Ayuntamiento de Hermosillo - Cities 2019

Introduction

(0.1) Please give a general description and introduction to your city including your city's reporting boundary in the table below.

	Administrative boundary	Description of city
City boundary	Metropolitan area	Hermosillo is the capital of the Sonora State in Mexico, and a regional example in the development of farming, animal husbandry and manufacturing industries. Hermosillo is advantaged with extraordinarily extensive municipal boundaries; its metropolitan area has an extension of 1,273 km² and 727,267 inhabitants (INEGI, 2010). Located on coordinates 29°05'56"N 110°57'15"W, Hermosillo's climate is desert-arid (Köppen-Geiger classification). It has an average rainfall of 328 mm per year and an average annual maximum temperature of 34.0 degrees Celsius. Mexico's National Atlas of Zones with High Clean Energy Potential, distinguishes Hermosillo as place of high solar energy yield, with a potential of 6,000-6,249 Wh/m²/day. Hermosillo is a strategic place in Mexico's business network. Situated about 280 kilometers from the United States border (south of Arizona), Hermosillo is a key member of the Arizona-Sonora mega region and a link of the CANAMEX corridor which connects Canada, Mexico and the United States. The city is among the "top 5 best cities to live in Mexico", as declared by the Strategic Communication Office (IMCO, 2018). Hermosillo's cultural heritage, cleanliness, low cost of living, recreational amenities and skilled workforce are core characteristics that make it a stunning place to live and work. In terms of governance, Hermosillo's status as the capital of Sonora gives it a lot of institutional and political advantages, particularly in terms of access to investment programs and resources, as well as power structures that matter in urban decision-making. Hermosillo is expanding a network of public spaces and urban amenities, strengthening its identity and promoting an infill development approach to stimulate innovative and productive economies. This strategic and sustainable vision is reflected in programs such as the cyclist mobility plan and cyclist infrastructure, the Bio-cultural Park Cerro de la Campana, Hermosillo's Eco-Park, the green-infrastructure manual and IDEA (the revitalization of Hermosillo's historic central district, one of the top 7 best projects of TheCityFix Labs initiative organized by WRI Mexico). The majority of these projects were co-developed with international institutions such as the Inter-American Development Bank and the Deutsche Gesellschaft für Internationale Zusammenarbeit (German Corporation for International Cooperation, GIZ). Hermosillo is a catalyst of high value-added industries; it hosts one of the biggest Ford Motor Company factories in the world and Latecoere Hermosillo, an Airbus excellence plant, which also collaborates with Boeing. Hermosillo is embracing circular economy and it sets an example for other Mexican cities, treating 100% of its residual waters (IDB-NADBANK, Hermosillo at a human scale 2018), and hosting a variety of sustainable start-ups, such as eco-friendly product manufacturing, solar parks, a solid waste recycling program, and a green infrastructure strategic plan, among others. The Economist's Intelligence Unit (2018) foresees that by 2030 Hermosillo will become the city with the second greatest amount of economic development in Latin America; benefiting from an increase of 133% in GDP per capita, about 66.6% of its habitants are expected to earn over $15 thousand USD per annum, which will make Hermosillo an even greater place for market opportunities. In addition to its healthy business environment, Hermosillo fosters great recreational amenities. In this city you will find cultural sites, sports facilities and amusement centers, which are as easily accessible as adventures through its mountains and its beautiful beach. Furthermore, Hermosillo is located in one of the most biodiverse deserts in the world, the Sonoran Desert.

City Details

(0.3) Please provide information about your city's Mayor or equivalent legal representative authority in the table below:

	Leader title	Leader name	Current term end month	Current term end year
Please complete	Presidenta Municipal	Célida Teresa López Cárdenas	September	2021

(0.4) Please select the currency used for all financial information disclosed throughout your response.

MXN Mexican Peso

(0.5) Please provide details of your city's current population. Report the population in the year of your reported inventory, if possible.

	Current population	Current population year	Projected population	Projected population year
Please complete	727267	2010	966821	2030

(0.6) Please provide further details about the geography of your city.

	Land area of the city boundary as defined in question 0.1 (in square km)
Please complete	1273

Governance and Data Management

Governance

(1.0) Does your city incorporate sustainability goals and targets (e.g. GHG reductions) into the master planning for the city?

Yes

(1.0a) Please detail which goals and targets are incorporated in your city's master plan and describe how these goals are addressed in the table below.

Goal type	How are these goals/targets addressed in the city master plan?
Water security targets	Construction of hydro-metric sectors to control the pressure and the expense in the water network, which reflects in the decrease of leaks and the improvement of the water supply. Construction of a municipal wastewater treatment plant, supplying irrigation canals with treated water. Additionally, there are smaller capacity treatment plants strategically located to irrigate green areas with treated water. Construction of an aqueduct to transfer water from other regions of the state of Sonora to Hermosillo. Green infrastructure development, with the additional support of a green infrastructure manual.
Adaptation targets	Sustainable mobility developments focused on reducing greenhouse gas emissions: Adaptation of regulations to encourage transit-oriented developments (TOD). East Hermosillo Ring Road. Built as a Transportation Utility Corridor integrated to CANAMEX corridor, East Hermosillo Ring Road provides about 39 km of free-flow travel around the city. It improves access to logistical channels and workplaces, and helps reducing congestion within the city.
Renewable energy targets	Generation of photovoltaic energy (There are four photovoltaic facilities in Hermosillo, which generate 247 Megawatts of power and a future project of 100 additional Megawatts). The promotion of investment on renewable energy projects and circular economy. Implementation of demonstrative projects for waste-management exploitation and bio-combustible manufacturing. Inclusion of marginalized sectors of society trough rural electrification, using renewable energy.
Waste management targets	Generation of clean and sustainable energy through solid waste (biogas).
Emissions reduction targets	Elaboration of the calculation basis to quantify emission and absorption rates of land carbon sinks (agriculture, forestry and other land use). Design of an instrument to increase land carbon sinks. Development of strategy to quantify and assess the conservation of marine carbon sinks. Transition of traditional street lighting to LED street lighting.
Energy efficiency targets	Cooperation with oil manufacturing companies to reduce greenhouse gas emissions, increasing the number of projects aimed to the facility operational efficiency. Design of programs to increase the efficiency of electrical power generation, transmission and distribution.

(1.1) Has the Mayor or city council committed to climate adaptation and/or mitigation across the geographical area of the city?

Yes

(1.1a) Please select any commitments to climate adaptation and/or mitigation your city has signed and attach evidence.

Name of commitment and attach document
Individual city commitment
IMPLAN Acuerdo WRI 20190605.pdf

Type of commitment
Both

Comments
Attachment: Cooperation agreement with WRI (World Resources Institute) for TheCityFix Labs initiative. The World Resources Institute (WRI) is a global research organization that spans more than 60 countries; WRI focuses in turning ideas into action at the nexus of environment, economic opportunity and human well-being. TheCityFix Labs is a collaborative initiative between WRI Mexico and the City Foundation to help cities design business models for green infrastructure projects, through specialized advice on business and finance processes, as well as bringing together promoters, potential investors and fundraisers. WRI Mexico held TheCityFix Labs call open from November 6, 2018 to February 15, 2019 and Hermosillo was chosen as one of TheCityFix Labs initiative winners with its project “Cerro de la Campana Biocultural Park”.

Name of commitment and attach document
Other (Municipal Development Plan 2019-2021)
2019CCIIIEE Plan Municipal de Desarrollo 2019 2021.pdf

Type of commitment
Both

Comments
The Municipal Development Plan is a governmental instrument for urban planning, established in the Planning Law of the Sonora State in Mexico. It is a management tool to promote the social, economic and urban development of the municipality of Hermosillo, with a comprehensive vision in the short, medium, and long terms built with citizen participation. The Plan specify objectives, strategies, lines of action, indicators, goals and municipal development priorities; it is the basis to forecast the city's economic and social undertakings, including adaptation and mitigation actions for climate change on: Urban mobility, regulation, afforestation and reforestation, green infrastructure, awareness and campaigns to promote sustainable developments, solid waste, protected natural areas, energy efficiency, participation citizen ad governance.

Climate Hazards & Vulnerability

Risk and Vulnerability Assessment

(2.0) Has a climate change risk and vulnerability assessment been undertaken for the city area?
Yes

(2.0a) Please select the primary process or methodology used to undertake the risk and vulnerability assessment of your city.

	Primary methodology	Description
Risk assessment methodology	Other (CAPRA Method, ESCI Method, ICLEI GPC and ISO 19155.)	Hermosillo’s Climate Hazards & Vulnerability assessment was elaborated in conjunction with IDOM, (in Spanish: Ingeniería y Dirección de Obras y Montaje), the North American Development Bank and the Inter-American Bank of Development. This assessment commits to the Emerging and Sustainable Cities Initiative (ESCI) program. The study features the following primary methodologies: CAPRA Method, Comprehensive Approach to Probabilistic Risk Assessment. Using CAPRA it is possible to design risk transfer instruments, the evaluation of probabilistic cost-benefit ratio, providing an innovative tool for decision makers to analyze the net benefits of the risk mitigation strategies, such as building retrofitting. ESCI Method, as a response to the challenges of climate change and rapid urbanization, the Inter-American Development Bank launched the Emerging and Sustainable Cities Initiative to support sustainable development in medium-sized cities facing high grow rates. Considering urban planning as a key tool to tackle climate change, ESCI seeks to build greater capacity in Latin America and Caribbean cities to improve the quality of life of their citizens, to reduce their carbon footprint, and to increase resilience. ICLEI GPC, The GPC provides a robust framework for accounting and reporting city-wide greenhouse gas emissions. It help cities develop a comprehensive and robust greenhouse gas inventory in order to support climate action planning. ISO 19155, Geographic information and Place Identifier (PI) architecture. The ESCI program delivered 4 leading publications: (1) Climate change mitigation study. (2) Vulnerability and natural risks assessments. (3) Urban Growth. (4) Hermosillo at a Human Scale: The conjunction of the previous studies trough the ESCI method, which delivers a comprehensive action plan in regard of the city’s risks and opportunities.

(2.0b) Please attach and provide details on your climate change risk and vulnerability assessment. Please provide details on the boundary of your assessment, and where this differs from your city's boundary, please provide an explanation.

Publication title and attach the document
Climate change and mitigation study
IDOM Vulnerabilidad HMO 20190529 S1.pdf

Year of adoption from local government
2018

Web link
https://www.idom.com/

Boundary of assessment relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

Explanation of boundary choice where the assessment boundary differs from the city boundary
The study includes the entire municipality of Hermosillo (rural area and urban area), located in the State of Sonora in Mexico, with a population of 884,273 inhabitants in 2015.

Areas/sectors covered by the risk and vulnerability assessment
Energy
Water Supply & Sanitation
Transport
Waste Management
Environment, Biodiversity and Forestry
Industrial
Commercial
Residential
Public health
Land use planning

Primary author of assessment
International organization

Does the assessment identify vulnerable populations?
Yes

Publication title and attach the document
IDOM: Vulnerability and natural risks assessments
IDOM Vulnerabilidad HMO 20190529 S2.pdf

Year of adoption from local government
2018

Web link
https://www.idom.com/

Boundary of assessment relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

Explanation of boundary choice where the assessment boundary differs from the city boundary
This study covers the municipal territory of Hermosillo for the calculation of greenhouse gas emissions. For the determination of hydro-meteorological risks, hazards and flood risk estimates it considers the scale of the basin and hydrological sub-basin. In the descriptive section on meteorological hydrological vulnerability, events that consider the impact on the municipal territory are described.

Areas/sectors covered by the risk and vulnerability assessment
Energy
Water Supply & Sanitation
Transport
Waste Management
Environment, Biodiversity and Forestry
Industrial
Commercial
Residential
Public health
Land use planning

Primary author of assessment
International organization

Does the assessment identify vulnerable populations?
Yes

Publication title and attach the document
PACMUN (Municipality's Climate Action Plan)
PACMUN HMO SAMPLE.pdf

Year of adoption from local government
2015

Web link
Not available on internet.

Boundary of assessment relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

Explanation of boundary choice where the assessment boundary differs from the city boundary
For the calculation of greenhouse gas emissions, the entire municipal territory was quantified. In the determination of adaptation and mitigation actions, actions to cover the entire municipal territory and specific actions in urban population centers within the municipal territory were considered, Hermosillo being the largest in terms of territory and population.

Areas/sectors covered by the risk and vulnerability assessment
Energy
Water Supply & Sanitation
Transport
Food and agriculture
Waste Management
Environment, Biodiversity and Forestry
Industrial
Residential
Public health
Land use planning

Primary author of assessment
International organization

Does the assessment identify vulnerable populations?
No

Publication title and attach the document
Municipal Risk Atlas
IMPLAN Atlas de Riesgo 20190617 REDUX.pdf

Year of adoption from local government
2014

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2017/05/atlasderiesgo2.pdf

Boundary of assessment relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

Explanation of boundary choice where the assessment boundary differs from the city boundary
The study includes all of the settlements considered as urban components of the Municipality of Hermosillo: Hermosillo City, San Pedro, Miguel Alemán and Bahía de Kino. This atlas is a reliable and timely informative document to provide Hermosillo inhabitants and third party groups (e.g. investors) with up to date data about the territory's characteristics. The information is available in both printed and digital versions. The Municipal Risk Atlas, constitutes a useful instrument for the consolidation of sustainable development and an adaptation mechanism to promote, understand and prepare before Hermosillo's natural environment and its changes.

Areas/sectors covered by the risk and vulnerability assessment
Water Supply & Sanitation
Food and agriculture
Environment, Biodiversity and Forestry

Industrial
Commercial
Residential
Land use planning

Primary author of assessment
Relevant city department

Does the assessment identify vulnerable populations?
Yes

Publication title and attach the document
Hermosillo's Strategic Program for Storm Sewers and Green Infrastructure.
IMPLAN Drenaje Verde REDUXv4.pdf

Year of adoption from local government
2018

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2018/10/PROGRAMA-DE-DRENAJE-PLUVIAL-E-INFRAESTRUCTURA-VERDE-DEL-CENTRO-DE-POBLACI%C3%93N-DE-HERMOSILLO-2018.pdf

Boundary of assessment relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

Explanation of boundary choice where the assessment boundary differs from the city boundary
The study considered the limits of watersheds and hydrological sub-basins for the determination of surface runoff and quantification of the risk of flooding in urban and urbanized areas. In addition, infiltration zones were identified to strengthen the aquifer capacity of the Hermosillo population center. This program considers areas for the incorporation and improvement of gray infrastructure and the application of different green infrastructure techniques in the urban environment as a mitigation measure as well as for prevention-adaptation to the effects of climate change.

Areas/sectors covered by the risk and vulnerability assessment
Water Supply & Sanitation
Transport
Environment, Biodiversity and Forestry
Residential
Land use planning

Primary author of assessment
Relevant city department

Does the assessment identify vulnerable populations?
Yes

Publication title and attach the document
Partial Program for Hermosillo's West Sector Urban Growth

Year of adoption from local government
2018

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2018/06/PPCUSO2018_2.pdf

Boundary of assessment relative to city boundary (reported in 0.1)
Smaller – covers only part of the city

Explanation of boundary choice where the assessment boundary differs from the city boundary
Hermosillo’s west sector is a strategic site for the attraction of real estate and productive developments, featuring great potential to maximize the city's capacity to attract investment, boost urban resilience and improve the environment. Due to its natural elements, Hermosillo’s west sector is susceptible for the undertaking of the local government’s green agenda and host actions to protect the ecosystem and its biodiversity, restore degraded land and revitalize deforested land. This program also includes strategic projects such as the Metropolitan Urban Park which features a constructed wetland, a wastewater treatment plant and conservation areas for the prevention of flood and rain water conduction; finally, this program also includes developments for pedestrian and cyclist mobility with a green infrastructure approach. Hermosillo’s west sector comprises 4,609.28 hectares. It is 1,242.16 hectares for the urban area, 2,348.95 ha. for urbanization developments and 1,018.17 hectares for natural conservation.

Areas/sectors covered by the risk and vulnerability assessment
Water Supply & Sanitation
Transport
Food and agriculture
Environment, Biodiversity and Forestry
Industrial
Commercial
Residential
Education
Community & Culture
Land use planning
Tourism

Primary author of assessment
Relevant city department

Does the assessment identify vulnerable populations?
Yes

Climate Hazards

(2.1) Please list the most significant climate hazards faced by your city and indicate the probability and consequence of these hazards, as well as the expected future change in frequency and intensity. Please also select the most relevant assets or services that are affected by the climate hazard and provide a description of the impact.

Climate Hazards
Extreme hot temperature > Heat wave

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
High

Current consequence of hazard
Medium High

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased demand for public services
Increased demand for healthcare services
Increased risk to already vulnerable populations
Increased resource demand

Future change in frequency
Not expected to happen in the future

Future change in intensity
Increasing

When do you first expect to experience those changes?
Short-term (by 2025)

Most relevant assets / services affected overall
Energy
Water supply & sanitation
Transport
Food & agriculture
Waste management
Environment, biodiversity, forestry
Industrial
Commercial
Residential

Education
Tourism
Public health
Society / community & culture
Land use planning

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities
Persons with chronic diseases
Low-income households
Unemployed persons
Persons living in sub-standard housing

Magnitude of expected future impact
High

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
Heat waves have a high impact on energy demand for the cooling of buildings and are a deterrent for most of the activities carried out in public spaces, which detriments mobility, recreational, educational, work activities as well as public health of all inhabitants of the population center.

Climate Hazards
Water Scarcity > Drought

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
High

Current consequence of hazard
High

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased demand for public services
Increased demand for healthcare services
Increased risk to already vulnerable populations
Increased conflict and/or crime
Increased resource demand
Loss of traditional jobs
Migration from rural areas to cities

Future change in frequency
Increasing

Future change in intensity
Increasing

When do you first expect to experience those changes?
Short-term (by 2025)

Most relevant assets / services affected overall
Energy
Water supply & sanitation
Transport
Food & agriculture
Waste management
Environment, biodiversity, forestry
Industrial
Commercial

Residential
Education
Tourism
Public health
Society / community & culture
Emergency services
Land use planning

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities
Persons with chronic diseases
Low-income households
Unemployed persons
Persons living in sub-standard housing

Magnitude of expected future impact
High

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
The shortage of surface water in Hermosillo turns groundwater into the city's main source of water supply. Currently, due to unsustainable management, the aquifers located along the coastal zone are in a state of over-exploitation, besides presenting saline intrusion problems. This has impacted reducing agricultural, livestock and forestry activities; thus, local government has enforced temporary prohibitions of water extraction in certain areas and rationed water supply. Currently, a portion of the water available in the urban area is brought through an aqueduct that transfers water from the El Novillo Dam, in the municipality of Soyopa, 150 kilometers away from the population center of Hermosillo.

Climate Hazards
Extreme Precipitation > Rain storm

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
Medium High

Current consequence of hazard
Medium High

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased demand for public services
Increased demand for healthcare services
Increased risk to already vulnerable populations
Increased conflict and/or crime
Increased resource demand

Future change in frequency
Increasing

Future change in intensity
Increasing

When do you first expect to experience those changes?
Short-term (by 2025)

Most relevant assets / services affected overall
Energy
Water supply & sanitation
Transport
Food & agriculture
Environment, biodiversity, forestry

Industrial
Commercial
Residential
Education
Public health
Emergency services

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities
Persons with chronic diseases
Low-income households
Unemployed persons
Persons living in sub-standard housing

Magnitude of expected future impact
Medium

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
High temperatures cause adverse health effects, typically associated with the exposure to extreme heat and/or extreme temperature changes (e.g. walking home when its 45°C outside, while in the office or in the car it was 20°C). This increases the costs of the health system and heightens the demand of energy for cooling appliances. Summer lasts approximately 4 months, from May 23 to September 21, with average daily maximum temperatures over 37 ° C.

Climate Hazards
Chemical change > Salt water intrusion

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
High

Current consequence of hazard
High

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased demand for public services
Increased demand for healthcare services
Increased risk to already vulnerable populations
Increased conflict and/or crime
Increased resource demand
Loss of traditional jobs
Migration from rural areas to cities
Loss of tax base to support public services

Future change in frequency
Increasing

Future change in intensity
Increasing

When do you first expect to experience those changes?
Medium-term (2026-2050)

Most relevant assets / services affected overall
Water supply & sanitation
Food & agriculture
Environment, biodiversity, forestry
Industrial
Commercial

Residential
Public health
Land use planning

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities
Persons with chronic diseases
Low-income households
Unemployed persons
Persons living in sub-standard housing

Magnitude of expected future impact
High

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
Saline intrusion in aquifer deposits prevents the exploitation of water. It impacts by reducing the economic activities of the area, and the development of its industrial vocations. It also affects the proliferation of flora and fauna, breaking the ecological balance.

Climate Hazards
Chemical change > Atmospheric CO2 concentrations

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
Medium

Current consequence of hazard
Medium

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased demand for healthcare services
Increased risk to already vulnerable populations
Increased resource demand

Future change in frequency
Increasing

Future change in intensity
Increasing

When do you first expect to experience those changes?
Medium-term (2026-2050)

Most relevant assets / services affected overall
Energy
Transport
Food & agriculture
Environment, biodiversity, forestry
Industrial
Public health
Land use planning

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities

Persons with chronic diseases
Persons living in sub-standard housing

Magnitude of expected future impact
Medium

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
In a business as usual scenario, the balance of emissions per capita would reach 10.80 t CO2e in year 2050, that is, 24% more than in 2015 (8.6 t CO2e).

Climate Hazards
Wild fire > Forest fire

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
Medium High

Current consequence of hazard
Medium High

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased risk to already vulnerable populations
Increased conflict and/or crime
Increased resource demand
Loss of tax base to support public services

Future change in frequency
None

Future change in intensity
None

When do you first expect to experience those changes?
Immediately

Most relevant assets / services affected overall
Water supply & sanitation
Food & agriculture
Waste management
Environment, biodiversity, forestry
Industrial
Commercial
Residential
Public health
Society / community & culture

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities
Persons with chronic diseases
Low-income households
Persons living in sub-standard housing

Magnitude of expected future impact
Medium

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
The incidence of fires increases during the hottest and driest months. Hermosillo is very susceptible to: Spontaneous fires in vacant lots or abandoned houses filled with dead grass and garbage, fires attributed to electric overload (since there is a heightened demand of energy for cooling appliances) and fires in cardboard houses (at the most vulnerable sectors of the city).

Climate Hazards
Biological hazards > Vector-borne disease

Did this hazard significantly impact your city before 2019?
Yes

Current probability of hazard
Medium High

Current consequence of hazard
Medium High

Social impact of hazard overall
Fluctuating socio-economic conditions
Increased incidence and prevalence of disease and illness
Increased demand for healthcare services
Increased resource demand

Future change in frequency
None

Future change in intensity
Increasing

When do you first expect to experience those changes?
Short-term (by 2025)

Most relevant assets / services affected overall
Education
Public health
Emergency services

Please identify which vulnerable populations are affected
Women & girls
Children & youth
Elderly
Indigenous population
Marginalized groups
Persons with disabilities
Persons with chronic diseases
Low-income households
Persons living in sub-standard housing

Magnitude of expected future impact
Medium

Please describe the impacts experienced so far, and how you expect the hazard to impact in the future
Between 2010 and 2015 Sonora concentrated more than 60% of dengue cases in the last 20 years (at a national scale); however, there has been a consistent decline of dengue cases after 2015: There was about 3,300 people infected with dengue during 2015, about 200 people in 2016, 160 individuals during 2017 and 26 in 2018 (which represents about 0.8% of 2015's cases of infection). This favorable change stems from entomological control actions, education, fumigation and the identification of mosquito hatcheries in homes. Other remarkable vector-borne diseases include zika and chikungunya, which also are transmitted by mosquitoes and rickettsia (transmitted by ticks); said diseases proliferate during the rainy season of summer, when water accumulates and does not infiltrate (allowing the incubation of the transmission vectors).

(2.2) Please identify and describe the factors that most greatly affect your city's ability to adapt to climate change and indicate how those factors either support or challenge this ability.

Factors that affect ability to adapt	Support / Challenge	Please describe the factor and the degree to which it supports or challenges the adaptive capacity of your city
Access to basic services	Support	The city presents a low gross density (53 inhabitants per hectare) in an oversized extension of land: approximately 17,000 hectares. Since 2000, Hermosillo has been expanding into private land located in the periphery where single family homes are settled. This model of expansion has drawn people away from their places of work and distanced them from basic services and public spaces, generating sizeable inner city displacement and impacting the efficiency of the transport system (City design, planning & policy innovation: The case of Hermosillo. Harvard GSD & IADB, 2018).
Access to healthcare	Support	Universality in healthcare services provision is an essential topic for Hermosillo, it accounts for 60 medical facilities, in addition to 21 medical homes and 27 technical homes; such organisms not only provide attention to local, but also foreign individuals seeking specialized attention, which demonstrates the high & sustainable performance of Hermosillo's Healthcare sector (IADB, Hermosillo at human scale 2018).
Access to education	Support	Hermosillo is the economic pole of Mexico's Northwest and a reference in the State of Sonora, for this reason it also is an important center for higher education, as both education, research and training are the basis of a strong & sustainable economy. As a key element in the city's development, there are more than 20 higher education institutions in Hermosillo, which offer more than 200 professional careers and important research centers.
Cost of living	Support	Hermosillo accounts as one of the top 5 best cities to live in Mexico, as revealed by the study "The Most Livable Cities in Mexico, 2018" by the Strategic Communication Office (in Spanish: Gabinete de Comunicación Estratégica "GCE"). Hermosillo's cultural heritage, low cost of living, recreational amenities and skilled workforce are core characteristics that make it a stunning place to live and work.
Political stability	Support	The mayor of Hermosillo is among the 5 most popular nationwide. The municipality maintains a good relationship with the state and federal governments.
Political engagement / transparency	Support	The government complies and is subject to national standards of openness and transparency.
Government capacity	Support	In addition to having mechanisms for self-financing, the government has access to national and international funds.
Budgetary capacity	Challenge	The recent transition of local and federal government limited the management of capital resources in the first months of work. The situation improves as the transition is consummated.
Resource availability	Challenge	The scarcity of water and the high temperatures of the city (due to its desert-arid climate) make it difficult to establish new industries, which could affect the growth of the city and therefore cause economic lag. On the other hand, these climatic conditions also affect the vegetation coverage (diminishing its survival and increasing its maintenance cost), limiting green areas prevalence.
Community engagement	Support	Currently, there are groups of companies and citizen collectives interested in the development of the city, which facilitates the implementation of programs, works and sustainable policies.
Access to quality / relevant data	Support	In recent years, Hermosillo has developed a base of studies that support the development and implementation of its municipal action plan, the management of sustainable policies and the development of a circular economy.

Adaptation

Adaptation Actions

(3.0) Please describe the main actions you are taking to reduce the risk to, and vulnerability of, your city's infrastructure, services, citizens, and businesses from climate change as identified in the Climate Hazards section.

Climate hazards
Water Scarcity > Drought

Action
Storm water capture systems

Action title
Manual of Green Infrastructure Design for Mexican Municipalities

Status of action
Monitoring and reporting

Co-benefit area
Enhanced resilience

Disaster preparedness
Enhanced climate change adaptation
Improved resource quality (e.g. air, water)
Improved public health
Improved resource security (e.g. food, water, energy)
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Improved access to and quality of mobility services and infrastructure
Shift to more sustainable behaviours

Action description and implementation progress
Green Infrastructure is a set of urban and design elements which incorporates vegetation systems and soil management for the provision of private, public and ecosystemic services, establishing spaces to enhance collective action. Its main benefit is environmental, economic and social improvement. The concept of Green Infrastructure was immediately coined by leaders from all the states and border municipalities that gathered at three large exchange forums organized by BECC between 2014 and 2016, whose reports are on its website. These forums served to identify the challenges in the sustainability of cities based on innovative schemes. The production of the manual is the second stage of the collective efforts of BECC and NADBANK to facilitate the implementation of the Green Infrastructure in the border region. In this stage, the development of regulations that incorporate elements of Green Infrastructure, the development of training workshops and the execution of pilot interventions in border municipalities that have expressed interest in it, as well as technical and design guidelines gathered in the manual, are a tool for regional actors to improve their development projects, not only through the concrete and the rod, but also with the contribution of the living elements proposed by the green infrastructure. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
900000

Total cost provided by the local government
900000

Primary fund source
International (ODA)

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2019/06/Manual_IV3.pdf

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Climate hazards
Water Scarcity > Drought

Action
Heat mapping and thermal imaging

Action title
Technical standards, characteristics and requirements for Green Infrastructure in the Municipality of Hermosillo

Status of action
Implementation

Co-benefit area
Enhanced climate change adaptation
Improved resource efficiency (e.g. food, water, energy)
Improved resource quality (e.g. air, water)
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Shift to more sustainable behaviours

Action description and implementation progress
The characteristic and accelerated urbanization process of the last century, resulted in a lack of space for environmental or ecological purposes in Hermosillo. There is a great prevalence of hard and impermeable surfaces, which detriments water infiltration and vegetation coverage in the city, harming its biodiversity, the health of its inhabitants and the economy: There's a minimal recharge of aquifers, a growing shortage of water for human consumption, an increase in runoffs which causes flooding, loss of land and infrastructure damage due sediment deposition, a decrease of biodiversity, proliferation of urban heat islands and a general reduction of environmental services. Said problems are aggravated by climate change, which manifests itself in Hermosillo with lower total rainfall but more intense rainfall events, as well as an increase in temperatures. For this reason, the Law of

Territorial Organization and Urban Development of the State of Sonora in its Article 105, established that municipalities must elaborate their construction regulations and carry out the verification of their dispositions; likewise, the supervision of water resources, sewage systems and solid waste, in order to avoid emergencies due to floods and landslides, mitigate risks and safeguard the physical integrity of people, their goods and public goods. In order to solve the problems arising from the management of rainwater (increased runoff, loss of soil, deposit of sediments and floods), the city took two approaches: - Gray Infrastructure, also called hard infrastructure, the traditional approach around the world. It consists of drainage systems which carry water away from urban centers as soon as possible. - Green Infrastructure, a relatively new alternative which integrates green areas with strategically designed sustainable gray infrastructure developments. It contributes to solve the problems of rainwater while fulfilling multiple functions. The regulations on climate change in the municipality of Hermosillo resulted in the publication of this document on September 27, 2018, which currently covers real estate development, construction, urbanization, afforestation, preservation of the environment, control of risks and municipal water management. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
400000

Total cost provided by the local government
400000

Primary fund source
Local

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2019/02/BOLETIN-OFICAL-NTIV-2018CCII26II-.pdf

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Climate hazards
Water Scarcity > Drought

Action
Community engagement/education

Action title
Transform a Bulevar

Status of action
Operation

Co-benefit area
Enhanced climate change adaptation
Improved resource efficiency (e.g. food, water, energy)
Social community and labour improvements
Improved resource quality (e.g. air, water)
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Improved access to and quality of mobility services and infrastructure
Shift to more sustainable behaviours

Action description and implementation progress
In October 2018, the local government lanched an initiative to strengthen municipal public service programs for both garbage collection and maintenance of forested areas. Transform a Bulevar, aims to involve the private companies with the government to promote the conservation of the city through the maintenance, cleaning, afforestation and reforestation of public spaces, specially green areas, roads and ridges. Currently, there are 122 private companies responsible for 24 kilometers of ridges. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
500000

Total cost provided by the local government
500000

Primary fund source

Public-private partnership

Web link
Local newspaper www.elimparcial.com/sonora/hermosillo/Se-suma-empresa-al-programa-Transforma-un-bulevar-20190702-0060.html

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Climate hazards
Mass movement > Vector-borne disease

Action
Community engagement/education

Action title
Hermosillo Recycles

Status of action
Monitoring and reporting

Co-benefit area
Enhanced climate change adaptation
Reduced GHG emissions
Improved resource efficiency (e.g. food, water, energy)
Poverty reduction / eradication
Job creation
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Shift to more sustainable behaviours

Action description and implementation progress
Hermosillo Recycles was launched during September 2018 as an initiative to improve the collection of solid urban waste. At that time, the public garbage collection service was at critical status due to the lack of collection trucks, which reduced the collection frequency. The main component of the Hermosillo Recycles is active citizen participation in recycling tasks; to achieve this, the city has developed: 1. A free mobile app to inform users about garbage collection schedules and routes; it helps preventing the exposure of garbage containers on streets for prolonged times. This is possible through GPS' incorporated into the collection trucks. 2. Campaigns for the collection of inorganic materials with low degradation potential or high contamination potential (e.g. cigarette butts). The strategy involves the exchange of inorganic materials for social incentives after reaching a milestone (such as public infrastructure improvements). 3. Establishment of collection spots for inorganic materials such as cardboard, plastic, glass, electronic components. The program begun with 18 collection spots established all over the city, benefiting 300 families dedicated to waste separation in the Sanitary Landfill, facilitating the commercialization of recyclable goods in more hygienic conditions. 4. Separation of organic and inorganic waste. For years, public garbage collection did not require the separation of waste into organic or inorganic materials. The local government launched on July 30th 2019 a pilot program for the collection of garbage separated in organic and inorganic containers; the pilot stage included 18 neighborhoods. With positive outcomes, now several community leagues have requested participation, summing about 40 new neighborhoods to the program. 5. "Our family cleans Hermosillo". An initiative to promote cleaning days in public and empty spaces with the voluntary cooperation of the city's inhabitants. Added benefits include improve the urban image, preventing spontaneous fires (due to grass and garbage) and preventing the proliferation of vector-borne diseases, such as dengue, zika and chikungunya. 6. Municipal composting center. An area of 10,000 m2 for the production of compost from organic waste; the production will be destined for afforestation and reforestation projects and sale to private and civil parties (including citizens) All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
2000000

Total cost provided by the local government
2000000

Primary fund source
Local

Web link
Local newspaper (article 1/3) https://www.elimparcial.com/sonora/hermosillo/Esperan-implementar-separacion-de-basura-en-toda-la-ciudad-20190726-0001.html Local newspaper (article 2/3) https://www.elimparcial.com/sonora/hermosillo/Estas-18-colonias-se-suman-a-la-separacion-de-basura-20190807-0002.html Local newspaper (article 3/3) https://www.elimparcial.com/sonora/hermosillo/Quieren-separar-la-basura-en-40-colonias-20190826-0031.html

Climate hazards
Extreme Precipitation > Rain storm

Action
Tree planting and/or creation of green space

Action title
La Esperanza Park

Status of action
Monitoring and reporting

Co-benefit area
Disaster Risk Reduction
Enhanced resilience
Disaster preparedness
Enhanced climate change adaptation
Improved resource efficiency (e.g. food, water, energy)
Social inclusion, social justice
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Improved access to and quality of mobility services and infrastructure
Shift to more sustainable behaviours

Action description and implementation progress
The former garbage dump known as the Hoyo de Bonilla, was transformed into De la Esperanza Park. The park is equipped with playgrounds, lighting, three small plazas, pedestrian ways, two multifunctional courts, and absorption field to capture and exploit rainwater (green infrastructure), three pedestrian bridges, 8 thousand square meters of urban forest and sport's equipment. This is a place was designed for social inclusion the promotion of quality public spaces, improved public security and social cohesion. The park also improves health conditions (the garbage dump was removed from an inhabited sector) as controls flooding in the sector. Co-responsibility actions are encouraged between the government and the citizens through a Vigilance Committee. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
14000000

Total cost provided by the local government
7000000

Primary fund source
Local

Web link
http://www.mundoreal.mx/inauguran-parque-de-la-esperanza-en-hermosillo/

Climate hazards
Extreme hot temperature > Heat wave

Action
Heat mapping and thermal imaging

Action title
Edaphic zone analysis to identify potential sites for green infrastructure developments in Hermosillo City

Status of action
Pre-feasibility study

Co-benefit area
Disaster Risk Reduction
Enhanced resilience
Disaster preparedness
Enhanced climate change adaptation
Reduced GHG emissions

Improved resource efficiency (e.g. food, water, energy)
Social inclusion, social justice
Improved resource quality (e.g. air, water)
Improved public health
Improved resource security (e.g. food, water, energy)
Ecosystem preservation and biodiversity improvement
Improved access to and quality of mobility services and infrastructure
Shift to more sustainable behaviours
Improved access to data for informed decision-making

Action description and implementation progress
This study is carried out in conjunction with the Cities for Climate Program (CiClim) between the Municipal Government of Hermosillo, through the Municipal Institute of Urban Planning of Hermosillo and the German Cooperation Sustainable Development (GIZ) within the framework of the International Climate Initiative (IKI) coordinated by the German Federal Ministry of Environment. This study began in 2018 and is expected to conclude in November 2019 and comprises two stages: Stage 1: Collection and integration of geographic and hydro-meteorological information of Hermosillo City. Stage 2: Analysis of soil/land composition, permeability and detection of contaminants. The general objective is determining the most adequate site for green infrastructure developments, including: 1. Identification of flood zones. 2. Estimation of aquifer recharge zones. 3. Delimitation of the drainage network and urban watersheds. 4. Location of urban and peripheral-urban wells. 5. Mapping of atmospheric pollution deposition. 6. Mapping of the zones vulnerable to heat waves. 7. Historical behavior of rainfall and evapotranspiration. 8. Behavior and estimates of runoff in the city. 9. Feasibility map for green infrastructure developments under 2 scopes: a. Based only on aquifer recharge. b. Based on multiple ecosystem services (Heat Waves, atmospheric pollution, aquifer recharge, urban flooding). 10. Summary of previous geo-hydrological studies. Additionally, a geographic information system will be generated, which shall provide an important input for the preparation of the “Strategic Green Infrastructure Program of the Population Center of Hermosillo”. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
1041976

Total cost provided by the local government
0

Primary fund source
International (ODA)

Web link
Not available.

Climate hazards
Chemical change > Atmospheric CO2 concentrations

Action
Diversifying power/energy supply

Action title
LED Public Lighting Network

Status of action
Operation

Co-benefit area
Enhanced climate change adaptation
Reduced GHG emissions
Improved resource efficiency (e.g. food, water, energy)
Improved access to and quality of mobility services and infrastructure

Action description and implementation progress
In 2017, the local government decided to undertake the modernization of the public lighting network, through a long-term concession with a private company. As of July of 2017, about 67 thousand obsolete luminaries were replaced under the supervision of Hermosillo’s Public Lighting agency. In 2018, circa 53 thousand luminaries were replaced, with an average coverage of 80.51% against the period’s scheduled installation. The renewal of the public lighting network contemplates the change of incandescent technology luminaries to LED luminaries; thanks to this change, according to figures from the concessionaire consortium, the city’s electricity consumption will be reduced up to 35%. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
540000000

Total cost provided by the local government
540000000

Primary fund source
Local

Web link
www.hermosillo.gob.mx/descargas/3er-informe-2018.pdf

Climate hazards
Extreme Precipitation > Rain storm

Action
Air quality initiatives

Action title
Metropolitan Eco-Park

Status of action
Implementation complete but not in operation

Co-benefit area
Disaster Risk Reduction
Disaster preparedness
Enhanced climate change adaptation
Reduced GHG emissions
Improved resource efficiency (e.g. food, water, energy)
Social community and labour improvements
Improved resource quality (e.g. air, water)
Improved public health
Improved resource security (e.g. food, water, energy)
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Shift to more sustainable behaviours

Action description and implementation progress
This park is strategically located at Hermosillo's south west. It has an area of 81 hectares, and its development responds to the particular need of mitigating the high levels of PM10 particles (dust, ash, soot, cement and pollen) recorded by the air quality monitoring station in that area. These levels exceed the permissible values established by the Official Mexican Standard NOM-025-SSA1-2014 for environmental health. The park features afforestation works to control dust, neutralize the increase in temperature and prevent the decrease of flora and fauna in the area. On the other hand, the park's artificial lake (an artificial wetland) fed with water treated by Hermosillo's wastewater treatment plant, will provide currently non-existent environmental services to the area: Heat control, carbon dioxide emissions reduction, refuge and nesting for migratory and resident birds, as well as a space for aquatic flora and fauna. This project's feasibility was based on the study "Historical trends and sources of TSP in a Sonoran desert city: Can the North America Monsoon enhance dust emissions?" by Dr. Diana Meza, researcher at the University of Sonora. All of the costs presented are an estimate, the final figures might differ.

Finance status
Feasibility finalized, and finance partially secured

Total cost of the project
65000000

Total cost provided by the local government
65000000

Primary fund source
Local

Web link
www.hermosillo.gob.mx/parque-metropolitano/

Climate hazards
Chemical change > Atmospheric CO2 concentrations

Action
Air quality initiatives

Action title
Cycling and Pedestrian Mobility

Status of action
Operation

Co-benefit area
Enhanced climate change adaptation
Reduced GHG emissions
Improved public health
Improved access to and quality of mobility services and infrastructure
Shift to more sustainable behaviours

Action description and implementation progress
The present urban conditions of the city promote a greater preference for motorized mobility. Currently there are almost 400 thousand motorized vehicles in the city; the mobility sector contributes 34% of GHG emissions (BID-NADBANK, Hermosillo at a Human Scale 2017). For this reason, the local government is incorporating sustainable mobility strategies into its urban development programs, to promote non-motorized transportation methods. The city is improving its cyclist lanes and roads, including cyclist paths as part of the road networks. Currently, there are 125 kilometers of cyclist paths. Additionally, the city is including vegetation zones for ridges and pedestrian lanes (green infrastructure) which reduces heat and provides shadow cyclists and pedestrians. All of the costs presented are an estimate, the final figures might differ.

Finance status
Feasibility undertaken

Total cost of the project
0

Total cost provided by the local government
0

Primary fund source
Local

Web link
Local newspaper https://www.elimparcial.com/sonora/hermosillo/Inicia-en-octubre-peatonalizacion-del-Centro-20190817-0016.html

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Climate hazards
Extreme hot temperature > Heat wave

Action
Heat mapping and thermal imaging

Action title
Urban Resilience to Extremes Sustainability Research Network (UREx)

Status of action
Operation

Co-benefit area
Enhanced resilience
Disaster preparedness
Enhanced climate change adaptation
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Improved access to and quality of mobility services and infrastructure
Improved access to data for informed decision-making

Action description and implementation progress
Since 2016, the city of Hermosillo is a member the Urban Resilience to Extremes Sustainability Research Network (UREx SRN) which focuses on integrating social, ecological, and technical systems to devise, analyze, and support urban infrastructure

decisions in the face of climatic uncertainty. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
2100000

Total cost provided by the local government
0

Primary fund source
International (ODA)

Web link
https://sustainability.asu.edu/urbanresilience/

Climate hazards
Chemical change > Atmospheric CO2 concentrations

Action
Community engagement/education

Action title
Rolling With You (mobile app)

Status of action
Operation

Co-benefit area
Enhanced climate change adaptation
Reduced GHG emissions
Improved resource efficiency (e.g. food, water, energy)
Social inclusion, social justice
Improved resource quality (e.g. air, water)
Improved public health
Shift to more sustainable behaviours

Action description and implementation progress
The city works and integrates sustainable mobility actions with the participation of cyclist collectives. Cyclist from these organizations or collectives connect with new cyclist trough a mobile app named “Ruedo Contigo” which was developed by the local government; experienced cyclists serve as instructors and accompany new cyclists through the city (for free). All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
400000

Total cost provided by the local government
400000

Primary fund source
Local

Web link
http://ruedocontigo.implanhermosillo.gob.mx/

Climate hazards
Water Scarcity > Drought

Action
Water extraction protection

Action title
Residual Water Treatment Plant

Status of action

Operation

Co-benefit area
Enhanced resilience
Disaster preparedness
Enhanced climate change adaptation
Improved resource efficiency (e.g. food, water, energy)
Improved resource quality (e.g. air, water)
Shift to more sustainable behaviours

Action description and implementation progress
The local government has concluded the construction of a waste water plant to treat the 100% of Hermosillo's wastewater; this facility is installed outside of the city's growth limit, west of the population center. The construction of Hermosillo's wastewater treatment plant, aims for the rescue ecological zone and, and improve the recovery from the deterioration of the water bodies. The quality of treated water allows its use for agricultural purposes and irrigation of green areas. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
119000000

Total cost provided by the local government
91083000

Primary fund source
Local

Web link
http://aguadehermosillo.gob.mx/aguah/ptar/

Climate hazards
Extreme Precipitation > Rain storm

Action
Restrict development in at risk areas

Action title
Declarations of destination of the Metropolitan Park and areas of high flood risk

Status of action
Operation

Co-benefit area
Disaster Risk Reduction
Disaster preparedness
Enhanced climate change adaptation
Reduced GHG emissions
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Shift to more sustainable behaviours

Action description and implementation progress
The local government, in accordance with the General Law of Human Settlements, Territorial Planning and Urban Development, the Law of Territorial Planning and Urban Development of the State of Sonora as well as the Regulation of Urban Development and Public Space has declared for cause of Public utility 38 zones of the urban area of the city of Hermosillo. These "declarations of destination" establish criteria for the limitation or prohibition of urbanization considering the type of infrastructure such as potable water conduction works and flood mitigation, urban parks, roads and areas of high flood risk. The declarations establish the set of activities allowed in the sector as well as the design characteristics for public developments such as cyclist lanes, green infrastructure, artificial wetlands and afforestation. These declarations are mandatory and are linked to urban development programs for the population center of Hermosillo. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project

0

Total cost provided by the local government
0

Primary fund source
Local

Web link
http://www.boletinoficial.sonora.gob.mx/boletin/images/boletinesPdf/2018/04/2018CCI29I.pdf

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Climate hazards
Water Scarcity > Drought

Action
Water extraction protection

Action title
Use of treated water for industrial uses: Purple pipeline

Status of action
Scoping

Co-benefit area
Enhanced resilience
Enhanced climate change adaptation
Improved resource efficiency (e.g. food, water, energy)
Social community and labour improvements
Economic growth
Improved resource quality (e.g. air, water)
Improved resource security (e.g. food, water, energy)
Resource conservation (e.g. soil, water)
Shift to more sustainable behaviours

Action description and implementation progress
This project promotes the use treated water for industrial purposes. It aims for the reduction of water extraction and the regeneration of aquifers, in order to improve water reserves and restore critical habitats and wetlands. The total energy required to produce reclaimed water is, in general, less than that required to develop, treat and transport first-use water from long distances, from traditional water supplies. The lower energy use reduces greenhouse gas emissions in turn. Climate change and diminishing sources of water supply require creative options for the present and future needs of the liquid. Employing treated water in the industry sector would reduce operation costs and boost the sector's economic growth, considering that the availability of water in Hermosillo would not be as limiting. This project is undergoing evaluation within the Smart-Cities program. This project aims to the use of treated water for industrial purposes; however, we provide a web-link which mentions the implementation of a pilot/test project conducted in Hermosillo's Metropolitan Park, namely the purple pipeline "tubería morada" of Hermosillo's Metropolitan Park. All of the costs presented are an estimate, the final figures might differ.

Finance status
Pre-feasibility study status

Total cost of the project
0

Total cost provided by the local government
0

Primary fund source
Public-private partnership

Web link
https://www.hermosillo.gob.mx/boletines/Sala-Prensa.aspx?articleid=10068

Climate hazards
Water Scarcity > Drought

Action
Tree planting and/or creation of green space

Action title

Botanical Index (Paleta Vegetal)

Status of action
Operation

Co-benefit area
Disaster Risk Reduction
Enhanced climate change adaptation
Improved resource efficiency (e.g. food, water, energy)
Improved resource quality (e.g. air, water)
Improved public health
Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Shift to more sustainable behaviours

Action description and implementation progress
In an effort to promote the Green Infrastructure in urban areas, the local government developed the Botanical Index of Hermosillo (Paleta Vegetal de Hermosillo), an instrument that regulates the selection of plant species that must be used in the city's public spaces. According to a diagnosis prepared by the Municipal Institute of Urban Planning and Public Space (IMPLAN), it is estimated that 80% of the plants employed in the urban area are not native species of the region and even the country. This results in a loss of biodiversity and detriments the preservation of culture and natural riches. With participation of students of the biology and architecture careers of the University of Sonora (UNISON), the Botanical Index of Hermosillo integrates 130 species of native flora, selected for their landscape quality and ecological value. The number of species will increase in further stages of the regulation. As a value added feature, this Index will allow the creation of an economic market for the production of the listed species of flora. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
120000

Total cost provided by the local government
120000

Primary fund source
Local

Web link
Botanical Index (synthesized) http://www.implanhermosillo.gob.mx/wp-content/uploads/2017/05/paleta-vegetal.pdf Complementary information https://www.hermosillo.gob.mx/descargas/3er-informe-2018.pdf

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Climate hazards
Chemical change > Atmospheric CO2 concentrations

Action
Tree planting and/or creation of green space

Action title
Germoplasm

Status of action
Operation

Co-benefit area
Enhanced resilience
Enhanced climate change adaptation
Reduced GHG emissions
Improved resource quality (e.g. air, water)
Improved public health
Ecosystem preservation and biodiversity improvement
Shift to more sustainable behaviours

Action description and implementation progress
As of July 2018, the National Forestry Commission in coordination with the citizen organization "Ser Natura" work in the production of Germplasm of native plants for afforestation and reforestation, these organizations call to voluntary work in the maintenance of plant production areas as well as in planting and distribution of plants to the public; it has no cost and its activities are permanent. Additionally, the National Forestry Commission carries out coordinated actions with the municipal government to provide native

plants to private and government projects of afforestation and reforestation. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
5000000

Total cost provided by the local government
0

Primary fund source
Other (National)

Web link
Local event https://www.eventbrite.com/e/cierre-de-temporada-una-semilla-por-hermosillo-registration-71441841471 National portal https://www.conafor.gob.mx/innovacion_forestal/?p=997

Adaptation Planning

(3.1) Does your city council have a published plan that addresses climate change adaptation?
Yes

(3.1a) Please provide more information on your plan that addresses climate change adaptation and attach the document. Please provide details on the boundary of your plan, and where this differs from your city's boundary, please provide an explanation.

Publication title and attach the document
Hermosillo's Metropolitan Development Program

Areas covered by adaptation plan
Energy
Transport (Mobility)
Building and Infrastructure
Industry
Spatial Planning
Agriculture and Forestry
Water
Waste
Public Health and Safety
Business and Financial Service
Social Services

Year of adoption from local government
2016

Boundary of plan relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

If the city boundary is different from the plan boundary, please explain why and any areas/other cities excluded or included
The rural area was included because of its influence on the urban area, considering rural locations with agricultural activities and rural housing areas.

Stage of implementation
Plan in implementation

Type of plan
Addressed in general city plan

Has your local government assessed the synergies, trade-offs, and co-benefits, if any, of the main mitigation and adaptation actions you identified?
Intending to undertake in the next 2 years

Comment or describe the synergies, trade-offs, and co-benefits of this interaction

The processes of urban development and territorial order consider an interdependence between regulations, planning and the goals carried in the Metropolitan Development Program of Hermosillo. All of the task contemplate the synergy of the all the government levels, as well as the participation of the economic sector, academic institutions and citizens. The implementation of actions allow the determination of short, medium and long term activities, while Indicators and goals are developed to allow continuous evaluation and monitoring.

Primary author of plan
Relevant city department

Description of the stakeholder engagement processes
This program incorporates the participation of citizens and private companies, considering that their involvement in the development of a sustainable way of life is the main component for the effectiveness of any mitigation and adaptation action. The government becomes a driver but the main actor remains the citizen. It is also very important for these actions allowing the evaluation of its impacts and this is strengthened by research provided by academic institutions and international agencies' support.

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2017/08/PDMHSEP2016-2_opt.pdf

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Publication title and attach the document
Strategic Program of Storm Drainage and Green Infrastructure
IMPLAN Drenaje Verde REDUXv4.pdf

Areas covered by adaptation plan
Energy
Transport (Mobility)
Building and Infrastructure
Spatial Planning
Water
Public Health and Safety
Social Services

Year of adoption from local government
2018

Boundary of plan relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

If the city boundary is different from the plan boundary, please explain why and any areas/other cities excluded or included
The limits of the program area were delimited by the urban hydrological basins and sub-basins, considering the areas of origin of the rainwater runoffs towards the urbanized area as well as the water conduction towards the uninhabited zones and fluvial runoffs that cross the city.

Stage of implementation
Measurement in progress

Type of plan
Addressed in general city plan

Has your local government assessed the synergies, trade-offs, and co-benefits, if any, of the main mitigation and adaptation actions you identified?
Yes

Comment or describe the synergies, trade-offs, and co-benefits of this interaction
For the design and implementation of the program, local government worked directly with the city’s construction development companies.

Primary author of plan
Relevant city department

Description of the stakeholder engagement processes
The government promotes the integration of green infrastructure with gray infrastructure to incorporate linear parks in the city and to establish a “green belt”, with the participation of commercial and service companies, schools, government entities and civil society organizations.

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2018/10/PROGRAMA-DE-DRENAJE-PLUVIAL-E-INFRAESTRUCTURA-VERDE-DEL-CENTRO-DE-POBLACI%C3%93N-DE-HERMOSILLO-2018.pdf

Publication title and attach the document
Hermosillo at a Human Scale (Action Plan)
IMPLAN HMO Action Plan p04.pdf
IMPLAN HMO Action Plan p07.pdf
IMPLAN HMO Action Plan p03.pdf
IMPLAN HMO Action Plan p02.pdf
IMPLAN HMO Action Plan p01.pdf
IMPLAN HMO Action Plan p05.pdf
IMPLAN HMO Action Plan p06.pdf

Areas covered by adaptation plan
Energy
Transport (Mobility)
Building and Infrastructure
Industry
ICT (Information and Communication Technology)
Spatial Planning
Agriculture and Forestry
Fishery
Water
Waste
Public Health and Safety
Business and Financial Service
Social Services

Year of adoption from local government
2017

Boundary of plan relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

If the city boundary is different from the plan boundary, please explain why and any areas/other cities excluded or included
The rural area was included because of its influence on the urban area.

Stage of implementation
Plan in implementation

Type of plan
Integrated mitigation / adaptation

Has your local government assessed the synergies, trade-offs, and co-benefits, if any, of the main mitigation and adaptation actions you identified?
Yes

Comment or describe the synergies, trade-offs, and co-benefits of this interaction
It is a statement of the positive transformations Hermosillo could undergo in the upcoming years and a blueprint for how to achieve them. It helps crystallize the lessons learned from the collaboration between the government of Hermosillo, the government of Sonora, the IDB, the North American Development Bank (NADBANK), and the students and researchers from Harvard University.

Primary author of plan
Other (International Organization & Relevant City Department)

Description of the stakeholder engagement processes
Hermosillo's Action Plan outlines a set of strategic interventions proposed to tackle the city's most pressing issues, while maximizing social returns and building credibility and social support. The document provides strategies for mitigation and adaptation to climate change. The environmental aspect regarding greenhouse gas inventory, mitigation and adaptation to climate change can be observed especially on pages 150-172 and 280-309. It also presents initiatives such as "Idea Hermosillo" and the Banco de Ideas projects, which aim to encourage sustainability, entrepreneurship and job creation while recovering traditional areas for leisure, promoting 'citizens' right to the city' and strengthening social capital.

Web link
Action Plan: Hermosillo at a Human Scale http://www.implanhermosillo.gob.mx/wp-content/uploads/2018/08/plandeaccion-AC-31-07-2018-Digital.pdf IDEA Hermosillo http://www.implanhermosillo.gob.mx/wp-content/uploads/2018/08/180417-IDEA-HERMOSILLO-PRINT.pdf

Adaptation Goals

(3.2) Please describe the main goals of your city's adaptation efforts and the metrics / KPIs for each goal.

Adaptation goal
Preventing and mitigating the effects and threats of natural events, emergencies and disasters

Target year
2030

Metrics / indicators
Population decrement affected by events Natural. (Damned People current period/ Victims Period) 1*100 This indicator proposes the quantification of the people affected by the different disasters or natural events by type of disaster (flood, storm, air, heat waves, drought, etc.) versus previous annual periods to determine the increase or decrease of casualties. This indicator, helps to determine the adaptation tasks in the Metropolitan Development Program. This target is a particular measure for the city, as the events might vary depending on the geographic-environmental conditions.

Percentage of target achieved so far
5

Does this target align with a requirement from a higher level of government?
No

Adaptation goal
Decrease of heat islands in the urban area through afforestation and reforestation

Target year
2030

Metrics / indicators
(Surface of vegetation / surface total) * 100 Increase of surface vegetation decreases the environment's temperature; incorporating actions of afforestation and reforestation will be able to geo-locate temperature changes over time. The study is currently being carried out, which will give us a point of reference to quantify the goal and the period of time. This target is a particular measure for the city, as the events might vary depending on the geographic-environmental conditions.

Percentage of target achieved so far

Does this target align with a requirement from a higher level of government?
No

Adaptation goal
Increase rainwater infiltration for aquifer recharge and flood prevention through green infrastructure

Target year
2030

Metrics / indicators
New roads built with Green Infrastructure / Total built roads * 100 Green infrastructure is mandatory as of 2016, and derives from the Metropolitan Development Program of Hermosillo. Subsequently, the Technical Standard for Green Infrastructure was formulated as of 2018, so the period to implement it is relatively recent. This target is a particular measure for the city, as the events might vary depending on the geographic-environmental conditions.

Percentage of target achieved so far
2

Does this target align with a requirement from a higher level of government?
No

City Wide Emissions

(4.0) Does your city have a city-wide emissions inventory to report?

Yes

(4.1) Please state the dates of the accounting year or 12-month period for which you are reporting your latest city-wide GHG emissions inventory.

	From	To
Accounting year dates	January 1 2014	January 1 2015

(4.2) Please indicate the category that best describes the boundary of your city-wide GHG emissions inventory.

	Boundary of inventory relative to city boundary (reported in 0.1)	Excluded sources / areas	Explanation of boundary choice where the inventory boundary differs from the city boundary (include inventory boundary, GDP and population)
Please explain	Larger – covers the whole city and adjoining areas		The inventory was developed to cover the urban areas of Hermosillo; however it features data for the settlements which surround the city.

(4.3) Please give the name of the primary protocol, standard, or methodology you have used to calculate your city's city-wide GHG emissions.

	Primary protocol	Comment
Emissions methodology	Global Protocol for Community Greenhouse Gas Emissions Inventories (GPC)	

(4.3a) The Global Covenant of Mayors requires committed cities to report their inventories in the format of the new Common Reporting Framework, to encourage standard reporting of emissions data. If your city is reporting an updated inventory, we encourage reporting this in the CRF format, for which guidance can be found in the link below. Would you like to report your inventory in the CRF format or continue to report in the GPC format? Please ensure you respond to this question in order for the correct emissions breakdown questions to be displayed.

No – continue to use the GPC format

(4.4) Which gases are included in your city-wide emissions inventory? Select all that apply.

CO2
CH4
N20
HFCs
PFCs
SF6
NF3

(4.5) Please attach your city-wide inventory in Excel or other spreadsheet format and provide additional details on the inventory calculation methods in the table below.

Emissions inventory format
GPC format: ClearPath (ICLEI)

Document title and attachment
Climate change mitigation study
IDOM Vulnerabilidad HMO 20190529 S1.pdf

Emissions factors used
IPCC

Global Warming Potential (select relevant IPCC Assessment Report)
IPCC 5th AR (2013)

Please select which additional sectors are included in the inventory
Please select

Population in inventory year
884273

Overall Level of confidence
High

Comment on level of confidence

(4.6b) Please provide a summary of emissions by sector and scope as defined in the Global Protocol for Community Greenhouse Gas Emissions Inventories (GPC) in the table below.

	Emissions (metric tonnes CO2e)	Where data is not available, please explain why
Stationary Energy: energy use – Scope 1 (I.X.1)	769995	
Stationary Energy: energy use – Scope 2 (I.X.2)	155542	
Stationary Energy: energy use – Scope 3 (I.X.3)	1951694	
Stationary Energy: energy generation supplied to the grid – Scope 1 (I.4.4)	1929	
Transportation – Scope 1 (II.X.1)	2331753	
Transportation – Scope 2 (II.X.2)	355194	
Transportation – Scope 3 (II.X.3)	6	
Waste: waste generated within the city boundary – Scope 1 (III.X.1)	307036	
Waste: waste generated within the city boundary – Scope 3 (III.X.2)	0	The value is 0.
Waste: waste generated outside the city boundary – Scope 1 (III.X.3)	10746	
Industrial Processes and Product Use – Scope 1 (IV)	1357990	
Agriculture, Forestry and Land Use – Scope 1 (V)	0	The value is 0.
TOTAL Scope 1 (Territorial) emissions	5351760	
TOTAL Scope 2 emissions	1578523	
TOTAL Scope 3 emissions	771719	
TOTAL BASIC emissions	5627561	
TOTAL BASIC+ emissions	7700073	

(4.8) Please indicate if your city-wide emissions have increased, decreased, or stayed the same since your last emissions inventory, and describe why.

	Change in emissions	Primary reason for change	Please explain and quantify changes in emissions
Please explain	Stayed the same	No new inventory to report	

(4.9) Does your city have a consumption-based inventory to measure emissions from consumption of goods and services by your residents?

	Response	Provide an overview and attach your consumption-based inventory if relevant
Please complete	Intending to undertake in the next 2 years	

City-wide external verification

(4.11) Has the city-wide GHG emissions data you are currently reporting been externally verified or audited in part or in whole?

Intending to undertake in the next 2 years

(4.11b) Please explain why your city-wide emissions inventory is not verified and describe any plans to verify your city-wide emissions in the future.

	Reason	Comments
Please explain	Data is internally verified	Analysis-validation of emissions is being assessed for the city's urban development plan.

Historical emissions inventories

(4.12) Please provide details on any historical and base year city-wide emissions inventories your city has, in order to allow assessment of targets in the table below.

Inventory date from
January 1 2007

Inventory date to
January 1 2008

Scopes / boundary covered
Total emissions

Previous emissions (metric tonnes CO2e)
6592773

Is this inventory used as the base year inventory?
No

Methodology
Global Protocol for Community Greenhouse Gas Emissions Inventories (GPC)

File name and attach your inventory
Historical emissions inventories (2008)
IDOM Vulnerabilidad HMO 20190529 S1.pdf

Comments
General figures are included within the study provided as an attachment (Pages 68 to 70).

Re-stating previous emissions inventories

(4.13) Since your last submission, have you needed to recalculate any past city-wide GHG emission inventories previously reported to CDP?

No

Emissions Reduction

Mitigation Target setting

(5.0) Do you have a GHG emissions reduction target in place at the city-wide level? Select all that apply.

Baseline scenario (business as usual) target

(5.0d) Please provide details of your total city-wide baseline scenario target, including projected business as usual emissions.

Sector

All emissions sources included in city inventory

Where sources differ from the inventory, identify and explain these additions / exclusions

No sources differ.

Boundary of target relative to city boundary (reported in 0.1)

Same – covers entire city and nothing else

Base year

2015

Year of target implementation

2020

Base year emissions (metric tonnes CO2e)

7700073

Target year

2050

Estimated business as usual absolute emissions in target year (metric tonnes CO2e)

13748689

Percentage reduction target from business as usual

19

Percentage of target achieved

0

Does this target align with the global 1.5 - 2 °C pathway set out in the Paris agreement?

Yes - 2 °C

Please describe the target and the modelling methodology(ies) and parameters used to define it

The Mitigation Roadmap has been defined with the relevant stakeholders in Hermosillo, through collaborative workshops with each sector. The starting point for the definition of the Mitigation Roadmap includes the GHG Emissions Inventory and the qualitative-exhaustive diagnosis of urban planning, to ensure the alignment of the Mitigation Roadmap with the strategies. The revised planning documents include: - Hermosillo's Municipal Development Plan 2016-2018. - Hermosillo's 2015 Municipal Climate Action Plan. - Hermosillo's City prosperity index by UN-HABITAT and SEDATU. The mitigation roadmap was established from three references: - New actions during the diagnosis. - The revision of municipal plans and projects. - The actions proposed directly by the city's stakeholders. The prioritization was carried out through a semiquantitative multicriteria analysis, considering specifically for each action, the following four criteria: - Mitigation potential. - Viability. - Added environmental benefits. - Added social benefits.

Please indicate to which sector(s) the target applies

Energy industry
Heating and cooling supply
Commercial buildings
Residential buildings
Public facility
Industrial facilities
Transport
Water

Does this target correspond to a requirement from a higher level of government?

Yes

Please describe your target. If your country has an NDC and your city's target is less ambitious than the NDC, please explain why.

The policy aims to improve the capacity for adaptation, strengthen resilience and reduce the vulnerability to climate change in the city by aligning with the efforts of the Nationally Determined Contribution (CDN). That is, at the local level and from its area of influence, this is a strategy to contribute to the fulfillment of Mexico's commitments with its CDN. For example, the regeneration of green areas is of special importance for Hermosillo; the Municipal Action Plan, Hermosillo at a Human Scale (BID-NADBANK, 2018), remarks regarding the ratio of green areas and public spaces, that the city has 20 hectares per 100,000 inhabitants.

Currently, there is an increase in the deficit of green areas and public spaces; it is expected that qualified green areas grow to a lesser extent than the population by the year 2050. Therefore, in a Business as Usual scenario: The index of green areas per inhabitant decreases from 2.14 m2 / hab in 2015 to 1.58 m2 / hab in 2050.

(5.1) Please describe how the target(s) reported above align with the global 1.5 - 2 °C pathway set out in the Paris agreement.

The mitigation goals are based on the diagnosis and others related to the Municipal Action Plan, Hermosillo at a Human Scale, which contemplates in its perspective the principles of the Paris agreement.

(5.2) Is your city-wide emissions reduction target(s) conditional on the success of an externality or component of policy outside of your control?

No

(5.3) Does your city-wide emissions reduction target(s) account for the use of transferable emissions units?

No

Mitigation Actions

(5.4) Describe the anticipated outcomes of the most impactful mitigation actions your city is currently undertaking; the total cost of the action and how much is being funded by the local government.

Mitigation action

Community-Scale Development > Eco-district development strategy

Action title

Cerro de la Campana Bio-Cultural Park

Means of implementation

Capacity building and training activities
Stakeholder engagement
Infrastructure development
Monitor activities
Verification activities
Policy and regulation
Financial mechanism
Sustainable public procurement

Implementation status

Pre-implementation

Estimated emissions reduction (metric tonnes CO2e)

549

Energy savings (MWh)

0

Renewable energy production (MWh)

0

Timescale of reduction / savings / energy production

Per year

Co-benefit area

Enhanced resilience
Enhanced climate change adaptation
Reduced GHG emissions
Poverty reduction / eradication
Social inclusion, social justice
Social community and labour improvements
Greening the economy
Economic growth
Promote circular economy
Job creation
Improved resource quality (e.g. air, water)

Resource conservation (e.g. soil, water)
Ecosystem preservation and biodiversity improvement
Improved access to and quality of mobility services and infrastructure
Shift to more sustainable behaviours
Improved access to data for informed decision-making

Action description
A public initiative to regenerate the deforested area of “Cerro de la Campana” hill with xerophile flora (resilient to arid climate) to function as a carbon sink and water damping. This development includes the establishment of a circular economy pilot program, in which the species of flora will be employed to produce goods (such as food), compostage (to maintain the forest) and ethnobotanical products for bio-cultural preservation. This park also contemplates establishing a low-emission zone, a high mobility network and social engagement attractions (such as an extreme sports facility, trekking and cafés). All of the costs presented are an estimate, the final figures might differ.

Finance status
Feasibility undertaken

Total cost of the project
50000000

Total cost provided by the local government
0

Primary fund source
Public-private partnership

Web link to action website
Not available.

Name of the stakeholder group
<Not Applicable>

Role in the GCC program
<Not Applicable>

Name of the engagement activities
<Not Applicable>

Aim of the engagement activities
<Not Applicable>

Attach reference document
<Not Applicable>

Mitigation action
Buildings > Energy efficiency/ retrofit measures

Action title
New public lighting network

Means of implementation
Infrastructure development

Implementation status
Operation

Estimated emissions reduction (metric tonnes CO2e)
22000

Energy savings (MWh)
43358

Renewable energy production (MWh)
0

Timescale of reduction / savings / energy production
Per year

Co-benefit area
Improved resource efficiency (e.g. food, water, energy)

Action description
Climate factors, prolonged lack of investment, absence of maintenance and other technical reasons led to malfunctions in the public lighting services. In 2017, the local government undertook the modernization of public lighting, through a long-term concession with a third party. As of July of 2017, an approximate of 67 thousand 702 obsolete luminaries were replaced, under the supervision of the local public lighting agency. As a result of the renewal of the public lighting network and the change of incandescent technology to LED and accordingly to figures from the concessionaire consortium, electricity consumption will be reduced by up to 35%. All of the costs presented are an estimate, the final figures might differ.

Finance status
Finance secured

Total cost of the project
540000000

Total cost provided by the local government
540000000

Primary fund source
Local

Web link to action website
www.hermosillo.gob.mx/descargas/3er-informe-2018.pdf

Name of the stakeholder group
<Not Applicable>

Role in the GCC program
<Not Applicable>

Name of the engagement activities
<Not Applicable>

Aim of the engagement activities
<Not Applicable>

Attach reference document
<Not Applicable>

Mitigation Planning

(5.5) Does your city have a climate change mitigation or energy access plan for reducing city-wide GHG emissions?
Yes

(5.5a) Please attach your city's climate change mitigation plan below. If your city has both action and energy access plans, please make sure to attach all relevant documents below.

Publication title and attach document
Hermosillo at a Human Scale (Action Plan)
IMPLAN HMO Action Plan p04.pdf
IMPLAN HMO Action Plan p07.pdf
IMPLAN HMO Action Plan p03.pdf
IMPLAN HMO Action Plan p02.pdf
IMPLAN HMO Action Plan p01.pdf
IMPLAN HMO Action Plan p05.pdf
IMPLAN HMO Action Plan p06.pdf

Year of adoption from local government
2017

Web link
http://www.implanhermosillo.gob.mx/wp-content/uploads/2018/08/plandeaccion-AC-31-07-2018-Digital.pdf

Areas covered by action plan
Energy
Transport (Mobility)
Building and Infrastructure
Industry
ICT (Information and Communication Technology)
Spatial Planning
Agriculture and Forestry
Fishery
Water
Waste
Public Health and Safety
Business and Financial Service
Social Services

Boundary of plan relative to city boundary (reported in 0.1)
Larger – covers the whole city and adjoining areas

If the city boundary is different from the plan boundary, please explain why and any areas/other cities excluded or included
The rural area was included because of its influence on the urban area.

Stage of implementation
Plan in implementation

Has your local government assessed the synergies, trade-offs, and co-benefits, if any, of the main mitigation and adaptation actions you identified?
Yes

Comment or describe the synergies, trade-offs, and co-benefits of this interaction
It is a statement of the positive transformations Hermosillo could undergo in the upcoming years and a blueprint for how to achieve them. It helps crystallize the lessons learned from the collaboration between the government of Hermosillo, the government of Sonora, the IDB, the North American Development Bank (NADBANK), and the students and researchers from Harvard University.

Has there been a stakeholder engagement plan to develop the plan?
Hermosillo's Action Plan outlines a set of strategic interventions proposed to tackle the city's most pressing issues, while maximizing social returns and building credibility and social support. The document provides strategies for mitigation and adaptation to climate change. The environmental aspect regarding greenhouse gas inventory, mitigation and adaptation to climate change can be observed especially on pages 150-172 and 280-309. It also presents initiatives such as "Idea Hermosillo" and the Banco de Ideas projects, which aim to encourage sustainability, entrepreneurship and job creation while recovering traditional areas for leisure, promoting 'citizens' right to the city' and strengthening social capital.

Primary author of plan
Other (International Organization & Relevant City Department)

Opportunities

Opportunities

(6.0) Please indicate the opportunities your city has identified as a result of addressing climate change and describe how the city is positioning itself to take advantage of these opportunities.

Opportunity	Describe how the city is maximizing this opportunity
Development of resource conservation and management	Hermosillo is changing to circularity, an economic model focused on reducing, reusing and recycling materials and inputs for the production of goods and services, with a sustainable and eco-friendly vision. Hermosillo is one of the two Mexican cities selected as members of URBELAC, the urban network of European, Latin American and Caribbean cities. Through URBELAC, Hermosillo acquires knowledge to design its own circular economy action plan. Among the leading circular economy projects in Hermosillo are: Four photovoltaic facilities, which generate 247 Megawatts of power and a future project of 100 additional Megawatts; this solar energy would be enough to power more than 30,000 homes. LUX farm, a ZERO-WASTE certified company which makes compost out of organic waste from the Ford Company plant in Hermosillo and its suppliers. Eco-friendly startups, the most remarkable is “Parque Bio Cultural Cerro de la Campana”. This is public initiative to regenerate the deforested area of “Cerro de la Campana” hill with xerophile flora (resilient to arid climate) to function as a carbon sink and water damping.

(6.1) Does your city collaborate in voluntary partnership with businesses in your city on sustainability projects?

Yes

(6.1a) Please provide some key examples of how your city collaborates with business in the table below.

Collaboration area	Description of collaboration
Agriculture and Forestry	"Transform a boulevard" (Transforma un boulevard, in Spanish). This is a collaborative action between the private sector and government, for the conservation of public space. The companies adopt a ridge of one of the main roads in the city, which they will have to keep and maintain. The main incentive of these activities is to improve the image of the city and boost citizen commitment to climate change adaptation and mitigation.
Transport (Mobility)	"Rolling with you" (ruedo contigo, in Spanish) The city works and integrates sustainable mobility actions with the participation of cyclist collectives. Cyclist from these organizations or collectives connect with new cyclist through a mobile app named “Ruedo Contigo” which was developed by the local government; experienced cyclists serve as instructors and accompany new cyclists through the city (for free). Cyclist organizations also collaborate in mobility studies and actions to improve road infrastructure, in decision-making for the intervention of roads and providing observations and monitoring public developments (i.e. construction). The local government can make adjustments to its public policies taking into account the needs of the city’s inhabitants.
Transport (Mobility)	"Active line" (vía activa, in Spanish). This action was established with the objective of attracting a greater number of visitors to Hermosillo, promoting the recovery of public spaces and contributing to the revitalization of the social fabric in the city. Coordinated by the local government, “via activa” engaged more than 328 thousand people in pedestrianization activities (entertainment, culture, education, health, welfare and gastronomy).
Waste	"Hermosillo Recycles". Hermosillo Recycles was launched during September 2018 as an initiative to improve the collection of solid urban waste. At that time, the public garbage collection service was at critical status due to the lack of collection trucks, which reduced the collection frequency. The main component of the Hermosillo Recycles is active citizen participation in recycling tasks. To achieve this, the following deliverables have been developed: 1. A free mobile app to inform users about garbage collection schedules and routes; it helps preventing the exposure of garbage containers on streets for prolonged times. This is possible through GPS’ incorporated into the collection trucks. 2. Campaigns for the collection of inorganic materials with low degradation potential or high contamination potential (e.g. cigarette butts). The strategy involves the exchange of inorganic materials for social incentives after reaching a milestone (such as public infrastructure improvements). 3. Establishment of collection spots for inorganic materials such as cardboard, plastic, glass, electronic components. To date, 18 collection spots have been established all over the city, benefiting 300 families dedicated to waste separation in the Sanitary Landfill, facilitating the commercialization of recyclable goods in more hygienic conditions. 4. Separation of organic and inorganic waste. Currently, public garbage collection does not require the separation of garbage into organic or inorganic materials. The local government expects to launch on July 30th a pilot program for the collection of garbage separated in organic and inorganic containers; the pilot stage includes 18 sectors. 5. “Our family cleans Hermosillo”. An initiative to promote cleaning days in public and empty spaces with the voluntary cooperation of the city’s inhabitants. Added benefits include improve the urban image, preventing spontaneous fires (due to grass and garbage) and preventing the proliferation of vector-borne diseases, such as dengue, zika and chikungunya. 6. Municipal composting center. An area of 10,000 m2 for the production of compost from organic waste; the production will be destined for afforestation and reforestation projects and sale to private and civil parties (including citizens) All of the costs presented are an estimate, the final figures might differ.
Spatial Planning	Hermosillo Metropolitan Development Program. The Metropolitan Development Program of Hermosillo is an instrument for urban planning development and territorial ordering. For the elaboration of the proposal as well as for its final formulation, the program is evaluated and analyzed by different organizations. Said organizations include sectors such as construction developers, research institutions, infrastructure developers and professional organizations, which also provide information to strengthen program and define strategies to establish standardized actions for its operability. Additionally, there is an Urban Planning Council constituted by citizens who provide information and propose actions and strategies for urban development, as well as promotion and compliance evaluation of urban planning.

(6.2) List any emission reduction, adaptation, water related or resilience projects you have planned within your city for which you hope to attract financing and provide details on the estimated costs and status of the project. If your city does not have any relevant projects, please select No relevant projects under Project Area.

Project area
Other (Circular economy project)

Project title
Cerro de la Campana Bio-Cultural Park

Stage of project development
Project structuring

Status of financing
Project not funded and seeking partial funding

Project description
A public initiative to regenerate the deforested area of “Cerro de la Campana” hill with xerophile flora (resilient to arid climate) to function as a carbon sink and water damping. This development includes the establishment of a circular economy pilot program, in which the species of flora will be employed to produce goods (such as food), compostage (to maintain the forest) and ethnobotanical products for bio-cultural preservation. This park also contemplates establishing a low-emission zone, a high mobility network and social engagement attractions (such as an extreme sports facility, trekking and cafés). All of the costs presented are an estimate, the final figures might differ.

Total cost of project
50000000

Total investment cost needed
50000000

Local Government Emissions

Local Government Operations GHG Emissions Data

(7.0) Do you have an emissions inventory for your local government operations to report? Reporting a Local Government Operations emissions inventory is optional.
In progress

(7.1) Please state the dates of the accounting year or 12-month period for which you are reporting an emissions inventory for your local government operations.

	From	To
Accounting year dates	January 1 2014	January 1 2015

(7.2) Please indicate the category that best describes the boundary of your local government operations emissions inventory.
Departments, entities or companies over which financial control is exercised

(7.3) Please give the name of the primary protocol, standard, or methodology used to calculate your local government operations emissions inventory and attach your inventory using the attachment function.

	Primary protocol and attach inventory	Comment
Emissions methodology	Greenhouse Gas Protocol: Public Sector Standard IDOM Vulnerabilidad HMO 20190529 S1.pdf	The study quantifies scope 2 and scope 3 data in kWh. Scope 2: Electricity 116,880,000 kWh Scope 3: Electricity loss 12,698,714 kWh Emissions in tCO2e are 59,347.

(7.4) Which gases are included in your emissions inventory? Select all that apply.
CO2

Energy

(8.0) Does your city have a renewable energy or electricity target?

Yes

(8.0a) Please provide details of your renewable energy or electricity target and how the city plans to meet those targets.

Scale

City-wide

Energy / electricity types covered by target

Other (Emissions reduction in tons of CO2e per MegaWatt hour (tCO2e / MWh), trough clean energy production.)

Base year

2014

Total renewable energy / electricity covered by target in base year (in unit specified in column 2)

0.46

Percentage renewable energy / electricity of total energy or electricity in base year

100

Target year

2050

Total renewable energy / electricity covered by target in target year (in unit specified in column 2)

0.35

Percentage renewable energy / electricity of total energy or electricity in target year

24

Percentage of target achieved

1

Plans to meet target (include details on types of energy/electricity)

Adopted towards 2018, with a base year factor of 0.456 tCO2e / MWh in 2014, the program establishes the objective of achieving an emission score of 0.350 tCO2e / MWh per year. Considering this new emission factor, the reduction of GHG emissions in 2030 would be 17% against the trend scenario, while in 2050 it would be 24%. NOTE: The 100% value pointed on question "Percentage renewable energy / electricity of total energy or electricity in base year" stands as a referral for tCO2e / MWh emissions percentage, where 0.46 tCO2e / MWh are the 100% (total) of the emissions to reduce. Hence, the 24% in "Percentage renewable energy / electricity of total energy or electricity in target year" represents the clean energy production target against the base year.

(8.1) Does your city have energy consumption data to report?

No

(8.6) Does your city have a target to increase energy efficiency?

In progress

Transport

(10.0) Do you have mode share information available to report for the following transport types? Select all that apply.

Passenger transport

(10.1) What is the mode share of each transport mode in your city for passenger transport?

	Private motorized transport	Rail/Metro/Tram	Buses (including BRT)	Ferries/ River boats	Walking	Cycling	Taxis or For Hire Vehicles	Other
Please complete	51	0	21	0	8	3	13	4

(10.5) Please provide the total fleet size and number of vehicle types for the following modes of transport:

	Number of private cars	Number of buses	Number of municipal fleet (excluding buses)	Number of freight vehicles	Number of taxis	Transport Network Companies (e.g. Uber, Lyft) fleet size	Customer-drive carshares (e.g. Car2Go, Drivenow) fleet size
Total fleet size	268378	94882	250	2900	0	0	0
Electric	0	0	0	0	0	0	0
Hybrid	0	0	0	0	0	0	0
Plug in hybrid	0	0	0	0	0	0	0
Hydrogen	0	0	0	0	0	0	0

(10.7) Do you have a low or zero-emission zone in your city? (i.e. an area that disincentivises fossil fuel vehicles)

No

Food

(12.0) How many meals per year are served through programs managed by your city? (this includes schools, canteens, hospitals etc.)

2850000

The School Breakfast program was established by the Sonora State Government to support marginalized children from indigenous, rural and urban areas. Launched in coordination with the 72 municipalities of the State (Hermosillo included), this is an effort to improve children's academic performance, considering that poverty factors (such as lack of nutrition) foster health issues, school desertion and reprobation. This program aims to prevent the fast in children, and boost their cognitive development to reduce absenteeism and academic failure. In the same way, this program was designed to reduce the malnutrition rates of children and micronutrient deficiency such as vitamin A, iron and zinc (Barquera et al., 2001).

(12.4) Does your city have any policies relating to food consumption within your city? If so, please describe the expected outcome of the policy.

	Response	Please describe the expected outcome of the policy
Please complete	Yes	There is a ban on the sale of junk-food within basic-level education schools. This ban aims to prevent the incidence of overweight and obesity in children and adolescents below the national average.

Water Security

Water Supply

(14.0) What are the sources of your city's water supply? Select all that apply.

Surface water
Ground water
Recycled / reclaimed water
Rainwater

(14.1) Where does the water used to supply your city come from?

From adjacent river basins (by water transfer schemes) outside the city boundary

(14.2) What percentage of your city's population has access to potable water supply service?

98

(14.3) Are you aware of any substantive current or future risks to your city's water supply?

Yes

(14.3a) Please identify the risks to your city's water supply as well as the timescale and level of risk.

Risks	Estimated timescale	Estimated magnitude	Risk description
Increased water stress	Current	Extremely serious	The city's water consumption, as declared by government's' water agency (AGUAH) is 25% surface water and 75% groundwater. The heavy dependence on groundwater carries an important limitation for the city against the threats of drought, since the extraction of water gets harder as the aquifers deplete.
Increased water scarcity	Current	Extremely serious	One of the limitations for economic diversification is the availability of water. This has caused the deceleration of economic growth. Due to the above, it must be considered that the impact in the medium term if it is not resolved, is that there will be limitations to the use of water, including processes of water availability for hours that the city has already experienced and that impacted on a series of health problems and increase of energy consumption for cooling of buildings.
Declining water quality	Current	Serious	The greatest threat is saline intrusion; an important portion of the water groundwater reserve is close to Hermosillo's shore, with vulnerable area of 1273 Km2. Since 1931, temporary suspensions of water extraction have been declared.
Inadequate or ageing infrastructure	Current	Serious	Much of the pipeline system for drinking water and sanitary sewer pipes is at least 50 years old, especially in the city's core. Between 2012-2016 there have been 746 pipe collapses, equivalent to a length of 66,353 KM; collapses increase during rainy season, a large portion of the rainwater in homes and commercial buildings discharges this water into the sanitary sewer pipe. In 2010, the physical efficiency of the water network supply was 65.6%, commercial efficiency was 82.5% and Global Efficiency was 54.1%.
Higher water prices	Short-term	Serious	The expansion of the urban sprawl in the last 30 years has increased the costs of infrastructure and services, as well as the vacant land in the interior of the urban sprawl, especially of underutilized buildings, uninhabited housing and baldiós properties, directly impacting urban sprawl , increasing the demand for water. However, the cost of operation to equip users with this infrastructure together with the obsoletion of the distribution system has impacted on water production. Therefore, it is necessary to carry out actions to replace infrastructure that implies a high cost that, with the current water rates, would not be covered.
Increased water demand	Short-term	Serious	Population growth impacts directly on water demand, while economic processes and agricultural activities are its largest consumers. The increase of water demand is clearly reflected in the depletion of water sources in the town and even the reduction of agricultural activity for human consumption; to exemplify, one of Hermosillo's main dams, the Abelardo Rodríguez dam, stopped supplying water for agricultural activities since the 70's decade.
Drought	Medium-term	Serious	According to the Intergovernmental Panel on Climate Change, in its fifth evaluation report (AR5), Hermosillo is one of the 106 Mexican municipalities with high degree of vulnerability and probability drought; Hermosillo is rated with very high global vulnerability to droughts and average frequency, thus a high risk overall score. The historic drought report of municipalities presented by National Water Commission for the period 2008-2016, states that Hermosillo was susceptible to drought about 52.4% of the time.
Severe weather events	Medium-term	Serious	The increase in the permeable area has impacted flood events, both of pluvial origin and the saturation of the storm drainage network that was originally built with the infiltration specifications of the surrounding undeveloped lands. The occupation of the land by settlements in risk zones with characteristics of expansive soils impacts the stability of the buildings and the storm events cause damages in the water, light and drainage service systems as well as in the mobility of the city.
Change in land-use	Medium-term	Serious	The occupation of the land in the urbanization process has increased impermeable surfaces, replacing vegetated and permeable areas that once allowed the infiltration of rainwater to the ground. Currently, the storm drainage system built with green infrastructure does not include infiltration into the urban area, so whenever there is a rain event, the water conduction distances the possibility of recharging the aquifer in the urban area.

Water Supply Management

(14.4) Please select the actions you are taking to reduce the risks to your city's water supply.

Risks

Increased water stress

Adaptation action

Conservation awareness and education

Status of action

Operation

Action description and implementation progress

The local government has a permanent plan to raise awareness among its inhabitants for the responsible use of water. Among its most relevant activities, the government conducts training in primary schools to teach water conservation techniques and media campaigns to promote water conservation. The current name of this strategy is "the culture of water", and involves academic, civil and private sectors with the government in water preservation activities.

Risks

Increased water scarcity

Adaptation action
Diversifying water supply (including new sources)

Status of action
Operation

Action description and implementation progress
To mitigate the effects of water scarcity, the city promoted and built the "Acueducto Independencia", which transfers water from "El Novillo" dam, 150 kilometers away from the population center of Hermosillo.

Risks
Declining water quality

Adaptation action
Water use restrictions

Status of action
Operation

Action description and implementation progress
The decline of water quality is primarily attributed to saline intrusion. On this line, the government has enforced the temporary suspension of water aquifers exploitation and water rationalization rounds (strategic water supply); such actions are expected to improve the natural regeneration of non-contaminated water deposits and allow repair-works in the affected areas. This action is complementary to the previous risk and actions.

Risks
Inadequate or ageing infrastructure

Adaptation action
Investment in existing water supply infrastructure

Status of action
Operation

Action description and implementation progress
Water infrastructure is about 50 years old; the government is contineously investing to repair the water supply network. On 2019, the city is started devising a plan for the network's renovation.

Risks
Increased water demand

Adaptation action
Water recycling / reclamation

Status of action
Operation

Action description and implementation progress
Hermosillo is the first Mexican city to treat 100% of its residual waters. This water is employed to supply civil, public and industrial activities in uses other than human consumption.

Risks
Drought

Adaptation action
Water recycling / reclamation

Status of action
Operation

Action description and implementation progress
Hermosillo is the first Mexican city to treat 100% of its residual waters. This water is employed to supply civil, public and industrial activities in uses other than human consumption (this is supplementary to the increased water demands risks).

Risks
Change in land-use

Adaptation action
Efficiency regulations or standards

Status of action
Operation

Action description and implementation progress
Changes in land use often translate into changes for urbanization; following this line, new developments must align to the municipal development plans and contemplate green infrastructure on their projects. This includes (but is not limited to) watershed preservation, forestation (for water damping) and installing water saving devices.

(14.5) Does your city have a publicly available Water Resource Management strategy?
Yes

(14.5a) Please provide more information on your city's public Water Resource Management strategy.

Publication title and attach document
The Culture of Water (Cultura del Agua, page 13)
CDP DOF cultura del agua p13.pdf

Year of adoption from local government
2019

Web link
http://aguadehermosillo.gob.mx/aguah/que-nos-alcance-a-todos/

Does this strategy include Sanitation services?
Yes

Stage of implementation
Plan in implementation

Submit your response

Please provide the following details about the amendments you have made to your CDP response.

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