Energy consumption study on school uniform ironing: A case study in Malaysia

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The authors would like to thank RMC, FKE and CEES, Universiti Teknologi Malaysia and the Ministry of Higher Education of Malaysia for the financial support provided under RUG(05H18) and FRGS(4F108) to carry out this research.

Abstract

Almost all children in Malaysia wear ironed uniform when they go to school, following the standard dress code that is issued by Malaysian Education Ministry. Indirectly, this school uniform ironing contributes to the energy consumption in residential sector in Malaysia. This paper attempts to investigate the status of energy used due to this activity, and to predict the amount of energy savings in the residential sector in Malaysia through the use of the un-iron uniform material. The energy measurements are based on the data reading on the smart meter during the ironing. For the energy saving prediction, the calculations are based on the population growth data in Malaysia. By retaining the school uniform ironing, about 3819 GWh can be saved from year 2010 to 2030. Therefore, this effort could assist in delaying the process of energy sources depletion and could extend the energy security in Malaysia for a longer time.

Keywords: school uniform, ironing, energy saving, energy security

1. Introduction

Electricity plays a vital role in development in Malaysia. Since past few years, the demand for energy has escalated in Malaysia as a result of rapid economic growth. Fig.1 shows the energy consumption or energy demand in Malaysia from year 2000 to 2012 (Department Of Statistics Malaysia, 2010). From Fig.1, it can be seen that the energy consumption has risen by 56% from 53.42 billion kWh to 93.8 billion kWh during these years. Malaysia's electricity consumption is estimated to boost by about 30% from its present value by the year 2020 (Christopher, 2010).

Fig.1 Energy consumption in Malaysia from year 2000 to 2012

Fig.2 shows the electrical energy consumption scenario in Malaysia, based on 2008 data (Christopher, 2010). The total energy used by consumers was about 8.4 million kWh. As shown in Fig.2, the industrial sector consumes the highest electrical energy in Malaysia. From that number, industrial consumers contribute the most, with a percentage of 47.43 %, followed by commercial (32.18%), domestic (18.96%) and others (1.44%). The number of all consumers in the industrial sector also increases every year. Therefore, the demand of electricity also increases.

Fig.2 Electricity consumer of TNB according to sector in year 2008

One of the factors that influence the electricity demand in Malaysia is the population growth (Mahlia, Masjuki,Saidur,Choudhury, &NoorLeha, 2003). Demographic changes, economic developments and increases of household income also escalate the electricity consumption globally (Malaysia Energy Information Hub, Suruhanjaya Tenaga , 2008). People affordability in purchasing goods increases year after year; which also covers purchasing the electrical appliances, leading to more consumption of electricity. Rather than using rain water for shower and gardening, using woods for cooking, using fan for cooling, using coals for ironing, people nowadays tend to have shower from the water heater, use auto-watering plant system for watering plants, use gas/electricity for cooking, use air-conditioner for cooling and use electricity for ironing clothings.

As a developing country, Malaysia is experiencing the increment of energy use every year. According to the statistics provided by the National Energy Balance (2008), it was reported that Malaysia recorded an increase of energy consumption at a rate of 6.1% yearly from 2000 to 2008 (Malaysian investment development authority, 2003). It is anticipated that Malaysia needs to supply more electricity in the next coming years. In 2012, the economy of Malaysia was noted as the third largest economy in South East Asia. This is due to the fact that the electrical and electronics (E&E) industry is one of the major manufacturing sectors that help to increase the total gross domestic product (Mahlia et al., 2003). Note that the gross manufacturing product is closely related to the gross domestic product.

Being a developed country is a goal for all countries in the world. However, since economic growth and energy consumption have a strong interconnected impacts and long-term mingled relationship (Fei, 2011),(Energy and Development Group, Cape Town, South Africa, 2013),(Shaari, Hussain, & Ismail, 2013), this will contribute to more negative greenhouse effects, global warming, carbon dioxide emissions and air pollutions. The air pollutions and gas emissions happen when the carbon dioxide and other gases get thick enough to form a 'gas blanket' around the earth, causing the earth to heat up more than usual (Tan, Maragatham, & Leong, 2013). This leads to global warming. The global warming then leads to worse scenarios such as polar ice melting, rising sea levels, drought, heat waves, hurricanes and others (United States Environmental Protection Agency, 2013). Though United States is said to be the largest source of global warming pollution by producing 25 percent of the carbon dioxide pollution from fossil fuel combustion, while Malaysia is not listed as one of the major contributors of the list, it should not mean that Malaysia should not have concern regarding this issues. We, as one of the developing country in the world, should participate in searching strategies on how to find supports for our fossil fuels, so that this energy source can be used for a longer time and energy security is promised as longer as possible. In Malaysia, electricity generation is mostly based on the fossil fuels such as natural gas, coal and oil. Burning coal and oil produce hazardous gas emissions, for instance CO_2, SO_2 and CO_x (Al-Amin, Siwar, &Jaafar, 2009)(Yumrutas&Unsal, 2012). These gasses are responsible to the global warming.

Other than population growth, demographic changes, economic developments and increase of household incomes, people's behaviour/attitude is one of the reasons why electricity consumption being increases. The term 'behavior' discussed here is related to conscious and unconscious choices that are made by consumers within a classified framework such as legislation, regulations, provisions and what is available in the market (Al-Mofleh, Taib, Abdul Mujeebu, &Wael Salah, 2009). People's behavior and attitude are involved in determining higher consumption of energy in daily life, particularly domestically (Muhammad Ery Wijaya, &Tetsuo Tezuka, 2013). There are many examples which show Malaysian ruthless behavior/attitude. For example, to provide a comfort and safety environments, many people will leave the lights on during the night, particularly in the bedroom, front yard and back yard. The attitude of switching on lights for no specific reason and switching on the fans and air-condition without using timer at home are also a common routine at night. Besides that, many people prefer to buy cheaper home appliances which have low efficiency rather than purchasing the higher efficiency home appliances which are usually more expensive. These happen because of lack of awareness about the importance of energy conservation among Malaysians. Many people do realize that they have to pay more for the electricity bills if they use more electricity. By that reason, parents will try their best to use the electricity for specific purposes only if they really need them, but, for the children, they never concern about the bills. The worst case the lack of the awareness about the energy sources depletion and gases emissions. Not many people know that the sources of energy that they use daily are non-renewable. They do not know what will happen if the sources have depleted. They also do not know that household appliances also emit dangerous greenhouse gases (Imran Rasul, Hollywood, 2012)(Natural Resources Defense Council, 2005) which may cause heart attacks, heat stroke and others (Meier, &Hill, 1997). This is supported by Maeir et al (1997)that residential electricity accounts for 40% of global energy-related CO_2 emissions and predicts that it will grow to 58% globally by 2030. In term of appliances, the refrigerator-freezer is the major energy-consuming appliance, followed by air conditioner, washing machine, fan, rice cooker, and iron (Bansal, Vineyard, &Abdelaziz, 2011).

Many energy policies regarding efficient use, adequacy, security, cost-effective and negative impact minimization of energy supply can be widely found in the literature. However, most of the discussions are only related to the scope of building (Deering, Newborough, &Probert, 1993)(Rodolfo, Zubi, &Fracastoro, 2012)(Aydinalp, Ugursal, &Fung, 2002), transportation (Akisawa, 1998)(Chen, Ding, Li, Zhang, & Kay, 2011)(Imaseki, 1998)(Maughan, Price,Probert,&Rushton, 1997)(Lakhani, 1981) and household appliances (Kilpatrick, Banfill, &Jenkins, 2011)(Cardoso, Nogueira, &Haddad, 2010)(Cezar,Negrão, &Christian, 2011)(Mansouri, Newborough, &Probert, 1996) management. Hence, this paper presents an investigation regarding the status of energy consumption due to school uniform ironing. By realizing the aim of this study, the amount of energy savings in the residential sector can be reduced, if a policy of wearing un-iron school uniform material is imposed in Malaysia.

2.0 Input data

Residential population growth and residential population census data are needed for this study analysis. These data have been obtained from Malaysia Statistics Department in (Department Of Statistics Malaysia, 2010). Table 1 shows the population growth in Malaysia from the year 2000 to the year 2012, whereby Table 2 presents the population census comprising different school children ages (from 7 to 17 years), races and gender. It can be seen from Table 1 that the number of population in Malaysia increases from year to year, about 2.2% each year. Table 2 shows that Malay is the majority ethnic living in Malaysia.

Table 1

Malaysia population growth

Table 2

Malaysia population census

3.0 Methodology

Several steps had been considered before estimating the energy consumption due to school uniform ironing. The body structure size among the school children is different, particularly between primary and secondary school. To ease the estimation, the estimation was done based on different uniform size, gender, uniform material and iron brand.

3.1 Determination of school uniform size

In this study, three different sizes were chosen, based on different gender; male and female. The sizes considered were L (large), M (medium) and S (small). For male, shirt and trousers had been considered, whereby for the female, the dress ('baju kurung') and long skirt had been chosen (see Fig. 3). The uniform dimensions for the male and female, for the primary and secondary school can be seen in Table 3 and Table 4, respectively.

Fig.3 School uniform based on gender (a) Male (b) Female

Table 3

The uniform dimensions for the male school children

Table 4

The uniform dimensions for the female school children

3.2 Determination of school uniform material

In this study, the types of cloth chosen were cotton and synthetic only. These types were chosen because they are the most common materials sold in the market in Malaysia for school uniform. The type of uniform material is usually printed on the size label.

3.3 Determination of iron brand

Four types/brands of common and widely used iron in the market were selected to study and reveal their impact. The iron brands selected were Panasonic (A), ELBA (B), Philips (C) and Khind (D). Similar power rating and iron type for all brands were chosen; 1000 W and dry iron. The iron that consumes the most energy will be considered for the final energy estimation.

3.4 Determination of ironing method

The method of ironing the male and female uniform is different. Before energy measurement is executed, three things must be done: set the ironing board to the comfortable height, followed by checking the type of cloth (cotton or synthetic), and then setting the iron temperature level based on the fabric type to get the optimum temperature or proper care that is suggested by the iron's manufacturer.

3.4.1 Ironing male uniform

For ironing the shirts, several steps had been undertaken. Firstly, the collar was laid out flat on the ironing board. The iron was then pressed from the points of the collar inward to the back of the neck. Then, the underside of the collar was ironed. The iron was then pressed on the yoke and shoulders. The ironing board was positioned inside the shirt. The sleeve of the shirt was then put on top of the ironing board, both sides together flat, and then ironed. Then, the shirt was turned to iron the backside. The shirt was then repositioned to iron the opposite shoulder. After that, the shirt was turned, and the rear side of the yoke and shoulders were ironed. The shirt was then turned to press the other side. One sleeve was laid out flat on the ironing board. The sleeve was aligned following the bottom seam. The sleeve was pressed carefully, moving both layers of fabric flat as the iron was glided across the front surface of sleeve. This was repeated for the other sleeve. The shirt was turned to iron the other side of sleeve. The body of the shirt was positioned on the square end of the ironing board, the buttonhole panel first. It was pressed from the bottom tail progressing upward to the collar. The shirt was then turned to iron the inside of the body of shirt also. Next, the shirt position was moved to the next body panel, half of the back. The shirt was then pressed from the tail progressing upward to the collar. After that, the shirt position was moved to the last body panel, to the other half of the front, marked by the button panel. This was repeated similar to the previous procedure.

For the trousers, they were laid out flat along the length of the ironing board. One of the legs was positioned over the other. Plain water was sprinkled to iron the creases easier. One leg was ironed at a time. One leg was then flipped back. The leg on the left was concentrated by focusing on the small sections of the leg. It was ensured not to iron the leg in one motion. The ironing was done down from the pocket in slow motion slowly. This would avoid stretching the trouser. Next, the second leg was ironed. The other leg was brought back to ensure the inseams to be lined up. The ironing motion was repeated on this leg. Next, the trousers were turned over on the ironing board and the other side of the leg. They were handled with care to keep the inseams line up. As before, the top leg was flipped back. The first leg was then ironed, followed by the second leg. Finally, the front and back crease were created by positioning both seams directly over each other. The iron was pressed, and the ironing motion was repeated.

3.4.2 Ironing female uniform

To iron the dress (baju kurung), the sleeve parts were ironed first. One of the sleeves was chosen to be laid on the iron board. The iron was pressed from the top where the sleeve was sewn to the body and then down to the cuff. The same process was repeated to the bottom side, and was also repeated onto the other sleeve. Next, the front side of the dress body was ironed. This was started from the top to the bottom side of the left side of the dress.

The process was repeated for the right body side. Then, the dress was turned from the front side to the back side of the dress. The similar process was repeated.

To iron the long skirt, the front skirt was placed horizontally on the iron board. The left side was chosen to iron first. The skirt was ironed from the top to the down side. Then, the same process was repeated for the right side, followed by the middle side to make sure the entire skirt was ironed properly. The same process was repeated for the back skirt.

3.5 Measurement of energy consumption

In this study, the energy consumption during the school uniform ironing was measured by using a SY1012 plug and smart socket power monitor. The smart meter can record and display the data of the voltage (V), current (A), frequency (Hz) and the total running time. It can also calculate current power consumption (W), highest power consumption (Hi W), lowest power consumption (Lo W), and also total K.M. energy (kWh) with cost, the unit price of electricity ($/kWh) and has many other functions.

To measure the energy used, before starting the ironing process, the energy meter was plugged into the wall socket. Then, the electrical iron socket was plugged to the meter socket. The devices were then switched on. The smart meter would start recording when the iron was switched on and stop reading when the iron was switched off.

3.6 Estimation of energy consumption based on the population data

To obtain the actual population data, particularly the specific age, gender, race and body size is very difficult for the analysis. Hence, to estimate the total yearly energy consumption based on the ironing activities, the population data for each year was estimated. The number of population from 2011 to 2030 was calculated by using an equation that was created by using polynomial curve fitting. This equation was created by using MATLAB software. To produce this equation, the population data based on year 2000 to 2012 was used.

To calculate the energy usage daily, weekly, monthly and yearly, Eq.1, Eq.2, Eq.3 and Eq.4 were used, respectively.

Total energy used daily = Total energy used by students (7 to 17 years old) (Eq.1)

Total energy used weekly = Total energy used daily x 5 days (Eq.2)

Total energy used monthly = Total energy used daily x 22 days (Eq.3)

Total energy used monthly = Total energy used monthly x 10 months (Eq.4)

Since only population census data for year 2010 was available, an assumption was made to estimate the energy used for the remaining years from 2013 to 2030. By using the proportion number of people aged from 7 to 17 years, to the others, based on the population data in 2010, the total energy consumption for ironing school uniform from 2013 to 2030 was estimated.

4.0 Results and Discussions

The school uniform made from the synthetic cloth is more cost saving compared to the cotton cloth. This is because the wrinkles or creases of the synthetic clothes can be loosened easier than those on the cotton clothes. Besides that, synthetic cloth has a smooth and thin surface compared to the cotton cloth. From the energy measurement, ironing cotton cloth consumed for about 0.074 kWh of electrical energy, whereby synthetic cloth used about

0.032 kW. Since cotton cloth is usually preferred and widely worn by students, the energy estimation was made based on the cotton type.

Based on the data shown in Table 1 and Table 2, and using the created polynomial curve fitting, the population data for the year 2013 to 2030 was estimated using the following equation:

$$= 5.1 \quad - 9.965 \tag{Eq.5}$$

The predicted energy consumption for male and female students based on the population data on 2010 are shown in Table 5 and Table 6, respectively. The energy consumption based on each size and its total energy used based on the number of population for each age (from 7 to 17 years old) were measured. For primary school level, children age from 7 to 8, 9 to 10 and 11 to 12 years old were considered to be wearing size S, M and L respectively. For the secondary school level, children with age 13 years old, from 14 to 15 and from 16 to 17 years old were considered to be wearing size S, M and L, respectively.

Table 5

The predicted energy consumption for male students based on different ages

Table 6

The predicted energy consumption for female students based on different ages

From Table 5, the energy consumed to iron a uniform for primary male student was 0.08, 0.096 and 0.114 kWh for each size of S, M and L, respectively. In the meantime, for the secondary male student, the electric consumptions were 0.128, 0.146 and 017 kWh when ironing uniform size S, M and L, respectively. From the data in Table 2, the total children aged from 7 to 17 years old in 2010 was 260906. Based on the population ratio among these years, the total energy predicted for primary male students ranged from 20872.48 kWh to 31840.77 kWh for size S, M and L, whereby for secondary male students, the energy used was between 33939.97 to 49730.95 kWh for each size, respectively. This accounted the energy used daily about 373114.832 kWh. The total of electrical energy used for weekly, monthly and yearly were 1865574.15, 8208526.26 and 82085262.60 kWh, respectively.

From Table 6, the total electrical energy used per day by female students was 328539.82 kWh. The total of electrical energy used weekly, monthly and yearly were 1642669, 7227875.95 and 72278759.5 kWh, respectively. The difference of energy consumed between primary and secondary female was about 32300 kWh daily.

However, in term of energy comparison between two genders, male students used about 44575 kWh of energy more than female to completely iron the uniform, daily. Since the number of male population for each year was higher than female, the energy difference between them could reach up to 9806503 kWh, yearly.

The predicted energy used for school uniform ironing from the year 2010 to 2030 is shown in Table 7. The population data for 2013 to 2030 was predicted by using Eq.5. From the table, it can be said that the population growth was proportional to the year. Since the population in Malaysia increases year by year, the total energy used yearly also increases. By the year of 2030, the total number of residents in Malaysia is estimated to reach up to 38800000, where the total of energy used to iron the school uniform in year 2030 would be 209520000 kWh. In total, for 20 years, from 2010 to 2030, about 3.819×10^9 kWh would be consumed for ironing school uniform.

Table 7

The result of energy prediction

Though domestic consumers in Malaysia only use for about 20% of the total energy consumption, the effort to improve human behavior/attitude (in reducing electricity consumption) is a must. An attempt must be made to reduce and minimize the energy consumption in Malaysia, which in future can delay the process of energy sources depletion, lowering the carbon supply chain and may extend the energy security longer. Therefore, by pushing Malaysian Education Ministry to impose a new policy for the school dress code, this will reduce electricity consumption in the residential sector. This can be achieved by changing the commonly used cotton and synthetic materials to the un-ironed cloth materials e.g. collar cotton t-shirt, and also by improving the Malaysian people behavior, attitude and energy conservation awareness in reducing the energy used.

5.0 Conclusions and Recommendations

The energy consumption for ironing school uniforms has been studied. The estimation of energy consumption during ironing school uniform from year 2010 to 2030 has been done by estimating Malaysia population for each year using polynomial fitting curve. From the finding, it can be concluded that the:

- Ironing synthetic fabric consumes less energy than ironing cotton fabric by 45.3%.
- The energy consumption ratio between the different size of L, M and S among the male student is 1.3:1.1:1, whereas for female student is 1.2:1.1:1.
- To iron male uniform, 44575 kWh of energy will be consumed more compared to the female uniform, daily. This is due to the longer time needed to iron male’s trousers according to the difficulty to make the trouser look smooth.
- By using the proportion number of people aged from 7 to 17 years, to the others, based on population data in 2010, the total energy consumption during ironing school uniform is predicted to be up to 3819 GWh from 2013 to 2030.

From this research, several recommendations are listed here to reduce the energy consumption towards the uniform ironing activity, such as

- The awareness campaign regarding energy saving should be advertised widely in Malaysia. Electronics media such as television, radio, newspaper, pamphlet and website should play their role in terms of providing correct information about the energy status (reserves, consumption), how energy are being wasted and how to save energy in daily life to the public.
- It is also suggested that Malaysia Government should change their policy code from wearing cotton fabric to wearing other fabrics that do not need ironing. If this can be done, a lot of energy can be saved and the depletion of the natural fossil fuels can be delayed.
- People should be encouraged to use high energy efficient iron to save energy. When ironing cloth, it is better to damp the cloth lightly to smoothen the fabric and lessen the ironing time rate.
- Ironing school uniforms as a bundle at one time can provide less energy used than ironing single uniform one at a time.

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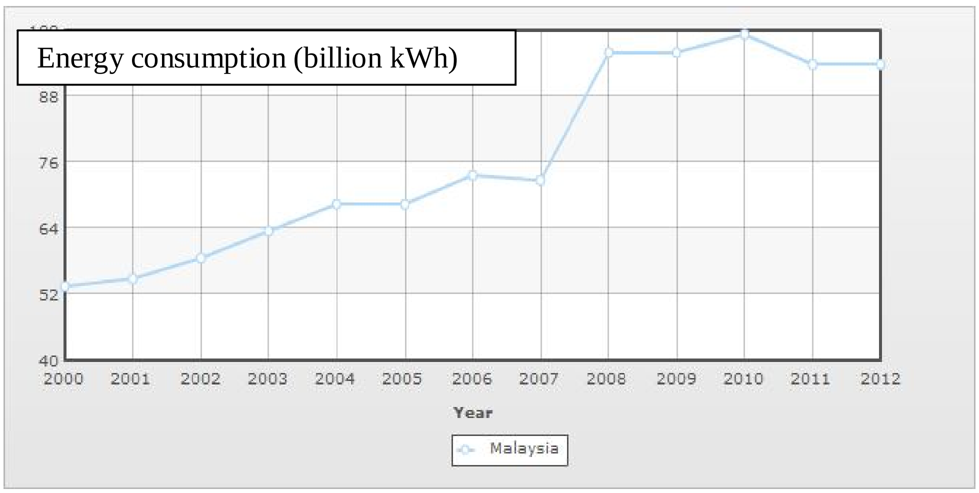

Fig.1 Energy consumption in Malaysia from year 2000 to 2012

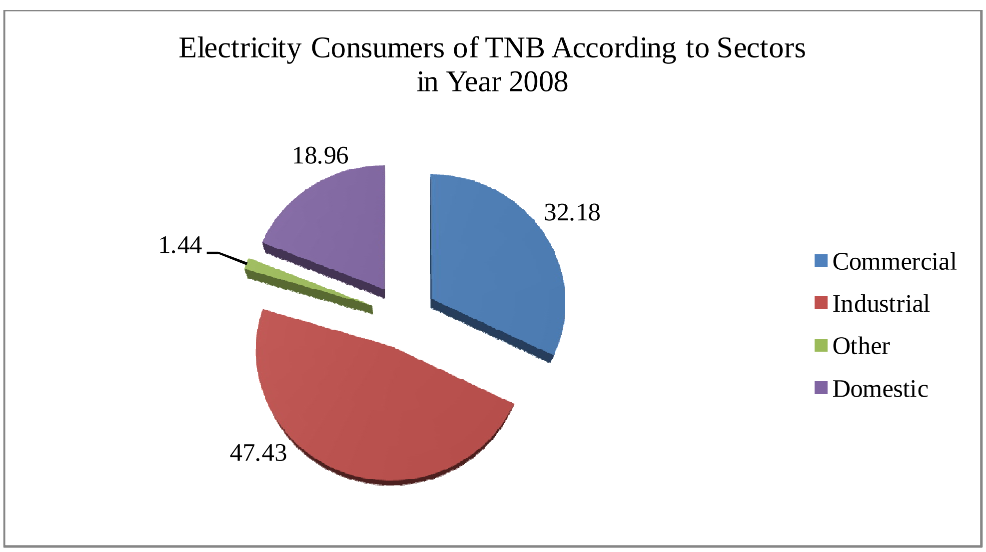

Fig.2 Energy consumption in Malaysia from year 2000 to 2012

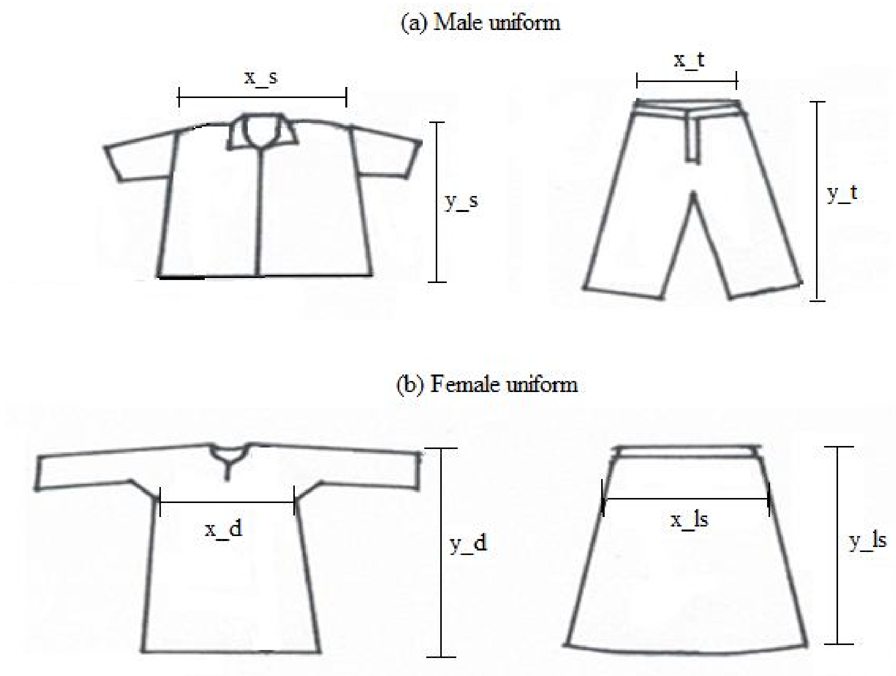

Fig.3 School uniform based on gender (a) Male (b) Female

Table 1 The total number of residents in Malaysia for year 2000 to 2012

Year	Population
2000	23494000
2001	24030000
2002	24542000
2003	25038000
2004	25541000
2005	26046000
2006	26549000
2007	27058000
2008	27567000
2009	28081000
2010	28588000
2011	28964000
2012	29336800

Table 2 Malaysia population census

	Age	Total	Indigenous		Chinese	Indian	Others	Non-indigenous
			Malay	Other indigenous				
		5908988	**3230190**	**804722**	**1134856**	**378761**	**47761**	**312698**
	7	506038	279696	71935	92651	31540	3881	26335
	8	516954	285913	72072	93875	31807	4351	28936
	9	540161	299118	75472	101672	34219	4217	25463
	10	565994	310570	76261	110545	36496	4628	27494
	11	500081	282746	70155	90169	32257	3674	21080
	12	543782	299794	73788	102700	35094	4146	28260
	13	517981	286405	69434	99941	34221	4024	23956
	14	524324	283836	72494	103101	34035	4901	25959
	15	610774	320873	78616	123372	39293	5693	42927
	16	517711	279037	70302	105750	34688	4161	23773
	17	565188	302202	74195	111080	35111	4085	38515
Male	7	260906	143525	37168	47830	16036	1910	14437
	8	265945	146521	36704	47743	16424	2298	16255
	9	281062	154193	39665	53035	17302	2225	14642
	10	290903	159309	38716	56620	18392	2305	15561
	11	258566	144447	35520	47188	16403	1921	13087
	12	279305	153665	37317	52715	17694	2152	15762
	13	265156	147133	35136	51063	17211	2054	12559
	14	269056	145580	36380	52103	17322	2813	14858
	15	318533	165888	40630	64256	20348	2917	24494
	16	266364	142949	35945	54679	17709	2145	12937
	17	292535	152074	37714	57979	17726	2136	24906
Female	7	245132	136171	34767	44821	15504	1971	11898
	8	251009	139392	35368	46132	15383	2053	12681
	9	259099	144925	35807	48637	16917	1992	10821
	10	275091	151261	37545	53925	18104	2323	11933
	11	241515	138299	34635	42981	15854	1753	7993
	12	264477	146129	36471	49985	17400	1994	12498
	13	252825	139272	34298	48878	17010	1970	11397
	14	255268	138256	36112	50998	16713	2088	11101
	15	292241	154985	37986	59116	18945	2776	18433
	16	251347	136088	34357	51071	16979	2016	10836
	17	272653	150128	36481	53101	17385	1949	13609

Table 3 The uniform dimensions for the male school children

Shirt						
School type	Primary			Secondary		
Size	S	M	L	S	M	L
Shoulder length (x_s), in inch	12.5	14.0	15.0	17.0	18.0	19.0
Shirt length (y_s), in inch	16.0	19.0	22.0	25.5	27.0	29.0
Trouser						
School type	Primary			Secondary		
Size	S	M	L	S	M	L
Waist length (x_t), in inch	10.0	11.0	12.0	13.0	14.0	15.0
Trouser length (y_t), In inch	22.0	28.0	32.0	36.0	37.0	38.0

Table 4 The uniform dimensions for the female school children

Dress						
School type	Primary			Secondary		
Size	S	M	L	S	M	L
Chest length (x_d), in inch	11.4	14.6	17.0	17.0	18.8	19.4
Dress length (y_d), in inch	23.0	32.0	35.0	35.0	39.0	41.0
Long Skirt						
School type	Primary			Secondary		
Size	S	M	L	S	M	L
Hip length (x_ls), in inch	13.8	16.4	17.0	18.0	19.1	20.7
Skirt length (y_ls), in inch	35.0	36.0	37.0	37.8	38.2	40.0

Table 5 The predicted energy consumption for male based on different ages

School type	**Age**	**Estimated size**	**Energy consumed per uniform (kWh)**	**Population based on age**	**Total energy by each age (kWh)**
Primary	7	S	0.08	260906	20872.48
	8	S	0.08	265945	21275.60
	9	M	0.096	281062	26981.95
	10	M	0.096	290903	27926.69
	11	L	0.114	258566	29476.52
	12	L	0.114	279305	31840.77
Secondary	13	S	0.128	265156	33939.97
	14	M	0.146	269056	39282.18
	15	M	0.146	318533	46505.82
	16	L	0.17	266364	45281.9
	17	L	0.17	292535	49730.95
The total energy consumption daily					373114.83
The total energy consumption weekly					1865574.15
The total energy consumption monthly					8208526.26
The total energy consumption yearly					82085262.6

Table 6 The predicted energy consumption for female based on different ages

School type	Age	Estimated size	Energy consumed per uniform (kWh)	Population based on age	Total energy by each age (kWh)
Primary	7	S	0.086	245132	21081.35
	8	S	0.086	251009	21586.77
	9	M	0.097	259099	25132.60
	10	M	0.097	275091	26683.83
	11	L	0.106	241515	25600.59
	12	L	0.106	264477	28034.56
Secondary	13	S	0.123	252825	31097.48
	14	M	0.133	255268	33950.64
	15	M	0.133	292241	38868.05
	16	L	0.146	251347	36696.60
	17	L	0.146	272653	39807.34
The total energy consumption daily					328539.82
The total energy consumption weekly					1642669.1
The total energy consumption monthly					7227875.95
The total energy consumption yearly					72278759.5

Table 7 The result of energy prediction from year 2010 to the year 2030

Year	Population	Total Energy (kWh)
2010	28588000	154364022
2011	28964000	156405600
2012	29336800	158418720
2013	30130000	162702000
2014	30640000	165456000
2015	31150000	168210000
2016	31660000	170964000
2017	32170000	173718000
2018	32680000	176472000
2019	33190000	179226000
2020	33700000	181980000
2021	34210000	184734000
2022	34720000	187488000
2023	35230000	190242000
2024	35740000	192996000
2025	36250000	195750000
2026	36760000	198504000
2027	37270000	201258000
2028	37780000	204012000
2029	38290000	206766000
2030	38800000	209520000
Total energy in 20 year		**3.819 x10^{9}**