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.
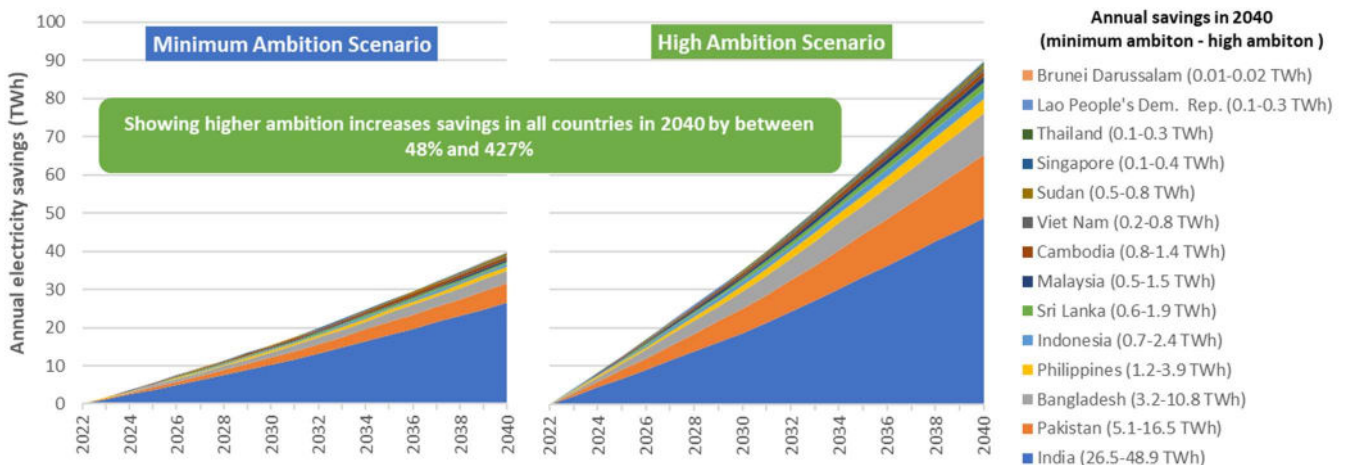
The typical annual energy consumption of products sold over time is derived from published data where available, with a limited use of proxy data when specific data is not obtainable. Future projections of energy consumption are based on typical incremental improvements on baseline values in the BAU 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

	Annual savings in 2040				Cumulative savings by 2040		
	Electricity	Electricity Bills	CO_2 emissions	Passenger cars	Electricity	Electricity Bills	CO_2 emissions
Country	(TWh)	(Million US$)	(Million tonnes)	(Thousands)	(TWh)	(Million US$)	(Million tonnes)
Bangladesh	3.2	304	2,282	700	29.9	2,810	21,118
Brunei Darussalam	0.01	0.3	4.1	1.3	0.05	2.4	37.7
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

Minimum Ambition Scenario

High Ambition Scenario

Showing higher ambition increases savings in all countries in 2040 by between 48% and 427%

Annual electricity savings (TWh)

Annual savings in 2040 (minimum ambiton - high ambiton)
- Brunei Darussalam (0.01-0.02 TWh)
- Lao People's Dem. Rep. (0.1-0.3 TWh)
- Thailand (0.1-0.3 TWh)
- Singapore (0.1-0.4 TWh)
- Sudan (0.5-0.8 TWh)
- Viet Nam (0.2-0.8 TWh)
- Cambodia (0.8-1.4 TWh)
- Malaysia (0.5-1.5 TWh)
- Sri Lanka (0.6-1.9 TWh)
- Indonesia (0.7-2.4 TWh)
- Philippines (1.2-3.9 TWh)
- Bangladesh (3.2-10.8 TWh)
- Pakistan (5.1-16.5 TWh)
- India (26.5-48.9 TWh)

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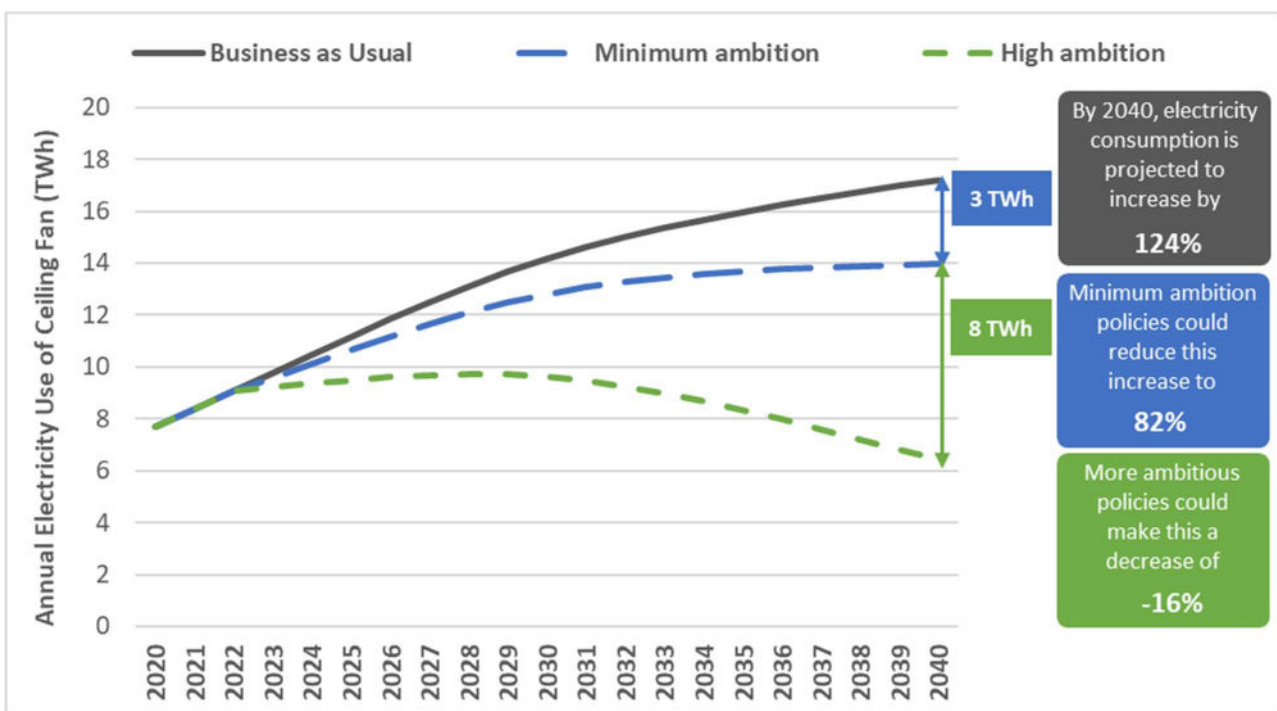
Equivalent to more than **1 power plant [500MW]**

Reduce electricity CO_2 emissions by **2.3 billion tonnes**

Equivalent to over **0.7 million passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Business as Usual — Minimum ambition — — High ambition

By 2040, electricity consumption is projected to increase by **124%**

Minimum ambition policies could reduce this increase to **82%**

More ambitious policies could make this a decrease of **-16%**

3 TWh

8 TWh

Annual savings in 2040 under both scenarios are being denoted.

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CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040
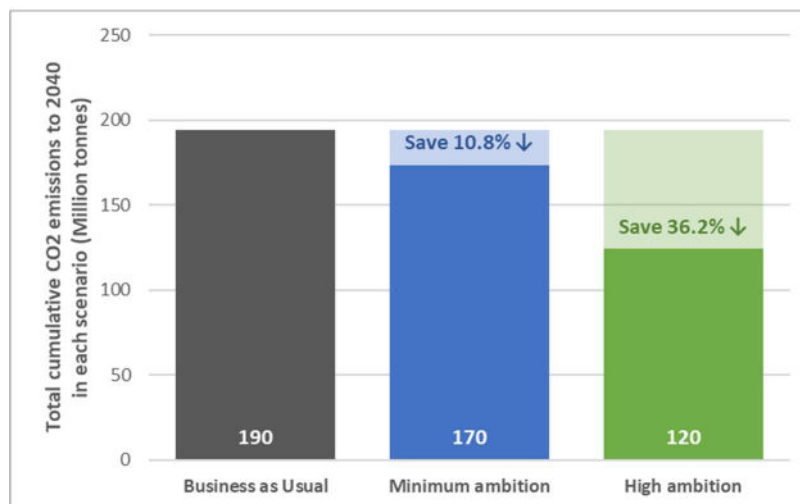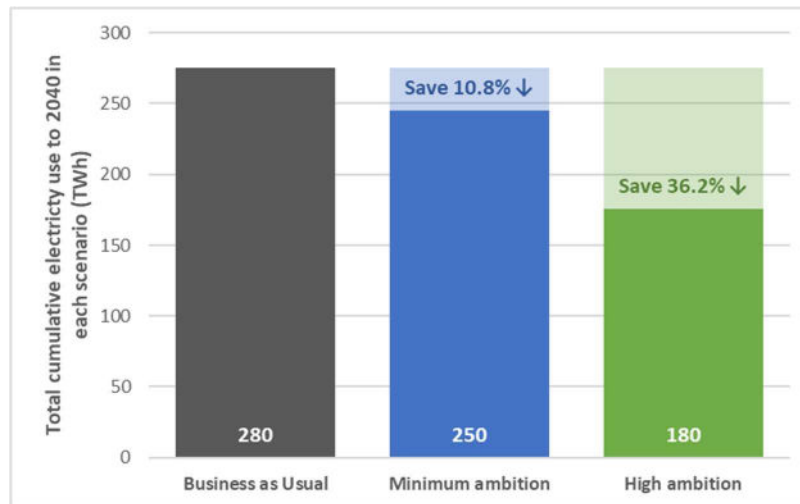
MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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$**
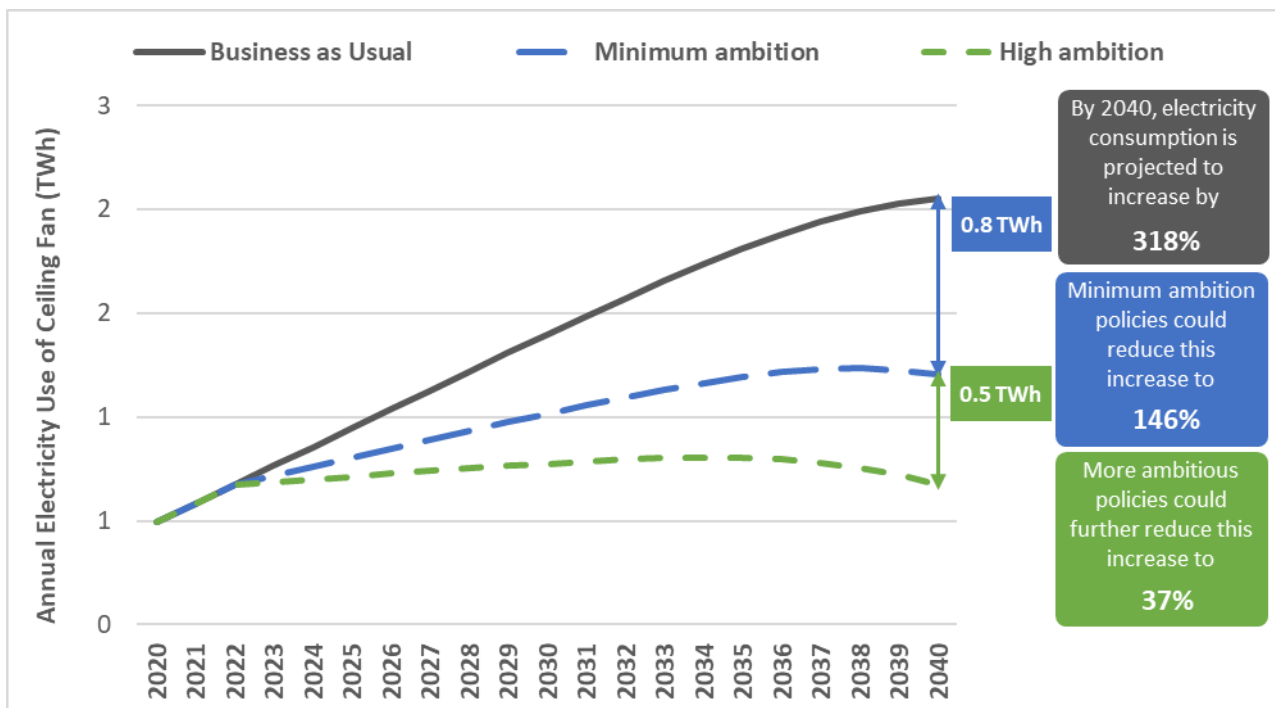
Equivalent to more than **1 power plant [100MW]**

Reduce electricity CO_2 emissions by **0.7 billion tonnes**
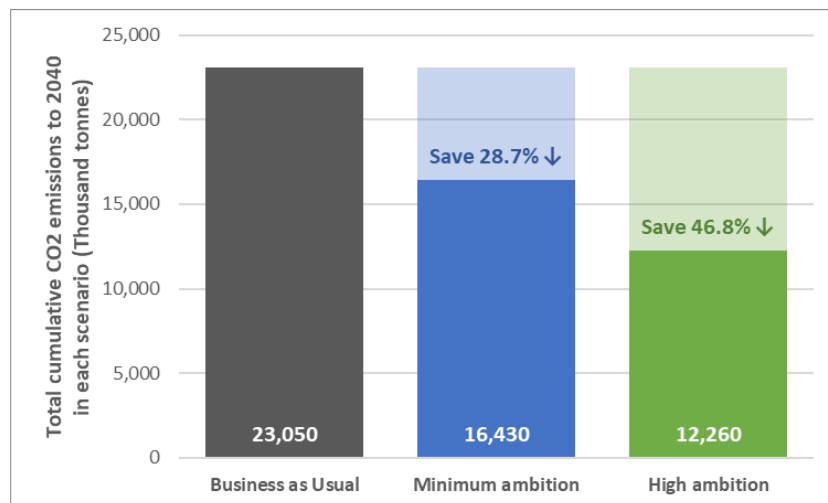
Equivalent to over **200 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: — Business as Usual — Minimum ambition - - High ambition

Y-axis: Annual Electricity Use of Ceiling Fan (TWh)

0.8 TWh

0.5 TWh

By 2040, electricity consumption is projected to increase by **318%**

Minimum ambition policies could reduce this increase to **146%**

More ambitious policies could further reduce this increase to **37%**

Annual savings in 2040 under both scenarios are being denoted.

COUNTRY SAVINGS ASSESSMENT FOR CEILING FANS

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040

Total cumulative electricity use to 2040 in each scenario (GWh)

- Business as Usual: 28,220
- Minimum ambition: 20,100 — Save 28.7% ↓
- High ambition: 15,010 — Save 46.8% ↓

Total cumulative CO2 emissions to 2040 in each scenario (Thousand tonnes)

- Business as Usual: 23,050
- Minimum ambition: 16,430 — Save 28.7% ↓
- High ambition: 12,260 — Save 46.8% ↓

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 m³/min	Size (mm)	Service value (m³/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

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

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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 CO_2 emissions by **32 billion tonnes**

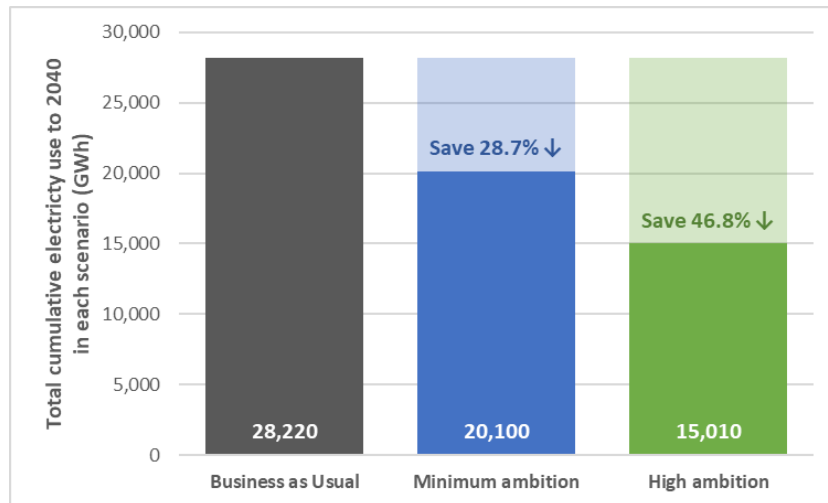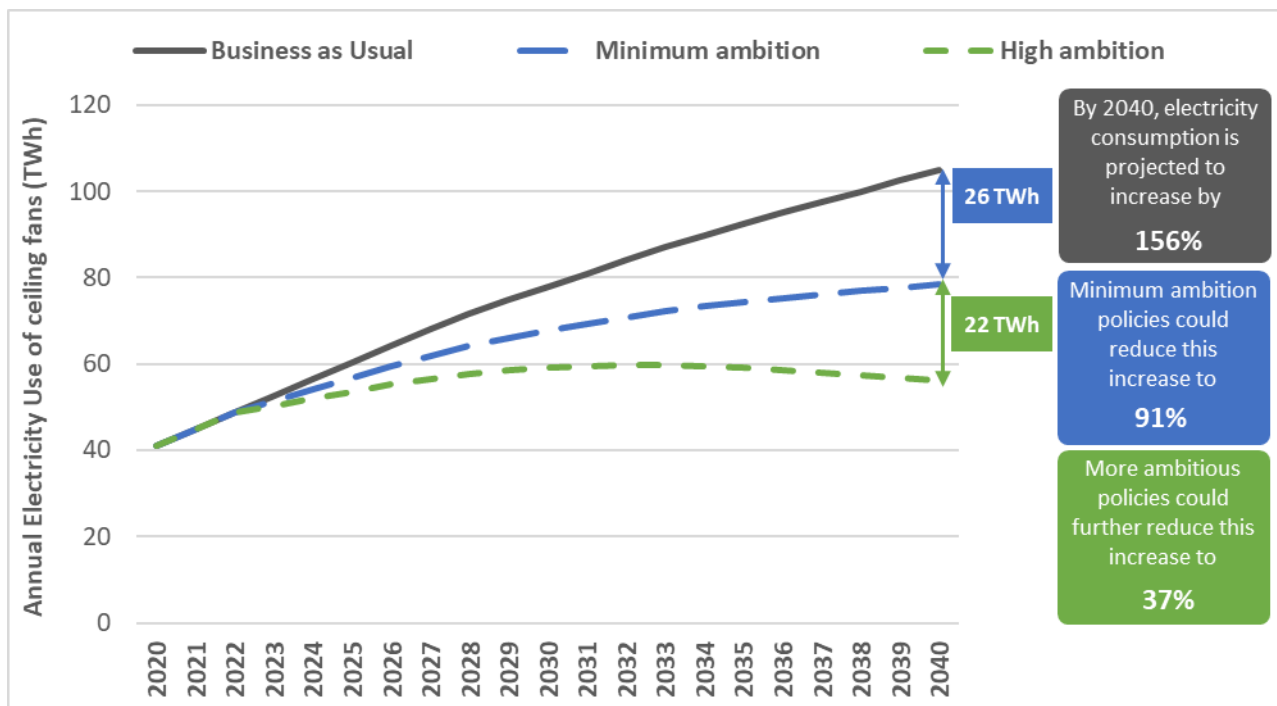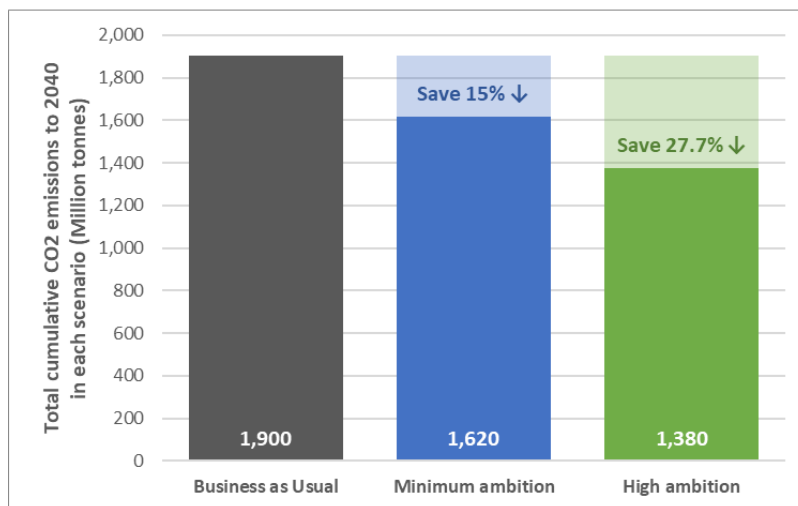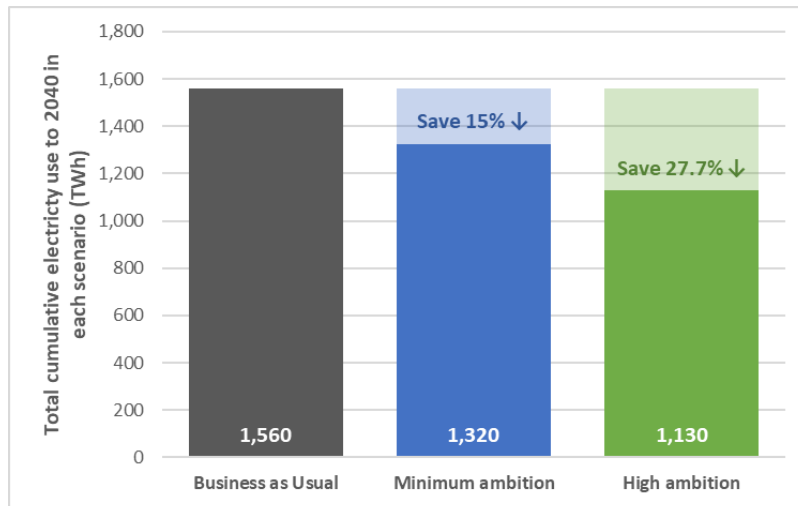Equivalent to over **10 million passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

— Business as Usual — Minimum ambition - - High ambition

Annual Electricity Use of ceiling fans (TWh)

26 TWh

22 TWh

By 2040, electricity consumption is projected to increase by **156%**

Minimum ambition policies could reduce this increase to **91%**

More ambitious policies could further reduce this increase to **37%**

Annual savings in 2040 under both scenarios are being denoted.

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COUNTRY SAVINGS ASSESSMENT FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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

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

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]**
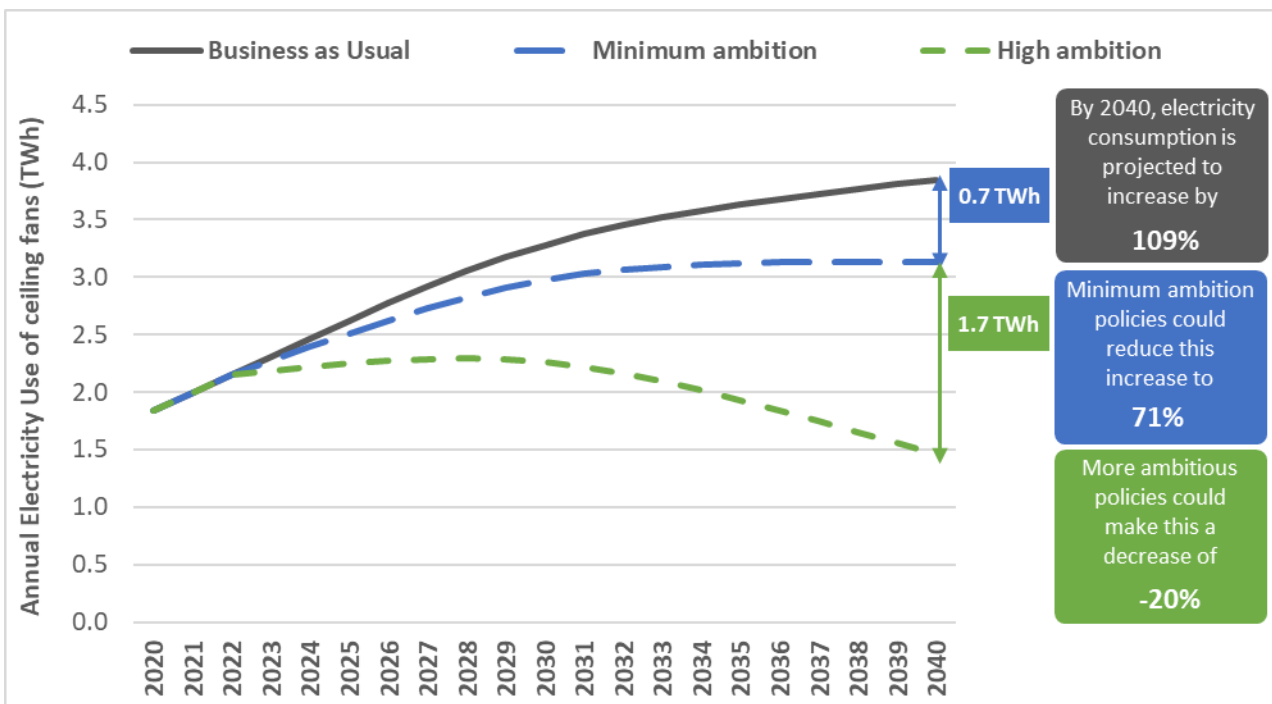
Reduce electricity CO_2 emissions by **0.6 billion tonnes**

Equivalent to over **180 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: —— Business as Usual —— Minimum ambition – – High ambition

Y-axis: Annual Electricity Use of ceiling fans (TWh) — 0.0 to 4.5
X-axis: 2020 to 2040

0.7 TWh

1.7 TWh

By 2040, electricity consumption is projected to increase by **109%**

Minimum ambition policies could reduce this increase to **71%**

More ambitious policies could make this a decrease of **-20%**

Annual savings in 2040 under both scenarios are being denoted.

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CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040
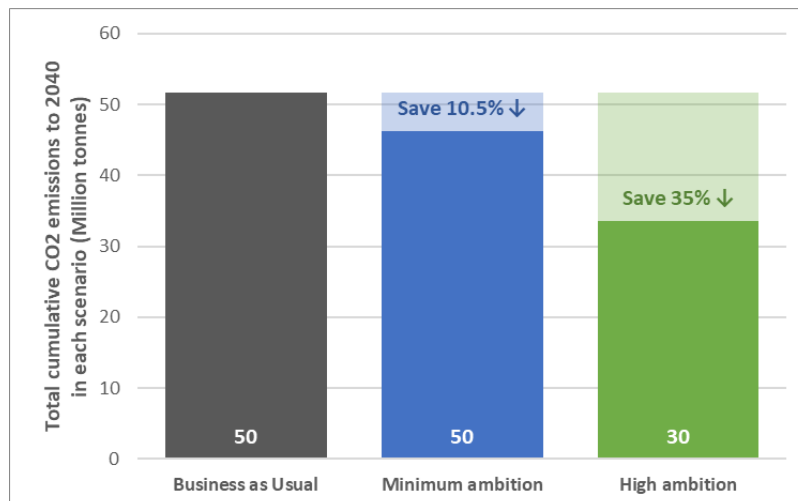
MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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

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

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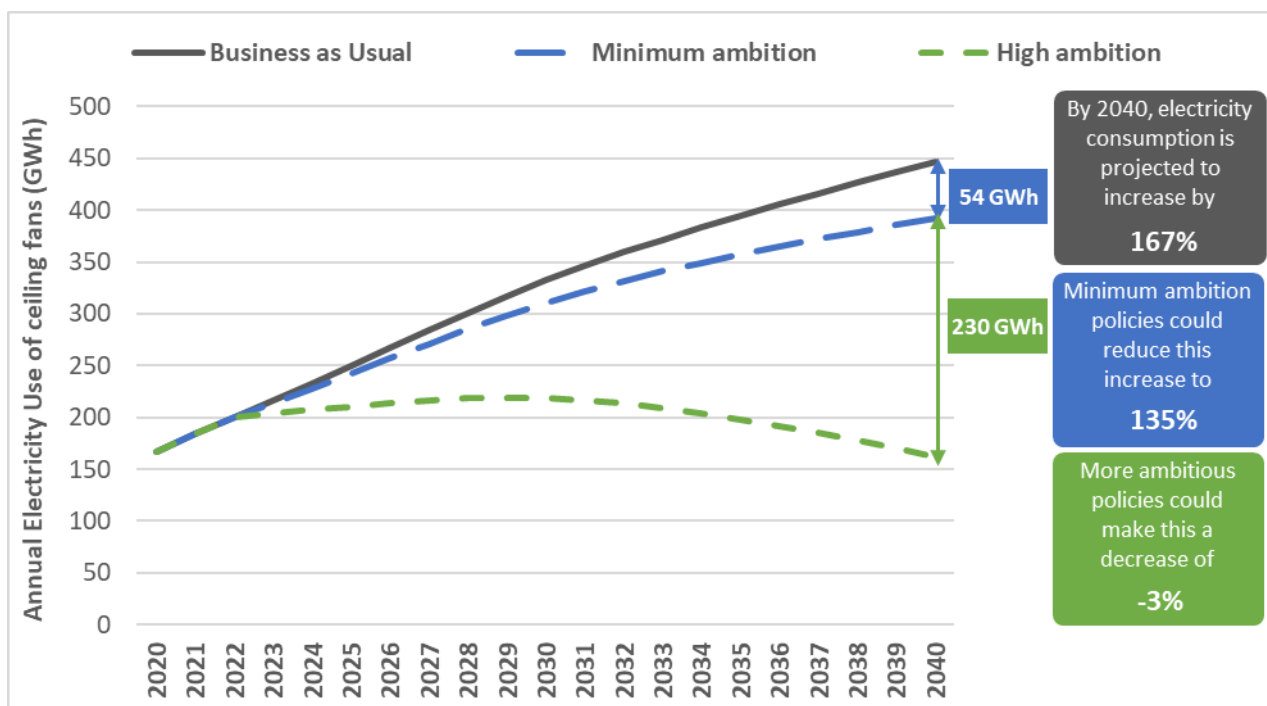
Equivalent to more than **2 power plants [5MW]**

Reduce electricity CO$_2$ emissions by **32 million tonnes**

Equivalent to over **10 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: — Business as Usual — Minimum ambition - - High ambition

Y-axis: Annual Electricity Use of ceiling fans (GWh) — 0, 50, 100, 150, 200, 250, 300, 350, 400, 450, 500

X-axis: 2020–2040

54 GWh

230 GWh

By 2040, electricity consumption is projected to increase by **167%**

Minimum ambition policies could reduce this increase to **135%**

More ambitious policies could make this a decrease of **-3%**

Annual savings in 2040 under both scenarios are being denoted.

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CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040

Total cumulative electricity use to 2040 in each scenario (GWh)

- Business as Usual: 6,590
- Minimum ambition: 6,110 — Save 7.3% ↓
- High ambition: 4,040 — Save 38.6% ↓

Total cumulative CO2 emissions to 2040 in each scenario (Thousand tonnes)

- Business as Usual: 3,930
- Minimum ambition: 3,640 — Save 7.3% ↓
- High ambition: 2,410 — Save 38.6% ↓

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 m³/min	Size (mm)	Service value (m³/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

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

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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 CO_2 emissions by **290 million tonnes**
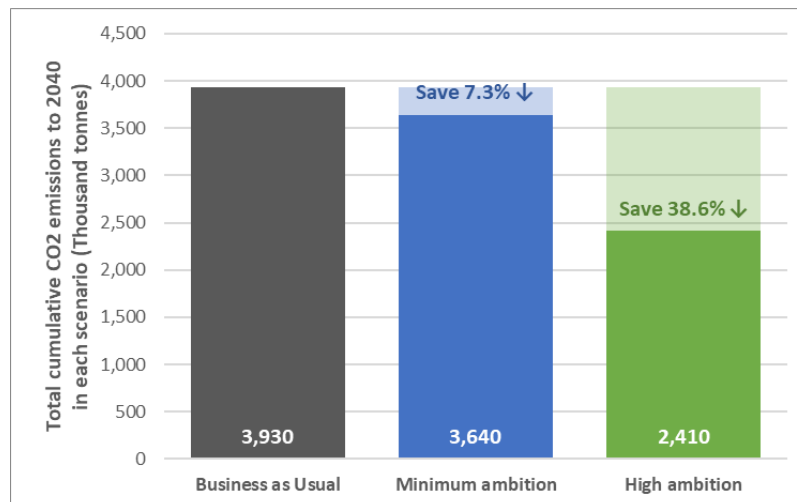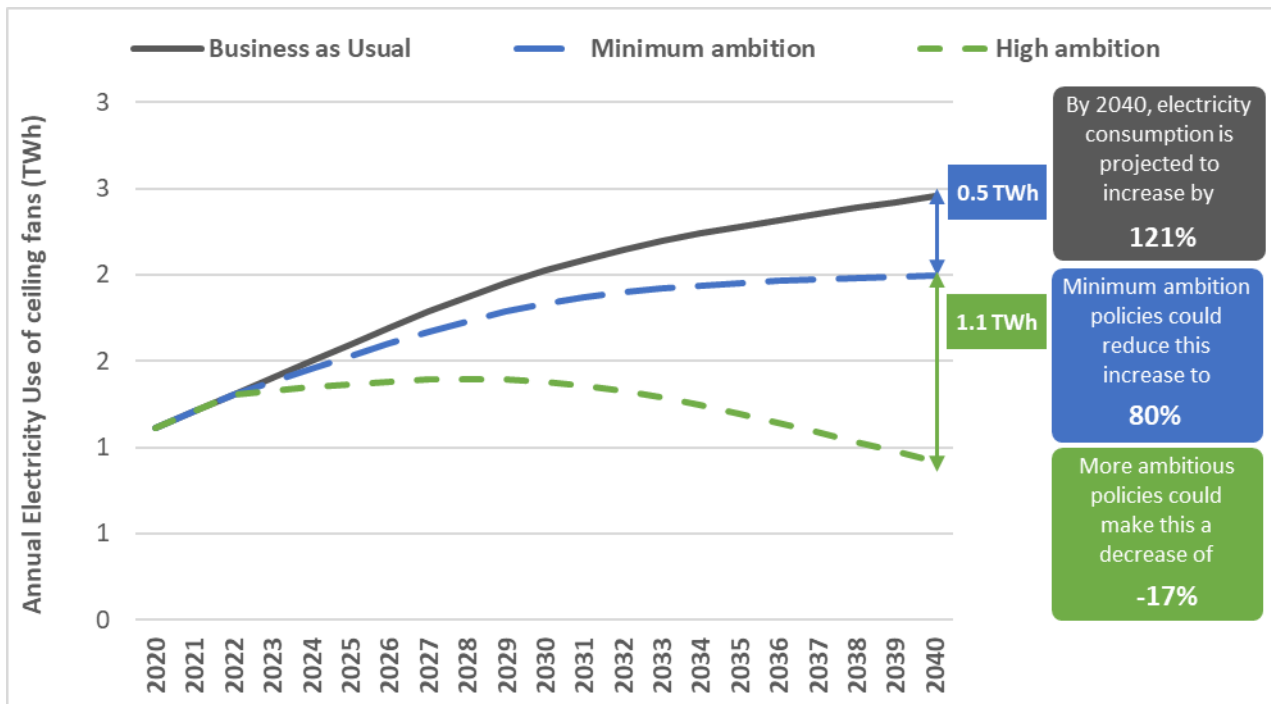
Equivalent to over **90 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: — Business as Usual — Minimum ambition – – High ambition

Y-axis: Annual Electricity Use of ceiling fans (TWh)

0.5 TWh

1.1 TWh

By 2040, electricity consumption is projected to increase by **121%**

Minimum ambition policies could reduce this increase to **80%**

More ambitious policies could make this a decrease of **-17%**

Annual savings in 2040 under both scenarios are being denoted.

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CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040
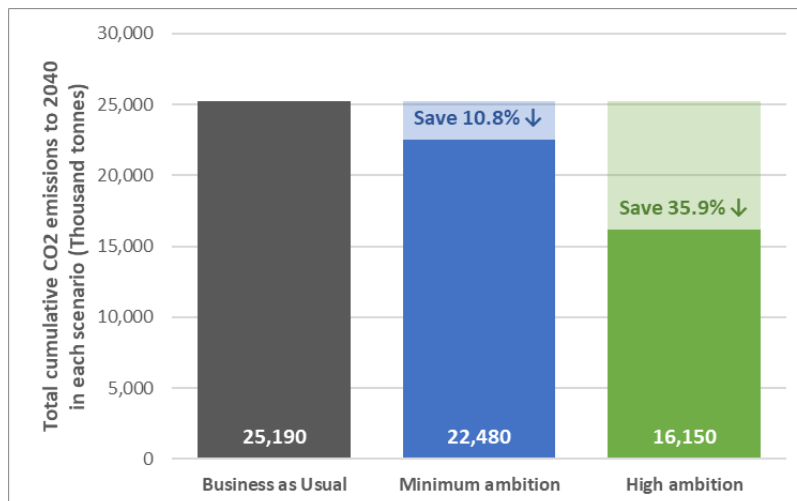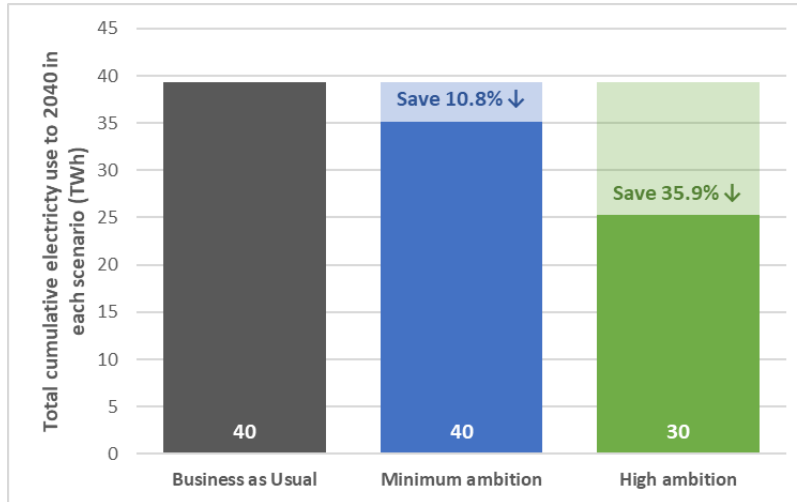
MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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

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

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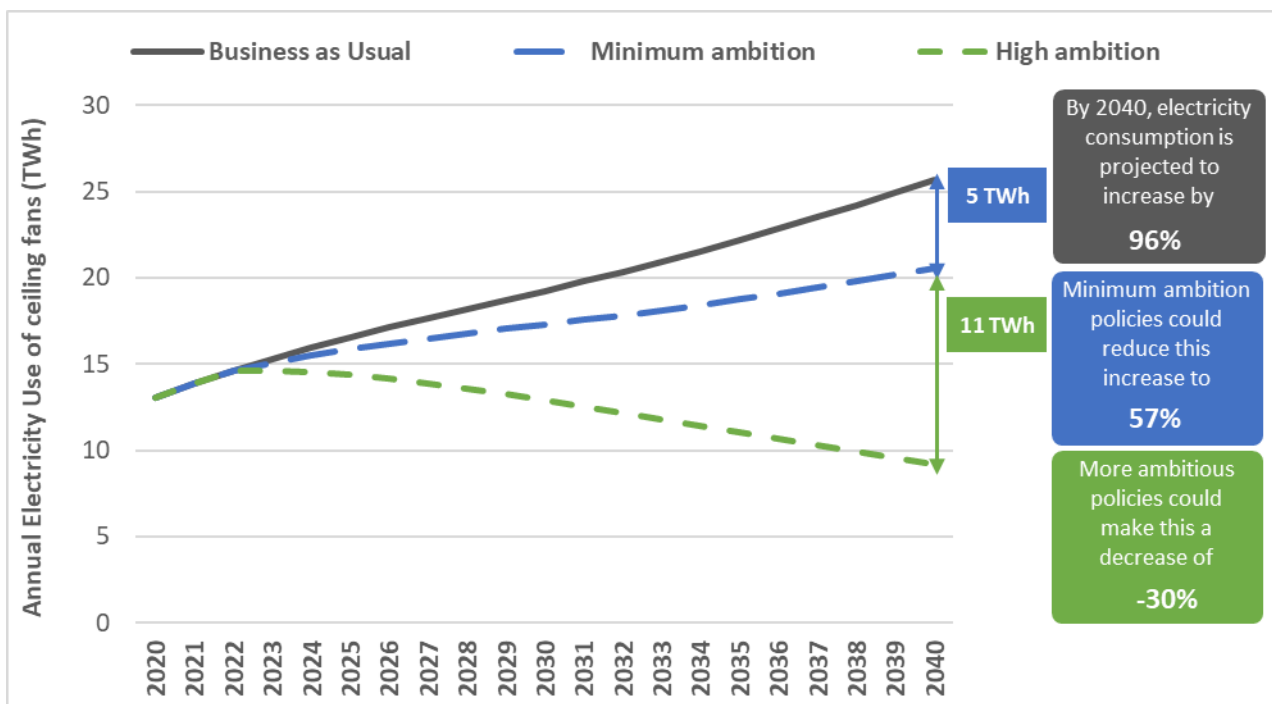
Equivalent to more than **2 power plants [500MW]**

Reduce electricity CO_2 emissions by **4.3 billion tonnes**
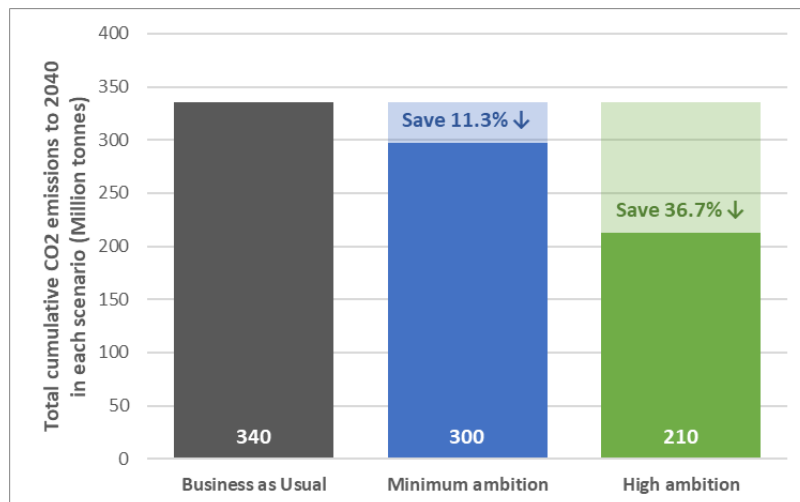
Equivalent to over **1.3 million passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: — Business as Usual — Minimum ambition – – High ambition

Y-axis: Annual Electricity Use of ceiling fans (TWh) — 0, 5, 10, 15, 20, 25, 30

X-axis: 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040

5 TWh

11 TWh

By 2040, electricity consumption is projected to increase by **96%**

Minimum ambition policies could reduce this increase to **57%**

More ambitious policies could make this a decrease of **-30%**

Annual savings in 2040 under both scenarios are being denoted.

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COUNTRY SAVINGS ASSESSMENT FOR CEILING FANS

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040

Total cumulative electricity use to 2040 in each scenario (TWh)

- Business as Usual: 390
- Minimum ambition: 350 — Save 11.3% ↓
- High ambition: 250 — Save 36.7% ↓

Total cumulative CO2 emissions to 2040 in each scenario (Million tonnes)

- Business as Usual: 340
- Minimum ambition: 300 — Save 11.3% ↓
- High ambition: 210 — Save 36.7% ↓

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 m³/min	Size (mm)	Service value (m³/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

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

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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 CO_2 emissions by **1 billion tonnes**
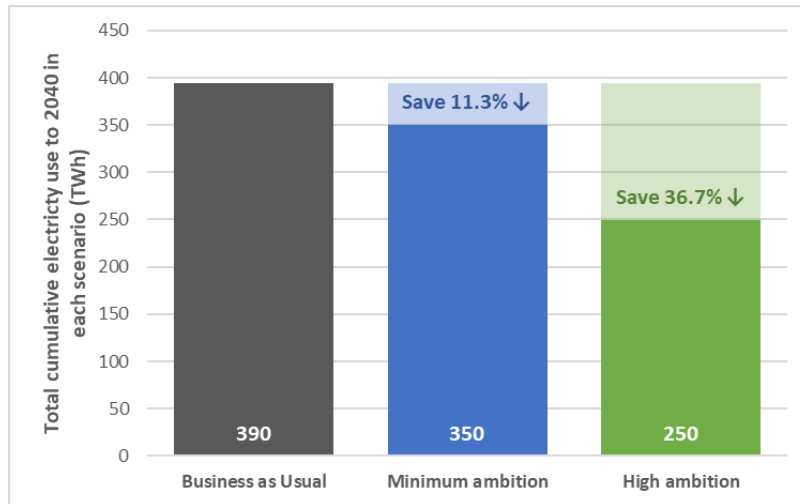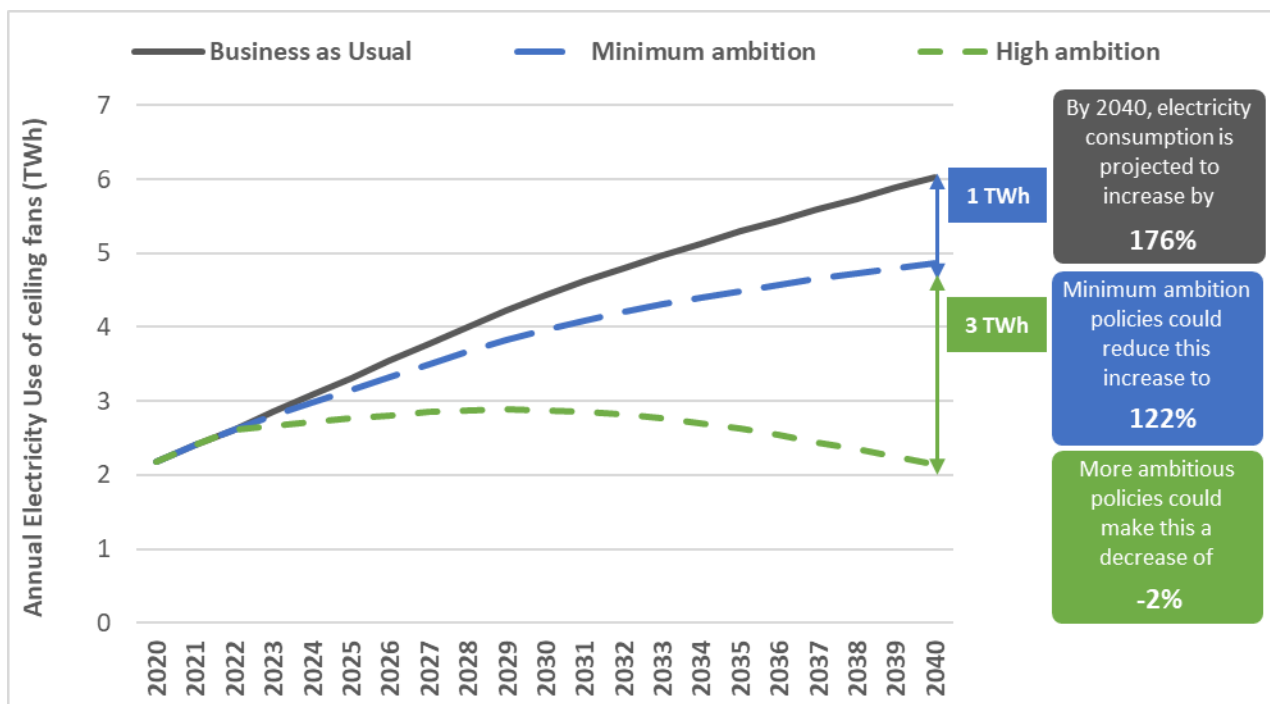
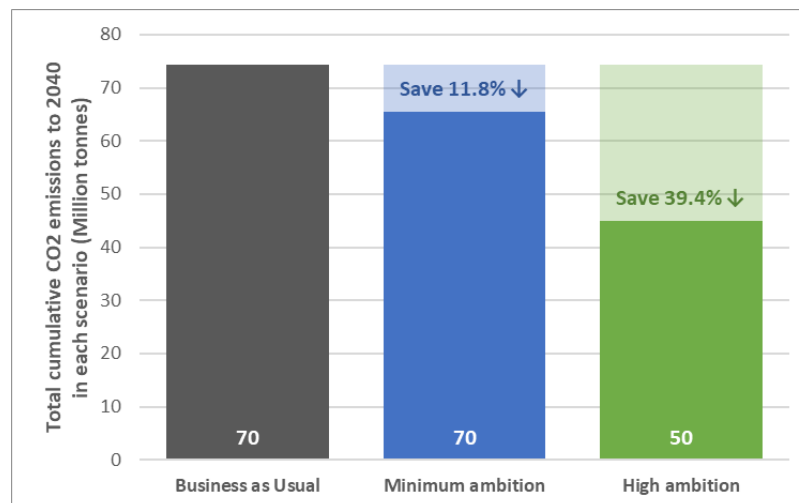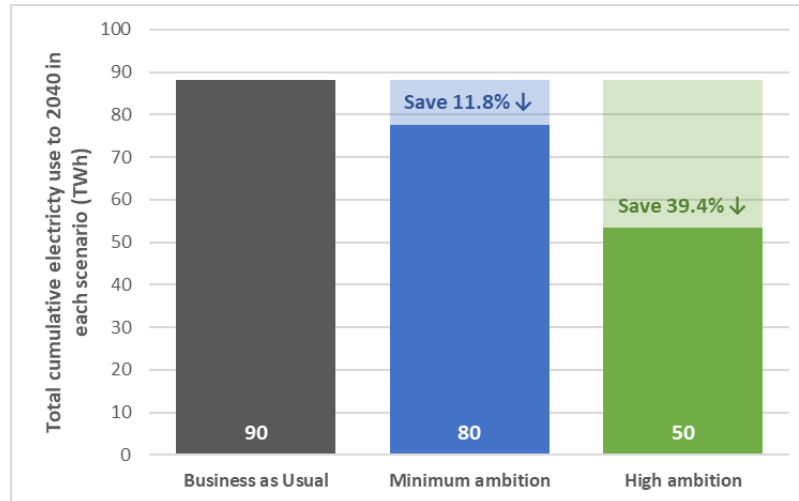Equivalent to over **300 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: ── Business as Usual ── Minimum ambition ─ ─ High ambition

Y-axis: Annual Electricity Use of ceiling fans (TWh) — 0 to 7

X-axis: 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040

1 TWh

3 TWh

By 2040, electricity consumption is projected to increase by **176%**

Minimum ambition policies could reduce this increase to **122%**

More ambitious policies could make this a decrease of **-2%**

Annual savings in 2040 under both scenarios are being denoted.

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COUNTRY SAVINGS ASSESSMENT FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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

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

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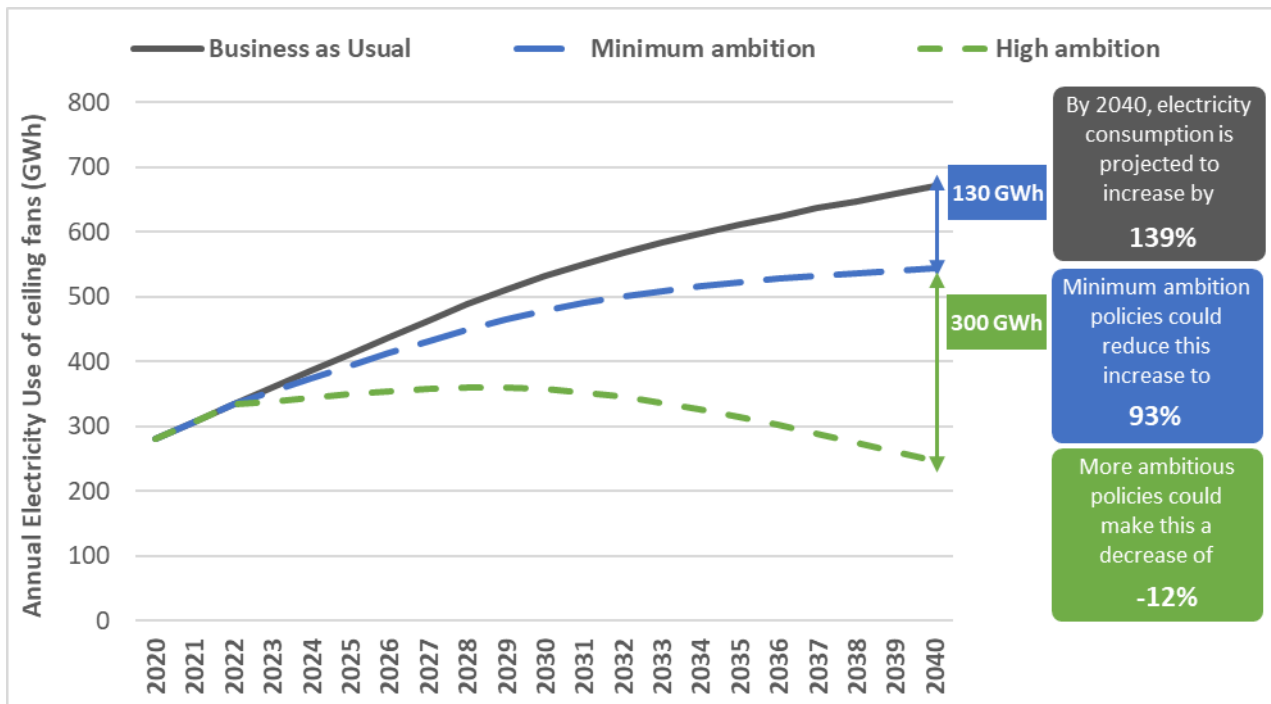
Equivalent to more than **1 power plant [20MW]**

Reduce electricity CO_2 emissions by **66 million tonnes**

Equivalent to over **20 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend:
— Business as Usual
— Minimum ambition
- - High ambition

Y-axis: Annual Electricity Use of ceiling fans (GWh) — 0, 100, 200, 300, 400, 500, 600, 700, 800

X-axis: 2020–2040

130 GWh
300 GWh

By 2040, electricity consumption is projected to increase by **139%**

Minimum ambition policies could reduce this increase to **93%**

More ambitious policies could make this a decrease of **-12%**

Annual savings in 2040 under both scenarios are being denoted.

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CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040
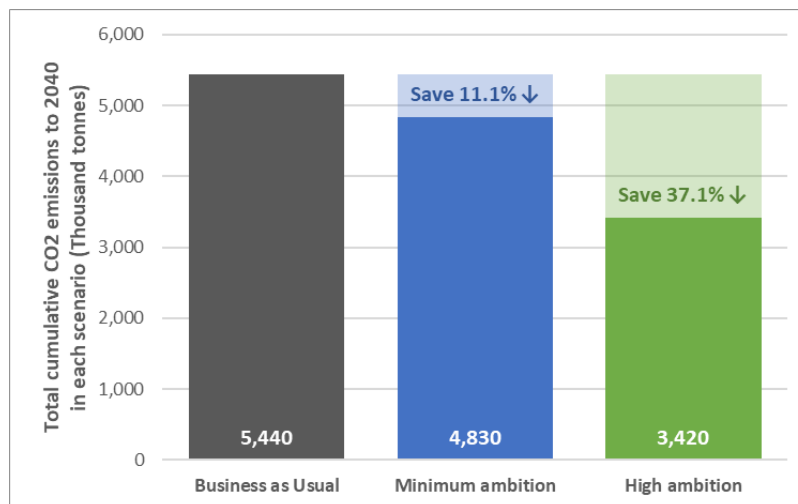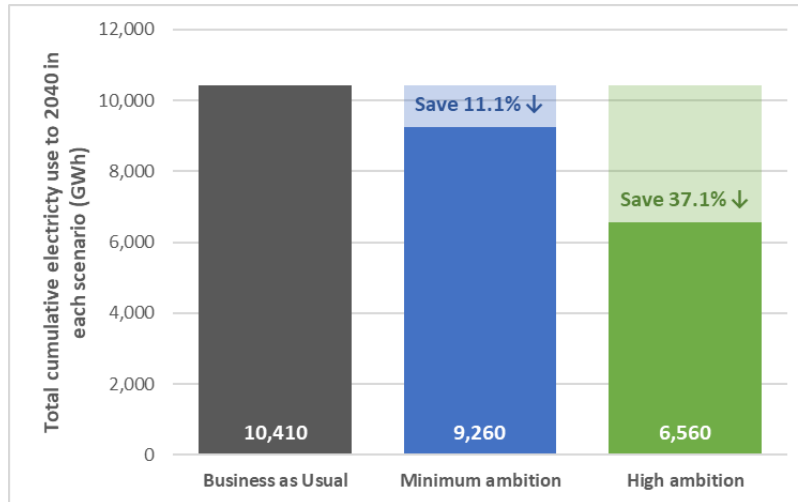
MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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

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

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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 CO_2 emissions by **500 million tonnes**
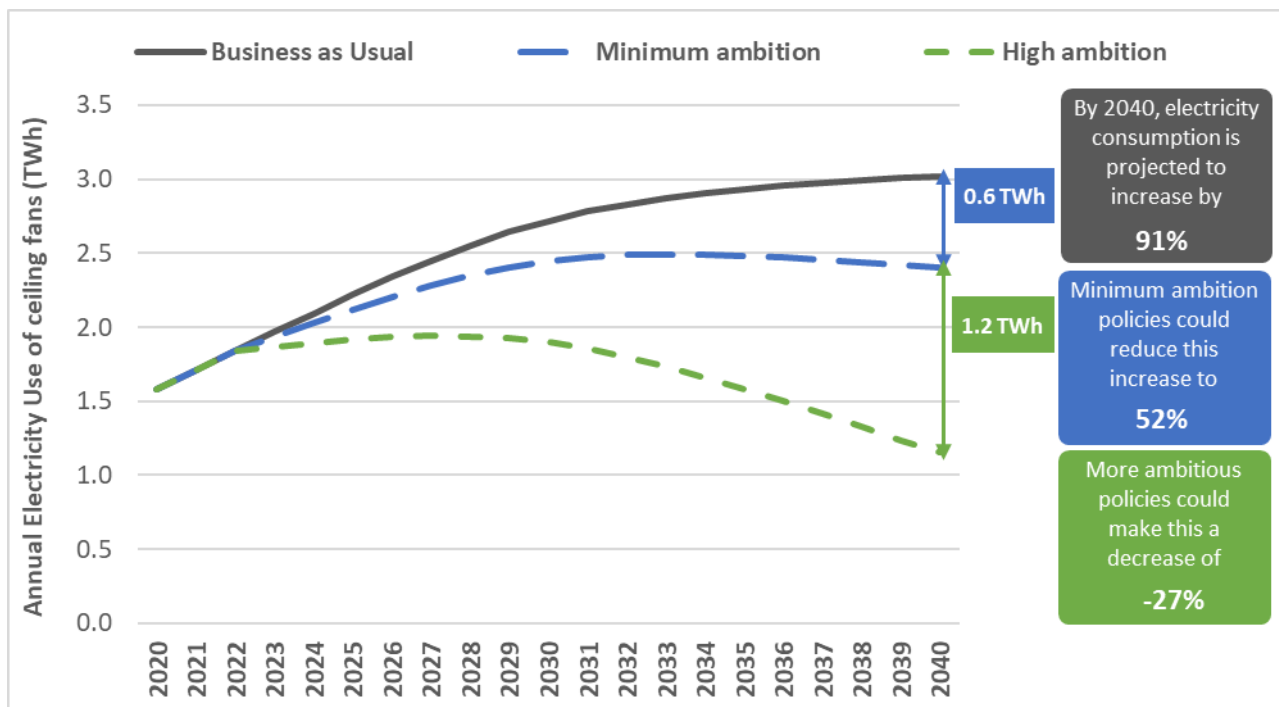
Equivalent to over **150 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

— Business as Usual — Minimum ambition - - High ambition

Annual Electricity Use of ceiling fans (TWh)

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040

0.6 TWh

1.2 TWh

By 2040, electricity consumption is projected to increase by **91%**

Minimum ambition policies could reduce this increase to **52%**

More ambitious policies could make this a decrease of **-27%**

Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040
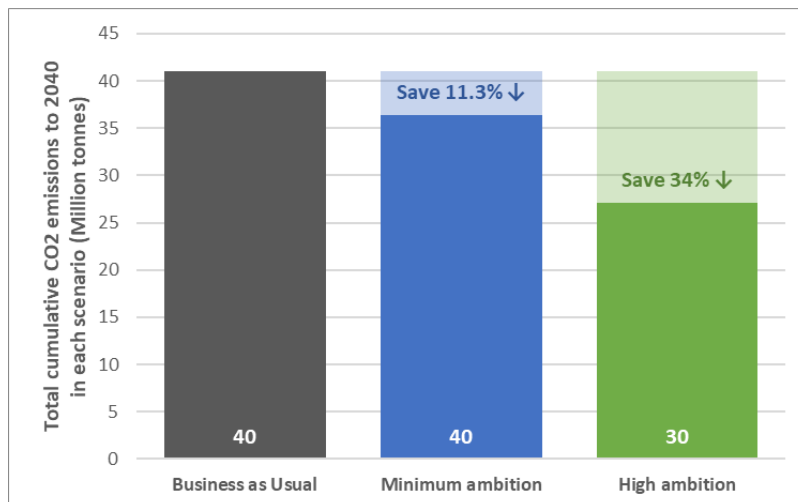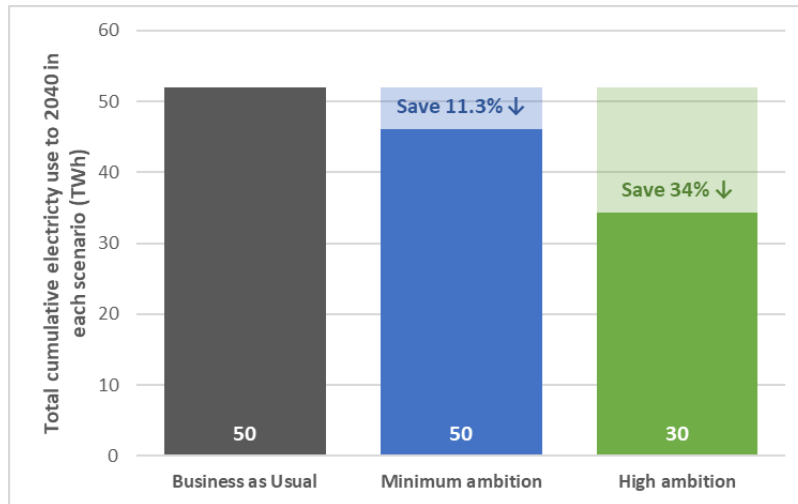
MACROECONOMIC DATA AND TYPICAL ASSUMPTIONS FOR CEILING FANS

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 m³/min	Size (mm)	Service value (m³/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 CO_2 emissions by **140 million tonnes**

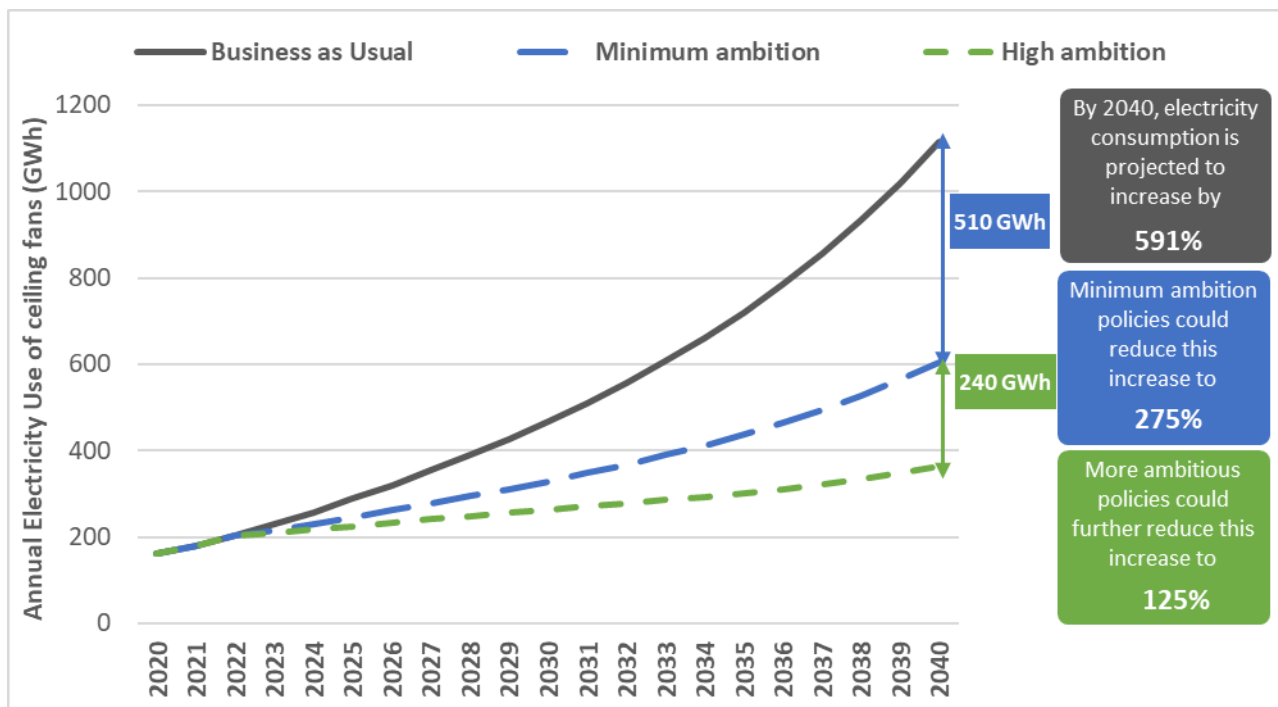Equivalent to over **42 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend:
— Business as Usual   — Minimum ambition   --- High ambition

Y-axis: Annual Electricity Use of ceiling fans (GWh) — 0, 200, 400, 600, 800, 1000, 1200

X-axis: 2020–2040

510 GWh

240 GWh

By 2040, electricity consumption is projected to increase by **591%**

Minimum ambition policies could reduce this increase to **275%**

More ambitious policies could further reduce this increase to **125%**

Annual savings in 2040 under both scenarios are being denoted.

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COUNTRY SAVINGS ASSESSMENT FOR CEILING FANS

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040

Total cumulative electricity use to 2040 in each scenario (GWh)

- Business as Usual: 10,900
- Minimum ambition: 7,180 — Save 34.2% ↓
- High ambition: 5,400 — Save 50.4% ↓

Total cumulative CO2 emissions to 2040 in each scenario (Thousand tonnes)

- Business as Usual: 2,940
- Minimum ambition: 1,930 — Save 34.2% ↓
- High ambition: 1,460 — Save 50.4% ↓

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 m³/min	Size (mm)	Service value (m³/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

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

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 CO_2 emissions by **60 million tonnes**

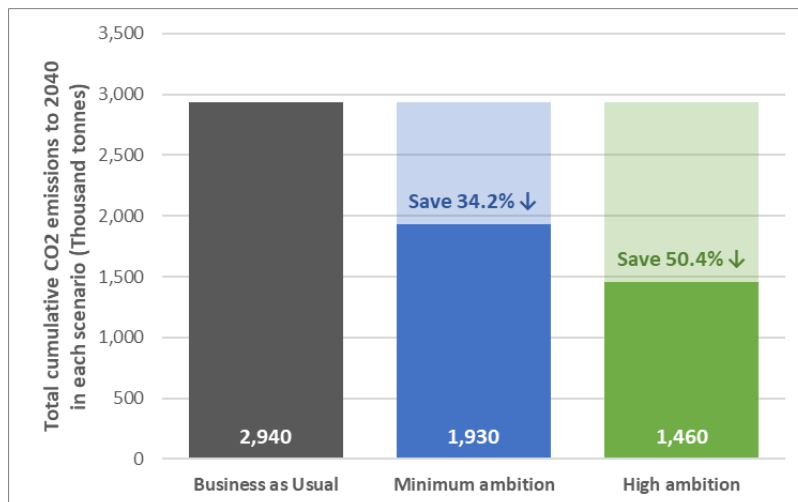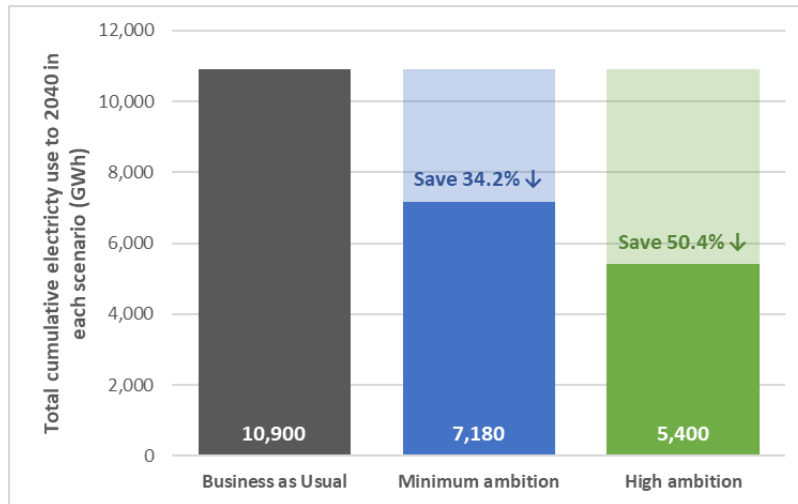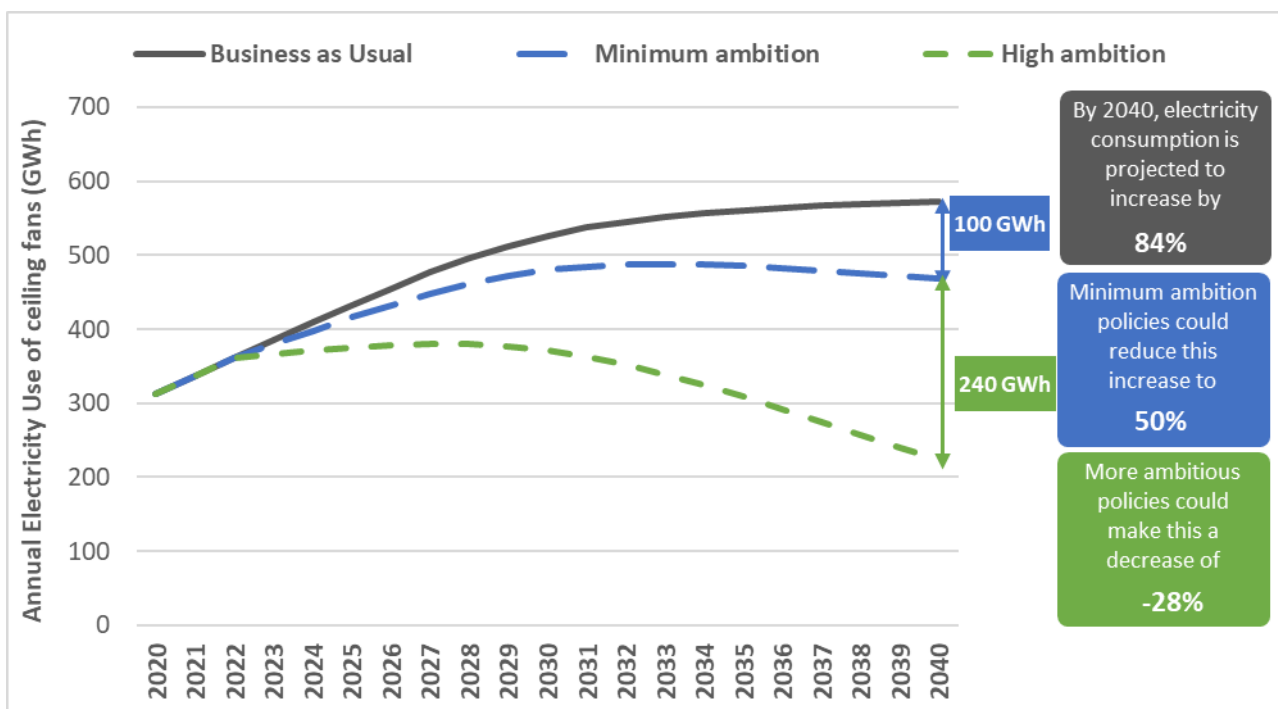Equivalent to over **18 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Business as Usual — Minimum ambition — High ambition

Annual Electricity Use of ceiling fans (GWh)

700
600
500
400
300
200
100
0

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040

100 GWh

240 GWh

By 2040, electricity consumption is projected to increase by **84%**

Minimum ambition policies could reduce this increase to **50%**

More ambitious policies could make this a decrease of **-28%**

Annual savings in 2040 under both scenarios are being denoted.

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COUNTRY SAVINGS ASSESSMENT FOR CEILING FANS

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040

Total cumulative electricity use to 2040 in each scenario (GWh)

| Business as Usual | Minimum ambition | High ambition |
| 10,030 | 9,030 Save 9.9% ↓ | 6,720 Save 33% ↓ |

Total cumulative CO2 emissions to 2040 in each scenario (Thousand tonnes)

| Business as Usual | Minimum ambition | High ambition |
| 5,750 | 5,180 Save 9.9% ↓ | 3,850 Save 33% ↓ |

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 m³/min	Size (mm)	Service value (m³/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

![Clean Cooling COLLABORATIVE logo]   ![UN environment programme logo]

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 more than **2 power plants [20MW]**

Reduce electricity CO_2 emissions by **215 million tonnes**

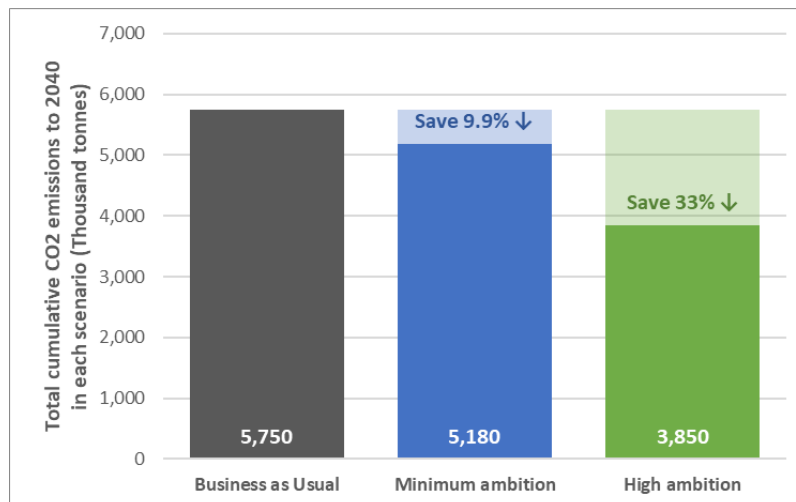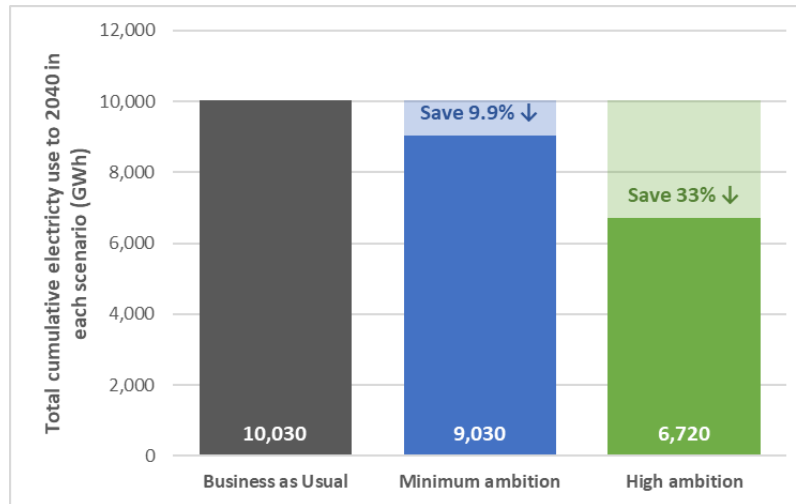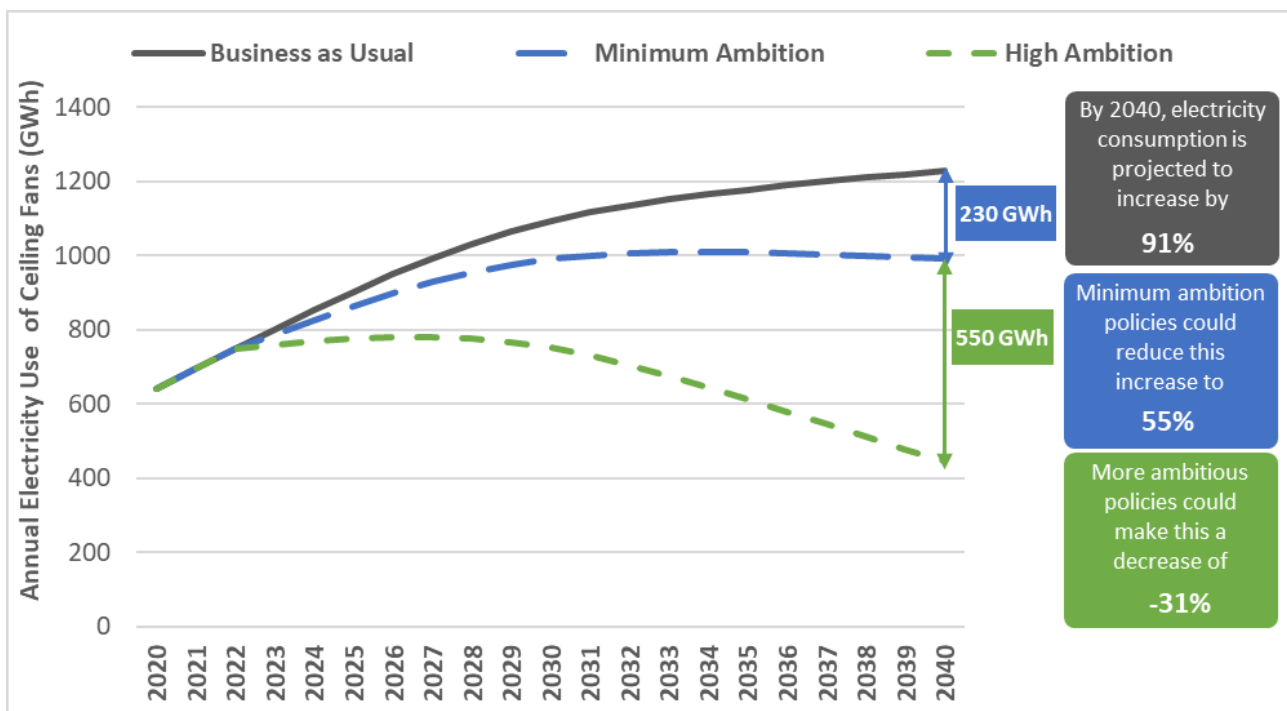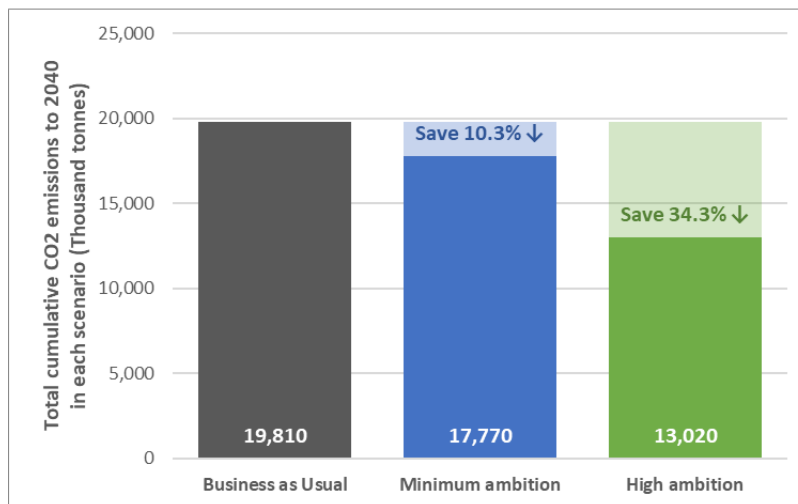Equivalent to over **67 thousand passenger cars**

MORE AMBITIOUS POLICY ENABLES MORE ELECTRICITY SAVINGS

Legend: Business as Usual — Minimum Ambition — High Ambition

Y-axis: Annual Electricity Use of Ceiling Fans (GWh) — 0, 200, 400, 600, 800, 1000, 1200, 1400

X-axis: 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040

230 GWh

550 GWh

By 2040, electricity consumption is projected to increase by **91%**

Minimum ambition policies could reduce this increase to **55%**

More ambitious policies could make this a decrease of **-31%**

Annual savings in 2040 under both scenarios are being denoted.

CUMULATIVE ELECTRICITY USE AND CARBON EMISSIONS BY 2040

Total cumulative electricity use to 2040 in each scenario (GWh)

- Business as Usual: 21,550
- Minimum ambition: 19,340 — Save 10.3% ↓
- High ambition: 14,170 — Save 34.3% ↓

Total cumulative CO2 emissions to 2040 in each scenario (Thousand tonnes)

- Business as Usual: 19,810
- Minimum ambition: 17,770 — Save 10.3% ↓
- High ambition: 13,020 — Save 34.3% ↓

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 m³/min	Size (mm)	Service value (m³/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

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