

ADB Block Heater Technology Business Fair

Introduction to Block Heater Technology for NurSultan, Kazakhstan

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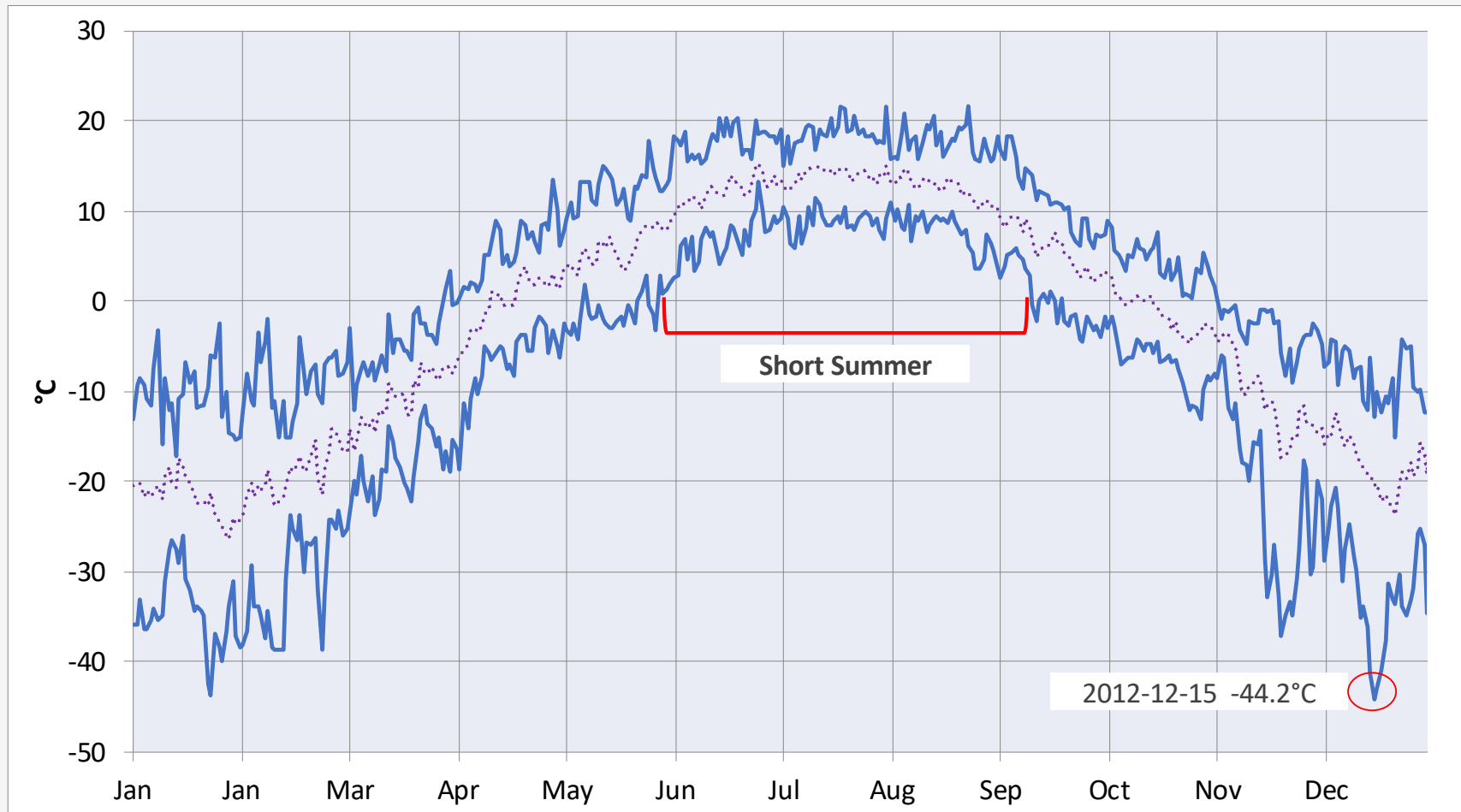
3 September 2020

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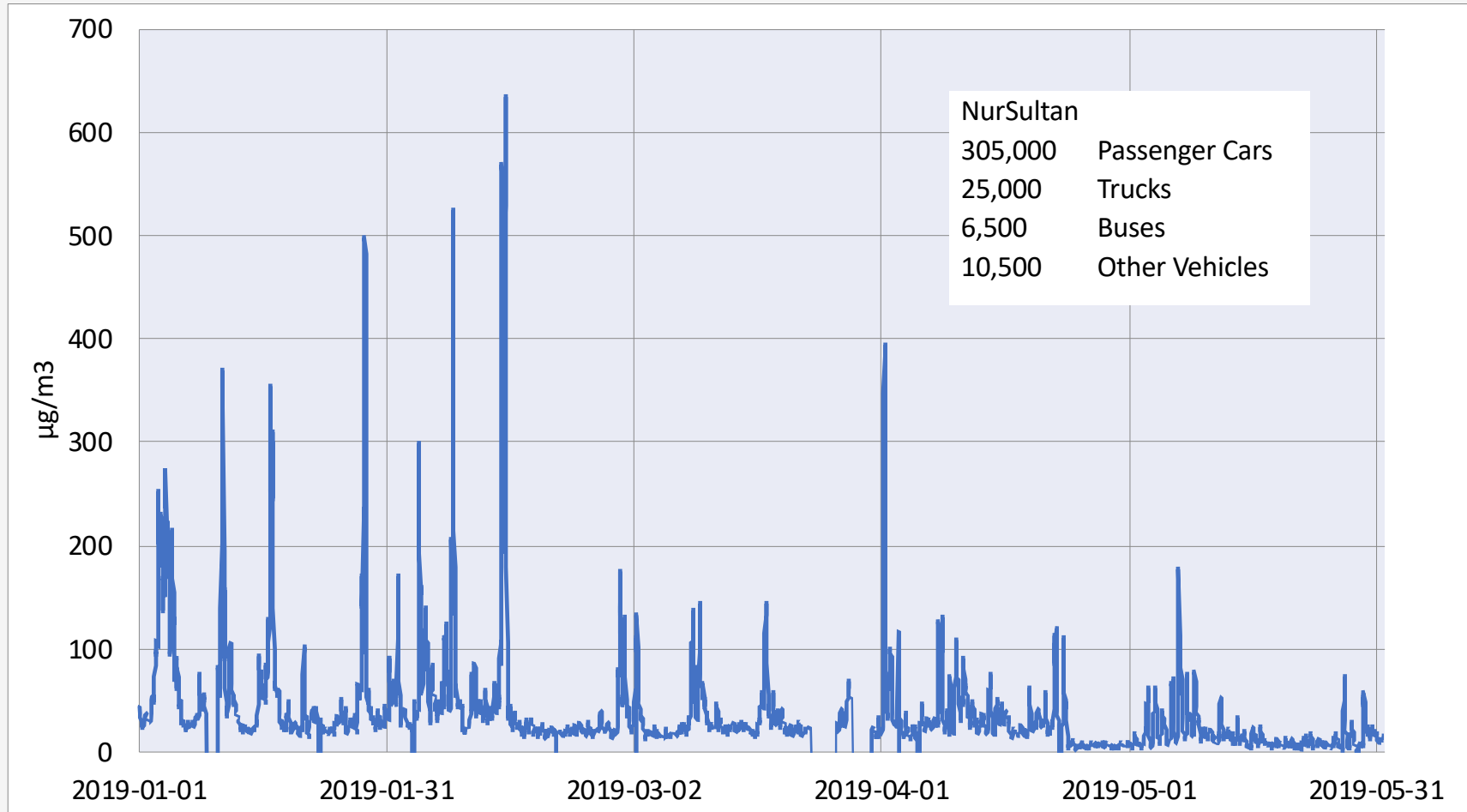
Introduction to Engine Block Heaters

- Smart City
- Benefits to Citizens
- Background
 - What
 - Why
 - When
 - Where
 - How

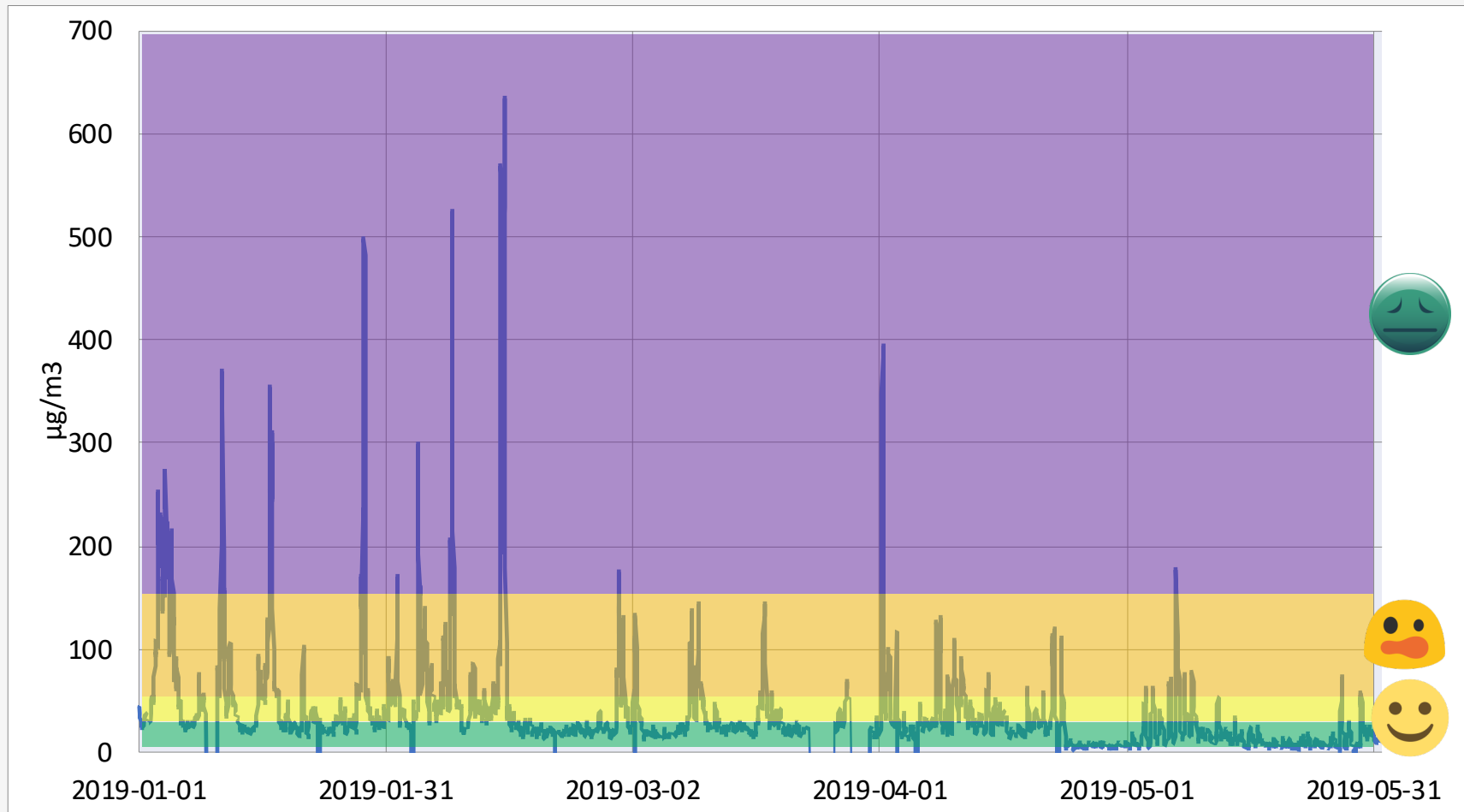
Nur-Sultan – 2010-2020 Coldest Recorded Daily Temperature Range



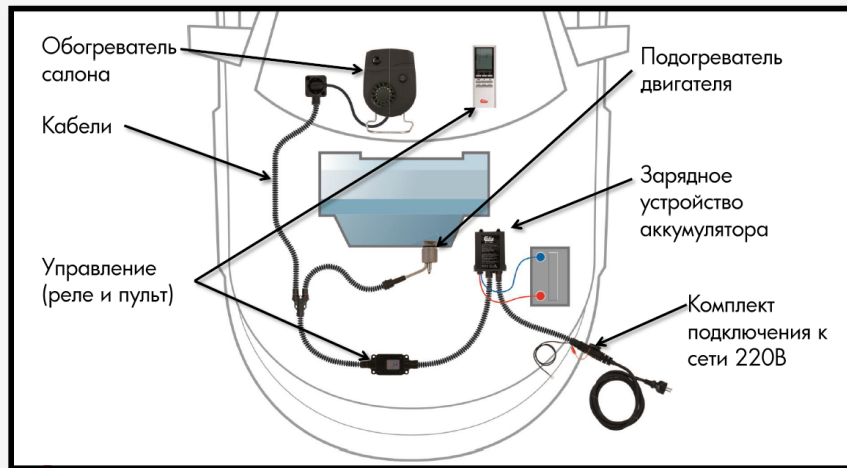
Nur-Sultan Air Quality – 01 January to 31 May, 2019



NurSultan Air Quality – 01 January to 31 May, 2019



Block Heater and Charging Pile Components



Block Heater for Vehicle

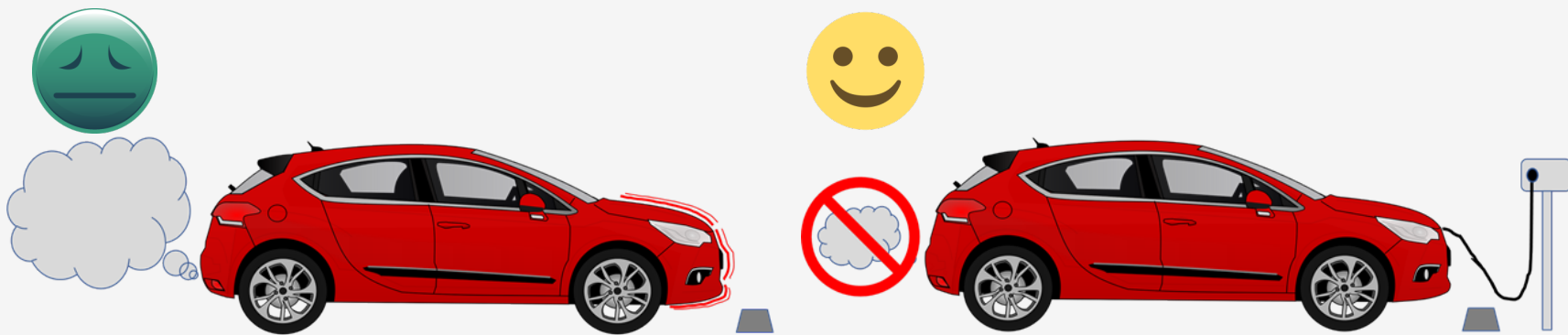
- Installed by trained mechanic
- Vehicle plugged into Charging Pile when parked
- Block heater uses 250-500 W electricity
- Optional cabin heater to defrost windows and heat interior
- Optional battery charger

Charging Pile Infrastructure

- Provides 220V AC power for the block heater
- Options for timer and temperature sensor
- Optional smart device (Bluetooth)



Environmental and Health Benefits from Block Heater Technology



Air Pollutant Emitted	Hazard and Health Impact	Benefit by using Engine Block Heater
Carbon Dioxide (CO ₂) greenhouse gas emissions	Causes global warming to Earth	↓ 1,239 kg per year
Carbon Monoxide (CO)	Dangerous gas to humans	↓ 41.4 kg per year
Volatile Hydrocarbons (VOC)	Causes difficulty breathing for people with asthma, senior citizens and young children.	↓ 6,453 grams per year
Nitrous Oxide/Dioxide (NOx)	Causes haze and smog when exposed to sunlight. Can also cause acidic rainfall.	↓ 3,775 grams per year
Particulate Matter (PM 2.5 and Soot)	Causes difficulty breathing for people with asthma, senior citizens and young children.	↓ 309 grams per year

Block Heater Solution



- Proven, Safe, Reliable Technology
- 20,000,000 vehicles use Block Heater Technology
- Canada, Sweden, Norway, Poland, Russia, USA (Alaska)



- Office Buildings & Shopping Malls
- Apartment Buildings and Houses
- Municipal Parking
- Emergency Services (Ambulance, Fire, Government Vehicles)
- Public Buses
- Snow Removal Equipment

Nur Sultan Pilot Project



Project initiated by ADB in 2019

Participants include:

- Astana Taxi,
- Toyota City,
- Railway Company
- Nursultan Akimat

Technology suppliers:

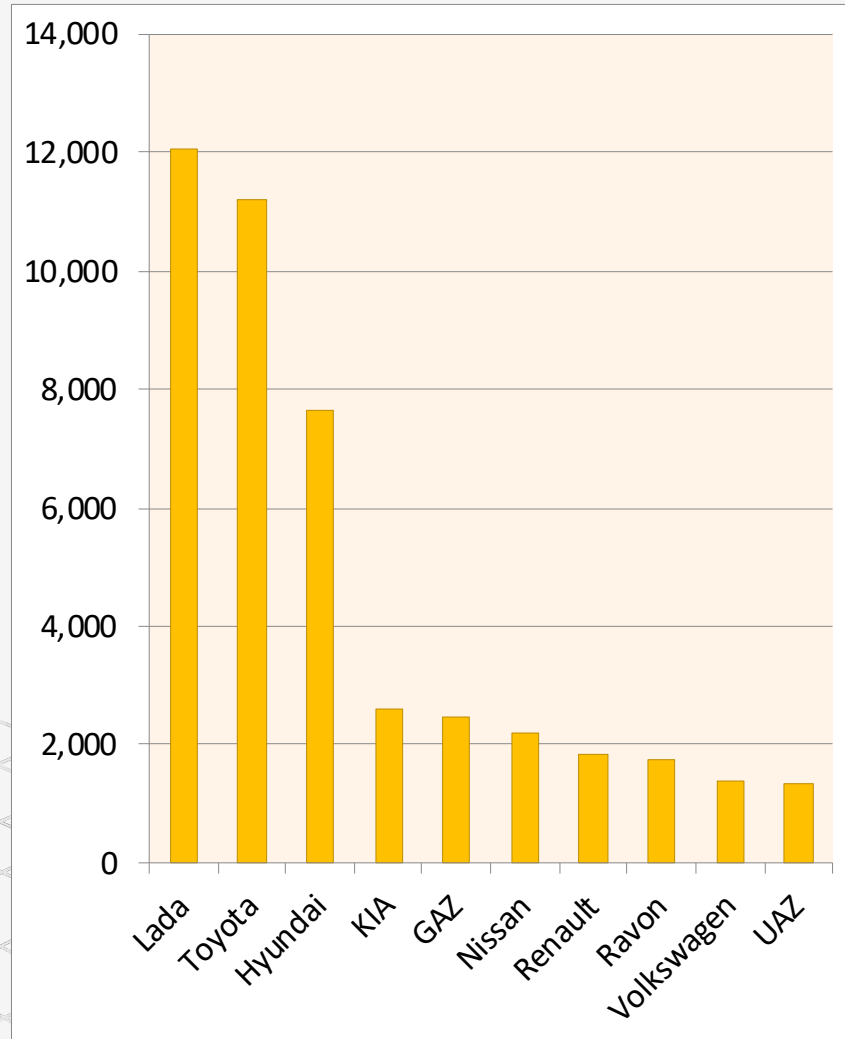
- Calix (Sweden)
- DEFA (Norway)
- Fibox (Finland)

Charging Stations installed at:

- Парковочная зона по пр. Сары-Арка 13, район Сары-Арка
- Парковочная зона платной стоянки по пр. Мангелик Ел 13, напротив ЖК «Нурсая -2»
- Парковочная зона по адресу ул. Кабанбай батыра 33, район Есиль
- Парковочная зона по районе железнодорожного вокзала «Нур-Султан -1»
- Парковочная зона по пр. Бейбитшилик 11
- Парковочная зона на территории Астанинская дистанция пути, пер. Шынтас 1а
- Парковочная зона на территории дилерской компании «Toyota city»



Kazakhstan New Automobile Sales



Economic and Environmental Benefit Calculator

Version 2.0 - Engine Block Heater Benefit Calculator for ADB Kazakhstan Project

Updated July 2020

Data Entry and Assumptions	
Winter Outdoor Temperature Range (°C)	-20 °C to -10 °C <Select from Dropdown List
Fuel Type (Gasoline or Diesel?)	Gasoline <Select either Diesel or Gasoline
Engine Capacity (liters)	2.0 to 3.0 L, 4 or 6 Cyl. <Select from Dropdown List
Rated Fuel Consumption (litres per km)	10 <Select from Dropdown List (most automobiles are about 10 km per liter in City Driving)
Daily Engine Idle Time (minutes)	60 <Use Default or Modify with Whole Number
Number of Winter Days Used (Days)	200 <Use Default or Modify with Whole Number (between 30 and 220 days per year)
Gasoline/Diesel Price (KZT/liter)	145 <Use Default or Modify with Whole Number
Electricity Price (KZT/kWh)	15 <Use Default or Modify with Whole Number
USD to Kazakhstan Tenge (KZT) Exchange	420 <Enter Whole number for USD to KZT Exchange Rate (Approximate 420 KZT per USD July 2020)
USD Cost to Install Block and Interior Heater	200 <Enter Approximate Cost to install Block Heater and Cabin Heater (Typical Range is 100 to 400 USD per install)

Economic Impact	Current Situation	Block Heater Enabled	Annual Reduction
Vehicle Idling Seasonal Fuel Consumption	646 litres of fuel	360 kWh Electricity	
Vehicle Idling Seasonal Fuel Cost	93,670 KZT	5,400 KZT	88,270 KZT

Expected Investment Recovery Period of Block Heater and Cabin Heater Upgrade (Simple Payback)

1.0 years

Greenhouse Gas Emissions Impact	Current Situation	Block Heater Enabled	Annual Reduction
Seasonal Emissions of CO2	1518 kg CO2	279 kg CO2	1239 kg CO2

Ground Level Air Pollutants Impact	Current Situation	Block Heater Enabled	Annual Reduction
Carbon Monoxide [CO]	41.7 kg	0.3 kg	41.4 kg
Volatile Hydrocarbons [VOC]	6,460 grams	7 grams	6,453 grams
Nitrous Oxide/Dioxide [NOx]	3,876 grams	101 grams	3,775 grams
Particulate Matter [PM]	323 grams	14 grams	309 grams

Summary

- Nur-Sultan has bitterly cold long winters
- Large stock of vehicles
 - 305,000 Passenger Cars
 - 25,000 Trucks
 - 6,500 Buses
 - 10,500 Other Vehicles
- Air quality is poor affecting citizens
- BHT improves air quality
- BHT reduced GHG emissions about 80%
- Quick return on investment
- Greater comfort and satisfaction by car owners