InfernoWatch

Team: Terra and Luna Analytics

Challenge: From EarthData to Action: Cloud Computing with Earth Observation Data for Predicting Cleaner, Safer Skies

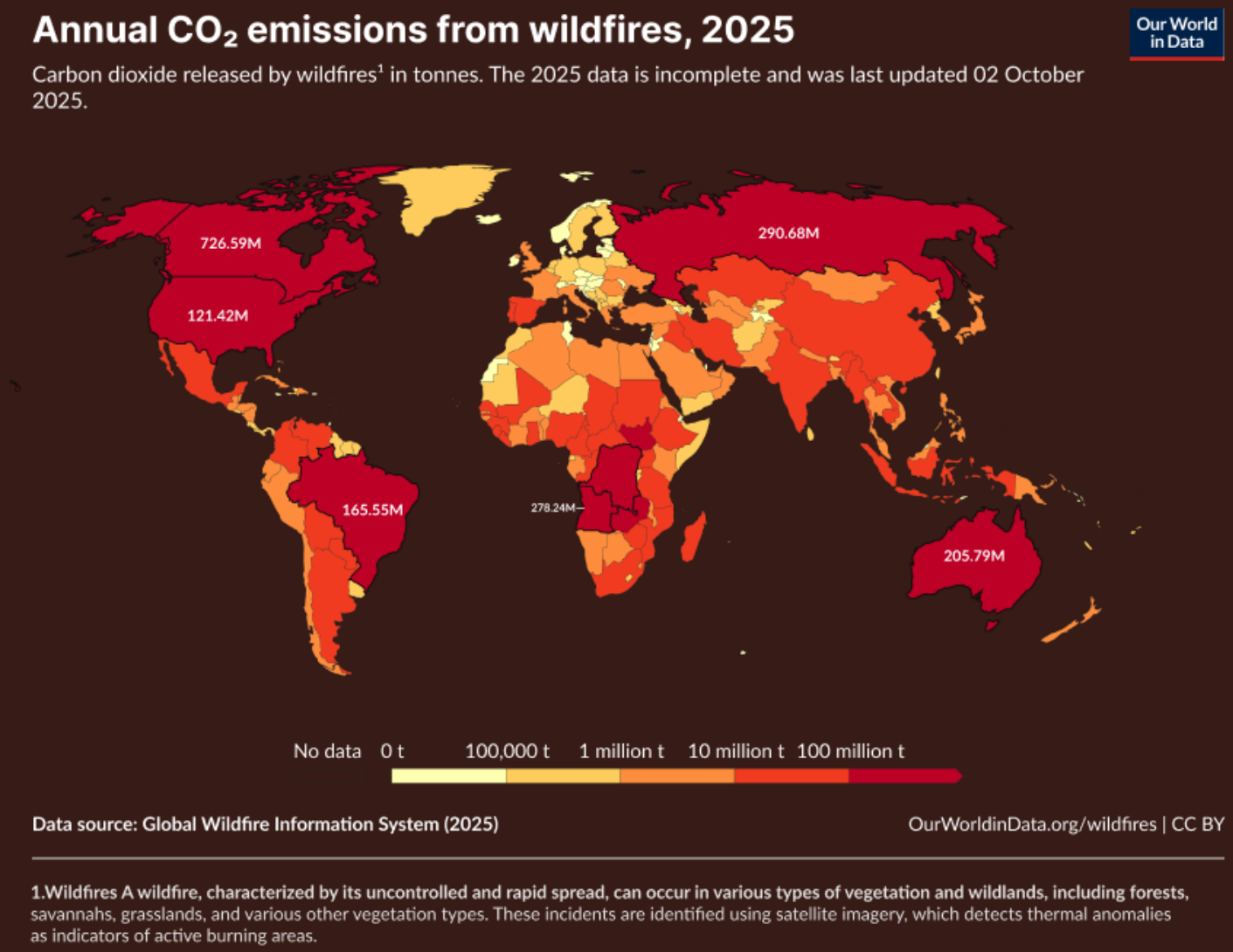
Problem

1.53 ***million***

Deaths around the world each year from wildfire-related air pollution[1]

3.7 ***billion***

Annual CO_2 emissions from wildfires[2]

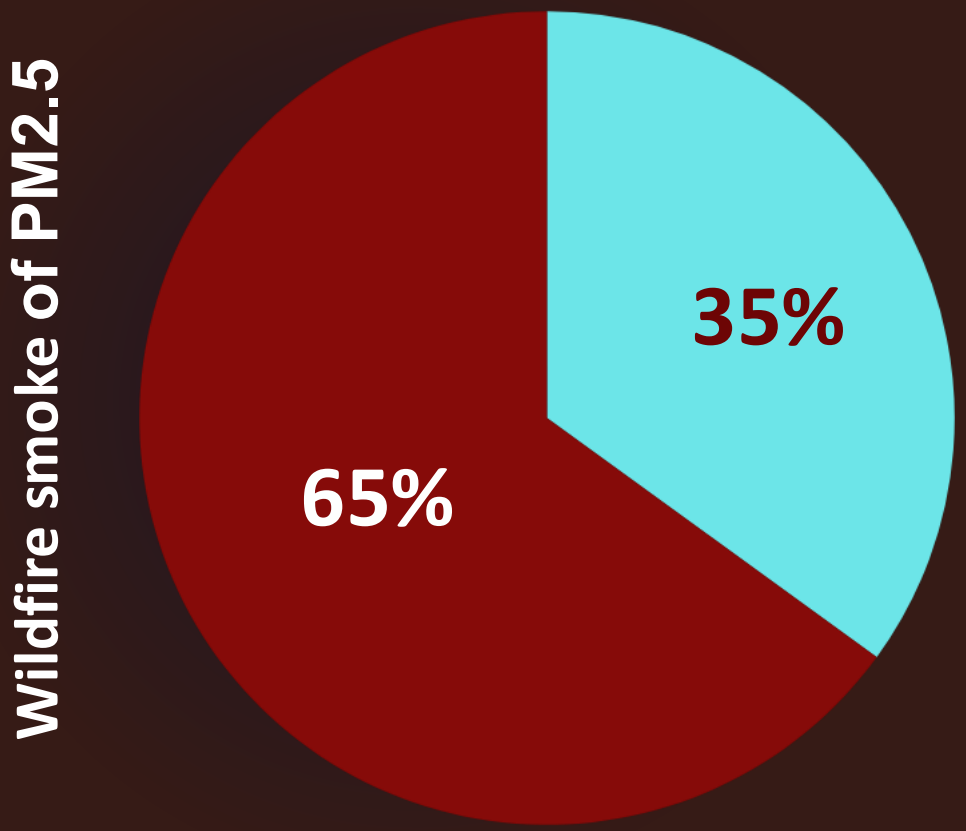


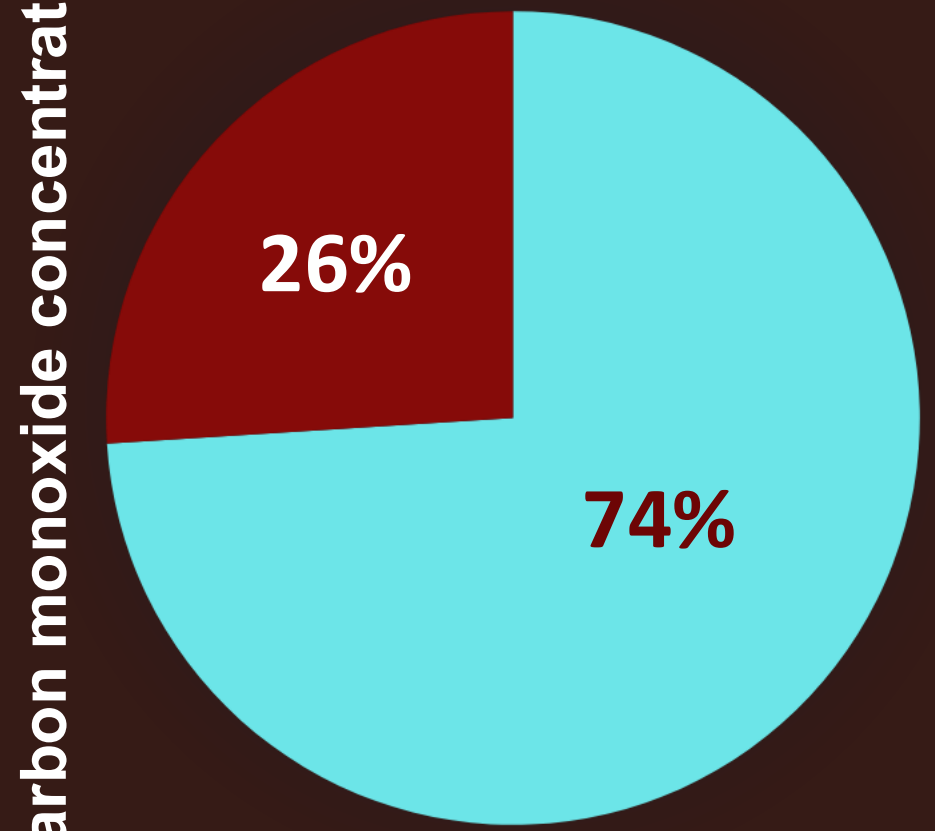
1.Wildfires A wildfire, characterized by its uncontrolled and rapid spread, can occur in various types of vegetation and wildlands, including forests, savannahs, grasslands, and various other vegetation types. These incidents are identified using satellite imagery, which detects thermal anomalies as indicators of active burning areas.

1. *Study on wildfire-sourced $PM_{2.5}$ exposure (2025), summarized in The Guardian (Aug 2025)*
2. *Global Wildfire Information System (2025)*

Without wildfires, the air quality will be significantly better

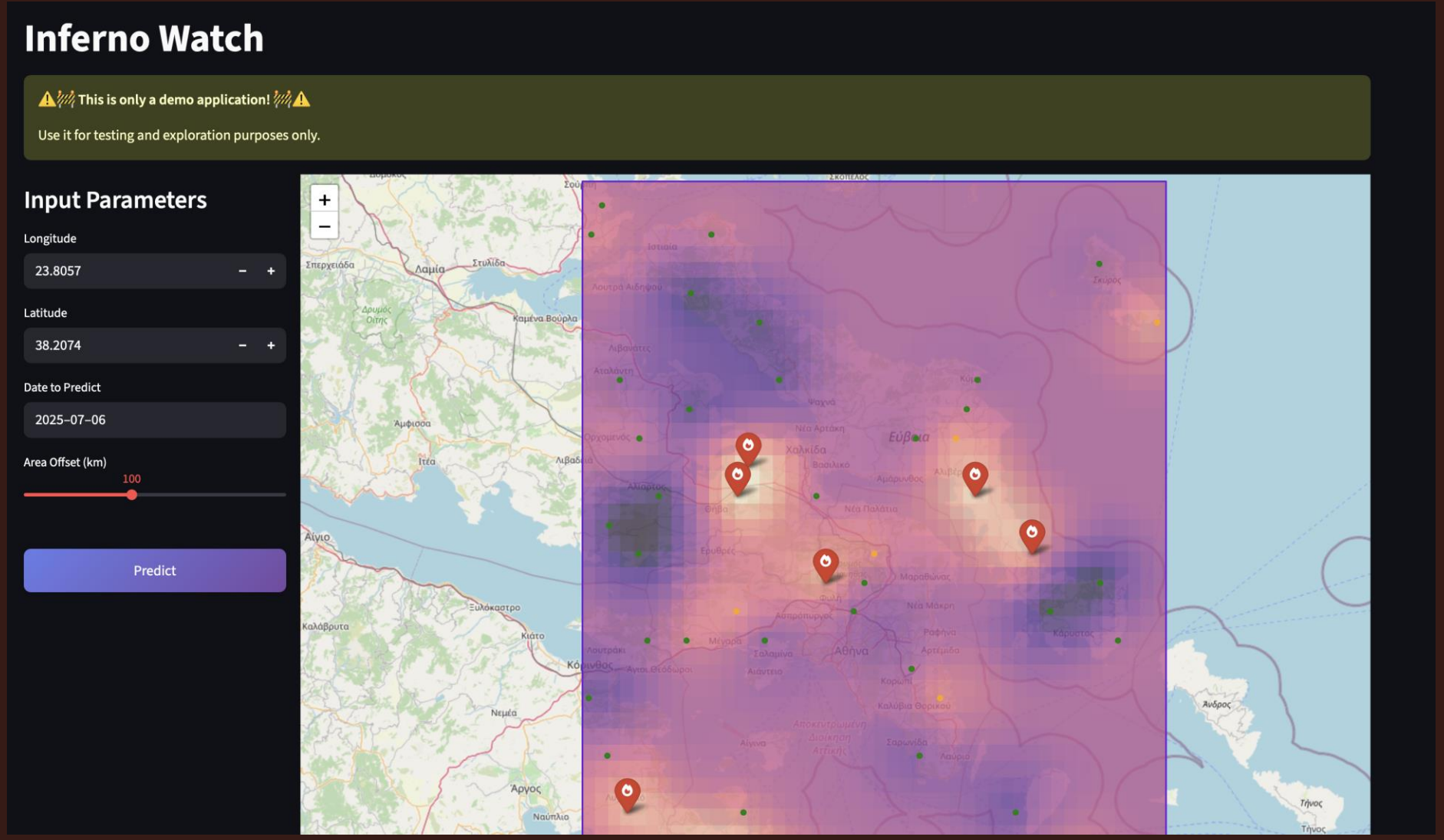
Study in Reno, Nevada





Source: Desert Research Institute. "New study analyses air quality impacts of wildfire smoke." ScienceDaily. ScienceDaily, 28 May 2025.

Features



AI model based on 18 weather parameters

Fire location prediction in a certain area

accurate coordinates of the fire

historical weather data from the coordinates

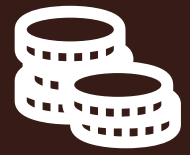
wind speed, temperature, rain, precipitation data

wildfire location prediction

Value Proposition

Reduces CO_2 and $PM_{2.5}$ emissions from wildfires

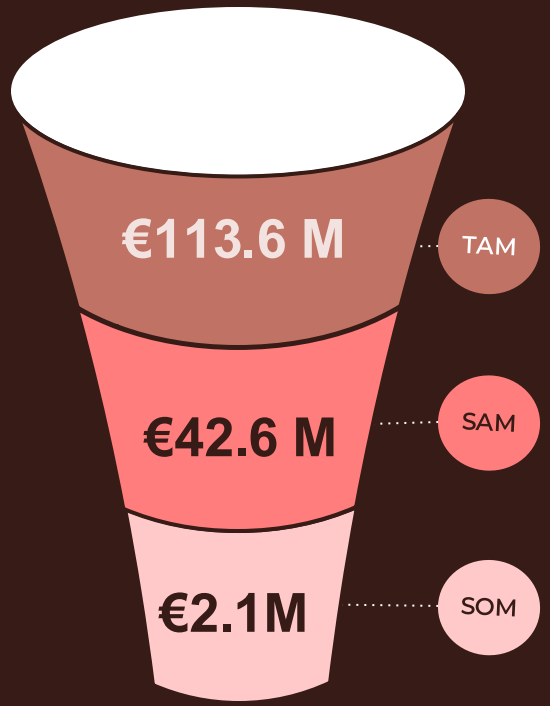
Reduces health risks and premature deaths from smoke exposure



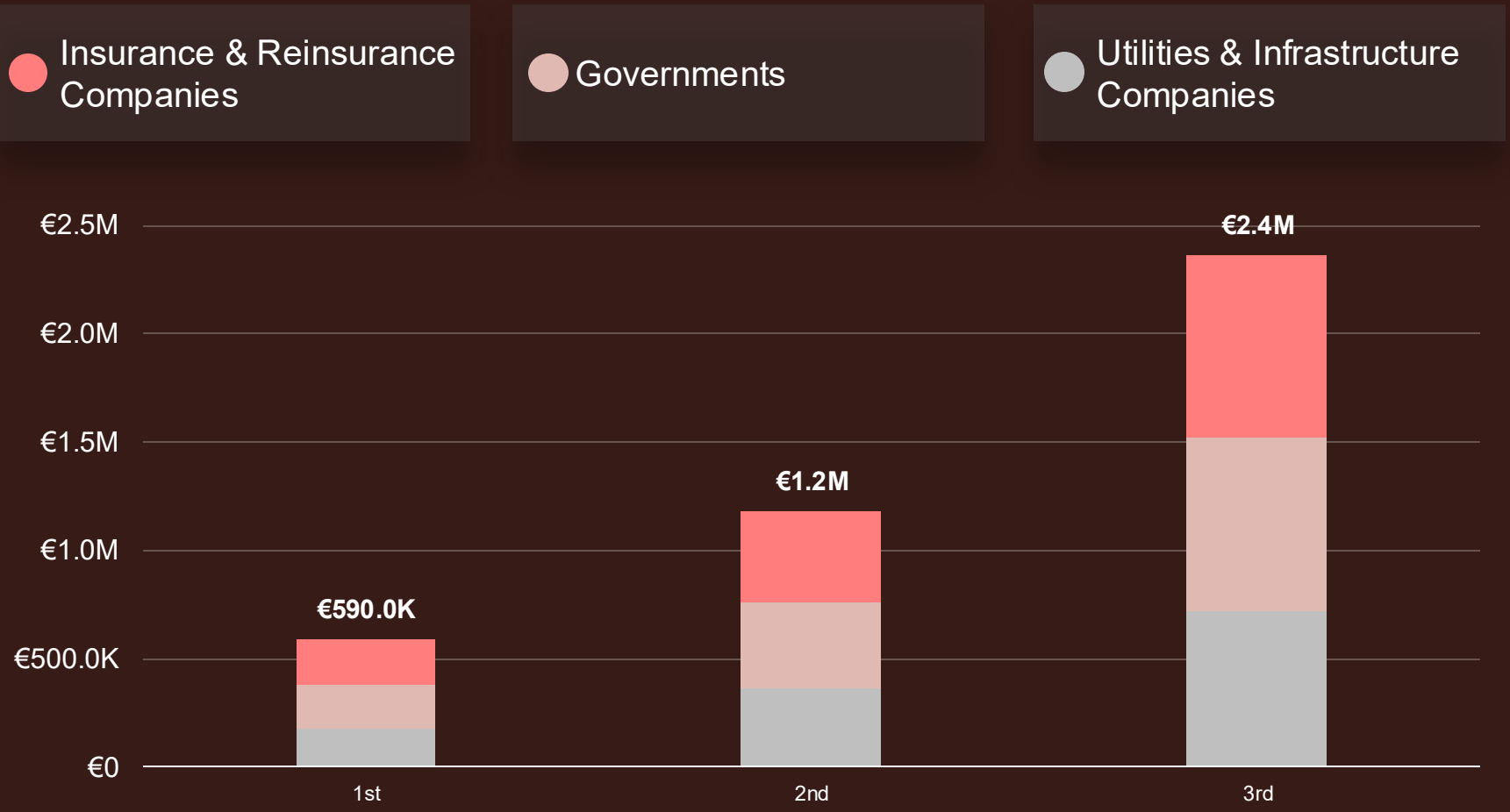
Saves governments and insurers millions by preventing large-scale losses

Market & Business Case

Market Structure



Engagement Projection
(yearly)



Fire direction prediction based on wind speed

Including topographic specs

Worldwide wildfire location prediction

InfernoWatch transforms satellite data into early and actionable intelligence protecting lives, air quality, and ecosystems

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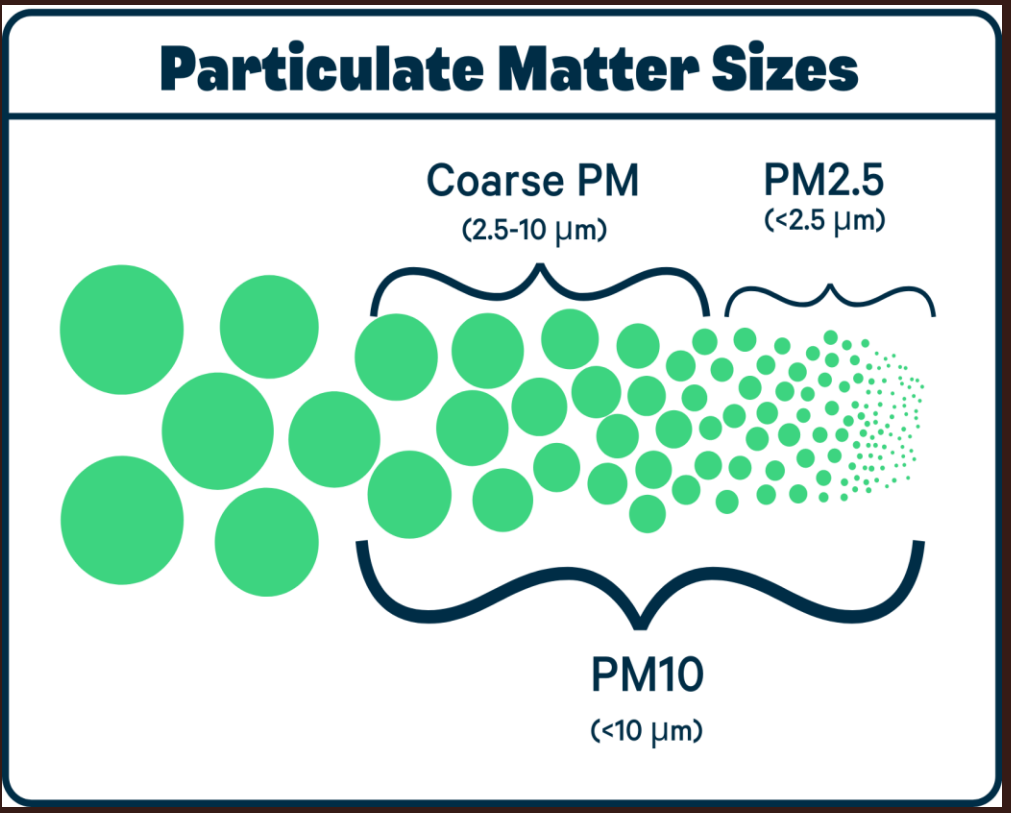
Layer (type)	Output Shape	Param #
lstm_2 (LSTM)	(None, 30, 128)	73,728
dropout_2 (Dropout)	(None, 30, 128)	0
lstm_3 (LSTM)	(None, 64)	49,408
dropout_3 (Dropout)	(None, 64)	0
dense_2 (Dense)	(None, 32)	2,080
dense_3 (Dense)	(None, 1)	33

Structure of the neural network



PM2.5 (Particulate Matter 2.5) refers to air These extremely small These extremely small particles (e.g. transportation, domestic heating, industrial activities, forest fires) and can also originate from natural sources (e.g., dust storms, borne dust particles **with a diameter of less than or equal to 2.5 micrometers (µm). These extremely small particles are mainly produced by combustion processes (e.g., transportation, domestic heating, industrial activities, forest fires) and can also originate from natural sources (e.g., dust storms, volcanic eruptions).**

Health effects

PM2.5 particles are more dangerous than larger particles (e.g., PM10) because they can PM2.5 particles are more dangerous than larger particles (e.g., PM10) because they can penetrate