Project Planet A

A plea for ecomodernism

from:
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based on: “An Ecomodernist Manifesto“
http://www.ecomodernism.org/manifesto-english

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Contents

Introduction

In the face of a socio-politically worsening climate crisis, approaches such as "DeGrowth" and "Post-Growth Economics" are in vogue. The population is taught that they can escape global problems by renouncing them, by moving from a kind of prosperity "operational blindness" back to an energy supply based on pre-industrial principles. But is renunciation and the associated slowing down of the economy the only possible way out of this crisis? We are convinced that technical progress can solve the problem better and also secure our prosperity.

The current social consensus in Germany is striving for a global full supply of renewable energies based on modern means. However, this path leads to an undersupply of secure useful energy and endangers not only our prosperity but also possible solutions that we urgently need for climate and environmental protection. The growing world population poses increasing challenges for energy supply and environmental protection - the technologies currently in use are reaching their limits. What is needed are technical solutions that overcome these limitations - and not, for example, a "grand transformation" of society towards a socialist-dominated "common good economy" that could never be implemented globally. Progressive building blocks of a "Star Trek society" such as the much discussed "Unconditional Basic Income" cannot be realized in this way.

Our concern is to use the sciences (physics, chemistry, engineering) to show the current path as a dead end, which is being discussed by politics, NGOs and protest movements. The new ***eco-modern*** concept we advocate shows ways to a feasible nature and climate protection that combines ecology, prosperity and progress.

This plea is intended to contribute to a fundamental rethink of current approaches to solving humanity's problems with regard to environmental protection, resources and the generation of useful energy. In doing so, we attach importance to logical overall contexts instead of detailed figures or planning.

1. The principle: decoupling instead of dependence on nature

We see the fundamental problem of the exploitation of the world's ecosystems in the dependence of humans on nature. Classical ecology aims to restore and promote human life "in harmony with nature" following the pre-industrial model. Bioenergy, photovoltaics and wind power plants are intended to raise energy production to a new, nature-neutral level. The aim is also to largely preserve our progressive way of life, to which we owe our prosperity, health and freedom in a democracy, and to make it accessible to the entire human race as far as possible.

In the case of technical systems for the generation of useful energy from volatile sources of ambient energy, however, it is not perceived that these in turn require considerable resources and energy for their full expansion. Humans thus become dependent on the weather again, use large areas of land and consume many raw materials as resources, which would have to scale accordingly as energy consumption increases. This is - contrary to all currently formulated goals - the opposite of "harmony with nature".

What is conjured up as "harmony" in today's condensed perception is, in a historical perspective, rather a dependence on nature, which - far from all current ideas of "sustainability" - has led to damage to nature. One expression of this is, for example, the increasing large-scale deforestation before the industrial revolution in the early 19th century in order to secure the energy supply for a world population that had already grown to one billion people at that time. The growing "hunger for energy", e.g. due to the invention and increasing use of the steam engine in industry, initially aggravated this problem, but at the same time paved the way for a technological solution to the problem of deforestation by looking for other possibilities to make the massive use of wood as an energy source superfluous. The increased extraction and use of fossil energy sources with a higher energy density than biomass enabled people in the industrialised countries to develop general prosperity for the first time. In connection with the present plea for an eco-modern decoupling from nature, however, it is above all essential that (contrary to current "technophobia" regarding environmental protection) it was precisely technical progress which, in a first step, also led to the preservation of nature, in this case the forests.

The Second Industrial Revolution was then essentially based on the use of electricity based on hydroelectric power and further use of fossil fuels. With prosperity, the population initially grew and life expectancy increased. At the same time, more and more fossil and other resources were needed. The price for this was high: environmental pollution, CO_2 emissions and increasing scarcity of land and raw materials.

In the following nuclear age this trend towards fossil energy production continued, mainly due to the need for (individual) mobility and the construction of more fossil power plants. At that time, nuclear energy was also easier and more economical to realize with light water reactors, so the further development of fast reactors with a truly sustainable energy supply and full exploitation of their physical potential was not further advanced.

The prosperity of our modern society is still largely based on fossil energy sources. As a result, the CO_2 content of the atmosphere has increased significantly since the Industrial

Revolution. The associated anthropogenic climate change and the exposure of various pollutants to the biosphere forces us to act in addition to the resource problem and environmental pollution. The growing energy requirements of numerous countries, which are developing from emerging to industrialised countries, will exacerbate the problem. At the same time, the growing world population will only level off at a constant level of around ten to eleven billion people if we can ensure prosperity, education and health worldwide through energy supply - the latter has been proven to bring about a fall in birth rates.

But how can environmental protection be reconciled with this understandably unstoppable global trend towards greater energy consumption? This is where the aforementioned idea of preserving nature by separating it from nature through technical progress comes into play: a) the replacement of biomass (e.g. wood) and ambient energy with energy sources of higher energy density such as coal and oil must take place b) in a next step, the replacement of fossil fuels with a clean and sustainable energy source of even higher energy density. This is the only way to achieve the climate and environmental protection goals that have been set and at the same time to combine them with the need for prosperity, in which further scientific, social and societal successes are founded.

In place of a romanticizing "back to harmony with nature" which, as explained above, does not lead to the desired goal, there is thus the progress-oriented idea of "nature conservation through decoupling from nature". The development of modern agriculture shows how this decoupling can work through less land consumption and urbanisation.

2. Withdrawal from the land: an opportunity for environmental protection

When it comes to nature, the modern view of the past is inevitably a transfiguring one: it is no coincidence that medieval markets, for example, where old forms of craftsmanship, economy and animal husbandry are presented as signs of a supposedly still "healing" way of life that brings man and the environment into "harmony", are in vogue. Esoteric teachings such as anthroposophy, which forms the background of biodynamic agriculture ("demeter"), in turn contribute to spreading in society a falsifying image of an allegedly ideal, nature-conserving, "chemical-free" agriculture of "old style" - a kind of "golden age" of agriculture which could be regained by returning to small-scale, pre-industrial conditions. Organic farming is even seen as a model for global implementation in agriculture.

The problem of organic farming, however, is that it consumes more land than modern integrated agriculture. However, more land consumption for agriculture is not desirable because the loss of specific habitats is a major driver of biodiversity loss. The additional demand of the energy industry for renewable, base-loadable energy sources also leads to energy crops for useful energy production being grown on land that would otherwise be reserved for food and nature. In a diverse agricultural landscape with pastures, fields, hedges and forests, biodiversity, and thus species richness, will also increase again.

Technology and progress have made agriculture more productive and improved people's living conditions. First the invention of artificial fertilizers and later the development of better crop varieties as well as the use of pesticides offered a way out of the recurrent crop failures and famines of the past. The increased use of agricultural machinery opened up prospects for people: Many moved to the cities. From the 1960s alone, the amount of land required for grain and animal feed fell by half - but at the same time CO2 emissions increased. The direction of integrated farming, which is currently the main development, minimizes the use of crop protection products by means of technical aids and novel forms of mechanical soil cultivation, including robotics and artificial intelligence. In agriculture, green genetic engineering helps us to develop and grow drought-tolerant, pest-resistant and nutrient-rich cereal varieties. Only in this way will it soon be possible to supply ten to eleven billion people around the world with food in sufficient quantities.

Modern livestock farming uses resources responsibly and is based on recycling management and animal-friendly housing systems. Alternative protein sources such as insects could reduce land consumption for animal feed. A renaissance of extensive grazing in regions where arable farming is not economically viable would also be desirable. Meat from grazing livestock is of high quality and meets consumers' desire to consume less meat, but high-quality meat. The desire for alternatives is also met by increasingly offering meat substitutes.

A future-oriented and at the same time resource-saving agriculture with an eco-modern approach also enables us to adopt new approaches such as "urban farming" or "vertical farming" in cities, so that all types of fruit and vegetables can be grown in any part of the world on a small area and with ever fewer pesticides. Such methods make it possible for every country in the world to regain regional or at least national supply. All this also makes the "city" life model attractive again in the face of all modern "longing for the countryside" - because, according to the eco-modern approach, city and nature no longer have to be seen as irreconcilable opposites. With this new understanding of nature, nature conservation can be practiced on a completely new level.

We do not have to completely abandon the agricultural land freed up by ecomodern management, but can finally continue to cultivate it in a nature-friendly manner as a cultural landscape. There is simply no longer any compulsion to exploit them in coherent, large-scale pure crops with a high overall land requirement. We can take better care of nature and wilderness reserves, since eco-modern prosperity provides both time and resources. Where decoupling from nature reduces the pressure on landscapes and ecosystems and we are no longer existentially dependent on their economic exploitation, communities are free to decide what aesthetic or economic use they wish to make of the land. In addition to nature reserves, this includes, for example, wine and hop cultivation, orchard meadows or pasture land for livestock. In this way we can therefore protect nature, not because we are dependent on it, whatever leads to its damage and destruction, but because we value it as a habitat that ensures our well-being.

However, the withdrawal of people from the land and greater urbanisation of their living spaces in turn requires advanced energy and waste management and clean forms of mobility in order to achieve a high quality of life in cities too. While small and medium-sized cities have already become cleaner as a result of progress in the course of industrialization, megacities are struggling more than ever with dirt and poor air quality. Cities of this size can only achieve this standard of living if they have energy sources of high energy density available to create livable living and working spaces with more energy per area.

How can we ensure the increased demand for raw materials for the construction of cities and for high technology in the future? By taking another brief look back into history, we can identify today's resource problem and find a solution to it.

3. Raw material use instead of raw material consumption

The current trend towards idealization that can be observed in Germany is also reflected in the way the topic of "raw materials and resources" is handled. Similar to agriculture, a pre-industrial lifestyle with less "consumption" and fewer products is being designed as a solution for today's "affluent society". This will not be enforceable worldwide and especially in poorer societies.

One thing that is constantly being overlooked: the environmental behaviour of earlier generations, which is often used as a "model" today, had a higher per capita impact on the environment than that of today's society. The objection that the generations before us, because they were equipped with fewer technical possibilities than we are, would have shown more resource-saving behaviour can be rejected as a fallacy by pointing out that the population is much smaller than today. The population, which had grown to just one billion people as a result of progressive industrialisation, demanded raw materials from mining and cheap fuels for useful energy, which it satisfied by deforesting entire swathes of land. Only fossil fuels of higher energy density solved this resource problem and the forests recovered as a result. A more progressive approach to environmental protection was the basis for the sustainable forestry that is still practiced today.

At the same time, industrialisation made increased mobility possible: railways, cars, freight transport, aircraft and cargo ships. New fossil fuels such as oil and gas fuelled progress and innovation. The most groundbreaking inventions and scientific successes were launched after industrialisation, partly because increasing prosperity and decoupling from agriculture enabled a large number of people to devote themselves to these issues in large numbers. Our current standard of living is based on these foundations. However, this progress and the population growth to now eight billion people worldwide has resulted in resources becoming increasingly scarce with the means of the classic raw materials economy and their extraction and use causing environmental problems.

In physical terms, however, there is no resource problem and thus no raw materials problem: the number of atoms of certain elements in the earth's crust always remains the same because atoms are indestructible unless they are bombarded with neutrons or fused together. Even after processing into products and even after combustion processes, all atoms of the stable elements of the periodic table remain on earth in their original quantity. They are only found, for example, as smartphones in the drawer, in the scrap yard, on rubbish dumps, in toxic waste and also in electronic waste, which we export backward to developing countries for "cannibalization". So we basically only have a recycling problem. The aim should be that we close these raw material cycles completely where it makes sense to do so.

The problem is that we cannot efficiently break down the molecules "produced" by us, of which all materials consist, into their individual parts (atoms) again due to the lack of cheap useful energy. A possible process here, in addition to microbacterial decomposition of organic molecule chains, would be plasma gasification at sufficiently high temperatures to crack all molecular bonds. Toxic waste can also be easily broken down into its elementary parts in this way. In order to recover metals, pyrochemical processes could then be used to partition the "element soup" into the individual elements of the periodic table, which would then be available to us again as raw materials. For other organic wastes, other processes tailored to them, such as the Fischer-Tropsch cycle, would be interesting. However, all these and other processes for material recycling require sufficient energy, which must also be available to us.

Other scarce resources such as fresh water also present us with new challenges. Seawater desalination is an effective method of extracting fresh water for irrigating eroded land, reclaiming it and improving soil quality through reforestation. Drip irrigation or a climate-controlled environment for plant cultivation also enable us to save fresh water. "Geoengineering" methods, such as the large-scale promotion of seawater evaporation for humidifying coastal areas or, in extreme cases, the release of aerosols into the atmosphere to reduce the greenhouse effect, are also conceivable. These methods, as well as the transport of water over long distances and the purification of waste water, also require useful energy, which we will have to provide in future in large quantities and with the lowest possible input of pollutants into the biosphere.

We regard such technological and also energy-intensive approaches as indispensable to solve the waste and resource problem of mankind. The availability of sufficient useful energy is therefore a prerequisite for solving many of these problems. In the following, we will show what possibilities there are for an energy supply that can cope with such tasks.

4. 100% renewable energies - a dead end?

The goal currently being pursued by society and politics, namely the global generation of useful energy from 100% renewable energies (biomass, geothermal energy, hydropower, ocean energy, but mainly solar energy and wind energy), takes into account neither the necessary space requirements for predominantly photovoltaic and wind power plants nor the raw material requirements for the construction of all components of the overall system. Solar and wind energy are volatile, i.e. highly dependent on the weather. For this reason, a supply-secure system on this basis includes pumped storage, (battery) storage, Power2X systems as well as backup power plants, which must ensure the residual power requirement if the sun and wind are not available and, last but not least, when the storage facilities are empty. An energy supply system designed in this way would exacerbate the raw material problem already described. We would "install" an extremely large number of raw materials, including rare ones, in these plants and would still not have the necessary amount of energy left over to economically recover these and other raw materials in a closed raw materials cycle. This additional demand for useful energy would have to be scaled up again immediately via the "renewable energies" route, with corresponding additional space requirements and raw material costs. Contrary to all current politically desired goals, the impact on the environment and nature is thus massively increased by this enormous resource and space requirement, which is hardly realizable in the final stage of development.

A not negligible indicator for the economic efficiency of a system for energy generation is the harvest factor (EROEI, Energy Return On Energy Invested). This indicates how much energy a power plant can generate over its lifetime in relation to the energy used to build, operate and dismantle it. The EROEI of a 100% EE overall system including the necessary energy-converting storage and backup peripherals is considerably lower than the individual EROEI of the photovoltaic and wind power generation systems it contains. However, the higher the EROEI, the higher the added value and the attainable standard of living. A decrease of the EROEI below the value for the use of fossil fuels would therefore be a bitter step backwards for society.

We see the limited annual output of factories and their scaling possibilities as a further obstacle to the rapid implementation of an energy supply with 100% EE. Due to the high material and energy input, the required plants cannot be produced in the required numbers in a short time.

An energy industry with 100% renewable energy has another interesting side aspect: due to the large number of plants required because of the low energy density, more and more people are employed in this industry - but we are following the path of a pre-industrial society and employ many people to secure elementary livelihoods. In an eco-modern society, however, these tasks should be performed by machines and as few people as possible.

However, it is decisive that, due to the gigantic consumption of land and resources of the 100% RES approach, an additional energy requirement is not easily scalable. There is virtually no growth potential. All model calculations on the supply of 100% renewable energy to a society are based on scenarios with massive energy savings, which would hardly be feasible in this form locally or globally. Many industrialised countries, which are not least expected to produce precisely the plants needed for this purpose, consume more energy than they can theoretically produce from renewable energies. This is a dilemma, but there is a way out of it: the solution lies in energy sources of high energy density and high harvesting factors.

5. Progress with high energy density energy sources

“Plentiful access to modern energy is an essential prerequisite for human development and for decoupling development from nature.”
(from: An Ecomodernism Manifesto)

The solution to many problems lies in the provision of abundant and CO_2-free useful energy. In our view, the only primary energy source that can take the next evolutionary step described above for a world population of up to eleven billion people in terms of eco-modern climate and environmental protection is nuclear energy. It is also the most sensible solution from a physical point of view: instead of generating heat energy only by exothermic reactions from weak molecular binding energy (burning fossil fuels to produce CO_2, among other things) or - even more costly - collecting material-intensive secondary ambient energy (sun and wind) and converting it into useful energy, nuclear energy uses nuclear fission or nuclear fusion according to Albert Einstein's famous formula $E=mc^2$ to convert mass into energy. The usable amount of energy from one kilogram of uranium, thorium or deuterium/tritium in fusion is therefore millions of times higher than from the same amount of fossil fuels. In a decarbonised energy economy, the use of nuclear energy also no longer causes CO_2 emissions.

The use of nuclear energy in light-water reactors to date is cost-intensive compared to its physically achievable potential and allows it to use only 3.5% of the total enriched fuel material and also only one specific uranium isotope U-235 (contained in natural uranium at only 0.7%). As a result of the enrichment process, about five times the amount of the material processed in fuel rods is additionally produced as residual material (depleted pure uranium U-238). The U-238 contained in the fuel rod also remains in the fuel rod with a proportion of about 94.5% after about 2% of it has been transformed into actinides or directly split. In the end, only about 1% of the natural uranium produced is used for energy production in light water reactors.

Because of the actinides produced by incomplete use, the "spent" fuel rods would have to be stored for hundreds of thousands of years until their radioactive radiation has decayed to harmless levels. Light-water reactors up to and including Generation III were not inherently (passively) safe, but can achieve this safety level with modern design of this type both during operation and when removing the decay heat. Despite the two largest accidents in Chernobyl and Fukushima, conventional nuclear energy has so far been the method of useful energy production where, for the same amount of energy produced, far fewer people have actually been harmed than in the use of fossil fuels, for example through lung diseases and poisoning, accidents in mining and in extraction in general.

In addition to the use of modern Generation III(+) light-water reactors, we must continue along the path of nuclear energy with new, modern Generation IV reactors, which should in principle operate inherently safely, and intensive research into nuclear fusion, rather than rejecting it on ideological grounds. With fast reactors, we can energetically use the nuclear waste stored worldwide from light water reactors, depleted uranium and also material from nuclear warheads, while still obtaining valuable raw materials such as rare earths. In the end, all that remains are fission products which, compared to the final storage of previous residual materials for almost half a million years, would only have to be stored for a few centuries in their safe containers in the existing interim storage facilities, so that a classic final storage facility would be superfluous. Moreover, even these residual materials can be almost completely defused radiotoxically by suitable measures. The stocks of residues from light-water reactor technology currently in interim storage alone are calculated to be sufficient to provide us with a full energy supply for several centuries. By the time these materials are used up, nuclear fusion will probably also have long since begun.

Modern use of nuclear energy also involves considerably lower material and resource costs per megawatt hour generated, even less than with conventional reactors. Built safely and in series and, above all, politically supported, modern reactors will also cause the price of nuclear energy to fall massively again, which is also understandable from their physical basis. Modern, inherently safe reactors of compact design also have a high degree of controllability, which, as with gas turbine power plants, can be designed to be directly load sequence-dependent.

Only with abundant CO2-free energy and high harvest factors will we be able to reduce CO2 emissions worldwide effectively and without destroying our societies. To achieve this goal, nuclear power can certainly be combined with renewables, for example, excellent with hydroelectric power and local generation from renewables. We also see photovoltaics as a partner for modern and also controllable nuclear power. As a compact source of useful energy for industry, nuclear power also offers the possibility of producing photovoltaic modules, for example, in a CO2-neutral manner at low costs never before achieved, so that they can be used in a sensible decentralized manner in various internal consumption scenarios.

With appropriate district heating networks, the waste heat from the reactors can also be used directly as process heat for industry and also to supply heat to households, which together with electricity can already cover 50-70% of the energy requirements of industrialised countries. However, the high temperatures of the process heat of modern reactors can also be used to directly synthesise hydrogen or synthetic fuels for heavy-duty vehicles, ships and aircraft, in order to operate them in a CO2-neutral manner in parallel with increased electrification of the transport sector. This would almost completely cover the energy demand. Reactors are still well suited for larger ships and spaceships. Sufficient inexpensive useful energy also makes plasma recycling, as mentioned above, economically viable in order to finally close the raw material cycle completely and transform our "raw material consumption" into "raw material use".

Sufficient cheap useful energy will thus give us the scope to raise our world to a new level of prosperity - the resulting innovations will in turn further decouple us from nature and at the same time protect and preserve it as our living space, which would also be globally just and ethically necessary. An increasingly discussed colonization of other planets in the solar system and even exoplanets is unthinkable without this fundamental approach.

Only with such a decarbonization and further development of the energy supply, which is open to technology and thus as fast as possible, can the sensible goal of ecomodernism be effectively advanced: the decoupling of man from nature. With regard to future policy, the central question will therefore be whether we want to restructure our society in a spirit of renunciation or choose the path of progress outlined here with abundantly available useful energy.

6. Ecomodernism in politics

We perceive today's politics as being driven by an understanding of nature conservation and climate protection, which is increasingly fed by extremes and ideologies. In the absence of possible solutions, however, this approach tends to lead to more and more dogmatism and populism - both of which, viewed from the perspective of society as a whole, lead to tendencies towards division and intolerance. The use of modern technologies that ensure environmental protection and prosperity and thus contribute to solving the problems will be better received by the people than mere prohibitions and restrictions that are basically only an expression of a lack of political perspective. The renunciation of comfort, mobility and progress could also only be achieved globally with an undesirable political form of autocracy or even dictatorship.

The inestimable advantage of ecomodernism is that it is not based on the renunciation of consumption and bans, but on offers and opportunities. However, the technical progress of an ecomodernity needs political framework conditions that open a path to these opportunities. Above all, the fear of the new forms of nuclear energy must be taken away from the world population in order to actively promote it with its possibilities. Measures such as a CO2 tax at an effective level can guide innovations in the right direction, open to new technologies.

Nor should such a will to modernise be mixed up with simple recriminations against capitalism, neoliberal economic policy or the power of corporations. We reject these simplifications just as we reject the striving for the opposite, a neo-socialist planned economy based only on renunciation or asceticism.

Modernisation and progress mean qualitatively higher prosperity through, among other things, improved health systems, better resource productivity, economic cooperation, sustainable value creation and personal freedom. The technologies described above enable us to satisfy material and cultural needs with less resource input and less impact on the environment. More productive economies that are allowed to "grow" are also socially richer, as they are more willing to invest their profits in non-economic amenities: in social welfare, health systems, art, culture, education and nature conservation - and even in new care systems such as the Unconditional Basic Income. However, this can only succeed with general added value through sufficient available energy with high harvesting factors and with the help of appropriately operated machines that relieve us of work.

Last but not least, ecomodernism is a plea for a science-based and humanistic world that sees facts as the basis of democracy. It continues to maintain pluralistic and liberal democracies, since its policies do not have to intervene in life habits in an authoritarian and restrictive manner, but can at best have a regulating effect. Such a foundation of a world worth living in and with freedom makes ecomodernism all the more desirable.

7. Why ecomodernism?

People have always used their innovative abilities to free themselves from predicaments. Be it the development of the wheel, agriculture and livestock farming, or industrialisation: challenges fired man's imagination and inventiveness, made him invent new technologies in recourse to research and science to secure his standard of living and protect himself from environmental influences. However, progress has always brought about destruction - the consequences for the environment are now more visible than ever.

The pressing environmental problems of our time present us with the greatest challenge of all: we run the risk of destroying our living space because our handling of resources is no longer up to date. The central idea of ecomodernism, to reduce the human influence on nature, together with the provision of clean and abundantly available useful energy (for the production of which we already have the strongest elementary energy sources in the universe known to us) is the basic prerequisite for the sustainable use of our resources. We are assisted in this by the fact that, compared to previous generations, the number of people living on our planet will stabilize in the foreseeable future due to prosperity and thus also the demand for resources.

Scientific knowledge, research and development provide us with the framework conditions to make the right decisions for an eco-modern future. Fear of progress is a bad advisor, because it would mean neglecting research and development and losing sight of real opportunities. In the globally networked information age, we run the risk of reacting to challenges with naïve actionism and panic. We are only calming our own conscience and contributing nothing to the solution of a global problem if we act locally as moral role models for our fellow human beings.

"Think global, act global", on the other hand, is the maxim under which we must tackle this global and central task to secure our existence. The Apollo program shows what forces and possibilities can be mobilized when it comes to creating seemingly unimaginable things - the moon landing was only possible because people did not shy away from intellectual and technical challenges, but used all available forces and possibilities to achieve the set goal. Riding a bicycle alone will not save our planet: the combination of research, development and optimism about progress, as characterized by the eco-modern concept, shows us a sensible and feasible way to solve this great task of our time.

Then we will not have to resort to a "Planet B": If we use the resources available to us sensibly and thus successfully, "Planet A", this our earth, will continue to be our home in the future.