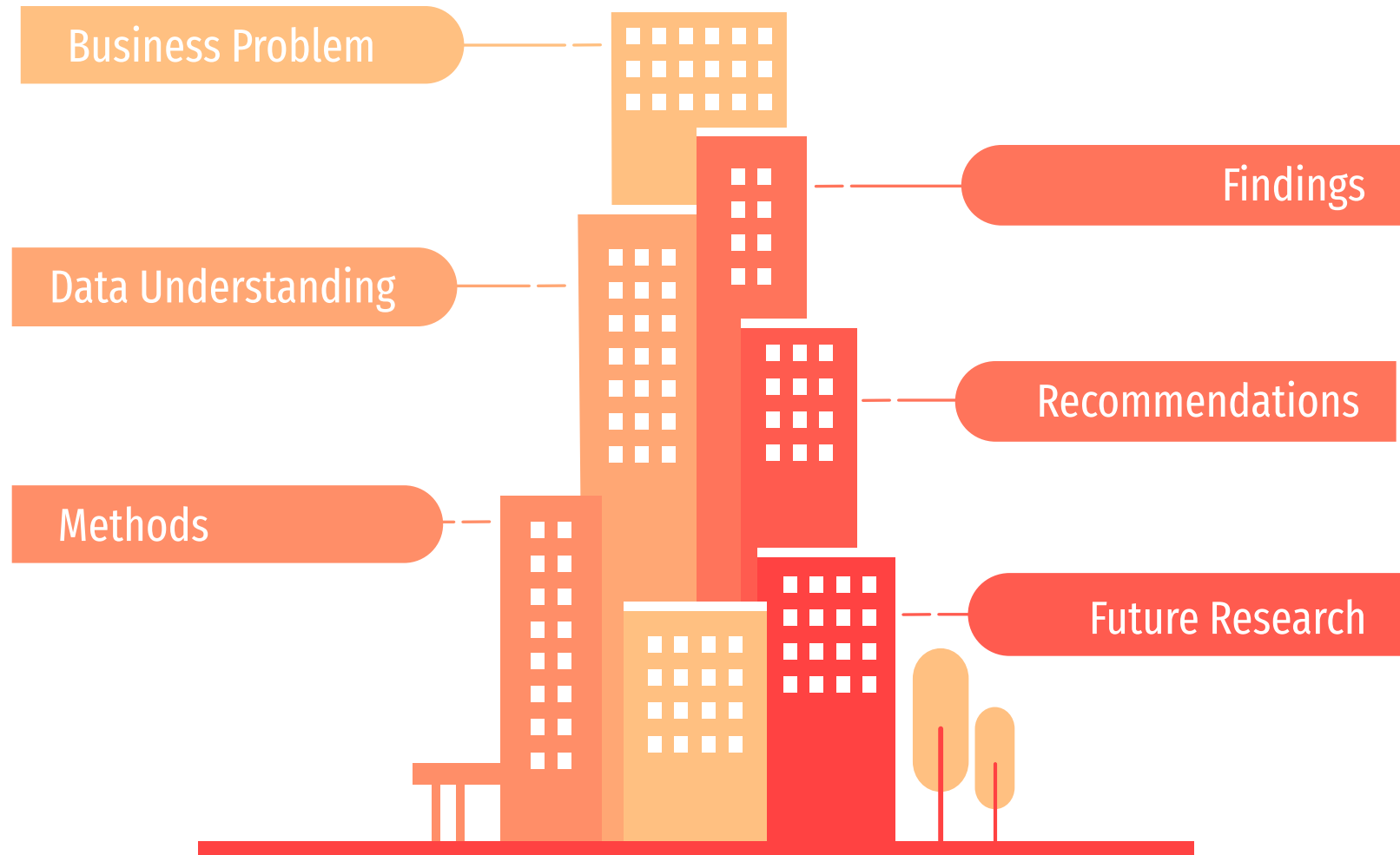


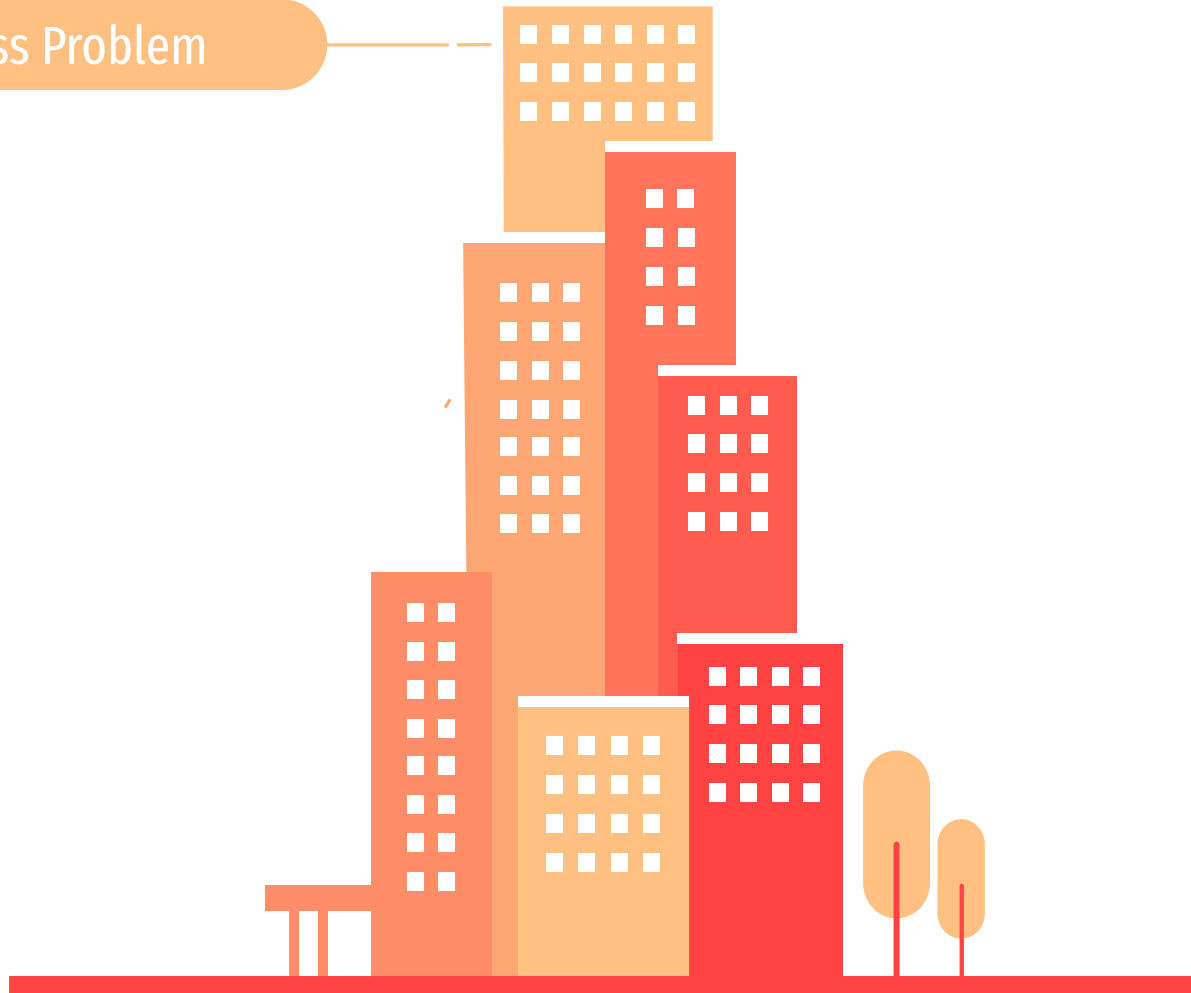
A stylized illustration of a city skyline on the left side of the page. It features several buildings of varying heights and colors, including shades of orange, red, and yellow. The buildings are represented by simple rectangles with white square patterns indicating windows. To the right of the buildings are two simplified trees with orange oval canopies and thin red trunks. The background is plain white.

Predicting Building Energy Usage for New York City

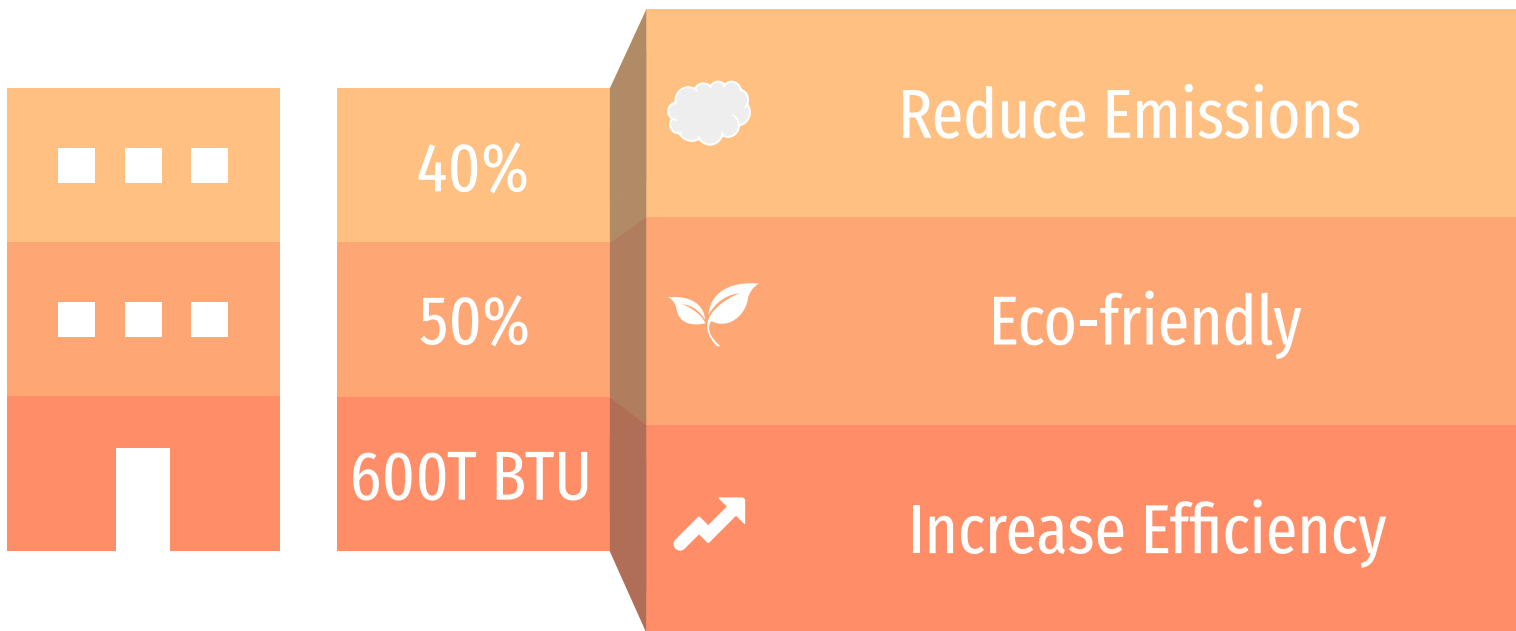
By Evan Johnson



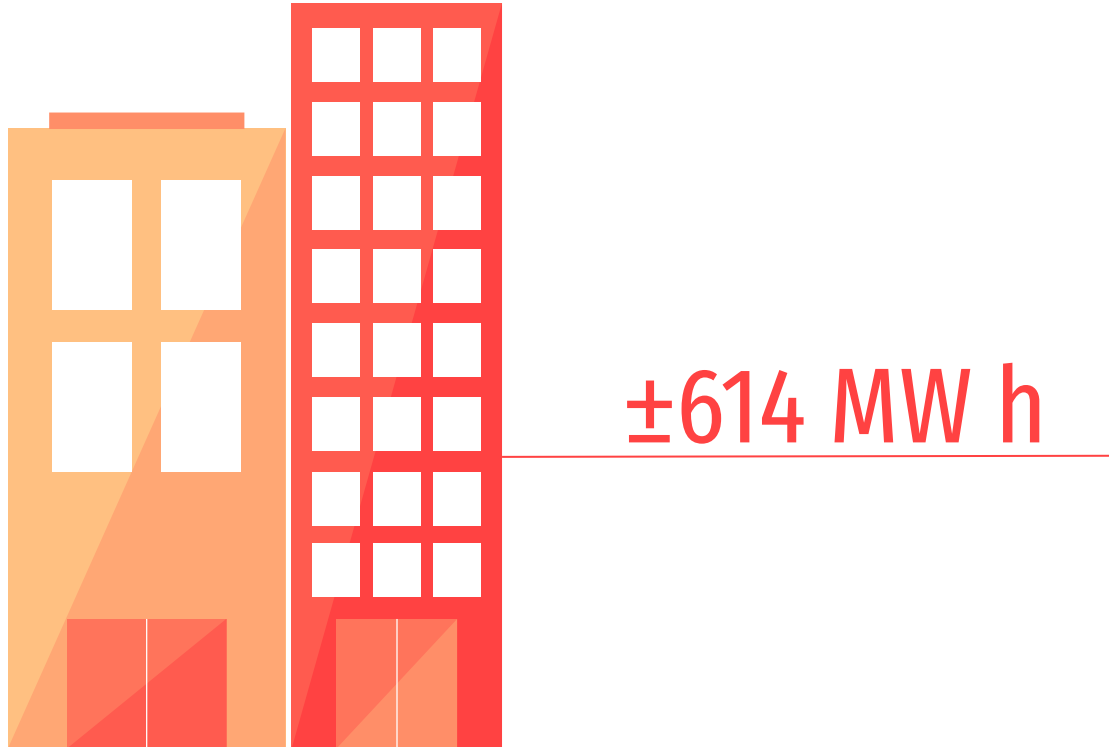
Business Problem



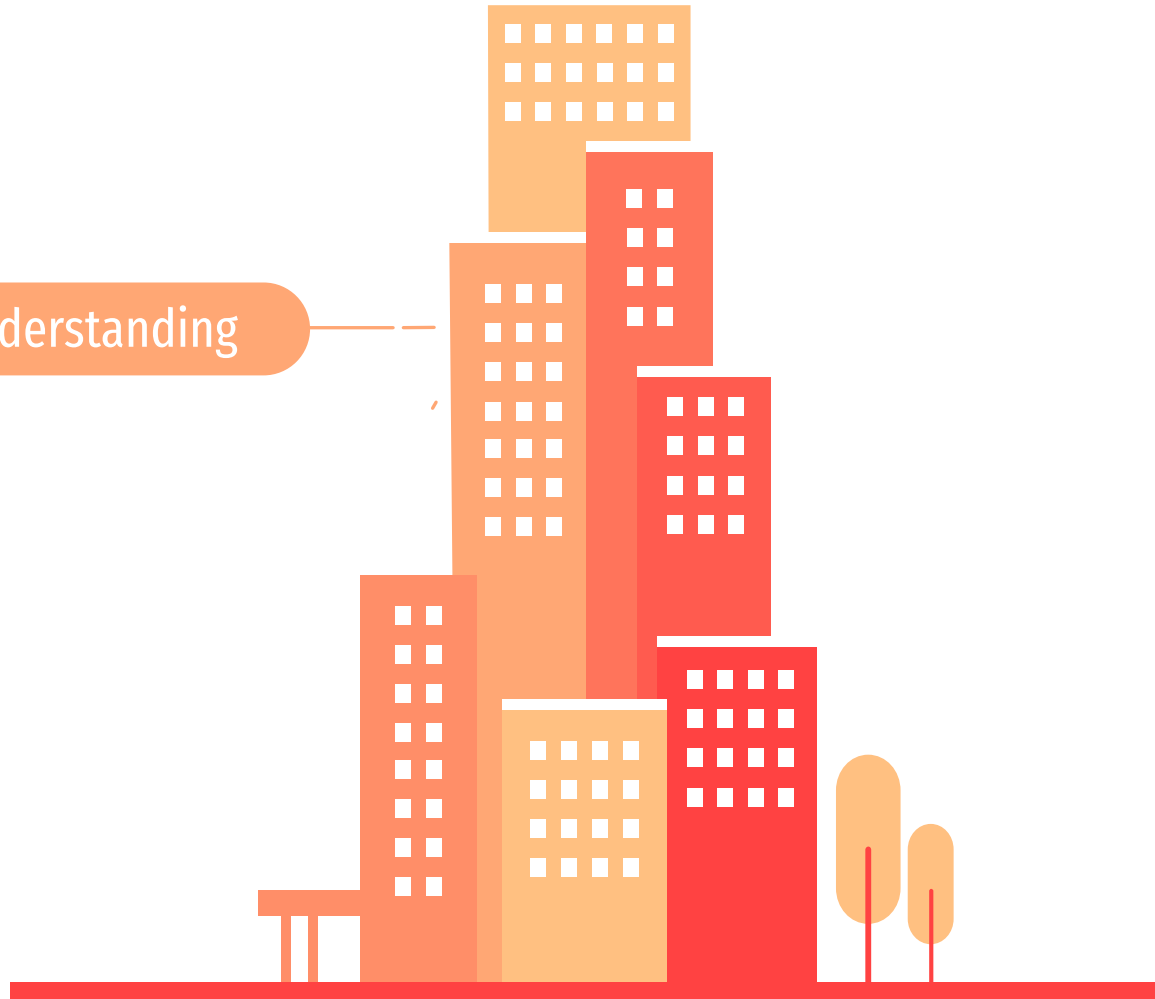
Supporting the New York State Energy Plan



Predicting Annual Energy Usage



Data Understanding



Data Understanding

01

Size



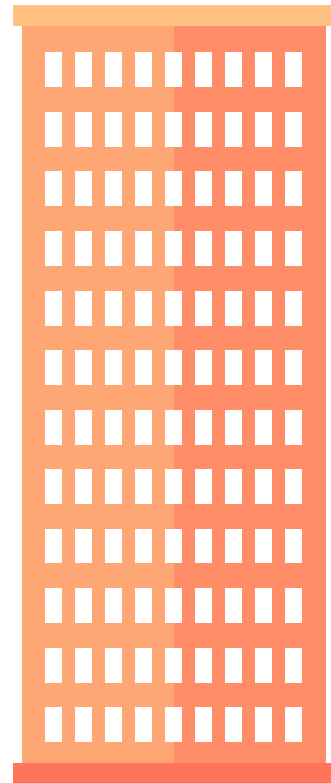
02

Energy Efficiency



03

Primary Use



Methods



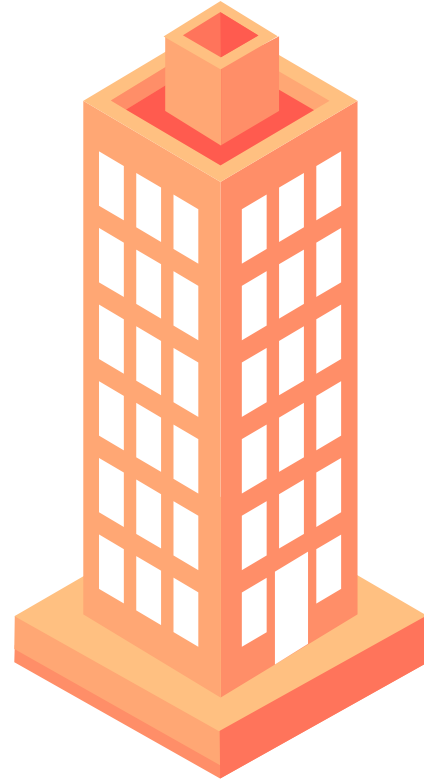
Methods

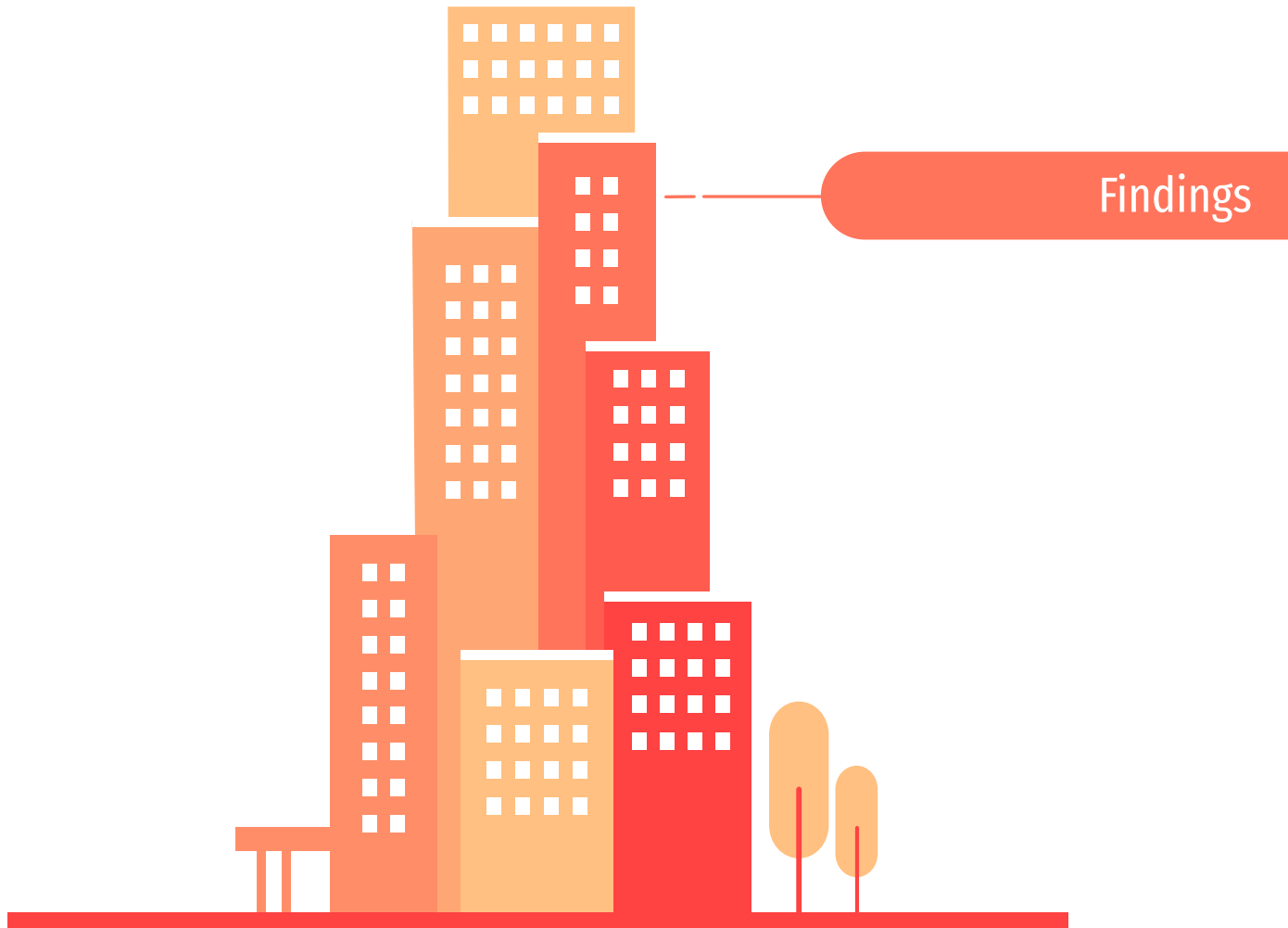


Occupied Buildings Only

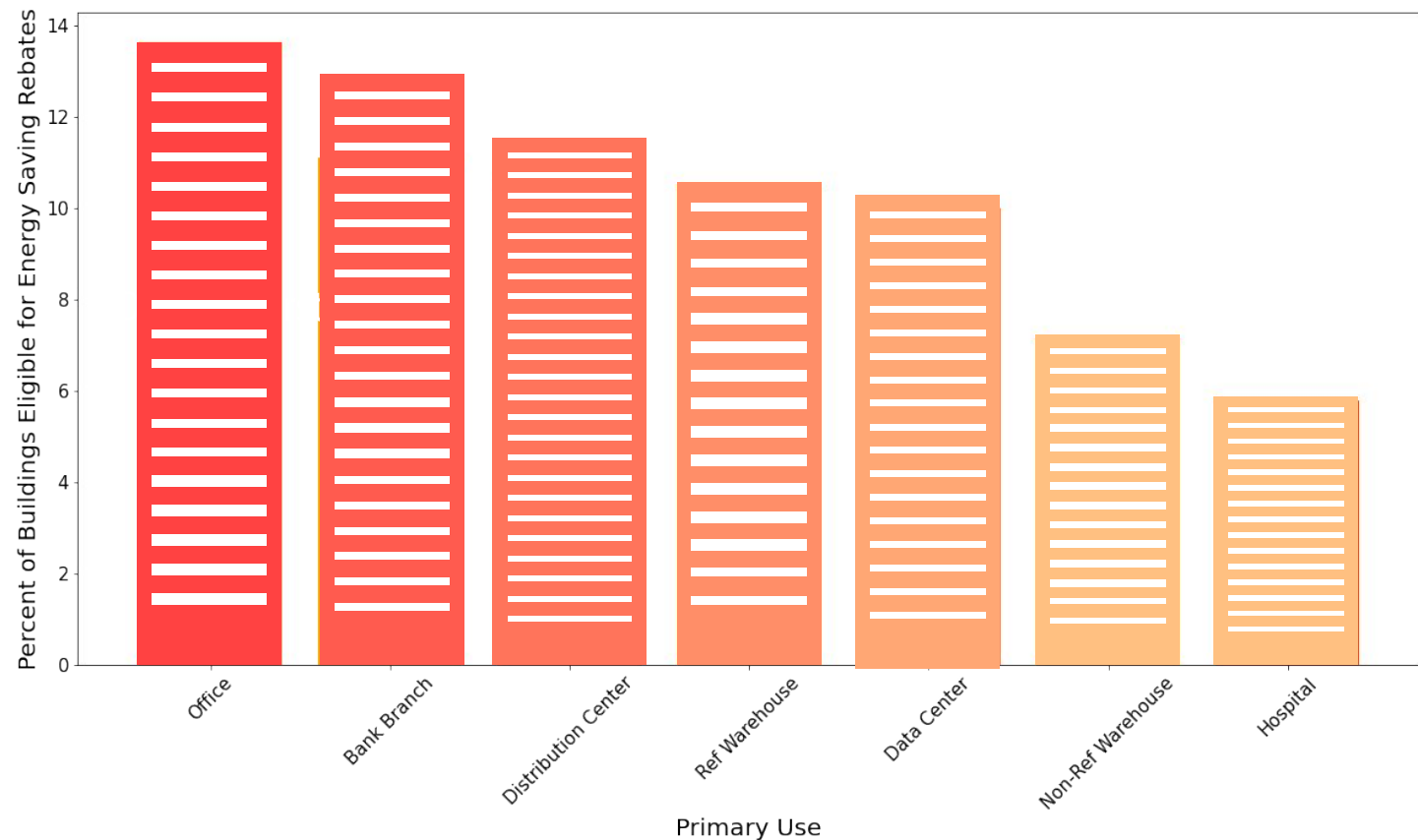


Annual Electricity Calculated from Grid Purchase

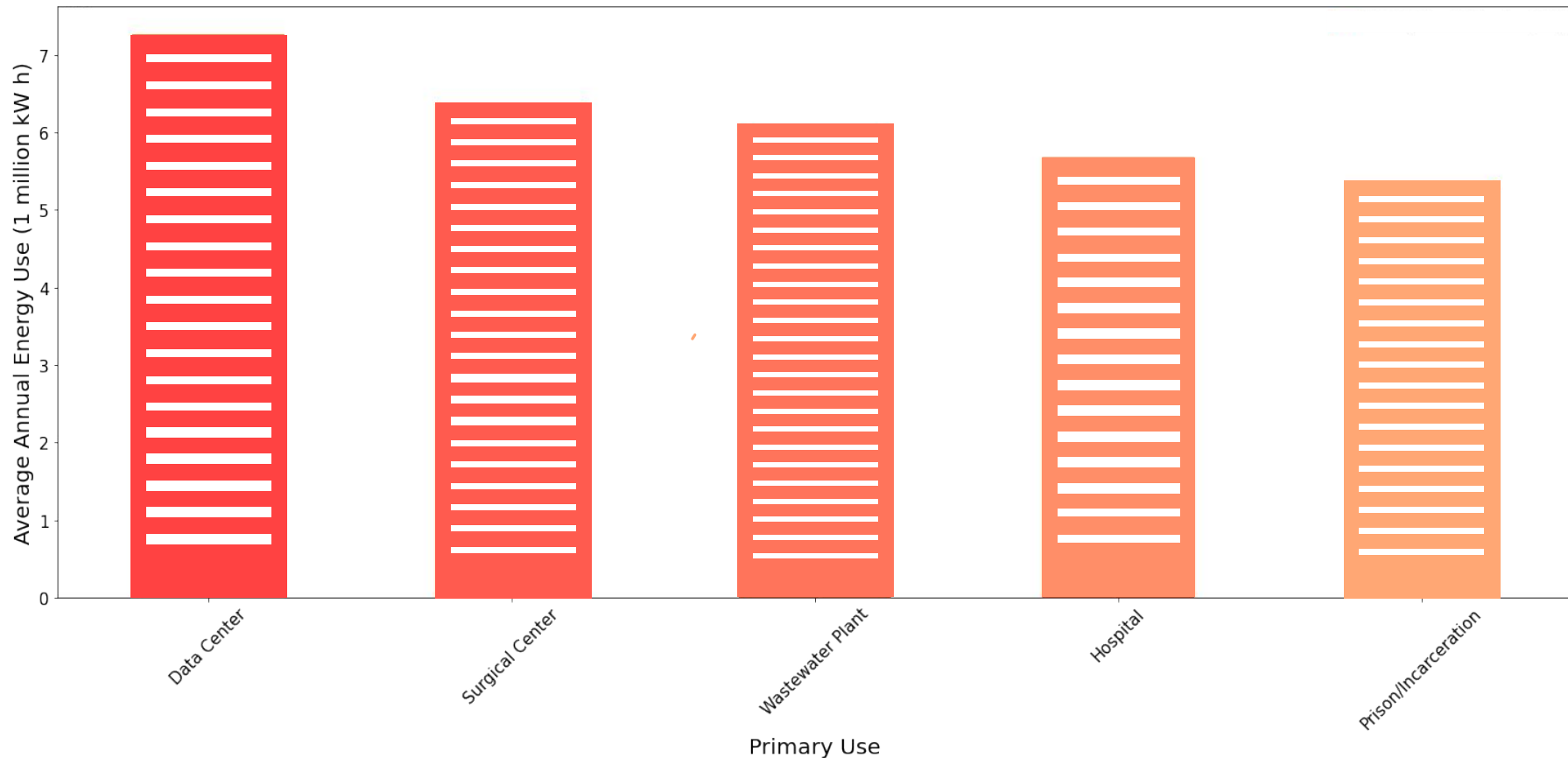




Percentage of Energy Efficient Buildings by Primary Use



Average Annual Energy Use by Building Type



Average Annual Energy Use by Building Type





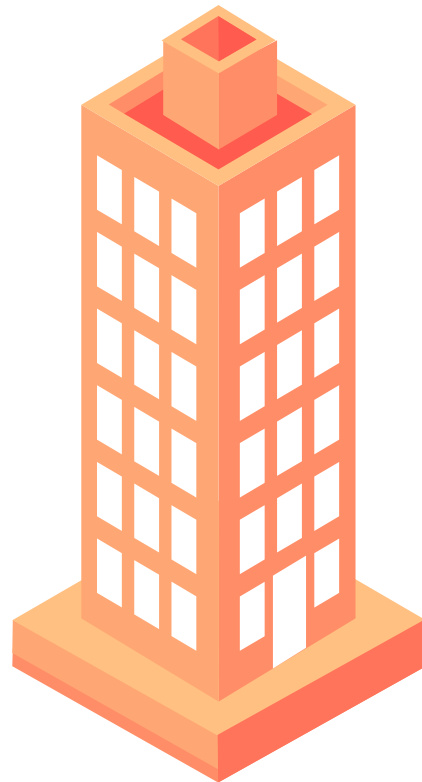
Recommendations

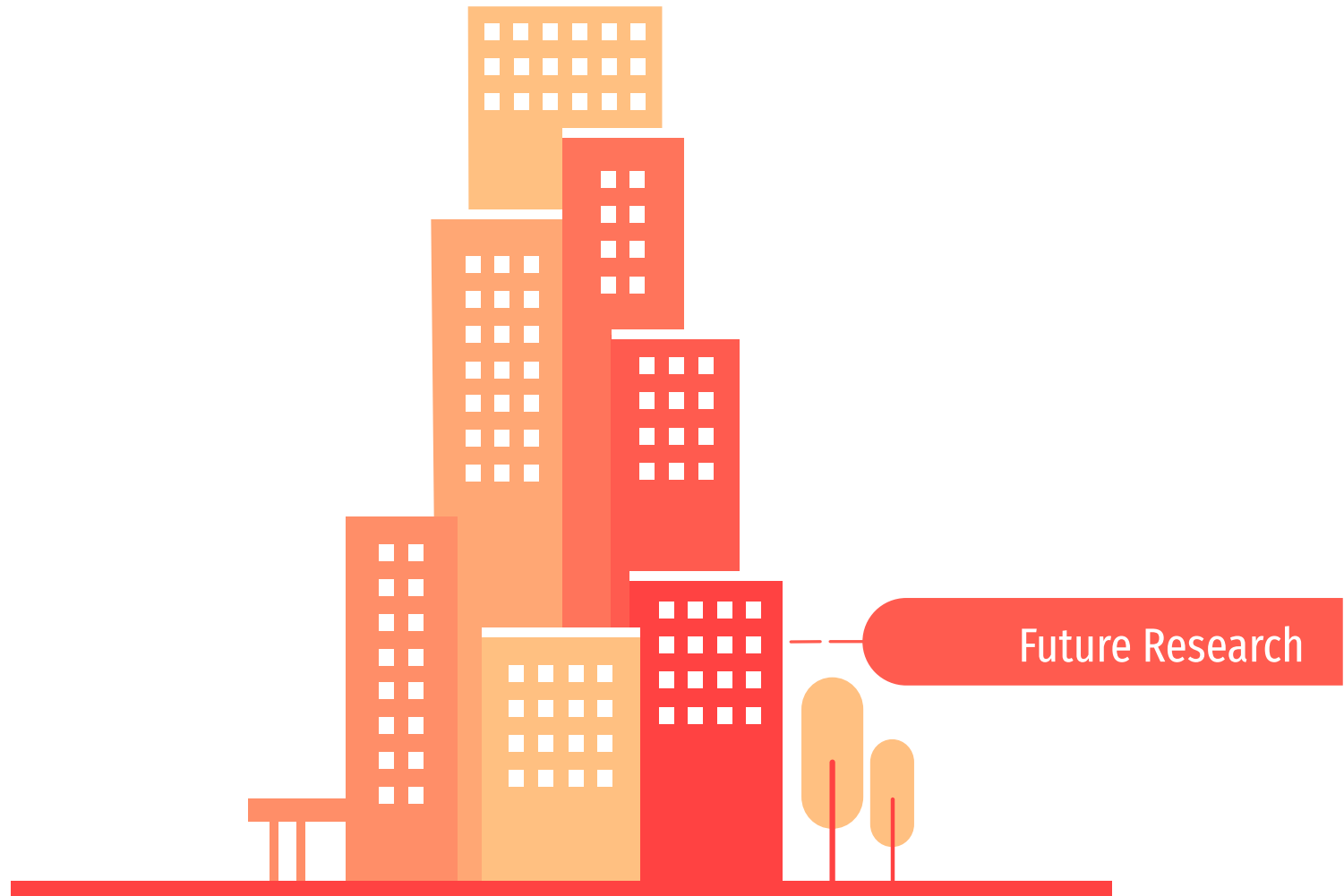
01

Focus energy efficiency incentive programs on high energy use building types

02

Identify impact to electrical grid for new buildings





Future Research



Use sub-metering data for specific energy use predictions



Weather Data for Seasonal Understanding



THANK YOU



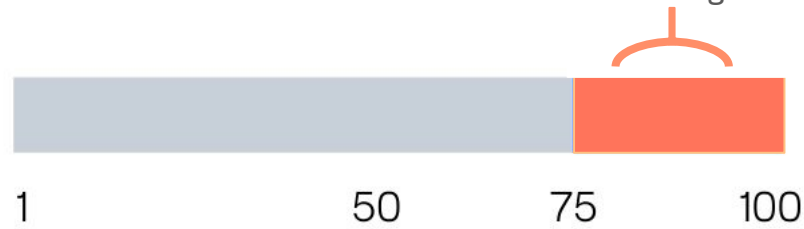
QUESTIONS?

APPENDIX

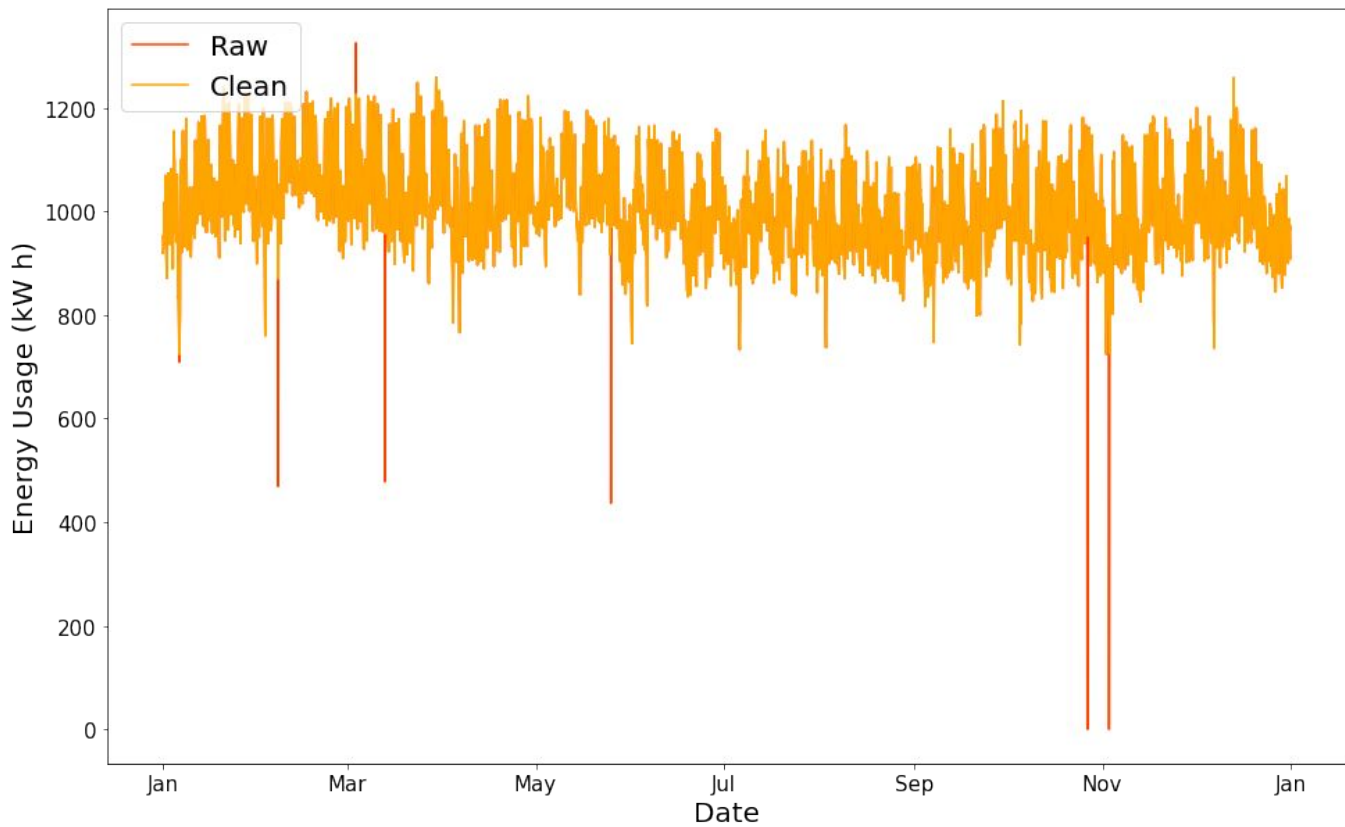


EnergyStar Score is a Relative Energy Efficiency Metric

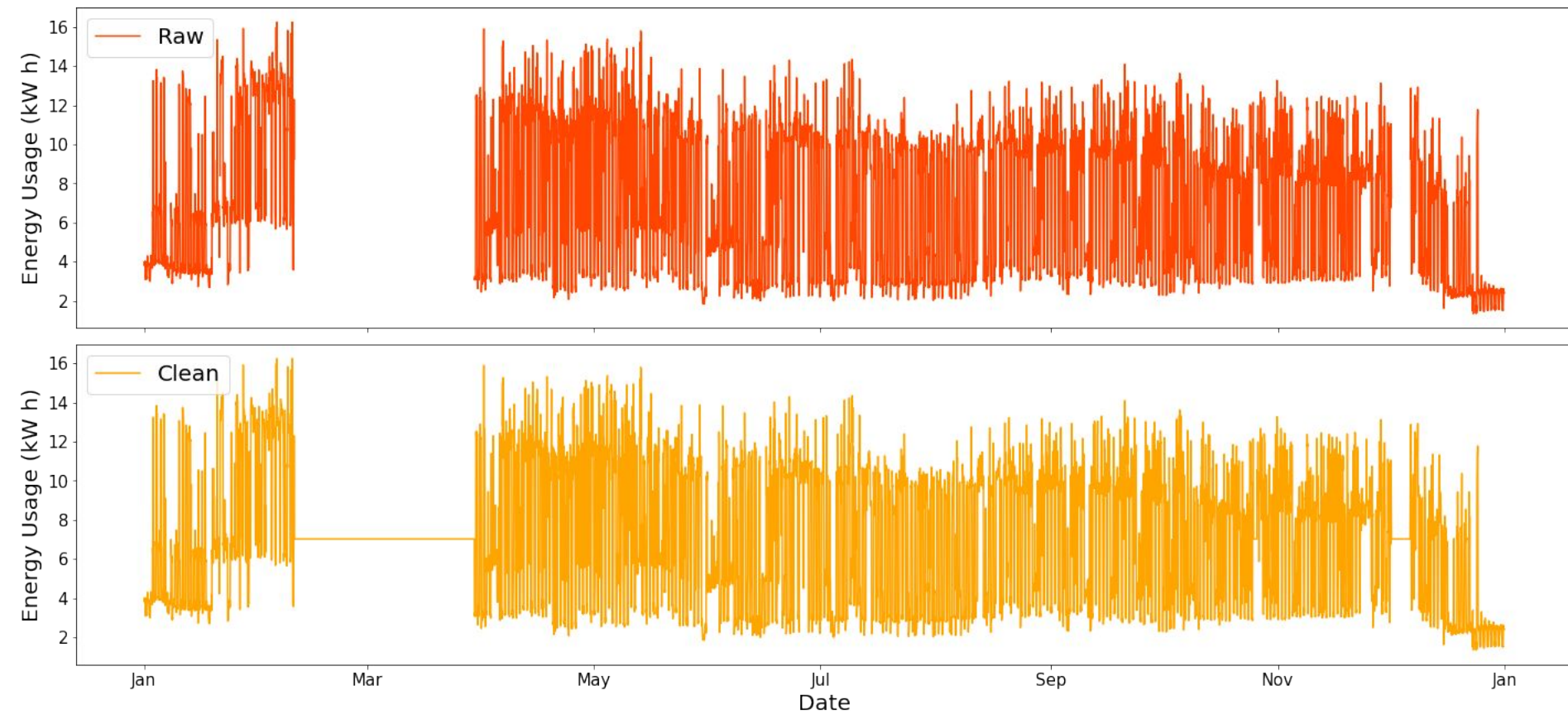
1 to 100 ENERGY STAR Scale



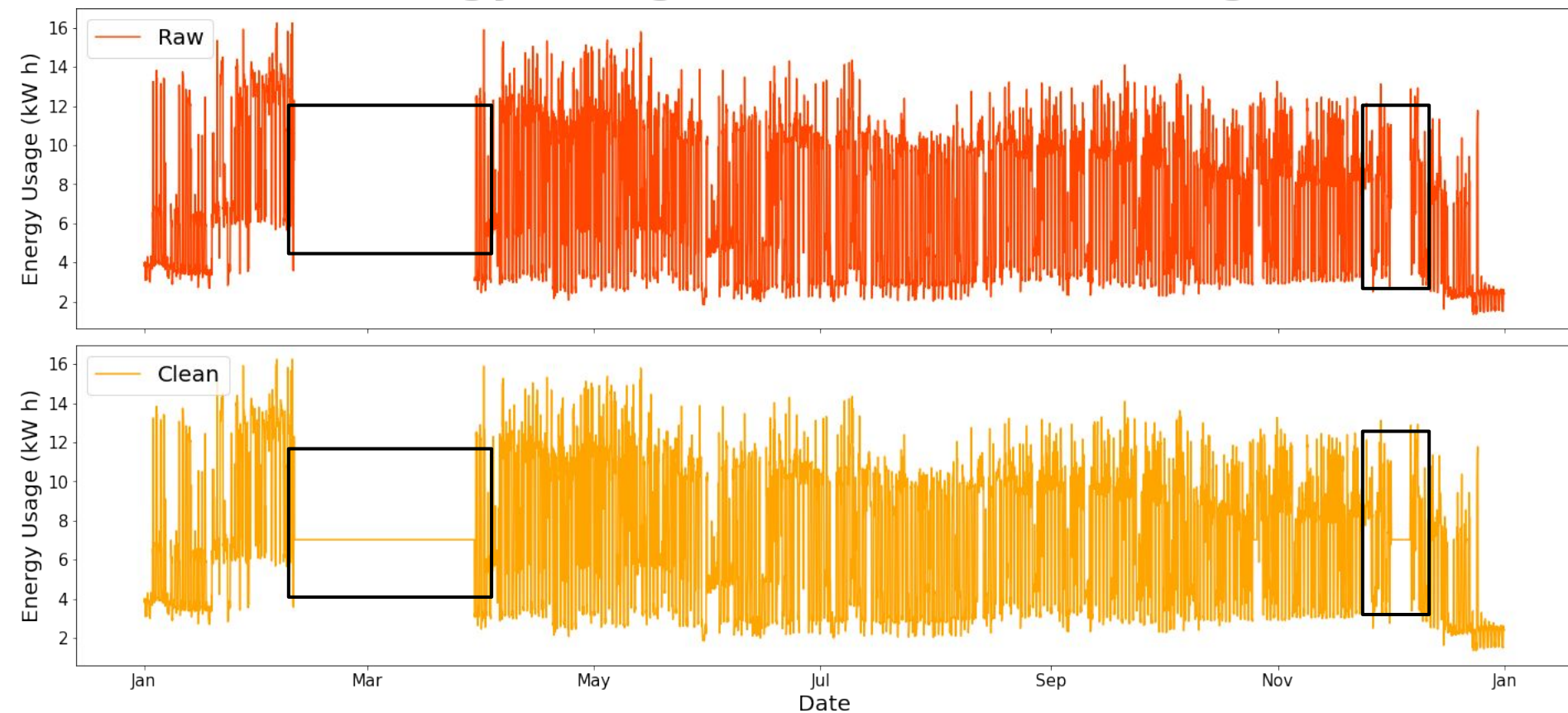
Annual Energy Usage - Minneapolis - Building #1212



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

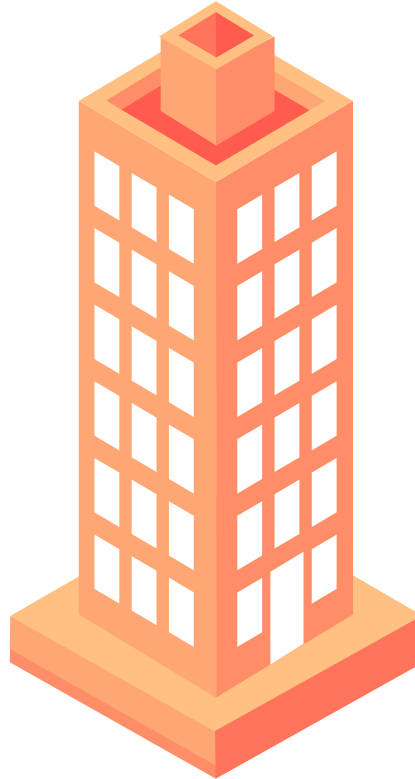
Mars

Despite being red, Mars is actually a cold place

03

Saturn

Saturn is the ringed one and a gas giant



04

Venus

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

05

Neptune

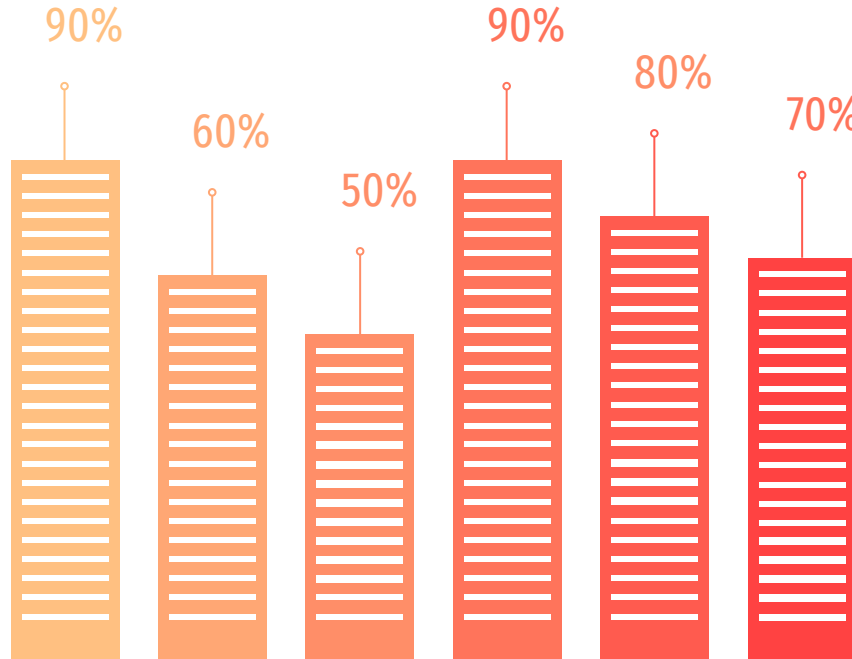
Neptune is the farthest planet from the Sun

06

Jupiter

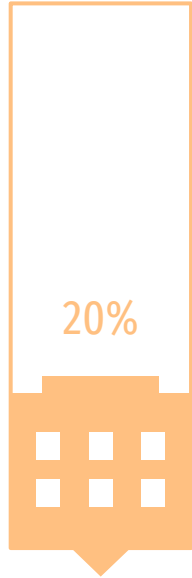
Jupiter is the biggest planet in the Solar System

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



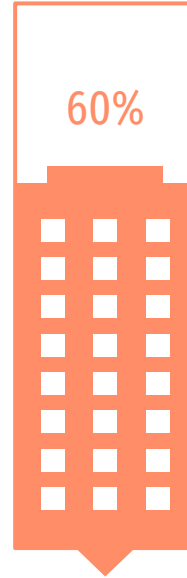
2017

Mercury is the closest planet to the Sun



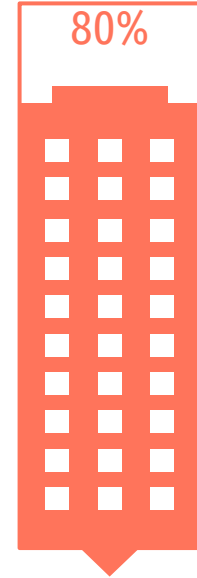
2018

Despite being red, Mars is a cold place



2019

Venus has a pretty name, but it's hot



Now

Neptune is the farthest planet

Building Infographics



Mercury

Mercury is the closest planet to the Sun



Mars

Despite being red, Mars is actually a cold place



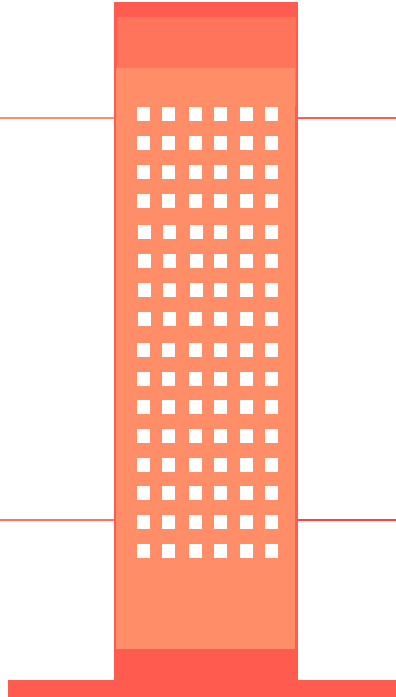
Venus

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



Jupiter

It's the biggest in the Solar System 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

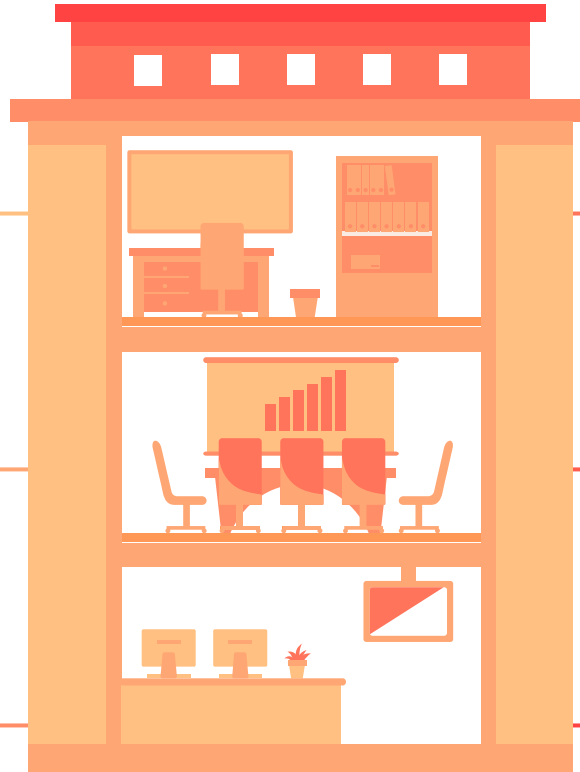
Venus has a beautiful name, but it's very hot

Neptune

Neptune is the farthest planet from the Sun

Jupiter

Jupiter is the biggest planet in the Solar System

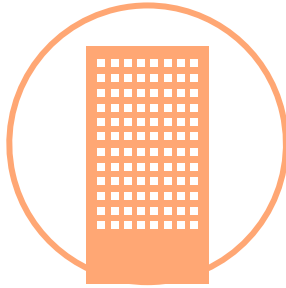


Building Infographics



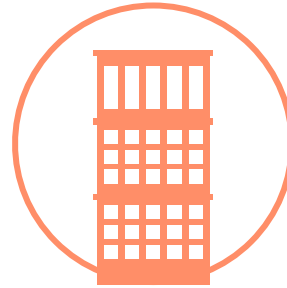
Mercury

Mercury is the
closest planet
to the Sun



Mars

Despite being
red, Mars is a
cold place



Venus

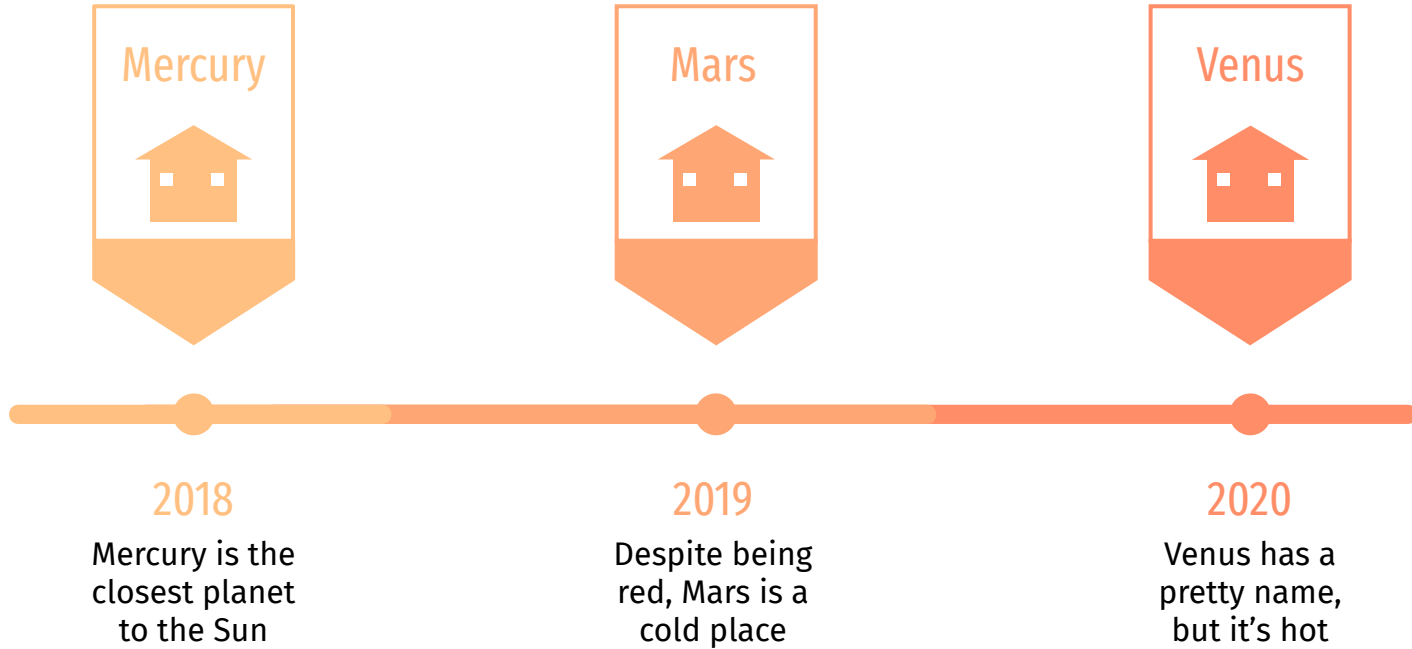
Venus has a
pretty name,
but it's hot



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



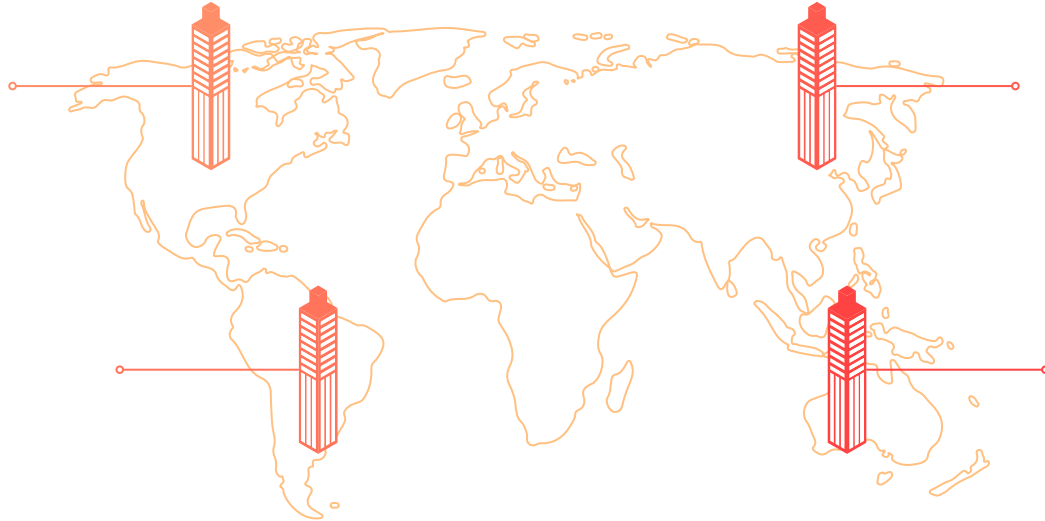
Building Infographics

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

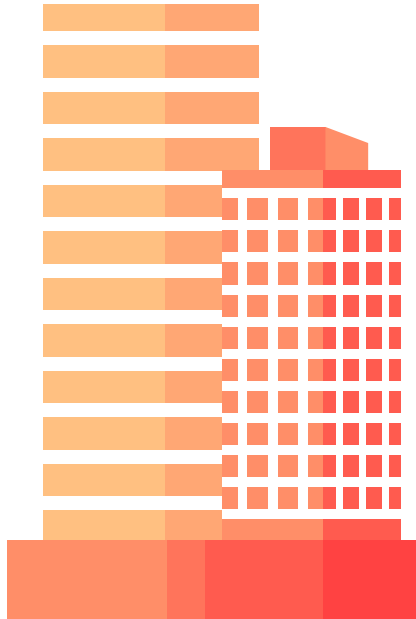


Neptune

Neptune is the farthest planet from the Sun



Building Infographics



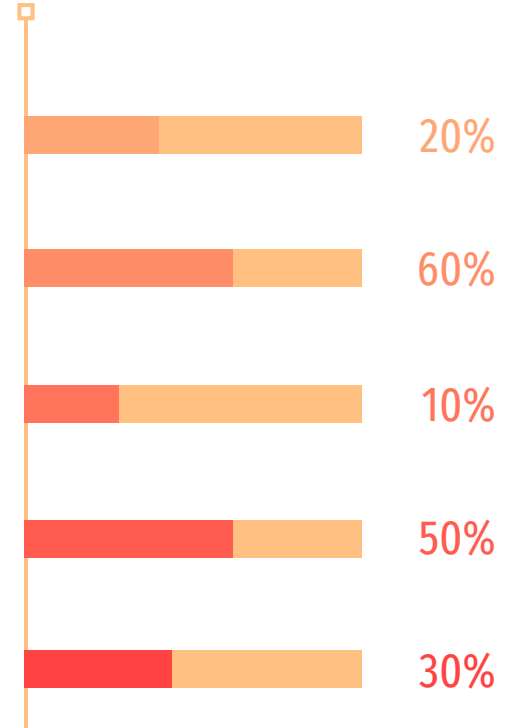
Venus has a beautiful name,
but it's very hot

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

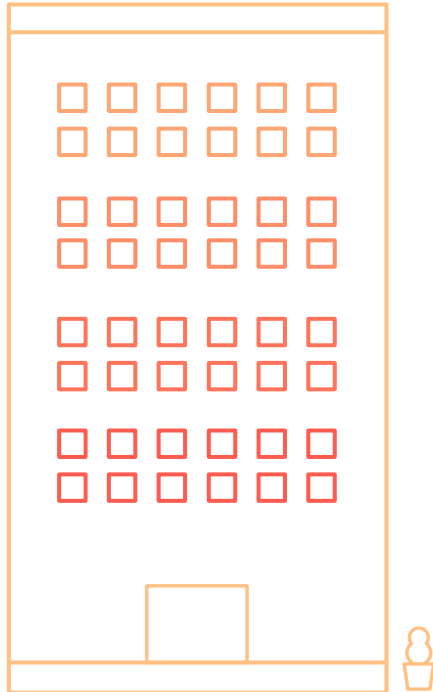


Building Infographics

- 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

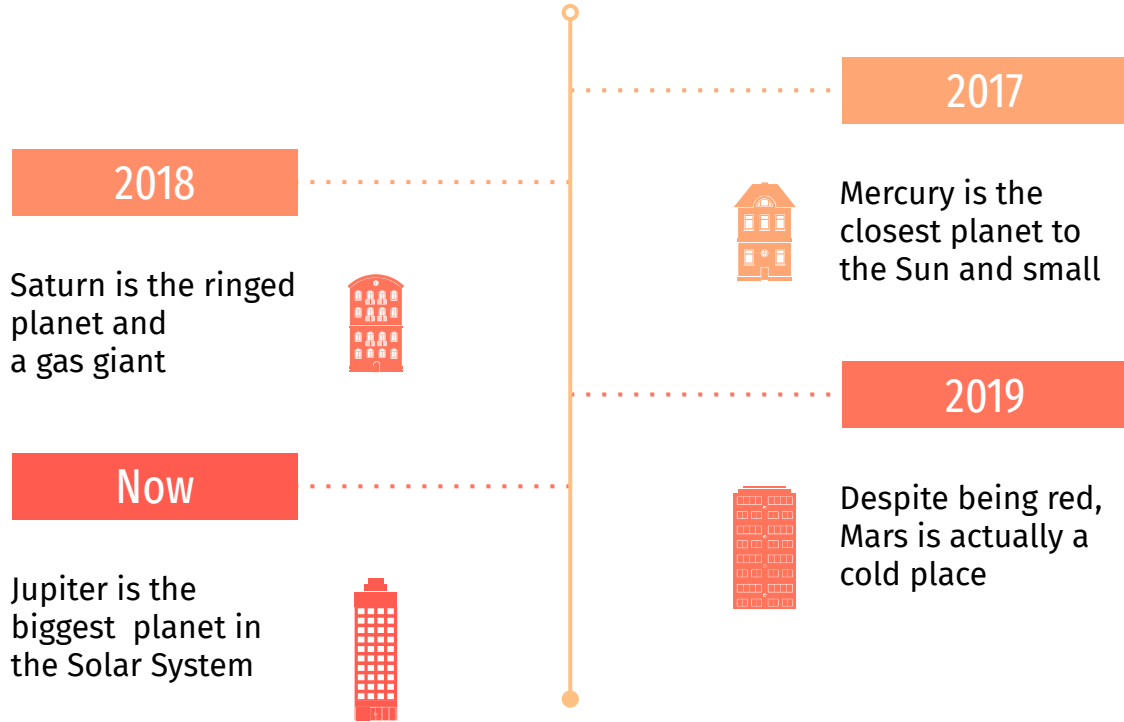
Saturn is the ringed one and a gas giant



Jupiter

Jupiter is the biggest planet in the Solar System

Building Infographics



Building Infographics

Mars

Despite being red, Mars is actually a cold place

Saturn

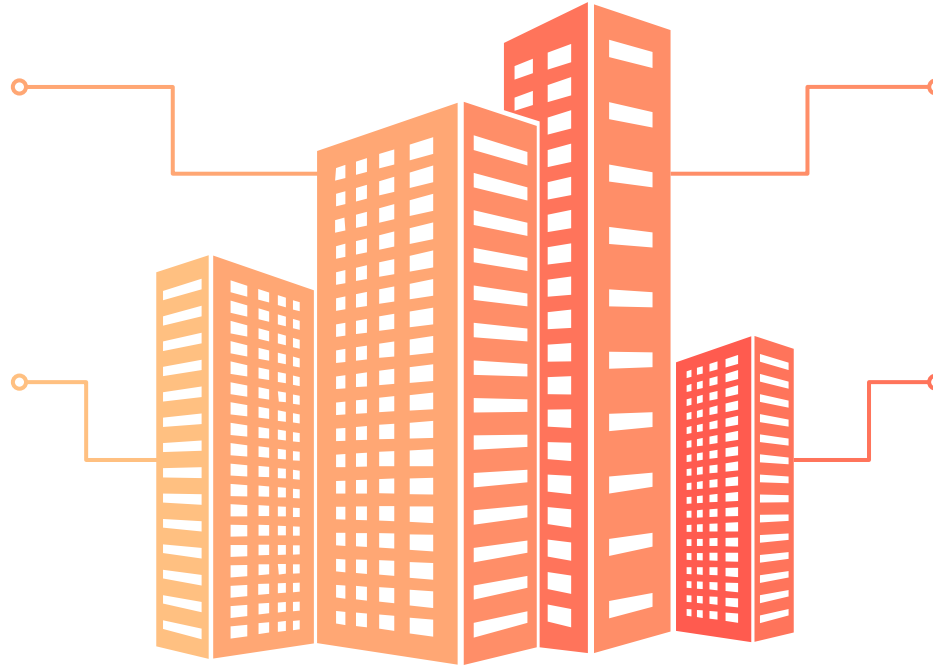
Saturn is the ringed one and a gas giant

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

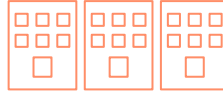
Mars

Despite being red,
Mars is actually a
cold place



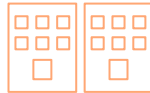
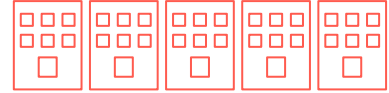
Venus

Venus has a
beautiful but it's
terribly hot



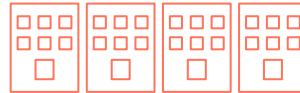
Saturn

Saturn is the ringed
one and a gas giant



Mercury

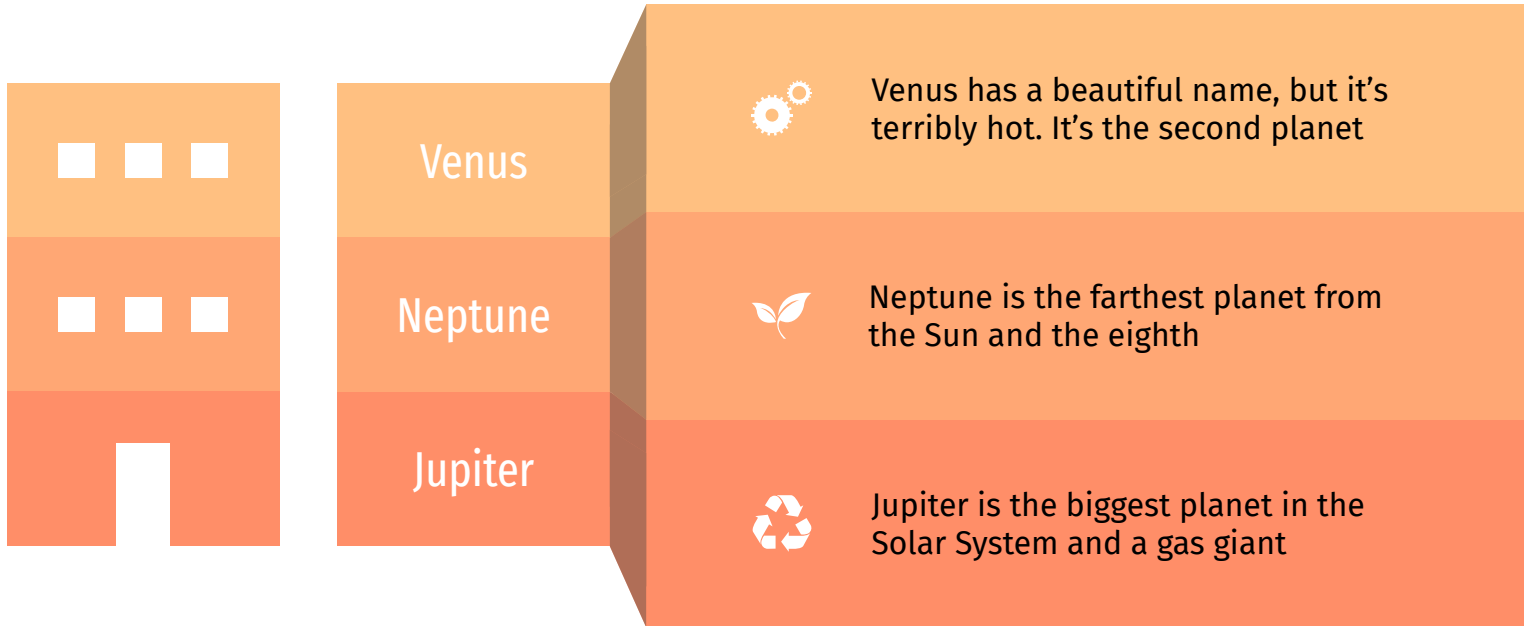
Mercury is the
closest planet to
the Sun



Neptune

Neptune is the
farthest planet
from the Sun

Building Infographics



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

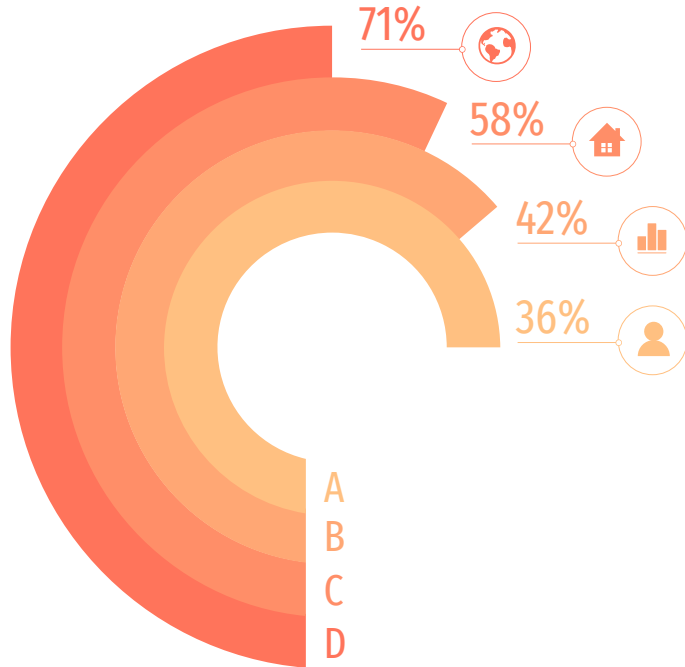


Neptune

Neptune is the farthest planet from the Sun



Building Infographics

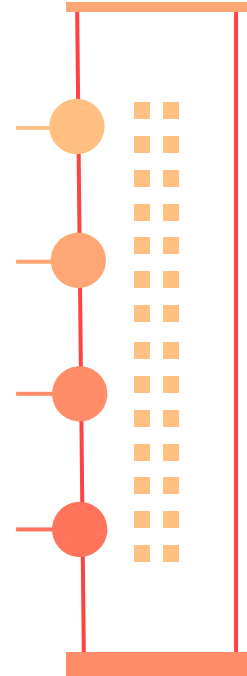


Venus has a beautiful name,
but it's very hot

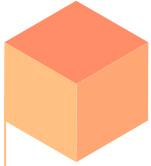
Neptune is the farthest planet
from the Sun

Jupiter is the biggest planet in
the Solar System

Despite being red, Mars is
actually a cold place

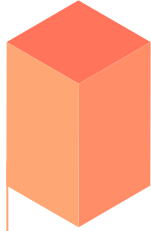


Building Infographics



Mercury

Mercury is the closest planet to the Sun and small



Mars

Despite being red, Mars is actually a cold place



Venus

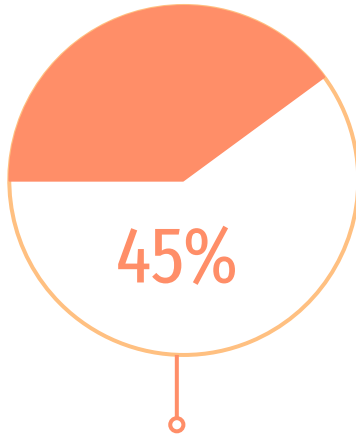
Venus has a beautiful name, but it's very hot



Neptune

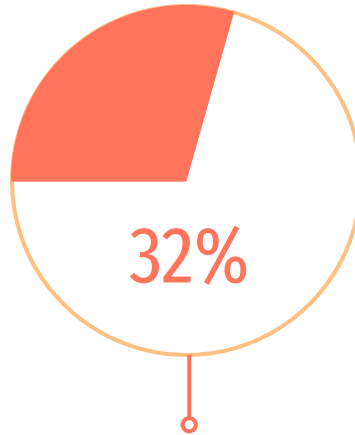
Neptune is the farthest planet from the Sun

Building Infographics



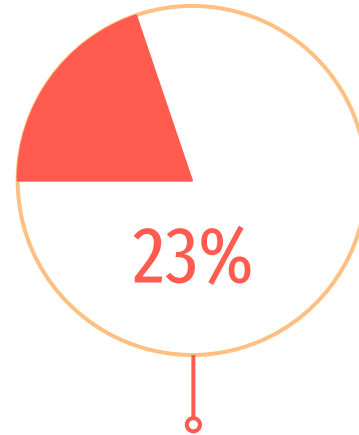
Mercury

Mercury is the
closest planet
to the Sun



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



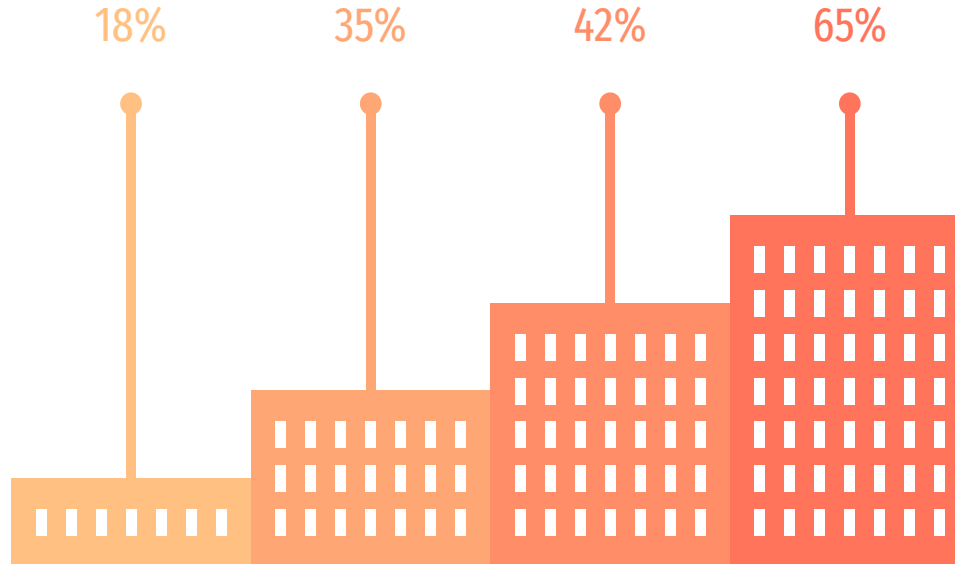
Building Infographics

● 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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