CLIMATE AND HEALTH COUNTRY PROFILE – 2017

JAMAICA

World Health Organization

United Nations Framework Convention on Climate Change

OVERVIEW

Jamaica is one of the largest and most populous islands in the Caribbean, with 1,022 km of coastline and over two and a half million residents. Jamaica has a rich cultural history and diverse tropical geography from the waterfalls of the famous Blue Mountains to the island's white sand beaches, making it a popular destination for tourism. Like many neighbouring Caribbean states, the Jamaican health system and economy are susceptible to the direct and indirect effects of climate change. Tropical storms, sea level rise, and the changing distribution and outbreaks of vector-borne diseases present major risks for population health and will also have an impact on critical aspects of Jamaica's economy such as tourism and agriculture. Over the past two decades the island has been impacted by major hurricanes causing extensive damage. Extreme weather events are anticipated to increase in intensity, emphasizing the importance of resilient infrastructure and health systems. Likewise, recent outbreaks of vector-borne diseases such as chikungunya and Zika highlight the need for climate-sensitive infectious disease surveillance and prevention.

SUMMARY OF KEY FINDINGS

- In Jamaica, under a high emissions scenario, mean annual temperature is projected to rise by about 3.6°C on average from 1990 to 2100. If global emissions decrease rapidly, the temperature rise is limited to about 1.1°C. Increases in heat wave days and drought conditions are also expected [page 2].
- Climate change is expected to increase the risk of vector-borne diseases in Jamaica including an increase in the potential for dengue fever transmission [page 4].
- Outdoor air pollution in several Jamaican cities in 2012 was higher than the WHO recommended guideline values. Air pollutants, such as fine particulate matter, pose a substantial risk to health [page 5].

OPPORTUNITIES FOR ACTION

Jamaica is currently implementing projects on health adaptation to climate change and has implemented actions to build institutional and technical capacities to work on climate change and health. There are opportunities for action in the following areas:

1) Adaptation

- Develop a national health adaptation strategy to be approved by the Ministry of Health.
- Conduct a national assessment of climate change impacts, vulnerability and adaptation for health.
- Implement activities to increase the climate resilience of health infrastructure.

2) Mitigation

- Develop a national strategy for climate change mitigation that considers the health implications and co-benefits of mitigation policies.
- Conduct a valuation of the health co-benefits of climate change mitigation policies.

DEMOGRAPHIC ESTIMATES	
Population (2017)[a]	2,890 thousand
Population growth rate (2017)[a]	0.3%
Population living in urban areas (2017)[b]	55.3%
Population under five (2017)[a]	7.2%
Population 65 years and over (2017)[a]	9.7%
ECONOMIC AND DEVELOPMENT INDICATORS	
GDP per capita (current US$, 2016)[c]	4,868 USD
Total expenditure on health as % of GDP (2014)[d]	5.4%
Average annual HDI growth % (2010-2015)[e]	0.22%
HEALTH ESTIMATES	
Life expectancy at birth (2015)[f]	76 years
Under-5 mortality per 1000 live births (2016)[g]	15.3

a World Population Prospects: The 2017 Revision, UNDESA (2017)
b World Urbanization Prospects: The 2014 Revision, UNDESA (2014)
c World Development Indicators, World Bank (2017)
d Global Health Expenditure Database, WHO (2016)
e United Nations Development Programme, Human Development Reports (2016)
f Global Health Observatory, WHO (2016)
g Levels & Trends in Child Mortality Report 2017, UN Inter-agency Group for Child Mortality Estimation (2017)

1 CURRENT AND FUTURE CLIMATE HAZARDS

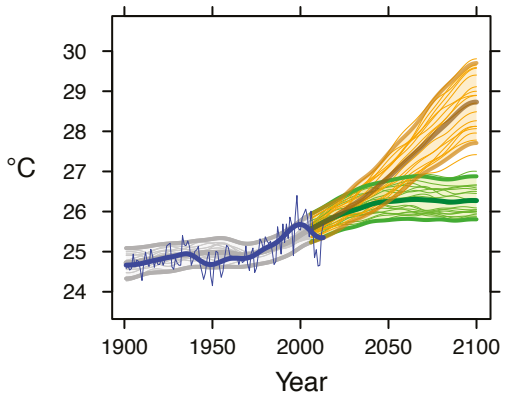
Due to climate change, many climate hazards and extreme weather events, such as heat waves, heavy rainfall and droughts, could become more frequent and more intense in many parts of the world.

Outlined here are country-specific projections up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions. Most hazards caused by climate change will persist for many centuries.

COUNTRY-SPECIFIC CLIMATE HAZARD PROJECTIONS

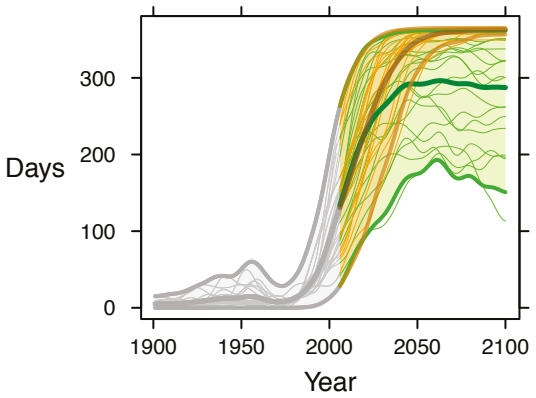
The model projections below present climate hazards under a high emissions scenario, Representative Concentration Pathway 8.5 [RCP8.5] (in orange) and a low emissions scenario, [RCP2.6] (in green).[a] The text boxes describe the projected changes averaged across about 20 models (thick line). The figures also show each model individually as well as the 90% model range (shaded) as a measure of uncertainty and, where available, the annual and smoothed observed record (in blue).[b,c] Modelling uncertainties associated with the relatively coarse spatial scale of the models compared with that of small island states are not explicitly represented. There are also issues associated with the availability and representativeness of observed data for such locations.

MEAN ANNUAL TEMPERATURE



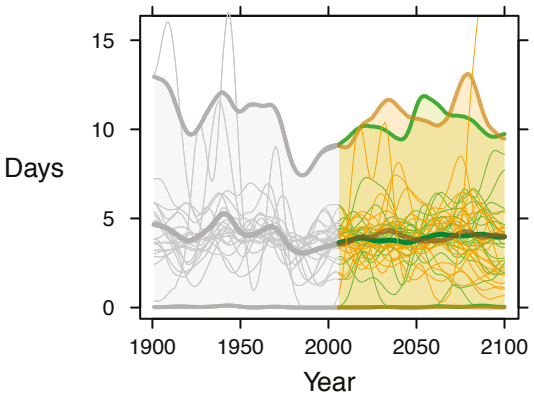
Under a high emissions scenario, mean annual temperature is projected to rise by about 3.6°C on average from 1990 to 2100. If emissions decrease rapidly, the temperature rise is limited to about 1.1°C.

DAYS OF WARM SPELL ('HEAT WAVES')



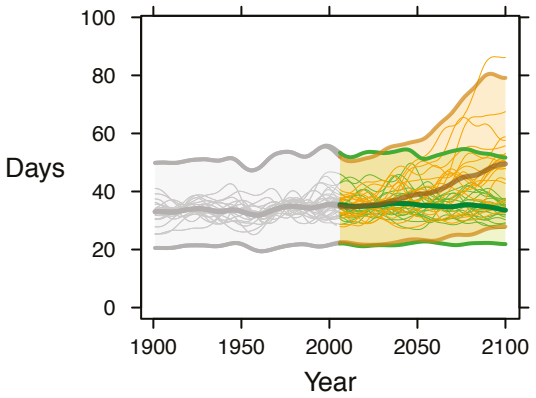
Under a high emissions scenario, the number of days of warm spell[d] is projected to increase from about 35 days in 1990 to about 360 days on average in 2100. If emissions decrease rapidly, the days of warm spell are limited to about 290 on average.

DAYS WITH EXTREME RAINFALL ('FLOOD RISK')



Under both high and low emissions scenarios, the number of days per year with very heavy precipitation (20 mm or more) is not expected to change much from an average of about 3 per year. The number of days with precipitation of 10 mm or more does however decrease somewhat under a high emissions scenario (from about 20 to about 15 days on average), with little change in such days and mean annual precipitation under a low emissions scenario.

CONSECUTIVE DRY DAYS ('DROUGHT')



Under a high emissions scenario, the longest dry spell could increase from about 35 days to about 50 days on average, suggesting greater persistence of droughts, with continuing large year-to-year variability and a few models indicating very large increases. If emissions decrease rapidly, there is no change on average. These changes are consistent with those in mean annual precipitation, which decreases by 15% on average under a high emissions scenario.

a Model projections are from CMIP5 for RCP8.5 (high emissions) and RCP2.6 (low emissions). Model anomalies are added to the historical mean (where observations are missing the ensemble mean is used) and smoothed.
b Observed historical record of mean temperature is from CRU-TSv.3.22.
c Analysis by the Climatic Research Unit and Tyndall Centre for Climate Change Research, University of East Anglia, 2015.
d A 'warm spell' day is a day when maximum temperature, together with that of at least the 6 consecutive previous days, exceeds the 90th percentile threshold for that time of the year.

2 CURRENT AND FUTURE HEALTH RISKS DUE TO CLIMATE CHANGE

Human health is profoundly affected by weather and climate. Climate change threatens to exacerbate today's health problems – deaths from extreme weather events, cardiovascular and respiratory diseases, infectious diseases and malnutrition – whilst undermining water and food supplies, infrastructure, health systems and social protection systems.

SEA LEVEL RISE & SEA SURFACE TEMPERATURES IN THE CARIBBEAN

Fig. 2.1. Climate change projections for the intermediate low (500–700 ppm CO2 e) Representative Concentration Pathway 4.5 (RCP4.5) scenario for the main small island regions.

The table shows the 25th, 50th (median), and 75th percentiles for surface temperature and precipitation based on averages from 42 Coupled Model Intercomparison Project Phase 5 (CMIP5) global models (adapted from WGI AR5 Table 14.1). Mean net regional sea level change is evaluated from 21 CMIP5 models and includes regional non-scenario components (adapted from WGI AR5 Figure 13-20).[a]

	RCP4.5 annual projected change for 2081–2100 compared to 1986–2005						
	Temperature (˚C)			Precipitation (%)			Sea level (m)
Small island region	**25%**	**50%**	**75%**	**25%**	**50%**	**75%**	**Range**
Caribbean	1.2	1.4	1.9	-10	-5	-1	0.5–0.6
Mediterranean	2.0	2.3	2.7	-10	-6	-3	0.4–0.5
Northern tropical Pacific	1.2	1.4	1.7	0	1	4	0.5–0.6
Southern Pacific	1.1	1.2	1.5	0	2	4	0.5–0.6
North Indian Ocean	1.3	1.5	2.0	5	9	20	0.4–0.5
West Indian Ocean	1.2	1.4	1.8	0	2	5	0.5–0.6

Sea level rise is one of the most significant threats to low lying areas on small islands and atolls.[a] Research indicates that global mean sea level rise rates are almost certainly accelerating as a result of climate change. Estimates point to a half meter rise in sea levels for Caribbean islands, though there is variation among models and scenarios.[a]

KEY IMPLICATIONS FOR HEALTH

Sea levels in the Caribbean are expected to rise by 0.5m to 0.6m by the end of the century. This is an urgent matter in Jamaica, where an estimated 70% of the population lives along the coastline and trends in population growth and increasing demand for land in these areas are expected to continue.[b] Models show that significant coastal land reduction of over 100km^2 due to sea level rise is likely by the end of this century.[c] Sea level rise is also significantly expected to impact Jamaica's groundwater systems including contamination of aquafers and a reduction in available clean water as well as salination of irrigation water for agriculture.[d] Jamaica's marine ecosystems, including fisheries and coral reefs, will also be affected by these trends as well as sea surface temperature changes and ocean acidification. Along with effects on biodiversity and tourism, the impacts of climate change on these ecosystems may disrupt the marine fishing sector, a major economic and livelihood activity in Jamaica with implications for food security.

a Nurse, L.A., R.F. McLean, J. Agard, L.P. Briguglio, V. Duvat-Magnan, N. Pelesikoti, E. Tompkins, and A. Webb, 2014: Small islands. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1613-1654.

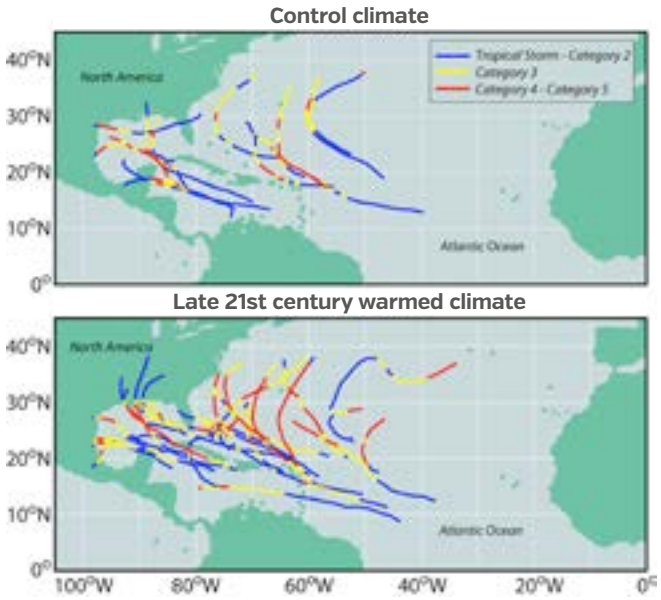
b http://www.pioj.gov.jm/portals/0/sustainable_development/jamaica_climate_change_paper.pdf

c Climate Studies Group, Mona (CSGM), 2014: Near-Term Climate Scenarios for Jamaica (Technical Report). Produced for the Planning Institute of Jamaica (PIOJ), Kingston Jamaica.

d Food and Agriculture Association of the United Nations, 2013: Climate Change and Agriculture in Jamaica Agriculture Sector Support Analysis.

EXTREME WEATHER EVENTS IN THE CARIBBEAN

Fig. 2.2. Tracks for all storms reaching category 4 or 5 intensity, for the control and the warmed 18-model ensemble conditions, as obtained using the GFDL/NWS hurricane model. Model projections indicate that tropical storms and hurricanes in the Caribbean region will increase in intensity due to climate change but not necessarily in frequency towards the end of the century.[a]



NWS version (GFDL)

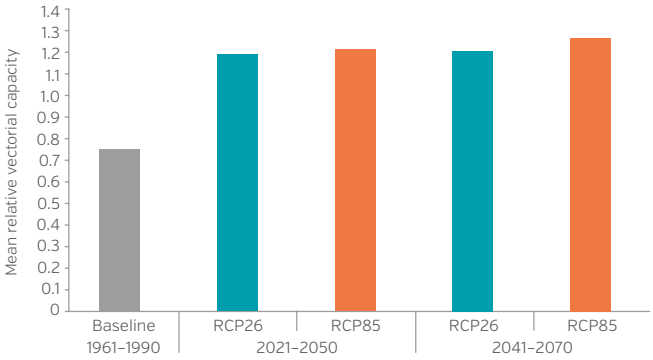
KEY IMPLICATIONS FOR HEALTH

Populations in small islands are particularly vulnerable to the direct and indirect impacts of weather-related disasters.

Extreme weather and climate events such as tropical cyclones, storm surges and flooding can lead to drowning, injuries, increased disease transmission, and health problems associated with the disruption of safe water supplies and sanitation services.[b] Long-term consequences of extreme weather events can also include an increase in mental health stresses and displacement for the population.

INFECTIOUS AND VECTOR-BORNE DISEASES

Fig. 2.3. Mean relative vectorial capacity for dengue fever transmission in Jamaica



The mean relative vectorial capacity for dengue fever transmission is projected to increase towards 2070 under both a high and low emissions scenario.

Source: Rocklöv, J., Quam, M. et al., 2015).[c]

KEY IMPLICATIONS FOR HEALTH

Some of the worlds most virulent infections are also highly sensitive to climate: temperature, precipitation and humidity have a strong influence on the life-cycles of the vectors and the infectious agents they carry and influence the transmission of water and food-borne diseases.[d]

Socioeconomic development and health interventions are driving down burdens of several infectious diseases, and these dengue projections assume that this will continue. However, climate conditions are projected to become significantly more favourable for transmission, slowing progress in reducing burdens, and increasing the populations at risk if control measures are not maintained or strengthened.[e]

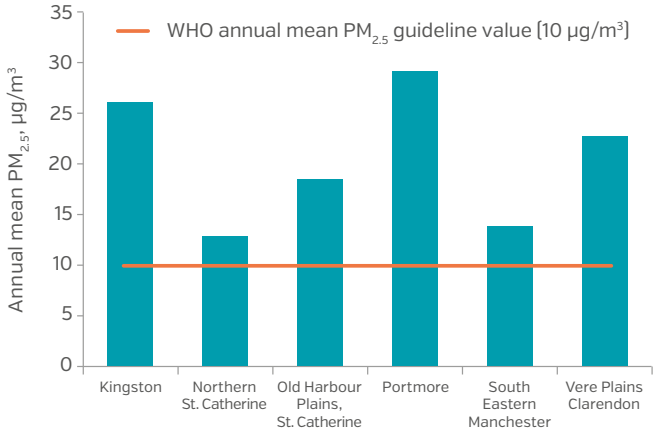
a Bender, M.A., et al. [2010]. Modeled Impact of Anthropogenic Warming on the Frequency of Intense Atlantic Hurricanes. Science Vol 327, Issue 5964, pp. 454-458.
b Nurse, L.A., R.F. McLean, J. Agard, L.P. Briguglio, V. Duvat-Magnan, N. Pelesikoti, E. Tompkins, and A.Webb, 2014: Small islands. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1613-1654.
c Country-level analysis, completed in 2015, was based on health models outlined in the Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014. The mean of impact estimates for three global climate models are presented. Models assume continued socioeconomic trends (SSP2 or comparable).
d Atlas of Health and Climate, World Health Organization and World Meteorological Organization, 2012.
e Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014.

3 CURRENT EXPOSURES AND HEALTH RISKS DUE TO AIR POLLUTION

Many of the drivers of climate change, such as inefficient and polluting forms of energy and transport systems, also contribute to air pollution. Air pollution is now one of the largest global health risks, causing approximately seven million deaths every year. There is an important opportunity to promote policies that both protect the climate at a global level, and also have large and immediate health benefits at a local level.

OUTDOOR AIR POLLUTION EXPOSURE

Outdoor air pollution in Jamaican cities annual mean $PM_{2.5}$ (µg/m³) 2012*



KEY IMPLICATIONS FOR HEALTH

Outdoor air pollution can have direct and sometimes severe consequences for health.

Fine particles which penetrate deep into the respiratory tract subsequently increase mortality from respiratory infections, lung cancer and cardiovascular disease.

The cities for which there was air pollution data available had annual mean $PM_{2.5}$ levels that were above the WHO guideline value of 10 µg/m³.

Source: Ambient Air Pollution Database, WHO, May 2016.

*A standard conversion has been used, see source for further details.

HOUSEHOLD AIR POLLUTION

JAMAICA

Percentage of population primarily using solid fuels for cooking (%), 2013

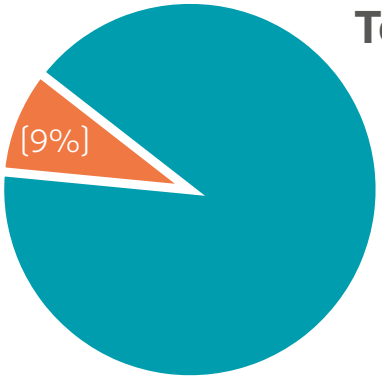
RURAL AREAS **19**

URBAN AREAS **5**

NATIONAL TOTAL **11**

Source: Global Health Observatory, data repository, World Health Organization, 2013

Per cent of total deaths from ischaemic heart disease, stroke, lung cancer, chronic obstructive pulmonary disease (18 years +) and acute lower respiratory infections (under 5 years) attributable to household air pollution, 2012



Total Deaths: 6,234

Attributable to household air pollution

KEY IMPLICATIONS FOR HEALTH

Air pollution in and around the home is largely a result of the burning of solid fuels (biomass or coal) for cooking.

Women and children are at a greater risk for disease from household air pollution. Consequently, household air pollution is responsible for a larger proportion of the of total number of deaths from ischaemic heart disease, stroke, lung cancer and COPD in women compared to men.[a]

Source: Global Health Observatory, data repository, World Health Organization, 2012

a Annu. Rev. Public. Health. 2014.35:185-206. http://www.who.int/phe/health_topics/outdoorair/databases/HAP_BoD_results_March2014.pdf?ua=1

4 CO-BENEFITS TO HEALTH FROM CLIMATE CHANGE MITIGATION: A GLOBAL PERSPECTIVE

Health co-benefits are local, national and international measures with the potential to simultaneously yield large, immediate public health benefits and reduce the upward trajectory of greenhouse gas emissions. Lower carbon strategies can also be cost-effective investments for individuals and societies.

Presented here are examples, from a global perspective, of opportunities for health co-benefits that could be realised by action in important greenhouse gas emitting sectors.[a]

Transport

Transport injuries lead to 1.2 million deaths every year, and land use and transport planning contribute to the 2–3 million deaths from physical inactivity. The transport sector is also responsible for some 14% (7.0 $GtCO_2e$) of global carbon emissions. The IPCC has noted significant opportunities to reduce energy demand in the sector, potentially resulting in a 15%–40% reduction in CO_2 emissions, and bringing substantial opportunities for health: A modal shift towards walking and cycling could see reductions in illnesses related to physical inactivity and reduced outdoor air pollution and noise exposure; increased use of public transport is likely to result in reduced GHG emissions; compact urban planning fosters walkable residential neighborhoods, improves accessibility to jobs, schools and services and can encourage physical activity and improve health equity by making urban services more accessible to the elderly and poor.

Electricity Generation

Reliable electricity generation is essential for economic growth, with 1.4 billion people living without access to electricity. However, current patterns of electricity generation in many parts of the world, particularly the reliance on coal combustion in highly polluting power plants contributes heavily to poor local air quality, causing cancer, cardiovascular and respiratory disease. Outdoor air pollution is responsible for 3.7 million premature deaths annually, 88% of these deaths occur in low and middle income countries. The health benefits of transitioning from fuels such as coal to lower carbon sources, including ultimately to renewable energy, are clear: Reduced rates of cardiovascular and respiratory disease such as stroke, lung cancer, coronary artery disease, and COPD; cost-savings for health systems; improved economic productivity from a healthier and more productive workforce.

Household Heating, Cooking and Lighting

Household air pollution causes over 4.3 million premature deaths annually, predominantly due to stroke, ischaemic heart disease, chronic respiratory disease, and childhood pneumonia. A range of interventions can both improve public health and reduce household emissions: a transition from the inefficient use of solid fuels like wood and charcoal, towards cleaner energy sources like liquefied petroleum gas (LPG), biogas, and electricity could save lives by reducing indoor levels of

Healthcare Systems

Health care activities are an important source of greenhouse gas emissions. In the US and in EU countries, for example, health care activities account for between 3–8% of greenhouse gas (CO_2-eq) emissions. Major sources include procurement and inefficient energy consumption. Modern, on-site, low-carbon energy solutions (e.g. solar, wind, or hybrid solutions) and the development of combined heat and power generation capacity in larger facilities offer significant potential to lower the

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