

Working Papers

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Committed to God's Creation

Suggestions for a Sustainable Approach to
Energy

An expert report on the ethical foundations of
a sustainable energy supply

16 May 2011

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Preface

The publication of the working paper ‘Committed to God’s Creation – Suggestions for a Sustainable Approach to Energy’, comes in the middle of a broad social and political debate on nuclear power and the future of the energy supply – a debate recently reignited as a result of the catastrophe in Japan, and in view of the 25th anniversary of the breakdown of the Chernobyl reactor. But the question of finding a sustainable approach to energy is by no means new – on the contrary, it is one of the main challenges of the 21st century. It was for this reason that the Commission for Society and Social Affairs of the German Bishops’ Conference resolved, two years ago now, to make a thorough study of these issues. The present working paper – the topicality of which could not have been foreseen at the start of the process – is the result of these thoroughgoing considerations.

The dramatic happenings in Fukushima have cast a new light on the urgent need to find a sustainable approach to energy. They have given us a drastic demonstration of the fact that even highly improbable events carrying a high degree of risk are capable of occurring, while the consequential problems associated with the use of nuclear energy still remain unresolved. The safety of nuclear energy has once again been called in question. The current debate on these matters should not, however, ignore those other developments which need to be taken into account for a comprehensive assessment of the situation – such as global climate change, the increasing frequency of major natural catastrophes and the consequences of the clearing or overexploitation of land areas, together with the associated implications for biological diversity. All these serious environmental problems underline the urgent need for

a change of course in terms of environmental and energy policy, or for what might be described as an ‘energy turn-around’.

The Commission for Society and Social Affairs and the Commission for International Church Affairs of the German Bishops’ Conference jointly published an expert report as long ago as 2006 under the title of *Climate Change: A Focal Point of Global, Intergenerational and Ecological Justice*. This was designed to heighten public awareness of climate change, as a question of justice and a survival issue for humanity and our fellow creatures. Energy policy has a particularly important contribution to make in connection with climate protection. And already today we see numerous approaches towards an environmentally friendlier energy policy.

The suggestions for a sustainable approach to energy contained in the present document do not by any means aspire to yield conclusive answers to all open questions connected with energy policy. ‘The Church,’ as Pope Benedict XVI has said, ‘does not have any technical solutions to offer’ (*Caritas in veritate* para. 9). Instead Catholic social teaching works out the ethical criteria that will support responsible decision-making, on the basis of the objective information at its disposal. This is because ‘the ecological problem must be [... motivated by] the quest for a authentic world-wide solidarity inspired by the values of charity, justice and the common good’ (*Message of the Holy Father for the Celebration of World Day of Peace 2010* para. 10). So our principal concern, as an episcopal commission, is to show that ethical action in relation to the environment is rooted in faith in creation, and that the energy issue is also bound up with the question of justice.

In his message for World Peace Day in 1990, under the title of *Peace with God the Creator, peace with all of creation*, Pope

John Paul II reminded the Catholic Church that ‘The commitment of believers to a healthy environment for everyone stems directly from their belief in God the Creator’ (para. 16). And his successor Pope Benedict XVI has likewise stressed, in his encyclical *Caritas in veritate*, that the holistic development of human beings is closely connected with the moral obligations arising from the relationship between the human race on the one hand, and nature and the environment on the other. This gives rise to a responsibility for environmental protection and an obligation to the whole of humanity, including future generations. In this connection the Pope emphasises the significance of the problems associated with energy (cf. paras. 48 ff.).

Along with climate change, the energy issue stands at the focal point of intergenerational, global and ecological justice. The assumption of responsibility for oneself, for one’s fellow human beings and for the environment calls for attitudes and modes of life that are characterised by moderation and solidarity. Lifestyles and business practices need to be subjected to serious scrutiny. Neither individuals, nor society and the state can remain indifferent in the face of the damage that they occasion. This calls for new rules and structures for a sustainable approach to energy and the environment. One of the fundamental tasks, in this connection, consists in developing joint strategies for the sustainable use of energy resources. The energy policies of the future must be characterised by reduced energy consumption, improvements in efficiency and the investigation and development of alternative and sustainable forms of energy.

In terms of structure this study follows the threefold sequence of inspection, judgment and action. First we present the current situation of today’s energy policies and power supply – this against a background of limited resources, the need to ensure reliability of supply and the threats associated with cli-

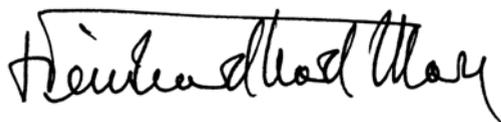
mate change for the whole of humanity. Taking a Christian ethic of sustainability as our point of departure, we have analysed the question of energy together with the special features of the power supply as a public good, and looked into the problems associated with risk assessment in relation to the use of specific forms of energy. With a view to the sustainable use of energy, we then recommend the threefold approach of moderation, heightened efficiency and the development of renewable sources of energy. The ethical criteria relevant to the assessment of nuclear energy have been discussed in a special section of their own. Finally we have pointed to fields of action where the church can assume responsibility. This final section reveals that considerable efforts are already being made by the church towards the sustainable use of energy.

I would like to express my warmest thanks to the members of the Working Group for Ecological Issues, who drew up this document at the request of the Commission for Society and Social Affairs of the German Bishops' Conference. The Commission ventures to hope that the publication of this text may contribute to a discussion which has been frequently characterised in the past by entrenched positions and ideological inflexibility. This is also in part due to the complexity of the problems of the energy issue. Different conceptions of an objective come into collision, making an intensive consideration of the benefits and risks involved indispensable. In this area there are no easy answers. We hope that this study will raise public awareness of these multifaceted problems, and offer suggestions for a sustainable approach to energy in future.

The time is ripe for finding responsible, honest and workable solutions for a future-capable, just and sustainable energy supply – this on a broad social basis. But the turnaround in energy policy can only succeed if we have an eye to the good of all – which includes those who are less than relentless in the

pursuance of their own interests. We must also allow coming generations to have their say, and commit ourselves to preserve the earth which God has gifted to us as a future-viable 'habitat' for all creatures. This calls for a readiness to rethink our attitudes and to act accordingly, in the awareness that we have an obligation to the creation.

Munich, 16 May 2011

A handwritten signature in black ink, which appears to read "Reinhard Marx". The signature is written in a cursive style and is enclosed within a thin, hand-drawn rectangular border.

Cardinal Reinhard Marx

President of the
Commission for Society and Social Affairs of the
German Bishops' Conference

The authors

The Working Group on Ecological Issues of the Commission for Society and Social Affairs of the German Bishops' Conference

Professor Dr. Karl Bopp SDB

Dr h.c. Gotthard Dobmeier

Dr Maria Flachsbarth MdB

Professor Dr. Bernhard Irrgang

Mattias Kiefer

Professor Dr. Andreas Lienkamp

Bettina Locklair

Dr Dagmar Nelleßen-Strauch (Executive Director)

Professor Dr. Ortwin Renn

Professor Dr. Josef Sayer

Elmar Schäfer

Auxiliary Bishop Dr Bernd Uhl (Chairman)

Professor Dr. Paul Velsinger

Professor Dr. Markus Vogt

Dr Ulrich Witte

Yvonne Zwick

I. The urgency of the energy issue

1. At the start of the 21st century the question of energy ranks among the most urgent problems facing humanity. The greater part of the demand for energy worldwide is met by the use of exhaustible resources such as mineral oil, coal, natural gas and uranium. The scarcity of these is becoming increasingly evident. The high consumption of fossil fuels, above all in the western industrial nations (but also in some threshold countries with high growth rates) is moreover resulting in climate changes that threaten the whole of humanity. Already today, climate change affects the life of the population in the poorer countries of the world and gives rise to injustice. In addition, a considerable part of the human race today still lacks open and affordable access to energy, which means they are without the necessary basis for the development of living conditions in keeping with human dignity.

2. The earth and the goods of the earth have been created by God and are designed for the use of all human beings and all peoples. Our responsibility for God's creation thus lays us under an obligation to deal with the problems associated with energy. In view of these serious challenges, the church cannot remain silent. And time is pressing! So Pope Benedict XVI calls on us to find 'joint and sustainable strategies to satisfy the energy needs of the present and future generations' (*Message of the Holy Father for the Celebration of World Day of Peace 2010* para. 9). The energy problems we face today are also the consequence of unjust power structures and economic practices that do not support solidarity. So the international community of nations must seek to bring about a comprehensive energy turnaround at the earliest opportunity. This means that 'technologically advanced societies can and must lower their domestic

energy consumption [...]. It should be added that at present it is possible to achieve improved energy efficiency while at the same time encouraging research into alternative forms of energy.’ (*Caritas in veritate* para. 49)

2. Global affluence, climate protection and justice

3. Energy is a precious and indispensable human good. Open and affordable means of access to a supply of energy form the basis of global affluence and peace in society. If access to energy is lacking, as is the case for countless people in developing countries,¹ economic and social progress becomes practically impossible. Anyone wanting to overcome poverty must create an established basis for the supply of energy, though the forms of energy used in this connection may vary widely from one country to another. Nation states – both as individual countries and as members of the international community – are faced with the task of creating regulatory structures that will provide the conditions for the sustainable management of energy. The idea of an ‘ecologically committed social market economy’, advocated by the churches as long ago as 1985², is fundamental in this connection. Internationally binding agreements are necessary in order to link strategies for competitiveness and a reliable energy supply with the requirements of climate protection. The initiative for this must proceed both from consistent energy policies at national level, and from parallel negotiations to create the conditions for an international framework.

¹ Cf. the Catholic Bishops’ Organisation for Development (Misereor), ed.: *Energie für die Armen. Ein Positionspapier [Energy for the Poor – A Position Paper]*, Aachen 2004.

² Cf. Church Administration Office of the Evangelical Church in Germany, Secretariat of the German Bishops’ Conference (ed.): *Verantwortung wahrnehmen für die Schöpfung [Taking Responsibility for the Creation]*, Bonn, Hannover 1985, paras. 79–87, 81. Also: *For a Future Founded on Solidarity and Justice*, Bonn, Hannover 1997, paras. 142–150.

4. In addition to this, the climate changes now making themselves felt worldwide are also highlighting the imperative urgency of an energy turnaround. Political conditions for the supply and use of energy can make an important contribution to the general wellbeing of the planet, when they are based on the guiding ideal of sustainability and on the criteria of global, intergenerational and ecological justice. To this end the various primary energy media (coal, natural gas, uranium, hydropower, geothermal energy, bioenergy, wind and solar power), as well as secondary forms of energy (electricity, fuel and heat), must be scrutinised in the light of their impact on the whole of creation. More than three quarters of global energy consumption is based on fossil and nuclear combustibles (mineral oil, coal, natural gas and uranium) of which there are only limited reserves, and which in some cases cannot be exploited without considerable risks to the creation as a whole, as well as for the workers involved and local residents. The consumption of fossil energy media also leads to the emission of climatically damaging greenhouse gases, which are partly responsible for the acidification of the oceans and global climate change. The latter will have an effect worldwide on present and future living conditions, with particularly severe implications for the developing countries – leading to a rise in the sea level and widespread flooding, increasingly frequent and destructive hurricanes, changes in the distribution of global precipitation (leading to droughts in some areas and floods in others) and an increase in infection and disease. Without a global turnaround, resulting in a sustainable energy policy, there is no chance of making climate protection effective. This means that a climatically friendly energy supply is a crucial prerequisite for justice, responsibility towards creation and economic good sense. In spite of the growing demand for energy worldwide, by the year 2050 global emissions of carbon dioxide must be reduced by at least 60%.

For the industrial nations, in view of their higher level at the start, this means a reduction of at least 80% as compared with the year 1990.³

5. Our energy policies of today will be largely responsible for determining the living conditions of future generations. The stakes are high. Already today the climatic consequences of emissions of climatically damaging gases are violating or threatening the fundamental rights of countless people, above all in southern countries. As the consequential costs of today's energy supply are being passed on to the poor, to future generations and nature itself, the energy issue is a question of justice in three respects – globally, ecologically and in intergenerational terms. It is a fundamental ethical problem of energy policy that those responsible for high levels of energy consumption and those who suffer the consequences are not identical. To the same extent, the crucial social issue of the 21st century is closely linked with the global socialisation of the consequential ecological costs resulting from the use of fossil and nuclear fuel. In its present, energy-intensive form, the western model of the affluent society is not sustainable and so does not have a future.

³ Cf. the Federal Ministry of the Environment (ed.): *Die Zukunft in unseren Händen. 21 Thesen zur Klimaschutzpolitik des 21. Jahrhunderts und ihre Begründungen* [The Future in our Hands – 21 Theses for the Climate Protection Policy of the 21st Century, with their Justifications], Dessau 2005, p. 23 ff.

3. Public goods and the common good

6. The ethical peculiarity of the energy question rests on the difficulty of supplying public goods in a cooperative manner and/or protecting them effectively. The climate, in particular, is a public good that is closely bound up with the energy supply. So climate change may be regarded today as one of the biggest human problems associated with the common good. There are no historical examples to indicate how such global problems which only become apparent after a certain lapse of time should be resolved. But as climate protection is a variable that depends on energy policy, these problems also apply to the question of energy. Not only can it be said that ‘the climate is a good that must be protected,’⁴ – it is also true that an adequate and secure energy supply is a highly important good, one which must be provided without detriment to the climate and in harmony with the development of the poorer countries of the world. When the environment is overburdened, non-renewable resources are consumed without any sense of restraint and the long-term costs find no reflection in the prices, this shows that the markets are lacking the necessary framing conditions and so are failing to function or else functioning inadequately. It is above all in connection with public goods that the state and the community of nations are challenged to develop a functioning regulatory framework to compensate the deficiencies of the market.

7. So if we want to understand the conflicts related to a future-capable energy supply, we must come to grips with the question how public goods can be protected effectively. The climate is a public good. The principal characteristics of public goods are their *non-exclusiveness* (under normal circumstances nobody is

⁴ Pontifical Council for Justice and Peace: *Compendium of the Social Doctrine of the Church*, para. 470.

excluded from the use of the good in question) and also, in many cases, the *non-competitive nature of their consumption* (if I admire a sunset, other persons are not prevented from enjoying the same experience).⁵ When it comes to their origin, public goods may either be present naturally – as is the case with the climate system – or they may be made available collectively. The problems associated with public goods have long been apparent when environmental goods are damaged, as when seas are overfished or soils contaminated with toxic materials.

8. The principal ethical dilemma in dealing with public goods is that it is beneficial, from the point of view of the individual, to make as intensive use of the generally shared good as possibility will permit, even if this means, in the long term, that the benefit for all will be reduced or even abolished. If the individual were to restrict his own use, he would have to anticipate that others would make correspondingly more intensive use of the shared resource; so that his restraint would actually mean his being exploited by others. In considering the economic subject, we speak of the problem of ‘freeloading’. When it comes to public goods, the freeloader makes excessive use of freely available or publicly supplied goods at no cost to himself, so long as it is not possible, or possible only with difficulty, to exclude him and other economic subjects unwilling to pay their share from such excessive use of the resource. Thus there are no adequate system-immanent incentives to encourage people to be considerate and careful in dealing with public goods like the climate system. Quite the reverse – individuals stand to benefit (at least in the short term) by avoiding the costs which would be incurred for the maintenance of collective resources.

⁵ Cf. Ulrich Hampicke: *Umweltökonomie [Environmental Economics]*, in: *Lexikon der Bioethik [Lexicon of Bioethics]*, vol. III, Gütersloh 2000, pp. 635–641, especially p. 639.

9. The energy supply is of existential importance for the common good. This by no means excludes the possibility of trading in energy as a private good, in the form of electricity, oil, coal and so on. But the state is obliged to provide regulatory frameworks, or supply companies in the public sector, so as to ensure that the function of the energy supply as a common good shall be maintained. An adequate supply of safe energy, together with protection against the associated risks, is of fundamental importance for ensuring the basic conditions of human life and development. It follows that the energy issue cannot just be left to the dynamic forces of the market. On the contrary, energy is a matter for public responsibility. One important factor pointing to this conclusion emerges when we look closely at the failure of the market in the energy sector. As a result of political dependencies, drastic price increases and crises of supply, global energy prices are subject to extreme fluctuation. Signals emanating from the markets are thus an inadequate basis for the creation of an energy solution that makes sense in the long term. As extremely high and long-term investments are needed, the necessary refinancing can be calculated only with difficulty. In addition, the ecological costs of different forms of energy are attributable only to a limited extent, and so cannot easily be mapped on the level of business management. It follows that if you want a reliable supply of energy, together with innovations focused on the common good to ensure that this supply shall be sustainable, you are forced to rely on regulatory political structures.

10. At the same time the global dimension of the energy question must not be left out of account. If just a few scattered states deliberately cut back their energy consumption, this takes the pressure off global market prices – which in turn can lead to increased demand on the part of other countries that are still hungry for resources. In view of this, it is essential that a global

framework for national energy and climate policy be created. Likewise when it comes to fossil and nuclear energy resources, which are *de facto* private property or property of the state in some few countries, international regulations are needed in the interest of peace and security. These are however difficult to achieve in view of the unequal distribution of energy resources throughout the world, as a result of which it is not in the interest of supplier states to support a global energy policy. Improved financial and technological mechanisms must be set up in this sector in future, to facilitate a climate protection system with binding effect based on the law of nations, and so encourage a turnaround in favour of a sustainable energy supply. One important instrument for the sustainable conversion of energy systems goes by the name of ‘emissions trading’. This provides financial incentives and an effective dynamic mechanism for climate protection. But emissions trading is dependent on properly functioning markets. These need to be gradually set up, starting from individual regions, countries and continents, and established on a consistent basis. Here there must be guarantees to ensure that the transfer payments for emission rights do actually reach the majority of the population in those countries and regions that are emitting less CO₂.

11. A further argument for seeing the energy issue as coming under the heading of the common good can be derived from the property theory of Catholic social doctrine. The goods of creation are in the first instance an object of collective ownership, and are to be used for the benefit of all. But there is also a subsidiary right that applies, namely the right to own private property. This right, however, is necessarily associated with the obligation of acknowledging the social function of property and its usefulness for the common good (cf. *Gaudium et spes* para. 69). Energy resources are an object of collective ownership which must be used in the interest of the common good, on a

global and intergenerational scale, and in such a way that the creation be not impaired. Property rights are legitimate when they promote a responsible, efficient and peaceful approach to energy and do not violate the common good.

12. The traditional ethics of the common good may be linked to ethical/political, legal and economic debate on the best way to manage public goods, with a view to deriving suitable regulations for responsible energy management. The important thing is to use the influence and dynamism of the markets, while directing them on the basis of regulatory conditions (in some cases restricting, in others supplementing them) in such a way as to give rise to a development based on social justice that is economically and ecologically sustainable, and is at the same time in the best interest of present and future generations. It was a good idea, and continues to be so, that the energy markets in Europe should be to some extent privatised. This has led to new opportunities, above all in connection with renewable energy and improved technological efficiency. But as the public energy supply is dependent on the grid, privatisation strategies are reaching their limits. The complex interrelationships of international developments, government actions and the dynamic forces of private business present major challenges to policy planners who aim to provide an energy supply in keeping with the interests of the common good.

4. Christian responsibility towards creation and the guiding ideal of sustainable development

13. Taking its universal message of salvation as a point of departure, the church sees herself as an advocate of responsibility towards creation. She ‘represents a concept of humankind that is based on the equal dignity of all people as the children of God [...] and that demands decent living conditions for all, including future generations’.⁶ The German bishops accordingly published a statement entitled *Zukunft der Schöpfung – Zukunft der Menschheit* [Future of Creation – Future of Humanity] as long ago as 1980. This was taken by the Commission for Society and Social Affairs and the Commission for International Church Affairs of the German Bishops’ Conference as the basis for their expert report, published in the year 2006, *Climate Change: A Focal Point of Global, Intergenerational and Ecological Justice*. The latter document already included a discussion of different forms of energy from a social and ethical point of view.

14. Pope Benedict XVI has also repeatedly pointed to the connection between a correct approach to energy and Christian responsibility for creation. In his social encyclical *Caritas in veritate*, published in 2009, he sees the energy question as a key issue for the preservation of creation. He bases his discussion on the theory of justice and the politics of peace. He argues for improved efficiency, the expansion and development of renew-

⁶ Secretariat of the German Bishops’ Conference (ed.): *Climate Change: A Focal Point of Global, Intergenerational and Ecological Justice – An Expert Report on the Challenge of Global Climate Change*, 2nd, updated edition, Bonn 2007, para. 9.

able energy sources and better access to energy for poor countries. The Pope's warning that 'the stockpiling of natural resources which in many cases are found in the poor countries themselves, gives rise to exploitation and frequent conflicts between and within nations' (*Caritas in veritate* para. 49), is more than ever topical today in view of the increasingly prevalent phenomenon of land purchasing (or 'land grabbing') on a large scale, with a view to accessing food supplies and energy resources.

15. The church speaks out for the sustainable use of energy on the basis of her understanding of human nature, her faith in creation and her social doctrine. The guiding ideal of sustainable development has been acknowledged by the church as a social principle and as an expression of Christian faith in creation.⁷ This guiding ideal constitutes a yardstick against which future energy use should be measured, as well as a goal to aim for.

Sustainability and justice – fields of tension and conflicts of objective

16. Sustainability is the decisive criterion. The effects of fossil and nuclear energy media, as well as the use of renewable energy, need to be scrutinised in the light of sustainability. Social and ecological factors that are involved in obtaining the raw materials needed for energy production must also be taken into account. From the point of view of Christian social ethics, the

⁷ Cf. Church Administration Office of the Evangelical Church in Germany/Secretariat of the German Bishops' Conference (ed.): *For a Future founded on Solidarity and Justice*, Bonn, Hannover 1997; Secretariat of the German Bishops' Conference (ed.): *Handeln für die Zukunft der Schöpfung [Acting for the Future of Creation]*, Bonn 1998.

idea of sustainability is aimed at a fundamental rethinking of the relationship between human beings and the environment. What is at stake is the reform of the ethical ideals on which the western model of the affluent society and the regulatory framework of the global economy are based. The growing demand for energy and resources worldwide can only be met if the richer countries reduce their consumption aspirations to a significant degree, and turn themselves into a convincing model of an environmentally friendly lifestyle for other countries to imitate. The most recent report from the Worldwatch Institute has calculated that otherwise we would need at least four times the resources that planet earth has to offer.⁸

17. The consumption of exhaustible energy resources should be balanced out through the provision of appropriate regenerative energy resources. This balancing out will make it possible to open up opportunities of comparable prosperity for future generations. From the point of view of the social dimension of sustainable development, we must pay particular heed to the serious effects of the energy issue on the poorest countries of the earth. These countries will not only be hardest hit by the negative consequences of climatic change, they also have the scantiest resources for dealing with them. At the same time, economic growth and rising energy requirements are still closely linked in these countries, while a third of the world population (in Africa and Asia, above all) still has no access to the energy markets. When it is a matter of the sustainable development of the economy and lifestyle in such parts of the world, energy poverty is a major stumbling block.⁹

⁸ Cf. Worldwatch Institute: *State of the World 2010. Transforming Cultures. From Consumerism to Sustainability*, New York 2010.

⁹ Cf. Jochen Ostheimer/Markus Vogt: *Energie für die Armen. Entwicklungsstrategien angesichts des Klimawandels [Energy for the Poor – De-*

18. Moreover, the social consequences of climate policy decisions (especially in relation to energy policy) in our own country should be considered. Higher taxes on energy, for example, will create incentives to cut electricity consumption. At the same time, this puts additional financial burdens on low-income consumers and their families. The hardships that may result from this should be averted by government subsidies. But above all, higher prices should be balanced out on the basis of improved efficiency and the modification of cultural behaviour patterns (e.g. regional cycles, seasonal nutrition etc.). Fundamentally, climate protection and energy-saving measures are in the interest of the poorer sectors of the population, because energy prices will continue to rise in any case and so claim an ever higher percentage of the budget of a low-income household. This means that climate protection as such is in no need of justification. But the concrete measures for implementing it must be based on social and economic justice.

19. From the point of view of the economic dimension of sustainability, security of supply for the population in the long term calls for particular attention. The necessary structural transformation of the energy supply system must be planned in such a way that the competitiveness of individual national economies and industrial sectors shall not be affected. Essentially this depends on our developing efficient and regenerative energy technology at the earliest opportunity so that the associated costs can be significantly reduced (as a result of learning effects and the factor of scale), stimulating broad demand both within Germany and in other countries and facilitating energy production at an affordable rate. This calls for appropriate regulatory

frameworks at the political level, as well as suitable funding guidelines.

20. The UN Framework Convention on Climate Change and the Kyoto Protocol¹⁰ make a fundamental point in speaking of a ‘common but differentiated responsibilities’. This first important definition of an obligation based on justice involves the acknowledgement of the primary responsibility of the industrial nations – this because they only succeeded in their own development by passing on the energy bill to the environment, and still continue to emit the lion’s share of greenhouse gases. The effects of this, however, become particularly apparent in the form of increasingly frequent extreme weather conditions in developing countries, where the vulnerability of the ecological and social systems of such countries means that drastic damage will be incurred.¹¹ Based on the ‘polluter pays’ principle, we have a direct obligation to reduce our own greenhouse gas emissions and to support the southern countries with measures for coping with the effects of climate change. This at the same time constitutes a contribution to social justice, in the sense of

¹⁰ The UN Framework Convention on Climate Change was formally adopted at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. 192 countries have now signed the convention committing themselves to climate protection. The convention forms the framework for negotiations on climate protection, which are conducted in the form of conferences of the signatory states. The third conference of signatory states saw the approval of what came to be known as the Kyoto Protocol, whereby the industrial nations have given a binding commitment to reduce their greenhouse gas emissions (such as carbon dioxide, methane, fluorocarbon etc.) between 2008 and 2012 by an average of 5% below the level of 1990.

¹¹ Cf. the German Catholic Bishops’ Organisation for Development Cooperation (Misereor), ed.: *Global aber gerecht. Klimawandel bekämpfen, Entwicklung ermöglichen [Global but Fair – Combatting Climate Change, Facilitating Development]*, Aachen 2010.

the avoidance and restoration of damages for which one admits liability.

21. The threshold countries and developing countries have a right to develop economically. But this should be effected by means of forms of technology that are acceptable in ecological and intergenerational terms. It follows that the structural transformation of energy systems in the industrial nations is crucial for bringing about a global change in energy management. This is where the process of change has to begin. As the western model of the affluent society is imitated worldwide, the ecological transformation of this model is a structurally primary form of global justice. Because the time is short, developing lands and threshold countries must be supported in their search for sustainable models of economic development and prosperity.

22. Sustainable energy management is by no means just a question of technology, corporate strategy and political regulatory frameworks – rather it calls for a far-reaching process of consciousness-raising, as well as for changes in lifestyle, mobility patterns and consumer habits. It is essential that new, globally acceptable and future-compatible models of the affluent society be developed. These should vanquish the general fixation on production and consumption by strengthening people's social, cultural and religious values, and focus on the objectives of provident budgeting. This transformation must involve all social groups and players, who should contribute clearly perceptible impulses for effective energy-saving measures and define the appropriate spheres of competence and responsibility. The important thing is to influence energy management in the light of the guiding ideal of sustainability, not just on the public and institutional level but also in private spheres of action, and to publicise this as a new definition of the objectives of social development right across all sectors of the population. Likewise in the areas of infrastructure, development of the national grid,

research and investment, the same principles of sustainability must be systematically borne in mind.

23. An ethical approach to the energy supply must constantly keep different objectives in view: climate protection and environmental conservation, security of supply and avoidance of political dependencies, long-term competitiveness and socially just means of access. If energy policy is to be consistent, these various targets must not be played off against one another. It is a quintessentially political task to give the different targets an appropriate weighting, relating them to one another in such a way that the many players in the field of energy receive adequate guidance for their individual decision-making, while at the same time creating synergy effects between the heterogeneous objectives that are involved.

Responsible risk awareness and rules of responsibility

24. In considering the pros and cons of a particular form of energy, the principles of risk limitation and compromise between conflicting values should be observed.¹² In political terms, an adult and responsible approach to risk above all calls for transparent and far-sighted risk management structures. Particularly important in this connection are the social mechanisms for the ascription of responsibility.¹³ There must be clear defini-

¹² Cf. Church Administration Office of the Evangelical Church in Germany/ Secretariat of the German Bishops' Conference (ed.): *For a Future Founded on Solidarity and Justice*, Bonn, Hannover 1997, para. 228.

¹³ Cf. Ortwin Renn: *Risk Governance. Coping with Uncertainty in a Complex World*, London et al. 2008; Jochen Ostheimer / Markus Vogt: *Risikomündigkeit – Rationale Strategien im Umgang mit Komplexität [Responsible Risk-Taking – Rational Strategies for Dealing with Complexity]*, in: Michael Zichy / Herwig Grimm (ed.): *Praxis in der Ethik. Zur Methodenreflexion der anwendungsorientierten Moralphilosophie [Prac-*

tions determining who is responsible to whom and for what, and which standards should apply in the given case.

25. In complex situations, the ethically responsible approach calls for the differentiated and appropriate application of principles. This is because in such cases it is often no longer possible to assign the consequential effects beyond all doubt to specific decisions or actions. Accordingly, in trying to ascribe responsibility we may well find ourselves unable to decide where the buck stops. Because the risks of actions in complex systems can be individually earmarked and controlled only to a limited degree, institutional backup is needed to ensure accountability, perhaps in the form of liability regulations. In the case of actions where the consequences are particularly difficult to predict, the important thing is to make the associated uncertainties transparently clear to all the parties involved, to ensure that those parties are involved in the relevant decisions and provide them with the resources they may need for responding to unforeseen events.

26. In the evaluation of different energy supply strategies, the different risks must be considered in relation to one another. This necessarily raises the questions of relative priority – the weighting due to different interests and the methods appropriate for arriving at a compromise, not to mention the assessment and balancing of the risks involved. The classic method of risk calculation, as the product of the scale of the damage and the probability of the damage occurring, is often less than helpful. The important thing is to contemplate the risks with all their ramifications.

27. If the consideration of possible evils is to be prevented from distorting the objective decision-making situation and reflecting it in a one-sided way, the consequences of the decision to take no action need to be systematically incorporated in the concept of responsibility. The strict avoidance of risk issues in a resigned refusal to innovate, and so may finally prove to be a strategy which by crippling the capacity for action in fact generates further risk rather than avoiding it. Responsible risk awareness is not aimed at the exclusion of risk of any kind, but rather at the avoidance of a critical risk threshold and at the enhancement of the flexible resources for the solution of problems – this in a way that is in harmony with the preferences and life choices of the persons affected. When dealing with collective risks, especially those which are caused by technology and whereby large numbers of people are affected, we need to have basic political regulations and transparent processes of decision. This is because a form of risk management that works only through the market or through the individual's sovereignty of decision will not be sufficient.

28. Responsible risk awareness essentially includes a clear hierarchy of problems and hazards in the estimation of complex situations and the weighting of risks which are not directly comparable with one another. Particularly problematic in this connection are systemic risks – detrimental incidents, that is to say, that make an impact right across the board. For the ethical assessment of such risks the following evaluation criteria are among those that may be found relevant: 1. Definition of the geographical extent and temporal duration of the damage; 2. Reversibility of the decision (especially in the case of effects that occur after a lapse of time); 3. The extent to which the risk has been entered into voluntarily; 4. Maintenance of the capability of action, control and direction in case of low-probability events occurring.

5. The triad of moderation, efficiency and renewable energy

29. The criteria mentioned above now permit us to draw conclusions for a sustainable approach to energy. At the same time we need to be aware that this is not going to be brought about by the individual player. In this context all players, each with their own latitude of discretionary action, have to be held responsible – individuals, civil society, politicians, the community of nations, the economy, scientists and academics, educational institutions and not least the church. Strategies for a sustainable energy supply must take all factors equally into account – the limited reserves of fossil energy media, the dangers and unresolved consequential problems of nuclear technology, the threats of climate change and the growing energy requirements of developing and threshold countries. With a view to changing the energy supply system, there are three possible strategies that may be considered:

- The strategy of keeping energy consumption as low as possible (a *sufficiency strategy*), based on adherence to moderation as a result of changes in consumption patterns and value preferences in favour of climatically acceptable and resource-saving models of prosperity;
- The strategy of relying on technical and organisational innovations to heighten the efficiency of the energy that is used (an *efficiency strategy*); and
- The strategy of replacing energy derived from fossil and nuclear sources with renewable forms of energy (a *substitution strategy*).

In order to meet the demanding requirements of a sustainable energy supply, all three dimensions must be tackled simultaneously and any possible synergies consistently exploited. The biggest potential savings in Germany at the present time are associated with the areas of domestic heating and mobility planning, and also – on a quite different level – that of meat consumption. This latter makes a considerable contribution to climate change, above all through the clearing of large areas of rainforest for the cultivation of feed crops and the methane emissions of the animals themselves.¹⁴

30. In view of the close links between the energy supply, economic development and environmental pollution, the energy industry has a key role to play in contributing to the establishment of a future-oriented national economy. We can also look to see a growing consumption of energy in future, especially in developing nations and the threshold countries. In Germany, where in recent years energy consumption has remained at a constant level, there are good chances that it may be possible to reduce it gradually, while at the same time boosting the proportion of renewable energy used to a significant degree. This however calls for a high measure of technical and institutional innovation, which in turn presents a challenge not just to scientific research, but also to the energy producers and companies with a high level of energy consumption. Their many years of experience and expertise as competitive suppliers will be indispensable if the necessary social changes are to be implemented speedily and successfully and on a sound financial basis. It is

¹⁴ Cf. Rat für nachhaltige Entwicklung [Council for Sustainable Development], ed.: *Der Nachhaltige Warenkorb. Einfach besser einkaufen. Ein Ratgeber [The Sustainable Shopping Basket. Simply Shop Better. A Vade Mecum]*, Berlin 2011, p. 14.

the task of the politicians, on the other hand, to create an appropriate regulatory framework for the changes that are required.

31. The capability of making do with the bare necessities is linked with the virtue of moderation. In the field of energy it is associated with the reduction of overall levels of consumption. Moderation or sufficiency does not necessarily mean consenting to an inferior quality of life. Often we find that less means more – less in terms of the quantity of goods and experiences consumed may be more in terms of contentment, and can also be good for a person's physical and emotional health. This however calls for a change of values on the part of the consumer, as well as the retraining of people's senses and social skills, with a view to enabling them to perceive and enjoy the world with a greater degree of awareness. The development of alternatives to a lifestyle centred on consumption is to some extent a cultural task. Here church organisations, with their fundamental Christian faith in creation, have a particularly important part to play. The initiatives that have already been launched in this direction can serve as a model.

32. Contrary to the widespread conception that sufficiency is damaging to the development of economic affluence, studies from various European countries have shown that this is by no means necessarily the case. Economic models based on sufficiency set their sights on qualitative growth. They are not unacceptable in either economic or social terms. It is a matter of finding alternatives to the traditional logic of growth, primarily based as it is on quantitative criteria,¹⁵ through the definition and elaboration of ecological models of prosperity. There are already numerous opportunities for action on offer in the world today. Take the shared use of goods (as in car-sharing) for

¹⁵ Cf. Meinhard Miegel: *Exit. Wohlstand ohne Wachstum [Exit – Prosperity without Growth]*, Berlin 2010.

example, or the consistent attention to considerations of energy efficiency when taking decisions relating to consumption or investment.¹⁶ This change of values in favour of sustainable patterns of consumption makes sense in both individual and collective terms. But it can only succeed when as many social forces as possible play their part. The churches have already been active in this area for a good while.

33. For all areas of energy supply (heat, mobility, electricity), improved *efficiency* is of central importance. Greater efficiency makes a positive impact on all dimensions of sustainable development – economic, ecological, social and ethical – simultaneously. Practically any other option is going to involve having to accept a downside in some quarter. Heightened efficiency is thus one of the options whereby the desired goal can be achieved with a minimum of cost and risk overall. In the energy policy of the Federal Republic of Germany, the improvement of energy efficiency has been a top priority ever since the first oil crisis in 1973. At the same time, most efficiency gains hitherto have been swallowed up by the corresponding increase in consumption (what is known as the boomerang effect). In a comprehensive and sustainable view of the matter, efficiency is closely linked to sufficiency.

34. The discovery of workable solutions in the efficiency area is dependent on a combination of technical, entrepreneurial and social innovation with changes in the habits of users. Thrift and efficiency have been given too little recognition in the past as a business opportunity for tendering companies or as offering cost benefits to the consumer. The struggle for technological

¹⁶ Cf. Rat für Nachhaltige Entwicklung [Council for Sustainable Development], ed.: *Der Nachhaltige Warenkorb. Einfach besser einkaufen. Ein Ratgeber [The Sustainable Shopping Basket. Simply Shop Better. A Vade Mecum]*, Berlin 2011, p. 53 ff.

supremacy has been characterised by the concentration of initiatives and financial resources on the supply side. The consistent reduction of energy requirements has hardly been pursued hitherto as policy for innovation. Interdisciplinary energy research has also been long subjected to neglect in Germany. As things stand today, a comprehensive concept of efficiency would constitute the most cost-effective 'energy source' and the most economical of resources.

Efficient thermal energy

35. Heating is a field where the biggest efficiency gains can be achieved at present without undue expense. The heating market accounts for something like 40% of total energy end use in Germany, making it a clear candidate for priority treatment. Moreover around 30% of this energy is used to heat buildings. The potential savings in this area are obvious, above all when structural modernisation includes energetic renovation measures. There are many possibilities here: financial incentives, energy certificates and the installation of energy-saving technological improvements, to name just a few. And yet there has been no haste to implement such measures: 75% of existing buildings in Germany are more than 20 years old, which means that the number of buildings affected by new building regulations constitutes a relatively modest group. And the modernisation of old buildings with a view to energy improvement currently affects only around 1% of existing buildings per annum. At this rate of progress, the realisation of efficiency measures is simply going to take too long. A renovation rate of 2% per annum is the minimum that should be aimed for.¹⁷

¹⁷ Cf. the Federal Ministry of Economics and Technology (ed.): *Energiekonzept für eine umweltschonende, zuverlässige und bezahlbare Energie*

36. The proportion of incidental costs in total rent payments has risen sharply since the seventies, and will continue to grow in future. This offers long-term advantages to those who are in a position to offer buildings benefiting from low operating costs. The contracting model is an interesting option – whereby the tenant or owner commissions a company to provide the necessary energy, including the technology involved. Giving buildings energy certificates is another good idea, though it calls for properly qualified specialists.

Sustainable mobility

37. In the sphere of mobility, the predominance of oil as the base material for fuels needs to be broken. Sustainable and climate-friendly mobility, using energy-efficient cars and alternative drive systems, can be achieved.¹⁸ Projects to be pursued here are the use of hydrogen technology and the development of electrically powered mobility. Both these developments only make sense if the energy that is required is derived from renewable sources. Particularly problematic is the enormous growth of air travel, in view of the vast amounts of energy used and the impact on the climate. Tax advantages as compared with other means of transport intensify the effect of transferring the environmental costs to the general public or to successive generations. Low prices produce a demand for flights which is incompatible with the development of sustainable mobility strategies and lifestyles. Here a change of course is called for at national and international level, based on new regulatory frameworks.

versorgung [An Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply], 28 September 2010, p. 22.

¹⁸ Cf. Jörg Schindler / Martin Held / Gerd Würdemann: *Postfossile Mobilität – Wegweiser für die Zeit nach dem Peak Oil [Post-Fossil Mobility – Pointers for the Time After the Oil Peak]*, Bad Homburg 2009.

38. In freight transport, on the other hand, fossil energy media, together with biofuels of the second generation, will continue to dominate the picture. Considerable savings can be achieved by transferring lorry freight to ships and trains. This will be dependent, of course, on the upgrading of the latter systems on a pan-European scale. Current trends however point in the opposite direction: freight transport on the roads goes on increasing, while rail transport continues to be reduced and cut back.

On the consumer side as well, there is more that can be done to encourage more efficient patterns of behaviour. Effective municipal development and town planning could develop infrastructures which make it easy for people to save energy. If public transport were made more attractive, more people would be motivated to use it. In this area we need further initiatives on all levels – from local councils, communities and the federal government.

A future-oriented energy mix

39. The electrical power supply frequently forms the focus of debate, even though it only represents just short of 20% of the energy supply as a whole. All the same, an adequate supply of electricity is crucial for the quality of human life, and companies would be unable to compete without it. Electricity has the further advantage that it gives rise to no emissions at the place where it is used. So more widespread electrification, assuming that the power is generated without CO₂ emissions, could help us to reach the objectives of a sustainable energy supply. Fundamentally speaking, the regulatory conditions for an effective mix of electrical power in Germany are the following:

40. Renewable energy is coming to play an ever more important part in the energy mix. But the proportion of renewable energy

still needs to be significantly increased. As a backup to this, a low-loss trans-European power grid should be developed. Power storage technology also needs to be improved. Then the problems associated with failure to maintain base load capability, such as currently still occur when the wind drops or in the hours of darkness, would no longer be a problem. Then too, fluctuations in the power supply indicate that there is a need to decide what class of power station will be called on to provide a backup when renewable energy reaches a level beyond 30 or 40 percent, and not enough power storage devices or effective inter-linked grid systems are available. At present both centralised solutions (e.g. Desertec) and decentralised solutions (like photovoltaic roof systems) are being traded off against one another, as opposite numbers in the political debate. If we are to reach our ambitious development targets by 2050, we will have to rely on a combination of centralised and decentralised approaches, to be implemented at international, regional and local levels. Even renewable energy systems are not immune from conflicts of priorities. They frequently lay claim to large land areas (biomass¹⁹ or solar thermal power stations²⁰), have an impact on the visible landscape (wind power plant, overland pipelines, energy storage facilities) or can lead to consequential ecological damage (as in the case of wind power plant on the high seas). They also call for investment on a large scale. Wind power has already crossed the threshold of economic viability; solar systems, on the other hand, will continue to depend on subsidies for a good many years, the expense of which must be

¹⁹ For an explanation of the concept of biomass, see para. 45.

²⁰ Solar thermal power plants transform solar energy first of all into thermal energy that can be used, which then serves for the generation of electrical energy. This is to be distinguished from photovoltaic systems, which transform solar energy directly into electrical energy with the help of solar cells.

borne by customers of the power companies or the community at large. A far-reaching change of awareness is essential if we are to achieve a sustainable energy system, coupled with a transformation of lifestyle, mobility patterns and consumer habits. In connection with the target-related conflicts referred to above, this calls for understanding and even for the willingness to accept the personal restrictions and inconveniences that may arise. These may involve additional financial burdens, but they could also come in the form of a negative impact on the landscape in a person's immediate vicinity, e.g. such as may result from the construction of wind power plants or overland pipelines, and the natural depredations occasioned by these. In the interest of arriving at a sustainable and future-capable energy supply, every individual human being must be prepared to assume responsibility, for every individual is responsible for the common good.

41. A crucial factor in the consideration of renewable energy production systems must be seen in the non-linear scale effects. For example, an energy mix with a 10% reliance on biomass meets the criteria of sustainability;²¹ when the proportion of biomass increases to a significant degree, the disadvantages grow out of all proportion – as a result of such factors as the preservation of species, security of the food supply and social justice. As a general principle it may be said that the bigger the proportion claimed by a given energy option in the overall energy supply, the more likely it is that sustainability problems are going to arise. So a mix involving smaller components of

²¹ Cf. The Baden-Württemberg Council on Sustainable Development: *Energie aus Biomasse: Potenziale und Empfehlungen für Baden-Württemberg, Gutachten [Energy from Biomass: Potential Opportunities and Recommendations for Baden-Württemberg, an Expert Report]*, Stuttgart 2008, p. 7.

many different forms of energy technology should be preferred to the preponderance of one technology alone.²²

Renewable forms of energy

42. In European energy policy, two different strategies are currently under discussion. On the one side we find predominantly small-scale and locally integrated strategies of generating electricity and heat, the advantages of which lie in the short distances, the possibility of operating independently of a central grid and the wide variety of combinations available, like for example the integration of photovoltaic electric power generation and water heating systems (by placing solar cells in a shallow bed of moving water – a method that can result in considerable efficiency gains). An essential condition, however, before such systems can succeed in establishing themselves, is the rapid improvement of storage technology. On the other hand we find the model of an extended electricity network being put forward – a ‘super-smart grid’ embracing the whole of Europe, North Africa and the Near East. A smart grid system of this kind would always be in a position to balance out the fluctuations of supply and demand. In keeping with the principle of subsidiarity, governments should ideally not undertake the investments that are called for themselves, but should rather prepare the ground on the basis of suitable regulatory conditions and financial incentives.

43. Solving the problem of energy storage is still of crucial importance. Effective storage technology can at all events balance

²² On the evaluation of different forms of energy (coal and/or carbon capture and storage, nuclear power, renewable energy systems) from a Christian point of view, cf. also *Amos international. Gesellschaft gerecht gestalten [Social Planning Based on Justice]* 1/2010.

out short-term peaks of demand or periods when the wind drops. To deal with high-pressure weather conditions prevailing over a wide area for days or even weeks at a time, power stations will still be needed as a backup resource, at least for the foreseeable future. In this way a reliable supply can continue to be guaranteed.²³ The most suitable power stations for this are those using gas and steam turbines that have a low quota of CO₂ emissions.

44. Geothermal energy is energy stored in the earth, in so far as it may be tapped and made use of. It is practically inexhaustible, and so comes under the heading of renewable energy. It is constantly available, being independent of sunshine, precipitation, wind and weather. Geothermal heat has many advantages as compared with conventional energy sources – when used directly, for example, it dispenses with the problem of energy storage, while at the same time a high standard of reliability of supply can be guaranteed. Geothermal energy can be used both for heating and for the production of electricity. A distinction is made between surface geothermics and depth geothermics. The latter is capable, based on thorough geological prospecting, of bringing the heat contained in thermal reserves at depths of 1000 to 4000 metres up to the surface. This can then be fed into a remote heating network and so directly supplied to the consumer. The downside of geothermics is the high cost of drilling and of heat-use networks, as well as the fact that such systems are restricted to geologically suitable locations. The disturbances occasioned by drilling operations in Staufen im Breisgau and the Basel region have shown how careful we must be with

²³ Cf. International Expert Group on Earth System Preservation (IESP): *Ein Zehn-Punkte-Programm für eine nachhaltige, marktwirtschaftlich ausgerichtete und global verantwortbare Energiepolitik Ten Steps Towards a Sustainable, Economic-Driven and Globally Responsible Energy Policy*, Munich, 5 June 2010, p. 13. [p. 10].

such projects. In certain areas, however, the use of geothermics can make a considerable contribution to cutting CO₂ emissions.

Bioenergy – a renewable energy with ambivalent effects

45. Bioenergy stands for the use of biomass to generate energy in the form of electricity, heat and fuel. Biomass is a collective term covering any organic substance which is produced by organisms on the earth. This includes all plant materials growing in forests, on meadows or on fields, which as they grow absorb carbon dioxide from the atmosphere. Biomass is deliberately cultivated for the yield of bioenergy (e.g. in sugar beet, sweet corn and rape seed), or else obtained from the residue of plant materials (e.g. waste wood and liquid manure). Energy from biomass can be obtained by combustion (firewood, wood chips, pellets), by fermentation in biogas plants (organic residue, biological waste) or by being transformed into biofuels (cold-pressed plant oil, especially rape; or bioethanol from sugar beet, cereals or potatoes).

The massive expansion of bioenergy in the last decade has led to highly ambivalent consequences, so any judgment of it needs to take account of the light and shade. Here the principles of social ethics may serve as a yardstick – sustainability understood as the integration of ecological, social and economic aspects with a view to the global general good, and justice and solidarity understood as option for the poor, with a particular focus on improvement of their quality of life. These principles give rise to the key points described below:

- In biogas plants, electricity and heat are obtained in a proportion of the order of magnitude of 40% electricity (as a maximum) to 60% heat. In many cases, however, only the

electricity is used and the heat just dissipates as exhaust heat. Those responsible for authorising biogas facilities should therefore endeavour to ensure that if possible both electricity and heat shall be efficiently produced.

- The cultivation of energy crops over wide areas is associated with the risk of increasing burdens on the environment (monoculture, increase in the use of fertilisers and pesticides, water and soil contamination, the artificial limitation of biological diversity etc.), as well as with potential scarcities on the food market. So the goal should be to use farmland and raw materials in a way that is environmentally friendly, based on sustainable agricultural practice. In the conflict between fuel and food, the human right to adequate nutrition should take priority.
- The use of feed crops (like sweet corn) for energy purposes in biogas plants may lead to competition between the production of sweet corn for biogas facilities and the production of sweet corn for animal feeds, and so result in a rise in the price of the product. For a biogas plant with an output of 500 kW to operate all year round, sweet corn must be cultivated over an area of 250 hectares. Farmers in Germany would therefore be well advised to mix their crops (sweet corn alternating with lupins, say, or other legumes). Smaller, decentralised biogas facilities are also to be recommended, as they can be operated principally with organic residue and biowaste from their own or neighbouring farms.
- When we look at the global situation, the large-scale use of agricultural land for the cultivation of crops (such as sugar beet) designed for the production of bioenergy, as well as the clearing of forests for the creation of palm oil plantations, can lead to considerable restrictions on the food production of the local population and so result in social and

ecological problems. The generation of bioenergy in developing countries can only be countenanced when it is based on sustainability and tied in with development strategies that focus on the poor.

- The admixture of biofuels with petrol and diesel can only be ethically acceptable when the cultivation and processing of energy plants both within and outside the European Union is consistently based on sustainability principles.

Ethical criteria for the evaluation of nuclear energy

46. Electricity can be produced from renewable energy and fossil energy media; it can also be generated from nuclear energy, and perhaps in future by means of atomic fusion²⁴ as well. The use of nuclear energy, however, is a matter of acute public controversy. The German bishops have contributed to the debate by engaging with the ethical evaluation of nuclear energy on repeated occasions. As long ago as 1980 they issued a statement under the title of *Zukunft der Schöpfung – Zukunft der Menschheit* [*Future of Creation – Future of Humanity*], in which they argued that even if ethically acceptable methods can be found for the production and use of nuclear energy, large-scale planning that is committed to just one form of energy would still remain questionable. Better, in their view, would be several mutually complementary paths – rather than choosing to go down just one route, with unavoidable technological implications for large parts of humanity in the long-term future, and so depriving coming generations of the freedom to make their own

²⁴ Nuclear energy is generally taken to refer to energy production based on nuclear fission. But another aspect of nuclear energy is to be seen in atomic fusion. This is the attempt to replicate the sun's energy production on earth, by fusing hydrogen atoms to form helium.

decisions.²⁵ The expert report on climate change referred to earlier, dating from the year 2006, likewise attempted an evaluation of nuclear energy. Above all with a view to the problems associated with the long-term storage of nuclear waste, it expressed doubt as to whether nuclear energy could be seen as a permanently acceptable solution. Intermediate and final storage of waste, the report pointed out, is attended with severe risks and unresolved consequential problems, which in the interest of intergenerational justice should not just be offloaded onto future generations. Nuclear energy thus violates the fundamental principles of providence and proportionality.²⁶ In view of the unresolved problems of disposal, the possibility of catastrophes on a large scale and its vulnerability to terrorist attack, the use of nuclear energy is just unacceptable today on ethical grounds. The objective must be to speed up the transition to the age of renewable energy, and phase out the use of nuclear energy at the earliest opportunity. Quite independently of the number of years for which nuclear energy will continue to be used, solutions for the disposal of radioactive waste are urgently needed. The quantities of waste that have already accumulated must be disposed of safely and in keeping with socially just and ecological principles. Nuclear energy will continue to be used, moreover, in many countries. So here again, based on the principle of global responsibility, we have an obligation to set up international bodies that can make a serious contribution to the phasing

²⁵ Cf. Secretariat of the German Bishops' Conference (ed.): *Zukunft der Schöpfung – Zukunft der Menschheit. Erklärung der Deutschen Bischofskonferenz zu Fragen der Umwelt und der Energieversorgung [Future of Creation – Future of Humanity. Statement by the German Bishops' Conference on Issues of the Environment and the Energy Supply]*, Bonn 1980, p. 19.

²⁶ Cf. Secretariat of the German Bishops' Conference (ed.): *Climate Change: A Focal Point of Global, Intergenerational and Ecological Justice*, 2nd updated edition, Bonn 2007, para. 54.

out of nuclear energy, to maximising the safety of nuclear power stations and to finding solutions to the problems of intermediate and terminal storage.

Sequestration and storage of carbon dioxide (carbon capture and storage / CCS)

47. The demand for energy services will rise sharply in future worldwide – in part as a result of population growth, but also because of the need to catch up on the part of nations that are not yet heavily industrialised. In order to meet the requirements of climate protection, when it comes to fossil fuels there are three courses open to us. The first would be a drastic lowering of consumption, but this is hardly capable of being realised in the short term. Above all the threshold countries which have their own reserves in this sector can be expected to continue to rely on fossil-derived energy media. The second course points in the direction of more efficient power stations burning fossil fuels, with a view to obtaining a maximum energy output from fossil-based energy media. The third would consist in research and experiment with CCS techniques, whereby carbon dioxide is sequestered at coal-fired power stations directly, after which it can be liquefied and stored in the ground or on the seabed (though possible effects of escaping gases need to be considered in connection with this scenario).²⁷

CCS technology is far from being fully developed as yet. In the present state of the technique, it seriously reduces the efficiency

²⁷ Cf. Jochen Ostheimer: *Kohlekraftwerke ohne Treibhausgase? Zur Abscheidung und Lagerung von Kohlendioxid [Coal-Fired Power Stations without Greenhouse Gases? On the Sequestration and Storage of Carbon Dioxide]*, in: *Amos international. Gesellschaft gerecht gestalten [Social Planning Based on Justice]* 1/2010, pp. 12–20.

of coal-burning power stations. From the point of view of energy policy this means that research and development in this area should be encouraged, with a view to making more efficient use of fossil energy media and with the aim of developing more effective CCS techniques. It should be considered, in this connection, that CCS solutions can hardly be used indefinitely and so are only suitable as a temporary technical stopgap, seeing that conflicts of priorities may well arise with renewable energy strategies (in connection with the use of deep geothermics, for example). What is more, this is a method that treats the symptoms but not the cause. If we rely consistently on approaches for boosting energy efficiency and on renewable sources of energy, this will have much more rapid effects for climate protection than CCS is able to deliver. The social acceptability of CCS solutions is another criterion that needs to be fulfilled – calling for better information, more clarity and transparency about the development targets envisaged and constructive involvement on the part of the local population.

6. Use of energy in the church – signposts and areas for action

48. The church's commitment to a sustainable approach to energy also includes giving testimony through concrete action in church institutions and organisations, as well as in the lifestyle and business practice of Christians. Some German dioceses, monasteries and convents, church institutions and parishes have already been observing their obligation to deal responsibly with energy, based as it is on both creation theology and social ethics, for many years.²⁸

Church institutions and parishes can already make a real difference to their energy consumption by being more conscious of the way they use heat and electricity. A shift in everyday habits alone can bring about savings amounting to as much as 15% with little financial outlay. The introduction of EMAS-based environmental management systems²⁹ is likewise wholly aimed at a strategy of consciousness-raising, based on the registration of consumption data, evaluation of possible measures for improvement and the gradual implementation of these. With more than 500 institutions, the churches now constitute the biggest group among all organisations in Germany that operate an en-

²⁸ For a more detailed account cf. Secretariat of the German Bishops' Conference (ed.): *Climate Change: A Focal Point of Global, Intergenerational and Ecological Justice*, 2nd updated edition, Bonn 2007, paras. 58–64, as well as, by way of illustration, EnergieAgentur.NRW [Energy Agency.NRW] (ed.): *Energiesparen in Kirchengemeinden [Saving Energy in Church Communities]*, Munich 2009.

²⁹ EMAS (the Eco-Management and Audit Scheme) is a European Community system for sustainable environmental management and the auditing of companies' ecological credentials. This instrument was developed by the European Community in 1993 for companies wishing to improve their environmental performance.

vironmental management system which is audited in accordance with EU guidelines.

A whole series of dioceses have established hefty energy funds, amounting to several million euros in each case, dedicated to the investigation, scrutiny and improvement of the energy situation in church institutions and parishes. Structural projects, involving heat insulation, new windows or more energy-efficient heating systems (based on cogeneration, for example), are reducing energy consumption to a considerable degree and so making an important contribution to climate protection. The effect is being intensified by the increased use of renewable energy media in many church institutions, above all in the form of thermal and photovoltaic systems³⁰ and through the installation of increasing numbers of heating systems based on wood chips and pellets.

49. But in view of the urgency of the challenge, none of these initiatives to date has been given anything like the priority that is needed if we are to be equal to our responsibilities, and to the complex technical requirements that are essential for the innovative exploitation of opportunities in the energy sector. The church finds itself involved in a far-reaching learning process. She can at least fall back on experience accumulated in those dioceses that have been succeeding in reducing their energy consumption levels for some time.³¹ This will be dependent, in the first instance, on the determination of the diocesan authorities to pursue sustainability as a declared diocesan target and make it a priority right across the board. It is important that this

³⁰ Cf. footnote 20.

³¹ For innovative paths to sustainable church practice, cf.: the German Catholic Bishops' Organisation for Development Cooperation (Misereor), ed.: *Aufbrüche im Zeichen des Klimawandels [New Beginnings in the Age of Climate Change]*, Aachen 2010.

decision of the authorities be clearly formulated and reiterated both internally and in relation to the general public, and that effective measures be adopted with a view to the achievement of this goal. These should include the approval of mandatory diocesan guidelines for sustainability and climate protection, diocesan building and property management systems explicitly based on sustainability criteria, climate-friendly changes in the diocesan building codes and suitable adaptation of the diocesan planning permission and building subsidy procedures. Diocesan objectives can however only be reached through the cooperation of the parishes and other institutions, which should be supported on the basis of appropriate incentive systems and with the intensive support of properly trained environmental and climate protection officers, including both full-time professionals and voluntary helpers. Diocesan environmental officers and qualified church environmental auditors can supply the support and advice that is so urgently needed in this field.

50. Besides establishing sustainability as a matter of diocesan practice that is relevant at all levels, church educational work – on councils and in associations, in academies, conference centres and training establishments – is also a matter of the greatest importance. People can be won over to the cause of sustainability in the dioceses and the parishes. Everyday life, lectures and discussion groups offer opportunities of discovering connections between energy consumption and its impact on the climate, and highlighting paths to the sustainable use of energy both in a personal context and in the sphere of responsibility of the church. Various church institutions and religious houses are giving an impressive demonstration of how their trailblazing changes in patterns of energy consumption can form the basis for their own educational efforts.

51. As a social element among others, the church is moreover called on to adopt a position in discussion of the energy issue, and to make her views felt in the political debate on energy and the climate – this at municipal, federal state and national level. Based on her understanding of her own role, she is particularly concerned to act as the advocate of social groups which would otherwise not obtain a hearing, and so makes a point of representing their interests. In his encyclical *Caritas in veritate* Pope Benedict XVI pleads urgently for making energy more accessible to the poorer countries. This aspect of global justice is one that he puts on an equal footing with intergenerational justice for our future descendants (cf. para. 49 ff.).

52. The church's gaze here is directed to society as a whole – to stability and socially equitable peace, both in our own country and worldwide, both in the present and for the future. Led by the goal of global, intergenerational and ecological justice, we need an intensive engagement with the issues of sustainable consumption and sustainable energy use. These questions will be crucial in deciding our future chances of global development. A dialogue with the various social groups and academic disciplines, one in which the 'autonomy of earthly affairs' is observed – respecting the independence of specific subject disciplines and social entities – is indispensable (cf. *Gaudium et spes* para. 36). In view of the complexity of the situation in many areas, a balanced consideration of the options is called for, one in which different positions and points of view have a perfect right to exist, even among Christians. And yet it would not be sufficient if the church's statements on social and environmental ethics were to be restricted to the mere utterance of general principles. This would remain on an abstract level and would be without binding implications. Instead of this, discriminating analysis and responsibly balanced reflections may provide signposts both for the politicians and for individuals

who are trying to plan their own lives. The earthly creation, the human family worldwide and the foundations of an ecologically acceptable and decent life all call for a sustainable form of energy management. It is all the more urgent that the church define her own position and put her own principles consistently into practice.

7. Conclusion

53. The energy supply is one of the biggest challenges for the development of human civilisation. The overuse of scarce fossil fuels and nuclear energy resources and the threats of climate change are already making breaches today in global, intergenerational and ecological justice. Many people in developing countries, moreover, are blocked from open access to the energy markets.

Christian faith in creation obliges the church, as an advocate of creation, to face the problems associated with the energy issue. In the social debate on what is needed for a responsible energy policy, the following summary conclusions are crucial for a sustainable energy management system:

Decisions of energy policy must be made in the light of a triangle of objectives, having regard first to climate protection and environmental conservation, secondly to security of supply and thirdly to economic viability and competitiveness. These three goals stand in a rather tense relation to one another. Depending on the weighting given to social, economic or ecological aspects, we may arrive at different priorities. It is a quintessentially political task to strive for a balance between these prospective targets. In evaluating different energy supply strategies, the responsible and ethical approach must involve a careful consideration and comparison of the various risks, based on appropriate and discriminating judgment. When it comes to dealing with technologically occasioned collective risks, we need to have fundamental political rulings and transparent processes of decision.

To bring about a sustainable approach to energy and a transformation of the energy supply, three paths need to be followed. The first involves economies, to reduce energy consumption. A

careful approach to energy calls for a new sense of responsibility in consumers and a change of lifestyle. Secondly, traditional forms of energy must be used in a more efficient way. This gain of efficiency is closely connected with a strategy of economy – in the fields of domestic heating, mobility and power consumption, for example – and with technical innovations that will increase capacity utilisation in energy use. Thirdly, a turnaround in the direction of regenerative energy is called for. Here and in connection with the more efficient use of energy, not only academic research is required – there is also an important role to be played by energy supply companies and companies with a high rate of energy use. In addition, the energy turnaround will be impossible without the help of subsidies that are not tied to specific forms of technology, and the development (frequently a controversial matter) of the required infrastructure.

A fundamental ethical problem of energy policy consists in the fact that those who are responsible for high energy consumption are not identical with those who have to bear the consequences. It follows that the key social issue of the 21st century is closely linked with the task of justly allocating the consequential costs of energy use to those responsible for causing them on a global scale. The energy supply is a public good, which must be provided and/or effectively protected on a cooperative basis. It is a particular dilemma, in this situation, that the expenditure of some parties in the interest of climate protection and the sustainable use of energy may have the result that others can profit without any effort on their part, or can even proceed to exploit this common good on a wider scale. So national energy and climate conservation policy cannot dispense with regulations, which must be applicable at international level as well.

Changes in our use of energy constitute a crucial testing ground for justice and affluence. Here it is by no means just technical problems that are at stake. Complex ethical considerations are

also involved – between the different requirements based on security, responsibility for the creation and economic and social development. On the basis of her social doctrine, the church is fully prepared to take up the challenge of this complicated task, both by engaging with the debate in society and by practising what she preaches.