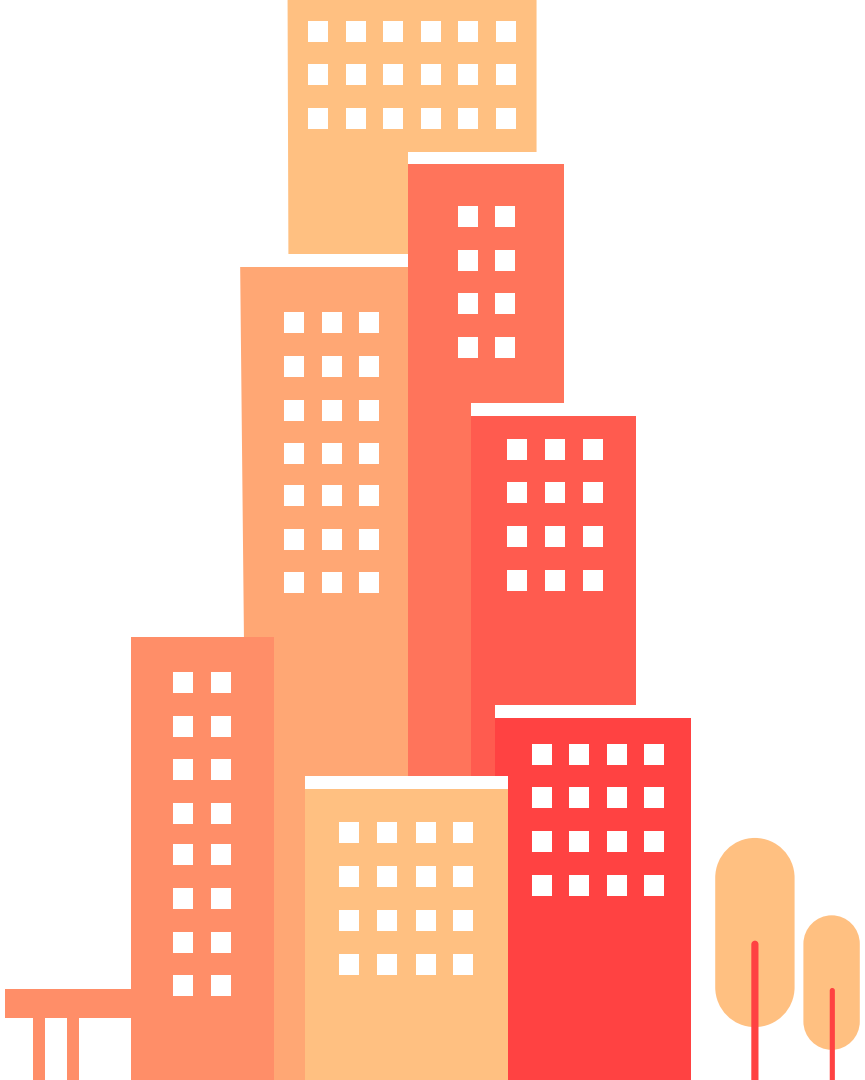
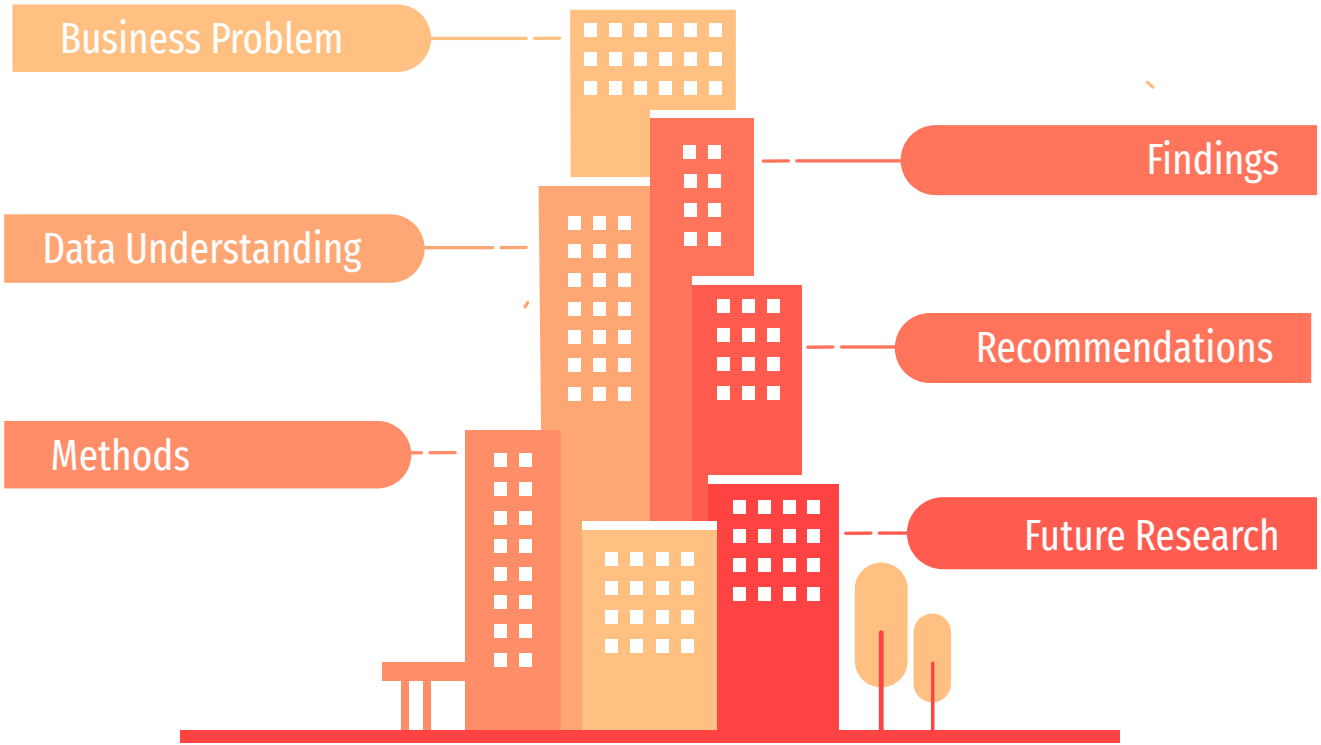


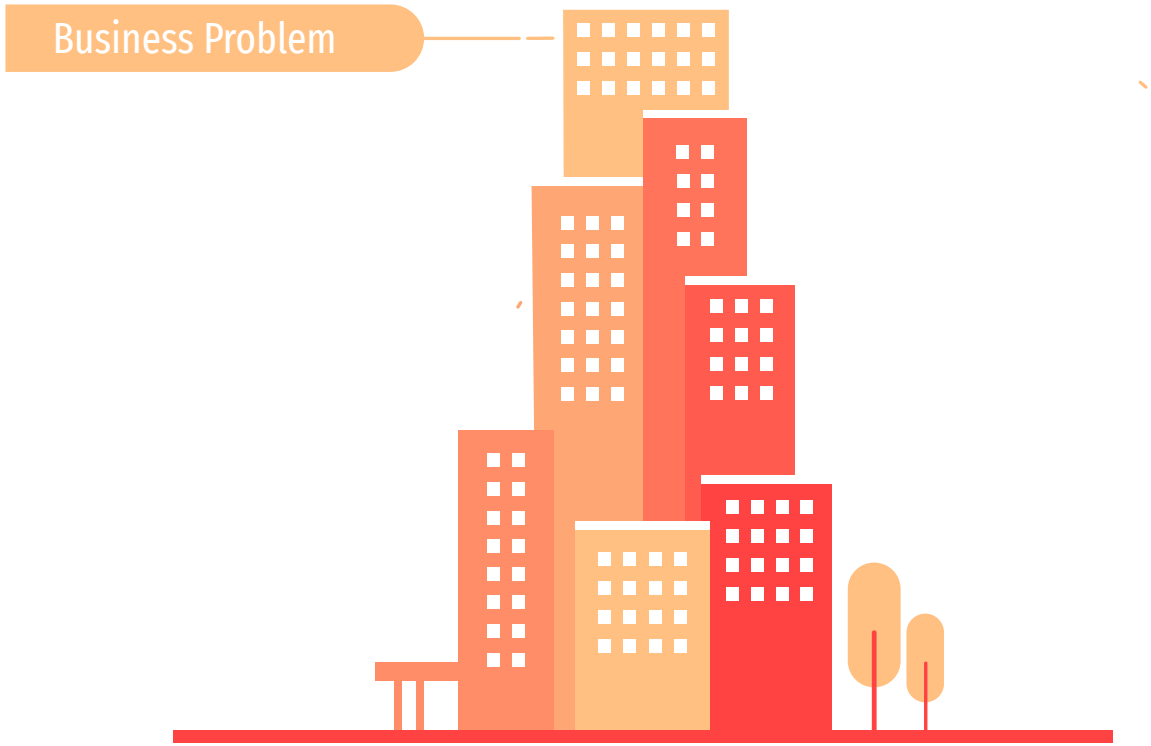
# Predicting Building Energy Usage

Evan Johnson

# Agenda


Business Problem
Findings
Data Understanding
Recommendations
Methods
Future Research

# Business Problem



# Business Problem

- Model that can predict building's annual energy usage based on location (weather) and building qualities (sqft,floors,primary use).

- **City Planning** - project future energy consumption
- **Identify Energy Abusers** - target buildings that are consuming more than their predicted amount and engage them in reduction actions

# Data Understanding

# Data Understanding

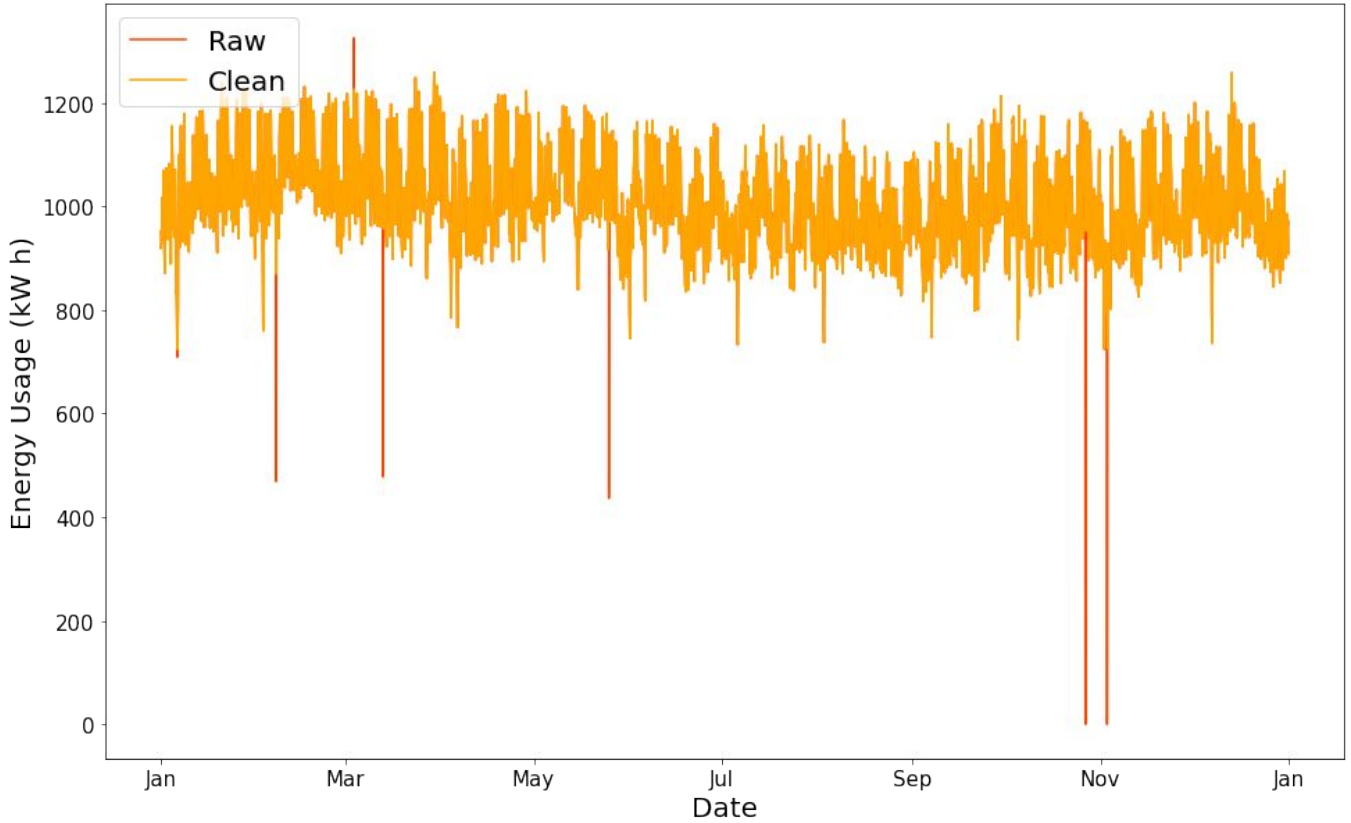
Target Variable - Energy Usage (kW h) - Collected by meters on hourly basis

- Not uncommon to have erratic or missing readings due to equipment malfunction

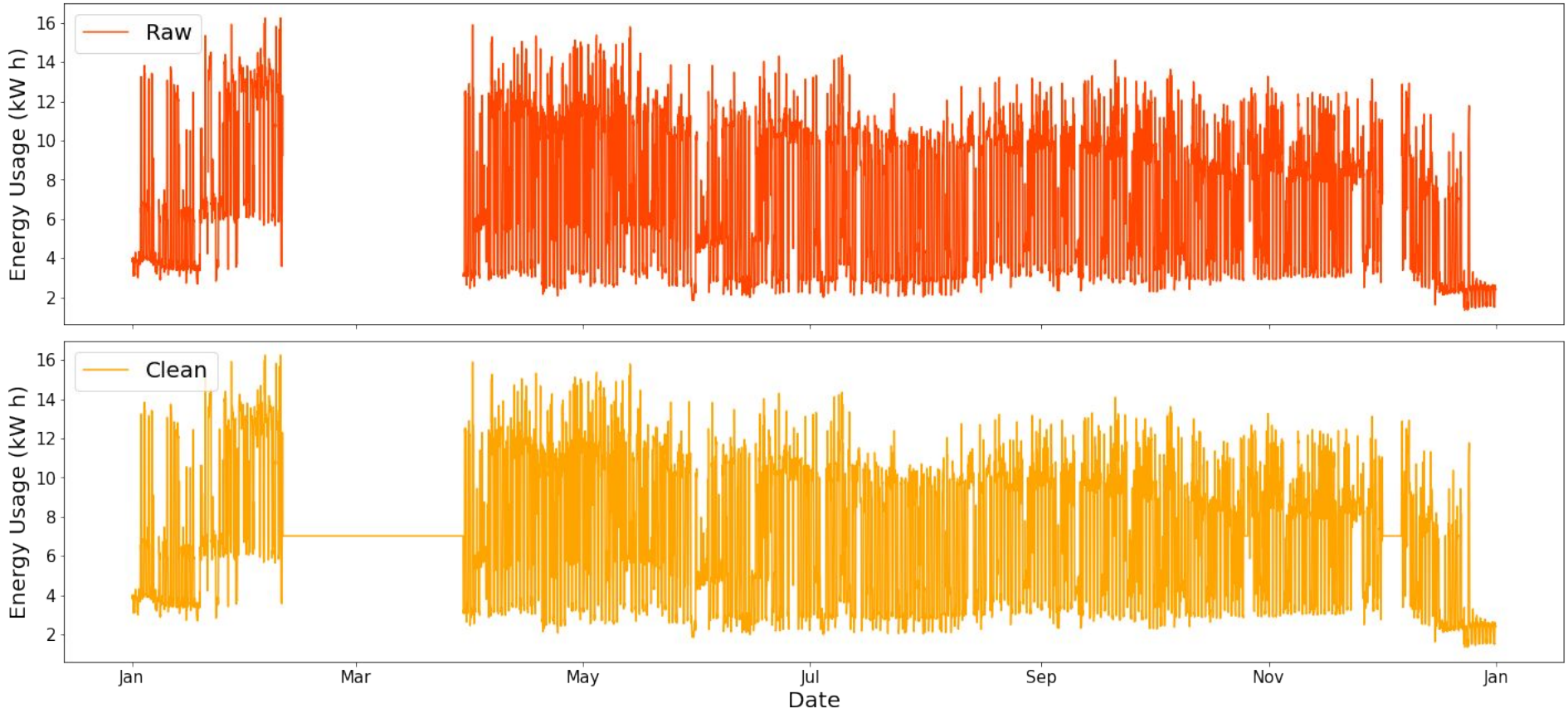
Building’s location data is what city it is in

# Methods

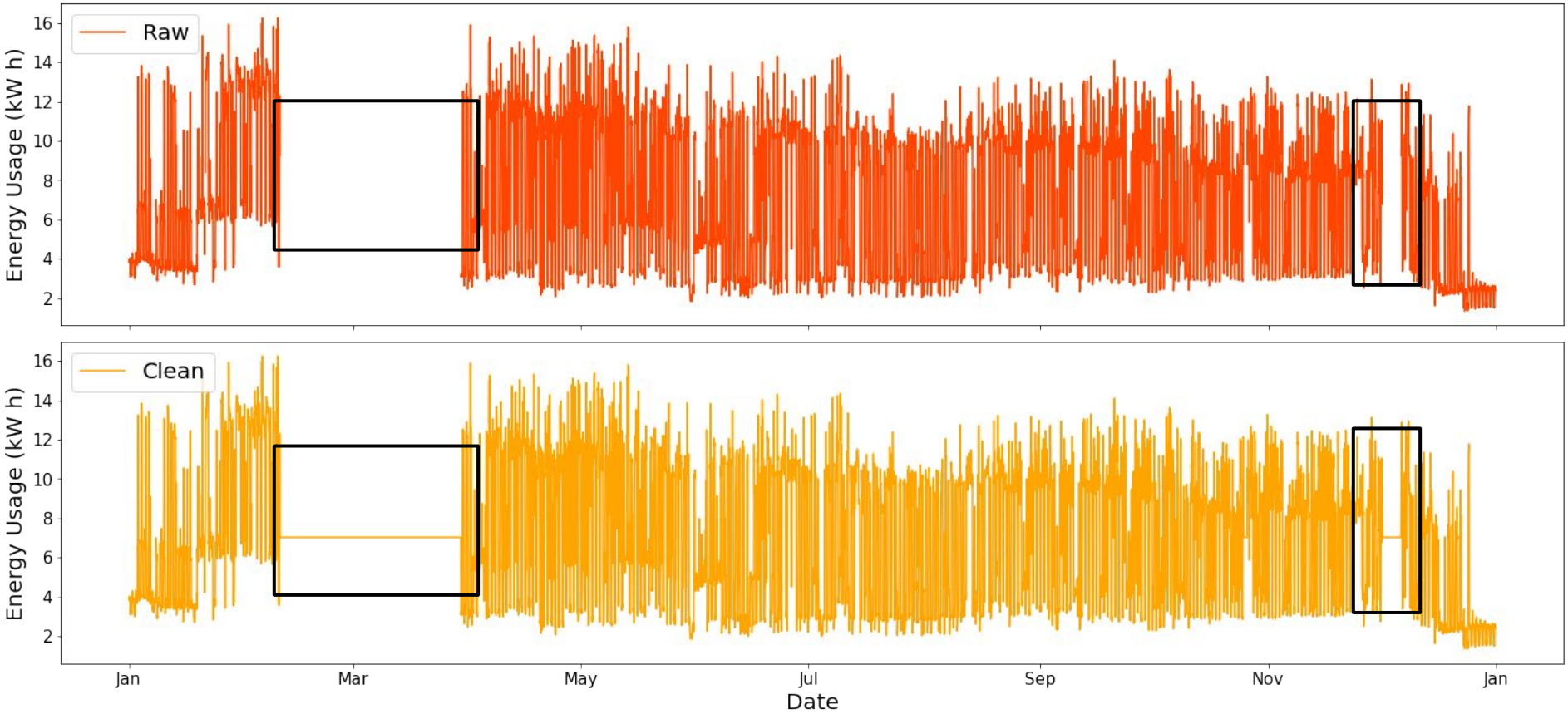
# Annual Energy Usage - Minneapolis - Building #1212



# Filling In Gaps During Periods of Missing Me



# Annual Energy Usage - Toronto - Building #1353



# Methods

01

## Mercury

Mercury is the closest planet to the Sun

02

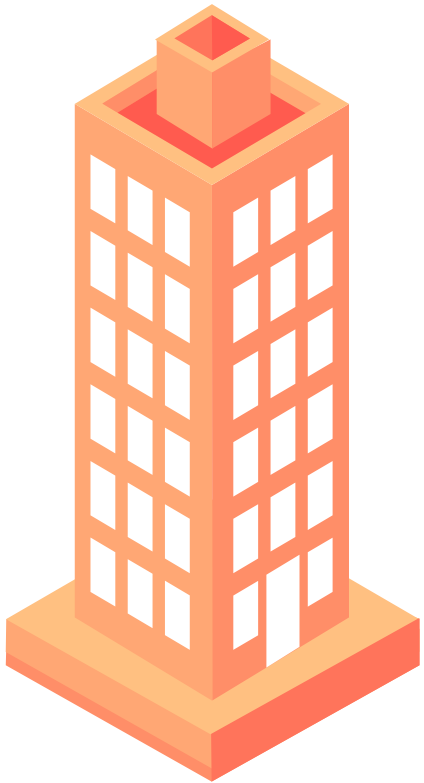
## Mars

Despite being red, Mars is actually a cold place

03

## Saturn

Saturn is the ringed one and a gas giant



## Venus

Venus has a beautiful name, but it’s very hot

04

## Neptune

Neptune is the farthest planet from the Sun

05

## Jupiter

Jupiter is the biggest planet in the Solar System

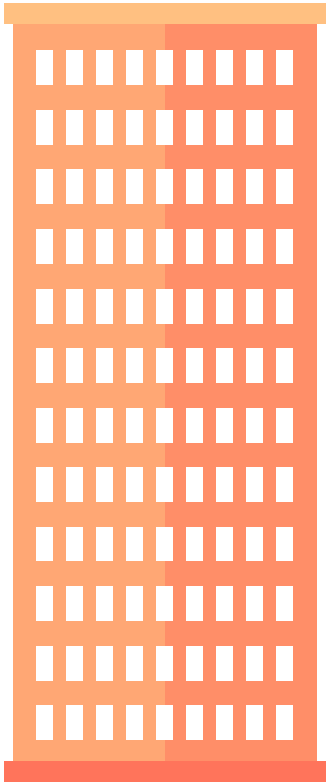
06

# Main Features

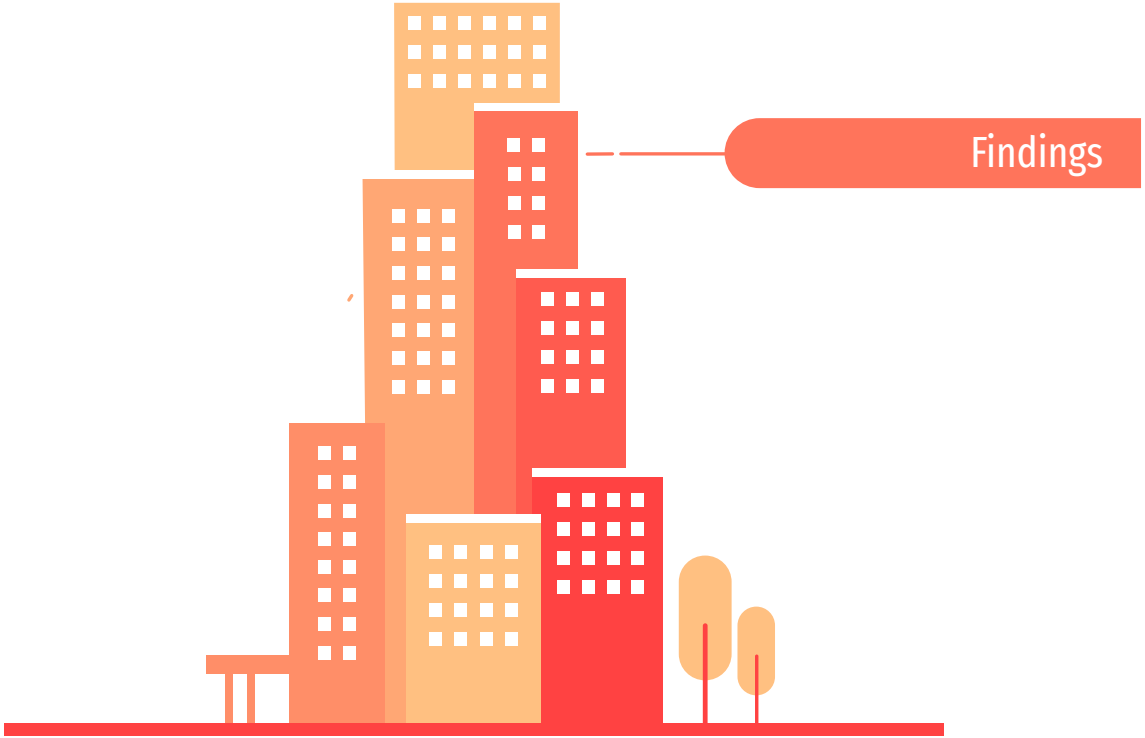
Energy Efficiency

Size (sqft)

Primary Use



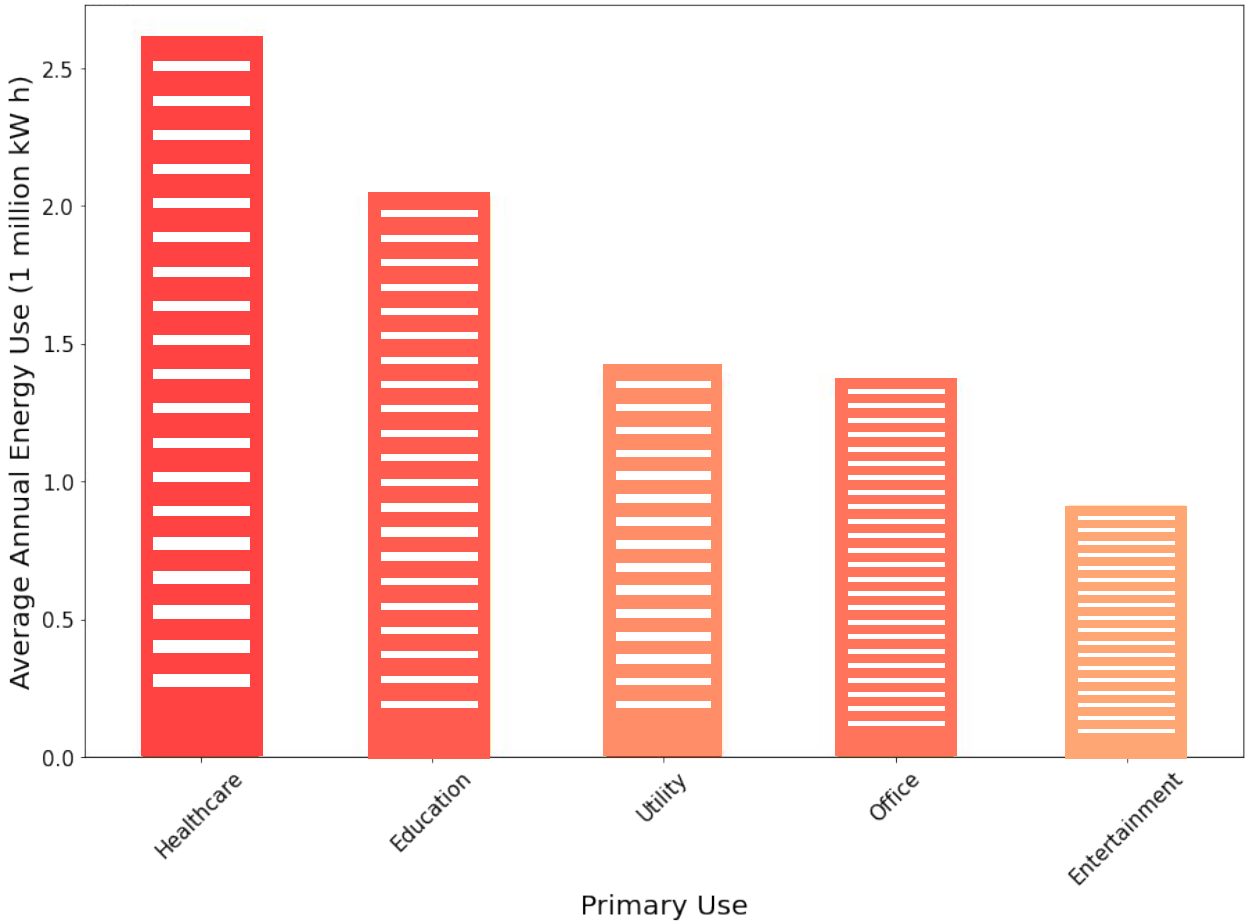
# Findings



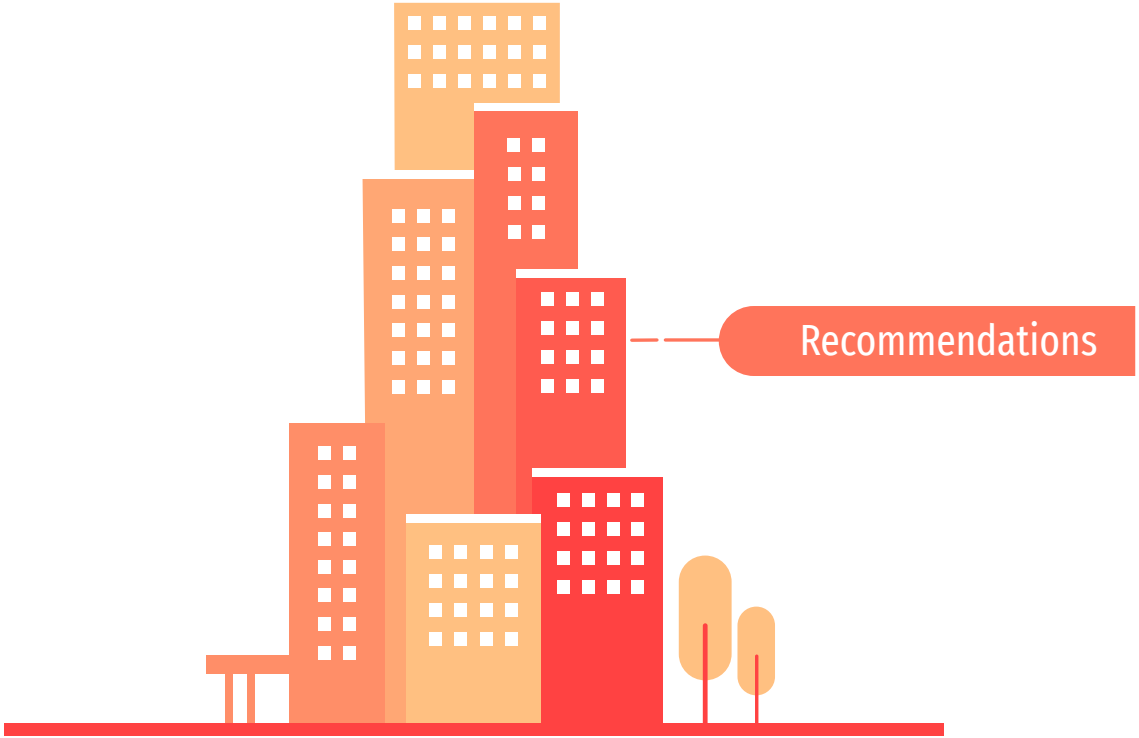
# Findings

- Rsquared of .65 on test data
- Final Model: RandomForest
- Simple Model: LinearRegression
- Will include findings/figures based on sqft, location and primary use
    - Show energy consumption based on primary use

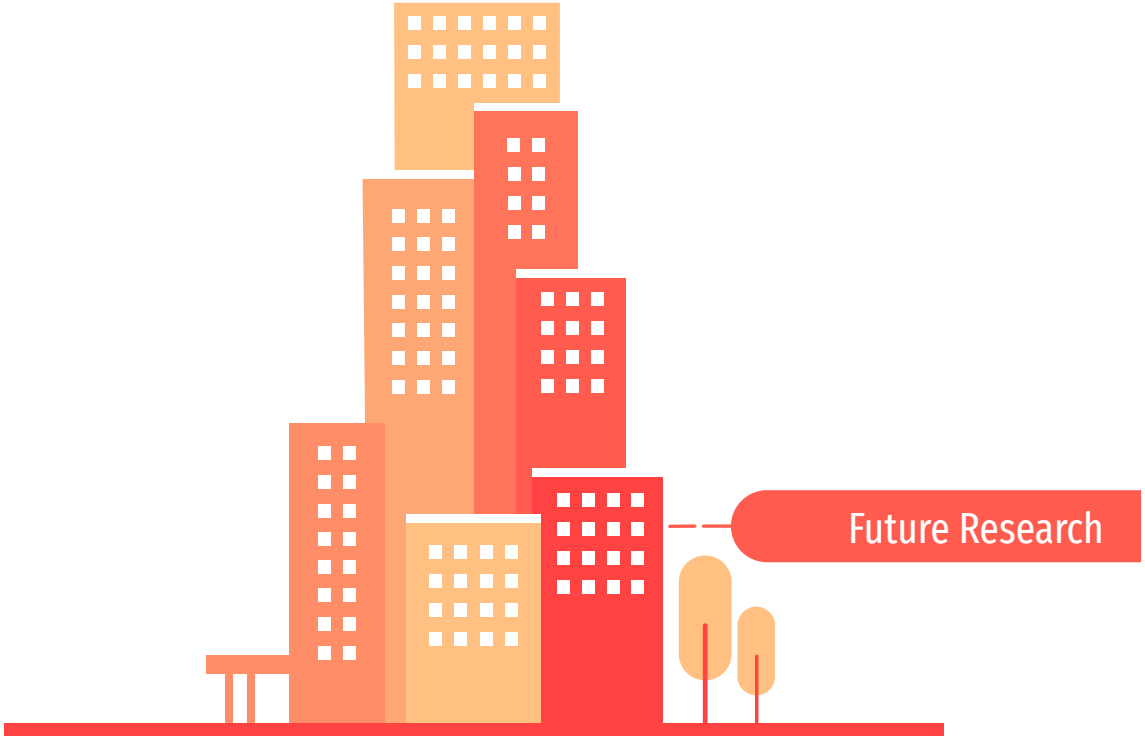
# Average Annual Energy Use by Building Type



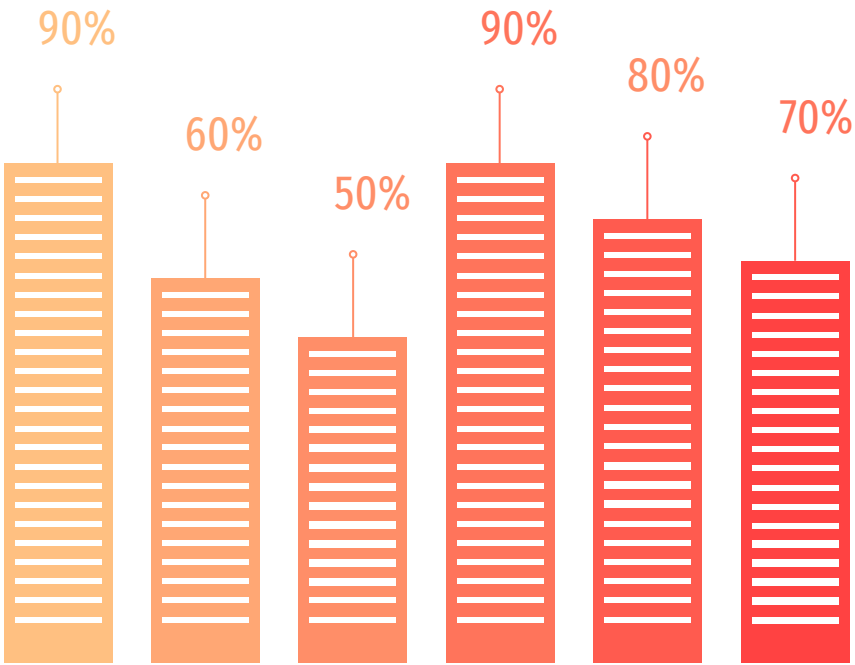
# Recommendations



# Future Research

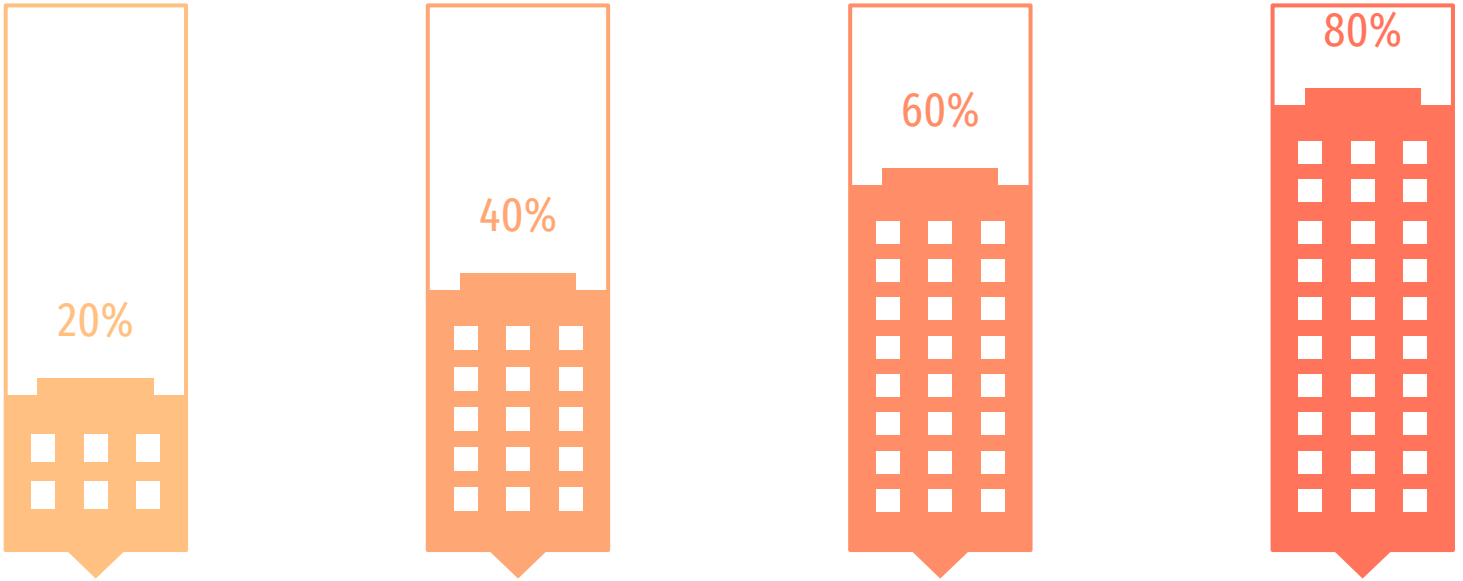


# FINDINGS




- Venus has a beautiful name, but it’s very hot
- Neptune is the farthest planet from the Sun
- Jupiter is the biggest planet in the Solar System
- Despite being red, Mars is actually a cold place
- Mercury is the closest planet to the Sun
- Planet Saturn is the ringed one and a gas giant

# FINDINGS




Mercury is the closest planet to the Sun

Despite being red, Mars is a cold place

Venus has a pretty name, but it’s hot

Neptune is the farthest planet

# Building Infographics

## Mercury

Mercury is the closest planet to the Sun

## Venus

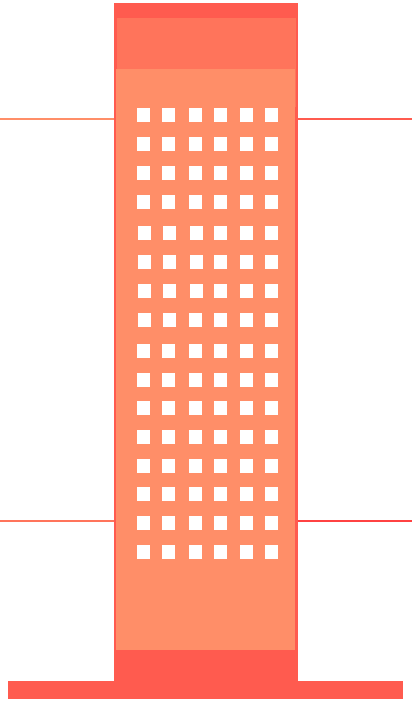
Venus has a beautiful name, but it’s very hot

## Mars

Despite being red, Mars is actually a cold place

## Jupiter

It’s the biggest in the Solar System and a gas giant



# Methods

01

## Mercury

Mercury is the closest planet to the Sun

02

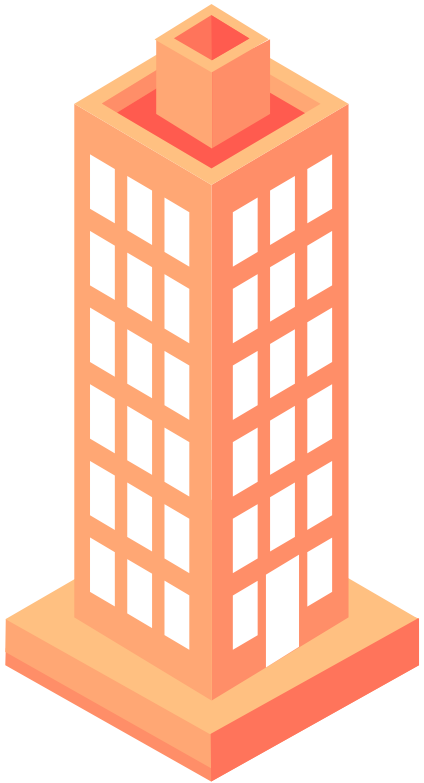
## Mars

Despite being red, Mars is actually a cold place

03

## Saturn

Saturn is the ringed one and a gas giant



# Building Infographics

## Mercury

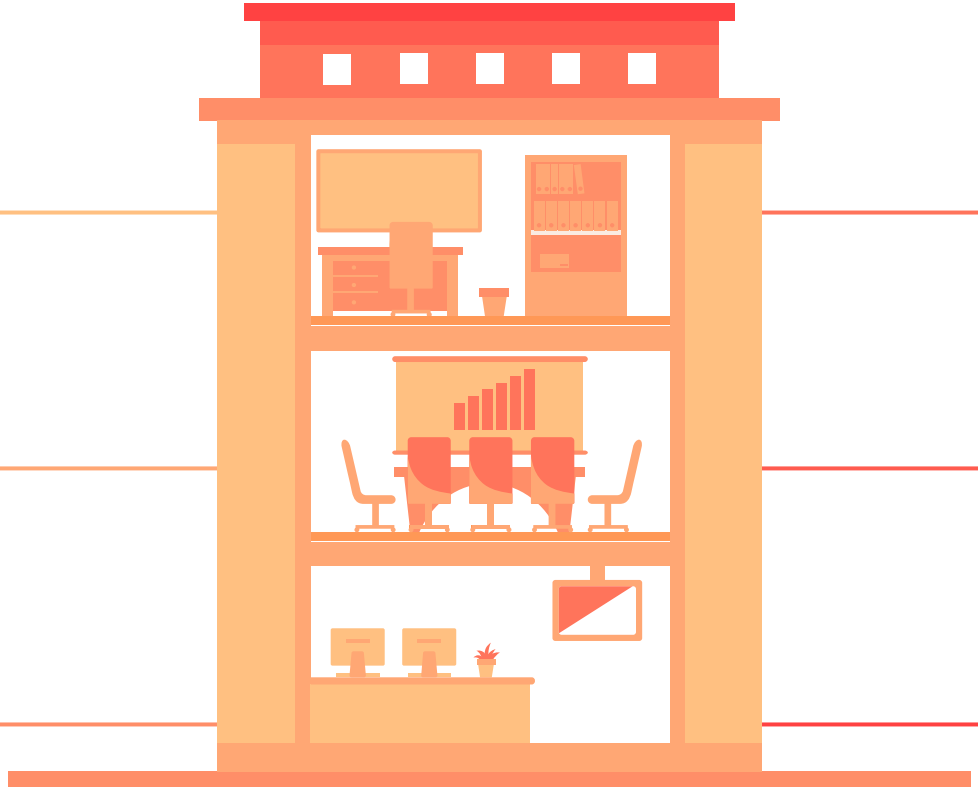
Mercury is the closest planet to the Sun and small

## Mars

Despite being red, Mars is a cold place, not hot

## Saturn

Saturn is the ringed one and a gas giant



## Venus

Venus has a beautiful name, but it's very hot

## Neptune

Neptune is the farthest planet from the Sun

## Jupiter

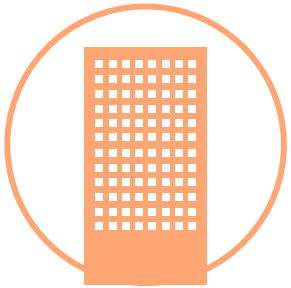
Jupiter is the biggest planet in the Solar System

# Building Infographics



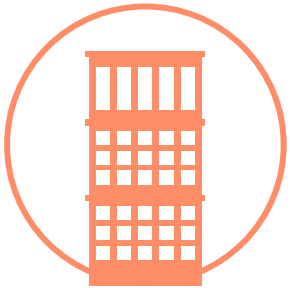
## Mercury

Mercury is the closest planet to the Sun



## Mars

Despite being red, Mars is a cold place



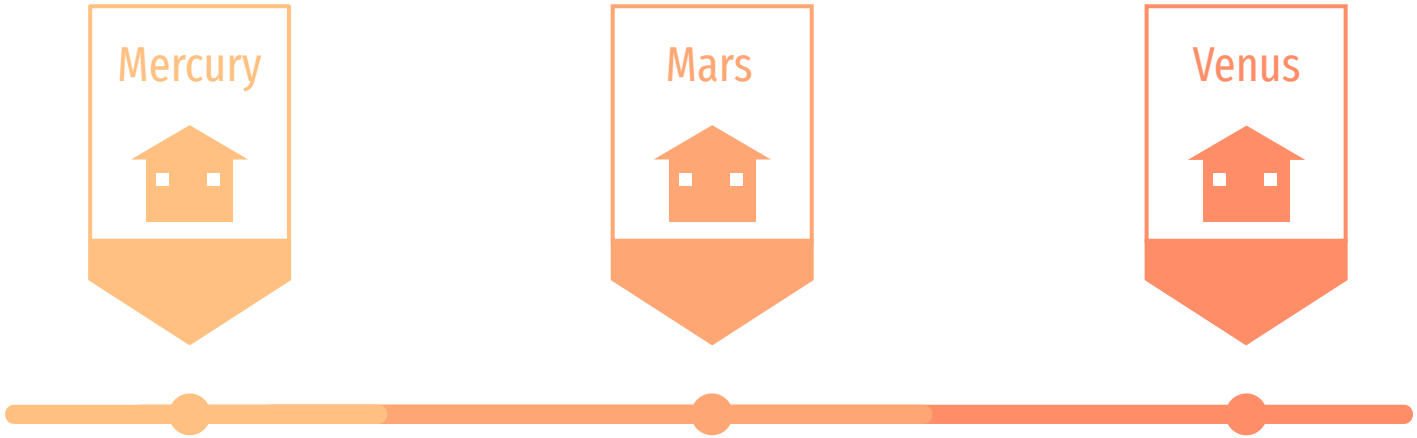
## Venus

Venus has a pretty name, but it’s hot

## Neptune

Neptune is the farthest from the Sun

# Building Infographics



# Building Infographics



## Neptune

**Free**

Neptune is the farthest planet from the Sun

## Mars

**$9,99**

Despite being red, Mars is actually a cold place

## Mercury

**$19,99**

Mercury is the closest planet to the Sun and the smallest

## Venus

**$29,99**

Planet Venus has a pretty name, but it’s terribly hot

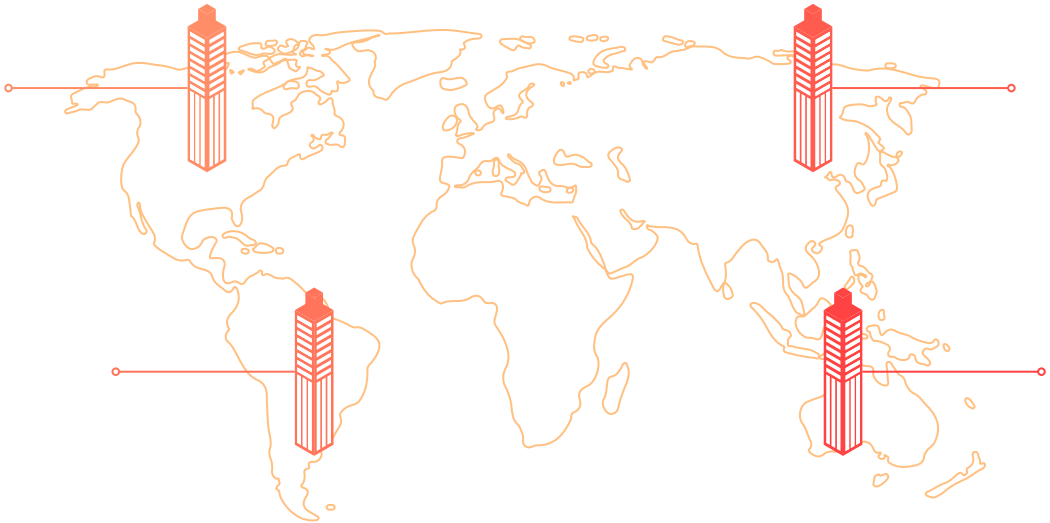
# Building Infographics

## Mercury

Mercury is the closest planet to the Sun and small

## Mars

Despite being red, Mars is actually a cold place



## Venus

Venus has a beautiful name, but it’s very hot

## Neptune

Neptune is the farthest planet from the Sun

# Building Infographics

## Mercury

Mercury is the closest planet to the Sun and small

## Mars

Despite being red, Mars is actually a cold place

## Saturn

Saturn is the ringed one and a gas giant

## Venus

Venus has a beautiful name, but it’s very hot

## Neptune

Neptune is the farthest planet from the Sun

## Jupiter

Jupiter is the biggest planet in the Solar System

# Building Infographics

## Mercury

Mercury is the closest planet to the Sun and small

## Venus

Venus has a beautiful name, but it's very hot

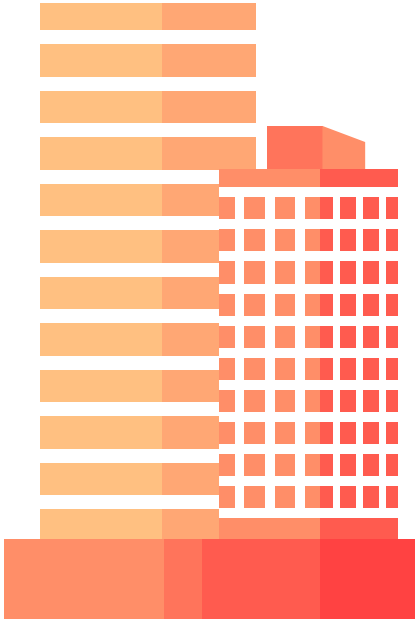
## Mars

Despite being red, Mars is actually a cold place

## Neptune

Neptune is the farthest planet from the Sun

# Building Infographics



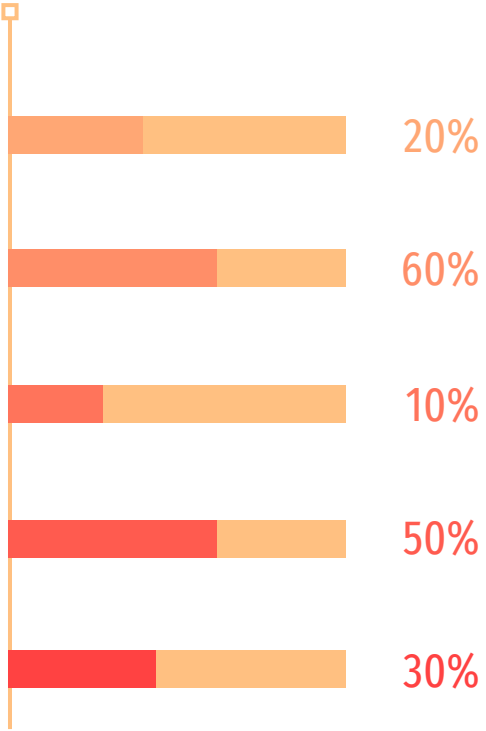
Venus has a beautiful name, but it’s very hot

Neptune is the farthest planet from the Sun

Jupiter is the biggest planet in the Solar System

Despite being red, Mars is actually a cold place

Mercury is the closest planet to the Sun



# Building Infographics

01 Venus has a beautiful name, but it’s very hot

02 Neptune is the farthest planet from the Sun

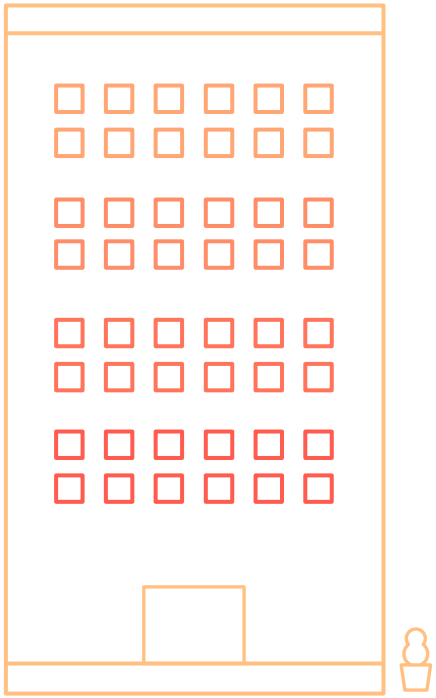
03 Jupiter is the biggest planet in the Solar System

04 Despite being red, Mars is actually a cold place

05 Mercury is the closest planet to the Sun

06 Planet Saturn is the ringed one and a gas giant

# Building Infographics



## Mercury

Mercury is the closest planet to the Sun and small

## Mars

Despite being red, Mars is actually a cold place

## Saturn

Saturn is the ringed one and a gas giant

## Jupiter

Jupiter is the biggest planet in the Solar System

# Building Infographics

**2017**

Mercury is the closest planet to the Sun and small

**2018**

Saturn is the ringed planet and a gas giant

**2019**

Despite being red, Mars is actually a cold place

**Now**

Jupiter is the biggest planet in the Solar System

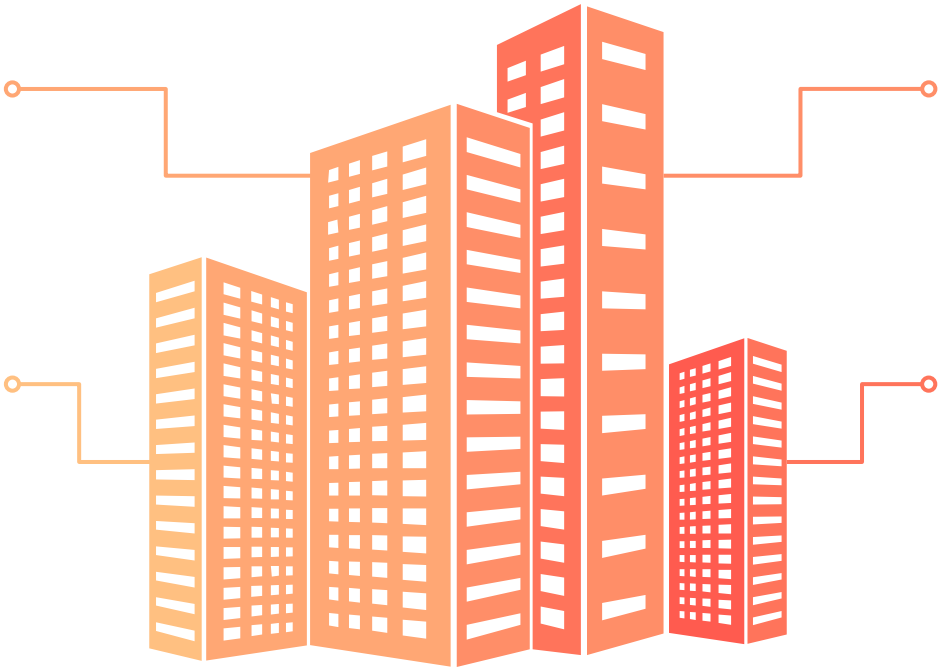
# Building Infographics

## Mars

Despite being red, Mars is actually a cold place

## Saturn

Saturn is the ringed one and a gas giant



## Venus

Venus has a beautiful name, but it's very hot

## Neptune

Neptune is the farthest planet from the Sun

# Building Infographics

## Step 1

Mercury is the closest planet to the Sun

## Step 2

Despite being red, Mars is a cold place

## Step 3

Venus has a pretty name, but it's hot

## Step 4

Neptune is the farthest from the Sun

# Building Infographics

## Venus

Venus has a beautiful name, but it’s terribly hot. It’s the second planet

## Neptune

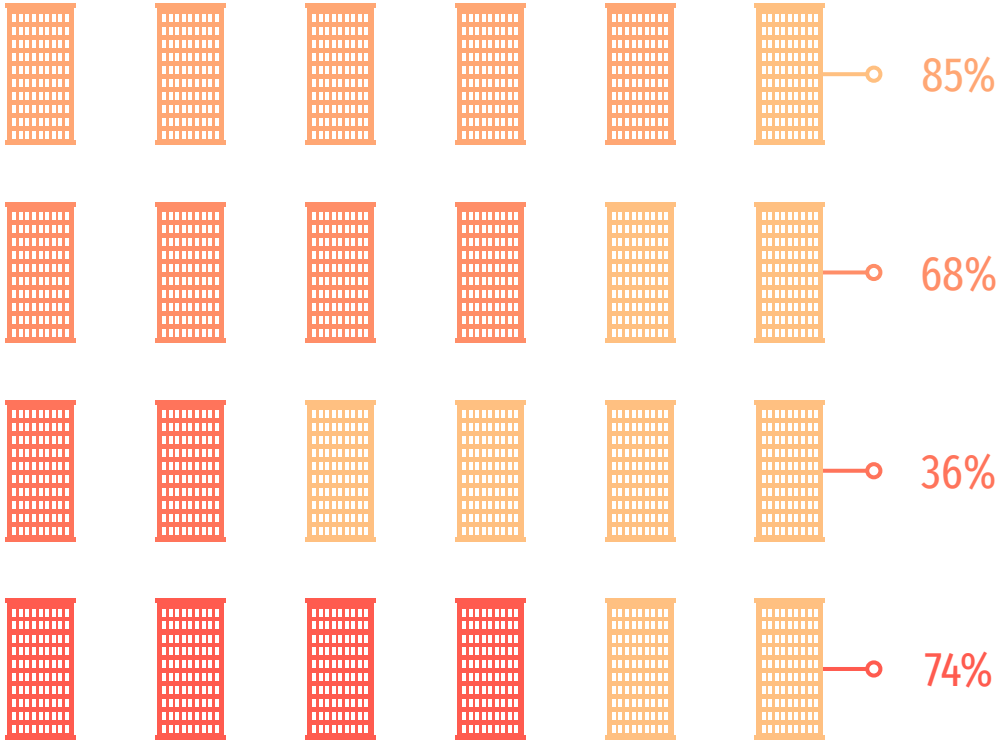
Neptune is the farthest planet from the Sun and the eighth

## Jupiter

Jupiter is the biggest planet in the Solar System and a gas giant

## Mars

Despite being red, Mars is a cold place. It’s full of iron oxide dust



# Building Infographics

## Mars

Despite being red, Mars is actually a cold place

## Venus

Venus has a beautiful but it's terribly hot

## Saturn

Saturn is the ringed one and a gas giant

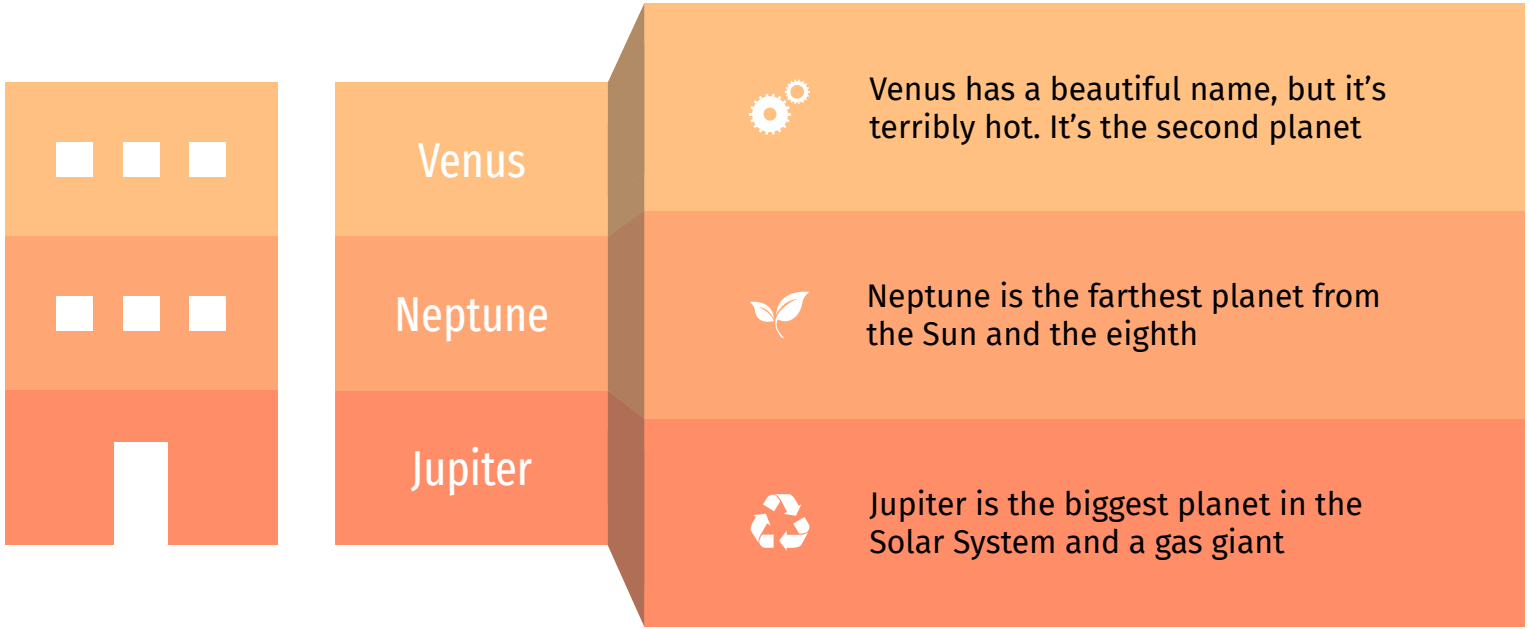
## Mercury

Mercury is the closest planet to the Sun

## Neptune

Neptune is the farthest planet from the Sun

# Building Infographics



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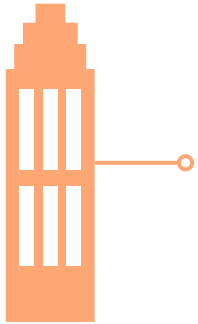
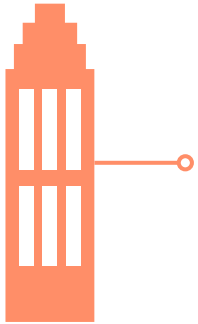


## Mercury

Mercury is the closest planet to the Sun and small

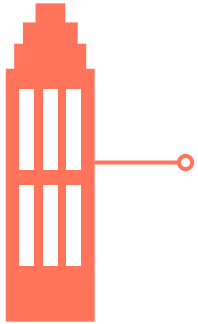
36%



## Venus

Venus has a beautiful name, but it’s very hot

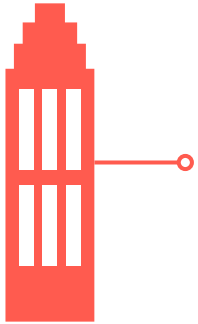
45%



## Mars

Despite being red, Mars is actually a cold place

82%

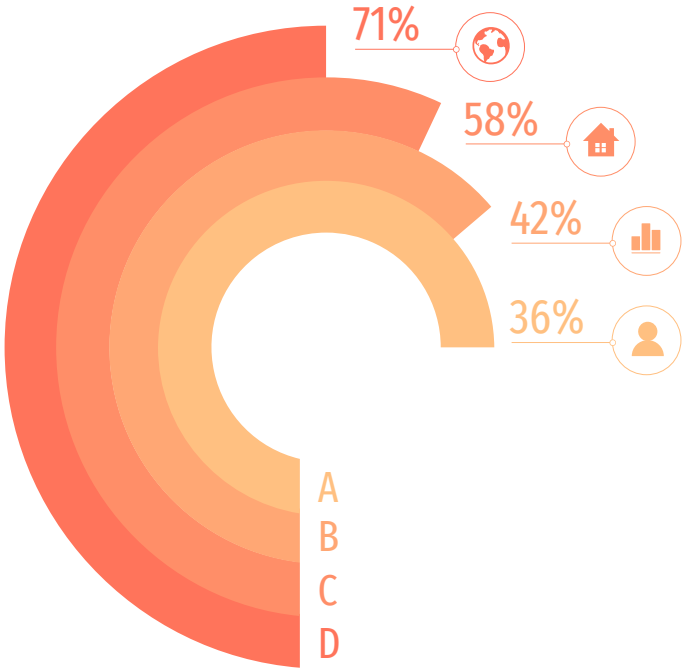


## Neptune

Neptune is the farthest planet from the Sun

69%

# Building Infographics

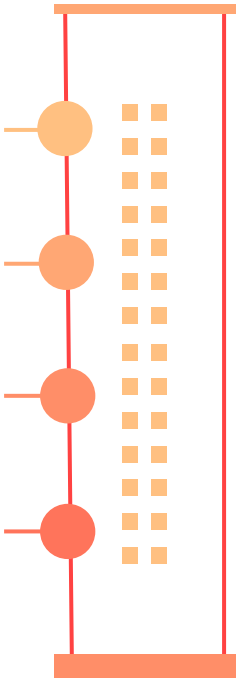



Venus has a beautiful name, but it’s very hot

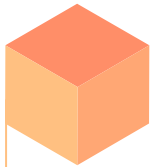
Neptune is the farthest planet from the Sun

Jupiter is the biggest planet in the Solar System

Despite being red, Mars is actually a cold place

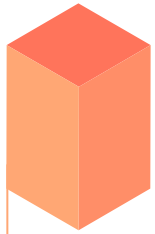


# Building Infographics



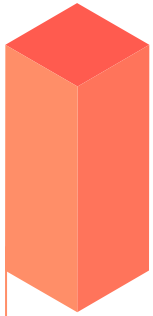
## Mercury

Mercury is the closest planet to the Sun and small



## Mars

Despite being red, Mars is actually a cold place



## Venus

Venus has a beautiful name, but it’s very hot

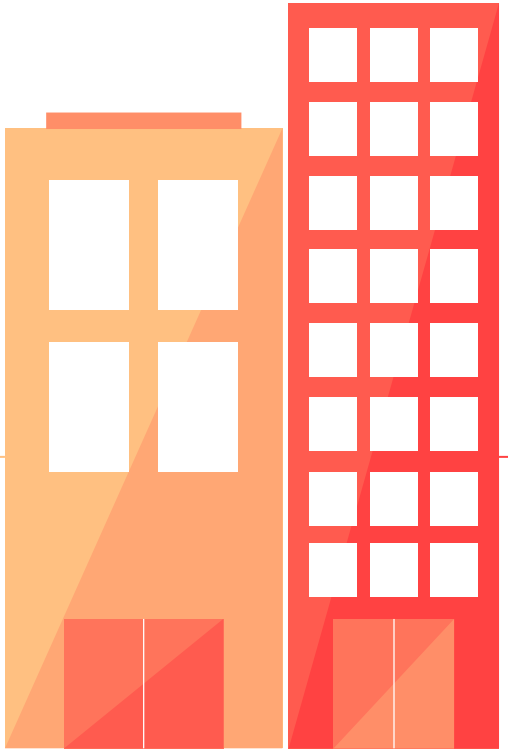
## Neptune

Neptune is the farthest planet from the Sun

# Building Infographics

58%

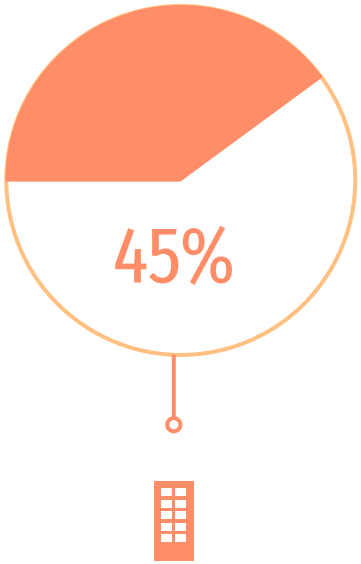
Mercury is the closest planet to the Sun and small



42%

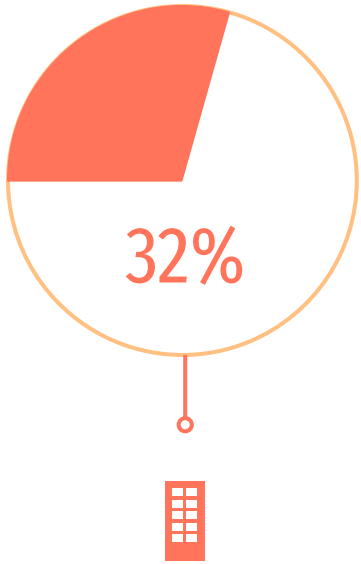
Despite being red, Mars is actually a cold place

# Building Infographics



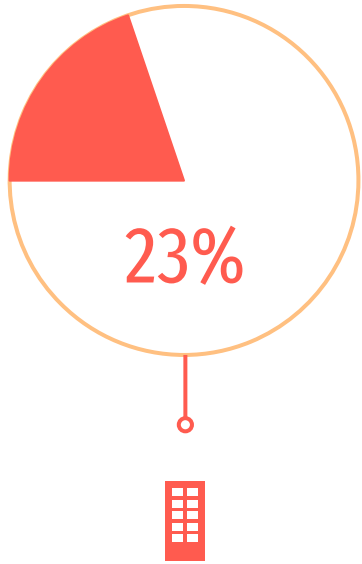

## Mercury

Mercury is the closest planet to the Sun




## Mars

Despite being red, Mars is a cold place




## Venus

Venus has a pretty name, but it’s hot

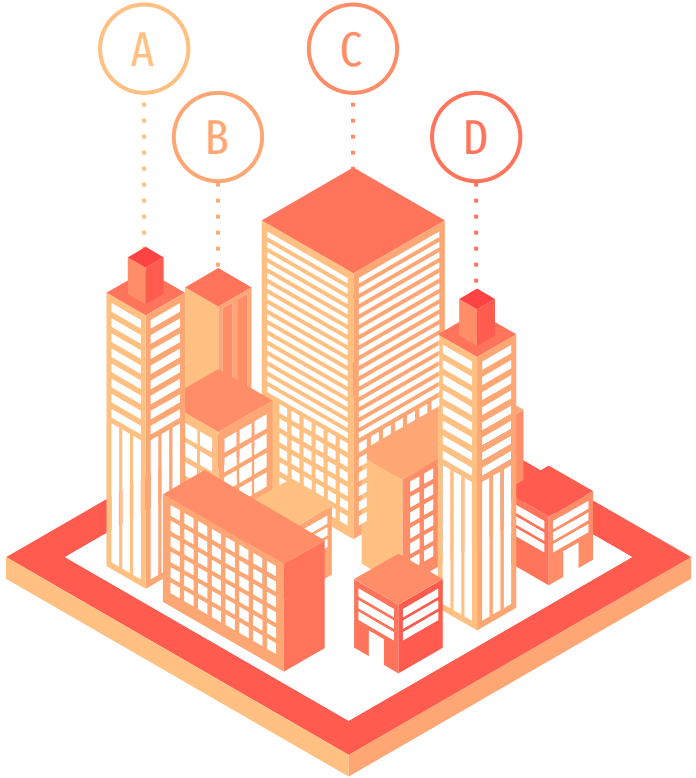
# Building Infographics

## Mars

Despite being red, Mars is actually a cold place

## Saturn

Saturn is the ringed one and a gas giant




## Venus

Venus has a beautiful name, but it’s very hot

## Neptune

Neptune is the farthest planet from the Sun

# Building Infographics

01

## Neptune

Neptune is the farthest planet



02

## Saturn

It’s the ringed one and a gas giant

03

## Mars

Despite being red, Mars is a cold place

04

## Mercury

Mercury is the closest planet to the Sun

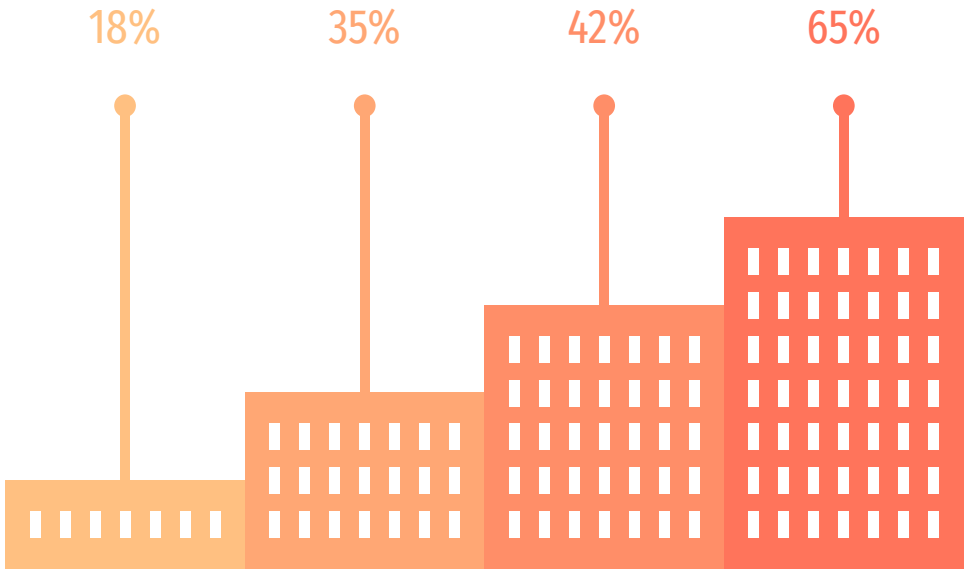
# Building Infographics

## Mars

Despite being red, Mars is actually a cold place

## Saturn

Saturn is the ringed one and a gas giant




## Venus

Venus has a beautiful name, but it’s very hot

## Neptune

Neptune is the farthest planet from the Sun

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# Infographics

You can add and edit some **infographics** to your presentation to show your data in a visual way.

- Choose your favourite infographic and insert it in your presentation using Ctrl C + Ctrl V or Cmd C + Cmd V in Mac.
- Select one of the parts and **ungroup** it by right-clicking and choosing “Ungroup”.
- **Change the color** by clicking on the paint bucket.
- Then **resize** the element by clicking and dragging one of the square-shaped points of its bounding box (the cursor should look like a double-headed arrow). Remember to hold Shift while dragging to keep the proportions.
- **Group** the elements again by selecting them, right-clicking and choosing “Group”.
- Repeat the steps above with the other parts and when you’re done editing, copy the end result and paste it into your presentation.
- Remember to choose the “**Keep source formatting**” option so that it keeps the design. For more info, please visit **Slidesgo School**.