Energy Saving Advice (EBA) for an apartment on the Bosboom Toussaintplein

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1. Executive Summary

This report provides a comprehensive Energy Saving Advice (EBA) for an apartment building on Bosboom Toussaintplein in Delft. By implementing various energy-saving measures, the apartment's energy consumption can be significantly reduced, leading to cost savings and a reduction in CO_2 emissions. As a result, the energy label of the apartment can improve from D to C.

2. Description of the apartment

The apartment has an area of 80 m². Depending on the location of the apartment (on the side, in the middle, top floor, ground floor) the energy consumption is higher or lower than the apartment under consideration. The apartment currently has an energy label D and an annual energy consumption of 9,100 kWh, a significant part of which is for heating.

3. Energy balance of the apartment

- Annual energy consumption: 9,100 kWh
    - Heating: 5,250 kWh
    - Boiler, shower and hot water 1.750 kWh
    - Lighting: 500 kWh
    - Household appliances: 1,600 kWh
- Energy consumption per m²: 113.75 kWh/m²
- CO_2 emissions: 9,100 kWh x 0.233 kg CO_2/kWh = 2,120 kg CO_2 per year

4. Possible Energy Saving Measures (EBMs)

a. Expected energy savings and cost-efficiency:

- LED lighting: LED lighting is on average 60% more efficient than traditional lighting. For an apartment with an energy consumption of 500 kWh for lighting, this can lead to savings of 300 kWh per year. Cost savings: €90 per year.
- High-efficiency home appliances: New energy-efficient appliances use an average of 40% less energy than older models. For an apartment with an energy consumption of 1,600 kWh for appliances, this can lead to savings of 640 kWh per year. Cost savings: €192 per year.
- Air conditioner/heat pump: An air conditioner/heat pump[1] is about 50% more efficient than a central heating system. The use of the 5,250 kWh central heating system will then save 2,625 kWh kWh per year. Cost savings: €788 per year.
- Insulation: Improved insulation can reduce energy consumption for heating by 20%. For an apartment with an energy consumption of 7,000 kWh for heating, this can lead to savings of 1,050 kWh per year. Cost savings: €315 per year.
- Heat pump water heater: Heat pump water heaters are about 50% more efficient than conventional water heaters. For an apartment with an energy consumption of 1,750 kWh for hot water, this can lead to a saving of 875 kWh per year. Cost savings: €263

b. Required investments and payback periods:

- LED lighting: Investment of €500. Payback period: €500 / €90 per year ≈ 5.6 years.
- High efficiency household appliances: Investment of €2,500. Payback period: €2,500 / €192 per year ≈ 13.0 years.
- Air conditioner/heat pump: Investment of €5,000. Payback period: €5,000 / €788 per year ≈ 6.3 years.
- Insulation: Investment of €2,000. Payback period: €2,000 / €315 per year ≈ 6.3 years.
- Heat pump boiler: Investment of €2,500. Payback period: €2,500 / €263 per year ≈ 9.5 years.

c. Available subsidies and their impact on investments and payback periods:

- For air conditioner/heat pump, a subsidy of €1,500 can be obtained, making the investment €3,500 and the payback period is 4.4 years (€3,500 / €788 per year).
- A subsidy of €1,000 can be obtained for insulation, making the investment €1,000 and the payback period is 3.2 years (€1,000 / €315 per year).

[1] Can be used as an air conditioner in the summer and as a heat source in the winter.

- For heat pump boilers, a subsidy of €1,000 can be obtained, making the investment €1,500 and the payback period is 5.7 years (€1,500 / €263 per year).

5. Explanation of chosen measures

a. Buildings

- Installation of energy-efficient LED lighting throughout the apartment.
- Replacement of old household appliances with high-efficiency appliances.
- Improved insulation to minimize energy loss.
- Installation of air conditioner/heat pump. Air conditioner/heat pump split units have a high energy label (A+ or higher), which indicates low energy consumption and lower energy costs.

b. Processes

- Optimization of energy consumption through energy management systems and awareness programs for residents.

6. Energy Saving Advice / Sustainability Plan

A coherent sustainability plan in which all proposed measures are integrated, aimed at achieving an energy label C within two years. This plan will help the apartment not only to save energy, but also to reduce its carbon footprint.

7. Evaluation of the implementation

A detailed evaluation schedule with quarterly reports on the progress of the implementation of the measures. Measurable goals such as reducing energy consumption and cost savings will be reviewed on a regular basis.

8. Legal and Regulatory Requirements

Overview of relevant laws and regulations in the field of energy saving and sustainability that apply to the housing sector.

Appendix A: Intended energy label after implementation of measures

Current situation:

- Energy label: D
- Annual energy consumption: 9,100 kWh
- Energy consumption per m²: 113.75 kWh/m²
- CO_2 emissions: 2,120 kg CO_2 per year

After implementation of the measures:

1. LED Lighting:
    - Savings: 300 kWh per year
    - New energy consumption for lighting: 200 kWh per year
2. High Efficiency Home Appliances:

    - Savings: 640 kWh per year
    - New energy consumption for appliances: 960 kWh per year
3. Air conditioner/heat pump:
    - Savings: 2,625 kWh per year
    - New energy consumption for hot water: 2,625 kWh per year
4. Insulation:
    - Savings: 1,050 kWh per year
    - New energy consumption for heating: 4,200 kWh per year

Total savings and new energy consumption:
- Total savings: 5,490 kWh per year
- New annual energy consumption: 9,100 kWh – 5,490 kWh = 3,610 kWh
- New energy consumption per m²: 3,610 kWh / 80 m² = 45.13 kWh/m²
- New CO_2 emissions: 3,610 kWh x 0,233 kg CO_2/kWh = 841.13 kg CO_2 per year

Improvement of energy label:
The implementation of the above measures will lead to a significant improvement in the energy efficiency of the apartment building, resulting in a new energy label C. This label is achievable due to the reduction of energy consumption per square meter and the associated reduction of CO_2 emissions.

The energy label C indicates an apartment with a good energy performance, where further optimisations are possible, but where significant progress has already been made compared to the current situation.
lighting.

Appendix B: What is the Return on Investment of the investments

- LED Lighting:
    - Investment: €500
    - Annual savings: €90
    - Payback period: 5.6 years
    - Total savings over 10 years: €900
    - ROI over 10 years: (€900 - €500) / €500 x 100% = 80%

- High Efficiency Home Appliances:
    - Investment: €2,500
    - Annual savings: €192
    - Payback period: 13.0 years
    - Total savings over 15 years: €2,880
    - 15-year ROI: (€2,880 - €2,500) / €2,500 x 100% = 15%

- Air conditioner/heat pump:
    - Investment: €3,500 (after subsidy)

  - Annual savings: €788
  - Payback period: 6.3 years
  - Total savings over 15 years: €11,813
  - ROI over 15 years: (€11,813- €3,500) / €3,500 x 100% = 238%

- Insulation:
  - Investment: €1,000 (after subsidy)
  - Annual savings: €315
  - Payback period: 6.3 years
  - Total savings over 20 years: €6,300
  - ROI over 20 years: (€6,300 - €1,000) / €1,000 x 100% = 530%

- Heat pump water heater:
  - Investment: €1,500 (after subsidy)
  - Annual savings: €263
  - Payback period: 9.5 years
  - Total savings over 20 years: €5,250
  - ROI over 20 years: (€5,250 - €1,500) / €1,500 x 100% = 250%

Total ROI of all measures

- Total investment: €9,000 (€500 + €2,500 + €3,500 + €1,000 + €1,500)
- Total annual savings: €1,647 (€90 + €192 + €788 + €315 + €263)
- Average payback period: €9,000 / €1,647 ≈ 5.5 years
- Total savings over 15 years: €24,705 (€1,647 x 15 years)
- Total ROI over 15 years: (€24,705 - €9,000) / €9,000 x 100% = 175%

Conclusion

The proposed energy-saving measures bring significant financial benefits to the apartment. The average payback period for the investments is about 5.5 years. Over a period of 15 years, the apartment is expected to save €24,705 on energy costs, with a total ROI of around 175%. This means that the investment pays for itself more than once over the lifetime of the implemented measures. Due to the improved energy efficiency, the energy label will improve from D to C, indicating a significant improvement in the energy performance of the apartment.