
IBM HACKATHON PROJECT

SMART HOME ENERGY ADVISOR AGENT

Presented By:

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OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

PROBLEM STATEMENT

A Smart Home Energy Advisor Agent acts like your personal electricity manager. It takes information from your smart meter and appliances, analyzes power usage, and gives you tips to save energy. The agent can answer questions like "Why is my bill so high this month?" or "What time should I run the washing machine to save money?". It uses AI to understand consumption patterns and provide simple recommendations.

TECHNOLOGY USED

- **IBM Cloud Lite Services** – Platform where the Smart Home Energy Advisor Agent is built and deployed
- **Watsonx.ai Agent** – Used to create, configure, and run the AI-based energy advisor
- **Natural Language Processing (NLP)** – To process user queries and generate meaningful answers
- **Retrieval-Augmented Generation (RAG)** – To combine model intelligence with uploaded dataset for relevant responses
- **Mistral-large Mode** – Foundation model used for reasoning and recommendations

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio – Environment for creating and managing AI agents, prompts, and datasets
- IBM Cloud Watsonx AI Runtime – Execution runtime for running AI models and serving responses to user queries
- IBM Cloud Agent Lab – Tool for building, testing, and refining AI agents using foundation models and custom data
- IBM Mistral-large Foundation Model– AI foundation model used for reasoning, energy consumption analysis, and recommendations

WOW FACTORS

- This agent will help households reduce electricity bills by analyzing usage patterns and suggesting cost-saving strategies.
- It will save time by automatically identifying high-consumption appliances and optimal usage schedules.
- It makes energy optimization accessible for non-technical users through natural language interaction.
- It encourages energy efficiency and sustainability, indirectly supporting environmental goals.
- Unique Features – Detects high energy consumption trends from usage data.
- Peak Hour Optimization – Suggests best time slots to run appliances for cost savings.
- Appliance-Level Insights – Identifies which appliances contribute most to the bill.
- Smart Recommendations – Offers tailored tips to reduce electricity usage and cost.
- Bill Explanation – Answers queries like “Why is my bill high this month?” in simple terms.


END USERS

- **Homeowners & Residents** – People looking to reduce their electricity bills and optimize energy usage.
- **Smart Home Enthusiasts** – Users who want AI-based insights for appliance usage and energy efficiency.
- **Energy Service Providers** – Companies interested in offering AI-driven energy advisory services.
- **Sustainability Advocates & NGOs** – Organizations promoting energy conservation and sustainable living.


RESULTS

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Agent preview

 You: 05:40 PM



Rank the appliances from highest to lowest energy usage.?

 Sous Chef 05:40 PM

Here is the ranking of appliances from highest to lowest energy usage based on the provided data:

1. **Air Conditioning:** 4.84 kWh
2. **Heater:** 4.87 kWh
3. **Dishwasher:** 1.62 kWh
4. **Washing Machine:** 1.17 kWh
5. **Microwave:** 1.34 kWh
6. **Oven:** 1.88 kWh
7. **Computer:** 1.53 kWh
8. **TV:** 1.65 kWh
9. **Lights:** 1.63 kWh
10. **Fridge:** 0.2 kWh


► How did I get this answer?

Type something...  

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Agent preview

Which appliance costs the most to operate?


 Sous Chef 05:40 PM

The appliance that costs the most to operate is the Air Conditioning, with an energy consumption of 4.84 kWh.

► How did I get this answer?



 You: 05:40 PM

How much energy is used during peak hours compared to non-peak hours?

 Sous Chef 05:40 PM

Here is the energy consumption data for different appliances:

Home ID	Appliance Type	Energy Consumption (kWh)	Time	Date	Outdoor Temperature (°C)	Season
94	Fridge	0.2	21:12	02-12-2023	-1	Fall
435	Oven	0.23	20:11	06-	31.1	Summer

Type something...  

RESULTS

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MD

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Agent preview

Electricity Rates

- Peak Hour Rate: \$0.20/kWh
- Off-Peak Hour Rate: \$0.10/kWh

Cost Calculation

- **Peak Hour Cost:** $5.76 \text{ kWh} * \$0.20/\text{kWh} = \1.152
- **Off-Peak Hour Cost:** $14.97 \text{ kWh} * \$0.10/\text{kWh} = \1.497

Extra Cost Due to Peak-Hour Usage

- Extra Cost: $\$1.152 \text{ (Peak)} - \$1.497 \text{ (Off-Peak)} = -\0.345

In this example, the extra cost due to peak-hour usage is actually negative, indicating that the off-peak usage cost is higher. However, this is just an example, and the actual calculation will depend on your specific data and rates.

To get an accurate calculation, you would need to provide the actual energy consumption data and the electricity rates for peak and off-peak hours.

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Agent preview

watsonx Agent 06:55 PM

The appliance that consumes the most energy is the Air Conditioner, with a power usage of 4.0 kWh on 05-07-2025 at 18:30 during peak hours, costing Rs 20.0.

► How did I get this answer?

You: 06:56 PM

Give me 5 tips to reduce my electricity bill.

watsonx Agent 06:56 PM

Here are 5 tips to reduce your electricity bill:

1. **Use Energy-Efficient Appliances:** Replace old appliances with energy-efficient ones. Look for appliances with high energy star ratings.
2. **Turn Off Lights and Appliances When Not in Use:** Make it a habit to turn off lights, fans, and other appliances when you leave a room. This can significantly reduce your energy consumption.

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Agent preview

You: 06:57 PM

Suggest ways to cut my electricity cost by 20%.

watsonx Agent 06:57 PM

Here are some ways to cut your electricity cost by 20%:

1. **Use Energy-Efficient Appliances:** Replace old appliances with energy-efficient ones. Look for appliances with high energy star ratings.
2. **Turn Off Lights and Appliances When Not in Use:** Make it a habit to turn off lights, fans, and other appliances when you leave a room. This can significantly reduce your energy consumption.
3. **Use Natural Light:** Open curtains and blinds during the day to let in natural light instead of using artificial lighting.
4. **Adjust Your Thermostat:** Set your thermostat to a comfortable but energy-efficient temperature. In summer, set it to 78°F (25.5°C) or higher when you're at home and need cooling. In winter, set it to 68°F (20°C) or lower when you're at home and awake.

RESULTS

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Agent preview

MD You: 05:42 PM
Give me 3 practical tips to reduce my electricity bill based on the data.

Sous Chef 05:42 PM

- Shift Energy-Intensive Tasks to Off-Peak Hours:**
 - From the data, it's clear that appliances like the dishwasher, washing machine, and oven are used during peak hours. Shifting their usage to off-peak hours can significantly reduce your electricity bill. For example, run your dishwasher and washing machine late at night or early in the morning.
- Optimize Heating and Cooling:**
 - Heating and air conditioning are the biggest energy consumers. During peak hours, adjust your thermostat to use less energy. In the summer, set it a few degrees higher, and in the winter, set it a few degrees lower. Also, consider using fans instead of air conditioning when possible.
- Efficient Use of Electronics:**
 - Devices like computers and TVs are used frequently. Ensure they are turned off when not in use, and consider using power strips to completely cut off power supply and

Type something... 🔍 ➤

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Agent preview

MD You: 05:41 PM
How can I reduce peak-hour electricity usage?

Sous Chef 05:41 PM
Here are some tips to reduce peak-hour electricity usage:

- Shift Energy-Intensive Tasks to Off-Peak Hours:**
 - Run your dishwasher, washing machine, and dryer during off-peak hours.
 - Charge electric vehicles overnight.
- Use Energy-Efficient Appliances:**
 - Upgrade to Energy Star-rated appliances, which use less energy.
 - Use LED light bulbs, which are more energy-efficient than traditional incandescent bulbs.
- Adjust Thermostat Settings:**
 - During peak hours, set your thermostat a few degrees higher in the summer and lower in the winter.

Type something... 🔍 ➤

RESULTS

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Agent preview

following dates and times:

- 01-07-2025 at 18:00
- 02-07-2025 at 20:00
- 03-07-2025 at 19:00
- 05-07-2025 at 18:30

► How did I get this answer?

[MD](#)

You: 06:59 PM

Which appliance consumes the most energy?

[🤖](#)

watsonx Agent 06:59 PM

The appliance that consumes the most energy is the Air Conditioner, with a power usage of 4.0 kWh on 05-07-2025 at 18:30 during peak hours, costing Rs 20.0.

► How did I get this answer?

[🔄](#)

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Agent preview

[MD](#)

You: 06:59 PM

Which appliance consumes the most energy?

[🤖](#)

watsonx Agent 06:59 PM

The appliance that consumes the most energy is the Air Conditioner, with a power usage of 4.0 kWh on 05-07-2025 at 18:30 during peak hours, costing Rs 20.0.

► How did I get this answer?

[MD](#)

You: 06:59 PM

Why is my electricity bill high this month?

[🤖](#)

watsonx Agent 06:59 PM

Hi, I am watsonx.ai agent. How can I help you?

The appliance that consumes the most energy is the Air Conditioner, with a power usage of 4.0 kWh on 05-07-2025 at 18:30 during peak hours, costing Rs 20.0.

► How did I get this answer?

CONCLUSION

- Generates energy usage reports with clear insights.
- Provides actionable strategies to reduce electricity costs.
- Saves time by automating data analysis for users.
- Enhances efficiency, accuracy, and sustainability in energy usage.
- Provides **cost-saving strategies** based on user-specific energy data.
- Supports **long-term bill reduction** through optimized appliance usage.

GITHUB LINK

- <https://github.com/Mansee-Dakhole/INTERNSHIP-EDUNET-IBM-CLOUD.git>

FUTURE SCOPE

- Multilingual Support – Expand the agent to provide energy insights in multiple languages for diverse users.
- Voice-Activated Assistance – Integrate voice commands to make the agent accessible via smart speakers and mobile devices.
- Real-Time Monitoring – Connect with live smart meters and IoT devices for continuous energy tracking.
- Personalized Energy Goals – Suggest monthly energy-saving targets and track progress automatically.
- Integration with Utility Platforms – Link directly with electricity providers for real-time tariff updates.
- Mobile App Integration – Provide instant notifications, bill alerts, and energy-saving tips via a smartphone app.

IBM CERTIFICATIONS



IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Mansee Dakhole

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU