

Proceedings

International Symposium

Sustainable Built Environment in the Tropics

New Technology

New Behaviour

12-13 November 2012, Jakarta - Indonesia

Edited by
Tri Harso Karyono

Introduction by
Robert Vale and Brenda Vale



Tarumanagara University - Indonesia

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International Conference

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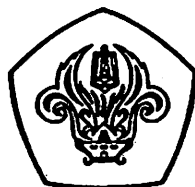
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Should we let technology correct our reckless life?

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Abstract

The climate change has continued and anthropogenic activities have been claimed to be the major contributor. New renewable energy resources have been explored. Environment friendly goods have been produced. Yet, human preference for freedom has not been changed very much. Automation technology can bridge the gap between the human's natural need for freedom and nature's need for conservation.

Keywords: Automation, human behavior, energy conservation, nature conservation.

1. The Facts about Our Earth's Present Condition: The time is running out.

Around two decades ago, global warming issue raised and gradually became a hot issue around the world. Climate change phenomenon, which introduced environmental disruptions, has been claimed related to the global warming. More frequent hurricanes (some of them were in new areas), severe droughts and floods, new diseases, harvest failures, rapid species extinctions are some of the popular evidences that are claimed caused by the climate change. The fast increase of three major green house gases concentration in the atmosphere within the last decades, namely CO₂ (carbon dioxide), CH₄ (methane) and N₂O (nitrous oxide), has been detected and published by many reputable institutions.

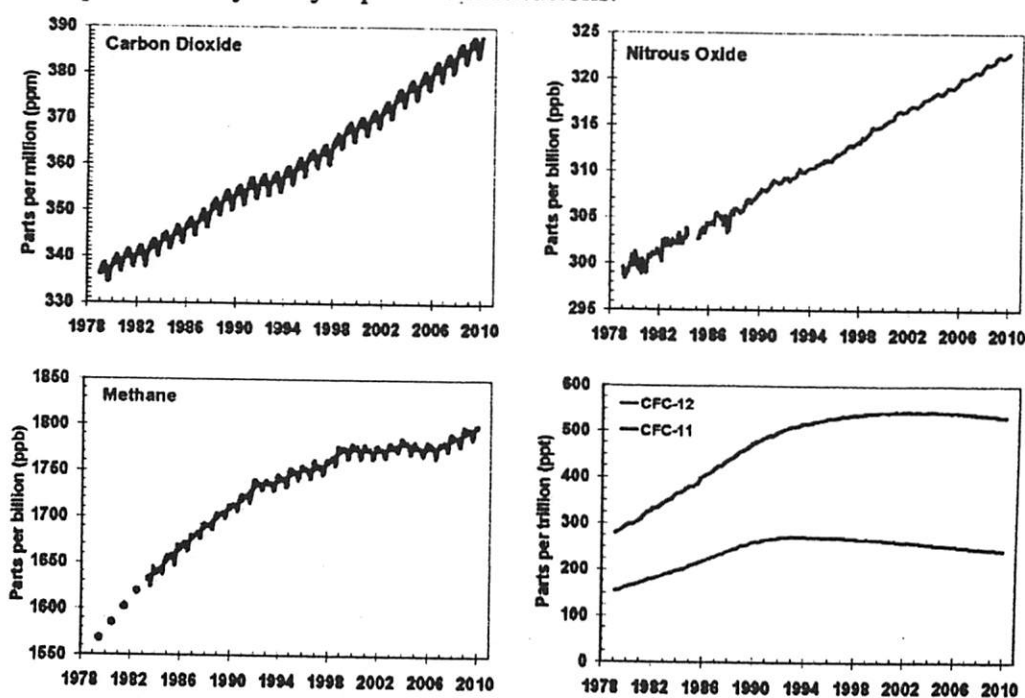


Figure 1 Data released by National Oceanic & Atmospheric Administration (NOAA) shows fast increase of the concentration of three major green house gases in the atmosphere within the last decades [1]

Climate change will certainly be a global business affecting the life of the whole world population, in different and unique ways. In 2011, the world population reached seven billions and there is no clear global action yet to slow it down. By 2050, the number will reach nine billions that some experts believe to be the limit of the world sustainability. In other words, the earth resources will no longer able to support normal life.

Billions of poor people in poor countries will suffer the most if there is no immediate and massive action to stop the climate change. Poor people have less flexibility than rich people do [2]. Poor people live in low land cannot afford moving to higher land when the sea water rises. They cannot afford buying more expensive food caused by harvest failure. Presently, 70% of the world population live in the tropical regions and 80% of them are poor. These poor people have limited access to energy resources. Nevertheless, once their income increases they might be able to buy more energy. Without proper understanding on the significance and urgency of energy conservation, they will use energy recklessly.

In terms of thermal comfort, tropical climate is difficult to handle. Even though in this region the weather is not extreme, the high humidity has made it thermally uncomfortable. Adopting passive ventilation is not easy as the wind velocity is commonly low so that it is not useable for physiological cooling. It is true that the range of the air temperature which usually ranges from 24°C to 32°C is tolerable for most people. However, this tolerance costs low work productivity. Present global warming effect tends to make the average maximum air temperature higher. Empirically; it is found that the demand for air conditioners has increased. Since HVAC consumes bigger portion of energy in buildings, we can expect higher energy consumption in the near future if the air temperature keeps rising.

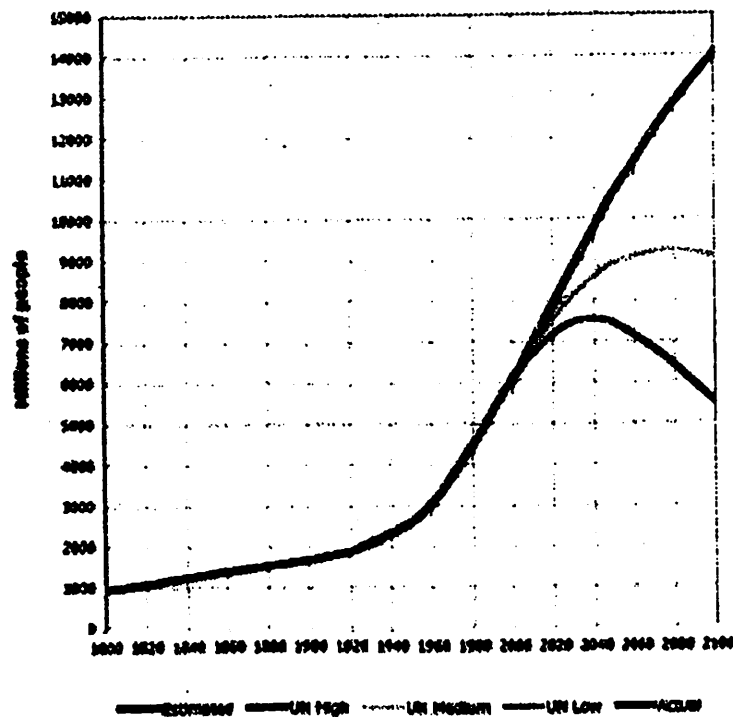


Figure 2 In 2011 the world population reached 7 billion people [3]. They use the world resources to its limit

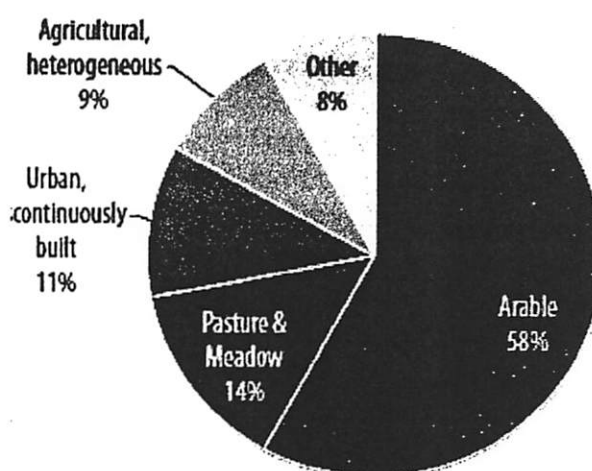


Figure 3 Pasture and meadow occupy 14% of the land, more than urban does (11%) [3]

2. Comfort Means Freedom: Subconscious.

Comfort is a comprehensive conclusion of mind in respond to physical and non-physical impulses. A single number cannot represent it. Physically, human body obtains information of its environment through its five senses. The information is then comprehensively processed and combined with mood (state of mind) to produce a feeling of, either, comfortable or uncomfortable. Any neutral environment (or tension free condition) will more encourage feeling of comfort than the opposite ones.

Psychologically and naturally, people will feel less tensed when there is no (or minor) conflict between their expectances and the reality. Regardless whether his/her expectance is right or wrong, any conflicting reality will create an uncomfortable feeling. Any new regulations or rules, for examples, will easily trigger feeling of uncomfortable because they might conflict with people's habits. It takes time to adapt to those new rules and get a new balance between expectance and reality. People are reluctant to change their daily habits if it is not coming from themselves. They will react to any external situation or command which conflict with their ongoing habits. In other word, people want to do what they want to do, want to feel what they want to feel. It is about freedom; freedom to have a less conflicting world. A study in Australia and New Zealand found that the most common reason why people are not acting in more sustainable ways is inconvenience or laziness [4].

The preference to have freedom feeling is in our sub-consciousness. It is very easy for us to understand that switching off unused lights is a good practice to conserve energy. But, still, it needs one's effort to voluntary walk to the switch, move his/her hand to push the button, and spend some seconds for this 'switching off unused lamp' business with no direct reward. In a voluntary environment, the consequence of the choice between 'turn the light off' and 'leave the light on' is easily forgotten and ignored. Freedom means, in our subconscious mind, not doing any additional activity that does not have direct consequences.

Whether it is realized or not the concept of freedom can dictate the success or failure of any energy and environment conservation efforts. Freedom is human nature. Doing anything we want is a part of freedom. Doing anything freely is a part of freedom. Unfortunately, doing anything that might disrupt our nature seems to be a lot easier than the opposite one. Throwing our rubbish to the nearby river is much simpler than collecting and putting them in separated rubbish bins or recycling them and using them as compost; a bit lengthy process.

3. Energy-saving Lamps can be Left on Longer: It is about mindset, isn't it?

Freedom is in our mindset. Freedom to do anything we want is a common mantra. If that freedom is harmful, we prefer to find a way to reduce or eliminate its negative impact rather than compromising our freedom. There is no guarantee that replacing incandescent lamps with energy saving lamps, for example, will save money as much as calculated on the paper. While the replacement does make some energy saving, it does not work exactly like what the theory says. People like to have freedom in having their lights on longer. The energy saving lamps fulfill this need. If incandescent lamps are on for one hour, the energy saving lamps can be kept on five times longer while they consume the same amount of energy. This phenomenon was confirmed by the tendency of buildings' occupants to leave the energy saving lamps on longer because they think those lamps consume less energy than their predecessors do. In short, people can reach maximum happiness or well-being if they feel they can control their environment [5].

Changing people's mind set is a crucial part of any energy and environment conservation. The fact that people want to 'get more' instead of 'save more' should be well-understood. This gives people a subconscious thought that they can have 'more light' (in terms of service time) from energy-saving lamps. In some points, this is not wrong. With energy saving lamps, people can lengthen their lighting without necessarily wasting too much energy. However, if this attitude becomes uncontrolled, the energy-saving lamps will serve beyond the real needs. This turns to energy wasting and can be even worse than when people are forced to turn their light off because they know their incandescent lamps consume a lot of energy.

A campaign of 'let's using energy realistically' should be more frequently published. It is less provocative than 'let's saving energy' which has, in some degrees, a notion of reducing someone's freedom. The former invites people to think realistically when using energy. It encourages people to think wisely and be a wise person. A study in Australia, a developed country, found that ecoliteracy, interpersonal influence and value orientation have strong correlations with attitudes towards environmentally friendly products [6]. In developing countries such as Indonesia, where putting orders is still difficult task, that finding can be used to focus the energy and environment conservation plan.

4. The Blessing Called Digital Era: Building Automation System

The energy conservation movement will be much easier and successful if it is easy for us to voluntarily change our long life habits. People tend to ignore any consequences which do not give them direct or instant impacts. The bad impacts of not reducing energy consumption, not conserving natural resources and such things are not immediately and personally felt. Floods, hurricane, famine, ice melt are all sometimes thousand kilos away. If we directly experience one of those climate change phenomena, we still think that it is just a common and normal phenomenon.

Enforcement seems to be the only way to change our habits. Law enforcement is a legal form to change people's habits. However, it is sometimes ignored or cheated if there is no supervision. It works better in a mature society which has a long history of disciplines or in a society where well order life has become a part of its culture. In less ordered society, people tend to break the law (rules) when there is no police (supervisor). Nevertheless, even in the well-ordered society people can sometimes, consciously or unconsciously, forget to follow the rules. This is the point where we can introduce means (or tools) to neutralize the impact of those non-deliberated errors.

Using technology to neutralize or compensate human errors (or reckless) seems to be a good way for energy conservation movement. A simple accessory as simple as a door closer

can actually do a good job to compensate people's laziness to keep the door closed. An automatic valve that flushes the urinal for three seconds can compensate man's reluctance to press the valve.

People need to adapt to a new environment and put the change to their subconscious. An observation conducted at Atma Jaya Yogyakarta University found that building's occupants try to reject changing. Campus of Atma Jaya Yogyakarta University was designed based on tropical architecture concepts, which suggest large openings. During its operation, it was gradually realized that passive ventilation was not able to provide thermally comfortable working environment. The campus authority decided to install air conditioners with only minor treatment to the building design. In the first weeks after the air conditioners installation, staffs always forgot to close the doors. 'Keep door closed' notices were put on the doors with no success, as staffs were lazy to do it. Door closers were then installed to close the doors automatically. Some staffs forced the door to keep it opened by putting a piece of wood under the door; they seemed to get annoyed with pushing and pulling the door every time they passed it. It took times for the staffs to understand why the air-conditioned rooms should be kept closed. Now, staffs are aware of closing the doors while the air conditioners are running. They still, however, have a behavior problem, ignorance to others. Sometimes a staff opened the door, passed and just released it without even looking whether there was someone behind him/hers who might hit by the door. Internal audit found that leaving the door opened and keeping air conditioners on while the rooms unused have contributed to the energy wasting, which cost this private university around 45 million rupiahs annually. The audit found 30% energy saving potential from 1.44 billion rupiahs annually [7].

Digital technology has brought a new way of living more conveniently. Nowadays, we are living by a digital world. Digital technology products, which give us abundant choices, have influenced almost every facet of our life [8]. New digital technology products are designed to be energy efficient and environment friendly, which make them in line with the current issues of nature conservations. In the future, for example, people will not even need to fly hours across the ocean just to attend a two-hour meeting. Three-dimensional avatars will represent attendees at a meeting while the real attendees stay at their place [9]. Latest digital technology products tend to have two important features: 'environment friendly' and 'lazy friendly' or 'ignorance friendly'. The automatic 'turn off' facility has been applied to almost all electronic devices. A built in movement sensor has been more common found in new generation of air conditioners. Both technologies are created to compensate people's laziness in controlling their equipment. Those technologies actually enforce people to conserve energy. Since those technologies work automatically and quietly, people do not feel anything. This quiet process gives people a sense of freedom. Though it is still debatable whether automation is a healthier practice than educating people to consciously do the conserving, at least it can reduce the bad impacts of people ignorance to energy conservation. People understanding of nature conservation cannot be developed by just introducing more equipment that is automatic. Bypassing the automatic switch off to keep the laptop monitor on though no one works with it is just an example how the real understanding of nature conservation is still important.

Automation system will be our future in conserving our nature. Automation system, which uses less energy, will help the whole energy system runs more efficiently. Automation system is not only applied in small scale such as in electronic devices, but also in larger scale such as in building energy system. The integrated automation system can be as large as urban scale. Information technology, the core of automation system, will make building smarter and more energy efficient [10].

A good automation system should encourage people to develop their understanding and adaptive behavior toward energy conservations. It should give a good feedback to buildings' occupants so that they become more aware of the impacts of their behaviors to energy and environment sustainability [11]. Nowadays, there is a new trend in Indonesia that people are feeling more convenient to bring their dirty clothes to the laundry. While this phenomenon creates many new commercial laundries, which are profitable, it is a drawback for the energy and environment conservation point of view. People used to hang their wet clothes on the lines and let the sun dry them freely. Now, they use energy-consuming dryers. Imagine a smart dryer that interactively displays how much its user uses energy, or in the opposite words, how much energy its user can save by not using that dryer while the sun shines. It is almost similar with the concept of warning smokers about the danger of smoking by putting picture of the impacts of smoking on the cigarettes box.

Considering that most people live in the tropics and most of them are poor, we should not ignore the impacts of their behavior to the energy and environment. We even should pay extra attention. If presently, their income per capita per annum is lower than other climate zones [12] and their energy consumption is low, it does not mean that they are energy aware people. It is because, once again, they cannot afford buying energy. Once they can buy energy, they will do it. The transition between 'cannot afford buying energy' and 'can afford buying energy' will not be easy culturally and emotionally. In this transition situation, preparing an environment that can compensate the bad impacts is crucial. A smart automation system is an answer.

5. Beware of Bias Propaganda: Your Home or Your Plate?

The connection between environment deterioration and the way we use energy in transportation and building is very popular. Mass media have published it almost every day. Another connection, environment destruction and human eating habits, is less popular if not to say no one realizes it [13]. Presently, more reputable organizations have openly published that meat-based menu has a massive impact to the environment. In terms of green house gases, for example, meat industries release more carbon dioxide equivalent than transportation, which is commonly claimed. Vegetarian diets have proved to help sustaining the environment [14]. While it is important to pursue greener architecture, we should not forget the most basic need of the people, food, because how people fill their plate actually brings a bigger impact.

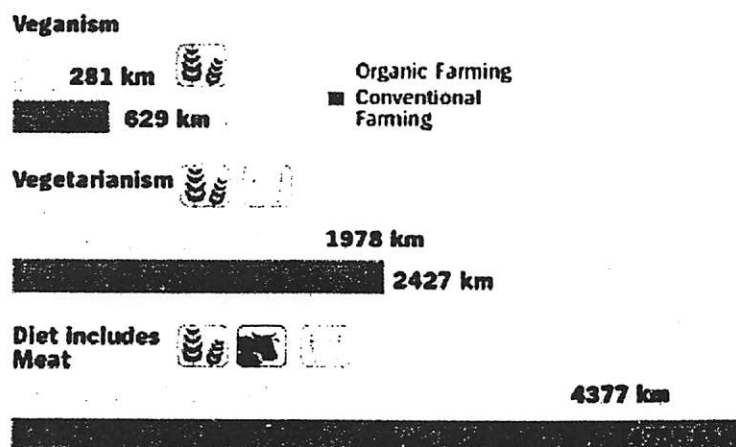


Figure 4. Eating vegan reduces more emissions than eating organic meat and dairy [16]. The graph shows green house effect of different eating habits, per capita, per annum, as presented by CO₂ equivalent emission of a BMW 118d with 119g CO₂/km.

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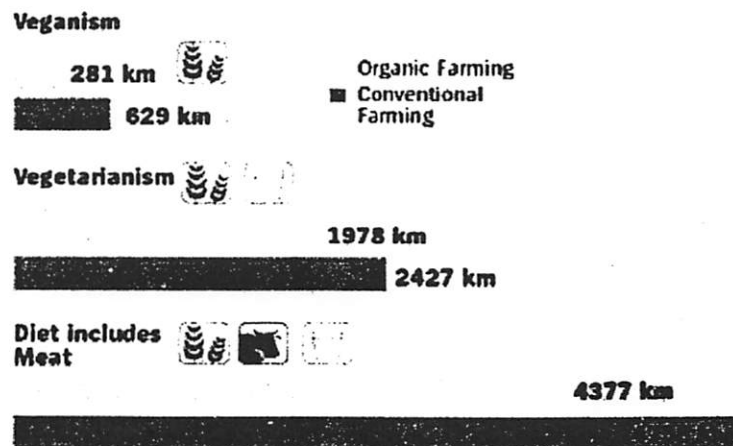


Figure 4. Eating vegan reduces more emissions than eating organic meat and dairy [16]. The graph shows green house effect of different eating habits, per capita, per annum, as presented by CO₂ equivalent emission of a BMW 118d with 119g CO₂/km.

Next generation should be taught and exposed to the real problems honestly. Yes, it is true that buildings and transportations are major contributors for green house gasses. However, what is in our plate should not be overlooked. Introducing the concept of sustainable development should be given at early childhood. A global study found that in many countries children do not recognize the concept sustainable development. Some countries do not even have a word to express it. However, the children had thoughts and ideas to bring up about the state of the earth in relation to sustainability [15].

6. Conclusion: A convenient truth

While we should not give up educating people how to conserve energy and natural resources, we should deeply understand that freedom is very human nature. Exploring new renewable energy resources, producing environment friendly goods, and maximizing smart automation technology to compensate human reckless behavior are realistic ways to save the planet.

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Part Two
CITY, TECHNOLOGY AND BEHAVIOUR