$$\frac{40}{30}$$

ENGR290: Renewable Energy

Quiz 1: Power and Energy Units and Calculations

Oct 1, 2013 *Solution*

Problem 1

A small photovoltaic system provides the daily power shown in Figure 1. Calculate:

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1. The total daily energy produced: _8 kWh_
2. The peak power produced: _1 kW_
3. The average daily power produced: _8/24 = 1/3 kW_

Problem 2

2

A small house with the load shown in Figure 2 is connected to the PV system in Problem 1. Calculate:

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1. The total daily energy consumed: _8 kWh_
2. The peak power consumed: _2 kW_
3. The average daily power consumed: _8/24 = 1/3 kW_

Problem 3

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1. Can the PV system supply the power to this house? _No_
2. Why or why not? _Peak too low + timing requires storage_

Problem 4: Extra Credit

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1. How much energy storage would be required to allow this PV system to power the house? _1+1+2+2 = 6 kW_

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2. Wal-Mart sells a 100Ah 12 Volt battery for $75. How much would it cost to buy enough batteries to fill this need? _$375_

$$100\ Ah \cdot 12V = 1200\ kWh/bat$$

$$6\ kWh \left(\frac{bat}{1.2\ kWh}\right) = 5\ bat$$

$$5\ bat \left(\frac{\$75}{bat}\right) = \$375$$

Average power during 1 hour intervals
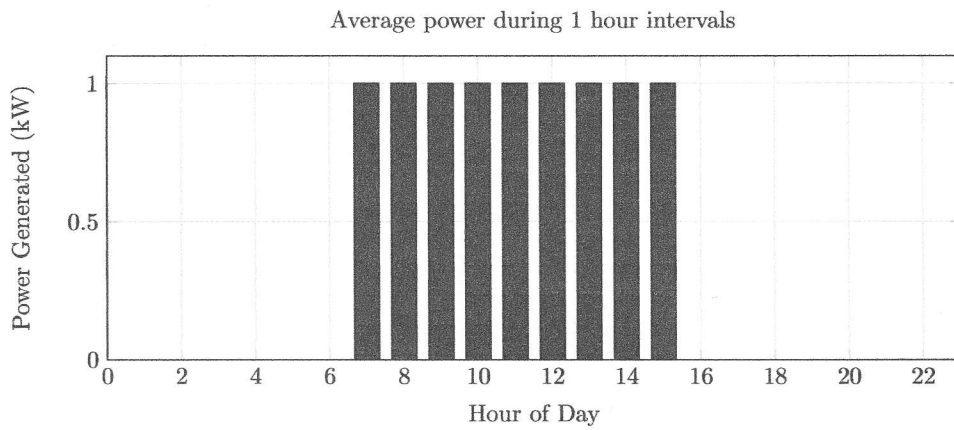
Figure 1: PV average system power for one day
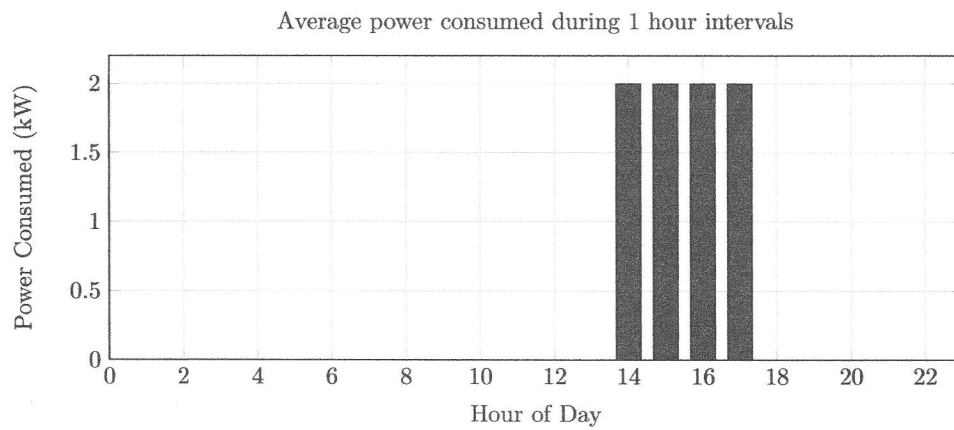
Average power consumed during 1 hour intervals

Figure 2: Average daily household power consumption