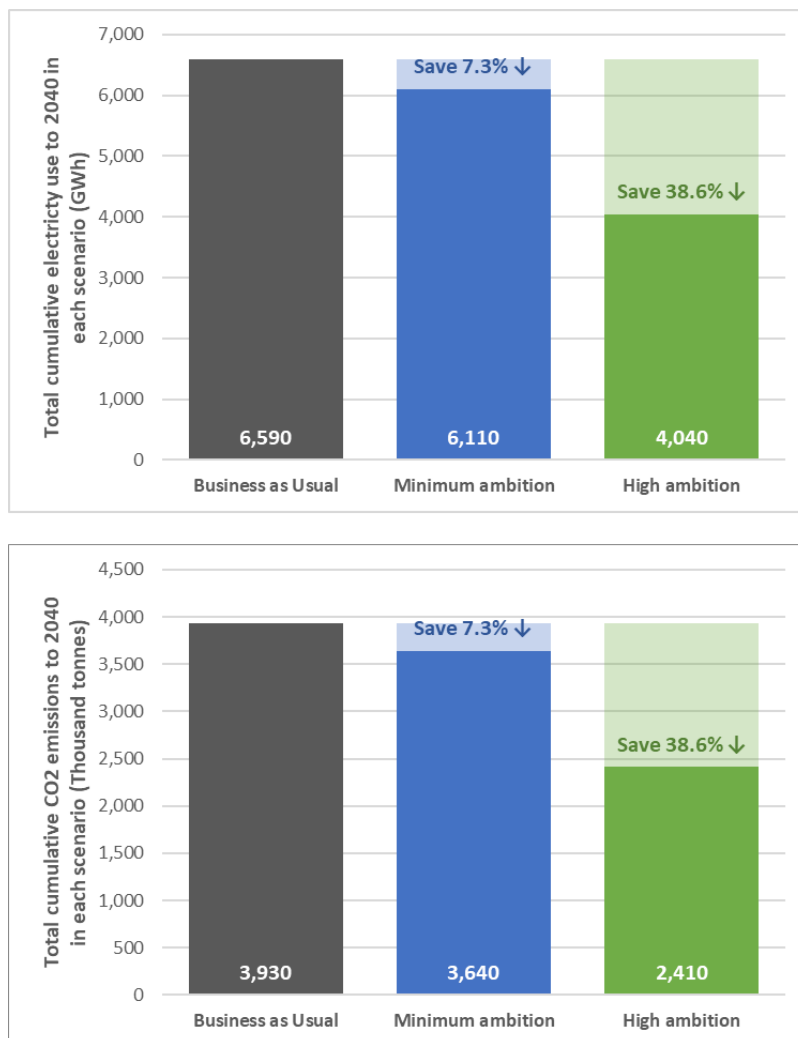


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	7.4 million
GDP per capita	2,746 US\$
Electrification level	97.0%
CO ₂ emission factor	0.56 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.13 US\$/kWh
Transmission and distribution loss factor	6.2%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Lao PDR	216	900	2.61 / 3.1 / 11	1566	129 / 109 / 31	8

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MALAYSIA



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **0.5 TWh**

Which is about **1%** of the total
current national electricity use



Save electricity
worth over **35 million US\$**

Equivalent to
more than **1 power plant [100MW]**

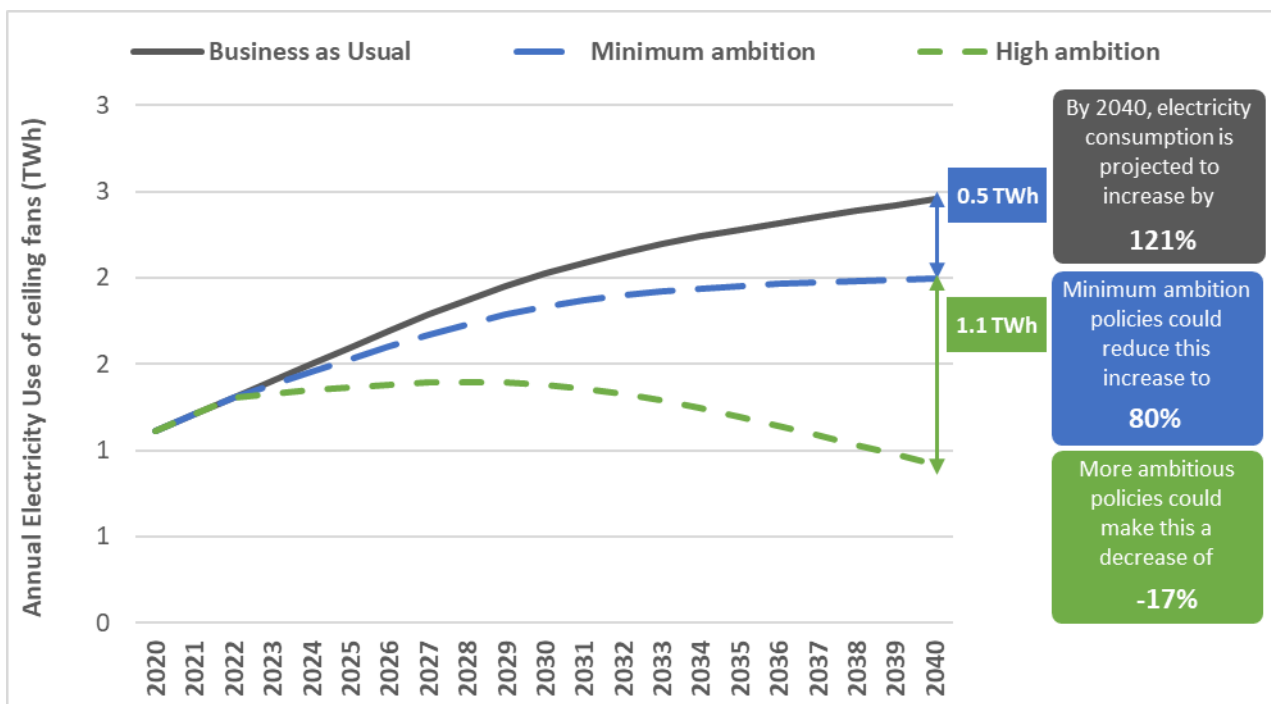


Reduce electricity
CO₂ emissions by **290 kilo tonnes**

Equivalent to
over **90 thousand passenger cars**

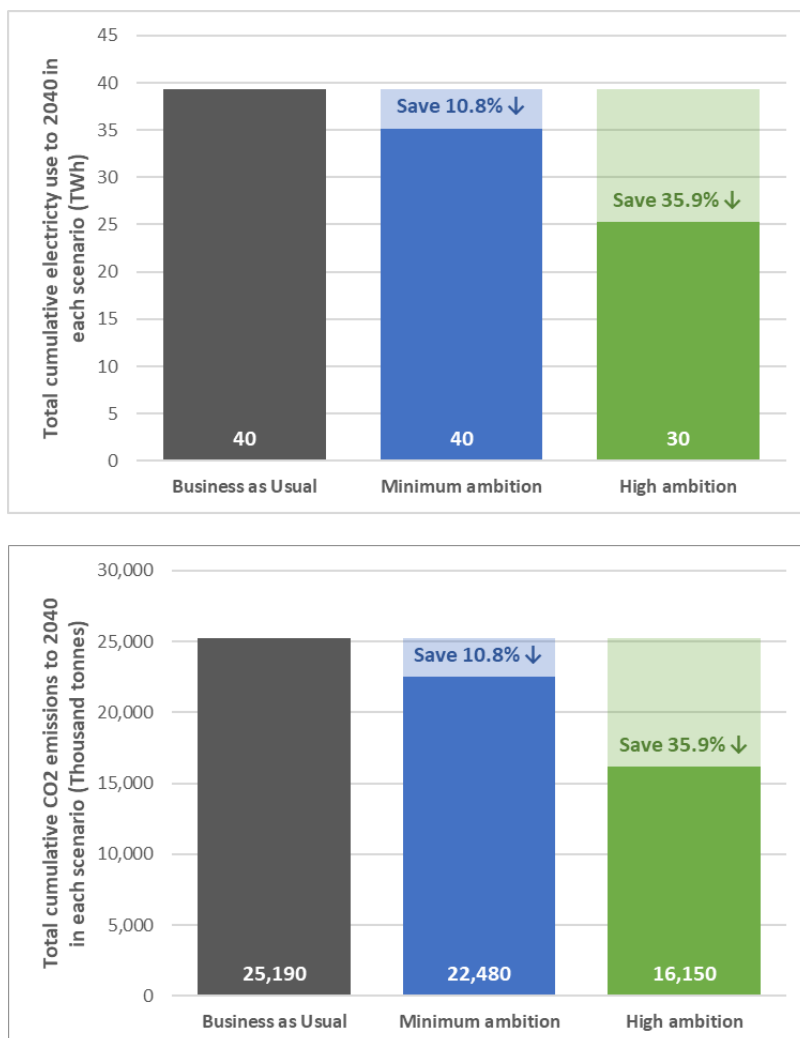


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	32.8 million
GDP per capita	10,669 US\$
Electrification level	100.0%
CO ₂ emission factor	0.6 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.08 US\$/kWh
Transmission and distribution loss factor	5.8%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Malaysia	216	1200	3.04 / 4 / 13	1566	111 / 85 / 26	8

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PAKISTAN



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **5 TWh**

Which is over **4%** of the total
current national electricity use



Save electricity
worth over **1.1 billion US\$**

Equivalent to more than **2 power plants [500MW]**

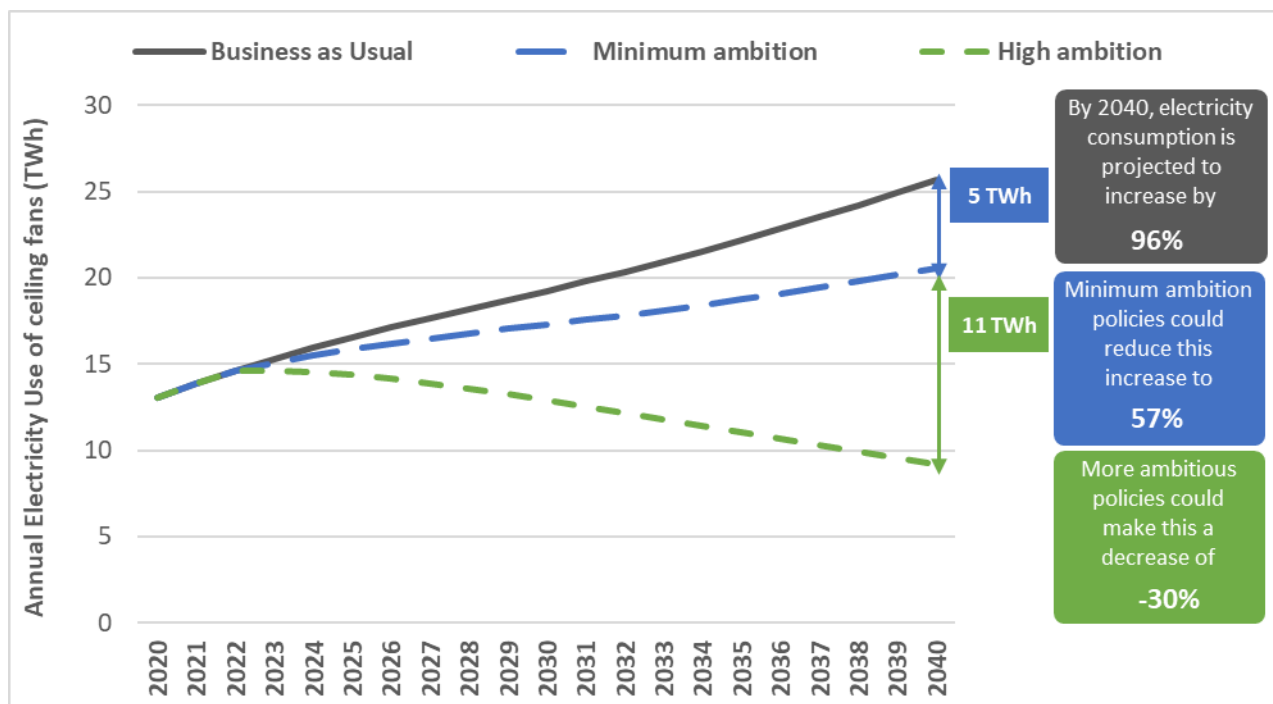


Reduce electricity
CO₂ emissions by **4.3 million tonnes**

Equivalent to over **1.3 million passenger cars**

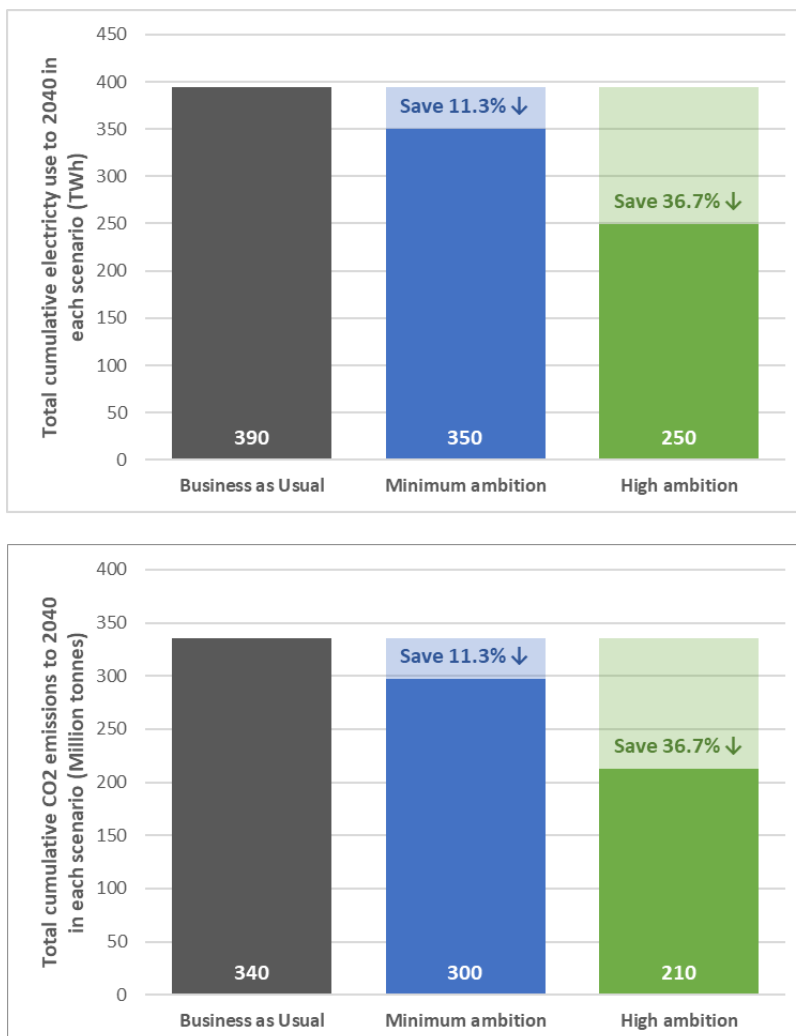


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	225 million
GDP per capita	1,216 US\$
Electrification level	76.0%
CO ₂ emission factor	0.7 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.22 US\$/kWh
Transmission and distribution loss factor	17.1%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Pakistan	250	1350	3.1 / 4.1 / 13	1233	100 / 75 / 24	8

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PHILIPPINES



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **1 TWh**

Which is over **1%** of the total
current national electricity use



Save electricity
worth over **0.2 billion US\$**

Equivalent to more than **2 power plants [100MW]**

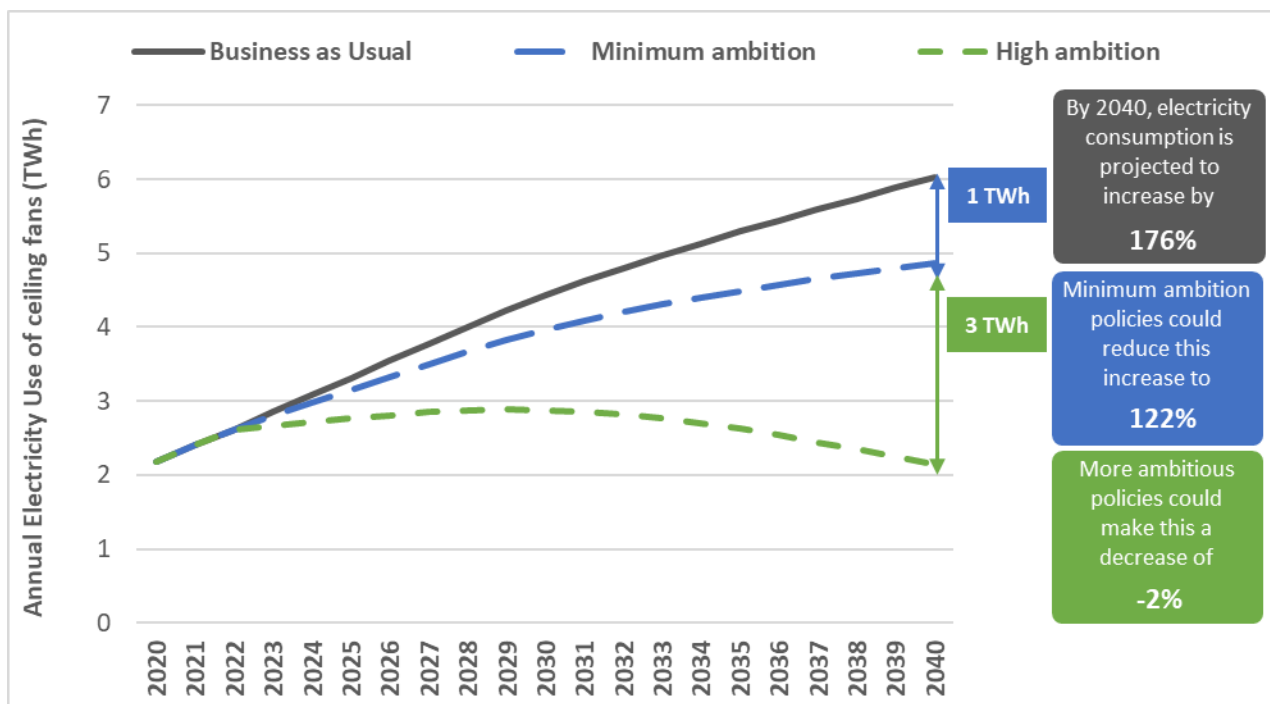


Reduce electricity
CO₂ emissions by **1 million tonnes**

Equivalent to over **300 thousand passenger cars**

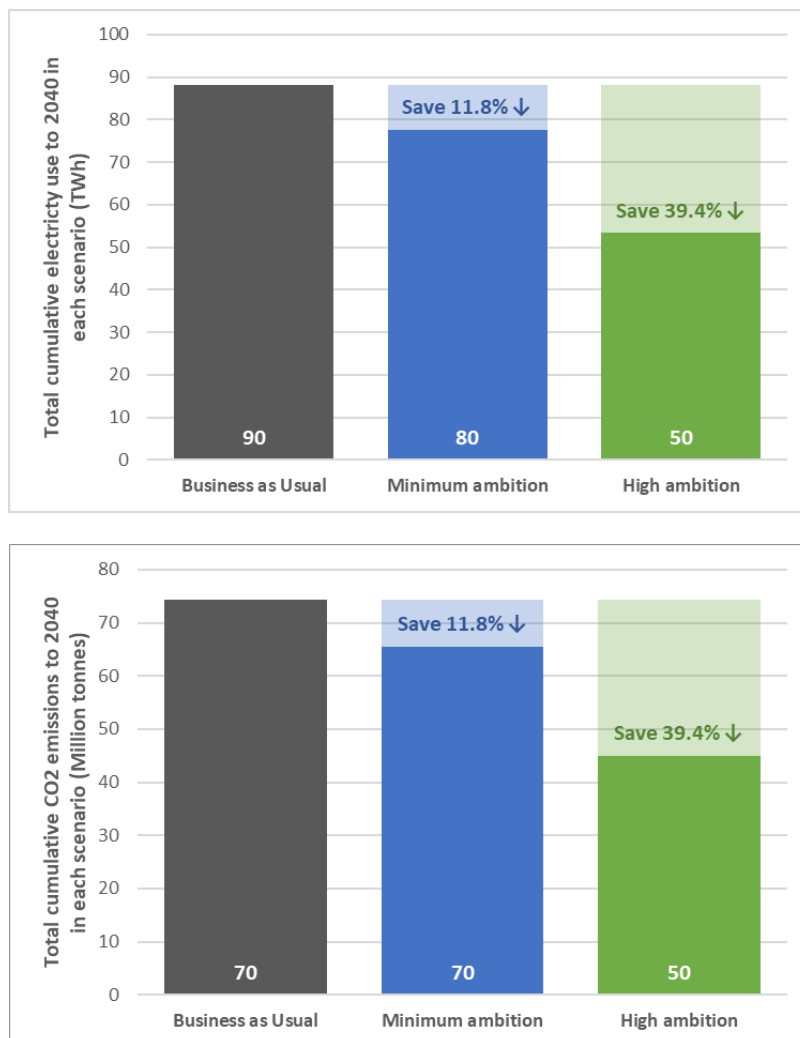


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	111 million
GDP per capita	3,376 US\$
Electrification level	98.4%
CO ₂ emission factor	0.77 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.18 US\$/kWh
Transmission and distribution loss factor	9.4%

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Philippines	216	1200	3.04 / 4 / 13	1566	111 / 85 / 26	8

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SINGAPORE



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **130
GWh**

Which is over **1%** of the total
current national electricity use



Save electricity
worth over **7 million
US\$**

Equivalent to more than **1 power plant
[20MW]**

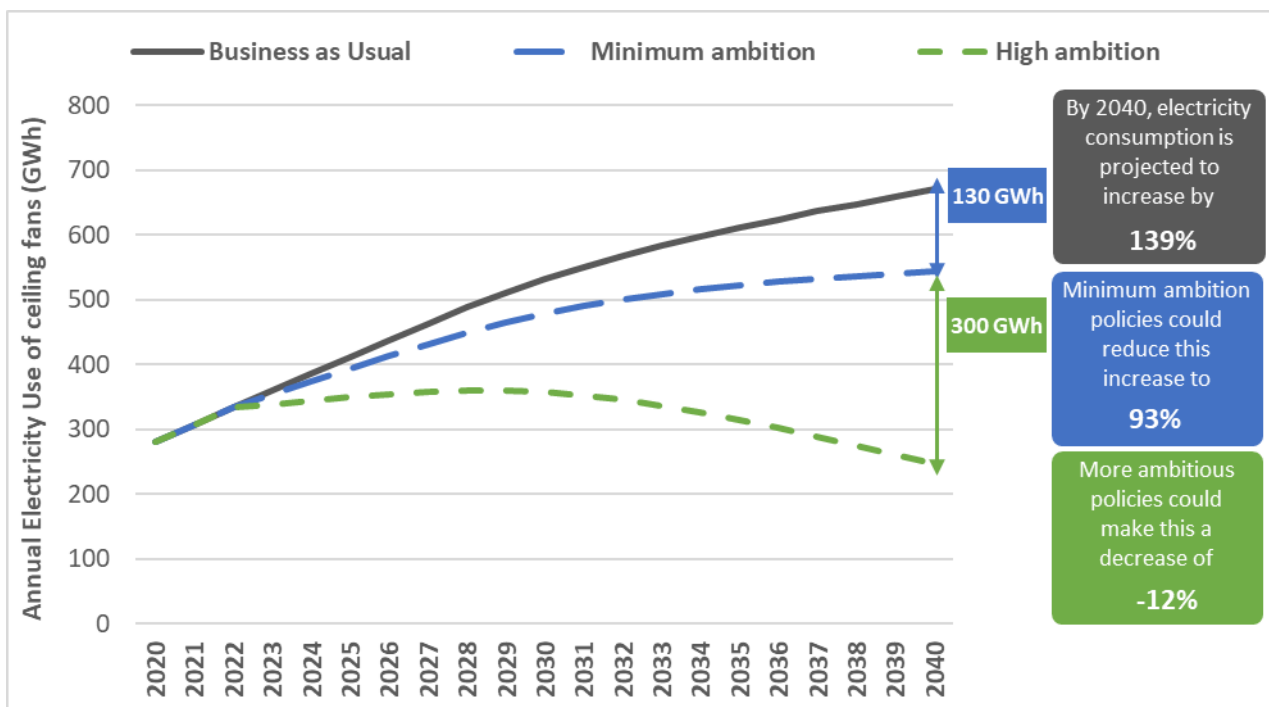


Reduce electricity
CO₂ emissions by **66 kilo
tonnes**

Equivalent to over **20 thousand
passenger cars**

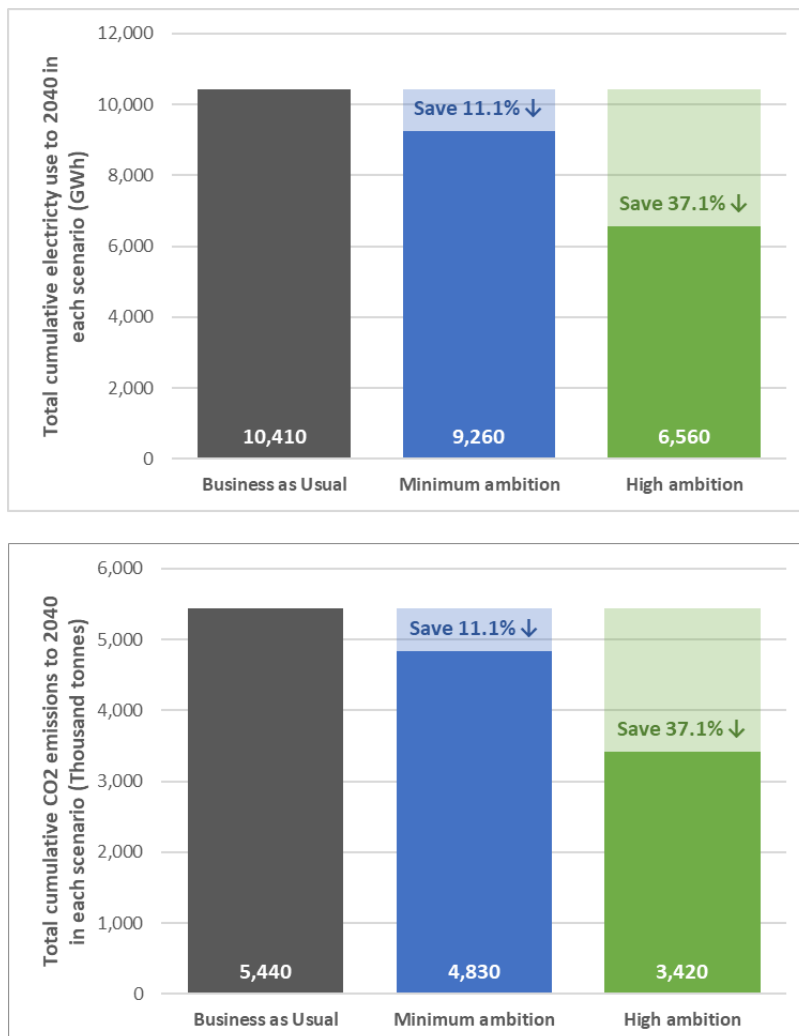


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	5.9 million
GDP per capita	60,829 US\$
Electrification level	100 %
CO ₂ emission factor	0.51 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.06 US\$/kWh
Transmission and distribution loss factor	2 %

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Singapore	216	1200	3.04 / 4 / 13	1566	111 / 85 / 26	8

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SRILANKA



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **0.6 TWh**

Which is over **4%** of the total
current national electricity use



Save electricity
worth over **110 million US\$**

Equivalent to
more than **1 power plant [100MW]**

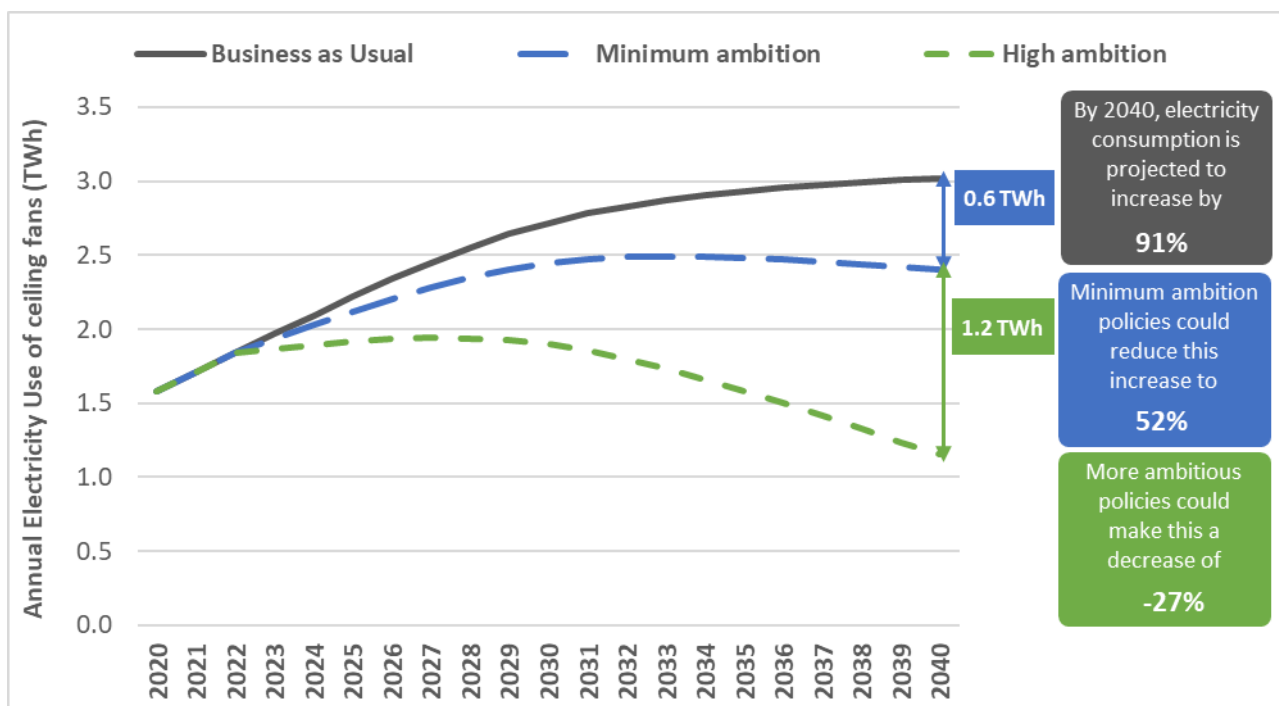


Reduce electricity
CO₂ emissions by **500 kilo tonnes**

Equivalent to
over **150 thousand passenger cars**

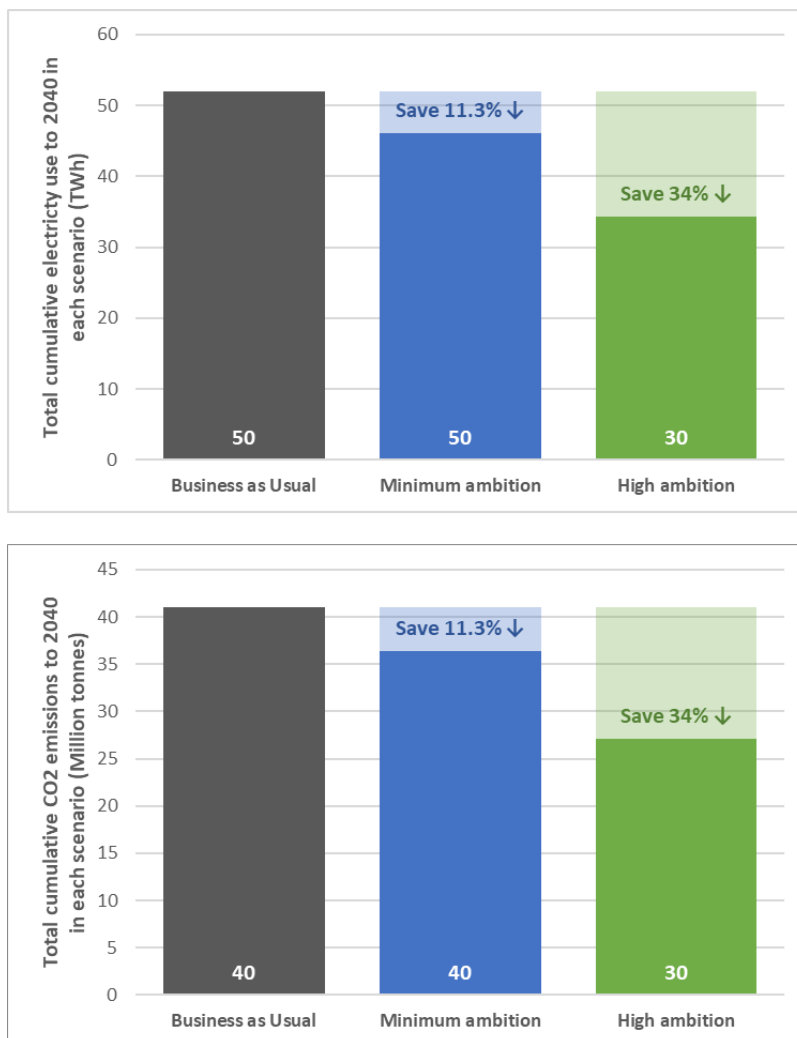


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	21.5 million
GDP per capita	3,838 US\$
Electrification level	100 %
CO ₂ emission factor	0.70 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.17 US\$/kWh
Transmission and distribution loss factor	11.4 %

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Sri Lanka	222	1200	3.04 / 4 / 13	1566	114 / 87 / 27	8

For further details on the modelling approach and assumptions please contact: unep-u4e@un.org

SUDAN



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **510
GWh**

Which is over **3%** of the total
current national electricity use



Save electricity
worth over **12 million
US\$**

Equivalent to
more than **1 power plant
[100MW]**

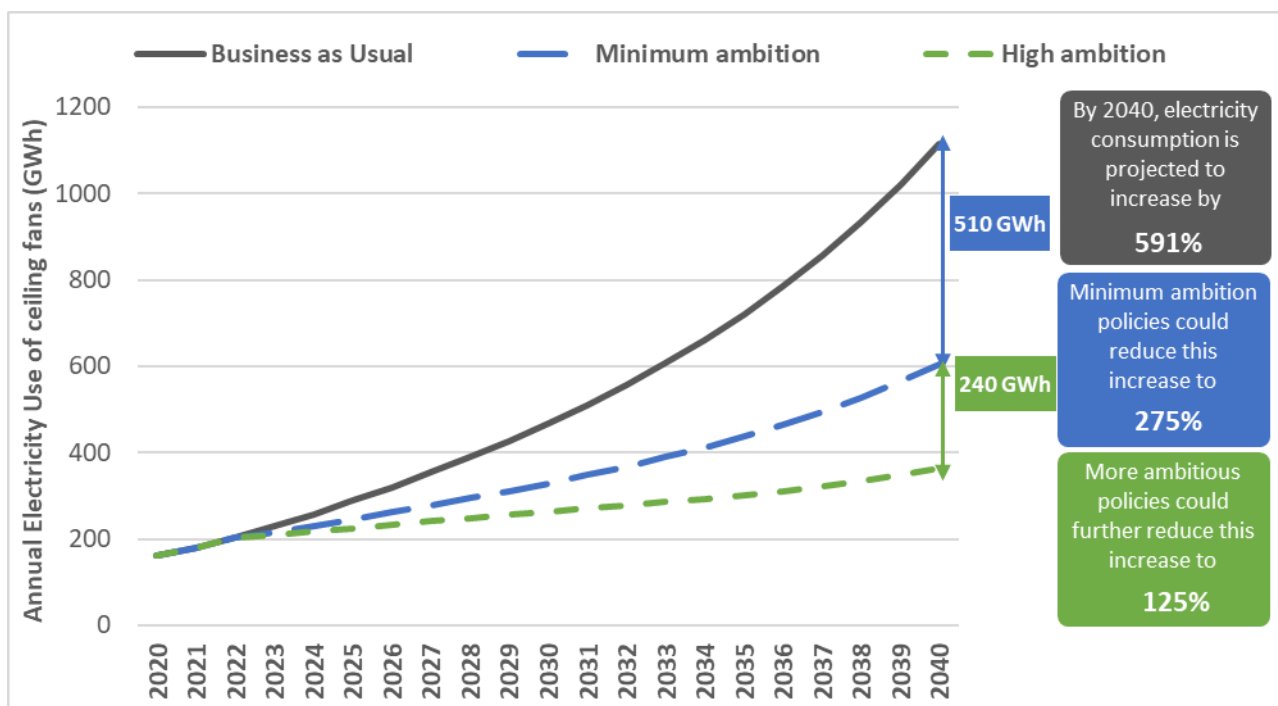


Reduce electricity
CO₂ emissions by **140 kilo
tonnes**

Equivalent to
over **42 thousand
passenger cars**

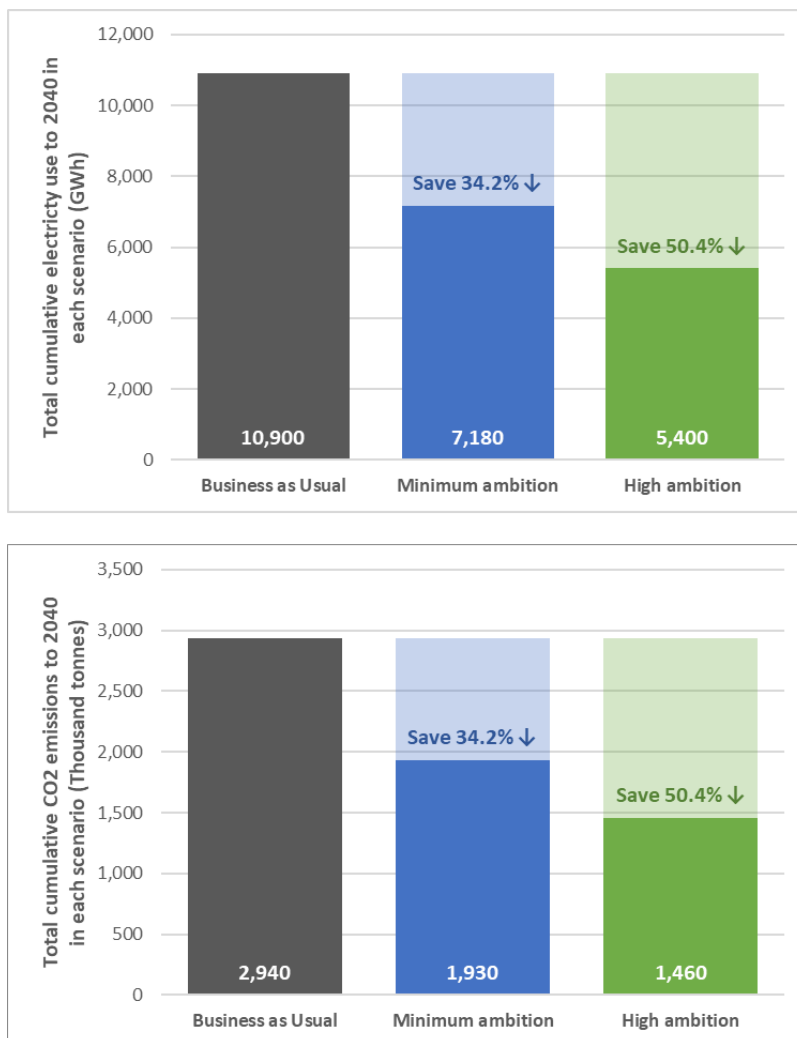


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	44.9 million
GDP per capita	500 US\$
Electrification level	56 %
CO ₂ emission factor	0.23kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.02 US\$/kWh
Transmission and distribution loss factor	14.3 %

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Sudan	273	1400	3.5 / 7 / 13	1540	120 / 60 / 32	8

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THAILAND



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **100
GWh**

Which is less than **1%** of the total
current national electricity use



Save electricity
worth over **14 million
US\$**

Equivalent to
more than **1 power plant
[20MW]**

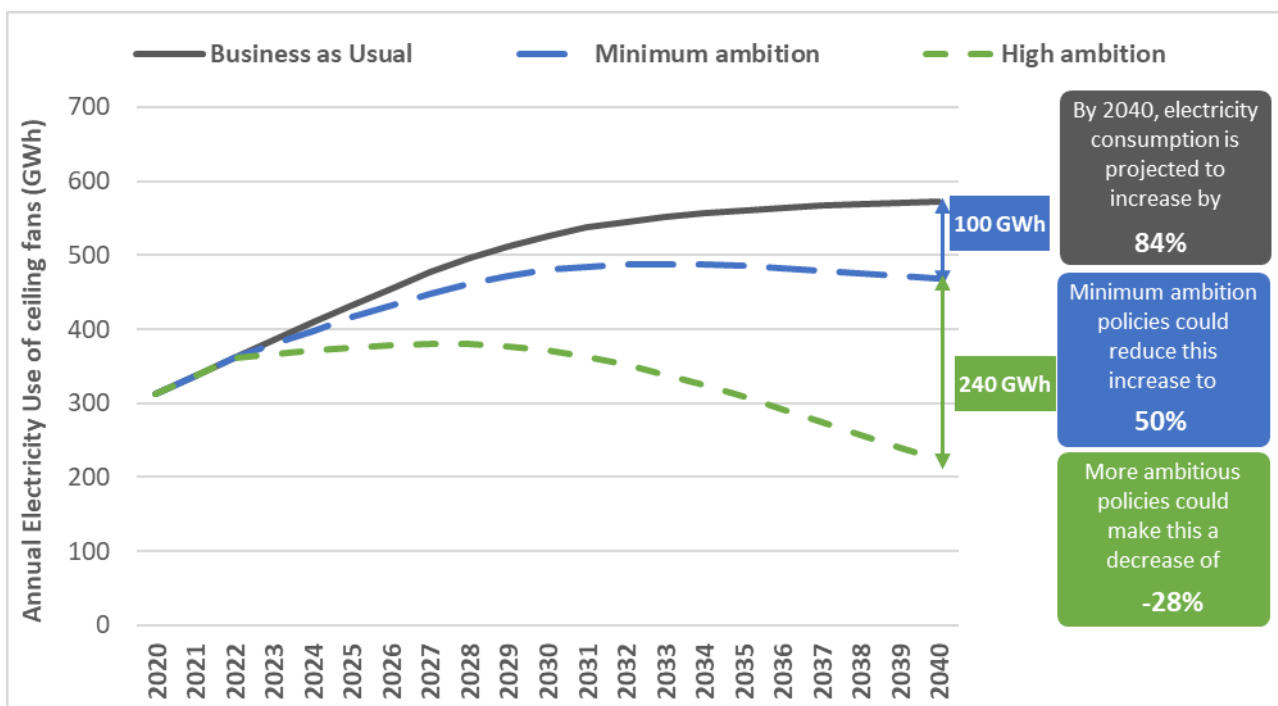


Reduce electricity
CO₂ emissions by **60 kilo
tonnes**

Equivalent to
over **18 thousand
passenger cars**

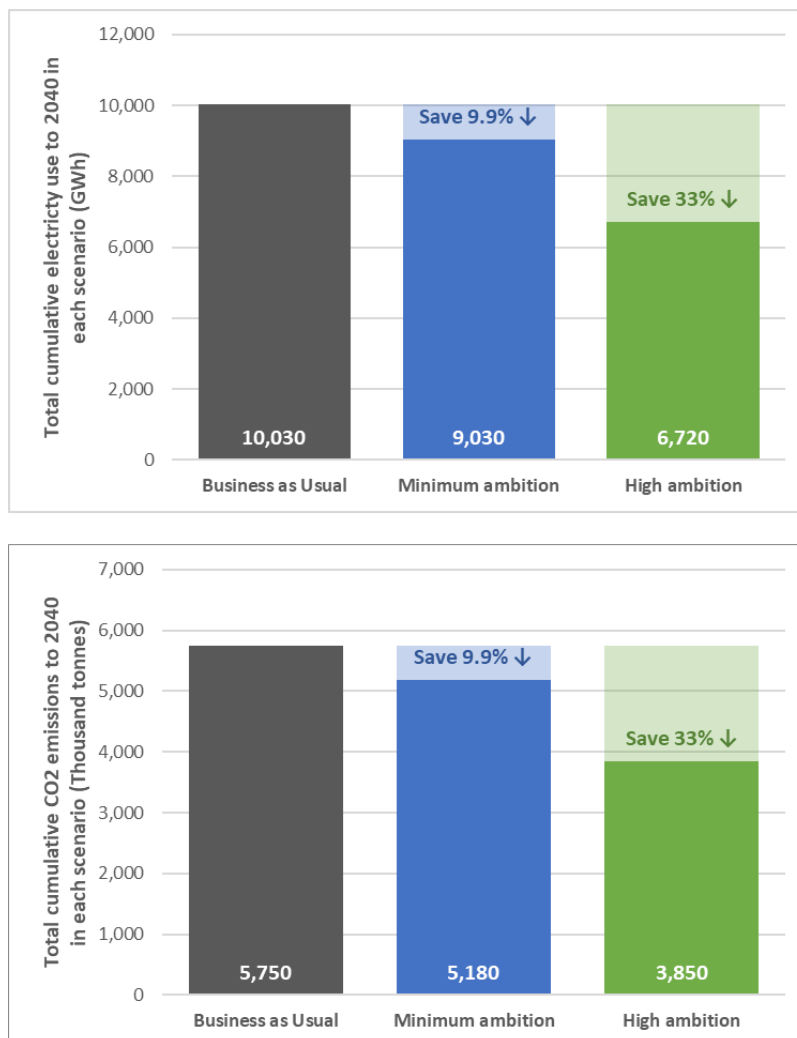


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	70 million
GDP per capita	7,450 US\$
Electrification level	100 %
CO ₂ emission factor	0.54 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.14 US\$/kWh
Transmission and distribution loss factor	6.1 %

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Thailand	216	1200	3.04 / 4 / 13	1566	111 / 85 / 26	8

For further details on the modelling approach and assumptions please contact: unep-u4e@un.org

VIETNAM



ANNUAL SAVINGS IN 2040 PER THE MINIMUM AMBITION SCENARIO



Reduce electricity
by overuse by over **230
GWh**

Which is less than **1%** of the total
current national electricity use



Save electricity
worth over **19 million
US\$**

Equivalent to **2 power plants
[20MW]**

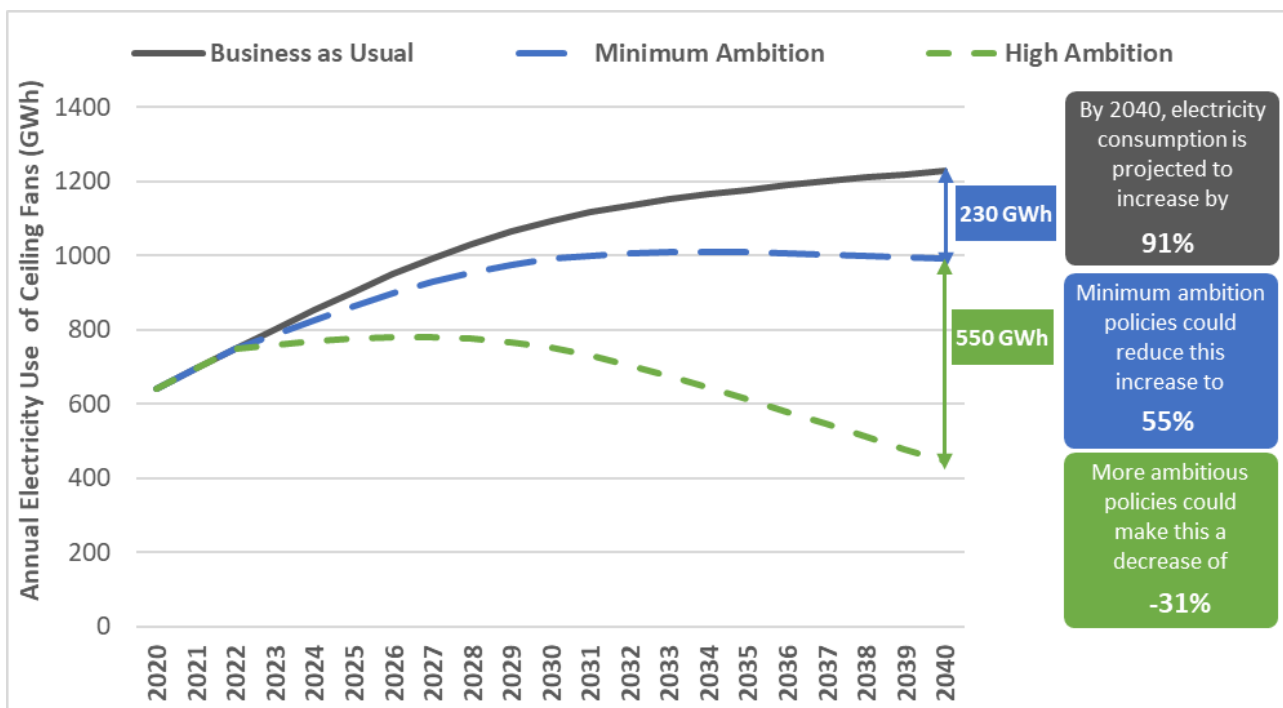


Reduce electricity
CO₂ emissions by **215 kilo
tonnes**

Equivalent to
over **67 thousand
passenger cars**

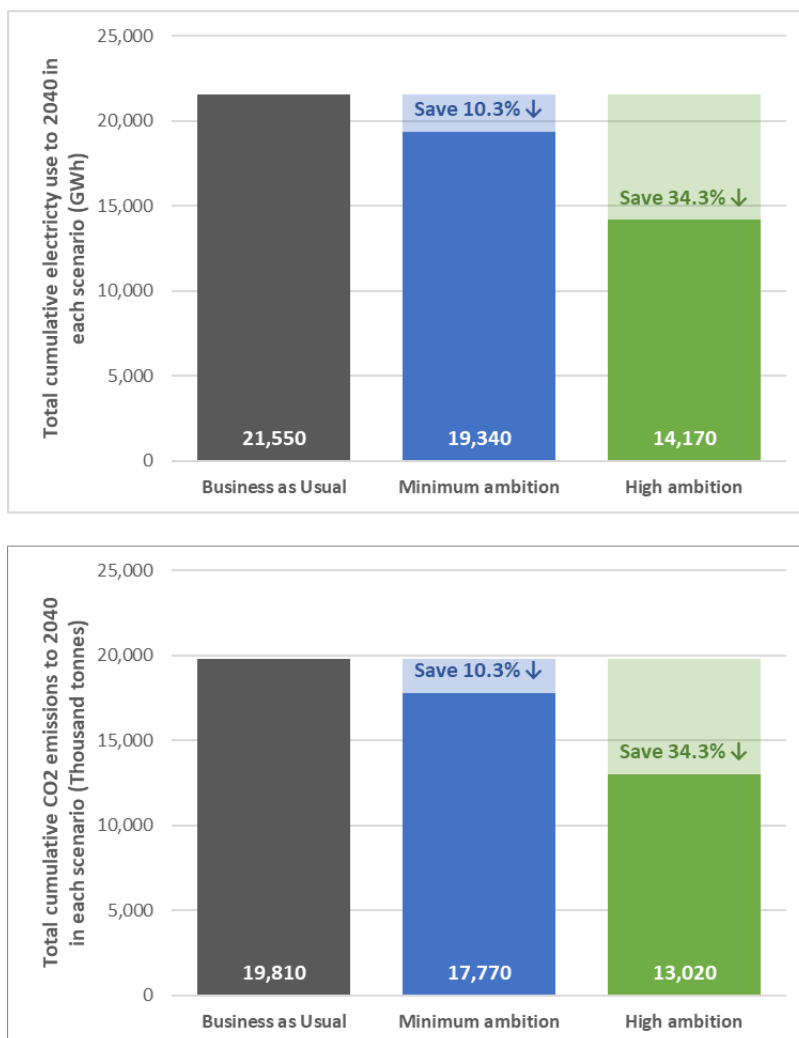


MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS



Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040



MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

GENERAL INFORMATION

Population	98.2 million
GDP per capita	2,907 US\$
Electrification level	100 %
CO ₂ emission factor	0.83 kg/kWh

ELECTRICITY MARKET

Residential electricity tariff	0.08 US\$/kWh
Transmission and distribution loss factor	9.3 %

Country	Airflow m ³ /min	Size (mm)	Service value (m ³ /min/W) (BAU / Min Amb / High Amb)	Annual hours of use	AEC (kWh/y) (BAU / Min Amb / High Amb)	Typical Life (years)
Viet Nam	216	1200	3.04 / 4 / 13	1566	111 / 85 / 26	8

For further details on the modelling approach and assumptions please contact: unep-u4e@un.org