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Known energy sources have been exhausted rapidly nowadays, and so efficient and effective utilization of energy has started to gain a vital importance. Finite fossil resources imply a definite limit on the amount of available energy that can be made available for public consumption. Fossil fuels will be depleted at a certain point in the future. For this reason, the collection and evaluation of periodical data concerning industry and other final energy consuming sectors are the primary conditions in the determination of targets for the studies on energy saving (Atmaca and Kanoglu 2012; Atmaca and Yumrutaş 2014).

The energy systems engineering is a growing field of interest in engineering and science communities. Practical preparation and development of technological energy systems is essential to the continued operation of the daily life of mankind (Dodoo et al. 2012).

Energy systems include renewable energy, but are not limited to, wind energy, solar energy, geothermal systems, tidal, hydrostatic systems, piezoelectric effects and other sources. The scope of the special issue surrounds energy consumption in industrial applications, the energy and environmental impact caused by construction of buildings, transportation, use and demolition stages, environmental safety and health, life-cycle assessment, ecological sustainability, green buildings, green economy and sustainable economic development (Atmaca and Atmaca 2015, 2016).

This special issue will provide a multi-disciplinary and comprehensive analysis of energy systems in engineering applications (including mechanical, civil, electrical and electronics, food, computer, industrial engineering)

supporting the green economy transition by means of targeting low-carbon energy systems and offering a forum for academicians, researchers and practitioners to share insights on innovation and development of new technological methods for conservation of energy.

1 Topic areas

In this special issue, we invite submission of review articles and research articles based on quantitative and qualitative methods, theoretical and methodological development, and case studies in all engineering disciplines. Topics of interest include, but are not limited to:

Energy, modeling of energy and systems, energy transport, power and fuels, energy systems, energy supply and demand, renewable energy resources and technologies, energy audit and rational use of energy, advanced energy technologies, energy-saving technologies, electrical and electronics engineering, civil engineering, green building, smart grid and cities, climate change and global warming, environmental engineering, environmental systems and telecommunications, environmental safety and health, water resources and future conflicts, solid waste, waste treatment and management, soil pollution, air pollution control, noise and vibration control, planning and sustainable development policy, environmental policy, planning and economy, energy policy, planning and economics, computer engineering, global climate change, international cooperation to reduce carbon emissions, industrial engineering, sustainable materials, more sustainable product design, science for sustainable development, social security, process safety and hazard management, waste

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assessment and treatment, sustainable urban development, mechanical and structural systems, sustainable chemical processes tools to plan, design and operate integrated green technology, adsorption and gas storage materials, sustainable agriculture and organic farming, green agriculture technology, food engineering, food safety and organic food, nanotechnology for sustainability, life-cycle assessment, computation, modeling and simulation, ecological sustainability, management, green economy and sustainable economic development.

A large number of submissions from seven countries were received for this special issue, and 26 papers were accepted after peer review. These submissions address a variety of technological issues and managerial implications related to urban energy system design, including:

1. Sustainable life span prediction of shelters in refugee camps in Turkey.
 2. Parametric real-time energy analysis in early design stages of residential buildings in Germany.
 3. Thermal fatigue characteristics of materials used in aerospace structures.
 4. Preliminary measurements on microwave plasma flame for gasification.
 5. Determination of optimum life span of container houses by using neuro-fuzzy methods.
 6. Life-cycle atmospheric emissions and energy use of the collection phase of a typical Indian sewerage system.
1. Sustainable life span prediction of shelters in refugee camps in Turkey

The post-disaster housing schemes have been one of the most interesting hard responsibilities faced by the governments of the countries. The requirements of the people in the disaster area should be met very fast. Turkey is always under the threat of seismic activities and immigration risks. The country is stressed with the large migration from Syria because of the war since March 2011. The country is currently hosting more than two million refugees in 20 temporary refugee camps established in 10 cities for more than 4 years (Atmaca and Atmaca 2016). Life-cycle assessment methods have been used for energy and environmental evaluation in many areas worldwide. All energy inputs required to produce constituents and materials required for the manufacturing process are considered. This methodology is functional for many studies in the literature.

The building sector consumes about 30% of primary energy worldwide. Life span is an important variable in life-cycle assessment (LCA) of buildings. The aim of this study is to make the LCA of containers constructed in a refugee camp in Turkey and to investigate the relationship

between life span and consumed energy with CO₂ emission values. The proposed model in the study focused on the construction phase of the containers to find energy consumption and emissions for different life span years. Life span years are chosen between 5 and 40 years. Energy and CO₂ release factors are defined per square meter. Total life-cycle construction and operational energy demand of the post-disaster housing is calculated to be 24.7 GJ/m². The CO₂ intensity of the housing is calculated to be 20.39 kg CO₂/m²-year. It is found that energy and emission values are decreasing with the increase in life span of container-type houses constructed in refugee camps in Turkey. Turkey is in the top rankings in the world with regard to people affected by natural and man-made disasters. Recovery works undertaken to eliminate physical, economic, social and environmental losses caused by disasters constitute an important part of the disaster management process. Because of the geological and geomorphologic structure and meteorological characteristics, natural disasters and huge immigration flows are common problems in the country. In order to use the natural resources fast and effectively, the recovery studies and works have been reviewed and controlled continuously. With the help of the statistics experienced as a result of all these works, the government has to read the future correctly. AFAD has many objectives to bring itself its ultimate goal. Related to these goals and objectives, AFAD has prepared a performance indicator for the improvement of recovery capacity between 2013 and 2017 years in Turkey.

2. Parametric real-time energy analysis in early design stages of residential buildings in Germany

The greatest potential for optimizing the energy efficiency of buildings is in the early design stages. However, in most planning processes energy analysis is conducted shortly before construction when major changes to the design have a high cost impact. The integration of energy performance analysis in the early design stages is therefore highly desirable, but requires suitable tools able to quickly generate results that can help the planner optimize the building design. Parametric design approaches permit the effortless generation of many variants and therefore represent a suitable way of testing different alternatives in the early design stages. Most plug-ins for parametric design software currently rely on dynamic building performance simulation which provides detailed results, but requires computation times ranging from 20 s to 5 min. As optimization processes typically require several thousand simulations, the computation time can quickly amount to days. The approach presented in this paper proposes a real-time energy demand calculation based on a quasi-steady-state method defined by the German standard DIN V 18599

which defines the national implementation of the European Directive on the Energy Performance of Buildings. The results are verified of tests on three residential reference buildings in Germany in comparison with an accredited commercial software product. An application example indicates the great potential for easy-to-use energy optimization in the early design stages.

3. Thermal fatigue characteristics of materials used in aerospace structures

In this study, thermal fatigue characteristics of materials used in aerospace structures have been investigated. A new algorithm developed under the finite element analysis software ANSYS is used to determine thermal fatigue characteristics of the specific structures. Safety factor distribution of thin plate with two boundary conditions is given, and associated results are compared. The circular holes are also made in the structure in order to see the effects of nonlinearities, and the distribution of safety factors is obtained and their results are compared as well. Thermal loading is one of the important loading types and should be considered in the design step of many structures. Aerospace structures are extensively exposed to the thermal loads during the working conditions. If these thermal loads are applied as cyclic, the structures can fail before expected. The phenomenon that causes this failure type is called as thermal fatigue. Because of this cyclic loading, micro-cracks can occur on these structures and propagation of these micro-cracks can cause failure. The other properties of them are also affected by these cyclic temperature changes. Different failure types should be considered by designers who work in industries, such as aviation, where the safety of structures is critical. Hence, knowing thermal fatigue characteristics of different materials can provide help in their design for these designers and the determination of thermal fatigue characteristics is critical to increase the life of these structures.

4. Preliminary measurements on microwave plasma flame for gasification

Microwave, MCW, plasma gasification systems have many applications in industry such as deposition, etching, surface treatment and gas treatment. One example of the microwave plasma system is the microwave plasma gasification. The plasma gasification process is a way to decompose the materials into syngas and ash because of the high temperature, compact design and potential of gasifying variety of organic materials. The effects of plasma power and plasma gas flow rate on the geometrical dimensions, the shape of plasma flame and temperature distribution in gasification reactor have been investigated. The effects of plasma power and plasma gas flow rate on the geometrical dimensions, shape of plasma flame and temperature

distribution in gasification reactor are presented. The plasma pictures at a variety of plasma power ranging from 300 to 4200 W with the range of plasma gas which airs from 50 to 100 L/min are presented. As expected, an increase in power causes the generation of intensive plasma with enhancement of the plasma flame volume. On the other hand, air flow rate is inversely proportional to the volume of the plasma flame. It is observed that both power and air flow rate have a significant effect on plasma flame shape. The spreading shape of plasma flame is observed at low powers. However, the shape of flame is pointed toward its end with an increase in plasma power. Meanwhile, reducing air flow rate causes a change in shape at lower power levels. The interactive influence of air flow rate and plasma power is confirmation of different plasma flow regimes.

The temperature measurements confirm the effects of air flow rate and power on plasma flame regime from 1800 to 6000 W power. Increasing power level causes increment in the reactor temperature. The average temperature in the reactor is increased from 480 °C at 1800 W power to 1018 °C at 6000 W power. The flow rate has a reverse effect on magnitude of the temperature. The average temperature in the reactor is reduced from 480 to 348 °C at 1800 W power and 1018 to 918 °C at 6000 W power when the flow rate is increased from 50 to 100 L/min. However, the temperature distribution is more uniform in higher flow rates. It is also related with the shape of plasma. While the magnitude of temperature and its gradient are high in pointed end plasma, the effects are reversed in spreading shape plasma.

5. Determination of optimum life span of container houses by using neuro-fuzzy methods

Life span is one of the most effective parameter in life-cycle assessment of building analysis. The purpose of the study is to display the life span and consumed energy relation with different usage areas of a typical post-disaster container house via neuro-fuzzy approach. The proposed fuzzy model in the study motivated on the construction phase of the containers to estimate total energy use for different life span years. Life span years are chosen between 5 and 40 years. By using life-cycle energy assessment (LCEA) analysis, it is found that energy values are decreasing with the increase in life span of the container house models. The most drastic reduction in energy values has been observed in the first years with respect to the usage areas. Besides the analytical LCEA analysis, an adaptive neuro-fuzzy inference system (ANFIS) modeling approach is used to predict the life span of the container houses. The results of the ANFIS modeling approach have shown promising results. The optimum life span for the CH models has been calculated to be around 16 years. There is

a remarkable increase in EE values of the CH having a gross area bigger than 26 m². It is shown that the neuro-fuzzy application is a very viable tool for accurate life span predictions in life-cycle assessment studies.

6. Life-cycle atmospheric emissions and energy use of the collection phase of a typical Indian sewerage system

Considerable number of Indian and international studies has focused on the environmental implications of sewage treatment plants. However, not many studies have taken up a comprehensive assessment of the collection phase of the Indian sewage systems. The aim of the present study is to carry out an integrated life-cycle assessment for the collection phase of an Indian wastewater treatment system. The paper develops in the form of a case study for Begusarai sewerage project and attempts to estimate life-cycle air pollution, greenhouse gas emissions and energy consumption for the collection phase of the project. The work consists of developing a life-cycle inventory for pipelines, manholes, pumps and transportation facilities in a typical collection phase, by making use of existing activity data and emission factors from secondary literature (see graphical abstract). Further, the normalized factors for different environmental damage categories are incorporated within the developed inventory to estimate overall life-cycle damage. Initially, the major components for each damage category are identified. For instance, side walls of manholes are major contributors toward PM_{2.5} emissions while pumping stations are major energy consumers and

CO₂ emitters. High resource consumption is identified as the major damage category, compared to atmospheric emissions. As larger quantities of water need to be treated owing to increasing water use in the country, a discussion on water–energy nexus is required to estimate the implications of sewage systems.

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