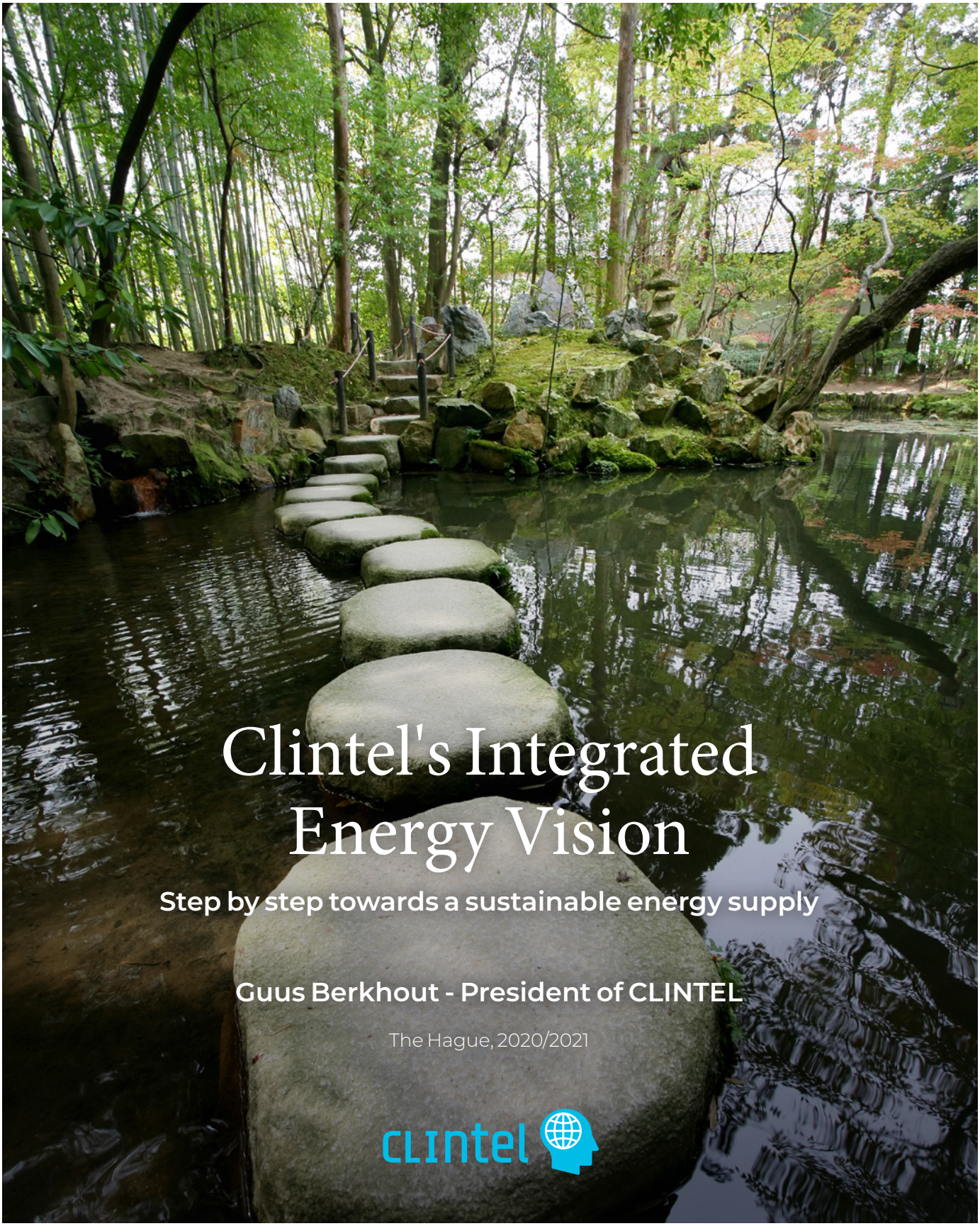

Clintel's Integrated
Energy Vision
Step by step towards a sustainable energy supply
Guus Berkhout - President of CLINTEL
The Hague, 2020/2021
CLINTEL

PREAMBLE

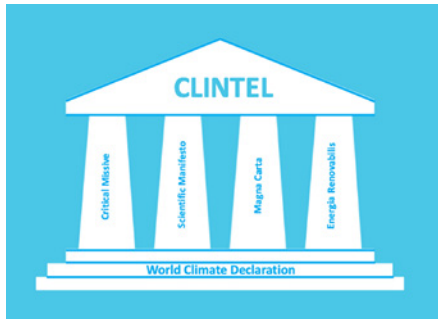
The Climate Intelligence Foundation (CLINTEL) was founded in March 2019 by emeritus professor Guus Berkhout and science journalist Marcel Crok. Since then, CLINTEL has grown into a global organisation in over 36 countries with 23 ambassadors.

Climate change is a global phenomenon and CLINTEL therefore wants to function as a global organisation, thereby considering the different cultures around the world. CLINTEL has drawn up the World Climate Declaration (WCD) with a number of internationally renowned scientists, including Nobel Laureate Ivar Giaever. The WCD has now been signed by more than 900 scientists and professionals; new applications continue to come in.

Without excluding anything in advance – such as a human influence on the earth's climate – CLINTEL wants to take all scientific points of view seriously and thus brings together scientists with different points of view. To this end, CLINTEL applies the 'Audiatur et Altera Pars' principle.

CLINTEL wants to enter into a discussion with leading scientific organisations. It has written a Crtitical Missive with a message to World Leaders and influential billionaires, a Scientific Manifesto with a message to Academies of Sciences, a Magna Carta with a message to universities and an Energia Renovabilis (this document) with an energy message to Academies of Engineering as well as all (supra) national governments in the world. Together with the WCD, these documents form the fundament and pillars of the CLINTEL-temple.

CLINTEL states in the WCD that there is no climate crisis. We have ample time to carry out research to reveal the true causes



of climate change. In the meantime, we just need to improve the climate models and invest in adaptation technology. On the other hand, CLINTEL does speak of an energy crisis, because in a short period of time the excellent energy infrastructure of prospering countries will be turned upside down due to a supposed climate crisis, with major negative consequences for the economies and landscapes in those countries. According to CLINTEL the energy crisis needs to be avoided at all cost.
With so many excellent scientists within the CLINTEL community, it is impossible – and also undesirable – that everybody has exactly the same view on the climate system. With so many uncertainties there will always be a range of nuances around our agreed Declaration. We all agree in CLINTEL that:
– There is no climate emergency. We have ample time to improve our climate models (for a better understanding of the factors that regulate the climate) and to search for better adaptation technologies.
– The influence of CO_2 on global warming is overestimated and its influence on greening is underestimated (even worse, it is often ignored). Nobody knows what the optimum value of atmospheric CO_2 concentration is, but from a geological point of view we may conclude that we live in a time with historical low concentrations. Again, there is no climate emergency.
– There is an energy emergency. Decarbonisation policies – in terms of the current energy transition – are most destructive. They do much more harm than good. These energy policies must be terminated immediately.
– The new generation (III and IV) nuclear power plants ought to get all our attention. These plants promise low-priced, reliable, safe and clean energy. In combination with natural gas nuclear energy is a 'No Regret Solution'. Wind and solar energy are at most niche technologies. Their contribution is and will stay marginal.

With respect to the energy transition, CLINTEL emphasises that there exists not something as a global uniform energy system. Every country needs a tailor-made energy system depending on its geography, mineral resources, development phase, industrial specialization, population density, etc. For instance, The Netherlands – being a very densely populated country and being severely divided on the CO_2 issue – it looks like the new generation of nuclear power plants may function as a breakthrough in the political process:
1. For hard liners who are convinced that anthropogenic CO_2 is the cause of climate change, nuclear energy is attractive because CO_2 emissions will be marginal;
2. For hard liners who are convinced that not anthropogenic CO_2 but natural variability is the cause of climate change, nuclear energy is attractive because it provides an excellent solution to the great demand for safe, clean, reliable and affordable energy.
Looking at the excellent Dutch gas infrastructure, a combination of natural gas and nuclear energy will be a 'No Regret Energy policy (NRE-policy)' for The Netherlands. I hope that CLINTEL's Dutch energy vision will function as an inspiration for other countries.

Clintel's Integrated Energy Vision

Step by step towards a sustainable energy supply

Guus Berkhout - President of CLINTEL

The Hague, 2020/2021

Dr A. J. (Guus) Berkhout is professor emeritus of Geophysics, chairperson of the Climate Intelligence Group. He is also a member of the Royal Netherlands Academy of Arts and Sciences (KNAW) and senior member of the Dutch Academy of Engineers (AcTI).

Together with a team of energy experts, CLINTEL has formulated an integrated energy vision, including a 'No Regret Energy Policy' (NRE-policy). This combination of green electrons and green molecules should establish the energy supply (generation, storage, transport) of the future: safe, clean, reliable and affordable. The uniqueness of the proposed policy is that progress is not dependent on the climate debate: energy transition and climate policy are decoupled. This document shows the result for the Netherlands. CLINTEL hopes that its energy policy will be adopted by all Dutch political parties. CLINTEL also hopes that its energy vision will inspire other countries.

MESSAGE TO THE CITIZENS OF THE NETHERLANDS:

1. We believe that the Netherlands should cherish its energy-intensive enterprises and not, with a nonsensical energy policy, chase them away.

2. We also believe that the Netherlands should protect its vast coastal and polder landscape and does not destroy it by continuing its nonsensical energy policy, being based on an abundance of windmills and solar panels.

3. In order to achieve this, the Netherlands must embrace the new generation of nuclear power plants. Nuclear power requires little space (500 MW/km²) and has the world's most stringent safety and waste regulations. New generation nuclear power stations will be safer and cleaner than ever before. The electrical energy and residual heat are a cheap and reliable source of energy.

4. With an abundance of cheap, top-quality electrical energy, we can produce green gas from existing raw materials, using the perfect Dutch piping network and simple high efficiency boilers at people's homes. The future is: the combination of truly green electricity and truly green gas. Solar and wind energy should stay niches in our country.

5. CLINTEL challenges the younger generations to lead the Netherlands to a new Golden Age with our proposed NRE-policy.

On behalf of the CLINTEL-team of energy experts,
Guus Berkhout
President CLINTEL

LEFT HAND SIDE PICTURE: ALTA WIND ENERGY CENTRE: 240 GWh/KM2/YEAR (LT: 20 YR)
RIGHT HAND SIDE PICTURE: MOCHOVCE NUCLEAR POWER PLANT: 4600 GWh/KM2/YEAR (LT: 60 YR)

ENERGY SYSTEM DETERMINES THE LEVEL OF WEALTH

THE TOP-DOWN ENERGY TRANSITION IN GREEN DEALS WILL RUIN THE NATURAL ENVIRONMENT AND WILL RAISE THE AMOUNT OF POVERTY IN THE WORLD.

'Planet Earth provides us with an incomparible beauty. Let us be good stewards and stop misbehaving by cutting down forests for wood burning and destroying landscapes by planting an abundance of wind turbines and solar panels'

SUMMARY

It is a hard fact that a country's economy and level of prosperity are primarily based on the reliability and affordability of the national energy supply. That is why the first requirement of any energy transition plan should be to improve reliability and affordability and prevent any decline. This is certainly true for countries, such as the Netherlands, which have built up an excellent energy infrastructure over the last century.

Therefore, we should definitely not take any risks with our energy system. If the energy supply woulf fail, organisations in most sectors would be forced to put all their operations virtually on hold (industry, transport, safety, health care, drinking water supply, etc.). An inadequate energy infrastructure would mean that the Netherlands – relying heavily on exporting goods and services – will become a poor and unhappy country.

A well-considered energy transition will therefore have to be innovative and led by true experts in the field of energy supply. Ideological agendas and subsidy-driven business models are literally life-threatening. In addition, energy transitions should never be implemented internationally. After all, each country has their own assets (e.g. hydropower), restrictions (population density) and economic strengths (industrial specialisation).

What makes the current Dutch energy transition plans so alarming is that this transition is mainly based on

(i) the model hypothesis that CO_2 is the dominant factor in global warming,

(ii) the belief that if we do nothing it will end in disaster and

(iii) the conviction that rapid decarbonisation is the only solution.

This all-decisive decarbonisation urgency means that we are rapidly turning our whole society upside down, risking that everything we have built up in terms of prosperity and well-being after World War II will be dismantled again in a short period of time.

Experts strongly disagree as to whether decarbonisation will have a worrying impact on climate change. However, what we do know is that CO_2 plays an indispensable role in sustaining life on Earth. Are the advantages of higher CO_2 concentrations not greater than the possible disadvantages of additional warming?

CLINTEL will come up with a solution that does not require an answer to that question.

Part I gives a summary of the Dutch energy system in 2020, with a critical assessment of the state of affairs. From there it appears that sources with a low energy density are totally unsuitable for densely populated countries/regions with a high level of prosperity, such as the Netherlands.

Part II presents the highlights of CLINTEL's energy vision for the Netherlands, including its proposed 'No Regrets Energy policy' (NRE). It is neither the UN, nor the EU, but the Dutch citizen whose voice should be heard. The Netherlands needs to pursue a sustainable energy policy that is realistic and suits the nature and characteristics of the country and its people.

Thermodynamically speaking, wind turbines are inferior energy producers. A country should never connect them to its national electricity grid. Thermodynamics is the responsibility of a technical scientist. Why have Technical Universities never warned the public against this inferior solution? Even worse, they are part of it!

Based on 2019 figures, as published by the Central Bureau of Statistics, CBS.

Wind turbines are becoming bigger and bigger and their influence on the quality of our living environment is intensifying. Think of noise and landscape pollution, and also of the turning cast shadow. In countries where the population density is high, wind turbines are not an option. People that are against these turbines are in the right.

PART I: CURRENT SITUATION

ENERGY CONSUMPTION 2019

The total Dutch energy consumption (oil, gas and electricity) has been fairly stable for some years and amounts to 145 kWh/day/inhabitant (kWh=kilowatt hour). But that is a gross number. Some 20 kWh/day/inhabitant fossil fuel is used as a raw material for the petrochemical industry, and some 30 kWh/day/inhabitant is lost during conversion and transport. If we subtract those figures, the net primary energy consumption in 2019 was approximately 95 kWh/day/inhabitant.

The Netherlands has 17.3 million inhabitants, so the total net energy use is 95 x 17.3 = 1.65 million MWh per day (1 MWh = 1,000 kWh). A year has 365 days, so during one year the Dutch use 1.65 x 365 = 600 million MWh. Because 1 MWh equals 3600 MJoule, the net use in the Netherlands comes down to annually 600 x 3600 = 2160 PJoules (1 PJoule = 10^{15} Joules).
It is hard to imagine such gigantic numbers. That is why CLINTEL likes to calculate gross and net energy consumption per day per inhabitant in kWh (145 kWh and 95 kWh respectively). Of course, this does not mean that every inhabitant uses the same amount of energy. The numbers are avarages and include usage in all sectors of Dutch society. Note that the Netherlands is an energy-intensive country as it has an export-economy.

If we look at primary energy sources, we see that fossil fuels are responsible for 89% of all the energy that is used in the Netherlands, of which 41% is natural gas, 38% oil, and 10% coal. The remainder, 11%, is a mixture of biomass, nuclear energy, wind and sun. Please note that electricity is not a primary, but a secondary source of energy, just like hydrogen. Electricity is generated by primary sources.

ELECTRICITY USE

If we look at it in more detail, Dutch energy use consists for 20% of electricity (electrons are the energy carriers), and for 80% of oil and gas (molecules are the energy carriers). In recent years, the annual electricity consumption in the Netherlands has increased to 120 million MWh (19 kWh/day/inhabitant). The ongoing electrification of society means that this figure will further rise. Which primary energy sources are being used to produce so much electricity? According to CBS (the Dutch Central Bureau of Statistics), the breakdown in 2019 was as follows: coal and gas 77%, wind and sun 13%, biofuel 5%, and nuclear 5%. By way of illustration, a few examples of every day electricity use per second (a human being uses about 0.5 kW doing heavy physical work):

- Iron 1 kW
- Vacuum cleaner 0.6 - 1 kW
- Plate on an electric cooker 1 - 2 kW
- Electric bicycle 0.5 kW
- Medium class car 75 kW

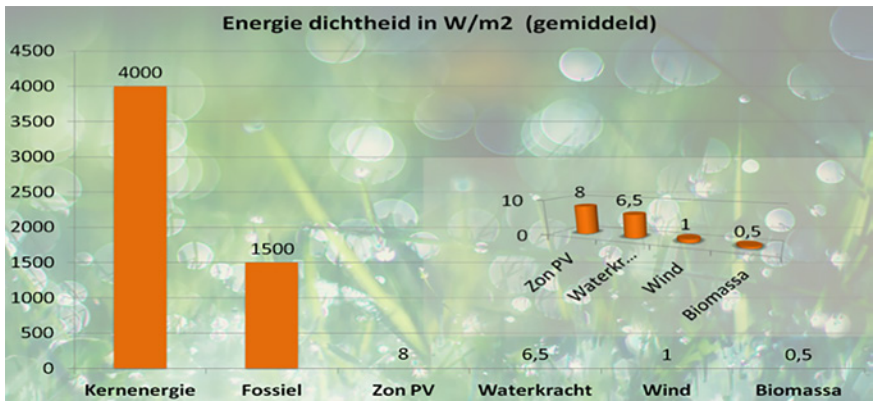
There is no electricity grid per energy source, which would make you know exactly from which source you draw your electricity. The combined electricity generated from all the different primary energy sources goes into the same grid at the same time. As electrons cannot be marked, consumers won't be able to make distinctions. For example, someone who 'fills the tank' of his green plug-in car with electricity, should realise that 87% of it comes from wood pellets, coal, gas, biofuel, and nuclear energy, and 13% from sun and wind. Note that the latter is only 2.6% of the total energy consumption. The same percentages apply to so-called 'green' heat pumps.

ENERGY POLICY IN FORCE

The current Dutch energy policy is aimed at reducing CO_2 emissions. By 2030 this should be 49% less compared to 1990 (the so-called decarbonisation target). That should be accomplished by decreasing energy losses, and by replacing primary energy sources, such as coal, oil, and gas, by biomass, sun and wind. The government has granted a long-term subsidy worth € 700 billion (approximately € 40,000 per inhabitant). Further on we will reveal how (un)sensible and (un)realistic that energy policy is in terms of feasibility and affordability.

ENERGY FROM BIOMASS

Woodchips are used in biomass and coal fired power plants as an extra source of energy. Wood produces less energy than, for example, coal. A lot of wood is needed to produce only 1 kW/h, therefore a huge number of trees have to be cut down for just one single day of energy. Resistance is increasing rapidly, because ecological systems are being destroyed, and the CO_2 gain is just theoretical; it exists only on paper. Moreover, burning woodchips is very polluting. Even environmental movements have turned against this so-called 'green solution'. Burning biomass will hopefully soon be something of the past. After all, by subsidising biomass plants with €11 billion, the Netherlands is actually funding its own environmental pollution. That is bizarre. Who still wants to continue with large-scale wood burning is deliberately irresponsible.



This graphic shows the desirability of nuclear power plants, particularly in densely populated countries/ regions.

It also shows how undesirable wind turbines and solar panels are.

WIND AND SOLAR ENERGY

Can wind and sun replace fossil energy completely in the future? In the Netherlands we had a critical look. These are the main points:

WIND ENERGY

It is a misconception that electricity from wind power can be treated the same way as electricity from a classic power station. The Dutch power grid is based on an AC (alternating current) at 50 Hz. This fixed mains frequency is an important reference for the interconnected network, which enables power plants to switch on extra turbines at different locations. The grid is fed by large rotating generators (driven by steam turbines), rotating with a constant speed within narrow limits, which ensures a constant mains power supply at a fixed 50 Hz frequency. The turbines are automatically turned on and off when the demand for electricity increases or diminishes, so production follows demand! The large rotational mass of all interconnected steam turbines is an important means of protection against sudden power outage. Therefore, until recently, power supply has been very stable and reliable in the Netherlands, which contributed to the country's wealth.

Energy production with wind turbines does NOT follow demand! Which makes using wind energy a totally different game. Clearly, wind power is a product that requires expensive post-processing before it can be made usable as a fully-fledged sustainable power source in the grid. As a result, the economic value of wind turbines is far below that of classic power plants. When we charge costs and forget about subsidies, then each wind turbine is responsible for reducing wealth in society. Therefore, wind energy is not possible without everlasting extensive subsidies:

https://fredudo.home.xs4all.nl/Zwaaipalen/De_economie_van_windenergie.html

Scan this QR code with your smartphone's camera to follow the link.

Post-processing should in principle consist of energy-storage in periods of strong winds and energy-return when the wind becomes weak. Such energy storage does not exist in the Netherlands. This won't change soon, because a suitable technology does not exist yet. Conventional energy production will have to fill the gaps, which is why it is expected that traditional power plants cannot be missed at all. In other words: In addition to the existing electricity system, a second very expensive system is being built, which on top of that produces electric power of an inferior quality, which increases the chances of power outages. Look for example at what is now happening in California and Germany (See Fritz Vahrenholt's new book 'Unerwünschte Wahrheiten').

Compared to other generators, wind turbines are in fact rather primitive. They need an almost exact 50 Hz reference of classic power plants to enable power transfer to the grid. Without that reference they fall out. However, wind turbines are incapable of delivering an accurate power frequency. Because of wind dependency their rotation speed varies too much. A grid exclusively consisting of 'dumb' wind turbines does not exist. Before connecting, intelligent extra parts need to be added.

Like its policy with biomass plants, the Dutch government wants to continue with wind energy, using an increasing number of wind turbines to generate power, without realising (at least publicly) that this shall lead to a more inferior energy system. Conventional power plants are needed to ensure a constant flow of electricity, but bear in mind that fuel revenues will sicnificantly decline in a back-up mode. This means that the desired nominal CO_2 reduction cannot be achieved (The Paris Climate Agreement aims at a 49% reduction by 2030!). Hydrogen has been presented as the ultimate solution. However, because there has hardly been any prior research, nobody knows for sure whether this can work energetically and, if so, what kind of revenues could be expected. As important is the answer to the question what the cost would be.

Apart from the restrictions outlined above, the installation of wind turbines will lead to other anomalies. Today's medium-sized wind turbines have a full load capacity of 4 MW. That is 4 x 24 = 96 MWh per day. The experience with existing wind farms (CBS figures) shows that, on average, only 30% of the theoretical energy yield is transferred to the grid (less on land, more at sea). The energy yield from a wind turbine is not 96 MWh but nearly 29 MWh per day. The combined Dutch inhabitants and Dutch companies use net 1.65 MWh per day (95 kWh/inhabitant x 17.3 million residents). To supply enough energy the Netherlands would need 57,000 of those wind turbines. In addition, all existing 2,320 turbines will have to be replaced within ten years from now. Therefore, folowing the Paris Climate Agreement means that thousands of new wind turbines have to become operational annually. Just installing them is expected to cost tens of billions of euros per year. Furthermore, considerable cost should be added for integrating wind power into the electric grid (connection) and adjusting existing electric power distribution. The necessary budget will have to be increased drastically to accomplish this. The bill will be presented to the tax payers, but in return they will receive power fall-outs! Why is the Dutch government doing this to its citizens?

The Netherlands: surface area: 41,543 km² (18% of which is water). Population: approx. 17.3 million. Population density: 416/km². Should all Dutch citizens be forced to live near wind turbines?

Unfortunately, there is more misery. With 57,000 wind turbines of 4 MW capacity, a turbine density of 1.3/km² is involved (larger turbines seem to be favourable, but according to ECN that won't pay off, because they will cost more than they might yield). A density of 1.3/km² means that wind turbines ought to be built in almost every corner of the country. Most residents would then live under the direct influence of a wind turbine. The result: a total destruction of our environment. The disappearance of the unique Dutch landscape, the irritating noise of wind turbines and the large amounts of tax payer's money that is required to operate them, make the introduction of wind energy on a large scale a far from desireable option. Again, why is the Dutch government doing this to its citizens?

SOLAR ENERGY

Is solar energy the answer then? The experience in the Netherlands shows that a standard PV solar panel of 1.65 m² delivers only 0.6 kWh of energy per day. Therefore, in total we would need 2.7 billion standard PV solar panels to guarantee that the required energy levels are met. That is exclusive the back-up power plants! So far, 13 million panels have been installed, at the end of 2020 that number should have increased to 20 million. If we consider the small surface area of the Netherlands, just 41,543 km², that will ultimately add up to a panel density of approximately 60,000/km². Again, like wind energy, this is a very unrealistic scenario, and far from desirable.

Yet another illustration. A field of 2.5 acres with standard solar panels supplies 500 MWh of intermittent electricity in the Netherlands annually. A traditional power station with a capacity of 1200 MW does so in less than half an hour! And, also interesting, 2.5 acres of arable land yields 25 tonnes of potatoes.

RELIABILITY

Now the most important issue. Solar and wind energy have to be stored, to compensate for a lack of energy production when there is little wind or sunshine, which is often the case. There is no affordable solution yet. Batteries? We would have to spent some €2 billion for just one day's storage of solar and wind energy. Hydrogen then? This energy carrier is often referred to as the ideal en-

The extremely low energy density of wind energy destroys beautiful nature reserves.

ergy buffer. But we have to realise that the conversion of electricity to hydrogen, storage under high pressure, and then back to electricity, means losses up to 70%. So, even more wind turbines and solar panels will be needed than originally anticipated. Using hydrogen makes wind and solar energy even less affordable and, therefore, 'green' plug-in cars and heat pumps even more nonsensical. At CLINTEL we cannot make this picture any more attractive. Bear in mind, the more wind turbines and solar panels, the more expensive the energy and the worse the quality of life.

Also remember that the hydrogen-hype does require building gigantic electrolysis plants, which are more expensive than the wind turbines that are supposed to provide the power. More and more Dutch citizens are wondering what the heck we are doing to our beautiful country. We should also be aware of the fact that too much solar and wind energy will destabilise the energy system, make the load on the grid more extreme, increase the need for back-up facilities, and lead to a higher electricity bill. In the Netherlands we definitely should not say goodbye to natural gas, because it's unfeasible and highly irresponsible. Today, each household uses 4.1 m^3 natural gas on average as well as 9 kWh electricity per day. Because natural gas has a high energy density (1 m^3 Groningen natural gas = 9 kWh) a lot of extra electrical energy has to be produced to guarantee that each and every household has enough energy on a daily basis. Saying farewell to natural gas leads to very expensive kWhs, which will be reflected in the electricity bills. This is not expectation, it is a hard fact.

As mentioned earlier, the reality is that the power supply must be safeguarded in the future by our existing power plants (So you can't close them down!). Mind you, these power stations will then run in back-up mode and won't be very efficient. The availability of more solar and wind energy means that less activity is needed in the back-up power stations, and green electricity becomes more expensive. All of this is not part of the governmental information campaign. On the contrary, the public is deliberately misled, deceived and manipulated. Is that not a crime to the citizens of the Netherlands?
A final example. At wind farms the expensive 'sockets in the sea', costing €2 billion per wind farm, are not included in the cost price. Just like the cost of storage, back-up and enhancing the grid, these extras are secretly 'socialised'. In other words: 'Dutch citizens pay the price'.

CONSEQUENCES OF RENEWABLE ENERGY FOR THE ENVIRONMENT

The scientific debate on climate change shows that with anthropogenic engineering of the Earth's climate mankind is overestimating its capabilities and the effect of decarbonisation plans on stopping global warming is only based on model hypotheses. See, for example: (https://www.epa.gov/sites/production/files/ 201411/documents/global_warming_ what_is_it_all_about.pdf).

Scan this QR code with your smartphone's camera to follow the link.

However, it is clear from the above that the huge negative impact of those plans on the functioning of the economy and the quality of the living environment is far-reaching (for wind turbines think not only of the continuous annoyance in the form of turbine noise, cast shadow and landscape decay, but also think of the large amount of birds that are constantly killed). But that is not all. After all, there are also the worrisome influences on the environment. We have already been clear about the large disadvantages of biomass plants, which should stop using woodchips immediately. Too bad about the beautiful forests that already have been felled, and about all that wasted public money (Dutch subsidy for biomass is €11 billion).
Next to biomass, what about wind and sun? We don't hear much about that, but the facts are not reassuring at all. Wind turbines and solar panels and the massive quantities of batteries they need to operate, require a large number of high-quality metals, such as nickel, lithium, cobalt, and manganese. For example, a plug-in electric car requires five times as much of these metals than a petrol-powered car (gasoline in the US), and a wind turbine nine times more per megawatt than a coal-fired powerplant. Solar panels are not innocent either. It takes much energy to produce them. In addition, the greenhouse gas SF6 is involved, which has a more than 20,000 times stronger warming effect than CO_2, according to UNCTAD. Even if improvements are made, and they certainly will be made, the optimum will still be far from what we may call 'green'. Fundamental physics tell us that wind flow and solar radiation are very low-density energy sources. Apart from some niches, harvesting wind and solar energy requires too much effort to be attractive. If politicians think they don't need to obey basic physics, they show an infinite amount of ignorance. Or, even worse, do they have something else in mind? Are they stupid or malicious or both?

To produce high-efficiency solar cells, the crystal structure of the silicon basis material should not only be regular, it ought to be enhanced with impurities (dotting). The substances that are used for this purpose, are poorly biodegradable, and often bad for the environment. Processing of discarded solar panels (worldwide we're talking about an ongoing flow of billions of discarded panels) is therefore too costly and too energy-intensive.

Mining companies are encouraged by solar cell and battery manufacturers to be more aggressive when exploring and producing high-efficiency metals. That's bad news for humans and nature. And what are we sup-

posed to do with all those millions of discarded solar panels, turbine rotor blades, and batteries? Nobody likes to talk about that, but it looks like we will be confronted with even more (toxic) landfills. Environmental activists, please raise your voice!

THE INDISPENSABLE ROLE OF CO_2 ON EARTH

Finally, there is one side of CO_2 that has largely been ignored in the climate debate, but is crucial for sustaining life on Earth. We recognise CO_2, or carbon dioxide, every time we open a bottle of beer or soft drink, and the gas starts to bubble. It occurs in the atmosphere too, in concentrations of about 0.04% or 400 ppm (parts per million). Since a couple of decades, CO_2 has become the villain in mathematical climate models, because it is assumed that the emission of more CO_2 is the dominant cause of global warming. In reality, climate change has not only to do with greenhouse gases, for many millions of years natural primordial forces also have major influence on climate variations on our planet. The two big questions are now:

- Global warming is caused by forces of nature and greenhouse gases, in particular CO2. How big is the influence of CO_2? Scientists still disagree about the answer to this question. However, a fact is that doom stories about global warming caused by rising CO_2 levels, are solely based on mathematical models. Their frightening conclusions have never been substantiated by measurements.

- The Earth has been warming up since the Little Ice Age ended around 1850. That is a fact. During this warming period there have not been any noticeable negative consequences. On the contrary, the levels of prosperity and human well-being on Earth have never been so high. So, there is no reason to panic at all: "There is no climate emergency."

In any case, it is obvious that the so-called climate crisis does not exist, and that there is plenty of time to develop a sensible decarbonisation policy, if needed. Concerns about finite fossil-fuel energy stocks only play a secondary role. Natural gas reserves can provide the world with energy for the next hundred years. Besides, natural gas is the cleanest fossil form of energy.

The fear stories about what happened in Greenland a couple of hundreds of years ago, are actually a representative example of the situation we are in now. The southern part of Greenland was ice-free during the Medieval Warm Period (MWP), and agriculture thrived. The Little Ice Age (LIA), a period of cooling that occurred after the MWP ended this green period in Greenland. However, as expected, the LIA disappeared again and now we are re-facing a warming period again. Geologically, that is nothing new. There certainly is no need for panic if we place current climate change in a historical context. So far, the Greenland ice sheet lost about 0.005% of all the land ice there is. Isn't it just part of the ever-present natural variation?

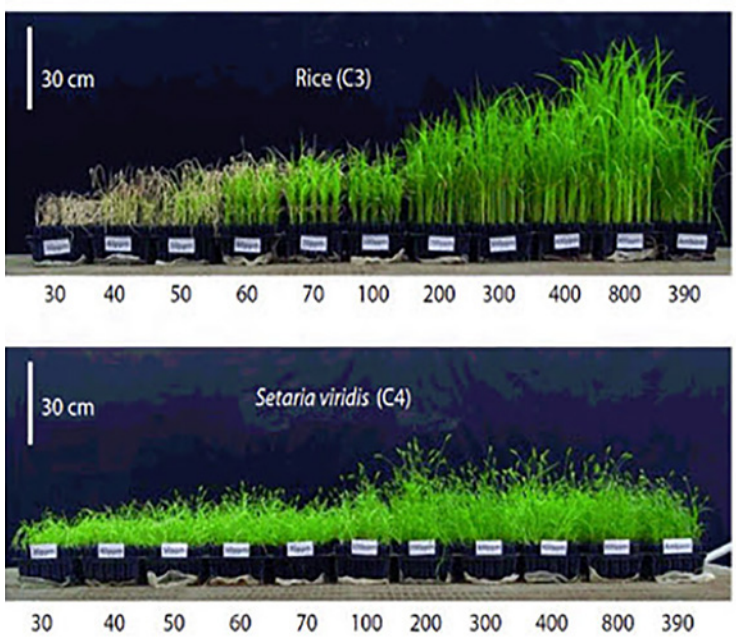
In addition to emphasising the computer-modelled drawbacks of global warming by CO_2, the certainty of the advantages of CO_2 are concealed. After all, it is clear that CO_2 in combination with H_2O is indispensable to life on Earth. CO_2's 'green' role is extremely important, but attracts hardly any attention in the discussion around climate change. Means (decarbonisation) has become the end.

Geological and historical data show that we are living in a period of time where the levels of CO_2 are low. In connection with this, the challenging question arises whether it is wise to keep CO_2 out of the atmosphere if we want our planet to become greener. Bear in mind, unstoppable population growth makes greening the Earth a necessity.

Controlled experiments are carried out with different crops in order to investigate the influence of CO_2 concentrations in the atmosphere on agricultural productivity.

Here are two examples: rice (C3 photosynthesis) and green bristlegrass (C4 photosynthesis). The positive influence of more CO_2 is obvious.

Our glasshouse horticulturists are making use of CO_2 in their greenhouses for years now, and to their full satisfaction.



CONCLUSION PART I

In 2020, the Dutch energy supply is still predominantly (89%) based on fossil fuels, such as oil, natural gas and coal. The Netherlands aims to reduce CO_2-emissions by 49% within the next ten years by further introducing sustainable energy sources like wind, sun and biomass. Unfortunately, insufficient thought seems to have been given to the reliability and affordability of such an energy system. By systematically painting a (too) positive picture about the cost and burdens of switching to so-called sustainable and renewable energy, people are now annoyed that the facts tell a totally different story. The support for the transition plans, that already have been set into motion by the Dutch authorities, is disappearing fast.

We've have seen the same thing happening with the corona approach, where there also has been insufficient consideration of the drawbacks of lockdowns and other drastic measures. Just wonder how much is being destroyed in society by monomaniac climate measures? Isn't the remedy worse than the disease?

We argue that the CO_2 benefits of biomass power plants only exist in computer models. Moreover, the environmental damage by cutting down (primeval) forests on a large scale as well as the extensive pollution of the atmosphere are harsh arguments to stop these practices immediately. Biomass plants stop wood burning. Instead, use land for increasing the diversity in the bio-sphere!

Hard figures show that the Dutch cabinet's plans for introducing wind and solar energy on a larger scale are as unfeasible as they are unaffordable. The often-praised hydrogen storage solution makes wind and solar energy even more expensive.

The attacks of the energy transition on the living environment in the Netherlands make it even worse. Today's energy policy is based on a fast-growing share of volatile energy (solar and wind), and an increasing number of electric cars and heat pumps, which is totally irresponsible. Finally, please remember that people on low incomes spend a relatively large sum on energy. They will be particularly affected by the higher energy prices.

Universities, you have the knowledge about all these fundamental problems with biomass, wind and sun. Why don't you speak out?

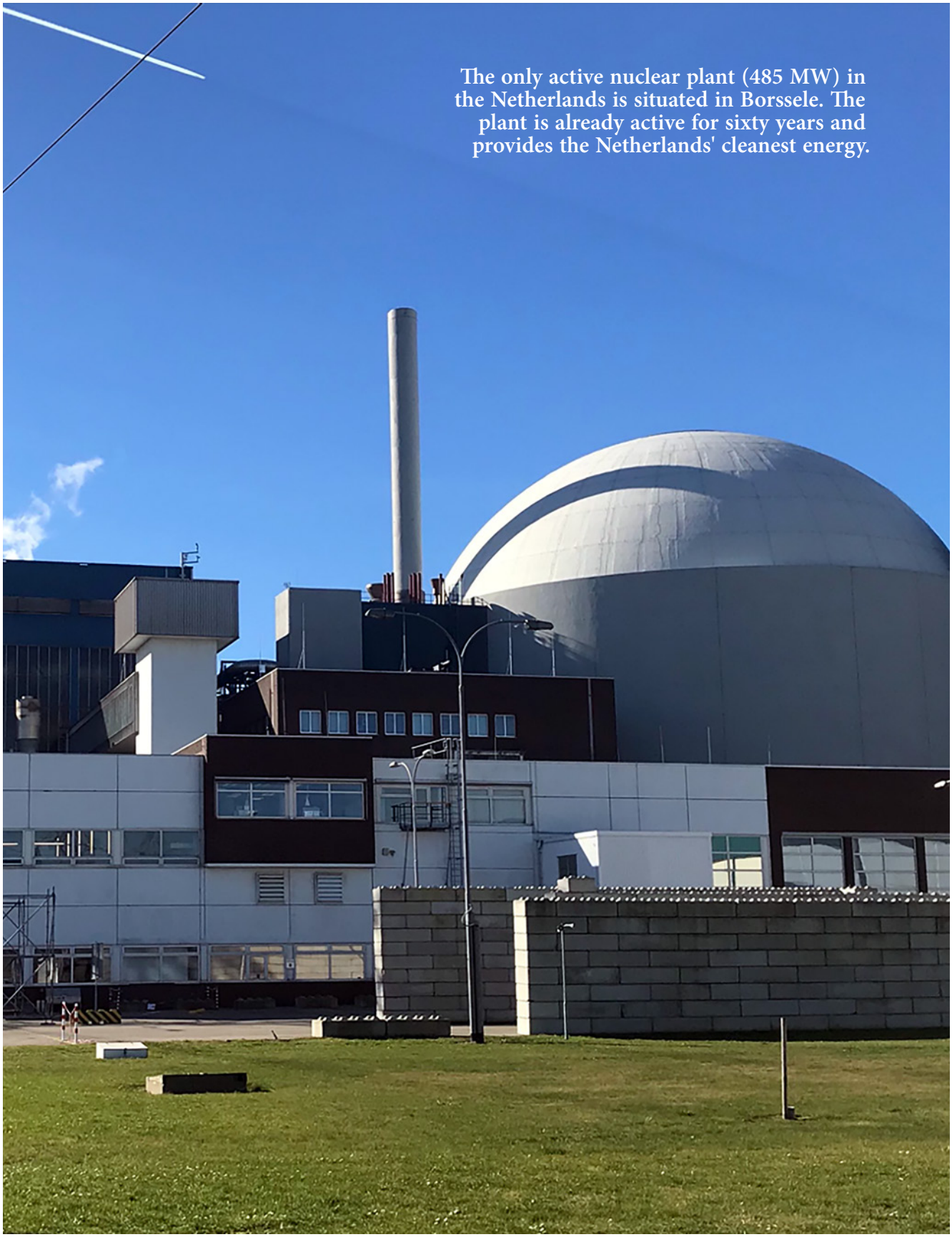
Once again, we must immediately stop claiming that large-scale wood burning is good for the environment and the climate. Moreover, the Netherlands, with its temperate climate, its volatile supply of wind and sun, its high population density and its export economy is totally unsuited to let sun and wind play a significant role in their energy supply.

The author would like to end Part I with the following messages:

1. **Application of poorly validated climate models has led to the prediction of an apocalyptic future. It may turn out to be the biggest scientific mistake of mankind in its recent history.**

2. **If we continue using zombie technologies in energy supply, we will stay dependent on subsidies indefinitely. Why have politicians chosen inferior technologies? What the hell are they up to?**

Visualisation of the future by RESinBeeld.nl:
New wind turbines, being planted near a small village (height 235 metres)



The only active nuclear plant (485 MW) in the Netherlands is situated in Borssele. The plant is already active for sixty years and provides the Netherlands' cleanest energy.

PART II, FUTURE VISION

Part I shows that current Dutch energy policy – having the ambition to reduce CO_2 emissions as much as 49% by 2030 – is based on panic and shall lead to immense additional costs and a drastically deteriorated living environment. Below, we will propose an inspiring long-term energy vision that fits our (and many other) country's needs, is based on scientific fats, and aimed at a prosperous future for everyone. A positive vision that replaces the gloom and doom predictions of the climate models. A vision with a hopeful perspective for the future.

A GUIDING VISION FOR THE FUTURE

It is well known that high-risk, capital-intensive decisions should be based on a policy that is as insensitive as possible about the way the future will unfold. We have called it a No Regret Policy. It represents a long-term policy, implemented by taking small steps, and continuously adapted to what is happening in reality. CLINTEL has drawn up a No Regret Energy Policy, especially aimed at the Dutch energy transition. The proposed NRE policy is insensitive for the impact that CO_2 might or might not have on climate change (dominant or marginal). In addition it is insensitive for what role the future electricity grid will play and for what the best mobility energy option will be. An extra bonus of the NRE policy is that the Netherlands' energy supply will become less dependent on Russian natural gas and Middle Eastern oil.

CLINTEL's proposal consists of three main ingredients:

1. Introduction of nuclear energy

If we base ourselves on the most up-to-date insights in energy supply, and we look at our four objectives as well as to our 'no regret demands', then nuclear energy is the only choice that meets these needs:

- No CO_2 emissions (mandatory requirement in the climate policy in force) as well as excellent controlled waste treatment (polution requirement)
- High safety level (safety requirement)
- Demand-driven, reliable and affordable (prosperity requirement)
- High energy density (environmental requirement)

About the last entry, please compare a medium-sized 500 MW nuclear power plant with a medium wind turbine park of 4 MW full load. For this reactor, we will need a terrain of approximately 1 km², for the wind farm approx. 300 km². In addition, a nuclear power plant delivers guaranteed for at least 60 years power with low operational costs. Wind turbines on the other hand deliver unreliable power with high operational costs for a maximum of 25 years. Solar panels aren't performing any better. Moreover, the corresponding inverter (from direct current to alternating current) only lasts about 10 years.

The Netherlands has one active nuclear power plant only – being situated in Borssele, Zeeland – with an electrical power of 485 MW. Borssele is of the 2.0 generation and delivers the cheapest energy in the Netherlands (about 3 euro cents per kWh). In French Flamanville, EDF builds the European Pressurised Reactor (EPR), a generation 3.0 reactor with a very high safety level, which is already operational. American company Westinghouse also builds a generation 3.0 reactor with a very high safety level. In addition, for the future a new generation of nuclear power plants (generation 4.0) is being developed (see the last paragraph of this section).

2. Transforming green electrons into green molecules

Transport and storage of much larger than the current quantities of electrical energy is technically difficult and economically unattractive. Every physicist will say: Don't do it! The real alternative is that with a large supply of cheap and reliable electrical energy we can afford to transform this energy into any desired molecular clean energy carrier, in the form of synthetic gas and synthetic oil. There are attractive candidates with an appropriate energy density, such as methanol (CH_3OH), ammonia (NH_3) and hydrogen (H_2), or a combination. These truly green energy carriers can be used safely and affordably be stored and transported using the existing infrastructure (bear in mind that 100% H_2 is very aggressive and highly flammable, so there is still a lot of work to be done before this energy carrier can be implemented safely at a large scale).

Oil companies should not be tempted by substantial public subsidies to participate in solar fields and wind farms. Instead, they should concentrate on production, transport and distribution of green molecules (green gas, green oil), so do what they are good at. Plans to store surplus CO_2 underground may turn out to be a silly activity. Oil companies, be critical before starting such an activity at a large scale.

3. Hybrid applications

With the supply of truly clean electricity and truly clean energy carriers, optimal choices can be made without large and expensive

grid reinforcements and polluting battery packs. Examples:

- Clean high-efficiency boilers (green gas)
- Clean road traffic (green petrol, green diesel)
- Clean aviation (green kerosene)
- Clean industrial production (green gas)
- Clean desalination of seawater (green potable water)

Interestingly, for each application there also is a hybrid solution (fossil-fuel molecules combined with green molecules and/or green molecules combined with green electrons). Here are also great opportunities to meet the ever-growing need for potable water.

After all, it is bad for the soil if we keep on pumping up groundwater (e.g. soil desiccation, and soil subsidence). This can be done much better if we link our energy policy to our drinking water policy.

NRE policy excludes burning of biomass ('the most stupid policy of all times') and includes sun and wind as niches only. Batteries are only used for low-power applications, as in the information sector. Natural gas and natural oil are primarily still raw materials for the industry. 'Saying goodbye to 'natural' gas, is utterly silly. Any CO_2 tax is even more silly. Nuclear energy is proposed as the only truly sustainable solution.

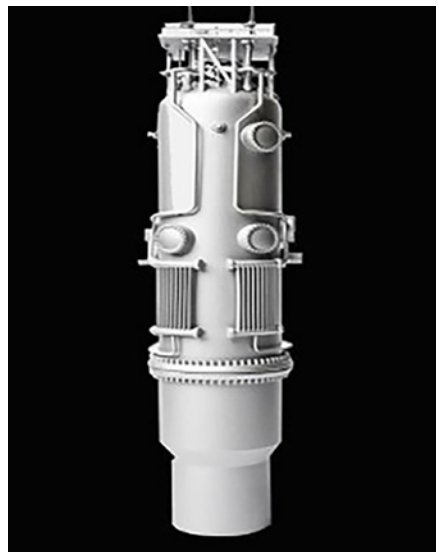
To start with, nuclear power will have to take over the energy and heat supply from existing power plants that have almost reached the end of their technical and/or economic lifespan. Next are the energy applications proposed by CLINTEL being part of this vision. The present nuclear technology works with enriched uranium. Breeder reactors on uranium and thorium will in the long run take over the role of these traditional nuclear reactors. Hopefully, nuclear fusion will follow. The Netherlands will, together with other countries, have to participate in research and development efforts, thus acknowledging the importance of a 100% clean, reliable and affordable global energy supply for the foreseeable future. For a comprehensive overview of the developments in the field of nuclear power plants, see the recent document of the World Nuclear Association:
https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power- reactors/small-nuclear-power reactors.aspx

Scan this QR code with your smartphone's camera to follow the link.

INSPIRING MESSAGE TO THE NEW GENERATION

The current climate policy conveys an extremely miserable message to the new generation. "Your parents and grandparents have been selfish and destroyed the climate for new generations by sticking to their prosperity ambitions. We are now in the middle of a climate crisis. However, there is hope. You will be able to save the planet by accepting a less luxurious standard of living. For your energy supply, you will have to make use of natural sources such as wood, sun, and wind, like we did when we were still poor. Please note, that if you don't take the appropriate climate measures now, we will be heading for disaster." To tell young people such a miserable story over and over again, is that not a crime to our youngsters?

Of course, young people will be discouraged by such a sad image of the future. Of course, many become depressive! CLINTEL addresses young people with a completely different message, which is full of inspiration and challenge. We show them that they can indeed do better than their parents and grandparents, provided they get rid of the current green ideology. CLINTEL challenges the new generation to replace 'ideological greening' by 'creative greening', as described in this energy vision. Then, we – young and old together – will be able to offer everyone wealth and prosperity, combined with excellent global stewardship.



Currently, there are many initiatives to build scalable nuclear reactors in mass production (IV). That will reduce the cost per megawatt significantly.

Above an image of aportable mini-reactor with a a capacity of 50 MW, which is being built by NuScale.

EPILOGUE

1. Network society requires a matrix infrastructure

Our information society has been transformed relatively fast from a linear one-way society, in which a single producer delivers information to the total population, to a non-linear network society, in which everybody informs everybody else through the internet. The clear separation between producer and consumer has disappeared in the world of virtual information. The same spectacular process of decentralisation is now happening in the energy sector, however a rapid implementation might lead to immense societal problems. After all, decentralising high power capacities is technically economically, and financially of a completely different order.

As a reminder, the existing electrical grid arose during an organic evolution as a response to the gradually rising demand in that period of time, which was based on the linear one-way concept: 'Transport from one producer to many diverse consumers'. That concept has determined everything: the mains voltages used, the number of cables and their thickness, the positioning of the switching and transformer substations, etc.

Transition to wind turbine farms and solar panel fields has made us transform towards a non-linear two-way concept: 'Transport of many diverse producers to many different consumers'. The clear separation between producer and consumer is therefore rapidly becoming a policy of the past in the energy world too. However, in this decentralisation battle, the existing power grid has proven to be far from suitable. We have to transform the linear grid with connections from 'one to everyone' into a nonlinear grid with connections from' everyone to everyone'. However, today there are far too few connections, stations have the wrong specifications, they are on the wrong spot, etc. By underestimating this problem, our power grid will guaranteed fall out. Our once so robust electrical network will become unstable and energy prices will certainly rise. In Germany the traditional one-way network has to guarantee the current energy supply. The effect is as expected: energy prices have been doubled since 2000.

Practice shows that it is asking for big problems to convert the grid just as is already ocurring in Germany. We will have to be extremely careful with allowing the number of electricity consumers and power generators to grow. The fast-increasing number of solar panel fields, highly subsidised wind turbine farms and plug-in electric cars cannot be met by the existing grid architecture, but hardly anyone pays attention.

We are fundamentally changing the world around our power grids, but the architecture of the grid itself has remained virtually unchanged. That is becoming a huge problem. I repeat, changing the network architecture is a mega operation, which should be executed very carefully to prevent an unstable power grid. Why is there no system vision in our country, so that all these changes can be realised in a coherent and synchronised way? Now it is sticking patch to the patch.

In CLINTEL's NRE-policy there will be a balanced transition, because we are convinced that electrons aren't always the best solution to everything (the complete electrification of society).
Molecules shall always play a significant role in energy supply. For instance, 'Saying goodbye to natural gas' is silly. To make natural gas cleaner is sensible.

2. Integration of energy and economic policies

If we agree on how we would like to organise our national energy supply, then we will be able to strengthen our capital-intensive and energy-intensive enterprises in a targeted way. After all, those enterprises have given us a great deal of prosperity after the war and they still form an indispensable pillar of our export economy. Together with those companies, we can start to fill-in the details of the vision. This is how we want to integrate our national energy policy in our economic policies and vice versa. However, if we decide to keep on expanding unprofitable wind turbine farms and solar panel fields, the future will be less prosperous. The Dutch National Growth Fund (€20 billion) is therefore doomed to fail.

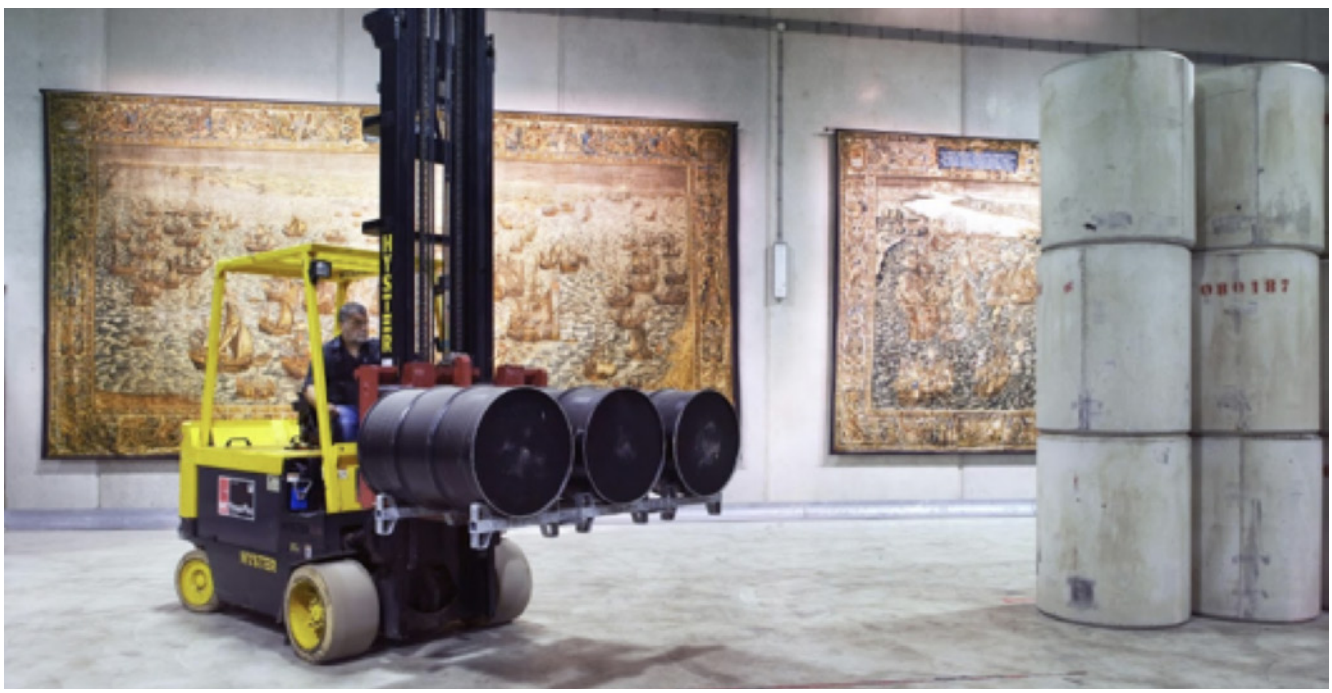
If we do decide to go ahead with the proposed NRE policy, then we will realise a reliable and affordable and clean and safe energy supply. We won't have anything to do with a senseless CO_2 tax, we will increase industrial productivity and keep on enjoying the beautiful Dutch landscape. If we want to stimulate the economy, we should not resort to more subsidies, but reduce the costs for entrepreneurs. The NRE policy enables us to do just that.

3. Decoupling of climate and energy policy

Successful entrepreneurs know it's not wise to bet on one horse in times of uncertainty. It's smart to look at more options and monitor relevant developments. It is also wise to follow a policy that is as insensitive as possible to the way the future might unfold. This is what CLINTEL describes as a 'No Regret Policy' and, as far as the Dutch energy concerns, being referred to as a 'No Regret Energy Policy' (NRE-policy). This NRE-policy is

THE DUTCH NUCLEAR ENERGY REPOSITORY IS LOCATED IN BORSSELE. THERE IS STILL ROOM FOR THE NEXT 100 YEARS.

Green hydrogen produced from wind power is economically and socially very expensive compared to hydrogen produced from nuclear power



NUCLEAR ENERGY WASTE IS STORED SAFELY AND RESPONSIBLY BY THE CENTRAL RADIOACTIVE WASTE ORGANISATION (COVRA)

based on expected long-term developments, that will have to be implemented by taking small steps, which are continuously adapted to what is happening in reality.

As we indicated earlier, the proposed NRE-policy is unique as it is insensitive to the impact that CO_2 might or might not have on climate change (dominant or marginal) and on what role the future electricity grid will play and on what turns out to be to be the best mobility energy option. CLINTEL has decoupled its climate policy and its energy policy.
If there were to be a climate policy, assuming that such a policy makes sense, it would have to be done on a global scale, both for creation and execution of plans such as measuring their impact.

After all, the Earth's climate is a process on a global scale. But in the energy transition it is different. Energy policy should be based primarely on national choices. As we indicated earlier, each country has its own specific opportunities, constraints and development phase. A uniform energy policy is doomed to fail. Energy policy should be tailor-made on a national level.

Finally, it is advantageous to have challenging specifications drawn up top-down. But the innovation process itself must never be imposed from above. Authorities/organisations may therefore never prescribe corresponding technological solutions. Finding the best solutions should be left to society: "Inspiration and specification from above, innovation and implementation from below."

The author would like to end Part II with an advice to all youngsters:

Climate change exists and is of all times, but don't worry, the current global warming period is gentle and only brought us prosperity: 'There is NO climate emergency'.
Global warming is best taken care of by adaptation. In nature 'adaptation to change' has always been the best strategy to survive, whatever the cause of change is.
Environmental pollution must be and can be stopped by establishing a circular and clean economy.

Creativity, ingenuity and innovation are required from the new generation. Nuclear technology is part of their exciting journey.

We should not aim at being champions in atmospheric CO_2-reduction, but we should become leaders in climate adaptation, energy system innovation and environmental stewardship.


"I don't want you to be hopeful, I want you to panic."
- Greta Thunberg,
teen climate activist
WORLD ECONOMIC FORUM
clintel