

RESOURCES CONSUMPTION MANAGEMENT AT THE NATIONAL LIBRARY OF IRAN

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ABSTRACT

This paper studies the various resources (water, energy, paper) as well as other wastes consumption management at the National Library of Iran in Tehran. After setting the targets and specifying the correct management framework of resources consumption through the green management schedule, the resources analysis in consumption pattern in National Library of Iran was set up. Some attempt plans were performed to find out management solutions to the related issues. For the achievement of this aim, the first step was considered the study of general conditions of the Library through several visits, completing the checklists and questionnaires and then gathering the necessary information and analyzing them. The results of the fuel consumption in transportations related to the National Library showed that the major pollutants produced by the transportation were CO₂, CO, NO_x, and hydrocarbons. The rate of CO₂ had a maximum level of 904 Kg and CO was 6 Kg, NO_x was 2 Kg and hydrocarbons were 0.58 Kg. Among the equipments, which use energy in the Library, refrigerators produce the levels of CO₂, SO₂ and NO_x. The total level of CO₂, SO₂ and NO_x produced by all the equipments were 1140.32 Kg, 3.9072 kg and 2.886 Kg respectively. The results of water investigations showed that the total water consumption was 45459 L/year and the greater part of it was related to irrigation of the garden in the courtyard which was equal to 32471 L/year. Regarding to the wastes, the results of 30 times sampling showed the highest level to be related to aluminum and paper and a computer analysis revealed these results in the rates of 19745 Kg/year of CO₂, 77.54 Kg/year, SO₂ 57.4 Kg/year NO_x and particulate matter was 2.92 Kg/year. Following the investigations carried out in management, executive solutions were suggested which led to the conclusion that the Green Management System should be established at this organization which should result in optimum consumption of resources such as water, power and paper in the National Library of Iran with considerable cost reduction.

Key words: Green Management System, pollutant, waste management, optimum consumption, consumption management

INTRODUCTION

Environmental protection, pollution prevention and optimal consumption/ use of resources are among the most important factors for the achievement of sustainable development. Unfortunately lack of attention paid to this matter, has made the country face various environmental crises (Paraccini, 1994). The most important environmental crisis is referred to the cultural problems; so correction of viewpoint in society is necessary which may be

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achieved through research and training.

Since 1980s, many theories based on sustainable development were declared about evolution of economical development theories in the world. According to these theories, economical development of countries may happen when there is no kind of environment destruction such as air, ground, and weather. These theories have so many fans in global societies and they were considered in plan of economical development by implementation of conferences in Rio de

Janeiro. Sustainable development is a kind of development which is people's advocate and nature compatible. Decreasing poverty of environment is the most important preferences in this development (Mark, 2005).

The United Nations defines sustainable human development as "moral obligation to do as well as for the next generation as the previous generation did for us" (DOE, 2004). The UN has declared the plan of sustainable development and additionally it has posed some theories about green internal production and green operation (Ekvall and Finnveden, 2000).

In our country, Iran, just as in any other country of the world, the issue of the environmental protection and movement towards sustainable development began with our first Socio-Economic and Cultural Development Plan and was continued in the second and third Plans. It is now some time since the Green Management Plan was begun. In this Plan each and every government- controlled organization must in its own turn have all the basic conditions of a "green organization". An organization can only be said to be a "green organization" in the society when it can continue its activities in a sustainable way with optimum use of consumptive materials, without waste. It is expected the organizations step forward to achieve the sustainable development aims by successful execution of green management, attraction of employees and development of green culture (Khadivi, 2005).

MATERIALS AND METHODS

In this research, it has been attempted to study and analyze the consumption of various resources such as energy, water, paper, wastes and identify the surplus materials produced, and offer suitable solutions as regards consumption management of these resources within the Iranian National Library and to offer strategies for turning this library into a "green library" as a step towards sustainable development in the country. For this purpose and to achieve such goals, the first step would be to gather the necessary information on consumption of such recourses as water, electricity, energy, and fuel. Therefore a questionnaire was prepared about the existing conditions of the library and was

completed. Then, water, electricity, and fuel (gas oil) consumption in the library were obtained. Furthermore, all the necessary information about consumption of papers was obtained from the library warehouse. Also 30 samplings were performed with respect to solid surplus materials found in the library. This was done by randomly collecting 2 sacs full of waste materials at 14:00 pm each day and these were separated according to material and weighed. Then checklists that had been prepared on the basis of the data gathered, were filled in and the results of the analysis carried out were arranged and presented.

RESULTS

The results of the studies carried out on the various materials consumed are offered as follows:

The results of the studies carried out with respect to fuel consumption of library vehicles indicate that among the pollutants produced through transportation (CO₂, CO, NO_x and hydrocarbons) the amount of CO₂ produced was the highest (904 kg). Next pollutants are CO (6 kg), NO_x (2 kg) and hydrocarbons (0.58 kg). The results showed that if new and sound vehicles are used, the amount of NO_x and CO shall be reduced to the lowest possible level. At present the fuel used for heating is gas oil, the amount used being 13011 liters per month, which amount depends on the season and the atmospheric temperature. Studies indicate that the largest quantity of gas oil used is 117100 liters of which the largest amount is consumed during winter months. This higher level of gas oil consumption in winter is also due to the official establishment of library personnel in winter 2005 and the need to secure warm water for them. According to the relevant electricity consumption receipt the general consumption trend can be illustrated as below as can be seen from the diagram, the maximum electricity consumption is amounts to 610000 KWh. According to the same statistics, during Aban the lowest energy consumption of 540000KWh was recorded. Electricity consumption during winter was 1810283 KWh as the peak consumption. The reason for this rised consumption was again the formal start of the library operation in the year 2005 and the putting in place of the employees with consequent

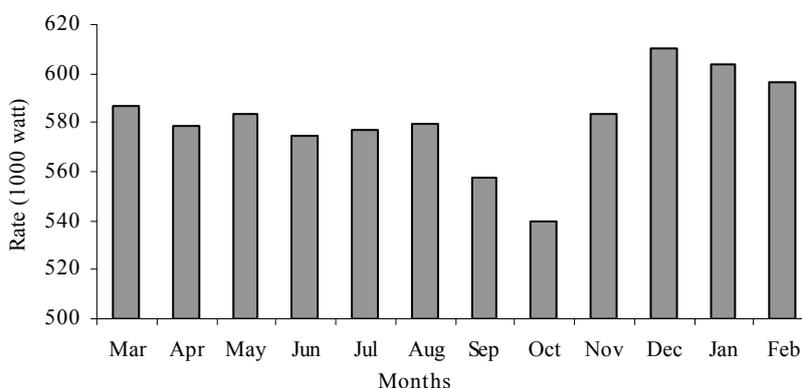


Fig. 1: Monthly average of power consumption in National Library of Iran in 2005-6

use of electrical equipments. Furthermore, the results of consumption of the checklists related to energy showed that among the energy consumption equipment, refrigerators had the largest share in producing CO₂, SO₂ and NO_x. The amount of CO₂ produced by all these equipments was 1140.32 Kg, and of SO₂ 3.9072 Kg and of NO_x 2.886 Kg. The total energy consumed by these equipment amounts to 2739.71 KWh. It should be pointed out here that the inspections made the number of 100 watt lamps in the entrance halls and the courtyard was 70. Replacing these with low-consumption, 20-watt lamps, there will be an electricity savings of 5600 watts per day in the library consumption of electricity, which is equivalent to 168 KWh per month (<http://ans.engr.wisc.edu/eic/EnergyForm>, 2006).

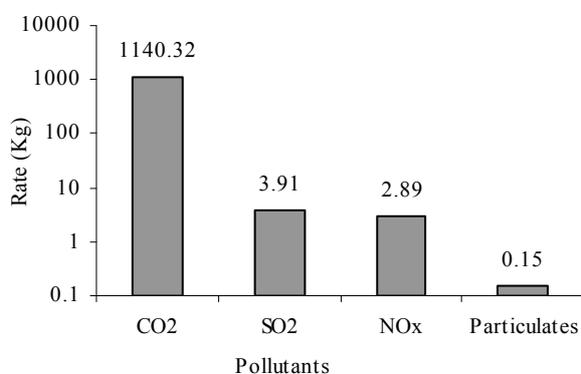


Fig. 2: The results of produced gases and particulates due to appliances usage in National Library

Research works and investigations several that the quantity of paper used during six months was 1610 packs, 4025 Kg in weight, equivalent to 805000 sheets of A4 paper. On the basis of this finding the annual per capita paper consumption in the same 6 months was 4.94 packs of A4 sheets. Interviews performed indicated that in the month of Esfand consumption is higher than in other months because correspondences increase in that month. On the basis of calculations carried out the average paper consumption per day were 8.94 packs of A4 or 4472.2 sheets. If only half of these packs that is 805 packs are used on both sides, 1117.5 sheets per day, which is 402 packs per 6 months (equivalent to cutting 15 trees) would be saved. (Fisher, 1995) It should be noted that, considering that each pack costs 30000 Rials, the savings could amount to 12069000 Rials in 6 months, which is an important figure in the costs. The total amount of water used for the gardens, dish washing and toilet was 45459 liters per year of which the larger part has gone to the gardens, some 832471 liters per year. Of course it should be pointed out that this amount used for the gardens has been extracted from a well and no city network water has been used for this purpose. It was so calculated that the average time taken for water consumption for washing hands and for ablutions would be 60 seconds and the water needed would be 6 liters. Considering that each person would need water for these purposes twice a day, such daily consumption would amount to 8

litters. If the taps were simply changed with UV-controlled taps the consumption would fall to 4

litters per person per day, i.e. a savings of 4 litters per day (per person).

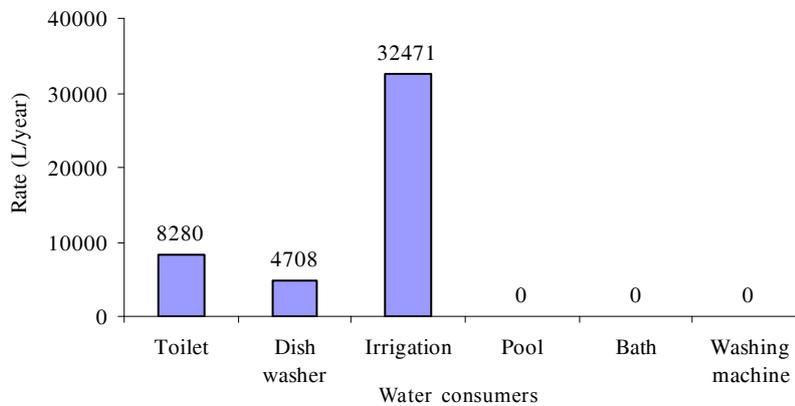


Fig. 3: Share of appliances and water consumers in the Library

Thus the total saving for all the personnel would be 39120 litters per month (<http://ans.engr.wisc.edu/eic/WaterForm>, 2006).

The results of the 30 samplings of solid wastes and the investigations, revealed that the largest quantity of waste consisted of paper, a quantity 6.3 Kg in 30 days of sampling on average, of which no recycling is made and all the waste paper is disposed mixed with other solid wastes.

Furthermore, the amount of CO₂ produced was 19475 Kg per year, of SO₂ 77.54 Kg, of NO_x 57.4 Kg and 2.92 Kg of particles. Table 1 shows a basis for comparison of recycling solid waste matters as found in the National Library of Iran and United States of America (<http://ans.engr.wisc.edu/eic/SolidForm>, 2006).

Table 1: Comparing of wastes recycling percentage in National Library of Iran and USA (Matos and Wagner, 1998)

Waste	USA	National Library of Iran
Aluminum	66	0
Newspaper	58	0
Plastic	26	0
Glasses	37	0

DISCUSSION

Before talking about management solutions in library, it is better to show a comparison done about consumption rate of sources in Enghelab Sport Complex as follows:

About power consumption we can say that the total consumed is equal to 6971900 KWh in National Library; which is greater than power consumption in Enghelab Sport Complex (This rate

is equal to 1941854 KWh). Gasoline consumption is equal to 1171000 L/year in The Library and the rate of natural gas consumption is equal to 709283 L/year in Enghelab Sport Complex. Regarding the wastes, results showed the average of them was 5.7 Kg in National Library and 114.1 Kg in Enghelab Sport Complex. After analysis of data in the Library, for establishment of Green Management in National Library of Iran the necessary management activities are:

- Reduction of power consumption
- Converting the fuel from gasoline to gas
- Reduction of water consumption
- Reduction of paper consumption
- Waste reduction and separation of rubbish

For establishment of Green Management System in The National Library, two rules should be used:

- First, making Green culture in National Library of Iran. For making this, increasing the employee's knowledge is necessary and this aim needs training plan.

- Second, procedures, patterns and implementations. For establishment of the system, we can use a technology and different suitable ways of consumption reduction such as automatic doors and establishment the paper less system.

Also making Green Management procedures and doing necessary activities for them, is a step for implementation of green government. These procedures should follow two rules:

1- Growing the knowledge of employees. These trainings could be managed in different methods.

- Producing different brochures about Green Government.
- Distributing of training book among the employees.
- Implementation of different training courses about resource consumption.
- Implementation of seminars for identifying green government.

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