



Energy Management System

Team 9



CONTENTS

#1 OVERVIEW

#2 Goals and Methods

#3 Team and Plans

#4 Expected Effects



Part 1

OVERVIEW



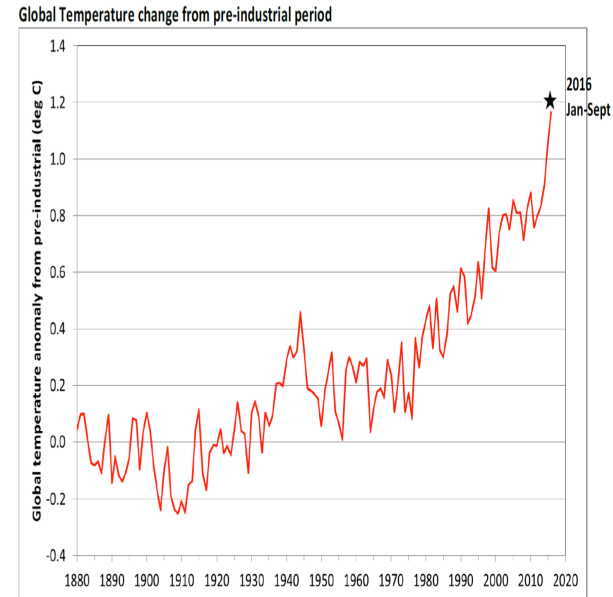
OVERVIEW - PROBLEM



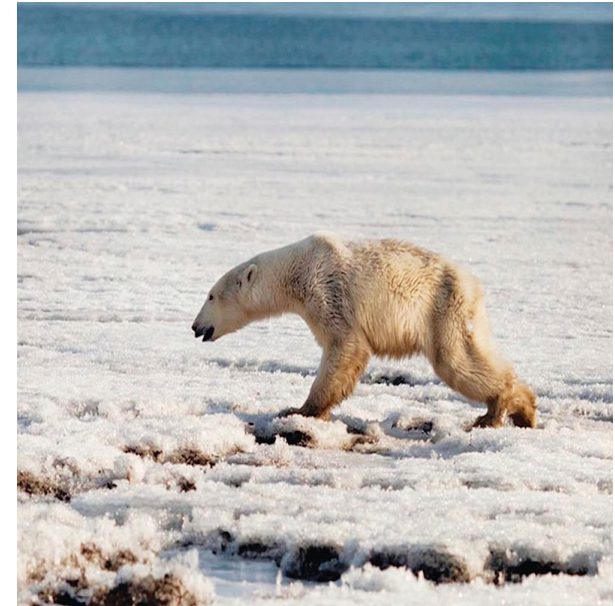
Scorching Heat



Drought



Rapid Temperature Changes



Ecosystem change

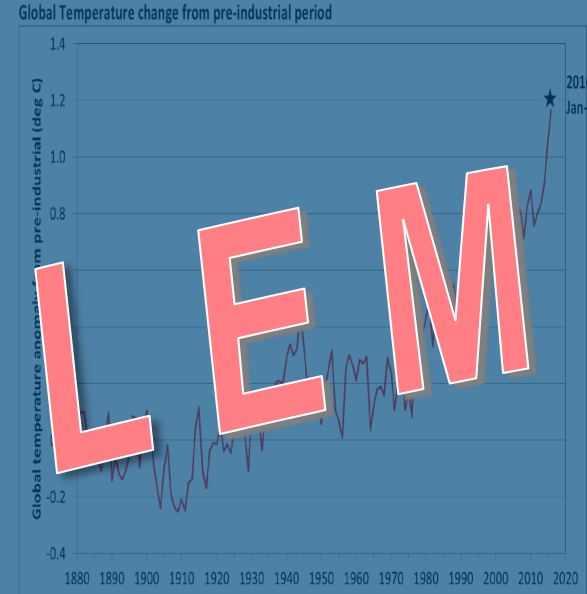
OVERVIEW - PROBLEM



Scorching Heat



Drought



Rapid Temperature Changes



Ecosystem change

OVERVIEW - CAUSING



because of **RISING GREENHOUSE GAS EMISSIONS**

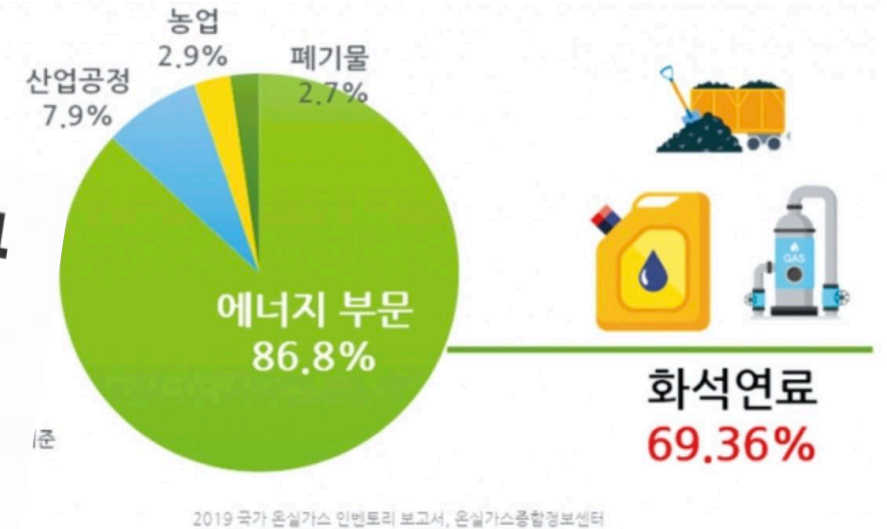
OVERVIEW_ CAUSING

“지난해 에너지사용량, 코로나19이후 역대 최고치 찍었다”

2016~2019년 E사용 연평균 1.7% 증가
EIA, “2050년까지 세계 에너지 소비 크게 증가할 것”
‘총조사’ 결과 발표

지난해 세계 탄소배출 사상 최대... “석탄 사용 늘어난 탓”

권승문 기자 | 입력 2022.03.24 16:47 | 댓글 0

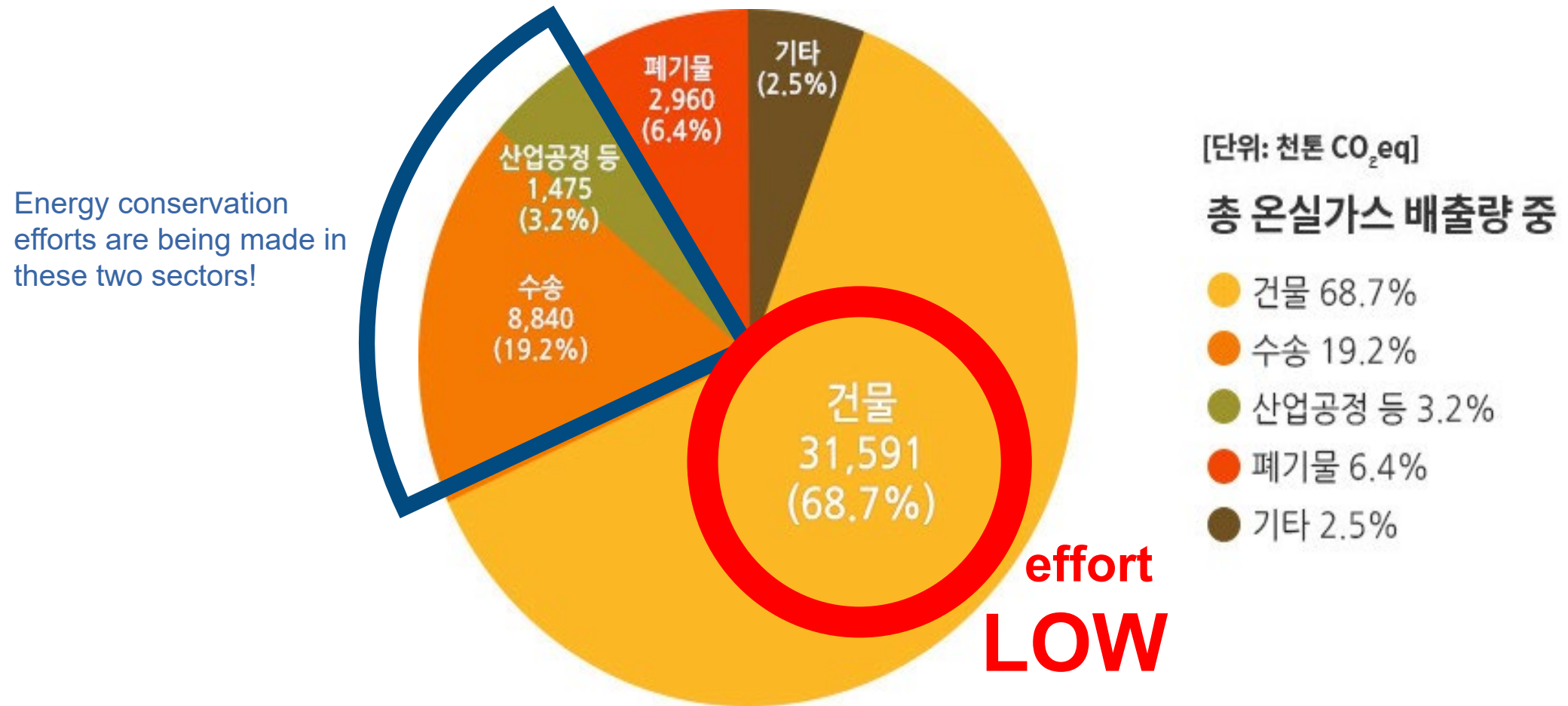


ENERGY USE ↑



GREEN HOUSE GAS ↑

OVERVIEW



GRAPH. Greenhouse Gas Emissions by Sector in Seoul

OVERVIEW

[에너지데일리 변국영 기자] 우리나라 국민들은 에너지과소비에 대한 문제 인식을 가지고 있으나 에너지절약 실천 행동의 필요성이나 중요성에 대한 인식은 부족한 것으로 나타났다.

에너지시민연대는 지난 5월16일 전국의 만 14세 이상 남녀 600명을 대상으로 진행한 온라인 설문조사에 따르면 우리나라가 OECD국가 중에서 에너지를 많이 소비하는 국가라고 생각하는지에 대해 58.5%가 그렇다고 응답했다. 그러나 우리나라 국민이 에너지를 절약하고자 노력하는지에 대해 28.3%만이 그렇다고 응답했다. 보통이다가 50.3%로 실천행동에 있어서는 응답률이 낮았다. 특히20대는 노력하고 있지 않다가 27.1%로 가장 많았다. 기후위기 시대, 20대에 특화된 다양한 에너지 절약 실천 홍보·교육이 필요하다는 의미로 해석되고 있다.

Low personal energy saving effort!

통계적으로 유의한 것으로 나타났다. 즉, 절전 방법이 효과
가 있다고 인식하는 정도에 비해 실천정도는 이에 미치지 못
하고 있는 것으로 보인다. 특히 효과 인식과 실천 사이의 차

수록기간: 년 2016 ~ 2016 / 자료갱신일: 2018-04-05

시점

증감(증감률)

행렬전환

열고정해제

(단위: %)

특성별(1)	특성별(2)	실천 정도	
		매우 적극적으로 노력하고 있다	실천하려고 노력 은 하고 있다
전체	소계	9.5	32.7

배포일: 2020년 10월 28일(수), 총 4매

담당 : 김민채 부장(02-733-2022/enet800@enet.or.kr)

에너지시민연대, 코로나19시대 에너지사용 및 의식조사 결과,
20대 에너지 절약 하지 않는다 27%에 달해

OVERVIEW

***“ OUR SMART ENERGYMANAGEMENT”
can help solve this problem***



A close-up, shallow depth-of-field photograph of a person's hands working at a desk. The person is wearing a white smartwatch on their left wrist and is typing on a silver laptop keyboard. A white computer mouse is visible on the desk. In the background, a white mug and a blurred arm are visible. A dark blue rectangular overlay is positioned on the left side of the image, containing white text.

Part 2

Goals and Methods

Goals – Main Goals

1

Check Energy Consumption

2

Set Energy Saving Actions

3

Notification

Goals – Main Goals

1

Check Energy Consumption

- Find out energy consumption per individual appliance and time
- Check energy charges by calculation of the quantity consumed and cost
- Not only daily reports, but also in real-time

Goals – Main Goals

2

Set Energy Saving Actions

- Set conditions
- Set Energy Saving Actions for each conditions
- Automatically detect when condition is met
- Automatically execute pre-set Actions or send notifications

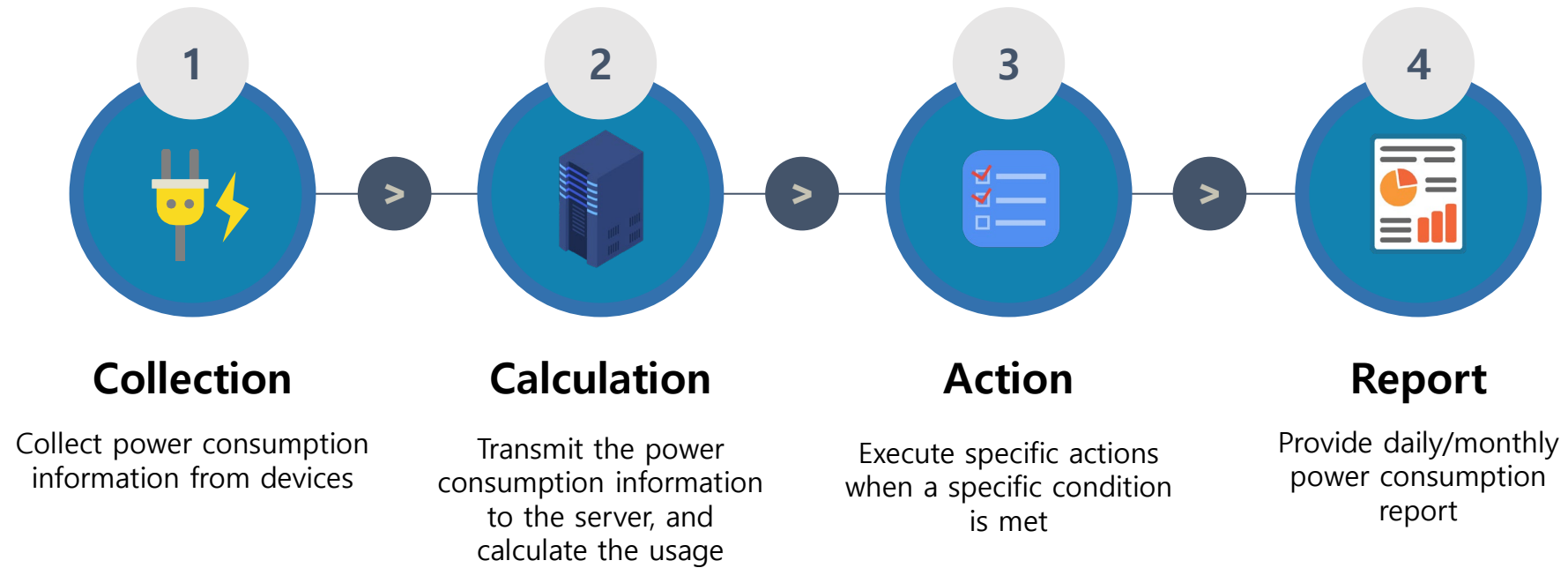
Goals – Main Goals

3

Notification

- Daily / Monthly Energy Consumption Reports
- Warnings for Energy Wasting Actions
- Notifications when pre-set Energy Saving Actions are executed
- Useful Information & Suggestions

Methods



Methods – Basic Functions

- Check the power consumption in real-time
- Check daily/monthly power consumption report
- Check the power consumption report for each device
- Automatically turn off devices when users leave the house
- Turn on/off the devices at a specific time
- Notify when air conditioner and heater are running at the same time
- Control the devices remotely

Methods – Detailed Functions

- Register/unregister devices
- Set specific conditions & linked actions

Manage devices

- Calculate Power consumption in real-time
- Make reports on a Daily/Monthly basis
- Make reports per device

Calculate power consumption

Set conditions

- If users are at home
- If users use specific devices simultaneously
- If the present time is in a pre-set time condition

Set actions

- Power on/off
- Control lighting settings

Part 2

Methods – System Structure

System						
Front-end			Back-end			
Application(Front-end)			Application (Back-end)	Database	Server	
Report	Notification	User Setting	User Authentication	Calculation	Condition Check	Execute Set Actions

Methods – IoT Devices



Smart Lights

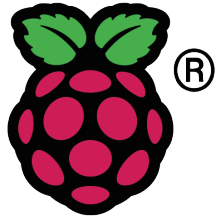
- ✓ Offers API to manage smart devices
- ✓ Change Light State – Brightness, Saturation, Luminosity
- ✓ User Settings – Effect, Transition, Alert



Smart Plug

- ✓ Offers API to manage smart devices
- ✓ Collect power consumption data
- ✓ Send data to the server
- ✓ Users can manipulate actions by applications

Methods – Server



Raspberry Pi

- ✓ Collect power consumption from devices periodically

- ✓ Calculate and Analyze power consumption data to produce Reports



Node.js

- ✓ Periodically check pre-set conditions and execute actions when conditions are met

Methods – Application



Android



iOS

- ✓ Register/unregister the devices
- ✓ Receive notifications from the server
- ✓ Set actions
- ✓ Set conditions
- ✓ Control IoT devices manually
- ✓ View power consumption statistics

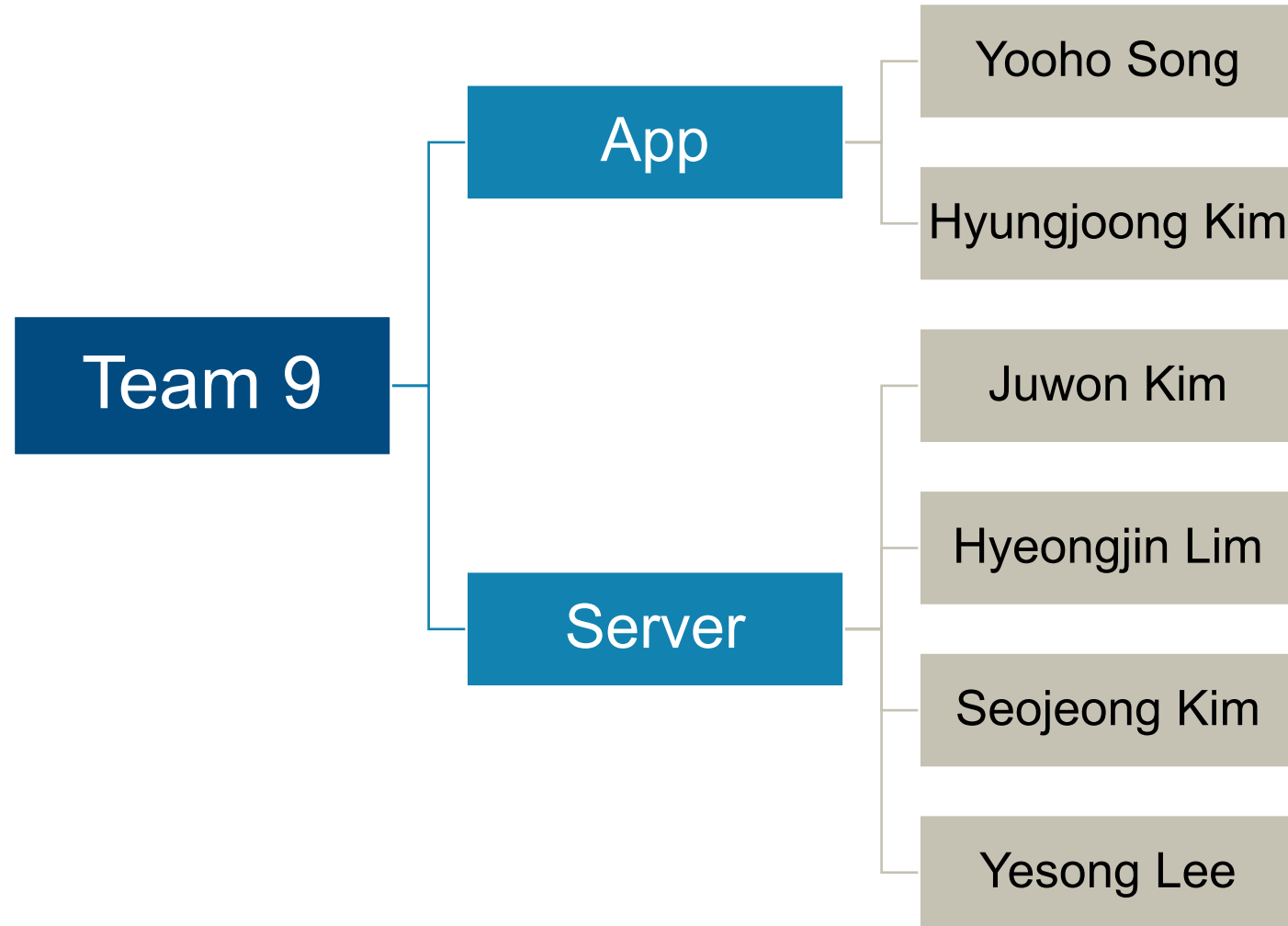
A modern office interior featuring a bright blue wall on the left and white shiplap on the right. Two large, black, dome-shaped pendant lights hang from the ceiling. In the foreground, a long wooden table is partially visible. In the background, there are large windows and glass doors with black frames. One door has a blue and green graphic on it. The floor is light-colored wood.

Part 3

Team and Plans

Team

Team Formation



Plans

Contents	3/28 ~	4/4 ~	4/11 ~	4/18 ~	4/25 ~	5/2 ~	5/9 ~	5/16 ~	5/23 ~	5/30 ~
Requirement Specification										
Design Specification										
Implement Component										
Integration										
Test Plan										
Code Review										
Testing										

Test Process



A close-up photograph of a brown leather bag with a metal buckle. Inside the bag, a black smartphone is placed on top of a brown notebook. A red pen with a silver clip is also visible, resting on the notebook. A pair of black-rimmed glasses is partially visible in the upper right corner. The entire scene is set against a dark blue textured background.

Part 4

Expected Effects

Expected Effects



1. Convenience

- Control multiple IoT devices with one application
- Provides user-based services using scheduler and GPS



2. Visualization

- See and compare energy usage data easily
- Induce users to energy saving



3. Cost-cutting

- As energy consumption is reduced, energy costs are also reduced



4. Environmental protection

- Reduction of greenhouse gases generated in the process of energy production and transportation
- Help in mitigating climate change