

# Rebalancing the Greenhouse Gas Account <sup>1</sup>

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## Introduction

In my younger days I had a love-affair with a number of cities that lie close to sea-level. I called them “cities in swamps”. Modern planning theory and practice have failed to address the problems of their development and management. Planning has ridden rough-shod over the cultures of canal-based peoples, and the houses of their poor flood regularly during the wet on each tide. This is before Climate Change. And it is not the rising sea that still brings an immense sense of sorrow for the people of these cities, it is extreme weather, the larger floods and higher storm surges.

Average global temperatures are a balance between the heat coming in from the sun during the day and going out at night when the sun doesn't shine. This balance is controlled by the properties of the so-called greenhouse gases in the atmosphere, with carbon dioxide and methane being gases that help most to retain heat. We are in the process of changing that balance.

While the roots of modern climate change date from the industrial revolution, the massive increase in greenhouse gases in the atmosphere started in World War II, caused by warfare's massive production and destruction.

Human activity produced more and more of these gases with increasing population and economic development, as we took carbon out of the ground that had been trapped there for millions of years, and burnt it so the carbon from millions of years ago went back into the atmosphere in the form of more carbon dioxide.

In the 1980s people started listening to the climate change scientists and the modern anti-climate change movement began. Deniers and connivers also began to resist appeals for climate action, pitting oil barons and politicians and those greedy for material gain against nature and the future.

In 2021, it is no longer the long-term consequence we are concerned with. For us all, it is medium term at best and for some it is their already-present crisis.

Joel Werner, an ABC Science journalist writes:<sup>2</sup>

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<sup>2</sup> Joel Werner. Mitigation or adaptation? When it comes to climate change, it's not a case of either/or. ABC Science report posted 17 January 2020 at [https://www.abc.net.au/news/science/2020-01-17/climate-change-mitigation-or-adaptation-not-a-case-of-either-or/11874202?sf228333416=1&fbclid=IwAR3duoUihBIHiAFVelsfLp-ewyHxHnmS3IxpTMPufkryZ\\_ALwQw531hrlLs](https://www.abc.net.au/news/science/2020-01-17/climate-change-mitigation-or-adaptation-not-a-case-of-either-or/11874202?sf228333416=1&fbclid=IwAR3duoUihBIHiAFVelsfLp-ewyHxHnmS3IxpTMPufkryZ_ALwQw531hrlLs)

*Climate change is a long, heavy, slow moving train crawling across decades. Even if we pull the emergency brake right now, we're not stopping for a while yet.... — the train has a hell of a distance to travel before it grinds to a halt.*

Addressing climate change needs two directions of change in human activity, mitigation and adaptation. Mitigation is activity to bring equilibrium to average global temperatures. Governments of the world have declared we should target this equilibrium at 1.5 degrees warmer than a century ago. Nobody believes we can achieve this now. Even 2 degrees is ambitious.

Adaption is coping with the climate as it changes. Coping with more floods, more draughts, more forest fires, more violent storms.

This is a global crisis. All countries have to change. And urgently. This paper does not address how countries can meet agreements on what to do or how to do it. It presents ideas that I hope some might take up anyway.

Ideally each country needs to contribute its fair share to mitigation, and as that will be hard for many countries, some countries would do well by doing more than their fair share, compensating for other nations that cannot reach their targets. Countries that take up the challenge will become global leaders of mitigation.

Some countries have good reason to do more. Indonesia, for example, will need to do more than average for adaptation, as Indonesia is so vulnerable to floods, storms, coastal erosion, droughts and forest fires, and that in itself is a good reason to lead in mitigation.

For both mitigation and adaptation, we need a combination of very powerful politics, extraordinary science, lots of engineering and project management, and finance. Science needs investment in research, and political will to invest in it. Lots of engineering need lots of investment, and investment need lots of project management, and political will to invest. Thus, political will, finance and good project management are core to re-balancing the greenhouse gas account.

I am not a scientist, so this paper is not about the science. Nor am I an expert on the international dialogue on climate change. This paper does not replace the work of many people who are far more knowledgeable and dedicated than me. I am no Naomi Klein<sup>3</sup> or Greta Thunberg or George Monbiot.<sup>4</sup> May God bless them and many others for being what I am not. I write this paper in the hope that it can help generate ideas and actions for the future, with a particular hope of helping the people of Indonesia, the country I live in and love.

It will be a battle to fight climate change, even in Indonesia, and the battle, I suggest, will be fought on eleven fronts that I present here.

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<sup>3</sup> Author of 2014 book “This Changes Everything: Capitalism vs. The Climate”

<sup>4</sup> See Greta and George’s short video on <https://youtu.be/-Q0xUXo2zEY>

## Changing Hearts, Minds and Politics

The most urgent action is to stop increasing the greenhouse gases in the atmosphere. But that cannot be done until we all change our hearts about what we do to the environment, our minds about how we live and work, and then convince our politicians to take action.

A 2019 survey by Yougov<sup>5</sup> indicates that 93% of people in Indonesia believe that climate is changing and that we humans are largely responsible, but there are no large demonstrations in Indonesia like in Europe, Australia and America. Those demonstrations are having an impact globally, and the last twelve months has shown a massive shift of hearts and minds, and slowly, ever slowly of politics. But the popular basis for political action is already apparent in Indonesia.

I hope political parties will be willing to take stronger stands and that their strong stand will earn them both public support and public demand for more and more action. In Indonesia local leaders who take a strong and passionate stance, like Tri Rismaharini, the previous mayor of Surabaya and now Social Welfare Minister, or the leaders of Desa Penglipuran in Bangli,<sup>6</sup> the people work together with them to create a clean and green environment.

Most of government everywhere is stuck in a mode of economic development that is unsustainable. We know we must stop exploiting oil and coal, but we still encourage investment in them, pitting medium term economic growth against the world that our children and grandchildren will live in. If businessmen and economists can illustrate to our politicians that there are alternatives to oil and coal, and if then a good leader will promote them and resist the oil and coal lobby, then the people will give them support.

Perhaps their support for mitigation will not be the same as for adaptation. They will be far more willing, or even demanding, to see the government working on adaptation, as this clearly works for the people.

Should officials in a ministry, say the Ministry of Finance, or Ministry of Forestry and Environment, or Ministry of Public Works, or Ministry of Home Affairs, enter the political debate on climate change? Certainly not, unless they are commissioned to do so by their Ministers. In Indonesia, both Sri Mulyani, Minister for Finance and Siti Nurbaya, Minister for Forestry and Environment, already have formed centres within their ministries to study policies to address climate change. These two ministers will be building collaboration with other ministers to encourage wide and public deliberation on Climate Change, aimed at changing hearts, minds and politics. Such affirmative action is urgent and critical.

## Greenhouse Gas Accounting

We have carbon trading. Do we have carbon accounting? Is it taught in our schools, like in Italy and New Zealand? Can our children tell their parents how much carbon they used when they

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<sup>5</sup> Indonesia ranks 4th after India, Thailand and Spain with 69% of those interviewed believing that climate is changing and mankind is responsible, and 24% believing in climate change and that mankind is partially responsible. Only 3% don't believe people are responsible for climate change and only 1% deny climate change. [https://d25d2506sfb94s.cloudfront.net/cumulus\\_uploads/inlineimage/2019-09-13/Chart%201-US-01.png](https://d25d2506sfb94s.cloudfront.net/cumulus_uploads/inlineimage/2019-09-13/Chart%201-US-01.png)

<sup>6</sup> <https://www.desapenglipuran.com/>

built their home or when they drive their motorbike? And can they tell them how much carbon they are storing in their gardens? Can we train our university student to make a carbon account of a traffic jam and compare it with a carbon account of the planting along our roads? Can we compare a plastic tree to a real one?<sup>7</sup>

Do we have accounting for the carbon used in making steel compared with how much reforestation? Can we compare a natural forest to a plantation?

The answer to all these questions is, well, it could be yes. And the benefit? When we understand the circular nature of carbon accounting, we will understand the need for a circular economy that allows growth in benefits to mankind, while restoring a balance to the greenhouse account.

The pivotal point in the war on climate change is the accounting of the production and absorption of Greenhouse Gases. Recommendations for action should all be conditional on scientific support, with priorities and extent of action set by evidence on how each action contributes to balancing the Accounts.

## Industries to Go

Back in the 1980s CFCs were depleting the ozone layer in the upper atmosphere. We succeeded in stopping the production of CFCs and stopped the depletion of ozone. CFCs were gases up to 40 000 times as bad as carbon dioxide in promoting climate change. In some climate change models of the time, scientists reckoned they contributed to global warming almost as much as fossil fuels. Successful cutting CFCs actually helped slow down the rate of climate change.

So, we have experience with stopping industries that produce greenhouse gases.

Coal-burning is the most damaging of the fossil fuels. And climate change action advocates have been calling for a phasing out of the coal industry for over 30 years, the period in which Indonesia as one country, massively increased its coal mining. Coal producing countries like Indonesia need plans to limit its exploitation of coal, and to collaborate with countries that use it to find other energy uses. Indonesia can ban the opening of new mines, stop the exploration for coal, and negotiate agreements with coal mining companies to close down and shift to other activities. It can do so with engagement with the countries that purchase Indonesian coal, to match non-supply and non-demand.

Continued burning of any fossil fuel militates against any equilibrium in the atmosphere. But the whole economy is highly dependent on it. Internal-combustion engines will have to go sooner or later, unless those that use alcohol produced from sugar-cane and other plants. This at least stops the increase in global atmospheric carbon, as the carbon in sugars is taken out of the air as plants grow, and return to the air when it is burnt. It is a cyclical process.

Many car manufacturers are announcing plans to stop producing internal-combustion engines, some by 2030, some by 2015, some by 2050. If the world can cut the average time to produce a

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<sup>7</sup> In 2018 planting of plastic trees along major arteries became a hot political issue. See <https://www.thejakartapost.com/news/2018/06/01/fake-trees-installed-without-my-permission-anies-says.html>

vaccine from 4 years to less than one year, these manufacturers can change much faster than that.

In several countries already over 50% of new car sales are electric. As electric cars become cheaper, there will be less sales of cars with combustion engines. So how can we make them cheaper? And more profitable so that more manufacturers are attracted?

A carbon trading approach to the marketing of vehicles could lead to tying vehicle registration or buying petrol to owning or renting enough forest to absorb the carbon dioxide we produce by driving. Maybe every petrol-guzzling car owner needs to own a thousand square metres of forest, and every motorbike owner two hundred square metres, depending on the model and age of each vehicle. Trucks and buses would be hit harder. Sound unfeasible? Try adapting Block-chain methodology.

Vehicles using natural gas produce less carbon dioxide. They would need to own less forest. In the era that Sutioso was governor of Jakarta, the United Nations Environmental Program (UNEP) gave its support to the Jakarta Bus Way, because it helped reduce the growth of atmospheric carbon dioxide in two ways. Buses used natural gas, and by making public transport competitive people would leave their private vehicles at home. Buses and taxis and trucks and on-line motorbikes are on the road for longer hours per day than private cars, and the priority should be for them to turn to electricity. Indonesia will be a global leader if it agrees now to a schedule for banning combustion engines in these vehicles first.

The growth of the beef industry has led to an increase in production of atmospheric methane. Recognising this, new industries are appearing that make beef substitutes. The potential impact of plant-based meat-substitutes is impressive.<sup>8</sup> I do not recommend we ban beef, as many poor people depend on their ownership of one or two cows for a living, but we should discourage its growth.

Three of the greatest contributors to the Greenhouse Effect are steel production, cement production and aluminium production. Our massive tree-planting campaigns will have marginal long-term benefit unless we find ways of using vast quantities of timber when they mature. We need to prepare for a shift from steel, concrete and aluminium to timber when we have created sufficient supply. We need to move from the idea that a permanent house is built of brick with a concrete frame to resist earthquakes. We need timber-based materials to prevent fires spreading from one house to another. Steel and cement and aluminium do not have to go entirely, but we do not need them so much in the coming economy.

## Industries to Come

Equilibrium in carbon dioxide depends not only on stopping our use of fossil fuels, but also tree-planting throughout the world to absorb the carbon, and to compensate for all the forests that

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<sup>8</sup> WEF citing Intergovernmental Panel on Climate Change (IPCC) without a reference, says plant-based foods and sustainable animal-sourced food could free up several million square kilometres of land by 2050 and cut 0.7-8.0 gigatons a year of carbon dioxide equivalent. [https://www.weforum.org/agenda/2019/08/global-meat-consumption-reduce-mitigate-effects-global-warming?fbclid=IwAR1Esct6iJrLGtiLttynsFyTDzgf3CJj9h\\_GSqgTHKZ-cvj4BeFkkjg\\_Seg](https://www.weforum.org/agenda/2019/08/global-meat-consumption-reduce-mitigate-effects-global-warming?fbclid=IwAR1Esct6iJrLGtiLttynsFyTDzgf3CJj9h_GSqgTHKZ-cvj4BeFkkjg_Seg)

have been chopped down to make way for human activity. In countries have introduced massive tree-planting programs, communities have become more aware of the extent of climate change. Billions of trees need to be planted. Most of the planting must be outside our cities, but the urban environment can hold far more plants than at present.

Cities have another problem that we should be aware of, that is, they are heat-traps. Because we have not enough greenery in the cities, sunlight reflects heat into the atmosphere, which is absorbed by the air trapped around us. Cities are far hotter than the areas around them. Urban planting cools cities. Hydroponics on balconies. Planting on roofs, especially our office towers. Planting in every street, along all rail tracks. All carparks should have trees, or vines growing over the parking, especially in front of ubiquitous mini markets. Community urban farming can also assist the urban poor with income.

Indonesia has an almost endless choice of alternative energy sources, so much so that it is now hard to understand why there is so little investment in it. We are not short of creative ideas for alternate energy sources. Not just hydro-power plants, which compete with other important uses of water. Not just geo-thermal power. We have tide power and wind-power and biodiesel. We have been short of the social energy and will-power to fight the current power regime and develop existing technologies.

Japan has its ocean-based solar farms and wind farms. Brazil has its sugar-cane sources. India uses cow pooh for power in villages. A hotel in Sumba (NTT Indonesia) generates its power using coconuts. Germans have so much capacity from solar panels on the roofs of consumers that coal-based generators are only used for peak energy time.

My favourite ideas for alternative energy in Indonesia are the lontar palm (*Borassus flabellifer* known also as palmyra) and straits between islands. The lontar palm grows in many places that nothing else will grow, and much barren land can become fertile by planting it. Lontar stores carbon, supplies timber, fodder for animals, fuel for vehicles, and a healthier palm sugar than coconut or aren. Where lontar is common as in the islands of Rote and Sawu in NTT, it sustains population densities several times higher than parts of neighbouring Timor with the same climate. Instead of the wealth from this plant going into population growth, it could go into fighting climate change. Maldives, India and Sri Langka have research centres for lontar, but Indonesia has none.

The constant flow of water between islands in Indonesia could supply a huge amount of electricity. Building a bridge from Java to Bali would be very expensive, but it could provide toll-free crossing, if it was used as an anchor for turbines to supply electricity to most of Java. The Lombok straight could supply more power<sup>9</sup>

The principles of economics are changing. In the Energy Age development was based on economies of scale. Bigger was better. We now recognise they are based on a grossly undervalued the long-term costs of distribution.

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<sup>9</sup> I do not yet recommend nuclear energy. It is still another buy-now-pay-very-much-later technology. Until nuclear energy can solve its waste and decommissioning problems, it should continue to be shunned.

The coming Information Age has economies of scope – intelligent machines doing targeted things. Economic growth needs no longer be tied to bigger markets and bigger operators. Our economy will thrive on smaller, informed business and smaller, informed distribution networks.

## **Water Management: Droughts, Floods and Coastline**

Early 2020 has made us aware how climate change challenges our management of water. Drought and fires in Australian and Amazon, floods in Java and even snow storms in Texas, have put climate change in social media and on the front page of newspapers around the world. We now talk about 20-year floods every three or four years, and how much longer are our dry seasons and forest-fire seasons.

Popular media has misreported the real problems of sea level rise. A 1 cm rise in the last century is nothing compared with the combination of storm surges with king tides. Along the coast of Nusa Tenggara Timor in Indonesia, we are finding storm surges three and four metres higher than before, accompanied by strong waves. Abrasion is destroying whole villages. This is due in a very small way to rising sea-levels, and largely to more extreme weather than in living memory.

We need much more local science to understand local climates and to advise local governments on local adaptation to climate change. Adaptation will require investments to protect people where they live, and other investment to remove people from places as they become vulnerable.

## **Transport and Urban Consolidation**

Fossil fuels have shaped our present cities. They are the cities of the Energy Age. Information, transport and high density will be the next main determinants of urban growth. The city of Makassar in Sulawesi, Indonesia, is the centre of an old New Order urban development concept known as Mamminasata, planning for expanding the city for tens of kilometres to the north, east and south. And yet there is enough land within a six-kilometre radius for the whole population projected for another 20-30 years, within already proposed development of reclamation islands and of swampland on the Tallo River.

Around Jakarta and other cities are industrial and office parks with 20m setbacks from roads and parking for all workers, and virtually no public transport access. We also have denser tree-less huge warehousing complexes close to airports and seaports. Meanwhile other cities like Singapore and Hong Kong have multi-storeyed factor buildings, still with trees around parks and gardens for workers, and close to public transport for far higher density of workers.

In other countries, housing densities that are needed to make public transport the system of choice are far lower than the big cities of Java. Transport theory would have us conclude that any urban transport system will work in Java, and probably other cities as well.

There are just three historic reasons why public transport is not the system of choice in most of Indonesia. Firstly, there is almost no public transport anyway. Secondly, the quality of existing services that few people want to use them. And thirdly, you need to walk at each end of a public transport ride, and walking is so unsafe in Indonesia because there are so few footpaths.

Covid19 has jolted public transport, not designed with pandemics in mind. But for the future of the planet we must still reduce private transport. A new reason why people don't like public transport is fear. And this is a real challenge of operators to be addressed with innovation.

While we develop our transport networks, we need a system of incentives to get people to give up their vehicles. These incentives need to target commuting, day-tripping, second-car usage, distribution of goods and services, and of course where to buy a home and where to accept work.

One reason why people use their cars and motorbikes now is that they have paid the capital cost of them. They drive as a way, they perceive, of saving money. If they have already paid for the public transport, more people would use it instead of their cars, simply because they have already paid for it. So, employers could be required to pay directly from each employee's salary the fares for commuting by the most direct public transport.

Another reason is that car use is subsidised. At last Depok, south of Jakarta, plans to penalise people who have cars but no garaging. The idea of only selling a car to a purchaser who has a place to park it was proposed in a recommendation to the government of Jakarta in 1983 by those preparing the 1985-2005 spatial plan. It has only taken 37 years to be adopted for the first time.

People who park their cars on public space (on the road or in a free parking area) are getting a subsidy of over a US dollar a day, a considerable incentive for buying a car. Where parking in the street costs almost nothing, it is a huge subsidy to those who park on roads from the all the people whose movement along the road is obstructed. Parking in cities has a far bigger subsidy. A parking space for civil servants working in a downtown office Jakarta has a commercial value of more than the salary of most of them. The parking space in malls provides a cross-subsidy to the rich from the poor who walk there or ride a bus.

Even in the 1970s, most Indonesians did not ever catch a bus. They walked. Now almost everywhere not even school children walk to school, because it is not safe. Even when there are footpaths they are so often used by motorbikes, car parking and foot stalls. For successful Transport oriented development (TOD) we need POD, pedestrian oriented development. Everywhere.

Bicycles deserve at least as much planning and attention as other means of transport. Bike-ways should focussing on commuter-stations and especially supplied with secure bike-storage facilities, as they have in other countries. But most importantly it should be safe for our children to ride to school, where they will build a habit that will last a lifetime.

Covid19 has taught us all to use the internet instead of going to school or a city office. More people are working from home or from small local offices and communicating with colleagues through emails, WA and video calls.

Indonesia has just announced a winner for the design of the new capital city. Who should move there? Perhaps ministers, running meetings by video with their executive officers who stay in Jakarta. And the ministers can walk or cycle to work, saving much disruption to the flow of traffic created by ministerial convoys. Even the prime minister of Holland rides a bike to work. Perhaps Indonesia's new houses of parliament could meet once or twice a year, with their committee



meetings and most plenum sessions held by video. Then members will spend 90% of the time close to their constituencies. That is not a bad idea.

## **Accountability for Waste**

In rural Indonesia, before plastic, ducks would eat anything dropped on the ground. Ducks would then pooh in ponds, providing nourishment to both fish and kangkung, and the people would eat the kangkung with a choice of fish or duck. This was the cyclical rural economy. Then along came plastic. People dropped plastic on the ground without understanding that ducks didn't eat it, and it would stay there until it washed into a river, or some more caring person picked it up. And people still throw plastic on the ground and too few caring people pick it up.

In Bali there is a very active community-driven program to transform waste management. One popular NGO, Transformers, is reducing plastic waste by teaching school children better habits than their parents have. Others NGOs organise massive beach cleaning programs. But behind the thinking of the leaders of this movement is a yearning for the time when society will make the changes to sustainable development and a new cyclical economy where anything that loses value for one person is given to someone who finds value in it, for in that economy, everything has value and nothing gets thrown away.

In a circular economy, waste is linked back to production. When we buy gas, we pay a deposit for the container, and we return it when empty. This is a partial circular economy that could be used for many other products. If take-away restaurants had returnable containers, people would return them for another meal.

Bali has banned single use plastic bags. We are required now to take a reusable bag to the shops.

A third or more of domestic garbage is food waste. We take trailer loads of garden refuse to the dump. Because old food is contaminated, it cannot be recycled in the same way as shopping bags and gas cylinders. It can be used to create both fertiliser and gas. Food waste and our own sewage is a source of that dangerous Greenhouse Gas methane, which is also a profitable source of heating. Many areas of Bali have a daily pick-up service for degradable waste.

Mario Ludovici proposed a scheme in Surabaya in 1999 whereby people get paid for disposing their rubbish, in the form of a discount from property tax. The discount could be from electricity bills if collected rubbish was used to generate electricity. Singapore burns all its waste, including the plastic, in a high temperature incinerator that generates electricity. Thus, the electricity company shares accountability for waste management. The price of electricity could be so set that the electricity buys the rubbish.

But we should not need a city-state scale system. Small is beautiful. In every home, the two main sources of methane gas are the toilet and the rubbish bin. We could produce our own gas for cooking.

So many existing ideas for reducing waste. Now why don't we use them? Perhaps because the right technology has not been produced. Or more likely, because government hasn't taken the appropriate action.

## Tourism

Tourism is a growing source of income for Indonesia, not just Bali. Is tourism going to die if we introduce carbon accounting and charging? Is our crazy development of massive beachfront projects evidence that the Energy Age is in its death-throws, waiting for the sea-rise to wash it to its grave?

Tourism is a highly greenhouse gas intensive industry, dependent on planes, taxis and bright lights. Should travel advertisements carry a warning: "Travel is dangerous for the health of your planet"? Perhaps, but tourism has a spiritual role that we should also recognise. Meeting people of other cultures is an education in itself, that has been prized by societies around the world since time began. And modern tourism above almost all else teaches us that the world is small, round, very human, and vulnerable. And we are one.

This is especially true for Indonesia. Unity in diversity is the basis on which Indonesia exists, and should be the basis on which the world must sustain itself. Indonesia can lead the world through its tourism.

We need specific targeting of tourism for reducing the use of fossil fuels. This is an industry we want to see thrive, but green.

## Investment and Money

It seems like a lot of money is required for mitigation and adaptation. But in fact, there is a lot of money about. Because of low interest rates, mitigation is becoming more viable. Solar and other power competes with coal and oil as sources of electricity, and thus switching to sustainable power sources is already a prudent investment. But much of the investment needed for adaptation has no commercial value and normal private public partnerships will not attract investors. And most of the adaptation is the responsibility of local governments, and most of them do not have much money for investment, some even to repair schools.

Innovative arrangements might be conceived that provide returns to investors just for reduction of the risk of losing returns rather than the certainty of making financial returns. These would work something like disaster insurances, applying particularly to climate change adaptation by local communities.

The richest of us might consider helping adaptation with investments that protect cities and towns labelled with their company name, associating the company with efforts of survival, a totally new concept of Corporate Social Responsibility.

But we need more than massive investment. A circular economy needs new type of capitalism, a capitalism for mitigation and adaptation, not just economic growth, and regulation that helps those most in need. I am not a financial expert and have no clue what I mean with these words, and we are dependent on those who do to chance the business of economics.

## Government

Government needs to change. By government I mean the organisations and people who serve the people by implementing the budgets agreed by political leaders. Government needs the capacity to respond to climate change policies set by leaders. Some of that capacity should be to help leaders develop climate change policies.

Firstly, government must improve its research capacity. Civil servants do not have to study how to be researchers, nor should civil servants be posted to research offices to conduct research that is best done by research professionals. Research from competent universities and research institutions can be procured and managed.

Departmental and subnational research offices should focus on the study of the impact of existing policies to verify their effectiveness, side effects and risks concerning public behaviour and the environment. Research should look at the impact of policies of one region on another, and one sector on another. For examples, policy on railways impacts road traffic and property development. Policy on property development impacts traffic. Policies on education impact national competencies in all areas in the future. Policies in the mountains can impact the plains.

Part of this research should be into carbon accounting. Ministries and regions should have access to research on the production and absorption of atmospheric carbon they cause.

Also, there should be research into water and drought. Flood water and storm surges provide an opportunity for extensive study using big data and Internet-of-Things, to prepare sophisticated and self-learning models that can predict flood conditions and provide data for addressing both flood early warning and longer-term improvements to drainage systems. Means of addressing drought includes investment in water-saving technology, and decisions on rural land-use.

Secondly, government must have the capacity to prepare policy change in response to the evolving climate change, with draft policies, their scientific and rational justifications, and public consultations. This will require civil servants with an understanding of natural sciences and human sciences of economic and sociology of climate change.

Thirdly, governments should create intersectoral institutions so that overall impacts can be seen. This is most important with the highly fragmented transport sector. In Indonesia, as in many countries, three levels of government, and separate of modes of transport, have their own transport institutions, with nobody is in charge of overall connectivity and mobility, let alone accountability for implementing measures to reduce carbon dependency.

Fourthly, subnational governments must focus on performance and have budgets adequate for adaptation, for subnational governments need most of the money needed for adaptation.

And fifthly, governments must build capacity to implement and oversee policy for mitigation and adaptation. Current reforms of the civil service, the structure of government and financial management should improve the capacity of government to face changing situations, including climate change, with the exception of changes of funding regions.

And finally, I do hope that the government will introduce curriculum on climate change not only in our schools, but also in our government offices.

## **Project and Program Management**

All the fronts I have written on above have one thing in common. They are all about change. We call the task of changing from what we have to what we want a project. My definition of a project manager is a person given the responsibility of creating a change within a fixed timeframe, starting without matching authority to order the change. Project managers must not only plan the changes, but also the skills of procuring the resources and negotiating the collaborations needed to achieve the change.

I do not propose that all efforts to mitigate and adapt should be led by project managers, but that the people who are given responsibility for them must have project management competencies.

## **TO CONCLUDE**

Mitigation and adaptation to climate change are in the human spirit. We need leaders elected by people who put global balance and the world of future generations first. And we need government with the project management capability to act. Back in a paper I presented to a conference in 1989, I wrote:<sup>10</sup>

*The re-establishment and maintenance of ecological balance is going to be the central theme of urban government and politics from now on... Within our lifetime, we will be changing the entire way our economies and cities are developed.*

I was not correct then, but now in my old age, as I see the start of the impacts of climate change, perhaps I will witness the start of such changes.

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<sup>10</sup> Owen Podger (1989). To Balance the Greenhouse Gas Account; ten urban fronts for fighting the greenhouse effect. Paper given at the Australian Institute for Urban Studies conference on Greenhouse Effect: Action for Urban Policy Makers, Sydney 19 May 1989.

## About the Author



**Owen Podger**

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**Owen Podger** began his career as an architect at Taronga Zoo in Sydney, studied urban design at UCLA and construction management at UNSW. After a career in urban development in Australia and Indonesia, and in academia in Singapore and Papua New Guinea, he has advised the Indonesian government on reforms since the downfall of Soeharto. He was planning adviser to the Aceh and Nias Rehabilitation and Reconstruction Agency (BRR), and supported the Aceh Government in establishing its special autonomy. More recently he has advised the Indonesian Senate on drafting laws on local government, the office of the Vice President of Indonesia on effectiveness of government, and Indonesia's national planning agency on urban development policy and programs. Owen is now assisting a small USA-Indonesia firm to develop capability in advising on public governance and accountability, and currently is living in Badung, Bali, Indonesia.

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