



QUR'ANIC PRINCIPLES OF SUSTAINABLE ENERGY MANAGEMENT: ETHICAL FOUNDATIONS, RESOURCE CONSERVATION, AND ENVIRONMENTAL RESPONSIBILITY

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ABSTRACT

The development of society requires energy, but the growth in the utilization of energy and environmental pollution have resulted in the necessity for sustainable energy management. This paper has analyzed some of the principles of Islam regarding the management of energy sustainably, such as Khalifah, Amanah, Mizan, Wasatiyyah, Israf, Adl, and Fasad. Applying qualitative methodology, their relevance to the issues of energy conservation, energy efficiency, environmental protection, use of renewable energy resources, and equitable access has been analyzed. The study has developed the framework for sustainable energy management, namely, the Qur'anic Sustainable Energy Management Framework (Q-SEMF). It includes such elements as ethical responsibility, responsible consumption, resource conservation, sustainable energy usage, and ethical governance.

Keywords: *Qur'an, Sustainable Energy Management, Islamic Environmental Ethics, Khalifah, Amanah.*

1. INTRODUCTION

Energy is essential for economic and social development as it facilitates transportations, industries, agricultural activities, health care, communications, and domestic chores. However, increasing energy demands and continued use of environmentally harmful energy resources have led to depletion of natural resources, pollution, environmental degradation, and climate changes. This way, sustainable energy management has become an important part of current sustainable development practices.

Access to affordable and reliable energy sources, sustainable and modern energy, as well as energy efficiency and renewable energy resources are the main topics of Sustainable Development Goal 7. At the same time, sustainable energy management is not only a technological and economic task. It is also associated with ethical issues of proper resource usage, responsible consumerism, environmental protection, fair access and responsibilities towards future generations.

There is an important ethical component to all these problems in the Islamic doctrine, as the Qur'an presents human beings as the stewards of Earth with the emphasis on such principles as moderation, balance, conservation, justice, and the need to protect environment from any harm. The principles of Khalifah (stewardship), Amanah (trust), Mizan (balance), Wasatiyyah (moderation), Adl (justice), and the prohibition of Israf (excess) and Fasad (destruction) are very relevant to sustainable resource management.

"Surely I am going to place him on earth as a vicegerent." (Qur'an 2:30), which defines the concept of the stewardship of humans. The emphasis on balance in Qur'an 55:7–8 and moderation in Qur'an 7:31 gives important ethical guidance about the responsibility of human beings in terms of resource consumption and environmental protection.

Under these circumstances, the current paper aims at exploring the principles of the Qur'an related to sustainable energy management and their possible implications for resource conservation, energy efficiency, environmental responsibility, renewable energy resources, and sustainable energy management. It does not aim at defining a model of current energy management by using Qur'anic principles. Instead, it analyses the ethical basis of energy management implied in the Qur'an.

2. LITERATURE REVIEW

Helfaya, Kotb, and Hanafi (2018) examined Qur'anic ethics concerning environmental responsibility and explored their implications for business practices. Their study highlighted that the Qur'an provided ethical principles emphasizing stewardship, accountability, moderation, and responsible utilization of natural resources. The authors argued that these principles encouraged businesses to minimize environmental harm and promoted responsible resource management. The study concluded that integrating Qur'anic ethical values into business practices could support environmentally responsible and sustainable organizational behavior.

Gulzar et al. (2021) reviewed environmental ethics and sustainable development from an Islamic perspective. Their study discussed the Islamic emphasis on environmental stewardship, conservation of natural resources, moderation in consumption, and human responsibility toward nature. The authors found that Islamic teachings provided an ethical foundation for sustainable development by discouraging wastefulness and excessive exploitation of natural resources. The review suggested that Islamic environmental principles offered relevant guidance for addressing contemporary environmental challenges and supported the development of sustainable practices.

Khalid (2017) explored environmental ethics in Islam through insights derived from the Qur'an and the practices of Prophet Muhammad. The study examined concepts such as stewardship, balance, moderation, conservation, and accountability toward the natural environment. Khalid emphasized that Islamic teachings presented human beings as custodians of the Earth rather than unrestricted owners of its resources. The study demonstrated that the Qur'anic worldview and Prophetic practices provided an ethical framework for sustainable interaction with nature and encouraged responsible environmental behavior.

Jaelani (2020) examined energy conservation and energy management for industries in Indonesia from an Islamic economic perspective. The study considered energy conservation as an important component of responsible economic activity and linked efficient energy management with Islamic principles concerning moderation, avoidance of waste, and responsible utilization of resources. The research highlighted that Islamic economic values encouraged industries to improve energy efficiency and reduce unnecessary consumption. The study concluded that Islamic principles could contribute to the development of sustainable energy management practices within the industrial sector.

3. QUR'ANIC PRINCIPLES OF SUSTAINABLE ENERGY MANAGEMENT

There is no technical or engineering concept of modern energy management in the Qur'an. However, there is an ethical approach that considers human responsibilities, natural resources, consumption, moderation, justice, balance in nature and protection from any harm to nature. This concept gives normative ground for the discussion of energy issues of the present day.

The importance of the Qur'anic approach lies in its inclusion of humans into the circle of responsibilities towards nature. Although energy sources are utilized to fulfill human needs and promote development,

they cannot be considered as objects for unlimited exploitation. The use of these energy sources should be governed by principles of responsibility, trust, moderation, balance, conservation and justice. The following principles are of great importance for sustainable energy management.

3.1 Khalifah: Human Stewardship and Responsibility

Khalifah is one of the fundamental ideas that form the basis of the Qur'anic idea of the human role towards the Earth. The Qur'an says:

"Indeed, I am going to place upon the earth a successive authority."

(Qur'an 2:30)

It means that Khalifah makes people the responsible members of the management of the Earth and its resources. It must not be understood as the right to exploit nature. On the contrary, it establishes the interaction between human beings and creation that assumes people's responsible attitude to their environment.

This idea finds its application in the sphere of sustainable energy management. Energy systems imply extraction and transformation of natural resources and such processes may cause many environmental problems. In terms of Khalifah, natural resources are supposed to be used reasonably and to satisfy legitimate human needs without causing excessive damage to the environment.

It means responsibility for:

- responsible usage of natural resources;
- consumption of finite energy resources;
- minimization of unnecessary environmental damage;
- environmental impact assessment in the process of energy generation;
- protection of natural systems; and
- conservation of resources for future generations.

In other words, Khalifah converts energy management into the problem of human responsibility to nature. Sustainable energy development is the practical manifestation of this idea.

3.2 Amanah: Energy Resources as a Trust

The Islamic idea of Amanah relates to trust, accountability, and responsibility. The Qur'an says:

“Indeed, We offered the Trust to the heavens and the earth and the mountains...”

(Qur'an 33:72)

The idea of Amanah helps establish a significant ethical relationship between humans and resources provided to them. Natural resources can be used by humans for their benefit, but the use of resources also entails a sense of responsibility on their part in respect of conservation and proper management of resources.

In case of energy resources, Amanah suggests that energy should not be used solely based on economic considerations. While taking decisions regarding extraction, production, distribution, and use of energy resources, environmental impact as well as long-term social benefits must be taken into consideration.

Hence, the principle can be explained using the following formula:

$$\text{Responsible Use of Resources} + \text{Efficient Utilization} + \text{Environmental Protection} + \text{Accountability} \\ = \text{Energy Stewardship}$$

The principle is relevant to many different entities. For instance, governments have the duty to formulate energy policies; corporations have the duty to reduce their impact on environment and conserve energy resources; institutions have the duty to reduce excessive use of energy resources; and individuals have the duty to avoid wasteful use of energy.

Therefore, Amanah serves as the foundation of ethical justification of sustainable energy management as resource accountability for the sake of future generations.

3.3 Mizan: Balance and Ecological Equilibrium

The Qur'anic term Mizan is about balance, harmony, and equilibrium. According to the Qur'an,

"And the heaven He raised and imposed the balance, that you not transgress within the balance."

(Qur'an 55:7-8)

The concept of Mizan is significant to the idea of environmental sustainability, in that sustainable development requires keeping in place an appropriate balance between human needs and ecological constraints.

About energy management, the concept of Mizan can be considered with respect to several balances, including the following:

- economic development and environmental protection;
- energy needs and availability of resources;
- energy generation and conservation;
- technological development and ecological constraints;
- consumption today and needs in the future; and
- human well-being and environmental health.

The idea does not mean that economic development and technological progress must be shunned. What is necessary is that development remains within the ecological and social bounds of responsibility.

Therefore, about energy management, Mizan implies that an approach to energy systems should involve more than just their capacity for increasing production. It should also take into account their environmental implications, resource consumption, social effects, and sustainability.

Accordingly, Mizan represents the ethical basis of balancing energy development and ecological preservation.

3.4 Wasatiyyah: Moderation in Energy Consumption

Moderation constitutes yet another key dimension in Qur'anic ethics. According to the Qur'an:

"... eat and drink, but waste not by extravagance."

(Qur'an 7:31)

The doctrine of Wasatiyyah emphasizes the need for a balanced attitude to human consumption and opposes all forms of wasteful excesses. Even though this Qur'anic verse deals with consumption in general, its ethical principle applies considerably to the consumption of modern energy.

Energy consumption in the contemporary world is often not limited to necessities. Poorly built homes, inefficient lighting, wasteful cooling and heating systems, poor transportation systems and industrial processes may contribute to wasteful energy consumption.

From a Qur'anic perspective, thus, sustainable energy consumption neither involves total avoidance of energy consumption nor unlimited consumption. Sustainable energy consumption entails moderate, efficient and purposeful energy consumption.

The principle of moderation may serve to promote:

- efficient consumption of electrical power;
- energy-saving devices and appliances;
- prudent heating and cooling methods;
- efficient transportation;
- construction methods and practices; and
- minimizing wasteful energy consumption.

Wasatiyyah, thus, introduces the behavioral dimension of sustainable energy management.

3.5 Israf and Tabdhir: Prevention of Energy Waste

Wastefulness and extensive utilization of resources have been discouraged in the Qur'an. The Qur'an 6:141 says:

"Indeed, He does not like the wasteful."

In addition, the Qur'an 17:26–27 also gives a strong warning about wasteful behavior. The above-mentioned principles form an important ethical basis for conservation of resources and energy efficiency.

In modern energy systems, waste can happen at various stages of the energy cycle. This can happen due to inefficiency of the production process, inefficiency of machinery, bad design of buildings, unnecessary transportations, too much heating and cooling, and unnecessary use of electricity.

Israf and Tabdhir principles are therefore very relevant to modern energy management. They emphasize on reducing unnecessary consumption and efficient use of available resources.

Energy conservation should be viewed with the following three related objectives in mind:

Reduction of unnecessary consumption → Efficiency → Energy conservation

The above principle applies to the individuals, institutions, industries, and government in terms of reduction of unnecessary electricity consumption, improvement of energy efficiency, implementation of energy management systems, and establishment of standards for energy reduction respectively.

Therefore, the Qur'anic prohibition of wastefulness forms an ethical basis for energy efficiency, energy conservation, and sustainable consumption.

3.6 Adl: Justice and Equitable Energy Access

The principle of *Adl*, or justice, provides another important foundation for sustainable energy management. Sustainability cannot be achieved simply by reducing environmental impacts; it must also address the question of who has access to energy and who bears the environmental and economic costs associated with energy production.

Access to reliable and affordable energy is closely connected with human development. Energy poverty can affect opportunities for education, healthcare, communication, employment, transportation, and economic participation. Consequently, an energy system that is environmentally efficient but inaccessible or unaffordable to large sections of society cannot be considered fully sustainable.

From the perspective of *Adl*, energy policies should therefore promote:

- affordable access to essential energy services;
- reliable and safe energy supply;
- equitable distribution of energy resources;
- protection of vulnerable and disadvantaged communities;
- fair distribution of environmental benefits; and
- prevention of disproportionate environmental burdens on communities.

This principle is closely related to the global objective of Sustainable Development Goal 7, which seeks universal access to affordable, reliable, sustainable, and modern energy.

The principle of *Adl* consequently broadens the meaning of sustainable energy management. Sustainability is not merely about producing cleaner energy; it is also about ensuring that the benefits of energy development are distributed fairly and that vulnerable populations are not disproportionately affected by environmental and energy-related costs.

4. CONCEPTUAL FRAMEWORK FOR QUR'ANIC SUSTAINABLE ENERGY MANAGEMENT

Taking into account the Quranic principles highlighted in the previous analysis and considering the insights provided by the reviewed literature on Islamic environmental ethics, sustainability, and energy management, the current study suggests the introduction of a Quranic Sustainable Energy Management Framework (Q-SEMF). According to this framework, sustainable energy management is viewed as a combination of ethical, behavioural, ecological, technological, and governance-related aspects. It is based on the idea that the sustainable management of energy resources involves both technological effectiveness and responsible human behaviour, environmental management, social justice, and accountability.

The suggested framework includes five interrelated dimensions, namely, (1) Ethical Foundation, (2) Responsible Energy Consumption, (3) Ecological Responsibility and Resource Conservation, (4) Sustainable Energy Practices, and (5) Justice and Ethical Governance.

4.1 Ethical Foundation: Tawhid, Khalifah and Amanah

First, there is the ethical foundation which comes from the Islamic concepts of Tawhid, Khalifah, and Amanah. It gives the basic relationship between God, man, natural resources, and the environment.

Tawhid makes us realize the fact that God is one and sovereign and nature is created by him. In the light of Tawhid, natural resources cannot be treated as limitless resources that can be exploited without any restrictions. Man has to realize his relationship with the created nature and become conscious of his responsibilities.

Khalifah establishes the fact that man is a steward or trustee of the earth. The fact of stewardship implies that man has to manage natural resources properly without causing any environmental degradation. With regard to the energy management, this concept implies the making of responsible decisions about energy production, consumption, conservation and its utilization.

Amanah enhances the responsibility of man towards the environment by treating it as a trust. Hence, the energy resources can be seen as those resources that have been entrusted to man for responsible use..

4.2 Responsible Energy Consumption: Wasatiyyah, Israf and Tabdhir

The second dimension of the framework refers to responsible consumption of energy. The Qur'anic values of moderation in Wasatiyyah, absence of excess in Israf and wasteful use in Tabdhir create the behavioral base for responsible energy consumption. The principle of Wasatiyyah means that one must consume energy moderately and not excessively. With respect to energy management, this means that energy must be consumed based on needs, rather than through unnecessary consumption.

Prohibition of Israf in the Quran is especially pertinent to today's consumption of energy. Such actions as unnecessary use of electricity, heating and cooling, unnecessary transportation and its inefficiency, unnecessary consumption of energy by industries and loss of energy can all be discussed in the context of Israf, the principle of avoiding excess. At the same time, the principle of Tabdhir stresses that wasteful utilization of energy must be avoided. The energy consumption in the modern world is usually associated with inefficient equipment, inefficient buildings design, loss of energy in transmission, unnecessary lighting and industrial energy consumption.

Thus, this dimension of the framework emphasizes the following results:

- Unnecessary consumption of energy reduction;
- Energy efficiency improvement;
- Avoidable energy losses prevention; and
- Responsible energy consumption behavior development.

In conclusion, responsible consumption is not only an efficiency concern, but an ethical responsibility according to Qur'anic values.

4.3 Ecological Responsibility and Resource Conservation: Mizan, Conservation and Prevention of Fasad

Thirdly, the Q-SEMF includes a dimension concerned with ecological responsibility and conservation of resources. The primary sources include the Qur'anic concept of Mizan (balance), conservation and prohibition of Fasad (any destructive or corrupting activity performed on Earth). The Qur'anic term of

Mizan means the concept of balance and equilibrium existing in the created world. Concerning sustainable energy management, it implies that energy development must keep the required balance among human needs, economic growth, available resources, and ecological constraints.

The principle of conservation arises because natural resources cannot be used in disregard of their availability and the environmental costs connected with such use. Hence, the process of sustainable energy management implies effective resource usage, minimal extraction and preservation of ecosystems. Finally, the Qur'anic concept of Fasad is another environmental constraint. Energy development and use should not entail avoidable or excessive damage to the ecosystem, to people's health and well-being and to natural resources. It is especially true concerning environmental pollution, ecologically destructive extraction activities, excessive reliance on energy sources of high environmental costs, as well as inadequate infrastructure development.

Therefore, the ecological dimension of the Q-SEMF implies such elements as:

- Protection of ecosystems and natural resources;
- Reduction of environmental pollution;
- Environmental responsible extraction and use of energy resources;
- Evaluation of environmental impacts associated with energy projects;
- Renouncement of environmentally harmful energy practices; and
- Keeping ecological balance.

Such a dimension draws an important link between the Qur'anic environmental ethics and modern principles of sustainable resource management.

4.4 Sustainable Energy Practices: Efficiency, Conservation and Renewable Energy

The fourth dimension of Q-SEMF is that of practicality and application. The ethical principles stated above may be translated into practical energy management through the following actions: Energy efficiency is the direct manifestation of the Qur'anic injunction against waste. Increasing the energy efficiency of buildings, appliances, machinery, transport systems and industrial processes is an effective way to decrease energy demands without decreasing the quality of energy services provided.

Energy conservation adds another layer to energy management by calling for the reduction of energy wastage. The combination of energy efficiency and conservation allows the reduction of resource and environmental pressure. Renewable energy is an important part of the framework as well. Since the Qur'an doesn't make any references to modern technologies, such as solar PV, wind power and energy storage systems, these technologies shouldn't be regarded as mandated by the Qur'an. Instead, their use may be assessed using Qur'anic ethical criteria: resource conservation, environmental preservation, public welfare, and harm prevention.

The practical aspect of the Q-SEMF includes the following:

- Energy efficiency;
- Energy conservation;
- Renewable energy development;
- Sustainable energy infrastructure;
- Energy storage technologies;
- Energy transmission and distribution loss reduction;
- More efficient and environmentally friendly transportation; and
- Sustainable industrial energy use.

This demonstrates how Qur'anic ethics provide the normative guidance, whereas science and technology provide the practical means for achieving the stated goals.

4.5 Justice and Ethical Governance: Adl, Accountability and Public Welfare

The fifth dimension in the Q-SEMF refers to the concepts of justice, accountability, and ethical governance. Achieving sustainable energy management is not only dependent on individual actions or technology. Instead, governments, institutions, industries, and other stakeholders have a very crucial role to play in the production, distribution, pricing, and regulation of energy resources. Adl, meaning justice in the Qur'an, is the ethical principle that underlies equity of energy resources and services. The management of energy should take the needs of various social groups into consideration, especially those which are disadvantaged or vulnerable.

The concept of accountability, based on Amanah in the Qur'an, obliges institutions to bear responsibility for the social and environmental effects of its actions. Therefore, energy companies and public institutions

should be accountable for using energy resources, its environmental effects and achieving the sustainability targets. The concept of public welfare means that any energy policies should take into account the common good and well-being of all social and environmental interest rather than personal short term advantages. In relation to this dimension, the governance of sustainable energy should seek:

- Accountable and transparent energy policies;
- Equity of energy services access;
- Vulnerability of disadvantaged communities;
- Strategic energy resource planning;
- Environmental accountability of energy institutions and corporations;
- Sustainable energy investment; and
- Environmental and social implications of energy decision making.

So, justice and governance create the institutional tool by which to implement the principles of the Qur'an into energy policies.

6. CONCLUSION

It was found that the Qur'an offers an important ethical framework for sustainable energy management based on the ideas of stewardship, responsibility, balance, moderation, conservation, justice, and environmental protection. The notions of Khalifah and Amanah create the idea of human responsibility for the use of natural resources, while Mizan stands for the ecological balance, and Wasatiyyah promotes the notion of responsible consumption. Avoiding Israf and Tabdhir is another principle of energy efficiency and avoiding waste, and Adl stands for fair access to energy resources and protecting vulnerable communities. Preventing Fasad, on the other hand, makes the focus on human responsibility for minimizing environmental impact from energy production and consumption. Therefore, the proposed framework of Qur'anic Sustainable Energy Management (Q-SEMF) links the ethical values offered by the Qur'an to responsible consumption, resource conservation, renewables, environmental protection, and ethical governance. Consequently, it may be stated that the integration of the ethical aspects offered by the Qur'an with the contemporary science and technology can contribute to sustainable development.

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