

Copenhagen, 30<sup>th</sup> March 2022

CEO, Sir Bernard Looney, BP  
CEO, Sir Ben van Beurden, Shell  
CEO, Sir Patrick Pouyanne, Total S.A.

## CONFIDENTIAL MAIL

Dear Sirs,

The reason my son and I send you this letter is, that we believe that we have a solution, that may help BP's, Shell's and Total S.A.'s longtime survival, as independent and valuable companies, in an era of rapid climate changes. A solution, that can turn out to be a new independent and profitable business concept for your three companies. And even we don't have any final proof, other than our knowledge of the laws of physics – and our knowledge of metrology, we may very well have the key on how to counter global warming. A simple geoengineering solution, that we strongly believe needs to be tested. We therefore hope, that all three of you, and your three companies, will join forces. That you will take your time to read this letter – even the thought-process behind the "solution" may appear a little bit weird or abstract at first.

In short – and crazy as it may sound, the preindustrial temperatures, that are so essential to global and human survival. The preindustrial temperature, that is highlighted in the Paris Climate Accord, is only 104.08 meters (341.5 feet) away from us, measured back in 2020. A year that was measured globally to be +1.02°C warmer, than the preindustrial average. All we need to know in order to counter global warming is, that this preindustrial temperature is right above our heads. It is 104.08 meters above ground. It is located at this altitude, because of the dry air adiabatic lapse rate, that is 9.8°C (17.64°F) per 1.000 meters.

Simple as it is, and even it may sound strange or even illogical at first. If you stand on the roof-top of Big Ben, in London, with a thermometer in your hand, what you will experience is, that the average annual temperature is equal to that of the preindustrial temperature. The temperature that you would have measured 120 to 170 years ago standing in the New Palace Yard, outside the entrance of Westminster. The average ground temperature that you would have experienced next to the foundation stone, when it was laid, at the Elizabeth Tower, back in 1843.

All we have to do, is to make use of our basic knowledge of physics and metrology. All we need to do, is to try to figure out a simple method on how to replace the hot layer of air, from the surface of our Earth to the top of Big Ben, with colder air. The much colder air, that we find from an altitude of 104.08 meters and all the way out to outer space, more than 1.6 million kilometers (more than 1 million miles) away. So, as simple as it may sound, if we can remove this layer of hot air, and by doing so, lower this "invisible" or "imaginary" 104.08-meter-high borderline back to the surface of Earth. Back from its present altitude, right above our heads, we could – or would, at least in theory, be able to counter the destructive power and effects of global warming.

The science professor in physics will however claim, and rightfully so, that this theory will not hold, if tested! That if you take 1 cubic meter of cold air from the top of Big Ben and bring it to the entrance of Westminster the temperature will go up 1°C (1.8°F). The volume will be less and the density of the molecules in the air will go up – due to the adiabatic lapse rate. All true!

However, when cooling hot air – heated by the sun's shortwave radiation, it has to return its surplus of energy, back to the universe, as longwave infrared radiation. And if we can artificially lift this "overheated" ground air to a higher altitude, where it can return its longwave radiation back into space, we may be able to lower global temperatures, and as such cool our Earth.

It is very basic physics – and nothing anyone will get the Nobel prize for. But global temperatures and global warming, is the end result of the interaction between incoming sunlight (shortwave radiation), thermal conduction (thermals) and natural convection, evaporation, surface radiation (longwave radiation) and reflection. Until the light from the sun hits something of mass, it will not convert into heat. As it strikes and heats the Earth, the land and the sea will warm up. And then the land and the sea will start to heat up the air above the surface of Earth. And as [explained in Wikipedia](#), (you can click to open the hyperlink to the page), if radiation were the only way to transfer energy away from the surface of the Earth, back into space, the natural greenhouse effect, of all the gases in the atmosphere, would keep the ground-temperature at roughly +60°C (+140°F). But because of thermals and convection, global ground-temperatures are kept at an average temperature of approximately +15°C (+59°F), "preindustrial average", but now +16°C.

But vertical convection including thermals is in itself, a rather slow meteorological process, when viewed globally, even it at times may appear to be quite violent, especially when we experience extreme low-pressure, such as hurricanes, typhoons, cyclones, tornados and winter storms.

Of the incoming energy from the sun – which on average is approximately 341 Watt per square meter ( $\text{Wm}^2$ ) – when you include the Arctic and Antarctic regions, thermals on average only lift something like 17  $\text{Wm}^2$  away from the surface of our Earth, see page 7. But since we know that there is a surplus of energy absorbed by Earth – resulting in global warming, of approximately 0.9  $\text{Wm}^2$ , all we need to do is to figure out how we can artificially (mechanically) and safely help thermals improve their efficiency with 5-6%. Adding manmade thermals – “ventilation”!

So simple as it may sound, if we can build a huge number of 100 to 200 meter (330 to 660 feet) tall vertical “ventilation chimneys” – steel or concrete cylinders, being 10, 30 or 50 meters (33, 100 or 165 feet) in diameter – or even more, and mechanically use them as ventilation ducts (shafts), to send warm ground-air 3.000 to 5.000 meters (10.000 to 16.500 feet) up into the atmosphere, away from the surface of Earth, we may be able to artificially an safely control and reduce global temperatures and remove the destructive effects of global warming.

As such, it would be a very simple – and also a relatively cheap, scientific experiment to test, if it is possible to artificially “help” atmospheres natural vertical heat-convective motion. Help speed up mother nature’s own heat reducing convection processes. Adding 5-6% manmade thermals to nature’s own temperature controlling thermals. All we need to test is, what will physically happen to global temperatures, if we suck – as in “vacuum clean”, air away from the surface of Earth – from this 104.08-meter-high layer, and blow it high up into the atmosphere? What will happen to temperatures locally, regionally and globally? And will it reestablish preindustrial temperatures? And will it buy humanity more time to adjust to “carbon-free” energy?

What it will do, at least in theory, is that it will lower this invisible or “imaginary” 104.08-meter-high borderline back towards the surface of our Earth. It will lower this borderline from the top of Big Ben down to the New Palace Yard. Down to the entrance of Westminster. Hopefully reducing global temperatures back to preindustrial levels. Reducing global warming to a point, where it no longer exists. Where it will no longer constitute an existential threat to global nor human survival. Where it will no longer threaten economic growth or global welfare and security.

The beauty is, that we already have a huge number of unused tall cylinders – “ventilation chimneys”, all over the world waiting for demolition. The chimney(s) needed to make these temperature controlling experiments. Inactive industrial chimneys, where we only need to add one or a number of highspeed blower(s) to the foundation – add ventilation intake(s) at the bottom, so that we can send controlled volumes of air – at high speed, from the surface of Earth high up into the atmosphere. We don’t need to build a 100 meter (330 feet) tall vertical steel or concrete cylinder for this experiment, since we already have unused industrial chimneys, that can be used for these tests. As you can see in the picture below, we already create and use artificial convection and thermals, when lifting steam and smoke away from Earth, high up into the atmosphere:



## **Why BP, Shell and Total S.A.? And what is the advantage of no more global warming?**

No one knows better than you, what kind of public and legal pressure your companies are under right now. No one knows, better than you, what kind of stress it would remove from your shoulders – and the shoulders of your businesses, if there were nothing called global warming. All the world leaders participating in the Rome G20 Summit and the COP26, in Glasgow in 2021, left no opportunity unspoken to verbally attack or criticize you and the oil industry for the ongoing global climate crisis. Even the very same world leaders, the day after COP26, blamed you, the industry and OPEC for global shortage of oil supply and unreasonably high oil and gas prices.

Even politicians will use climate change politically to benefit their own political careers, climate change is very real, as stated in [the latest UN climate report, dated 27<sup>th</sup> February 2022](#). Climate change and global warming needs to be countered! So, if we through a set of very simple and controlled “scientific” full-scale tests, can show the world, that there is a possibility to safely and mechanically reduce global warming – make climate change go away, maybe to a point, where it no longer exists! Then maybe – as a result, it would or could ease some of the public or legal pressure on your core businesses – and help the world move forward. Hopefully – if successful, it will remove many of the legal battles that your companies and the whole oil and gas industry faces, on daily bases. If tests are being successful, you may even end up getting more time to find new areas of future commercial businesses. You will get more time to find and develop non-conventional and new green advanced synthetic and non-synthetic fuel alternatives.

And if tests are being safe and successful – and as soon as you, my son and I, are the shared holders of the IP (Intellectual Properties) and owners of the needed patents and knowhow, then this technology can be shown to the world. Maybe as soon as COP27, from 7<sup>th</sup> to 18<sup>th</sup> of November, this year, in Sharm al-Sheikh in Egypt. And as said! What it would mean to BP, Shell and Total S.A. – and to the rest of the world, for that matter, is that it will give all of us more time to adjust to a sustainable “carbon-free” future, creating new valuable areas of businesses.

### **The business potential for us – for BP, Shell, Total S.A., my son and I ...**

On page 4 to 6, we have loosely estimated, that the world could easily save more than \$6 trillion (\$6,000 billion) each year, from now until 2050, if we, through safe and controlled geoengineering, can make global warming go away – and as such, remove the effects of climate change. An amount that can easily turn out to be twice, three or even five times higher! And on page 6 and 7, we have calculated the cost of building one “ventilation chimney” – one geoengineering unit, to approximately \$30 million. And if we assume that we need to build 1,000 units all around the world – for a start, the total sum of money will be \$30 billion. Further to this we assume yearly running costs to be 10%, of the building costs, in order to run the “ventilations chimney’s” in a structured and coordinated way. Preferably operated under some kind of UN–IPCC supervision! Should the demand later turn out to be 2,000 units, the cost will be equal to \$60 billion, with running costs of \$6 billion per year. Or establishing costs of 1% of the annual global savings, and operating expense of 0.1% of the worlds annual savings! A sum that is only a small fraction of the more than +\$6 trillion, that the world will otherwise lose each year – gaining nothing!

Even it will be very hard to achieve! But if we – that is BP, Shell, Total S.A., my son and I, can get a negotiated 20- or 30-year deal, where we can retrieve a \$30-, \$60- or \$90 billion global investment and get a reasonable overhead in return, for running the “ventilation chimney’s”, as entrepreneurs, under some kind of UN–IPCC supervision, it could ultimately be an independent and very strong annual billion-dollar (\$) business for all of us. Even as little as 0.1% of more than \$6 trillion saved each year – from now until 2050, is equal to more than \$6 billion per year!

So dear Sirs. As we hope to hear from the three of you, very soon, since this technology may very well save your companies – and the existence of your core businesses, for an extended period of time, as well as create new prosperous business opportunities for all of us.

Your sincerely,

Per Uggen & Andreas Wain Uggen.

### **1.1 Global cost of sea-level rise ...**

One of the fundamental cornerstones in global economy, and in global stability – if not the most important, is the value of land. In many ways the value of land and real estate is more important for global stability than gold, silver and other metals, diamonds, oil & gas, industrial production and food-supply. And given, that more than [one billion people live and occupy land less than 10 meter above the current line of high tide](#), and that approximately 0.23 billion of those people live less than 1 meter (less than 40 inches) above the surface of the sea, makes it obvious, that this financial cornerstone and its global stability qualities, will get threatened should people need to abandon these areas, due to sea-level rise.

At the same time, we need to acknowledge, that some of the most expensive properties in the world, valued per square meter – or per square foot, is located in the front row – or equally as close, to the sea. It goes for London, Liverpool, Southampton, Amsterdam, Rotterdam, Haag, Bordeaux, Cote d’Azur, the French Riviera, Venice, New York, Long Beach, Miami, Tokyo, Bangkok, Sydney, Hamburg, Saint Petersburg, Dubai, Copenhagen, Cairo etc. etc., being less than 10 meter above the current line of high tide. On the [attached hyperlink to a virtual flood-map](#) you can see, that even a very modest sea-level rise will have a huge impact on keeping land and real estate safe and dry, all around the world.

Even global costs and losses from sea-level rise are very real, they are also very hard to estimate, especially since we have not really experienced these losses yet. But if we can [avoid the Western Antarctica ice sheet from collapsing](#), which may happen very fast if temperatures rise above +2°C (+3.6°F) above preindustrial level, then the world will save tens of trillions of dollars. And even it is not going to happen any time soon – not until after year 2040, a conservative global value estimate, pre-discounted to 2022, could easily be valued (estimated) to more than +\$1 trillion (+\$1,000 billion) per year.

### **1.2 Global cost of Desertification and Deforestation ...**

According to UN, the world loses something like 30 million hectares to desertification and deforestation every year. Some estimates are lower – and some estimates are higher! But even it is very hard to put a price tag on something, that is as irreplaceable as lost habitats, forests and farmland, if we assume, that each square foot of lost land represents a very modest market value of \$0.25 (a quarter), then the annual global cost (loss) adds up to more than +\$800 billion per year.

### **1.3 Reclaiming lost land from global warming ...**

According to some studies, the world has [lost more than 5 million square kilometers of dryland](#) to desertification. Dryland, of which 45% used to be agricultural farmland, affecting the lives of more than 200 million people. Dryland where biological productivity has been lost due to fertile areas become increasingly arid. Farmland not necessarily turned in to desert.

If we assume, that we – through controlled geoengineering, could reclaim 10% of these 500 million hectares of lost land, each year – and restore it to its former glory, as agricultural farmland. And if we could reclaim 10% of global deserts, back to become marginalized dryland, for wildlife to live. The value of reclaimed land could easily be more than +\$1 trillion (+\$1,000 billion per year). It would then become an annuity savings – adding +\$1 trillion to global “Real-Estate” each year. Adding +\$1 trillion to the world’s wealth, as annuity savings !!! – why a conservative global value estimate could easily be much more than +\$2.5 trillion per year, even we chose to “conservatively” estimate its value to be \$2.5 trillion a year.

### **1.4 CO<sub>2</sub> removal using “new” reclaimed young forests – new forests less than 30 years old ...**

For obvious reasons we need to bring the global CO<sub>2</sub> ppm (parts per million) level in the atmosphere down, because it prevents earth from cooling. And until now, there has been no better or cheaper method, than to use nature’s own photosynthesis. And it is estimated, that [to sequester and convert 1,000 tons of CO<sub>2</sub> per year](#) from the atmosphere, you need approximately 200 hectares of new and young forest, why losing 10 million hectares of forest per year – to deforestation, means that the world loss its ability to sequester and convert approximately 50 million tons of CO<sub>2</sub> each year.

As you can see on the next page, if you use mechanical CO<sub>2</sub> extraction technology, you may have to pay more than +\$100 per ton CO<sub>2</sub> captured. And given the mathematical rules of annuity savings. If you lose a CO<sub>2</sub> capturing ability – equal to \$5 billion, each and every year, then you need to add losses from all the previous 30-40 years, in order to calculate the total costs. Just as an example; Ability lost 3 years ago therefor has a value of 3 X \$5 billion. And the CO<sub>2</sub> collecting ability you lost 2 years ago, has a value today of 2 X \$5 billion. And what you lost last year, has a value of 1 X \$5 billion. Or a combined value over 3 years of +\$30 billion !!!, why an accumulated 40-year value of \$100 billion per year is very modest.

Furter to this, if we can stop deforestation and reclaim and grow new and young forest – equal to the size of forest we lose every year, this new forest would also come with an accumulated value of \$100 billion per year. Therefore, a conservative value estimate – if we can make global warming go away, could easily be more than +\$200 billion per year.

### **1.5 CO<sub>2</sub> removal – and the value of not needing CO<sub>2</sub> extraction technologies and heavy energy consuming machinery ...**

If we assume that we could mechanically / artificially remove 100 ppm of CO<sub>2</sub> from the atmosphere, the [cost of running mechanical CO<sub>2</sub> extraction machines](#), could easily be more than +\$100 per ton CO<sub>2</sub> removed. Studies estimate that lev- elized costs are somewhere between \$ 94 up to \$ 232 per ton of CO<sub>2</sub>! And given that each ppm of CO<sub>2</sub> in the atmosphere represents a weight of approximately 7.82 Gt of CO<sub>2</sub> – equal to 7.82 billion tons, means that each ppm will cost approxi- mately \$800 billion to remove mechanically. And if the world could ever agree to remove 100 ppm of the present CO<sub>2</sub> level – and the 2 ppm of CO<sub>2</sub>, that we add every year, and do so over a period of 50 years – removing 4 ppm per year, and if the costs were distributed evenly, the annual price tag would correspond with approximately \$3.2 trillion per year. +\$3,200 billion, that the world will potentially save each year, not to mention the extreme amount of energy needed to run these CO<sub>2</sub> extraction machines! Our geoengineering proposal could save the world from having to pay this expense!

### **1.6 Public cost for climate immigration – climate refugees ...**

At the moment, Europe experiences the enormous costs of having millions of refugees coming into EU from Ukraine. In a study [“The Cost of Non-Europe in Asylum Policy”](#) it is estimated, that the status quo for European immigration into Europe is €49 billion per year – equal to \$56 billion, if the number of immigration and asylum seekers remain the same, which used to be somewhere between 0.5 – 1.0 million immigrants and asylum seekers each year. However, should this number double – or become three- or fourfold – from now until 2050, compared to the present status quo, then a con- servative estimate – just take a look at the current refugee crisis in EU from Ukraine, could easily raise this amount to more than \$100 billion per year. And if the same amount goes for USA and Asia – as for Europe and EU, the sum could easily become substantially more than +\$300 billion per year. More than +\$300 billion, that the world could – and most certainly would save each and every year, until 2050. As said, just see what’s happening – look at the multi \$-billion dollar bill, that refugees coming from Ukraine currently is burdening the EU, the European, the US and the global economy with.

### **1.7 The annual cost of natural disasters – and how much the world could save ...**

Viewed in a historical perspective, it would most likely reduce the number of natural disasters worldwide with approxi- mately 50%, if we could remove global warming. And as such reduce the annual global costs with 50%, if global temper- atures could return back to preindustrial level! Last year [natural disasters came with a price tag of \\$145 billion](#) in USA. And over the past 5 years (2016-2020) the average annual cost, in USA, has been \$121.3 billion per year – equal to \$370 per capita. And natural disasters across the globe caused \$280 billion in economic losses in 2021, why a conservative estimate is, that if global warming continues and if it is not countered, this amount could easily double over the next 20 years to more than +\$500 billion per year. [See the full climate report released by UN, 27<sup>th</sup> February 2022.](#)

Given the named UN report, \$500 billion per year may even turn out to be a very modest and conservative estimate, given that hurricane Katrina, as an example, came with a total price tag of approximately \$320 billion. And given that last year’s most expensive hurricane Ida – as a single event, reached a damage tally of more than \$100 billion. +\$100 billion in damages not taking into account, that you had 20 other named hurricanes last year, making 2021 the third costliest hurricane season on record. Not taking into account the cost of more than 50,000 wildfires in USA. And not including the cost of flooding, loss of coastline, landslides, loss of lives etc., etc. And as said. If we can reduce the cost from natural disasters globally with 50%, the net effect for insurance companies, private citizens and governments could easily be more than +\$250 billion saved, each year.

### **1.8 Estimated spending per year of GDP to counter global warming ...**

In order to answer this question, you need to look at the public GDP estimates around the world. What is it expected to cost – in percentage of GDP, to reduce greenhouse gas emissions, according to political ambitions? And according to the most ambitious plan there is, [Scotland’s Net Zero Roadmap](#) – see page 16, also referred to as the Scottish TIMES-model, Scotland needs to spend between 1% to 3% of its GDP, per year, in order to counter global warming. And if we take a look at the second most ambitious plan – the Danish plan to reduce CO<sub>2</sub> emissions with 70%, before 2030, it is estimated that this plan requires spending of 1.1% to 1.2% of the Danish GDP – also introducing an equal amount of new taxes.

Given the cost in UK, Scotland and Denmark, it is a qualified and conservative assumption, that the 1.269 billion people in Europe (\$46,914 GDP per capita), USA (\$62,631 GDP per capita), Canada (\$49,007 GDP per capita), Japan (\$41,182 GDP per capita), Australia (\$49,456 GDP per capita) and New Zealand (\$42,878 GDP per capita) will spend an average of +1.0% of their GDP, year by year, from now until 2050. This equates to an average public investment, year by year, of approximately \$500 per capita, in each of the named countries. Or a total public spending of \$635 billion per year, from now until 2050. And if you include the rest of the world, this could easily amount to public spending of more than +\$1 trillion (+\$1,000 billion) globally each year of GDP, from now until 2050 – or until forever.

### **1.9 Global tensions and risk of wars ...**

The global costs of international conflicts and wars is extreme. Just take a quick look at the global financial “open wound bleeding” caused by Russia’s invasion of Ukraine! [According to World Economic Forum](#) the global stock markets took a one-day loss of \$1 trillion from this war – not including loss from energy supply interruption, food supply shortage, inflation, loss of life etc. Given the economic losses from the Russian invasion of Ukraine, global tensions and wars, caused by climate change, can easily generate costs of tens of trillions of dollars (\$). But given the extreme uncertainty – in estimating these losses, we have not estimated any annual sum or value. But given what we see in Ukraine, global tensions and wars could, as said, easily cost the world tens of trillions of dollars (\$) each and every year – as a result of climate change.

### **2. Geoengineering under the supervision of UN–IPCC ... and why this technology is so extremely dangerous to humanity ...**

It is important to understand, that geoengineering – no matter the method, is extremely dangerous. In principle, active geoengineering can be just as dangerous, as having access to nuclear bombs! And as if it’s a law of nature, mankind has proven time and time again, that whenever we invent something of value and create technology for the good of humanity, someone somewhere will do whatever they can, to use the same technology to find ways to harm and destroy us all. We need to realize, that having a technology that can potentially lower global temperatures to a point, where we in Europe, USA, Canada and Russia will find ourselves in a deepfreeze 6 month each and every year possesses an extreme risk to the whole world. Just – as a thought experiment; imagine what would or could happen to global stability, if someone in the hottest places on Earth singlehandedly decided to lower temperatures 10°C, 15°C or 20°C (18°F, 27°F or 36°F) leaving areas like Canada, huge parts of USA, Northern Europe, Northern UK and Russia with an arctic and uninhabitable climate?

For the same reason, the only “customer” – when it comes to geoengineering, that can be allowed to control this technology is United Nations (UN). We – that is BP, Shell, Total S.A., my son and I, can offer this service to the world, as commercial entrepreneurs – as private contractors. But we can never be the once in control of how much to cool the Earth. It is extremely important, that no single or private person, no commercial entrepreneur or company, that no single nation or any independent government can take control over this technology. It is simply way too dangerous! It could threaten global stability in numerous and unimaginable ways, none of which will be helpful to human survival. This is why we need to present this “ventilation chimney” technology to the world – if it is proven to work, when we own the IP. And with a little bit of luck, maybe we can already do so, at the COP27, from 7<sup>th</sup> to 18<sup>th</sup> of November, this year, in Egypt.

### **3. Cost of making “ventilation chimney” research and costs of conducting very simple full-scale geoengineering tests ...**

As stated on page 3 – in this letter, we already have a huge number of inactive vertical ventilation shafts (ducts), in the shape and form of unused industrial chimneys or unused industrial / nuclear cooling towers. And as with all unproven technologies, we need to do a lot of basic testing in order to see and estimate, if it is possible to achieve a substantial geoengineering cooling effect – on a massive scale, with an equal cooling effect – in Joules, to the surplus of energy, that Earth receives from the sun, leading to global warming.

The location for this research and these tests should preferably be in a warm geographical location with a climate with high humidity air near the coastline – approximately 5 to 10 meters above sea-level. A place with good infrastructure and easy accessibility. A place like the Canary Islands or another similar island location, with a tropical or subtropical climate. Other potential locations could be the southern parts of Europe, where we can try to find an abandoned industrial chimney – a power plant chimney or an old cooling tower, located in a port near the sea. An industrial chimney or cooling tower, where we only need to add air-intake(s) and a set of highspeed blower(s) to the foundation. This so we can mechanically blow hot and humid ground air from the surface of Earth – at very high speeds (200 to 300 kilometers per hour) height up into the atmosphere (3 to 5 kilometers) from sea-level. By doing so, it will be possible to measure the temperature on this vertical column of ascending air with infrared cameras from drones, planes or helicopters. And it will, hopefully, be possible to establish more precise geoengineering knowledge from this data. Data establishing how much heat is removed? If it is possible to create artificial cloud coverage, that will reflect incoming sunlight back into space? If there is added effects of rain coverage – precipitation? This, so it is will be possible for us to establish and calculate all the climate effects of manmade thermals! The costs to finance and start these basic research programs – in order to establish the effects of this type of safe geoengineering – locally, regionally and globally, is estimated to be less than \$15 million.

### **4. Cost of building geoengineering “ventilation chimney” units ...**

If the proposed geoengineering experiments and this technology works – and if we can secure the IP – and if we “preferably” can get a profitable deal with UN–IPCC. If all these unanswered “ifs” are being meet, we would need to construct / build something like 1,000 “ventilation chimney’s” all around the world. A number of “ventilation chimney’s” that may rise to several thousand, as we get more knowledge and more precise data about the effect of these manmade thermals.

If tests and negotiations are successful, this project could easily create thousands of new valuable jobs, all around the world. Jobs connected to construction / building, transportation, technical support, daily operation, coordination, oversight, administration, in metrology, in researches, in public administration, needed UN-IPCC coordination teams etc. etc. Especially the oversight needed from UN-IPCC is vital, in order to secure safe and controlled use – and avoid harmful misuse, of this technology by persons, states and nations. An argument – about “job creation”, that we need to remember in relation to the many nations (global stakeholders), when it comes to bringing global warming under control.

And as said, on page 6. If successful, it would mean that we need to build “ventilation chimney’s” and units on an industrial scale, so that each unit can easily be transported around the world. This so that we can assemble the units, as they arrive on the individual locations. Basically, using the same method as being used when building and transporting wind-turbines.

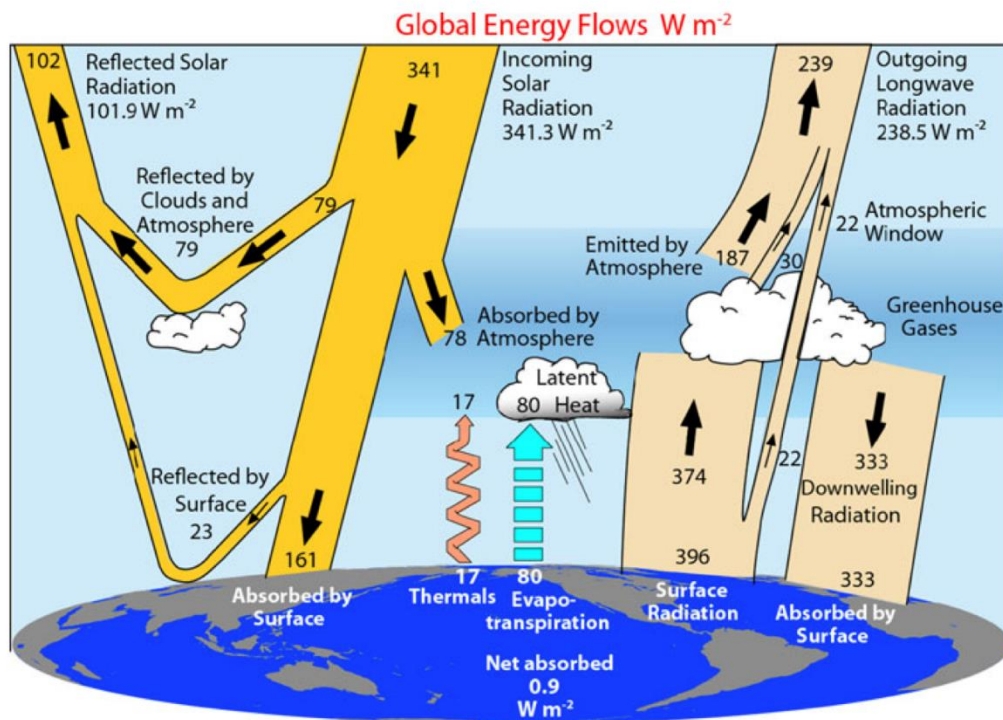
In these calculations it is estimated, that each unit will cost approximately \$30 million. A price which consists of approximately \$12 million building the vertical “ventilation chimney”. \$2 million for 3MW to 5MW (Mega Watt) high-speed ventilators. 2\$ million for control-room, workshop, office and crew-room, computers, sensors, CCTV etc. etc. \$10 million for 3MW to 5MW power units – consisting of wind-turbine(s), solar-panel(s) and a 3MW to 5MW back-up diesel generator. \$1 million for technical support and connecting to local power grid. \$3 million for transportation and miscellaneous, such as purchase of land. Further to this it is estimated that running costs will be approximately \$3 million per unit per year.

The use of wind-turbine(s) and solar-panel(s) is simply to operate the units with as small a carbon-footprint as possible, in order to get as much international and political acceptance for this safe geoengineering technology, as possible.

##### 5. Global solar energy flow-chart ... and to better understand the magnitude of global warming ...

In order to understand what drives global warming, we need to recognize, that Earth receives a substantial surplus of energy – each and every day, that roughly equates to 680 Exa Joules (EJ, 1 EJ =  $10^{18}$  Joules). In comparison, the total global energy consumption – in a whole year, is about 400 EJ. The total global manmade energy consumption – in a whole year, is roughly 60% of the excess energy – the surplus of heat from the Sun, that Earth receives in a single day, 365 days per year. It is these 680 Exa Joules per day, that we need to help Earth get rid of!

On the flow-chart, you can see that it is the  $17 \text{ Wm}^2$  from thermals, that we want to improve, so that the total effect from thermals reach  $18 \text{ Wm}^2$ . Simple as it is – we need to improve the effect of thermals globally with something like 5-6%.



Trenberth and Fasullo (2012) Surv. Geophys.