

Radio Ecoshock Transcript

This is a rough transcript of the interview of David Wasdell, on Radio Ecoshock November 18, 2015. Also included are two questions, with David's text reply, that were not included in the program.

INTRODUCTION BY ALEX SMITH

Humans have a known tendency to either panic and hide, or to fight against the wrong enemy. So I try to stick to rational voices, and back those up with the best scientific proof we can find. Our guest David Wasdell is one of those voices. But now he's poking big holes in mainstream hopes and illusions about saving ourselves from climate change. His latest video and paper is called "Climate Dynamics: Facing the Harsh Realities of Now".

BEGIN INTERVIEW

David Wasdell, welcome back to Radio Ecoshock.

Hello Alex. It is always good to work with you on the critical issues you raise and to know that our discussion is being heard by a global audience that is both well-informed and passionately concerned.

[6 FAST QUESTIONS]

David, just so the listener knows what they are in for, why don't we start with a quick round of "yes or no" questions.

Alex, that sounds like a great way to set the agenda, though I can't guarantee one word answers!

1. World leaders meet in Paris to reach an agreement to keep the world safe from dangerous climate change. Even if they agree to all the voluntary goals set by each country, will that be enough to keep climate change below 2 degrees Centigrade of warming?

Absolutely not!

2. Do we still have a comfortable margin of carbon we can burn and still avoid catastrophic climate change?

No! We have overshoot that boundary by a massive amount!

3. Have leading scientists modified science for politicians, because the harsh realities of what we need to do are "unrealistic"?

Sadly that is correct.

4. Is it true that United Nations projections of climate change, including those from the Intergovernmental Panel on Climate Change, routinely leave out important warming forces?

That is true!

5. Is it conceivable, even possible, we are setting planet Earth on a path toward heating of 8 degrees or more Centigrade, or say 16 degrees Fahrenheit hotter, in the next 100 or 200 years?

That is exactly where we are headed.

6. If we don't wake up and act, can this generation ruin the Earth for humanity and other species for thousands of years?

Yes!

All this is part of a stunning new video lecture and paper called "Climate Dynamics: Facing the Harsh Realities of Now." The presentation is by David Wasdell, Director of the Apollo-Gaia project. I've followed David's work for years. In December 2010 we did an interview for a Radio Ecoshock show called "Beyond the Tipping Point". Wasdell is well-versed in science. He keeps in touch with other scientists around the world. As an independent analyst, with no institutional ties, David is free to bring out the climate science few others discuss openly with the public.

[TEMPERING REALITY TO FIT]

David, I've interviewed several psychologists about the human ability to lie to ourselves. But your talk goes much deeper, looking at vast institutional fantasies, where even science is tempered by a kind of "real politik". What did the famous German climate scientist John Schellnhuber tell you about that several years ago?

The idea of an "available carbon budget" was introduced just prior to the 2009 Copenhagen Conference by a big think tank in Germany, the WGBU, (the German Advisory Council on Global Change). The Introduction was written by Professor John Schellnhüber who was Chair of the WBGU Council. By the way, John was one of my initial colleagues at the start of the Apollo-Gaia Project. In that introduction he wrote: "this Report is a compromise between what is scientifically necessary and what is politically and economically feasible". This report is a compromise between what is scientifically necessary – what the actual situation demands – and what can be tolerated politically and economically. Now when key scientists put out reports that have already made that compromise, so that what they report to the policy-makers is already an appeasement document in terms of what the political and economic vested interests will allow, then, in my opinion, they have lost their authority as scientists.

We all need to keep this carbon fantasy going. Otherwise how will we drive to work, or feed ourselves? Why do you think this is a critical time to face the harsh realities about climate change?

Our patterns of work, city design, building architecture, transport arrangements, food production, population growth, power generation, military strategy, political, economic and financial institutions, have all developed in the context of a virtually unlimited supply of cheap fossil energy. That age is over! Not because we have run out of fossil fuel, far from it! But because the collateral damage from burning the vast amounts involved has changed the composition of the very air we breathe and dramatically transformed the energy-balance of our planetary home. Digging ourselves out of that hole requires a transformation the likes of which have never before been faced by our human civilization.

Let's dive into your work. I found your comparison between changes in Earth temperature and our own body temperature makes it easier to understand. How do they compare?

Alex, the Planet acts a little bit like your own body. I mean in response to temperature. If your temperature goes up by three or four degrees you are getting into life-threatening stress. Five degrees you are probably dead, three-and-a-half you may be going into delirium. If your temperature drops by about two or three degrees, you are suffering hypothermia. You have a very narrow temperature scale within which to operate. Your body is very sensitive to small changes in temperature. So is the Planet. Just five degrees marks the difference between a mile and a half of ice over Ottawa and the bustling capital city we know today! Five degrees, that is all. So in that sense, global sensitivity to temperature change is extremely high.

From a different perspective, if you catch flu your temperature goes up. If you have streptococcal meningitis it will go up a lot further and faster. So there is sensitivity of temperature to pathogen behaviour, and there is also sensitivity of the body to change in temperature. Two very different sorts of sensitivity. So at a planetary level we can distinguish between the Sensitivity of Global Climate to changes in temperature and Sensitivity of Global Temperature to changes in CO₂.

[SAFETY AND CLIMATE SENSITIVITY]

A number of scientists, including Dr. James Hansen, have warned the 2 degrees Centigrade limit on warming is not safe at all. In fact, Hansen said it was "crazy" to think so. Do you agree?

Alex, my short answer is "Yes". My long answer goes like this: Tiny changes in planetary temperature have big effects on Global Climate. You can see that already with the present increase of just under 1°C. Drought, fires and crop-failure across California and other southern States (not to mention Australia!), desertification and collapse of subsistence agriculture in sub-Saharan Africa with starvation, disease, migration and conflict, loss of 70% of the floating sea-ice in the Arctic, start of methane release from sea-bed permafrost, disruption of the circumpolar jet stream with the "weirding" of weather across the northern hemisphere, knock-on effects on the monsoon behaviour, crop failure and farmer-suicide in Northern India, devastating flooding in some areas, increase in the strength of rainfall and in the power of tropical

storms with changes to their normal routes, loss of 40% of phytoplankton around the globe, damage to coral reefs and the ocean food-chain, spread of bark beetle with die-back and burn of the Canadian pine-forests, shift from carbon sink to carbon-source in the Amazon rain forest, with die-back, wild-fires and the start of the change from forest to savanna, species extinction running at about 1000 times the normal background rate, loss of about 500 cubic kilometres per year (and rising!) from land-based ice, 20 cm of sea-level rise (about a tenth of what is already in the pipe-line), extreme water-shortage in the countries around the Mediterranean, with social unrest, escalating conflict, accelerating migration, and economic collapse.

Alex, we are way beyond “safe climate change” already. A rise of 2°C would lead to over 4.5 metres (about 15 feet) rise in sea-level and multiplication of all the effects we are seeing today. It might give temporary protection to the profits from fossil energy, it would be catastrophic for humanity as a whole. Yes I agree with James Hansen. Setting a rise of 2°C as a global target and calling it “safe” is sheer madness!!

You explain developing new science on climate sensitivity. How would you define "climate sensitivity" to the person on the street?

The air we breathe is about four fifths nitrogen and one fifth oxygen. Those gases allow light and heat radiation through in both directions without interference. Carbon dioxide is a trace gas. The atmosphere contains just 2 fifths of one hundredth of 1% of CO₂. CO₂ is a “greenhouse” gas. It allows light in from the sun and blocks some of the heat energy from being radiated back out. Along with water vapour, ozone and methane, it acts like a thermostat, controlling the surface temperature of the planet within a range of about 35°C. Burning fossil hydrocarbons for energy increases the concentration of atmospheric CO₂, changes the setting on the thermostat and pushes up the surface temperature of the planet. Obviously we need to calibrate the thermostat and the measure we have chosen is a doubling of the concentration of atmospheric CO₂. So the question is “how much does the surface temperature of the earth go up if we double the concentration of CO₂?” The answer to that question is what we mean by “Climate Sensitivity”. If the value is pretty low then we can emit large quantities of CO₂ without pushing the temperature up too far. However, if the value is much higher, then emitting quite small amounts of CO₂ will have a big effect on temperature. So getting that figure right is absolutely crucial for setting future strategy.

How did the Intergovernmental Panel on Climate Change, - the IPCC - manage to set climate sensitivity far too low?

There are two ways to tackle the problem: building computer models of the system and reading off the resulting predictions, or looking in detail at the relationship between CO₂ concentration and associated surface temperature over millions of years of the planetary history. But here we need to take a step back and understand a bit more about the thermostat. The effect of change in CO₂ concentration on its own is known pretty accurately. Trouble is it sets off a whole host of other mechanisms, (what we call feedback effects) that amplify what the change in CO₂ does on its own. Some of these feedbacks are well known and can be quantified and confidently used in the computer models. Others are known but cannot easily be quantified (the

“known unknowns”). Then there is a whole set of unknown feedbacks and relationships between them all that are beyond current understanding (the “unknown unknowns”).

The set of computer models used by the IPCC only work with the feedback mechanisms that can be quantified. Inevitably that only gives part of the picture. In contrast, the history of planetary change includes by definition all the feedback processes, known and unknown, positive and negative (that is amplifying or damping), together with all the complex interactions between them. The computer models predict that the temperature change from doubling the concentration of CO₂ would be about 3°C. Using the history of the actual relationship between temperature and CO₂ concentration we find the outcome is more like 8°C. That is a huge difference with massive strategic implications. The reality of earth System Sensitivity is about 2 and a half times that stemming from the partial computer models.

Then you get into the politics and economics that really drive the selection of the facts. The main IPCC Report clearly states that the relationship between predicted temperature and total emissions depends on the value of Climate Sensitivity. That fact was ignored in the Summary for Policymakers. The low computer-generated value was selected as the basis for strategy against strong academic advice. The decision clearly fits the economic agenda of the fossil industry which largely controls the political position.

This is an example of policy-selected climate science, not science-directed climate policy!

I suppose this means that a smaller amount of carbon dioxide, and a lesser rise in global mean temperature, will do much more damage than we thought? Is that it?

Spot-on.

[FEED BACK LAYERS]

A key part of your presentation, well-shown in simple graphs, are the layers of feed-backs that amplify the simple measurements of carbon in the atmosphere. Please take some time to tell us about that. Let's start with the so-called "fast feedbacks" or "Charney" feedbacks.

Alex, it sounds like you are asking for a mini-tutorial at this point. Is that OK?

Then let's have a go! In order to maintain the energy balance of the Earth, the average surface temperature of the planet has to change by 1°C to compensate for each 3.8 watts per square metre of radiant energy blocked by change in the greenhouse effect. So if temperature has changed by 5°C between the depth of the last ice-age and the pre-industrial benchmark, it means that 19 (3.8 x 5) watts per square metre has been blocked because of the change in the greenhouse effect and the reflectivity of the planet during that period.

So what are the elements that give rise to this change? Let me introduce them in layers, starting with change in solar energy, then adding the contribution of CO₂ on its own. Then we will add the effects of the “fast feedbacks” (the “Charney” sensitivity). That will be followed by the carbon-cycle feedbacks (Hadley), the ice-sheet dynamics (Hansen), and finally the full Earth System Sensitivity including all amplifying processes.

To start with, there is a change of just over ½ watt per square metre in the solar energy received because of **change in the eccentricity of the earth’s orbit** around the sun. Change in the concentration of carbon dioxide contributed about 2.3 watts per square metre during that period. The earth system amplifies the effect of carbon dioxide, so if you are just looking at the contribution from carbon dioxide on its own, we have to account for another 84%.

Next we put in the effects of the fast feedback response (the “Charney” sensitivity, so-called because Jule Charney was the Chair of the original committee that worked on this back in 1979): firstly atmospheric water vapour (a powerful greenhouse gas) increases with rising temperature, secondly, cloud-behaviour changes and increases the feedback, and thirdly, the area of floating sea ice decreases with rising temperature so reducing the reflection of solar energy. These come into action as soon as the temperature starts to change, which is why they are called “fast feedbacks”, though the resulting heating is very slow. They added about 5wm⁻² during this period, leaving 58% still unaccounted for.

The current set of climate models, the one used as the basis for the Fifth Assessment Report of the IPCC, deals only with these fast feedbacks. Workgroups 2 and 3 of that Report, together with all the subsequent analyses prepared in the run-up to the Paris Climate Conference, all share the same methodological dependency. They all use an understanding of climate feedback dynamics that falls short of reality by nearly 60%, but persists in being inappropriately used as the basis of the international negotiations in Paris.

Some of the more sophisticated super-computer models (like that of the UK “Hadley” centre) also include some of the effects of the carbon cycle feedbacks which add around another 3.3wm⁻². We are still 41% short of the 19wm⁻² required to balance the energy budget of the Planet. The carbon-cycle feedbacks are not taken into account in the IPCC advice to Policymakers. This situation reflects a long-standing policy in the work of the IPCC which tends to focus on the output from the most basic computer models, while the more sophisticated ones are seen as “outliers” and tend to be ignored!

Using non-modelled historical data, James Hansen has included the long-term ice dynamics – the changing reflection from the big land-based ice sheets. That adds another 3.6wm⁻². But even Hansen's work is still some 22% short of the target.

The dynamics of the planet as a whole, with all its feedbacks and all their interactions, known and un-known, adds a final 4.1wm⁻² to the total, so completing the change of 19 watts per square metre between the depths of the ice age and the pre-industrial bench-mark. That is the figure we need to be working with in making strategic

policies. It is the ground of what we have come to term the full “**Earth System Sensitivity**”.

You say the whole collection of feedbacks amplify the simple effect of adding carbon by a factor of eight. What does that really mean?

As we have seen, the effect of changing the concentration of CO₂ on its own is quite small, but the change in temperature it initiates sets off a great range of feedback mechanisms which increase its power eight-fold. It is a bit like feeding a small signal from a microphone into the amplifier of a P.A system, that increases the power of the signal and feeds it out into a large auditorium. Does that help?

Please tell us what doubling CO₂, from 280 parts per million in pre-industrial times, to 560 parts per million in the near future, produces as we include each stage of feedback.

Moving from the specific example of change since the last ice-age, we can derive the **value of the more generalised “Climate Sensitivity”**, the equilibrium change in average surface temperature of the planet following a doubling of the concentration of atmospheric CO₂.

The temperature change required to compensate for the effect of doubling concentration of CO₂ on its own is calculated to be 0.97°C. Climate sensitivity when only fast feedbacks are taken into consideration stands at 3°C. Including the effects of the carbon-cycle feedbacks raises the value of Climate Sensitivity to 4.5°C. Adding the contribution from the ice-sheet dynamics correlates with a 6°C value for Climate Sensitivity.

While the Sensitivity value representing the equilibrium dynamics of the Earth System as a whole stands at 7.8°C. Though please note that this figure is derived from slow and close to equilibrium conditions of change in the Quaternary period. It may be too low in the current conditions of the Anthropocene.

Now if you are working with computer models using only the fast feedbacks, you would predict that 2°C would be achieved at around 440 ppm. But if you are using the Earth System Sensitivity, then at 440 ppm we would be looking at more like 5°C of change. However, as I keep reminding you, the computer simulation, inadequate and partial though it may be, is what is still being fed into the process of strategic policy-making on the assumption that the temperature change will only be 2°C for a concentration of 440 ppm of CO₂.

What is the eventual warming, or as you say "the implicit temperature" we can expect from our current level of 400 parts per million carbon dioxide in the atmosphere?

[In his online video at Apollo-gaia.org, at 34:06 Wasdell says: "Today we are at 400 parts per million" ending "is now about 6.2 degrees Centigrade, when everything is worked through to equilibrium- to 35:13]

But that is fantastic! We are not just doomed to go past the supposed 2 degree safety barrier, but we are already committed to over 6 degrees Centigrade warming - just with our current greenhouse gases in the atmosphere!

This is Radio Ecoshock. I'm Alex Smith with my guest David Wasdell from the Apollo-Gaia Project.

[INERTIA]

There are many responses to relatively small changes in climate in the geophysical world, like ice melting, and in the living world. You talk about the way climate responds to small changes in temperature. Is that what you mean, or is there a different scientific angle to your point?

There is a huge gap, a failure of the human mind, that stops us from facing reality, and taking action to save ourselves. You call it "dynamic inertia". That acts as a trap in our experience that fools most people into thinking things aren't so bad - that climate disruption must be a long way off. How does "inertia" work in the world's climate system?

Despite record greenhouse gas emissions every year for the past 30 years, Earth has only warmed about 1 degree C since the industrial revolution. What happened to the rest of the warming, and when will we feel the impact of the emissions we've already dumped into "the skyfill"?

[IMPLICIT TEMPERATURE CHANGE]

To tackle this "inertia" trap, you introduce something called "implicit temperature change". Please explain that.

[IMPLICIT RISING SEAS]

Then we have a huge impact with an even bigger delay built in. I'm talking about rising sea levels. Some of my scientific guests say rising seas will have even more impact on human civilization than rising temperatures. How will rising seas reshape the geography of the world?

[I've just received a new scientific report saying a massive Greenland glacier called "Zachariae Isstrom" is decaying rapidly. The report says nothing can stop it now from disappearing into the sea, adding 18 inches to sea levels around the globe, from just this one glacier. Do you think it's too late to stop rising seas from inundating most of the world's coastal cities?]

Is there a way to know the pace and destination of "implicit sea level rise"?

This is Radio Ecoshock. My guest from London is David Wasdell from the Apollo-Gaia Project. We are talking about his new video presentation and online paper called "Climate Dynamics: Facing the Harsh Realities of Now."

[COLLAPSE OF THE CARBON BUDGET]

At various conferences, in the business press and in scientific circles, there has been a lot of effort to work out how much carbon we can still burn, in the form of oil, gas, and coal, - and still remain below the supposed 2 degree warming safety limit. No doubt diplomats at the Paris Conference will talk about this "carbon budget". How much of a budget do we really have left?

At present the CO₂ concentration stands at 400 ppm. If it is thought to be safe to go up to 440 ppm, then we have a good budget to play with. There is still plenty of room in the sky-fill site. However, if we don't use the inadequate computer models, and instead apply the real Earth System Sensitivity, then we were already committed to passing the 2°C ceiling when CO₂ concentration stood at 334 ppm. That was back in 1978. We have already overspent the budget by a large amount! Getting the picture?

How did you work out our real carbon budget, and what do you base these calculations on?

I've claimed for years that our "carbon budget" is already bankrupt. We need emergency action to crash our greenhouse gas emissions, and then start pumping carbon back out of the atmosphere. Is that crazy?

Ahead of your time perhaps, Alex, but definitely not crazy!

What has to happen for the world to warm 10 degrees Centigrade?

National promises ("INDCs") (Independent Nationally Determined Contributions) concerning reduction in CO₂ emissions, have been tabled ahead of the COP21 in Paris. Those promises look like pushing us to about 700 ppm by the end of the

century (if they are implemented, and there is no guarantee about that whatsoever!). Business as usual is driving us up towards 800 or 900 ppm up here. If we cannot improve the level of promised emissions reduction, then “We might hit 4°C” predicts the IPCC using its low value for sensitivity.

But if we use the full Earth System Sensitivity to examine the way the climate behaves at the level of 700 ppm. We are not looking at something around 4°C, but an increase of more like 10°C. That is twice the temperature shift between the ice ages and the pre-industrial benchmark. If we are not able to cut back on our current “business as usual” behaviour, then the temperature rise increases to more like 12 or even 15°C, (and two or three times that amount in the Arctic!) Good bye all the ice on earth. Welcome to something like 90 feet of sea level rise, or even more when all the Greenland ice-cap and the whole of the Antarctic ice sheet melts. Civilisation would have collapsed and we would have evacuated London and New York well before then!

[STRATEGY AND STABILIZATION]

A small group of scientists will advise UK Prime Minister David Cameron, and all the world leaders, on what to say at the Paris COP 21 climate summit in December 2015. If you wrote that report for leaders, what strategy would you recommend?

This whole presentation was conceived at an event organised by “The Global Leaders Academy”. The task of leadership in this context is truly awesome. Alex, you refer to “world leaders” attending the Paris summit, but they attend in their role as national representatives. However well-intentioned the wording of the final communique, each leader is present to fight for the best interests of the nation they represent. It is a struggle-group, fighting over limited resources, trying to minimise threats to national interests.

True Global Leadership steps up a level to recognise the overall planetary scale of the crisis, resolution of which requires collaboration to triumph over competition. National interest bows to the overarching requirements of global survival, the achievement of which is ultimately in the best interest of each and every one of the nation-states involved.

But to return to your request for a scientific briefing. Every report and every paper being prepared and presented ahead of the Paris Conference echoes this three-fold mantra of:

- The 2°C ceiling
- The budget approach to negotiations
- The strategy of goal-achievement by the reduction of carbon emissions.

The pressure to collude with this party line is phenomenal.

Any agreement reached in Paris on these terms would be a strategic disaster, committing humanity to a course of action that would guarantee catastrophic climate change with all the unmanageable consequences that would involve.

There is also profound pressure to determine strategic response by reference to currently observed changes in the global climate system. That is a grossly inadequate approach when dealing with any complex system subject to the kind of massive time delays between cause and effect that we have already noted. **Strategic response must be ordered by the scale of implicit change in system behaviour rather than by reaction to the minor symptoms already presenting themselves for observation.**

It is now abundantly clear that limiting temperature change to 2°C cannot be achieved by emissions reductions on their own. There is no available carbon budget. It is already massively overspent, even for the 2°C target. Moreover the 2°C target has been set far too high and must be reduced from 2°C through 1½°C to 1°C or even further, in order to avoid dangerous climate change and therefore to conform with the globally agreed terms of the United Nations Framework Convention on Climate Change.

Emissions reduction is a necessary but not sufficient step towards climate stabilisation. In addition it is now imperative to draw down much of the stock of emitted greenhouse gasses already in the atmosphere.

It is therefore essential to move beyond the reduced emissions of a low-carbon economy, to pass through and beyond the zero-carbon economy and then to achieve a substantial carbon draw-down economy at a global level and within the shortest possible time-frame. **This demands moving beyond the current one-dimensional strategy of emissions reduction to an integrated two-dimensional strategy that also includes stock reduction.**

You talk about "climate stabilization". Personally, I think that's a moving target, rather like aiming for "a survivable climate" or at least "avoiding the worst catastrophe". Do you think it's possible we could stabilize the climate into something livable?

Absolutely yes! Stabilization is a bit like riding a bicycle. It is dynamic, requiring continuous adjustments. Learning to ride in the first place is the real difficulty. Currently we are wobbling all over the place and heading for a crash.

[Extra question: not included in this Radio Ecoshock show:]

Tell us about your 5-step program to stabilize the climate.

The collective journey towards climate stabilisation involves five global steps beyond the harsh reality of our current situation:

Step one: involves the constraint of our current “business as usual” behaviour to the set of promises tabled internationally for COP21 in Paris.

Step two requires increase in the ambitions of the tabled set of promises until they match the demands of the IPCC “available carbon budget”.

Those two steps are reflected in the recently published UNEP Gap report 2015. However, three additional steps would then be required before the global climate could be deemed to be on track for stabilisation at a level that would minimise our exposure to dangerous climate change:

Step three would be the essential replacement of the inadequate computer-derived value for climate sensitivity by the figure for the full Earth System Sensitivity.

Step four reduces the target ceiling temperature from its current setting of not more than 2°C above the pre-industrial bench-mark down to a target increase of just 1°C or less.

The fifth and final step would be the strategic removal of the forcing from all the non-CO₂ greenhouse gasses (or their compensation in extra reduction of the allowed level of CO₂ emissions). In other words the transformation from a maximum concentration of 305ppm of atmospheric CO₂ on its own, to a ceiling of not more than 305ppm of CO_{2e} and its maintenance however the atmospheric composition changes over time.

[RESISTANCE AND SOLAR POWER]

[Extra question: not included in this Radio Ecoshock show:]

How can we overcome the giant human forces of resistance - resistance to acknowledging the size and immediacy of the crisis, and resistance to taking the steps necessary to save ourselves?

Standing firmly in the way of effective change, dominating all the official pronouncements, governing the terms of every official report being tabled ahead of the COP21, and embedded at the heart of the [Draft Agreement](#) for Paris is the policy-directed illusion of the 2°C target, the falsely assumed budget of available carbon emissions, and the myth that reduction in emissions on its own can achieve those objectives.

Meanwhile we face a **massive amount of resistance** to staying in touch with the reality of the global climate and bringing our political and economic decision making into line with that reality. Not least we have to confront the addictive power of enslavement to fossil fuel as the energy source of our global civilisation. Maintaining that addiction generates massive profits from the extraction, refining, marketing and use of fossil hydrocarbons, whether they be coal, oil, gas, fracking or tar-sands. Those profits make the money that drives the global economy. They line the pockets of the most powerful hyper-rich. Remember that, in addition to large multi-national companies, there are some very large national economies that are totally dependent on their income from fossil energy for economic survival, for social stability, for religious coherence, and for the maintenance of political and military power. Resistance to change also extends deep into the social and collective unconscious. That profound motivation for resisting change compounds the power of the more rationalistic political and economic forces outlined above.

The resistance to the implementation of any strategy required to avoid dangerous climate change is massive. **Never, in the course of human history, have so many been trapped in economic bondage to so few.**

At the end of your presentation "Facing the Harsh Realities of Now" you suggest this climate crisis could be converted into an opportunity - to jump to a completely different power system. What do you have in mind?

It is time to say NO to the dark and toxic energy of the underworld. It is time to say YES to the pure and sustainable energy of light. Photo-dynamics can out-power, out-pace and out-resource any amount of energy we can get from fossil sources, and by the way, it's free! It is time to break out of our bondage to the past. It is time to embrace the freedom of the Sun. It is time to usher in the dawn of Solar Society.

You know, the transition from fossil dependency to solar dependency is an extraordinary shift for our species. It can be compared to the introduction of photosynthesis in the evolution of plants, which could then take solar energy to transform basic chemicals into more complex molecules. Today we are able to take solar energy and transform it directly into electricity, power, heat, and light. That provides the basis for a metamorphosis. We are not caught in the death throes of civilisation, merely the demise of an inappropriate mode of civilisation. We are experiencing the birth pangs of a new form of humanity.

What has been the reaction so far to your new video on "harsh realities"?

I think it was the English poet T.S. Elliot who wrote "Mankind cannot tolerate very much reality", and time-poverty is one of the excuses we use to mask our fear. Thankfully there is a rapidly growing movement of people around the world who are finding the courage to "face the harsh realities of now". The video seems to be a catalyst to that momentum. The response has been quite overwhelming! It gives me the courage to share my dream of the future. It goes something like this:

I have a dream: that humanity will break out of its state of denial and find the courage to face the harsh realities of now.

I have a dream: that, as a species, we will look back on this current crisis and celebrate the solutions we were able to put in place and say with pride "that was humanity's finest hour!"

That is the dream. Our task is to make the dream come true.

[WRAP UP AND WEB SITE]

Listeners can go to apollo-gaia.org - that's apollo with one "p" and two "l's" dash gaia - g-a-i-a dot org to watch this free video with David Wasdell. Spend the time. Learn. It may be the most important hour you spend this month or this year. Or download the free .pdf summary of the video. Of course I'll also put links in my own show blog, published every Wednesday at ecoshock.info.

Or just Google "Facing the Harsh Realities of Now" and David's web page comes up at the top of the pile.

David Wasdell, thank you for taking the time to explain all this.

[Thanks for the opportunity.](#)

I'm Alex Smith reporting for Radio Ecoshock.