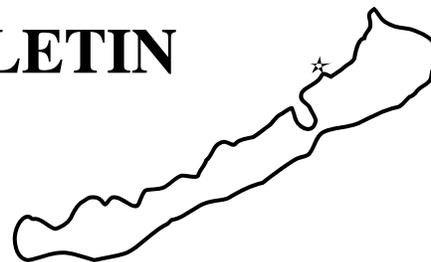


# THE BALATON BULLETIN



Newsletter of The Balaton Group

FALL 1998

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## PRE-MEETING E-MAILS ON ENERGY FUTURES

*Just before the Balaton meeting, a hot discussion broke out on our e-mail list on the topic of the meeting — energy futures. It captured the hopes and frustrations, the dreams and possibilities and obstacles inherent in this turn-of-the century moment. Above all it demonstrated poignantly the struggle within our own membership — people who are well informed, who think long and hard about these issues, and who are dedicated to a sustainable future — the struggle to believe that anyone will ever listen to us, or that, whether or not they listen to us, a sustainable future is actually possible.*

*Listen to the battle here between faith and doubt, cynicism and hope, patience and impatience. As he often is, **Philip Sutton** was the provocateur. **Amory Lovins** was the voice of faith.*

Date: Wed, 19 Aug 1998

From: **Philip Sutton**

<psutton@PEGASUS.COM.AU>

I've just started reading *The Living Company* by Arie de Geus, 1997 (ISBN 1-85788-180-X). De Geus worked for most of his life for Royal Dutch/Shell.

On page 10 de Geus says "Then feeling the pressure of the energy crisis, Shell's managers were swept up in the trend to diversification. We entered into metals, nuclear power and other businesses that were new to us, with varying degrees of success. By the early 1980s, serious doubts had surfaced in the Shell group about the wisdom of this diversification. Yet we weren't sure we could survive with our core oil and petroleum business alone. Reserves of reasonably accessible oil were projected to last three or four decades before they would be exhausted. Shell executives cannot avoid discussing whether there is life after oil."

None of this sounds all that remarkable except the second last sentence. My recollection of the 1980s was that oil companies were promoting the view that oil would last for a *very* long time and that people would be silly to worry about depletion - all we had to do was increase the price paid to the producers and more would be found.

In recent years Campbell and Laherrere have been blowing the whistle on this view (the March *Scientific American* article being their most recent effort). They are saying that world oil production could peak in the next decade and be significantly depleted by 2020. This timetable looks pretty similar to the one quoted by de Geus. Does this mean the big oil companies just didn't bother telling society for 20 years that party was over?

Date: Wed, 19 Aug 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

No.

(a) You may be confusing resources with reserves. Reserves are a function of price and technology; they're the resources whose location is known and that can be

profitably extracted at present (or stated assumed) prices with present technology. Mineral companies don't bother proving reserves beyond their planning horizon because it's a waste of money to do so. This is fundamental to mineral economics and good business planning.

(B) The SciAmer article is in my view of quite poor quality and should not be relied upon.

(c) There have been such stunning developments on both the supply and the demand side, and there are so many better and cheaper ways to do most if not all of what we now do with oil, that *oil will probably become uncompetitive even at low prices before it becomes unavailable even at high prices*. This contrarian view, by the way, is rather widely shared among senior planners at several major oil companies, who NOW (but not then) believe we're entering the fossil-fuel endgame, and the real question is whether to say so publicly — but we're entering it for competitive reasons (oil is becoming obsolete) rather than for resource reasons (we're running out of oil).

(d) For more on why I think this, please visit <http://redtail.stanford.edu/seminar/presentations/lovins/1/sld001.htm>

Date: Tue, 25 Aug 1998

From: **Bert de Vries** <Bert.de.Vries@RIVM.NL>

The arguments put forward by Amory are at the core of the Sustainable Development scenario we have been constructing for the IPCC over the last months and which will be discussed at the BG meeting in September. Scarcity of cheap oil and gas poses only small problems because efficiency and renewables cause cumulated use to be rather small.

Yet, it is important to realize that important and influential groups have a mindset in which abundant and cheap oil and above all gas dominate the supply and the demand side - and delay conservation and renewable options. Some of the other IPCC scenarios are along these lines. And in the background lurk those who, with sound self-interest, advocate the prospects of [advanced]

coal and [inherently safe and hence acceptable] nuclear. Is the best strategy to simply not hear them? In that case we have to be strong in our belief that non-fossil non-nuclear options can really contribute a large fraction of the Chinese and Indian economies over the next 20-80 years. I'd like some support in this respect — data, views...

Date: Tue, 25 Aug 1998

From: **John de Graaf** [degrj@KCTS.ORG](mailto:degrj@KCTS.ORG)

Please pardon my ignorance but how does all this talk about vastly increased fuel efficiency of gasoline, etc. jive with what we see around us— a 37% increase in automobile miles driven per year since 1990, an actual decrease in fuel efficiency per car because the market is now dominated by sport utility vehicles averaging less than 15 mpg, a doubling or more of air travel per decade (what will planes run on in the future anyway?) and discussion about fuel cells that focus on increasing horsepower rather than mileage (as a friend of mine in that business has told me). Honestly, all this confuses me greatly, as a journalist and layperson with no technical training in this area.

Date: Tue, 25 Aug 1998

From: **Dana Meadows**

<[Donella.H.Meadows@DARTMOUTH.EDU](mailto:Donella.H.Meadows@DARTMOUTH.EDU)>

I need to add to the frustration expressed by John de Graaf about the tension between Amory's wonderful vision of an energy efficient future, and my own perception of the world around me.

I have worshipped at Amory's temple for decades. And every time I have to make a practical decision about my own energy consumption, I find myself stopped not by my obsolete mindset, but by the lack of options available in the market to the ordinary, non-genius, busy, finance-constrained householder.

For example — when I renovated my house, ripping out all the windows, I could not find a supplier of superwindows — so I didn't put them in, though I was willing to.

Another example — the Sears repairman just pronounced my 20-year-old electric stove terminal. First I don't think stoves should be tossed out after only 20 years, but if I can't find someone to fix it, or even the parts to do so, what can I do? Second, what should I replace it with? What, in a sustainable energy future, will we COOK with? I guess I should abandon electricity as an obviously inefficient option. Should I go with natural gas? (We're way too small an operation for biogas, and I don't know where to find a biogas digester

anyway.) When I ask stove suppliers about energy efficiency, I get a non-response. They don't know what I'm talking about — nor do I, really. The only place I can see efficiency coming in would be oven insulation.

My biggest example is the 22-unit eco-village we're planning. I would love to make it state-of-the-art, Amory-vision, no moving parts, no pipes or wires in or out. But when I ask anyone to design it that way, even people who are convinced of the wisdom of doing so, I find myself being talked into compromises, either because of non-affordability or non-availability of the most sustainable choices. It looks like we will NOT put in state-of-the-art passive solar heating, because it costs way more than the combination of slightly leakier houses and wood heat (especially because the wood grows on our own land). It looks like we will be talked into gas cooking and probably even gas water heating, though I have said: No Fossil Fuels. Solar hot water systems we can find, but they need a backup in winter, and we can't afford both the solar and the backup, especially since the backup itself will actually do the job. We will probably have PVC pipes, though I have declared: No PVC. The alternatives are too expensive.

It's really frustrating! Maybe people like those at RMI who spend their lives learning about these things and who get grants to pay for them, can cut their throughput by 2 or 4 or 10. But I would like to demonstrate what regular folks, who have to spend most of their time doing other things and who have to finance their purchases out of ordinary American incomes (average \$31,000/year, among the world's highest, of course), can do. Sadly, I'm concluding they can't do a whole lot.

We need Amory's soaring vision to lead the way. But, remembering Alan's innovation-diffusion game, I'm detecting a weak link in bringing the vision down to practical implementation so that the very convincing masses can actually practice it.

I have a feeling this observation is relevant to the task we take up in our meeting in two weeks — make a CONVINCING scenario of a sustainable energy future.

Date: Tue, 25 Aug 1998

From: **Amory B. Lovins** <[ablovins@RMI.ORG](mailto:ablovins@RMI.ORG)>

John de Graaf — Your facts are not inconsistent with mine; merely simultaneous. So far, more efficient cars have roughly kept pace in the U.S. with more cars and more driving to hold motor-fuel demand flat. The coming leapfrog, rather than incremental, will send that demand downward, both nationally and globally. Savings in fixed-wing aircraft will be less dramatic but still very helpful; ultimately they'll run on H<sub>2</sub> and, I hope, any hydrocarbon aircraft fuel will be taxed (it's now exempt

worldwide — a huge subsidy to air travel).

Dana Meadows — True. As put-upon early adopters, we all need to try to bust these barriers by being informed and insistent. (No criticism of Dana intended or implied — it really *is* a hassle, and she can save a lot more energy by doing her daily work than by optimizing her household!)

Local contractors often don't know, but there are nationally distributed window brands such as Hurd Insol-8, and they've captured over 10% of the national market for insulated glass units (over 50% if you count one-coating low-E glass with argon fill). RMI's outreach toolkit includes a factsheet on superwindows, a book called *Homemade Money: Saving Energy and Dollars in Your Home* that advises on what to do in what order, etc.; and we maintain staff to answer exactly such questions (970/927-3851, outreach@rmi.org, www.rmi.org).

About the stove — not much you can do, alas, other than gripe to Sears and go elsewhere, or try (depending on what's broken) to get a local non-Sears handyperson — who has no interest in selling you a new Sears stove — make or scrounge parts and fix it. Isn't that what rural New England is all about?. Electricity for cooking can be very efficient with the right pots, superinsulated ovens, induction cooktops, microwave ovens, etc. We've published a lot on this over the years.

An ordinary septic tank may serve as a biogas digester. Richard Pinkham, rpinkham@rmi.org, may know if digesters, which are common in some European and Asian markets, are on the market here as packaged units.

As Jørgen Nørgard has long shown, severalfold to manyfold savings are available in most household appliances. However, cooking is probably the most backward area of commercializing household energy efficiency; most of the great stuff he and others have developed isn't on the market or is hard to get. (This is also called a business opportunity.) I intend to pursue this with a big whiteware firm that wants to hire RMI on strategic matters. Cooking with gas isn't such a bad result in the short term, and as reversible-fuel-cell/photovoltaic systems become cheap commodities, you can switch from CH<sub>4</sub> to H<sub>2</sub>.

Our solar hot water system uses the Vermont-based French Aquastar demand heater to back up the last 1% — a good deal with or without solar. You too could get to 99% solar (100% in some years) with the sort of quasi-seasonal storage we use — the normal storage optimization is wrong. By the way, a really good passive downpumper tuned to cloudy climates, caught in an undeserved small-business collapse a few years ago, will go into the public domain next year and could be nicely

made by any sheet-metal shop in your area if you can wait until then.

It *is* frustrating — even more so to those of us who know what should be at the corner store but isn't yet. Chicken-and-egg — it's not there because you didn't all demand it yet, and you couldn't demand it because it wasn't there yet.

Obviously there is a big opportunity for entrepreneurs willing to put up with the building industry, whose basic unit of production is the pickup truck and which actively resists innovation.

All this stuff (supercars and fuel cells and solar hydrogen generators and rooftop PV systems and constructed wetland sewage treatment systems and passive solar houses) does exist (except Hypercars which will very soon), but almost all comes through unconventional distribution channels that your local builders may never have heard of. If you go to funkier kinds of designs it's even easier because any handy and open-minded builder can create them from scratch — but maybe that's not easier if that's not the kind of builder you have.

Patience, courage, *nulle bastardo carborundum* (don't let the bastards grind you down) — will help you get there, one small victory at a time. The problems you describe so eloquently are real. The solutions are also real and can be obtained through persistent manifestation of your correct design intention. Just keep lending “the small stubborn ounces of your weight” and we'll all get that balance tipped.

Date: Wed, 26 Aug 1998

From: Niels I. Meyer <nim@IBE.DTU.DK>

Like Dana I have always been a great admirer of Amory's technological insight and fighting spirit. His scenarios have been right in a number of cases - but not always, and especially not when it comes to implementation of the wonderful technical solutions. Leap-frogging is a very difficult exercise. On the contrary, vested interests are very efficient in diverting any serious attempt of leap-frogging.

I do not trust the market forces nearly as much as Amory seems to do. They have had ample of chances of using the potential for energy conservation for years, but energy consumption continues to go up and efficiency is ages behind Amory's documented potential. The situation is worse in THE country of market forces: the U.S.

After more than 20 years in this field I am more and more convinced that we can not leave the long range priorities of our societies to market forces. Although I

am far from impressed by the wisdom of governments, they are a lesser evil in countries with active democracies (and active NGO's).

Today the fashionable concept is "globalisation", and most people regard this undefined concept as a law of nature. It is not! It is a human concept and it can be regulated by humans. Unfortunately, it is dominated by multinational companies and the interests of international capital. Nothing wrong with globalisation, if it were based on solidarity and concern for the global environment. It is not! Just look at the reality of WTO policies (or EU policies).

My latest fight is concerned with the rules of liberalisation of energy markets in Europe. The basic principles are wrong. They state that energy should be treated as any other commercial good. But energy is not any other commercial good. A week ago, the Danish Minister of Environment and Energy published his draft for a new comprehensive Danish energy law adapted to the liberalised energy market. If he can find a majority in the Danish parliament it will probably be the most reasonable and regulated energy law in Europe — with first priority to a sustainable energy development, not to commercial interests. I shall give more details at the Balaton meeting.

In a way, I think the answer to the question of why we are moving away from sustainability is simple: the capitalistic system is dominating the economy of the world - and the minds of the decision makers. This system has a short time horizon and does not care about sustainability. It will not react before problems are so obvious that no one can overlook them — and then it is probably far too late, too many irreversible consequences have occurred - and it will be extremely costly to save the remains.

I do not have an answer to the question why decision makers are not more clear in their minds about these problems, except that they have given up fighting the enormous forces behind the capitalistic system.

I do not think that the Balaton Group should give up. I think we should enforce our revolt against the global mistaken development.

Date: Wed, 26 Aug 1998

From: **Betsy Taylor** <betsy@NEWDREAM.ORG>

I resonate with Niels, in part because I just had lunch with a top lobbyist for the renewables industry. He represents the biggest wind and solar energy companies in the U.S. I learned that the vast majority of these alternative energy companies are subsidiaries of the oil and gas industry, and that they would never support a car-

bon tax, for example. I had hoped that segments of industry, most notably the renewable energy companies, might be persuaded to join in a national campaign for a gas/carbon tax. He informed me they would fight to the death against such a tax, as would every utility company, since almost all of them have coal holdings. I know we are discussing the prospects of leapfrogging problems via technology — not the prospects for an energy tax. Still, given the rate of increased consumption of fossil fuel and the public's addiction to large vehicles, I'm not sure the new super car will meet individual expectations about comfort and status. We will need a combination of personal change, policy change, and technological innovation. Alas, the key policy change — a tax shift — seems ever more difficult to obtain.

Date: Wed, 26 Aug 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

Betsy — Yes, many are subsidiaries — often for the excellent reason that smart companies see they're entering the fossil-fuel endgame and are diversifying out of that business. The market is simply too competitive for the unsmart ones to try to suppress solar technology — though the conspiracy theorists love that notion. It might have gone on a couple of decades ago, but it's not the story now, when every PV maker has demand far exceeding supply.

No, the carbon-tax opposition is simply untrue. For example, Enron, a giant natural-gas company which has amassed probably the biggest renewables portfolio in the U.S., is among the strongest backers of climate protection, including carbon trading. Among the other obvious counterexamples are BP and Shell. Having worked with that industry for the past 25 years, I think it's the most fertile and exciting time ever — many good things are happening in oil folks' heads, and need to be encouraged.

Many feel, as do I, that carbon trading will work better and is much more likely to happen in the US than a carbon tax (and leads to the same place).

The utility industry is split on the climate issue, but the smart firms, including some that are largely or wholly coal-fired like Tucson Electric, are on the right side, as is (tempered by the politics he's facing) Tom Kuhn, who runs Edison Electric Institute. Most utilities do not own coal, and many that own coal-fired power plants are busily trying to sell them, for excellent business reasons that may or may not be related to climate concerns/risks.

And contrary to economic theorists' normal assumption that a 4-8x more efficient car must be small, uncomfortable, sluggish, or unsafe, our Hypercar does

everything as well as or better than present cars, and will be competitively priced. In the next few weeks, we'll post a big update of [www.hypercar.com](http://www.hypercar.com) that may help you see why.

We do need lots of kinds of change. However, let's differentiate "the corporations." The coal lobby and half the U.S. oil industry are problems. Most others, no. Private-sector opinion on climate, environment, energy strategy, and sustainability generally is shifting steadily in the right direction. We need to recognize and encourage that shift in order to help it happen faster — not lump all corporations as bad or dumb.

And a reply to Niels:

The US has cut its annual energy bills by \$150-200 billion per year, yet is still wasting \$300b/y, and the more we save, the bigger the potential for further savings, because learning outpaces doing. However, as for the "ages behind" ...yes, efficiency is at least \$300b/y short of documented potential, but let it still be noted that total US primary energy use is still 1-2% BELOW the soft-energy-path curve I published in *Foreign Affairs* in 1976. (Renewables, however, lag about a decade: that curve assumed supportive public policy, but we got just the opposite for most of the 22 years.)

We all need to pay much more attention to market failures in buying efficiency, renewables, etc. that make great sense on paper but are being bought only slowly. Our "Climate: Making Sense \*and\* Making Money" ([www.rmi.org/catalog/climate.htm](http://www.rmi.org/catalog/climate.htm)) catalogues 60-80 of these and shows how to turn each one into a business opportunity. (*Factor Four* and our forthcoming *Natural Capitalism* with Paul Hawken contain some similar material, but perhaps less compellingly organized for business readers.) I'm impressed by how quickly smart companies are picking up this idea and using it as a roadmap to profits. My own experience suggests that we need to apply a detailed and exact understanding of how the market mechanism works in order to fix what's broken, not throw out the machine as unworkable.

Also...I don't disagree that government should make the rules that set societal objectives and guide market activity, but I hope Niels isn't saying that government should subsume or supplant that activity.

I agree about the world trade regime. The scandalous results one expects and gets when the traders make the trading rules will lead to a revolution. Herman Daly is right that there will be a strong movement for relocalization of capital, consistent with Adam Smith's original principles.

Perhaps what's wrong with capitalism is that it's never really been tried — i.e., actually existing capital-

ism violates its own principles by liquidating, without valuing, its two greatest sources of capital (natural and human). It's also designed for the old pattern of scarcity (scarce people, abundant nature). Now that we have abundant people and scarce nature, we should employ more people and fewer resources, not the reverse. That turns out to solve a great many problems at once, probably without making new ones. But it doesn't require us to throw out the baby with the bathwater.

Date: Thu, 27 Aug 1998

From: **Niels I. Meyer** <nim@IBE.DTU.DK>

It is true that international carbon trading (tradable emission permits) may have some short term benefits, e.g. relieving immediate economic problems of developing countries, but it may easily trap the same developing countries when they later are entering a phase of strongly needed economic growth — and have sold their emission quota, so that they may not use fossil fuels as a transition energy. You may of course argue that they should leap-frog to renewables (which I would love to see!), but this would require an order of magnitude stronger support from the industrial countries. For the moment most of the industrial countries (including US) are cutting down on this support.

Another problem is that you may suspect the industrial countries of using carbon trading as an excuse of doing less at home to implement conservation and renewables. I think we agree that the present efforts are far too small, so we do not need excuses for doing less.

I have a suspicion that one of the reasons US policy makers are so happy about carbon trading that it fits with their traditional principles of economic speculation. Carbon trading will open up a new field for speculators. I am not sure that this is what is most needed in this field of resource conservation.

The main economic argument behind carbon trading is that it should optimize the total cost better than carbon taxes. I think that will depend on many parameters including the way one takes care of environmental and social externalities. My conclusion on carbon trading is that this is a complex tool, that may well give more problems than benefits.

Date: Thu, 27 Aug 1998

From: **Betsy Taylor** <betsy@NEWDREAM.ORG>

Just a quick response to Amory. I hope you're right; you surely know more than I do re these configurations of corporate ownership and motivation. Still, I wasn't meeting with an environmental radical but with a top lobbyist for the industry. He indicated that some com-

panies moved into renewables because they believed it was prudent for long-term planning. Others however are in it purely for public relations. He was adamant that the vast majority of companies would fight it.

Are there any corporate backers of a carbon tax? BP has been enormously helpful at the international level, especially during the Kyoto debate. I don't know what they've advocated in terms of concrete change. Do you have any examples of companies that support a tax? If so, there are many groups that would like to meet with them to discuss how to move the tax policy agenda forward.

I defer to Niels on the pros and cons of carbon trading versus tax policy as the most effective tools for change. Is there a definitive analysis of this issue anywhere? I remember a debate at Balaton over the limited constructive impacts of European gas taxes, primarily because the taxes were perceived to be far too modest.

I recently learned that several well-known environmental leaders drive sports utility vehicles. These are people who know better. I've literally lost sleep over this fact but perhaps it was all for naught. I'm a believer, Amory, and I'm counting on you to come through with this Hypercar.

I'm not lumping all corporations together. Our latest newsletter led with an article entitled Sustainability in the Marketplace, featuring the terrific work of RMI, the Natural Step, Business for Social Responsibility, CERES, and companies like Interface. We also mentioned Monsanto's Shapiro and got heavy attacks from our readers. Talking about corporations in society is as hazardous as talking about sex or religion. People assume you're for them or against them. There are obviously other options. I for one deeply appreciate the creativity, vision, and persistence you've shown in moving many corporate leaders.

Date: Thu, 27 Aug 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

Just one small idea about cheap gasoline:

1. Hypercars will have a marginal operating cost pretty close to zero. (Paul MacCready points out that in 1989\$, the cost of buying enough U.S. gasoline to drive an average new car 40 km was \$4 in 1929, \$3 in 1949, \$2 in 1969, \$1 in 1989. Extrapolate and you get \$0 in 2009. Hypercars will make that right within about a nickel.)

2. However, people will buy Hypercars like mad, not because they save fuel and pollution, but because they're superior cars — in all respects, with no tradeoffs.

Such cars will sell for the same reason that compact disks displaced vinyl phonograph records: they're simply a better product that redefines market expectations.

Virtually all economists miss this point. Indeed, almost all, despite daily counterexamples from consumer electronics, which get constantly smaller/better/faster AND cheaper, assume that if cars are going to get 4-8x as efficient, they must get bad in some other respect (comfort, safety, acceleration, price...). Actually, in a good Hypercar whole-system engineering turns tradeoffs into synergies, vicious into virtuous circles, problems into felicities...you get the idea.

In the interests of full disclosure, my 84-year-old mother-in-law, who lives next door, has a Ford Explorer which I occasionally drive when I need to carry a lot of people or need 4WD in bad winter weather. Normally I (a) commute 10 m across the jungle (brachiation has been suggested) or (b) drive to the airport in my 60-mpg Honda. Actually, I think today's SUVs are pretty dumb, but that doesn't mean that people who drive them are necessarily evil. Likewise Hunter drives a Ford 250 pickup when she needs to haul her rodeo trailer, buck hay, etc. But we live in a place where such things are actually utilitarian, not decorative. Before long, anyhow, there will be HyperSUVs and Hyperpickups, so we can all stop feeling guilty and get regrunted. Just remember this mantra about cars: Size doesn't matter. (That's because the ultralight materials will nearly decouple size from mass. Mass is what matters, other than in finding parking spaces, and to a modest degree in taking up roadspace.)

Date: Fri, 28 Aug 1999

From: **Niels I. Meyer** <nim@IBE.DTU.DK>

Concerning the US, it is sometimes overlooked that the CO<sub>2</sub> emission per year per capita is 19 tonnes in the US, around 10 in EU, around 4 as a world average, around 2 in China and 1 in India. Nevertheless in Kyoto in December the EU, with half the emission of the US, agreed to reduce by 8% by 2010 (which is not impressive), while the US only agreed to a reduction of 7% - and this has not been confirmed by the US Congress, and may never be!

Before Kyoto there was an enormous lobbying campaign by US industry in TV and other mass media to prevent any commitment from US government in Kyoto. It is fine that Amory is optimistic about "smart companies" but this does not seem to correspond to real life in a foreseeable future. As I mentioned earlier, maybe in the far future when disasters are obvious the majority of industry will be smart enough to acknowledge the dangers, but "in the long run we are all dead" - maybe including our natural environment.

I hope that Amory's super efficient cars will be on the market soon. It will certainly be useful if the efficiency can be increased by a factor of 3 to 5 compared to good Japanese cars of today. One question is how you will avoid that these wonderful cars become so popular that the car population will triple or increase even more?

Another question is how much effort is aimed at letting the hypercar run on drive fuels from renewables (hydrogen or batteries based on wind or solar primary energy)? With the global growth in the car fleet nothing will be sustainable except if they run on renewables.

Date: Fri, 28 Aug 1998

From: **Jørgen Nørgard** <jsn@IBE.DTU.DK>

Since Amory is quoting me on the issue of technical options for saving energy I am provoked to add a few comments.

I agree on the fact that enormous potentials exist for using energy more efficiently. But I do not believe that they are infinite. Maybe a factor of three to five on average. In theory they might seem close to infinite, but taking into consideration also the sociological aspects of implementing the technologies, they are not infinite in practice.

I strongly prefer simple technical solutions based on well-known materials and well-known technical systems, since every new technology implies a new risk to the environment and to humans. History has shown many examples like estrogenlike chemicals, CFCs, etc. This is one more reason to prefer energy savings to supply, since in general they can be made simpler. But also some of the technical saving solutions do imply highly complicated technologies. I am more on line with people who are "accused" of suffering from techno-phobia than with those who make such claims and who often seem to suffer from "nature-phobia".

I prefer to argue for energy saving (or conservation) rather than efficiency, because pure technical efficiency can — and experience seems to indicate that it will — lead to higher energy consumption. One example is electronic communication, which per word is much more energy efficient than travel or mailed letters, but which leads to much more "communication" and to making friends thousands of miles away, whom you do want to meet face to face once in a while, rather than just making friend with your neighbors. This explains why energy demand in Europe, USA, etc. is not declining, especially not in the transport and communication sector, despite increased efficiencies.

When I first learned about the California energy utilities investing in energy efficiency many years ago,

it was presented (I think by Amory also) as a result of rational market thinking, because it was cheaper for the utility to save a kWh than to produce one. I did not quite buy that, and I later learned that it was the result of a dedicated regulation by the California Government, implemented by rewarding through rate control the utilities for each kWh saved. By forcing the utilities to do this it did not show up in the government budget to the taxpayers! It did not work in the long run. There are good reasons for never turning the responsibility for reducing sale over to the suppliers.

About the question of carbon taxes or tradable quotas, we should keep in mind that we are facing an enormous problem of inequity in the world, which of course is part of the environmental sustainability problem too. This points towards moving towards some rationing policy as we have used in other more passing shortages. I therefore favor carbon taxes. I don't like the idea that wealthy countries and people can pay their way out of their fair share of the solutions.

In all my time working on saving energy, since 1972, I hardly ever presented technical options without stressing that without appropriate changes in people's attitudes and in economic policy, it would only buy us time. Otherwise the technical efficiencies are more than eaten up by declining efficiencies in the economy.

I once outlined a scenario for Denmark (transferable to any other country) for a future with around one-tenth the present energy consumption. This can be achieved by a combination of changes in technologies, population, and social structure and life style, maintaining a very decent quality of life. In this case the supply side becomes rather easy to solve without environmental problems.

Sometime I wish we in a closed group could talk straight out about what is our personal opinion and what are our strategies in the different societies in which we work. Not that strategies are unimportant, but it is a problem when one gets so entangled in strategic matters that you don't know what is your own opinion, and maybe don't have one anymore!

Date: Fri, 28 Aug 1998

From: **Tsuchiya Haruki** <tsuchiya@ST.RIM.OR.JP>

At the end of the 21st century, the global population will be 9-11 billion, twice the present population. So total energy consumption will be twice as much, if the population stays in the present life standard. But the growing economy will make it double. That means we will have 4 times or more energy demand.

If energy efficiency improvement will be twice or so, energy demand will only be twice the present level. I don't know of this prediction will work or not. Maybe

the short supply of scarce oil will change the situation drastically. But now I assume that the above prediction will happen.

This means, compared to present level,

1) people in the developed countries will consume about 50% of their present energy use on a per capita base. (Roughly 5-10kw per capita at present, 2.5-4 kW per capita in 2050-2100)

2) people in developing countries will consume 2-10 times present energy on a per capita base. (0.2-1.0 kW at present, 1 -2kw or more in 2050-2100. The 1 kW is assumed to be the necessary minimum level to live decently with present technology)

If the energy supply depends heavily on fossil fuels, then global warming will be inevitable. Of course, the development of renewable energy is necessary, also. It is not an easy task to supply renewables to the large part of present energy demand within 50 years.

It is important to discuss efficiency improvement. Hybrid cars, efficient refrigerators, efficient industry furnaces and electric appliances without stand-by mode electricity consumption, insulated houses and so. And renewable energy is becoming cost effective and under development — PV, solar house, solar hot water unit, wind power and hydrogen directly generated by solar panels. (On the feasibility of efficiency improvement and renewables in Japan, please see my report for WWF(World Wide Fund for Nature) Japan for COP3 in 1997. You will be able to see it soon at the US WWF website)

But it is not enough in the long run. Some CHANGE in life style or society or something is necessary. But it is quite difficult to discuss the CHANGE. I feel I have not the tools or methods or theories to persuade people to change the present way of living on the earth.

Which is easier to work on 10 times energy efficiency improvement or to find the way of CHANGE?

We are familiar with economic growth, more material consumption, and also technical improvement because they are easy to be understood. I feel we have not discovered any new concepts of CHANGE that are persuasive and popular and effective.

Date: Fri, 28 Aug 1998

From: **Faye Duchin** <duchin@RPI.EDU>

I agree and believe that throwing light on the prospects for change in lifestyle is the central challenge for the social scientists among us. You are right to stress that it is first a matter of understanding (before advocating)

because the concept of households having lifestyle options is much less concrete and persuasive than that of businesses choosing among alternative technologies. These ideas are developed in my new book, *Structural Economics* (Island Press). I do not draw conclusions about how people should change their lifestyles but do lay out ideas about how to structure an investigation that could move us along these lines.

Date: Fri, 28 Aug 1998

From: **Garry Peterson** <garry@ZOO.UFL.EDU>

Just a note on carbon trading & carbon taxes, and their problems.

One of the major problems with carbon schemes is how to operationalize partial and incomplete ecological understanding. While people have a pretty good idea of where anthropogenic emissions come from and how much, we have nowhere near as good an idea for 'natural' emissions and sinks. Furthermore, what we do know is that unlike anthropogenic sources (or sinks) of CO<sub>2</sub>, natural sinks (such as a growing forest) can quickly become sources if rainfall or temperature changes (and because this is just what global change is expected to do, managing land to be a sink becomes complicated).

For example, one of the scarier conclusions of the recent Global Change in Terrestrial Ecosystems research effort is that the current sinks in global boreal forests will become sources as peak bogs are warmed and begin to respire more (see: <http://www.consecol.org/Journal/vol1/iss2/art2/>). However, the same thing is possible from year to year. For example, what would have happened if there had been carbon trading in effect in Indonesia this year? What do you do if your reduced impact logging forest is burnt by forest fires that have escaped from the adjacent oil palm plantation? Does your work count as emissions reduction? Or do you have to buy emissions rights because your land has emitted lots of carbon?

Personally I feel encouraging trading in sinks makes sense, because it incorporates ecological processes in economic calculations (e.g. we are going to log more sustainably so we can sell the carbon offsets). However, the technical difficulties of measuring these emissions are immense. As far as I am aware, these vast uncertainties are not being addressed from a policy perspective, and potential carbon schemes are discussed as if there are accurate measures of CO<sub>2</sub>. To be feasible a carbon trading regime needs to address the uncertainties associated with fluxes, the possibility of surprise, and the costs of monitoring.

I think that carbon trading is a good idea, but ecological uncertainties leave the system open to all sorts of potential problems — particularly the abuse of trad-

ing by rich countries that can afford to conduct research on and monitoring of issues that benefit them. Similar problems exist, less transparently, for carbon taxes (e.g. how do you set the tax rate, & how do you tax land-use/land-cover changes).

All this concern over carbon has a bright side, at least for ecologists. It will probably provide lots of jobs for ecosystem ecologists, and lead to an increased understanding of biogeochemistry.

Date: Fri, 28 Aug 1998

From: **Jonathan Rowe** <rowe@essential.org>

Is disaster or the threat of disaster the only thing that can move us? Recent history would suggest that, in the U.S. at least. But the constant resort to disaster scenarios just turns people off, perhaps rightly. Religions of fear ultimately produce their opposites.

People with a lot of education — or rather schooling — tend to think that information is the answer. But the Gita points out that the mind is extremely low voltage when it comes to action. We act from our moving center, not our thinking center. As Paul said, “The good that I would I do not, but the evil that I would not that I do.”

This is the dilemma of our age. Our moving centers have been commandeered by a commercial culture that uses us for its own ends. I don't have the answer. But I think part of the answer is:

1. Making fun of the commercial culture the way Adbusters does, on a much larger scale.
2. Telling new stories.

It is not surprising that the most potent protest movement in the U.S. today is at least nominally scripture based. Scripture is story that connects to our deepest moving centers. There is a deep deep hunger for that, one that has not been filled by the secular theorizing of the Left. Nor is it surprising that the only potent force opposing the commercial culture in the world today is Islam — also scripture based.

Advertising is a kind of perverse scripture, told on the installment plan, every day and every hour of the day. It connects daily actions or lack of action to a version of the larger ends of life.

Somehow we have to sneak into that realm of the cognitive arena and claim it back. We need scripture as well as science, the emotive as well as the factual.

Date: Fri, 28 Aug 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

Niels, no question that a carbon tax would work. The laws of economics, as of physics, are similar if not identical across the Atlantic. But the politics are not. We'd be unlikely to get a U.S. carbon tax because of some irrational peculiarities of contemporary American politics, whereas we may well get carbon trading, and some smart firms are already starting to do it even in the absence of an international regime. Please remember that our sulfur-reduction trading scheme is now 2/5 ahead of schedule at 5-10% of the initially estimated market-clearing price. Carbon trading should do even better because its mainstay will be energy end-use efficiency (which wasn't explicitly admissible in sulfur trading) and because saving carbon, unlike saving sulfur, is clearly profitable because you needn't buy so much fuel.

The one plausible exception to the politics I just described is that we might, though not quickly, get a carbon tax in effect — hidden within tax-shifting from jobs and income to depletion and pollution — if economic conditions improve the political prospects of this excellent approach.

Also — the enormous corporate lobbying campaign failed to prevent a U.S. government commitment at Kyoto. It has also been much discredited lately, both by the public's finding out more about its coal leadership and bad science, and by an extremely hot summer. Few in the general public believe the lobby that there is not a climate problem. What most people lack is a concrete understanding of what they can do that will protect the climate and make money. Much corporate leadership is, however, emerging on this issue, and the firms that lobbied so hard, making the lobby appear broadly based, have been quietly peeling away from the coal sponsors. This is very satisfactory, is accelerating, and needs to be appreciated by our friends in Europe.

Global car population is rising 5%/y — we're only half as good at birth control for cars as for people, which is not very good. Since Hypercars will be even cheaper and more attractive to drive than today's cars, they may slightly increase this growth rate. The real solution is in the important parallel agenda of less automobility (better land-use, telecom, transit, etc., and internalization of costs). We've always emphasized this. But there is nothing magical about our cars that will make them sell worse — quite the contrary. We promote them anyway, in conjunction with fundamental transport and land-use reforms, because after much thought, we concluded that the first-order benefits far outweigh the second-order costs.

Also — I'd add "benign natural gas" as an important option — reform the CH<sub>4</sub> at the wellhead, reinject the CO<sub>2</sub>, ship the H<sub>2</sub> as a high-value fuel (because in fuel cells it can be used several times as effectively as hydrocarbons in a boiler). The reinjection is roughly paid for by the enhanced CH<sub>4</sub> recovery from repressurizing the reservoir, and you can get paid a third time for sequestering the carbon. This good idea by Bob Williams has lately got a lot of attention and [so far unannounced] major investment from the energy industries. Watch this space.

Jørgen — I am not so worried about the seeming unfairness of carbon trading, for two reasons. First, I believe nearly all the abatements will not be costly but profitable. There is therefore not an equity issue of fairly sharing a sacrifice; rather, there is an opportunity to seek profits. I can as easily see the South investing in savings in the North as vice versa — everyone has vast potential for profitable energy savings, but the practical obstacles to capturing that potential are different in different places, and it's not at all obvious which way the credits will mainly flow.

Date: Sat, 29 Aug 1998

From: **Jane King** <king@HOLYROOD.ED.AC.UK>

Is it not time we stopped talking about energy in dollars, and considered the energy question in energy units? After all it is a non-renewable resource, whereas dollars are infinitely expandable. We have run the renewables options through all our more detailed models (GlobEcco, European Union (SuE) and UKEcco), and find that the capital requirements for substitution are so large that there is not enough time to put the required capital investments in place before the oil and gas runs out AND maintain current material standards of living. In other words either society faces future energy scarcity, or it undertakes to curb consumption now, and devote a much higher proportion of available investment to renewables. We fear the latter will not happen (partly due to complacency about supplies), and that rather than go without, the world at large will opt for nuclear. We believe it is a cruel hoax on the public to give the impression that renewables can solve our future problems at no pain.

Much the same can be said for investment in energy efficiency. Try working out the pay-off (in dollars or energy) of triple glazing!

Date: Sat, 29 Aug 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

With all due respect, I cannot imagine any valid way to reach this conclusion. You must be assuming some

unrealistically costly technologies for both renewables and efficiency — technologies that wouldn't be bought in the first place because they'd cost too much.

Careful examination of empirical costs shows that in general, properly designed end-use and conversion-system efficiency improvements, especially if they're large and leapfroggy rather than small and incremental, cost considerably less than the current cost of the fuel they save. Most properly designed and chosen renewables are roughly comparable in cost to, say, oil today — some cheaper, some modestly dearer. Nuclear fission, in contrast, is markedly more expensive (and slower to deploy, both for fundamental reasons) than most renewables and virtually any efficiency options, so even if it had no other problems, it couldn't be chosen under the conditions you posit.

Perhaps you could kindly post me a simple and representative calculation (1739 Snowmass Creek Rd, Snowmass CO 81654-9199), so I can better understand where you're getting these unusual results and whether I'm overlooking something obvious. — Amory

Date: Mon, 31 Aug 1998

From: **Dana Meadows**  
<Donella.H.Meadows@DARTMOUTH.EDU>

If I read Jane's message correctly, I think she's talking about the TIME DELAYS of CAPITAL REPLACEMENT (which is to say, all the energy-consuming capital — cars, boilers, engines, coolers, motors, etc.), not necessarily either the money cost or the energy cost (both of which would also be considerable). Even if it makes sense in both money payback and energy payback terms to make a global transition to efficiency and renewables, and even if politically and psychologically everyone is ready to do that, there are still bottlenecks just in the ability to gear up and produce and deliver all that new capital.

That's a comment not on the desirability or feasibility of the final state of Amory's vision, but on the transient — the path to get there and how long it will take.

Seems to me one could only figure out the transients with a model — and Jane's and Malcolm's models (and probably also Bert's at RIVM) are the only ones I know that are capable of handling the question.

Am I hearing you right, Jane? Have you incorporated, even as a sensitivity test, the kinds of numbers Amory quotes for the ultimate cost and availability of efficiency and renewable options? I always suspect our BG models (including my own) of not testing the full range of uncertainty, especially not in optimistic direc-

tions. And since, starting next week, we will be engaged in a serious effort to produce a believable transition path to a sustainable energy economy, I want to be sure we get that not-so-small consideration of the actual rate of substitution of physical capital right! It also seems to correlate with my own complaints about not being able to get my hands on the technologies, though I'm willing, the technologies exist, and they are beginning to be affordable. There's an important DELAY in there.

Date: Mon, 31 Aug 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

Thanks for the possible clarification, Dana. Lags are important. However, I think there's abundant empirical evidence that it's a lot faster to do many small things that are accessible to diverse actors than to do a few big things that need specialized big institutions. Also, empirically, the stuff that costs least (chiefly efficiency, some renewables) also happens to have extremely short lead times.

If lags are the issue, it seems to me one need be even less worried about a nuclear-fission resurgence — the rate-and-magnitude problem there is simply impossible.

By the way, our efficiency/renewables costs, as usual, are empirical present costs, not ultimate project costs, though those would be lower.

Date: Tue, 1 Sep 1998

From: **Bert de Vries** <Bert.de.Vries@RIVM.NL>

In the IMAGE-TIMER model, the energy system contains some 20 capital stocks, each with an assumed technical lifetime and technical characteristics which change proportional to the turnover rate, e.g. by coupling these characteristics (energy-intensity, conversion efficiency, specific investment costs etc.) to the rate of activity growth or to the cumulated production ('learning-by-doing').

As a result, the simulations always take such delays into account. Very rapid shifts are next to impossible, unless a society is willing (very high growth rate...) or forced (war...) to depreciate at very high rates. The question, then changes to whether the forces that change the capital characteristics into a desired direction can be reinforced. In modeling this, we are confronted with huge uncertainties which have, therefore, been dealt with in scenario / worldview terms.

Examples of such questions:

\* to what extent are efficiency trends offset by other trends (heavier cars, larger houses etc.) which are in

complex ways related to income and income [in]equality;

\* what relative weight do we give to energy price-induced change in purchasing and operating behavior, as distinguished from the more or less (and ill-understood) 'autonomous' changes in capital stock characteristics?

\* what can we assume about the rate of these 'autonomous' changes, such as the development of the supercar and cheap solar cells — what mixture of hope, educational and entrepreneurial skills, curiousness, institutional infrastructure, zest, political awareness etc. gives a high or a low rate?

\* what will privatization and deregulation do to the introduction of efficiency and renewables in electricity generation - opposite views are defended;

\* in a poor, capital-scarce country with lots of cheaply exploitable oil and gas, what incentives are there to NOT use the oil and gas, and instead switch to capital-intensive options such as photovoltaics? Obviously, this borders on questions about technology and capital transfer, another field of controversy-in-ignorance.

Answers to these questions are most welcome. In fact, many have been given already in the ongoing debate. Next week more will come, no doubt.

Date: Tue, 1 Sep 1998

From: **Amory B. Lovins** <ablovins@RMI.ORG>

Bert et al., does such a model permit the sort of rapid uptake of technologies like cellphones, VCRs,... which has actually occurred? I ask because (a) many of the technologies we're talking about look more like those than they look like major capital-infrastructure plants, and (b) in a world where some of the most advanced spread-spectrum wireless is in Mongolian yurts, and Lesotho is skipping the wires to jump straight to cellphones, leapfrog development strategies are becoming less hypothetical.

Date: Wed, 2 Sep 1998

From: **Bert de Vries** <Bert.de.Vries@RIVM.NL>

The kind of changes you refer to are extremely important and probably the most revolutionary part of what's going on. Unfortunately it is very hard to understand and model the dynamics, if only because it is so volatile. Modeling problems compound if you have to work together with economists.

In the IMAGE-TIMER model this part has largely been blackboxed into the dynamics of energy-intensity

change (partly structural change, partly autonomous, partly energy-price-induced). Within the IPCC SRES scene I have insisted that the kind of activity in the future and the potential of leapfrogging are explicitly written down in the storylines. Hence (qualitatively):

\* in an A1 future with no or little dematerialization, (income 80-140.000 \$/cap) we all live in underground cities, have our own aerocar (recent invention demonstrated in Berlin, 40 kWe engine) AND cellular phones to keep contact with other family members and friends flying around;

\* in a B1 future with lots of dematerialization, (income 60-80.000 \$/cap), we certainly use cellular phones but large parts of the money flow also have to with social services (children, elderly, hospitals) and cyberspace (recreation, art etc.).

An intense debate about these issues has taken place during the workshops in Washington and Berkeley. One of the burning questions: why should the B1 future have such money flows — is it necessary to money-tag all our activities to satisfy economists and those whose income depends on taking small percentages of other people's money flows ?

Sorry to end again with a question mark.

*The question mark is perhaps the best way to lead into the description of the '98 Balaton meeting, where we continued the discussion face to face. The excerpts here constitute just a small part of a richer e-mail conversation, which would have taken 77 pages of this Bulletin if we had included it all — and which is, at the time of this writing, still going on! For those on the Balaton listserv, if you would like to access the full record, send the message Index Balaton to Listserv@Dartmouth.Edu. You will receive from the listserver a file with entries like Balaton LOG9607 LOG OWN V 280 1106 96/07/18 06:38:38. To download the July '96 archive, for example, send the message Get Balaton LOG9607 to Listserv@Dartmouth.Edu.*

## SCENARIOS A AND B REVISITED

### A RETURN TO A BALATON '95 PRESENTATION BY HARTMUT BOSSEL

*In our 1995 Balaton meeting on the theme of Sustainable Consumption Hartmut Bossel gave one of those historic presentations that live on in Balaton Group consciousness. He laid out two scenarios that have a direct relevance to the topic of the Balaton '98 meeting: Energy Scenarios. Hartmut has now developed those scenarios into a just-published book, (Earth at a Crossroads: Paths to a Sustainable Future, Cambridge University Press, 1998). To put the account of the '98 meeting in context, here is a repeat of Hartmut's original scenarios, as summarized in the Fall 1995 Balaton Bulletin. They are, we admit, the world's possible futures as seen from the point of view of Egalitarians (which is what most BG member are).*

#### **Scenario A: Competition and Globalization.**

If you are not privileged to participate in the global economy, you will try to survive in an abandoned building or a self-built shelter near a waste dump. You rely on charity or on selling scrap from the dump. As soon as they can walk, your kids must help in the family business of survival. They have no time for school, and you are unschooled, so you can't teach them.

If you have marketable skills, you can get a job in a global corporation. If your spouse also has such a job, you can live in a house or apartment for which you have mortgaged most of your future earnings. Jobs are increasingly eliminated by automation, and the remaining ones require higher and higher skills. Governments privatize nearly all services (utilities, water, waste disposal, security, schools, mail, etc.) After initial economic advantages due to competition, these services become concentrated in quasi-corrupt monopolies, which provide expensive but shoddy service.

Increasing production and consumption are overriding objectives, and industries that are especially effective in this regard enjoy government support. Settlements and infrastructure reflect this policy. You and your spouse both need a car, since there is no public transport, and shopping, schools, work, and recreation areas are some distance away. The goods you buy are designed to break down quickly, and repair is impossible (or unaffordable). Your life requires continuous consumption; and you have significant expenses for water, sanitation, school fees, road tolls, etc. You must keep your job, so you work late, don't take vacations, and take on tasks you find unethical. There is no sense of community — you have to look out for yourself.

Food and goods come from all over the world, wherever they can be produced in the cheapest way. To compete in the global market, nations desperately relax environmental standards, labor laws, even democratic and human rights. There is an accelerating exploitation of natural resources. Many regional cultures disappear with the destruction of their means of livelihood. Life expectancy in all parts of the world drops because of en-

vironmentally caused diseases. The international community tolerates dictatorial regimes, environmental destruction, and civil wars as part of the "natural" struggle for survival in the global market. International competition and declining social and environmental integrity lead to increasing distrust, intolerance, and aggression between competing regions.

#### **Scenario B: Partnership and Decentralization**

You live in a village-like community. Modest houses of various sizes and shapes in a style typical of your region, a style imposed by local building materials and climate, stand in clusters around courtyards with lawns, playground, and gardens. Many families keep small animals to recycle kitchen and garden wastes and to contribute to the food supply. Older folks live with natural or "adopted" relatives and help in the house or garden or with childcare. The size and shape of the community is defined by the terrain and the need to have shopping for necessities, elementary school, and neighborhood help within walking distance. Other community functions are within cycling distance, and public transport connects town centers to each other and to bigger centers. Those bigger centers offer centralized services (university, specialized hospitals, research, etc.) for a larger region.

For occasional trips families share vehicles, as they share other seldom-used equipment (power tools, boats). With energy-conserving architecture, solar collectors and other renewable energy sources, each group of houses is fairly energy-self-sufficient. Only reusable packaging, recyclable materials, and reworkable products are used. Domestic wastes consist essentially of organic materials, which are composted in the gardens. All durable products (appliances, machines) are returned to the manufacturer at the end of their useful lifetimes for disassembly and re-use of parts. Construction materials are recycled.

High transport costs give local resources and products an economic advantage. Antitrust laws keep businesses small and regional competition alive. Difficult-to-produce high-technology goods (pharmaceuticals,

computer chips, etc.) are imported from centers that specialize in those products. Due to a significant reduction in unnecessary production, the total need for paid labor in this society is strongly reduced, but then so is the need for income. Work is shared by adjusting the length of the work week. People devote part of their increased leisure to public service (community administration, teaching, etc.) in exchange for the right to use such service themselves. A barter economy for a whole spectrum of services develops (piano lessons for gardening, for example.)

Each region is adjusted to its carrying capacity, does not exploit the resources of other regions, and is essentially self sufficient. As each region adjusts to its carrying capacity, the North/South gap disappears. A multitude of unique regional cultures develops. The nation-state loses importance. The common global environment and common goal of human survival force some binding agreements on basic human rights, care for nature and future generations, and global enforcement if

necessary. Telecommunication and high transport costs reduce business travel and tourism significantly, but information networks let individuals interact with other peoples and cultures. Tolerance and appreciation for diversity reduce national egotism and make global agreements easier to implement.

*These scenarios were developed in more detail than is captured in these short summaries by an association of systems analysts and representatives of the Protestant church. They considered the actual dynamic processes going on in the world and their mutual interactions. There was a vigorous attempt to outline other plausible futures, including combinations of these two, but they could not be made internally consistent. This observation seems to confirm the systems characteristic of synergetics, in which subsystems are "entrained" by larger dynamics, allowing only distinct configurations to appear. In particular the two scenarios summarized above have such different operating beliefs and principles that it is unlikely they could co-exist harmoniously.*

<u>Dominant Beliefs</u>	<u>Competition</u>	<u>Partnership</u>
worldview	cause/effect, duality, linearity, independence	interaction, coexistence, nonlinearity, holism
actors	everyone for himself	partnership, community
resource availability	technological progress will overcome scarcity	ecological carrying capacity must be respected
control	efficiency of the market, monetary indicators	systemic self-regulation, diversity, fitness selection, physical indicators
<u>Dominant Principles</u>		
interaction	power and conflict	cooperation
resource use	growth, high throughput	efficiency, limits on total scale
organization	order, uniformity, economies of scale	diversity, evolutionary self-organization
control processes	laissez faire in the market, global standards	self-regulation under efficient choice of constraints
information	filtered and biased, information as property and power	free and open to all, timely, accurate, source of adaptation
property	maximize individual wealth for power, influence, security, and self-esteem	sufficiency, responsible stewardship, power and self-esteem gained from personal and community integrity

## IPCC STORYLINES: FOUR SCENARIOS FOR A UNITED OR DIVIDED WORLD

*In contrast to Hartmut's scenarios, here are the official "storylines" from the IPCC website (see <http://sres.ciesin.org>) for the four energy scenarios to be used as inputs to global climate models. These are possible futures as seen from the Hierarchist point of view. Note the strong contrast with Hartmut's (Egalitarian) scenarios in terms of where the implicit faiths and doubts of these future-thinkers lie — in particular note the assumption that that when the hierarchy fails, the entire society fails.*

*Having read these futures, you can probably produce others, from the Individualist and Fatalist and even Hermit points of view. In the differences between these "takes" on the future lies the thrust of the '98 Balaton meeting — and of all global discussion of sustainable, equitable futures.*

### A1 Storyline — "Golden Economic Age"

The A1 storyline is best characterized as a case of rapid and successful economic development and "catch up." It is a case of high growth in which the logic of successful development assumes that growth is smooth with no major political discontinuities or catastrophes. The primary driving forces are the strong human desire for prosperity, high human capital, a high propensity to innovate, vigorous technology diffusion, and free worldwide trade. "Intangible" assets such as human capital characterized by high educational levels and a stable political and institutional climate take precedence over "tangible" assets such as physical capital, material resources, and other natural endowments. The main motivation for the storyline is to explore the implications of a world in which all regions achieve sufficiently high levels of development so that current distinctions between the "poor" and "rich" become increasingly inappropriate.

The main difference relative to the historical experience of the OECD is a certain acceleration in growth in space and time (i.e., "leapfrogging") made possible by better access to knowledge and technology, a consequence of the high-tech and free trade characteristics of the storyline. Success in catching up economically becomes pervasive. All parts of the world participate, although with differences in timing. The final outcome is that practically all regions of the world achieve high levels of affluence by the end of the 21st century, even if disparities do not disappear entirely.

The link between the demographic and economic forces driving development corresponds to present empirical observations that the affluent live long and have few children, resulting in low mortality and fertility. The global population grows to some 9 billion by 2050 and declines to about 7 billion by 2100. This results in a considerable "graying" of the population. But the growth in productivity and output is more than sufficient to provide for the increasing percentage of retirees.

The global economy expands at an average annual rate of about 3 percent through 2100. This is approximately the same as average global growth since 1850, and in this respect may be considered to be "growth as

usual." Gross world product (GWP) increases from about US\$20 trillion (million million) in 1990 to some US\$530 trillion by 2100.

Resource availability and technology are tightly interrelated in this scenario. High productivity growth results from substantial technological innovation. Both contribute to economic growth, an expansion of accessible resources, and improved efficiency in resource use. Improvement rates follow long-term historical trends and are technology- and income-driven. For example, final energy intensity – energy use per unit GWP – decreases at an average annual rate of 1.3 percent.

Four important variants, or marker scenarios, have been identified for A1 that differ in the directions taken by technological change. The key difference is which resources might become economically accessible in the future, and which technologies might become available to convert these into final goods and services demanded by the consumers. Four pathways are considered:

1. "Balanced" progress across all resources and technologies from energy supply to end use;
2. "Clean coal" technologies that are generally environmentally friendly with the exception of GHG emissions;
3. An "oil and gas" rich future with a swift transition from conventional resources to abundant unconventional resources including methane clathrates; and
4. A "non-fossil" future with rapid development of solar and nuclear technologies on the supply side and miniturbines and fuel cells in end use.

Ecological resilience is assumed to be high, although in and of themselves, ecological concerns are a low priority. Instead, the valuation of environmental amenities is primarily economic. Altogether, the concept of environmental quality might change in this storyline from "conservation" of nature to active "management" – and marketing – of natural and environmental services.

The divergence between the four marker scenarios in terms of resource availability and the direction of

technological change result in a wide range of GHG emissions: from about five to more than 35 GtC by 2100.

## **B1 Storyline — “Sustainable Development”**

The central element of this future is a high level of environmental and social consciousness, successful governance including major social innovations, and reductions in income and social inequality. Successful institutional innovations allow many problems that are currently hard or difficult to resolve to fall within the competency of both governments and non-governmental organizations. Solutions reflect a wide stakeholder dialogue leading to consent on international environmental and social agreements. This is coupled with bottom-up solutions, which reflect wide success in getting broad-based support within communities.

Concerns over global sustainable development, expressed in a myriad of environmental and social issues, result in the successful management of the interaction between human activities and the biosphere. While no explicit climate policy is undertaken, other kinds of initiatives lead to lower energy use and clean energy systems, which significantly reduce GHG emissions.

High levels of technological development focused on achieving sustainable development lead to high levels of material and energy saving, innovations in emissions control technology, as well as labor productivity. High labor productivity in particular is essential to support the B1 storyline’s rapid growth in personal income. Technologies tend to be implemented in an industrial ecology mode, implying a much more highly integrated form of industrial production than at present. Information technology achieves a global spread and is fully integrated into production technologies. Advances in international institutions permit the rapid diffusion of new technologies – RD&D approaches 2 percent of GWP.

The demographic transition to low mortality and fertility happens a bit faster than in A1. Global population reaches 8.5 billion by 2050 and declines to about 7 billion by 2100. Where potential adverse impacts of population “graying” in the A1 storyline are offset by the expansion of resources due to high economic growth, the B1 storyline, which has lower economic growth, relies more on improved institutions, governance, and social cohesion.

The transition from traditional to modern economic activities throughout the world proceeds faster than it has historically. Developing countries experience few institutional failures, enabling them to grow at or near the upper bounds of historical experience. This yields a world with high levels of economic activity and significant and deliberate progress toward international and

national income equality. GWP reaches US\$350 trillion by 2100 and average incomes reach about US\$50,000 per capita. Economic development is balanced and active management of income distribution is undertaken through the use of taxes and subsidies. The B1 storyline describes a world as prosperous and successful as in A1, but with different priorities. Where the A1 world invests its gains from increased productivity and know-how primarily in further growth, the B1 world invests a large part of its gains in equity, social institutions, and environment protection.

Energy efficiency improvements in conjunction with successful institutional innovations result in much lower levels of energy use relative to historical patterns. There is a relatively smooth transition to alternative energy systems as conventional oil resources dwindle in availability. There is extensive use of unconventional gas as the cleanest fossil resource during the transition, but the major push is towards renewables, driven in large part by environmental concerns. Two important variants, or marker scenarios, are considered:

1. A “gas rich” future with an initial shift from conventional oil and gas to abundant unconventional gas resources followed by an eventual transition toward renewables; and
2. A “non-fossil” future with rapid development of renewables including solar and wind technologies on the supply side and miniturbines and fuel cells in end use.

Given the high environmental consciousness and institutional effectiveness in the B1 storyline, environmental quality is high, as most aspects of rapid development are anticipated and dealt with effectively. Low emission technologies, careful management and preservation of land, and active intervention to counteract the impacts of activities potentially damaging to the environment strengthen the resilience of ecological systems and the environment in general. These proactive environmental measures and policies also lead to relatively low GHG emissions even in the absence of explicit interventions directed at climate change. CO<sub>2</sub> emissions are foreseen to be on the order of about eight GtC by 2100, and could conceivably be much lower. Low GHG emissions reflect aggressive RD&D to reduce both energy use and pollution as a way to manage local air quality and minimize damage to the biosphere.

## **A2 Storyline — “Cultural Plurality”**

In this future shifts in political alliances lead to a more fragmented world than in either the A1 or B1 storyline. In the A2 world each region relies primarily on its internal cultural and material resources. The world “consolidates” into a series of roughly continental economic regions in a retreat from current globalization trends. Trade

within economic regions increases, while trade between regions is controlled by tariff and non-tariff barriers to support the different regions' economic strategies.

High income regions encourage higher levels of education and science to increase productivity of their labor force. They restrict immigration and impose selective controls on technology transfer to maintain high domestic incomes. Low income regions are only able to increase domestic incomes slowly. They do not have the resources to invest in educating the labor force or in RD&D. Investment from other more affluent regions is constrained, and exports are thus primarily products manufactured with low cost labor or natural resource-intensive commodities. Populations are high relative to high-income regions. Income inequalities become more pronounced within low-income regions and increase between regions.

The primary cause of this transition to a "divided" world is underinvestment in education, science, and RD&D resulting in a productivity slow-down. The transition is driven by the priority given to cultural, political, and protectionist self-interest at the expense of seeking possible longer-term shared objectives.

With the emphasis on regional priorities and an associated return to traditional regional cultural values there is in general an increased focus on family and community life, but fertility rates vary among regions. In particular there is a shift in the world population balance from Asia to Africa by the end of the century, and total world population reaches 15 billion by 2100, much higher than in the A1 and B1 storylines.

Regional economies emphasize self-sufficiency leading to wide variations in growth rates. Average global economic growth is relatively low at about 2.2 percent per year leading to a GWP of US\$250 trillion by 2100.

Technological change is rapid in some regions and slow in others as industry adjusts to local resource endowments, culture, and education levels. As regions try to use their resource endowments to economic advantage, regions with abundant energy and mineral resources evolve more resource intensive economies and seek export markets where they can, while those poor in resources place very high priority on minimizing import dependence. With conventional oil and gas resources diminishing due to slow technological progress and limited investment flows, coal becomes a dominant primary energy source throughout the world. It is used primarily for electricity or to produce synthetic liquid fuels. Given the importance resource-poor regions place on limiting import dependence, nuclear energy also gains ground in this storyline. The fuel mix in different regions is determined primarily by resource availabilities, and divisions among regions persist in terms

of their mix of technologies, with high-income but resource-poor regions shifting toward advanced and renewable technologies and low-income resource-poor regions generally relying on older fossil technologies.

Consistent with regional self-interest local environmental concerns are strong, especially in the high-income regions. Concerns focus mainly on conventional urban and regional air pollution. Substantial agricultural requirements with a significant dependence on highly intensive techniques, driven by larger populations and lower productivity growth than in the A1 and B1 storylines cause initially disastrous levels of soil erosion and water pollution that are eventually managed through the local development of more sustainable high-yield agriculture. Although attention is given to potential local and regional environmental damage, it is not uniform across regions. For example, sulfur and particulate emissions are reduced in Asia due to impacts on human health and agricultural production but increase in Africa as a result of the intensified exploitation of coal and other mineral resources. There is effectively little capability to address global environmental problems.

The result is relatively high energy and carbon intensity, and correspondingly high GHG emissions. CO<sub>2</sub> emissions exceed 30 GtC by 2100 and are the highest of all four storylines.

## **B2 Storyline — "Regional Stewardship"**

This is an intermediate future that is perhaps best characterized by a somewhat imperfect realization of the A1 and B1 storylines. It shares some of A2's diversity across regions, but to a lesser extent. B2 is a world with good intentions, which it is not always capable of implementing. This storyline is most consistent with current national and international developments. On balance the B2 world is one of central tendencies that can be characterized as "dynamics as usual".

Human welfare, equality, and environmental protection all have high priority, but the world proves unable to tackle these concerns at a global level and resolves them as best it can regionally or locally. The trend toward increasing globalization slows down and may be abandoned altogether. Regional economic opportunities and the persistent recurrence of international economic and political imbalances and frictions result in the emergence of strong regional trade blocks and intensify regional integration. The trust between the regions is comparable to today, global agreements are difficult to reach, and the end result is "multiple islands" with inward-looking policies and strong indigenous values.

Generally high educational levels promote both development and environmental protection. Indeed environmental protection is one of the few remaining truly

international priorities due to widespread acceptance of the conviction that ecological and natural resources need to be exploited in a sustainable manner. However, successful environmental solutions are limited by competing economic and regional development goals in many areas, with governments less able to find the “win-win” strategies that allow the greater environmental protection, economic growth, and social equity in the B1 storyline. While there is a clear widespread desire for environmentally friendly policies, the reality is that regional issues and interests take clear precedence when decisions are actually made, but not to so great an extent as to divide the world.

Education and welfare programs are widely pursued leading to reductions in mortality and to a lesser extent fertility. This results in a central population projection of about 10.4 billion people by 2100, consistent with both the United Nations and IIASA median projections.

GWP grows moderately at an annual rate of 2.2 percent to reach about US\$235 trillion in 2100. This reduces the gap between the poor and the rich substantially, but the North and South are still separated by a factor of three in terms of per capita incomes. even by the end of the century. The global economic climate favors specialized economies, promoting international trade for complementary products and commodities on the one hand and protectionism with barriers and tariffs between competing regions on the other.

The B2 storyline also presents a generally favorable climate for innovation and technological change especially in view of high educational levels and relatively efficient markets at the regional level. RD&D is strongly encouraged especially in the more successful regions (mostly those with more limited natural resources), and transfer of knowledge and techniques are promoted through trade, international cooperation and

technical aid. There are substantial, but regionally uneven, gains in this world from technological learning. Successes in some regions are hampered by technological lags in others. Of all the characteristics of the B2 storyline, the description of “dynamics as usual” applies best to the pattern of technological change. On average, improvements are vigorous, but still far behind best practice. The primary energy intensity of GWP, for example, declines at about one percent per year, exactly in line with the average historical experience of the last two centuries.

B2 is a world of “regional stewardship” that, in some regions, is particularly frugal with energy and many other natural resources. Consequently, energy system structures differ among the regions. At the global level there is by 2100 essential balance among different primary energy sources with roughly equal shares of coal, oil and gas, biomass, other renewables and nuclear. There is a gradual transition from the current reliance on fossil resources to markedly higher shares of renewables, and to a much lesser extent nuclear, but the energy supply is still predominantly hydrocarbons even in 2100.

Overall high priority is given to environmental protection, although global policies prove elusive and regional policies vary widely. Regional cooperation leads to regional successes, for example, low levels of acidification which is principally a regional problem. Regional cooperation also leads to reductions in emissions of NO<sub>x</sub>, SO<sub>x</sub> and tropospheric ozone. These developments and the need to use energy and other resources more efficiently spur the development of technologies that use carbon more prudently and result in lower emissions at all scales despite relatively high shares of fossil resources in the global energy mix. This results in median levels of annual CO<sub>2</sub> emissions of about 14 GtC by 2100 and relatively low annual SO<sub>2</sub> emissions of about 12 MtS in 2100 compared to almost 60 MtS in 1990.

## BALATON '98: SCENARIOS FOR ENERGY (AND OTHER) FUTURES

*It might be wise to remember two myths — one Eastern, one Western — which provide a caution to the human race. The Indian myth maintains we are living in the age of Kalyug, which presages the end of the world. Kalyug is characterized by speed. Speed, being the enemy of reflection, will spread fantasy with such velocity that humans, in their pursuit of escape, will ultimately destroy themselves. The Western myth, as expressed in Goethe's Faust, introduces the devil as a poodle, welcomed as something harmless and amusing until it turns into the implacable force that exacts damnation as the price of greed.*

— Gita Mehta, *Karma Cola*, Delhi, 1989

We met a week later than usual, farther into the fall, past the start of school, when the shore of Lake Balaton is less crowded.

The weather started out fine but got windy and rainy as the meeting went on. (The Balaton shore would be a great place for windmills.)

We tried a new schedule that avoided overnights in Budapest. Friends arrived singly and by the busload at the Hotel Petrol. Hugs, handshakes, it was wonderful to see the group gather. The conversation geared up into the non-stop Balaton buzz.

The logistics seemed flawless, thanks to the arrangements made by **Zoltan Lontay**, thanks to contributions from Zoltan's firm EGI, thanks to Elek Turda, who helped us find the home of Eva Solyom as a gracious stop-over and rendezvous place — and thanks above all to the Balaton Group's efficient, untiring, cheerful **Betty Miller**.

There is now an arched plexiglass cover over the Hotel Petrol's swimming pool, allowing it to be heated. (Necessary, we are told, to be competitive in the international hotel business.) Rumor has it that next year there will be a new floor on top of the hotel with a 120-person meeting hall. (Does anyone want to recommend a 120-person Balaton meeting?) Rumor also has it that the hotel might be sold by the Hungarian Oil and Gas company (MOL) to private owners.

Our self-introductions around the table took place in the morning instead of the evening. As usual we excited ourselves by who we are and what we do. **Jørgen Nørgard** is on the board of an electricity-saving trust with \$15 million to hand out. **Valdis Bisters** is in the Latvian Ministry of the Environment, overseeing international relations and training. **Joan DuToit** make national energy forecasts for South Africa. **Bishan Singh** has been conducting farmer-centered resource management projects in eight Asian countries. Wow! We get to spend five days with a whole roomful of people like these!

**Nanda Gilden**, the wife of our departed friend **Wouter Biesiot** came to fill his empty place and introduced herself to us in her own right, a chemist and consultant to Dutch industry, working on environmental

management and company-level environmental indicators. In remembrance of Wouter **Dana Meadows** read an excerpt from Thich Nhat Hanh's biography of the Buddha, *Old Path White Clouds*:

*One morning novice Cunda, who was Venerable Sariputta's attendant, came seeking Ananda. He informed Ananda that Sariputta had died. He handed Ananda Venerable Sariputta's robe, begging bowl, and urn of ashes. He then covered his face and burst into tears. Venerable Ananda wept too.*

*Venerable Ananda wiped away his tears and went with Cunda to find the Buddha. The Buddha gazed quietly at the robe, bowl, and ashes of his greatest disciple. He did not say anything.*

*Ananda said, "Lord Buddha, when I heard that our brother Sariputta was dead, I felt paralyzed. My eyes and mind grew hazy. I am deeply grieved."*

*The Buddha looked at Ananda and said, "Ananda, did your brother take away your precepts, concentration, understanding, and liberations when he died?"*

*Ananda quietly answered, "That is not the reason for my sadness, Lord. When brother Sariputta was alive, he lived the teaching with his whole being. He taught, guided, and encouraged the rest of us. With brother Sariputta gone, the sangha feels empty. How could we not feel sad?"*

*The Buddha said, "Ananda, so many times I have reminded you that with birth there is death. That which comes together must separate. All dharmas are impermanent. We should not become attached to them. You must transcend the world of birth and death, arising and dissolving. Ananda, Sariputta was a great branch that fulfilled his duty in helping nourish the tree. That branch is still present in the tree. The tree is the community practicing the teaching. If you but open your eyes and look, you will see Sariputta in yourself, in me, in the community, in all the people Sariputta taught, and along every path Sariputta traveled. Open your eyes, Ananda, and you will see Sariputta everywhere. Don't think Sariputta is no longer with us. He is here and will always be."*

We heard about many approaches for trying to see into, or to influence, the future. We looked at possible futures of China and Africa and India and California and were reminded that there are many places within those places. We got the latest update from **Niels Meyer** about the evils of the European deregulated common market and the latest mile-a-minute **Aromar Revi** Grand Synthesis. Through **Dennis Meadows**'s systems games we peered through our fingers at a pen, clapped hands in (almost) unison, tore up squares of paper, and plodded toward a sustainable future on wooden planks. We consulted numbers and trends and computer models and our hearts and souls. We rejected the IPCC's whole paradigm.

Working groups formed and plotted and schemed. There were hikes into the hills and excursions into Balatonfured and Veszprem. We pored over plans for eco-villages, laughed at **Chirapol Sintunawa**'s funny electricity-saving ads, saw new GIS plots of forest loss in Costa Rica, and sat in candlelight to hear **Alan AtKisson**'s poem about Time, inspired by last year's meeting. We watched "Escape from Affluenza" and "Metropolis" and discussed whether a sustainable path could be sexy.

At the final banquet **Alan AtKisson** introduced two new songs, one on Systems (see the end of this *Bulletin*) and one on Sustainability (see the end of last spring's *Bulletin* — this guy can write a song about ANYTHING!) He was backed up vocally and gesturally by the dynamite team of **Tony Cortese**, **Nanda Gilden** and **Vicki Robin**. (We really need to make videos of these final banquets!)

**Bert de Vries** won the coveted prize for the Most Incomprehensible Slide of the Year, with honorable mention to **Aromar Revi**. Betty Miller instituted a new prize for First Person to Return the Travel Form to her. **Bob Wilkinson** won, with **Niels Meyer** receiving recognition for being first in the two previous years (before there was a prize). **Bob Wilkinson** also won the only serious award, the Balaton Group Member of the Year, for his steady devotion to difficult places (such as California and Central Europe and Russia and the Aspen Institute and the President's Council for Sustainable Development) and for his quiet, gracious, natural networking, web-knitting, and friend-supporting activities within the Balaton Group.

Friends departed singly and by the busload from the Hotel Petrol, some of them at 4 AM. Hugs, handshakes, it was hard to say good-bye. The conversation quieted and retreated back to email, waiting to come alive in person again next year.

## Day One, September 10, 1998 Looking into the future: who sees what?

*Chaos, Cosmos! Cosmos, Chaos!  
Who can tell how all will end?  
Read the wide world's annals, you,  
and take their wisdom for your friend.  
Forward then, but still remember  
how the course of Time will swerve,  
Crook and turn upon itself  
in many a backward streaming curve.*

— Alfred, Lord Tennyson,  
from "Locksley Hall, Sixty Years After."

Curl your index finger against your thumb to make a very small circle, said **Dennis Meadows**, and hold it out at arm's length so you can look through it at this red pen I'm holding up. Now stay focused on the pen and slowly bring the circle back toward your eye.

Lo and behold! when we did so, we saw the pen, the front of the room, the wall behind, and Dennis holding the pen, waving at us with a silly grin on his face. Notice what happens, Dennis said, when you enlarge the frame and take in the whole context. It was a metaphor for looking into the future that we kept referring back to for the rest of the meeting.

\* \* \*

The Intergovernmental Panel on Climate Change (IPCC) has three working groups, said **Bert de Vries** — WG1 on science, WG2 on impacts, and WG3 on policy. Bert's department head at RIVM is chairman of WG3. He has gathered a group of modelers, economists, and energy experts and charged them to produce a Special Report on Economic Scenarios (SRES), several likely 100-year forecasts for world economic development, which then are used to generate possible trajectories for greenhouse gas emissions, which are then entered into the global circulation models to churn out calculations of possible climate change. The mandate was to produce scenarios that do NOT assume explicit climate change policy. Bert is part of the group working on the SRES.

Four draft scenarios have emerged. They are now posted on the Internet, in a site to which comments may be addressed over the next 4-5 months, after which the scenarios will be finalized. (See <http://sres.ciesin.org/>). The scenarios fall into a matrix, based on the SRES group's perception that the two most important uncertainties about the future were:

- economic and cultural globalization versus division,
- free market economics versus concerns for equity and sustainability.

The first (underlined) name given in the matrix below is the one currently given to each future. Other names were considered but eventually rejected.

	1 continued globalization	2 more regionalism
A free market rules	A1 <u>Golden Economic Age</u> , Tiger World, cybertopia, high performance, conventional wisdom, “just do it”, hypermarket.	A2 <u>Cultural Plurality</u> , divided world passive mean world, rich get richer, barbarization, battlefield.
B rising concern for equity and sustainability	B1 <u>Sustainable Development</u> , great transition, ecologically driven, dematerialization, renewables-intensive, energy- efficient.	B2 <u>Regional Stewardship</u> , bioregions, good intentions but economically failing.

The A scenarios are assumed to produce 750 ppm atmospheric CO<sub>2</sub> concentration by the year 2100; the B scenarios produce 450-500 ppm. (Compared with 360 ppm now, and 270 ppm 100 years ago.)

We were struck by the mindsets apparent in the names of the scenarios, so we asked Bert who these people producing the SRES are. He replied: about 30-50 people, meeting in four different places for 8 days altogether, mostly modelers and engineers and economists, mostly from OECD countries. He also said that B2 had the fewest names because it was the hardest for this group to think about. “There is hardly any template.” The A1 future, on the other hand, can be read almost directly out of the official forecasts of the World Bank, IMF, UN, corporations and national governments and was the easiest for the group to spell out in detail.

The “grand logic” assumptions of A1 are:

- The desire for material prosperity is the key driver.
- Technology is the engine behind economic growth.
- Governance is effective on all scales.
- Communication and trade nourish the development of a global culture.

High economic growth allows convergence in incomes of the rich and the poor. That leads to a slowing of population growth; population peaks at 9 billion and falls

to 7 billion by 2100. There is significant decline in the energy and materials used to generate a dollar’s worth of GWP, and a transition to a service economy. (Energy intensity of the economy is assumed to go down by a factor of 10 because of structural change, “autonomous” efficiency, and price-induced efficiency improvements.)

We all get around in our own small planes in this future, Bert said, and he illustrated the A1 mindset with an actual ad from a British newspaper: IN THE RUTHLESS WORLD OF BUSINESS, SHOULDN’T YOUR STAFF BE TRAINED TO SURVIVE? (The ad asks employers to enroll their workers in the British Volunteer Reserve Forces — because “whether you’re talking unarmed combat training or the cut and thrust of business life, we live in a competitive world.” This ad is not a joke.)

Another present-day example of A1: the Dutch-based Ahold company owns 3200 supermarkets in Europe, North America, Asia and Latin America. It has 220,000 employees, 20 million customers, and \$25 billion in annual sales, aiming for \$50 billion by 2002. “We want to become the biggest supermarket concern in the world. Ahold chases all over the world. What really matters are take-overs and joint ventures.” Ahold built 23 supermarkets in Thailand in 1997. They are open until late at night, sell ready-made meals, have big parking lots. Thai middle-class customers like them. “It is clean and cool, recreational and saves time.” Ahold has also made agreements with 20,000 Thai farmers, who supply produce — agreements that specify the use of new seeds, pesticides, and harvesting schemes. “It may sound colonial, but we have to educate our suppliers.”

Bert pointed out some of the dynamics inherent in the A1 scenario (not considered by the SRES committee):

“Success to the successful” feedback, which rewards the winners of competition with the means to win further, leads to oligopoly, inequity, marginalization, bureaucracy and corruption, trade barriers and protectionism, cultural resistance — and transition to either an A2 or a B2 world.

“Shifting the burden to the intervenor” (dependency) could lead to IMF support dependence, environmental degradation, lower taxes to get votes (and hence the decline of government), oppression of civil rights to combat international terrorism, and a divided A2 world. (Malaysia stops floating its currency; the walls go up.)

“Limits to growth” could bring about resource scarcity, financial instability, economic contraction, and A2 (perhaps going on to B2, if lessons are learned).

“Escalation” could set up competition in business growth, in arms races, in “green” technologies, or in status-based consumption, leading to A2 or B2.

“Eroding goals” in government budgets, deficits, trade balances, environmental standards, technical performance, and infrastructure could also produce A2. (The Dutch Prime Minister, recently informed that Dutch CO<sub>2</sub> emissions are now 10% higher than they were in 1990, said “that goal of 3% reduction by the year 2000 was nice — but no longer attainable.”)

In short, for many reasons, A1 is not sustainable. It seems to drive mainly toward A2, but could also plausibly turn into B1 or B2.

Well, Bert concluded, there were obviously weak points in this exercise in “computer-aided storytelling.” After 15 years I’m still amazed by the difficulty of communication between economists and physical scientists. And then there are the politicians. All mention of social unrest, economic collapse, poverty, and other forms of devolution was considered TABOO. We were only allowed to put forth politically acceptable scenarios.

Hands shot up for discussion.

That taboo part was exactly the position of the Soviet Central Committee for a very long time, said **Vladimir Kollantai**.

When I worked at the FAO, **Janos Hrabovszky** added, I was not allowed to put forward negative growth scenarios, even when negative growth was actually happening.

People on these committees are not neutral, said **Hartmut Bossel**, they are married to the A1 view. They put in dematerialization and these other unjustified assumptions to push their own visions — *to prove to themselves and others that growth can go on and be unconstrained*. IASA, Shell, and the World Energy Commission pushed A1 and had to put in nuclear power in huge amounts to make it plausible at all. We should criticize this scenario strongly. Its assumptions are obviously weak. It sounds like one of those visions from the 1950s about universal air cars and cheap nuclear power. It might be worth investigating why those visions failed.

The events of the last few weeks will open the door to more unpleasant scenarios, said **Bob Wilkinson**. There has to be a crash scenario. There is already environmental feedback in the form of floods in China, fires in Indonesia, drought in Texas.

Economists understand the A1/A2 axis and the possible breakdowns of globalization, said **Bert**, but not the A/B axis and environmental feedback. (For Balaton Group members it might be just the opposite!)

**Herbie Girardet** said, the people who come up with these scenarios are in the power structure. Why don’t they ever *learn*?

**Gilberto Gallopin** added, the A1 emphasis isn’t surprising; it comes from the dominant paradigm. What bothers me is that the axes here aren’t really orthogonal. It doesn’t feel right. Furthermore, the idea of a possible shift from one scenario to another assume a *forgiving, reversible* world, which we may not have at all.

Can these scenarios be of any use? asked **Niels Meyer**. I think they’re directly dangerous; they are so dubious. Will they introduce more confusion than clarity? Can’t we insert better ideas?

\* \* \*

**Gilberto Gallopin** followed with a set of possible futures that fit our mental models much better. They were assembled by the Global Scenarios Group (including Paul Raskin, Allen Hammond, Rob Swart, and number of volunteers from both North and South, with funding from UNEP and the Nippon Foundation — see <http://www.gsg.org>). They start by assuming that this is a time of deep change, not a time when smooth extrapolations are appropriate. Therefore, rather than trying to predict a “most likely” future, the task was to explore the limits of the possible. Because worldviews can never

be disentangled from statements about the future, the exercise was international and intercultural, and differing worldviews were kept as visible as possible. There was no computer modeling involved, but back of the envelope quantitative calculations were made, and more detailed calculations were made for the business-as-usual (“reference”) scenario ..

The group came up with three basic scenarios, each with two variations:

*Conventional worlds:* assumes no basic discontinuity in society, either in the prevailing societal value — consumerism — or in institutions.

*Reference* — business as usual. (We can be sure this scenario won’t happen, said Gilberto — it was declared unsustainable at Rio.)

*Policy reform* — implementation of the basic recommendations of the Brundtland Report.

*Barbarization:* assumes that due to the failure of the Conventional Worlds scenarios to solve social and environmental tensions, poverty persists, population growth is high, global capitalism accelerates, there is ecological disturbance at the planetary level, and transnational corporations control more and more

*Breakdown* — if the rich governments and TNCs compete with each other.

*Fortress World* — if the rich governments and TNCs unite to control the poor.

*Great Transitions:* assumes the same drivers as barbarization *with the addition of* widespread science of complex systems, strong NGOs and civil society, and a re-invigorated United Nations, leading to a discontinuity in societal values.

*Eco-communalism* — non-urban, bioregional, “small is beautiful” — it was hard for the group to imagine a trajectory from the present situation to this world except through breakdown.

*New sustainability paradigm* — there is widespread demilitarization, the “peace dividend” is captured for development, there is disenchantment with consumerism, a New International Sustainability

Party emerges, alternative lifestyle experiments flourish, the Internet provides the medium for planetary ferment, there is an international redistribution of wealth.

Figures 1 and 2 illustrate these scenarios, Figure 1 with no numbers at all, Figure 2 with possible numerical trajectories on a plot of population versus GWP.

In spite of our previous discussion about “taboos,” these scenarios were well-taken when they were presented to the UN Council for Sustainable Development and to the Rio +5 meeting, said Gilberto. Maybe because the UN’s explicit mission is to avoid barbarization. So it isn’t always fatal to talk in official circles about crashes.

These scenarios ring much more realistic to me than the IPCC ones said **Ashok Gadgil**.

These scenarios tell us more about the people in the group than about the future said **Tamas Fleischer** — but that’s true of all scenarios.

**Laszlo Pinter** pointed out that there are no visible decisionmakers in these scenarios (and also not in the SRES scenarios).

Do you know any historical examples of a whole society moving toward less consumption and voluntary simplicity? asked **Vicki Robin**.

Perhaps some aspects of the Japanese Zen-inspired samurai society, answered Gilberto, or the potlatches of the Native Americans, or monastic societies, or a society fighting against an external enemy (such as England during the Second World War.) Certainly the examples are few, but they are also not negative — these are thought of as vigorous, purposeful, mindful, effective societies.

Why is it, asked **Dana Meadows**, that depictions of the future from official and powerful people are always “reference scenario” and “business as usual,” but depictions of the future in films and science fiction and art are so often barbarization, breakdown, and fortress worlds?

\* \* \*

Figure 1:

Figure 2:



**Hartmut Bossel**, having long ago presented us with two compelling scenarios, gave us this year a presentation on scenario consistency — on constraints, principles, and ideas to use to be sure scenarios make internally consistent sense.

What can go wrong with scenarios? he asked:

- lack of imagination,
- wishful thinking,
- neglect of physical, human, and system constraints,
- neglect of impacts feedbacks, and eigendynamics (the internal dynamics of systems, determined by their inherent structure),
- restrictiveness of theory, model, or ideology,
- neglect of possibilities for self-organization and evolution,
- ignorance of basic driving forces or actors,

It helps to check scenario realism by keeping in mind:

- natural laws and constraints (it's surprising how often this isn't done, especially in economic models). Not everything is physically possible. For example, check carefully for:
  - laws of physics (especially the 2nd law of thermodynamics),
  - rules of logic,
  - solar energy flows,
  - material resource stocks and flows,
  - carrying capacity (which is defined by the *most limited* factor),
  - ecosystem relationships.
- system dynamics and impacts,
- psychological, social, and cultural constraints. Not everything is desirable. Check for:
  - human actors not as machines but as self-conscious, anticipatory, imaginative, creative beings,
  - human organizations explicit and

evolving,

- culture (and the long lags by which it changes),
- technology and what drives it,
- ethics and values.
- the pace and direction of self-organizing and evolving systems:
  - feedbacks cause intrinsic eigendynamics,
  - dynamic processes take time,
  - self-organization follows viability needs,
  - systems evolve in co-evolution with other systems,
  - systems move to stable attractors (and away from unstable ones),
  - movements can be synchronized by mode-locking.
- breakpoints and bifurcations and irreversibilities,
- stable attractors, transient and transition states.

Driving forces — such as demographics, environmental deterioration, social dynamics, technology, and market forces — restrict a system to stay within an “accessibility space,” outside of which it is physically impossible to go. It can help immensely in developing scenarios to be clear about what future spaces are simply inaccessible. (Figure 3)

**Figure 3:** Accessibility space: future developments are constrained

Figure 4: Basic orientors: they ensure viability of systems in their environment

It is also useful to check any depiction of a future system against the six basic orientors that ensure the viability of systems in their environment. (Figure 4)

When we came up with our Scenarios A and B, said Hartmut, we actually started out with four scenarios, much as the SRES exercise did. But as we described them and followed their secondary and tertiary impacts, we found they converged into just two paths — we called them *riverbeds* — wide channels that allow for significant variation, but nevertheless that flow in only two basic directions. They are equivalent to A1/A2 vs. B1/B2 in the IPCC scheme, or to Gilberto's paths of barbarization verses great transition.

We found, essentially, Hartmut said, that in the long run A1 (global/free market) is physically impossible. A2 (regional/free market) is incompatible with the free market and B1 (global/sustainability) is incompatible with sustainability. Therefore they are likely to devolve or evolve eventually to B2, the one stable attractor. Only B2 (regional/sustainability) is both humanly and environmentally consistent.

All these scenarios are Western in perception, said **Bishan Singh**. Both Buddhism and Hinduism start by looking not outside first, but inside. "Something not compatible with me cannot be going right. What am I doing to create that wrongness?" That philosophy would say that we can create B2 directly, not by going through A1 or A2 or B2, and we can do so by creating it within ourselves.

### **Day Two, September 11, 1998** **Experimenting with envisioning and implementing sustainable futures**

*The future isn't what it used to be, and it's never gonna be.  
The future is our permanent address.  
It's very hard to predict, especially the future.*

— Future truisms, quoted by **Dennis Meadows**

**Dennis Meadows** gave us a history of "objective" methods for creating images of the future, where "objective" means that others following the same methods would theoretically come up with the same results.

An image of the future, he pointed out, could be quantitative — a specific number to be measurable at a specific future time. But it also could be a story (like good science fiction) or a path with key dimensions specified. Forecasts can be qualitative or quantitative, objective or subjective, and normative (specifying how to get where one wants to go) or extrapolative (laying out where the system is likely to go, given past trends).

An amorphous body of techniques with a diverse set of goals emerged mainly from the business consulting world during the 1960s and 70s. One of the classic descriptions of these techniques was *An Overview of Futures Methods*, written by Joe Coates, who founded

the Office of Technology Assessment of the U.S. Congress. (Which lasted until Newt Gingrich killed it in 1995.) In 1966 Eric Jantsch did a study for the OECD looking at how governments and companies see the future. It was published as *Technological Forecasting in Perspective*, which led directly to *Futures* magazine and the World Futures Society. (Notice how these early “futures” efforts centered on the future of *technology*, which was seen as the most important and interesting thing to foresee.)

All forecasting depends on five assumptions:

- issues occur within complex systems,
- there is not one pre-determined future, but several, about which we have a choice (the best number to specify is 3-5).
- we have the capacity to do this — there are underlying regularities and we can perceive them,
- this “futures” information will make us more effective in influencing the future in desirable directions, or in coping with the future,
- we should try to be more effective.

Forecasting can be applied at many possible stages of social impact, from discovery to proposal to verification to pilot to scaling up to selling/training/ investment/building/learning. The best method to use depends on which stage is being influenced and on the relevant time horizon.

The methods available, proceeding roughly from most to least “objective” are:

- trend analysis
- cross-impact analysis
- decision trees
- modeling/simulation
- historical analogy/precursor analysis
- polls, Delphi
- science fiction
- astrology
- divine revelation

Trend analysis is probably used more commonly than any other technique — plot out the trend line and extend it into the future. Watch out, said Dennis, for the practice of drawing trend lines that have nothing to do with the data, for spurious correlations, and, of course, for major system changes that make past trends simply inapplicable to the future. (Such as, for example, assuming that the scarcest ingredient for economic production is capital, when that may no longer be true.)

Cross-impact analysis is a crude form of complex system modeling. It simply makes a matrix of all factors assumed to influence each other, and asks whether each factor can help another (+), force another (++), hinder another (-), or block another (—) or be completely unrelated (0).

	A	B	C	D
A	X	+	0	0
B	-	X	—	-
C	0	++	X	+
D	-	+	+	X

Filling in guessed probabilities for the initiation of A, B, C, and D begins to allow one to trace out possible paths for all variables into the future.

Historical analysis, or precursor analysis, assumes that there are leading indicators by which one can prognosticate the future. For example, the French philosopher Condorcet around the turn of the 19th century postulated that what the wealthy eat, drink and do today will be what the middle class does tomorrow. Other examples: the leading-edge technology today will be the standard technology tomorrow; or California’s politics today will be the nation’s politics tomorrow; or the events of 1929 tell us something about the financial crashes of the late 1990s.

The Delphi technique (which was invented to overcome authoritarian opinion-following in the military) is simple to do and looks quite scientific. It is a multi-step method to find consensus among a group of people, but not necessarily consensus around the truth. In a Delphi study each member of the group replies to a questionnaire (about expected future events or trends). Then each receives back a copy of his or her own responses along with the compiled (anonymous) responses of the rest of the group. Those whose responses differ from the rest are asked to explain what information or reasoning led to their responses. Those explanations are then circulated to all respondents and the questions are re-asked. The process is repeated until there is convergence.

Modeling and simulation are techniques well known to the Balaton Group. They postulate a set of rules about how the system unfolds and then set up a simulation to let it unfold.

This is a very useful summary, said **Bob Wilkinson**. You should write it up into a paper.

I hope someone already has, answered **Dennis**. I'll try to find you a reference.

These techniques are not objective in any scientific sense, said **Gilberto Gallopin**, they are *intersubjective*. They are tools for getting agreement among experts, which can be useful and maybe even true. We have used Delphi to try to get functional relationships to plug into simulation models.

They seem like passive tools to me, said **Dana Meadows**. They assume that the future happens to us and our best strategy is to predict it so we can be ready for it. That's basically unempowering. I'd rather have tools that help me create a future I want.

\* \* \*

Bear with me here, **Vicki Robin** started. I'm going to go in another direction entirely, and it's not necessarily an easy one.

The main problem with the whole A1-B2 concept is that it's missing the dimension of the human heart, a sense of what makes life worth living.

I've really come to understand that dimension through the loss of my dear partner Joe Dominguez. When grief and sorrow pierce your heart, then you learn what it means to be alive. Nobody tells you that when you lose your life partner, you lose your whole way of life, your whole system comes apart. There used to be a Native American condolence ceremony, after a war, when both sides were mourning their dead. One side would go to the other side and say, "We know how it feels. We too have these unconsolable losses. We offer you our condolences. We know how it is when your mind is always going back, when you stay busy just in order not to feel, when your mind is too clouded to allow life in."

Grief is a process that we in our culture are required to keep hidden. There is a taboo against revealing the deep content of our hearts, our grief, rage, joy, fear. So we carry around our feelings unexpressed, including our grief and helplessness and impotence against the power of A1.

Let's talk about that. Let's let it up.

(Up it came from the group. Our outrage and sorrow after **Michael Ochieng Odhiambo's** message about the bombing in Nairobi. Seeing a beautiful estuary turned entirely into shrimp farms. Turning beauty everywhere into junk. Forest fires in the Amazon and Indonesia. Advertising taking over ancient cultures. The helpless feeling that society is trying to prevent us from passing knowledge and culture and ethics and unspoiled nature to our children. The exploitation and marginalization of farmers in Asia, turning them into makers of money instead of makers of a way of life — "I don't want a tractor," said one, "I don't want my cow to be unemployed." It all — all that A1 stuff — feels as powerful as a glacier, coming over and crushing what is most precious to us.)

Understand, said Vicki, that the place in your heart that feels all this pain exists also within the people generating the A1 scenarios. You can do your work at that level, the level of shared feeling, compassion, empathy. "You know how it feels. You too have these inconsolable losses." Speak from your heart to other hearts, knowing we are all trapped in cages of our own egos, constructed out of fear, embarrassment, judgment, insecurity. Break your cage and that will allow others to break theirs.

We have that to offer, but we have more; we have joy, delight, sexiness, music, companionship. One of our errors is that we haven't yet made B2 seem like fun. We should be running to a desirable future as we would run to meet our lover; we should paint pictures of sustainability full of juice and joy. B2 isn't happening because people think it's boring.

(Reaction from the group — it's not boring to US!)

Well, then, what do you know about it that makes you delighted? How often do you communicate that? How much time do you spend making where we are now look awful, and how much time pointing out the joy of a sustainable future? Where did your passion for this work begin? Tell that as a vivid story. Tell about the time you fell in love with sustainable development.

Then there's a third task, proving that there's a plausible bridge from A1 to B2. How many of us really, really believe there is? Or do we walk around thinking "Well, A1 will win, we'll have a collapse, it will serve them right. At least as it all crumbles I can have the smugness of knowing I was right." If that's what you believe inside, that's what you wordlessly communicate. People hear your lack of faith more loudly than whatever words you speak.

In fact, look around in your daily life, in your family and neighborhood, in the actions of the billions of

“small folk” rather than the media-magnified actions of the very few “big folk.” *We’re living in B2. Most of the world is already closer to B2 than to A1.* What’s truly implausible is A1. It takes enormous determination and expense and loud declarations and frantic activity to keep the pretense of A1 alive.

Our book *Your Money or Your Life* demonstrates that so clearly, Vicki said. It has sold hundreds of thousands of copies, has been on the *business* best-seller list for more than two years, is still selling at 8500 copies a week — and it gives people a personal program to take

them directly from A1 to B2. It is based on both self-interest and higher values. After people work the program, their expenses go down by an average of 25% while their quality of life increases. The program makes people feel smart; it helps them decode the A1 marketing system and free themselves from it. People can see that there is a place called enough and that going beyond that place just leads to clutter. Once you have enough, any further increase in fulfillment comes not from getting but from giving.

That is a true message, it speaks to people’s hearts, and it means the death of A1.

Vicki offered yet another matrix (this was the Balaton Meeting of Matrices). Try filling this one in for yourself:

		HAVE	
		yes	no
WANT	yes	list what you already have that you are happy with, that you actively use and need.	list your unmet needs, that which you don’t have but wish you did. Be expansive, include both material and nonmaterial wants.
	no	list what you have that you wish you didn’t have.	list what you don’t have and don’t want

If you do this exercise thoroughly, said Vicki, you’ll learn a lot about yourself and about life. You’ll see that the four spaces in the matrix encompass four very basic human feelings:

		HAVE	
		yes	no
WANT	yes	<b>GRATITUDE</b> , happiness, satisfaction. (The failure of the consumer culture is a failure of gratitude amidst plenty.)	<b>LONGING</b> , dissatisfaction, vision. (Photovoltaic collectors, peace, an endowment for the Balaton Group.) Most things on this list are actually <b>NONMATERIAL</b> for most people.)
	no	<b>SHARING, GENEROSITY</b> When we recognize what is excess, we can share joyfully.	<b>FREEDOM</b> (From plaster flamingo statues for the front lawn, jet-skis, sports utility vehicles, Coke.) Freedom from craving, market manipulation, clutter. Freedom to enjoy life beyond stuff.

I do shameless marketing of these ideas into the culture of shameless marketing, Vicki said. I say these things on radio, on TV. Every day they have to get interesting guests on their programs, why not me? We intellectuals don't like marketing; we think it's demeaning. We try to sell B2 on the basis of its "features" (what — solar power, energy efficiency, organic food), not its benefits (why — gratitude, sharing, freedom, joy, health, real security and satisfaction). Watch the professional marketers — they *always* point to benefits (love, beauty, youth, pep, self-esteem) rather than features (fast food, toys, cosmetics). The difference between them and us is that their message is *false* (and people know it), but ours is *true* (and people don't yet know it).

As a rousing conclusion, Vicki made her Balaton Group singing debut (an act of great courage for her) by treating us to her newly composed song:

### I HAVE ENOUGH

by Vicki Robin (to the tune (kinda) of Dark Town Strutter's Ball).

*Excuse me sir, I know it's impolite,  
But since kids are starving I thought I might  
Just ask some folks to figure out rough  
If they could possibly have enough.  
Sure more might be better, but maybe it's worse.  
Stuff taxes your serenity as well as your purse, so  
Could you say as though it were true:  
I have enough. I do.  
I have enough. Do you?*

*I have one car and a motorcycle,  
A real nice camper and a bicycle,  
Lots of shoes, twenty shirts or so,  
Skirts, pants n dresses for wherever I go.  
Five coats, a computer and a paid-for place to live,  
Hey, honey, I even have money to give.  
And here's the best, ain't got no debt.  
Interest on savings to pay the rest.  
My life is rich and full and dandy  
And each year I just spend 9 grandy!  
I have enough. I do.  
I have enough. Do you?*

*Hello Mr. Turner and Mr. Gates,  
I'm wondering if you could congregate.  
Billionaires like you, who might have a few  
More things than you need, and be needing nothing  
new.  
Since our forests are denuded and our waters are  
polluted,  
Could you fortunes be diluted, and maybe contrib-  
uted?  
So would you say, and have it be true:  
I have enough. I do.  
I have enough. Do you?*

*Excuse me Mrs. Bangladeshi  
I just have one very simple question.  
I notice that the floods have taken your home,  
Your husband's gone, you're all alone.  
If you don't have enough, can we work together?  
If what I have will help you weather  
Poverty and storms, I'll surely give  
For you and your neighbors to love and live,  
So we all can say and know it's true:  
You have enough. You do.  
You have enough. Me too.*

*Hey everyone, can you just guess  
How we might live without the mess  
Of some having lots, some having less?  
Let's all have plenty but none excess.  
Forget lambs and lions lying down together.  
Can rich and poor learn to love each other?  
So we all can say and know it's true:  
We have enough. We do.  
We have enough. Yahoo!*

\* \* \*

Now let's get into the details of some of these energy scenarios, said **Matthias Ruth**. What is likely to happen to energy-intensive industries, such as steel? What effect might climate policies, such as a carbon tax, have on them?

Iron and steel is the fourth most energy-intensive industry in the United States. U.S. plants account for about 12% of the world's total capacity. More than 60% of their energy comes from coal. Matthias has modeled this industry using a combination of system dynamics and statistical analysis (the latter in order to communicate with economists in the industry and to prove how the model tracks real data).

The model uses exogenous production rates, forecasted from population and GDP trends. Then it simulates endogenous technology change and CO<sub>2</sub> output as a function of production and prices. It keeps track of both direct and indirect energy use (such as bought electricity and its embedded carbon content). The industry is in the middle of dynamic technology change in any case, as it shifts from the old blast furnaces and basic oxygen furnaces to the smaller, more flexible electric arc furnaces.

The bottom line of this very careful analysis (done together with industry participants) is that energy use and total carbon emissions will go down in the iron and steel industry anyway, whether or not there is an explicit climate policy, because of endogenous technical change.

You can't say "carbon tax" in the U.S., says

Matthias, but “if the cost of carbon fuels should happen to go up” by \$50/tonC, the model says that total carbon emissions would drop by 24% from 1994 to 2020 — as opposed to 21% in the base case — a small change. If the carbon cost rose by \$150/tonC, total carbon emissions would drop by 28% (Figure 5).

Figure 5: Carbon Emissions per Ton of Steel for Alternative Costs of Carbon.

This industry will meet the Kyoto target reductions (which we know are inadequate to stabilize the atmosphere) even if there is no climate policy at all.

If that \$150/ton “tax” actually happened, it would raise \$40 billion in revenues from the iron and steel industry over the next 20 years. The way the conversation is carried out, says Matthias, the deal is posed like this: Either we tax you by that much, or you achieve that same emissions reduction over that same period on your own. Industry vastly prefers the second choice, of course.

Similar analyses for other energy-intensive industries (pulp & paper and cement) produce similar results — a fairly stiff carbon tax produces little change from what the trend of carbon emissions would otherwise be. For the pulp & paper industry, whose production is growing rapidly and expected to continue to do so (Figure 6), a carbon tax actually produces an *increase* in gross carbon emissions, because more expensive purchased fuels cause the industry to switch even more to their own wood waste as fuel. (*Net* emissions would be smaller, as long as the wood is sustainably harvested — which it often isn’t. Some companies in this industry make more from selling electricity from their internal power plants than they make from selling paper.)

This industry will not meet the Kyoto targets, even with a very aggressive carbon tax, because of its production growth rate.

Figure 6: Gross Carbon Emissions. Solid lines represent the baseline scenario, dotted lines represent the \$100 per ton carbon increase in the cost of carbon.

Conclusions Matthias drew:

- Physical-thermodynamic measures of energy efficiency can provide consistent indicators and an unambiguous basis for negotiation about the performance of individual industries.
- Dynamic modeling can provide a whole-system perspective and an environment for consensus-building.
- Changes in the cost of energy or carbon affect different industries in different ways.
- Carbon taxes or their equivalent are unlikely to reduce total emissions if total production rates continue to increase.

Another conclusion implicit in his study is that established large basic industries bring enormous momentum to the system. Given their huge installed capacities, even in the middle of rapid market-induced technical change, the physical system and the damage it does to the environment cannot change quickly, except by ceasing production altogether.

(For more information on Matthias’s work, see <http://web.bu.edu/CEES/readmoreMR.html>)

**Day Three, September 12, 1998**  
**Interpreting global change, from India to California to Denmark**

*B2 or not B2, that is the question.*

— William Shakespeare,  
Global Modelling Theatre, 16th Century.

By the third day of our conversation, scenarios A1 and B2 were drifting into new meanings — they were no longer strictly the IPCC scenarios, nor Hartmut's original A and B. Some of us were meaning "rich" when we said A1 and "poor" when we said B2. Others thought A1 meant "very rich and very poor and increasing distance between them," while B2 meant "everyone pretty much equal." Some of us meant by A1 "the future we don't like" and by B2 "the future we like." Listen for all these meanings and more as the presentations go on.

\* \* \*

India is too big a country, said **Somnath Sen**, with too many subcultures to fit into any simple A or B scenarios. To many Indians futurism seems a luxury, anyway, given our present problems. Our Planning Commission does put forth 15-year plans, which are always hopeful — but not if the rain gods fail us.

At any rate, Somnath did a sort of modified Delphi exercise, and did find some clear dominant trends for India as a whole. Population is increasing rapidly but birth rate is falling. The population will soon be 50% urban. There is increasing resource conflict, exacerbated by local and regional interest groups, yet at the same time there is an increasing nationalism and "Indianness." Economic trade and aid links are increasing, there are more TNCs, more small entrepreneurs, a middle class rising in power, and enclaves of the rich. Infrastructure is increasing, forests decreasing, water becoming critical. There is more underemployment and crime, also more consumerism, modernization, technical fixes. Tourism is rising, as are class conflicts, as are both regional consolidation and balkanization.

Perhaps the most important fact about India is its inverted pyramid of wealth and control. Fewer than one percent form the wealthy cream of society, and another 4% the top elite. The whole system works to the benefit of this 5%, and they skew all the indicators. Then come 6-12% in the upper class, 40-50% in the middle class, and 30-40% poor, forgotten, invisible. These economic classes are also interknit, through connections of education, profession, vocation, family, place, and institution.

There is never going to be one India. To do a future scenario, we need to follow at least five Indias:

*Global-industrial India* has 300 million people with average per capita income of \$400-\$450 now but \$3000+ by 2020. Much of the growth will come from selling resources, especially minerals. These people are highly mobile, even internationally. Some have second homes in the UK or US. They are linked into efficient modern infrastructure; they consume a lot of energy; they buy protection and privilege from the government.

*Agro-industrial India* has 200 million people, \$300 per capita income now, rising to \$1000 by 2020. They have moderate mobility and trade connections. They are entrepreneurs and innovators (who have adapted washing machines to mix up commercial quantities of the Indian drink *lassi*, for example) and political brokers. They travel by train and car more than airplane; they are moderate energy consumers. They have a strong identity as Indians.

*Small India* (or B2 India) is 75 million people with \$200 per year, growing to \$500 in 2020. These are people with little mobility or financial exchange, they form pocket economies, often in scenic places, where they serve tourists. They are spiritual people; they are political losers; they consume little energy. They travel by bus, if at all. They identify themselves more as "others" than as Indians.

*Laggard India* consists of 200 million people, many of whom work for or trade with or identify with the agro-industrial group. Per capita income \$100-\$175 now, maybe up to \$225-\$375 in 2020. Subsistence farmers fit here, also employees of small industries. There is a high dependence on government dole, highly inefficient energy use, a dispersed identity.

*Historic India* is disappearing, though it still comprises 250 million people. They make less than \$100 per capita per year now and probably won't be much above that in 2020. They live with nature; they are often exploited; they exchange commodities and labor more than cash; they have almost no infrastructure. Their energy consumption is very low. They have a weakened, fatalistic outlook. They travel by cart or foot. They are written off.

This doesn't fit neatly into an A1-B2 framework, Som said. There are clear elements of both A1 and B2, probably diverging and conflicting with each other as the future unfolds.

How did you build this picture? asked **Alan AtKisson**. Detailed data on present incomes and lifestyles are available for over 400 districts, said Som. Beyond that, we had an "intersubjective dialogue."

Do you like this future? **Dana Meadows** asked. Is it inevitable? What can we do to prevent it? asked **Bishan Singh**.

It's too early to look at what we don't like and what we can do about it, said **Ashok Gadgil**. We have to understand the system and its leverage points and the dynamics unleashed by unbotting forces far bigger than we are.

**Bishan Singh** said, many organizations have B2 worldviews about how development should proceed — the Gandhi Peace Foundation, for example. We should get together to develop and publicize B2 scenarios. Modeling has to be demystified and taken out to the grass roots. Nothing has to be re-invented; sustainability is at the foundation of all great religions.

You can only have A1 anywhere if other places are not A1, mused **Ulrich Loening**. A1 needs a lot of B2 people to hold it up. Inversely a lot of B2 people would lose their livelihood without A1 people to serve or sell to. None of these subgroups can exist alone or be the whole world; they depend on each other.

\* \* \*

California's water economy runs on the storage and slow melt-off of the winter snowpack of the Sierra Nevada mountains, said **Robert Wilkinson**. This is a huge, free natural service, which could be greatly impacted by climate change. The largest single use of energy in California is to move water (thereby exacerbating the trend toward climate change!). Water, climate, and energy are deeply interrelated. The whole issue becomes a great excuse to make changes that we want to make anyway.

California is as large as many countries in both population and economy. Its annual GDP is twice as big as Canada's; over \$1 trillion, of which about 10% is exported. The population of 32 million is 54% white, 28% Hispanic, 10% Asian and 7% black. By the year 2000 it will be the first state with a majority non-white population.

The economy is quite diversified, with tourism the biggest earner, then computers and electronics, entertainment, aerospace, agriculture, environmental technologies (which bring in \$18 billion a year!). As in the United States as a whole, the rich are getting richer and the poor

poorer. From 1978 to 1998 the top 20% saw a 30% increase in income; the bottom 20% saw a 37% decrease.

The expanding economy and population have eliminated 95% of the wetlands in the state and 95% of the wild salmon populations. It is the top state in number of endangered species. The human economy is not only at the limits, it's beyond the limits. Major water sources are not only fully utilized, they are actively declining. The water budget is so stressed that any climate change at all could be disastrous. Energy is substitutable; water isn't.

There is still an unabashed growth mentality in California, though there is also a rising emphasis not only on environment, but on restoration. There are some excellent policies; for example, if you're putting up a new building and you go beyond the energy efficiency code in its design, you go to the head of the line in getting your building permits. California is a leader in appliance and building efficiency standards, in electric cars, and in reducing air emissions.

California is perhaps above all teachable, ready to innovate, because it is so indisputably vulnerable. It wouldn't take much to make Californians aware of how climate change could affect wildfires, floods, infrastructure, or the pest/predator balances in their agricultural fields. A warm rain in August or an unusual freeze could wipe out the wine industry.

If you extrapolate the future of California, you can see horrible pictures, but if you consider the potential for learning and surprise, you can see plenty of room for hope.

California seems the epitome of A1 to the rest of the world, said **Aromar Revi**. What would it take to crash California?

Any strong pattern disruption, Bob answered, especially to the farmers or to the infrastructure (like the highways that hold everything together). Any extreme event for which there would not be time to adapt. But California is highly diversified and that's a strength. It would never collapse all at once. As with India, there are many Californias, and they're not all A1.

\* \* \*

The Europeans are busily putting together an A1 scenario, said **Niels Meyer**, and I'm not optimistic about it.

In particular the EU Commission is pressing for a liberalized electricity market. It is opposed in this by many existing utilities and even some governments. But if you go on proposing something over and over, year after year, sooner or later it begins to look inevitable. People stop thinking about whether it's desirable and they just start preparing for it.

The premise of the EU argument is that electricity should be treated like any other commercial good. There should be no trade barriers. Competition should be free in order to lower consumer price. (That shifts the focus to more efficient production, and takes away pressure for more efficient consumption.) Many countries are already liberalizing — the UK in 1989, Norway in 1991, Sweden in 1994, Finland in 1996. An EU Directive in December 1996 pushed for this trend to continue throughout Europe, but with enough regulation to preserve public service obligations (such as supply security even to the smallest or poorest consumer and environmental safeguards).

However the experience so far has been:

- Concentration of utility ownership. Big utilities buy up small ones. This makes it harder for governments to pursue their policies. For example, Sweden has a policy to phase out nuclear power, but the new private owners of the nuclear power plants have overturned this policy.
- Uncertain price development. Prices have not settled into any pattern except that the largest consumers get the lowest prices.
- Environmental concerns are downgraded in priority. (Conservation and renewable programs in particular.)

A1 and B2 applied to energy policy produce two entirely different paradigms:

	A1	B2
goal function:	profit maximizing economic growth	regional stewardship sustainable development
time horizon:	5-10 years	30-100 years
means and principles:	competition deregulation	cooperation social planning
externalities	not included or only partly included in price	fully internalized

The liberalized market supports A1 and suppresses B2. This is the energy policy of most industrialized countries. Denmark has been the only country in the EU with a B2 energy policy. The official goal of Danish energy policy since 1990 has been to create a sustainable energy system. There are official commitments to reduce CO<sub>2</sub> emissions by 20% by 2005 and 50% by 2030 and to use renewable sources for 12% of the total energy supply by 2005 and 35% by 2030. Windpower is now

1200 MW (7% of electricity) and is scheduled to rise to 1500 MW by 2005 (10% of electricity — this target will be surpassed) and to 5500 MW (40% of demand) by 2030 — 4000 MW of which will be offshore.

These policies are implemented by means of a guarantee to renewables producers (utilities must accept all electricity from wind and biomass producers at a minimum price of 9 cents/kWh) and by a 25% government subsidy for investment in solar heat and biogas and a 35% subsidy for photovoltaics. Government funds R&D programs, including developing the island of Samsø as a demonstration “green island.” Integrated resource planning (IRP) requires utilities to consider all options before adding generating capacity, including conservation). And many utilities are non-profit, often owned as coops by their consumers.

The fear is that all these good policies will die now, if there is forced, Europe-wide electricity liberalization. None of these policies are consistent with free market A1 ideology. There will be a special problem with district heating, which Denmark has a lot of. In order to lower electricity price in a competitive market, district heat providers will try to raise the price of the heat. There can't be a competitive heat market, because customers have no choice; they must live close to their supply.

So Niels has a draft proposal for a new Danish energy law (and a new EU law):

- Authorized distribution companies must be nonprofit and consumer-owned. They would be obligated to meet renewables and conservation quotas. They could earn “green certificates” (which they could sell) by exceeding those quotas.
- Existing power plants that have been financed by consumers could not be sold. All existing plants would be obliged to supply electricity to utilities at production cost.
- New power plants must give priority to renewables and cogeneration.
- Increased electricity taxes, support for efficient technologies, and norms for efficiency standards and labeling of appliances are needed.

There are problems in figuring out a green electricity policy. How to promote new technologies without micromanagement from above? How to protect small consumers? How to avoid cycles and “sunk costs” in old technologies, as new technologies appear? How to prevent windpower from sweeping the market and stopping the progress of biomass and PV?

How to keep demand-side management (conservation) as a competitive option, when markets actively reward more sales, not less?

Energy is *not* like any other commercial good, Niels summarized. The Danish model won't survive unless an increasing number of other European member states switch from an A1 to a B2 viewpoint. How could that happen? A social or environmental collapse would probably do the trick. Alternatively, a few countries could revolt against the EU (and WTO) and refuse to join unless the B2 paradigm is recognized and protected. It should be easy to convince any civilized and enlightened population to go that direction.

Paul Krugman and other influential economists are beginning to realize that the free movement of capital is dangerous and contradictory to the theory of comparative advantage, said Niels. But this idea has to take *political* form, based on pressure from below.

This liberalization wave is coming to Latin America too, said **Gilberto Gallopin**. And the Swedes are also in a debate. They feel their impact is so low that their only effect can be within a global negotiation. They should join Denmark and others to form an alliance and create a new comparative advantage for green technology.

In the short term pioneers pay higher costs, said Niels, but in the long run they always benefit.

Some NGOs are starting their own utilities, said **Michael Hanssler**. They sell electricity from green sources only, at 15% above market price.

That's good, but I worry about what is called green, Niels answered. And why should we pay *more* for the least harmful options? I'm afraid the market will turn green into a green veneer.

Half the capacity of the Netherlands comes from the generators of big industries now, **Bert de Vries** added. Companies build co-generators for industrial heat and make money by selling electricity to the grid. The green electricity market is not working at all — windpower collapsed after they took away the subsidies. There's been a lot of nice green noise, but nothing is happening.

The Third World could have an advantage here, said **Jelal Ezzine**, if we could jump directly into B2 instead of A1. How can we learn from the pioneers? How can we get the state of the art technologies at a fair price?

I love all this starry-eyed Scandinavian idealism, said **Jeff Sayer**, but I'm worried that it will just render you uncompetitive. I'm glad to see hope, and especially

that the economists are changing their views. Malaysia is also trying another path just now too. How can we encourage more experiments, rather than punish them?

The LDCs tried in the 70s and 80s to argue for a New Industrial Economic Order, to make globalization more civilized, said **Vladimir Kollantai**. The developed countries sabotaged it and built a system to concentrate financial resources and technologies in their own hands. It sucks money out of communities all the time. That fight was over a decade ago.

It is a pretty small accommodation, said Niels, if I box with Mohammed Ali, that we both have to box with the same rules.

There was obviously much excitement about the topic of electricity deregulation, so an afternoon workshop was created — see later in this *Bulletin*.

\* \* \*

Where are we now? **Bert de Vries** asked. We don't understand the complex dynamics that determine the demand for steel. We don't understand what creates or changes lifestyles. Total annual energy use in the Netherlands is  $60 \times 10^9$  kWh. In the US *new* torchier lights and waterbeds have just increased annual energy use by  $30 \times 10^9$  kWh. *The whole IPCC argument hangs on the simplistic assumption of increasing \$ growth and an assumed relationship between \$ growth and energy use.*

But this isn't a *law*, said **Ashok Gadgil**, it's a *choice*. A consequence of policy and activism.

Do the IPCC scenarios take into account other benefits of CO<sub>2</sub> reduction beside greenhouse gas abatement? asked **Tony Cortese**.

Scenario development has to be done by and communicated to activists, said **Jillian Martin-Mehers**. The IPCC aims only at decisionmakers.

Furthermore its scenarios are ahistorical, **Tom Kelly** added. Human purpose and the "power of one" are only revealed when you go down in resolution. The whole IPCC discussion is taking place at the wrong scale.

A lot of this apparent growth in GDP is coming just because household activities are being incorporated from the informal sector into the GDP, **Janos Hrabovszky** observed. It shows increased commercialization, not real growth.

Economics is appealing because it's simple, **Matthias Ruth** added. But it's free of history, geography, society, values, choices — people.

It's not enough simply to move your fingers closer and see at a wider angle, said **Tamas Fleischer**. We have to look from a *different place*.

And we have to look at the dual standards by which the rules are applied, added **Carlos Quesada**. The growing confrontation between the powerful and the nonpowerful could blow up all the decisions of the decisionmakers.

We're falling into the A1 trap, **Aromar Revi** cautioned. We have to break out of the IPCC process completely. If we do B2, we can't take on the A1 assumptions and look only macro, average, and simplistic. We have to work in context, in history, and with diversity.

It's clear that this group is in total revolt against the IPCC scenarios, said **Dana Meadows**. If we're going to make any comment as a group about them, we can't just make minor additions and corrections. We need to make a thorough list of our paradigmatic problems with the scenarios. Let's make this a paradigm-cracking exercise.

I have five theses to offer, said **Alan AtKisson**:

- The Balaton Group was created out of a sense that global trends are dangerous.
- History is validating that sense.
- The power structures are in denial.
- There are strong campaigns to suppress general awareness of the problems.
- So change is unlikely to come in time.

If these theses are true, said Alan, the strategy should be more to plant and nurture seeds of change in the populace than to confront the power structures directly. In other words, to quote the innovation-diffusion game, don't waste your time with reactionaries.

#### **Day Four, September 13, 1998** **Interpreting global change, from Russia to China to Africa**

*History doesn't repeat itself. But it rhymes.*  
— attributed to Mark Twain

Extrapolation is not a useful exercise for looking at the future of Russia, said **Vladimir Kollontai**. Most trends are going in the wrong direction. Population is decreasing. Production is decreasing. Russia is probably the most unpredictable area in the world. We lurched too strongly into A1 and outward trade. But very

recent events (some happening during the Balaton meeting) give a ray of hope.

We should begin by understanding that Russia has been for more than three centuries living in a mixture of traditional B2 with a transplanted overlay of A1. Russia is a vast area with a severe climate, which has furthered a national character of endurance, stubbornness, and survival. It has been a frontier, with no particular need for social compromise as there would be in a more densely populated place. There has always been extremism, lurching from one experiment to another. Russia is so big, with such momentum, that it's very hard to change. Change, when it has come, has come mainly through smashing.

The Russian society developed always under strong central power, with few limits on that power. There wasn't so much difference between the Czars and the Politburo. Modernization came as transplants from outside (culture from France, technology from England and America), but the Russians remolded all transplants their own way. The main transplant was bureaucracy, which the people saw as foreign, oppressive, to be resisted and foiled. Therefore there is little respect for the rule of law and an interesting distinction in the Russian mind between what is legal and what is legitimate.

A1 and B2 exist side by side throughout the land, A1 trying to modernize, B2 clinging to old truths and habits. They lend themselves naturally to a formal and an informal economic sector, far apart in productivity, technology, and mindset.

The Soviet era brought highly progressive ideals (never realized), which did have and still have the support of the population.

The Russian population is dropping in some years by as many as 1 million people. That will set up a labor shortage in 20-30 years — for the moment it is compensated by abandoning obsolete productive capacity and by an influx of refugees, Russians returning from former USSR states. In the future there will probably be vast immigration from China, Korea, Mongolia.

The old Soviet regulatory mechanism has now been smashed and nothing has been put in its place. There is no effective law enforcement, hence an outbreak of crime. No planned or regulated economy, hence black markets and mafia. The old specialized economy, in which different units sent products to each other with no intervening market, is gone, and there's a longing for some kind of hierarchy to restore it. The people have to learn that freedom does not work without responsibility. (Freedom is loudly shouted, responsibility is still under the table.) They are like a submarine crew that has been suddenly put in a jet plane. They are learning

fast; now many people understand the market, and they don't especially like it.

The Soviet system paid people half of what they need, so they moonlighted. They learned to keep a part of themselves for themselves, not for society. The military was organized and privileged; it had lucrative contracts with industry. When these disappeared, industry went on building weapons and selling them wherever they can. This is a grave danger. Atomic weapons are dispersed throughout the country probably in one-fourth of the regions.

The fundamental driver of the market, the purchasing power of the people, has been ignored — indeed the IMF took what was left of it away. So entrepreneurs can only make money by selling abroad.

There are no reliable statistics. The first person to be arrested under the new anti-corruption laws was the head of the statistical office.

The resource base, which was always used inefficiently, is now crumbling. Mines, often in uninhabitable areas, are deteriorating and people leaving. Those areas will be needed some day, but we're losing them, said Vladimir.

Manufacturing will always be uncompetitive because of large heating and transport requirements (balanced at the moment by low wages). We're pumping out all the raw resources we can, Vladimir said. If Russia has any economic future, it has to be in our well-educated people, in high technology.

The environment has a low priority at the moment. Pollution control mechanisms were the first part of the economy to fall apart. So now wherever production increases, pollution increases. There are forest fires in Siberia, the Caspian Sea is dropping and being polluted by oil production, so that's the end of the caviar. The shadow economy is lawless about environmental regulations as it is about everything else. Environmentally sound technologies are more expensive, so forget them. TNCs are consciously selling old, dirty equipment, forbidden elsewhere, to Russia.

All people are flocking in with money and paradigms. Someone needs to make a serious case for a modernized B2. Russians do not want to go back to being peasants. They want to make a decent living. They are educated and cultured and full of B2 values, but they're understandably untrusting. The "Tolstoy communes" that sprang up in Russia's "back to the land" movement of the 19th century, were flops. If you come in with B2, you have to have a better plan than that.

Will Russian gas continue to be exported? asked

**Bert de Vries.**

No problem! answered Vladimir. GAZPROM is the only remaining working monopoly.

Two generations of Russians were raised to expect their basic needs to be met by the state as their right, **Gilberto Gallopin** pointed out. What kind of system can arise out of that mentality?

A big question mark, especially after one more generation, said Vladimir. Now we have ads for nonbasic needs all over the media — Pampers, chewing gum. We could imagine several scenarios for Russia, mostly dependent on what comes from outside. It could be brutal. The population has its back to the wall. Society could degrade. On the other hand, there's a self-awareness, a philosophical ability to distance ourselves from our own dilemma. There has been a wonderful discussion going on for about 20 years about our real values. That discussion just isn't getting out.

Tradition and values could be the key to a B2 revival, said **Dennis Meadows**. After all, the Tolstoy communes lasted longer than the Soviet state did.

\* \* \*

The World Bank has systematically underestimated the growth of China, said **Qi Wenhui**, but now it is probably overestimating it.

In 1995 China's GDP was twice what the World Bank had projected in 1985. China is now the world's #1 producer of coal, cement, cotton cloth, television sets, grain, and meat. It is #2 in chemical fertilizers and #3 in steel, sugar and electricity. Consequently the World Bank predicts that:

- China's population will reach 1.5 billion by 2020 and peak in 2050 at 1.6 billion. (Between 1995 and 2020, China will grow by about the same number of people as the present total population of the United States!).
- China's GNP is projected to grow from 0.3 trillion US\$ in 1990 to 17.1 trillion US\$ in 2040 (a multiplication by a factor of 50!). Per capita income will rise from \$300 to \$11,000 over that 50-year period. China's economy by 2040 will be fully modern, industrial, and market-based.
- China's energy demand in 2020 is expected to be 2.4 billion tons of coal, 0.43 billion tons of oil (0.16 imported), and 143 billion cubic meters of natural gas (42 imported).

Wenhu does not take this forecast at all seriously. It ignores the increasing stress on natural resources, not only domestic, but also international. China considers food security a top priority, which means it has to try to feed 20% of the world's people on only 7% of the world's cultivable land (and the 20% is rising while the 7% is falling). Water is an especially critical issue, probably the most constraining resource.

China has to think through the implications of an aging population and of an economy that suddenly goes from scarcity to surplus of consumer goods — which means China has to find reliable markets. The environment is deteriorating, and there is increasing awareness of that. Links with the rest of the world are increasing, especially trade. That can be a good thing in helping China cope with the obvious problems ahead.

Like the other countries we have looked at here, China is currently a mixture of A1 and B2, Wenhu said. The discrepancies between these two Chinas are widening. Perhaps parts of the traditional culture and values will recover and combine with similar values coming from the West to move China toward B2. We have a long tradition of saving, not wasting. We are not materialistic; we are being driven toward materialism by the West.

The Chinese are the “farmers of 40 centuries,” **Bob Wilkinson** said. There is such a tradition of sustainability, we could learn so much from it. But this one century could wipe all that wisdom out. It's very frightening.

Traditional agriculture in China is sustainable, but modern agriculture definitely is not, Wenhu answered. It makes no sense; we have enough labor to continue traditional agriculture. The government has a policy of no net loss of arable land, but it is not really enforced. Chinese scientists are concerned about climate change; the government isn't. Farmers typically, from long habit, have two years' worth of grain stored at any time, without the knowledge of the government.

I have worked in China for the past four years, said **Bishan Singh**. There is a strong culture of recycling; I never saw its equal anywhere else. But China is playing to the A1 gallery and destroying decades of social investment. The First Cultural Revolution was bad, this second one is worse. Capitalism is changing all thinking. Rural areas have gone from communes to enterprises, the land is now three times more productive, but these gains cannot last. The B2 scenario has only one hope in the world, and that's China. We have to support them morally and culturally not to lose their traditional wisdom.

If we keep our distance from the rest of the world, said Wenhu, we can keep our culture.

\* \* \*

Africa as seen by official world agencies is very different from Africa as seen by Africans, said **Joan du Toit**. There's not much resolution to the global, official view:

- average life expectancy: 54 years
- total fertility: 5.3 children/woman
- infant mortality rate: 86/1000 live births
- crude death rate: 13/1000 people
- percent rural: 65
- percent under 15 years of age: 43
- autos per capita: 0.02
- televisions per capita: 0.04
- population: 778 million, growing at 2.5% per year
- GDP per capita: \$639 and declining

Per capita food and energy consumption are also declining, though the energy part is hard to measure, because perhaps 70% of energy use is in the form of unmarketed traditional fuels. As a result forests are disappearing rapidly — down 3.5% just from 1990 to 1995. Only about a third of the original forest remains. Carbon dioxide emissions are slightly over 1 ton per person per year, not counting fuelwood. Withdrawals for agriculture constitute 88% of water use, but only 6% of cropland is under irrigation.

The axes used to make the IPCC matrix don't seem relevant to Africa, Joan said. African planning exercises always use these axes:

		governance	
		stable	unstable
economic growth	rapid		
	negative		

The rapid-growth, stable-government quadrant is considered the only possibility for sustainable development. The environment is usually a low priority. Consider, for example, the IMF/World Bank directives for the development world:

1. Establish the foundation of law.
2. Maintain a non-distortionary policy environment, with macro-economic stability.

3. Invest in basic social services and infrastructure.
4. Protect the vulnerable.
5. Protect the environment.

And South Africa’s new energy policy:

*Whilst the long-term ecological sustainability of the energy sector is desirable, government’s current view is that the immediate priority is to address those environmental problems which affect the living conditions of millions of people on a daily basis. Amelioration of these conditions is seen as the first step on the path to achieving a more harmonious balance between society and the environment.*

To illustrate one extremely influential use of the “African matrix,” the Mont Fleur scenarios (named for the meeting place where they were worked out) had a great deal to do with preparing the minds of leaders — including recalcitrant leaders — for the transformational change South Africa has now undergone. One thing that undoubtedly helped make the Mont Fleur scenarios memorable was their names. (See matrix below.)

(What does South Africa actually have now? Joan mused. Maybe lame flamingoes. Everything envisioned and promised hasn’t been realized, and people are frustrated. Perhaps a B2 scenario could be called guinea fowl — indigenous, not beautiful, but useful and well adapted.)

All of Africa needs a flight of flamingoes, said Joan. It is locked into poverty in spite of rich resources. Over 130% of the continent’s annual GDP is required just to service its existing debt (which is, obviously, not being serviced). By 2005 every third person in Africa will be food insecure. Health problems are rising, especially malaria, tuberculosis, and AIDS. Sub-Saharan Africa has an estimated 21 million people living with HIV, 68

percent of the world’s total, 7.4 percent of the adult population. AIDS has reduced average life expectancy in Burkina Faso by 11 years, in Zimbabwe by 22 years.

To be more sustainable, Africa needs:

- Increased awareness of the plight of the poor. Tony Blair calls for joint efforts to stop the resurgence of malaria. Nelson Mandela declares the next century the age of the once duntrodden. Increased awareness can lead to more direct investment in urgently necessary social and natural capital.
- The concept of an African Renaissance. Self-reliant people set their own development agenda, cooperate regionally, (maybe show the rest of the world the way to B2!)
- Regional energy cooperation. Africa has abundant energy resources, especially in renewables. What is mainly needed is capital and technical skills. Solving energy problems means greatly increased economic productivity, not only directly but also indirectly, for example in releasing all the time women spend gathering fuel.
- Eco-tourism could create jobs while also giving real value to the environment and providing funds for environmental protection.

**Tom Odhiambo Ojienda** added to Joan’s plea to destroy the “myth of no hope” for Africa. Each traditional tribe had practices and beliefs and deep knowledge about the management of local resources. They had no concept of dividing or titling land or other resources. It wasn’t until their traditional schemes collapsed that people were thrown into poverty — poverty now reinforced by the IMF and World Bank. Let Africans go back to basics, reclaim their traditional under-

		political outcome	
		no acceptable settlement	acceptable settlement
rapid development			<b>FLIGHT OF FLAMINGOES</b> (flamingoes fly strongly and all in a group) inclusive democracy and growth
stagnation		<b>LAME DUCK</b> incapacitated government	
collapse	<b>OSTRICH</b> (head in sand) non-representative government		<b>ICARUS</b> (crashing and burning) macro-economic populism

standing. Look at Africa in terms of rejuvenation; don't write us off.

Can old mindsets be reclaimed? asked **Vicki Robin**, or are they irreversibly warped? Is any sort of backward direction possible, culturally, or are there only choices of totally new ways forward?

India had the same disastrous changes in land tenure, said **Ashok Gadgil**, with the same disastrous results. But I wonder if we can go back. I don't see any way to provide for 1 billion Indians without some sort of industrial economy. That requires some sort of A1 thinking.

I wonder too, said **Bob Wilkinson**. Notice that we ourselves in this very conversation are taking GDP and World Bank numbers seriously, even though we know that 3/4 of the energy use isn't even shown on the charts. The Africa Tom is talking about is there and rich and full; it looks irreversibly lost to us only because we can't see it.

**Day Five, September 14, 1998**  
**Change in practice**

*A1 is a sauce.*  
*B2 is a vitamin.*

— **Wim Hafkamp**

**Dennis Meadows** had us tear corners off pieces of paper in order to demonstrate the kind of chaos that emerges when you can't ask questions, when you have no sense of where you're going, and when you believe all the expertise is up at the front of the room.

Inspired by the Mont Fleur scenario names, we brainstormed names for A1 and B2.

A1  
the aggressive eagle  
Blade Runner  
more bigger faster  
to have  
isolated individual  
tiger  
market future  
Tyrannosaurus Rex  
competition  
materialistic  
Viagra  
achieving  
Titanic  
more stuff  
the impossible dream

B2  
the wise owl  
Ecotopia  
enough for everyone  
to be - 2B - two bee  
community  
lion  
value future  
emerging mammals  
cooperation  
humanistic  
hugs  
being  
Kon Tiki  
more love  
the future to be (2B)

What do you love about A1? we asked ourselves and answered: Air travel, laptops, big bookstores, email, compact disks, high pay for engineers, being a member of the privileged class, chocolate and other exotic foods, interest on investments, charitable foundations, the Balaton Group, racing cars, dirt bikes. (Are any of these consistent with 2B?)

What do you love about 2B? — Making music yourself, food without poison, riding a bicycle (downhill, someone added), poems, wild places, friends and community, the Balaton Group, quiet, bird song, sharing, cities without cars, biodiversity, security, chances for sophisticated engineering, peace. (Are any of these inconsistent with A1?)

What do you hate about each? (Do this exercise for yourself!)

\* \* \*

Our group in India does a lot of scenario construction for our living, said **Aromar Revi**. We have an analytical frame behind that work, drawn from a lot of ideas familiar to the Balaton Group, such as:

- the idea of accessible and impossible trajectories,
- the **de Vries** three-fold hierarchy, **Daly** pyramid, etc. Recognition of natural systems as fundamental life-support, translated through human-designed physical structures, guided by human thinking and paradigms, to ultimate human purposes,
- the **Bossel** viability criteria and “orientor stars,” the idea of a system having to respond to multiple outside challenges through numerous inner system properties; the idea of multiple dimensions to describe the welfare of a system; the idea of the Liebig law of the minimum,
- the recursive nature of systems and Ashby’s law of requisite variety,
- **Thompson’s** cultural theory (the different worldviews of individualists, hierarchists, egalitarians, fatalists, and hermits, and Bert’s additional concept of utopias and dystopias, as seen from these different viewpoints,
- the **Biesiot** criterion that a system’s response time must be considerably faster than the respite time (which is the time available for effective action before the system is in some way irretrievably endangered).

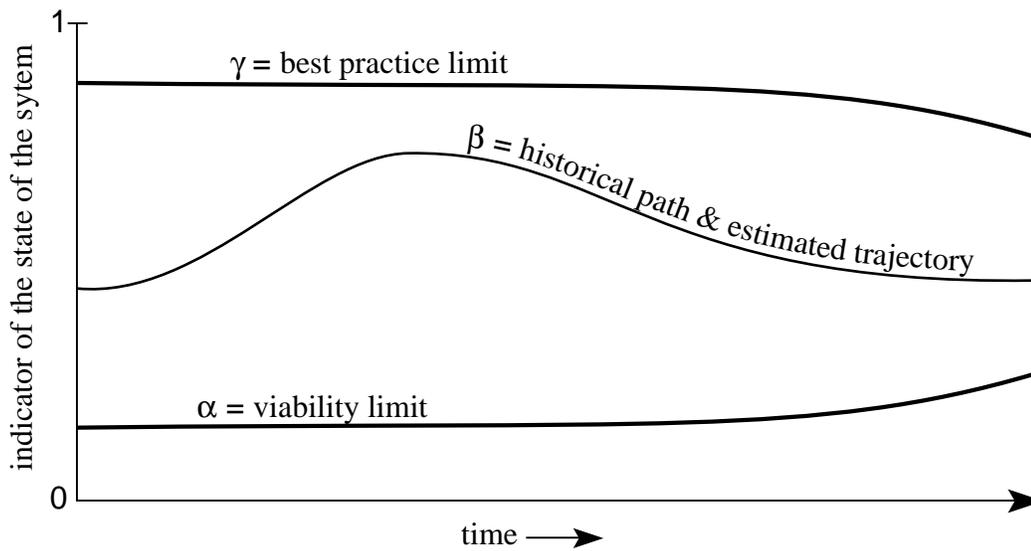
- the concept of limits à la **Meadows**, which can be combined with the idea of accessible trajectories to define sustainability, development, best practice, and risk all in one. (See Figure 7)

At this point time began running out, Aro started talking faster, and all the ideas were brought together into a Grand Synthesis that your faithful Balaton note-

taker could not follow. It had something to do with **Biesiot-Bayes** criteria for sustainable development in a **Gallopín-limits** framework with **Bossel-Thompson** representation. It was probably very profound. We all hope Aro will take the time to *write it out*, so we can study and digest it thoroughly. We promise to put out a special issue of the *Bulletin* whenever he does this.

\* \* \*

Figure 7: Possibility Frontier(s)



At time = t ...	efficiency ratio <sub>t</sub> = $\beta_t/\gamma_t$	... as it approaches...	1	the result is ...	Best Practice
	potential ratio <sub>t</sub> = $\gamma_t/1$		1		Development
	possibility bandwidth <sub>t</sub> = $\gamma_t - \alpha_t$		0		No Choices
	risk ratio <sub>t</sub> = $\alpha_t/\beta_t$		1		Unsustainability

**Gillian Martin Mehers** started with the question: what qualities of leadership are needed to get to 2B?

She described the basis of her question, the Rockefeller Foundation's LEAD program, which was started in 1992 and now operates in 12 countries and regions. Its purpose is to identify, encourage, and create leadership for sustainable development. After six years the program has just become independent and is redefining itself. Gillian is the new director for training, so she meant her question quite literally. She also demonstrated one special and unusual form of leadership, by just asking questions and letting the group answer them for itself.

What does a leader need? We answered:

empathy  
commitment  
charisma  
integrity  
sense of humor  
a laptop computer (this brought a laugh, because the LEAD program does supply a laptop!)  
reliability  
service  
the ability to empower others  
humility  
creativity  
self-sacrifice  
information  
wisdom  
the ability to listen  
vision  
risk-taking  
accountability  
transparency  
systems thinking  
the ability to work hard  
an ethical and moral foundation  
persistence  
good communications skills  
intuition  
energy (solar powered of course)  
a sense of justice  
flexibility

Are any of these characteristics more essential for an A1 type of leader or a 2B type of leader?

How can we enhance these qualities in people?

I find it deeply distressing, said **Alan AtKisson**, that we even have to think about training programs for things like integrity. That speaks to a big cultural breakdown.

In Asia we've found that special training programs destroy people as leaders, said **Bishan Singh**. It makes them feel superior.

Ariyaratne, the Gandhian leader in Sri Lanka, used to say you could always tell in a village who is the real leader, said **Dana Meadows**. It's not those who speak first or loudest or most often. They are just the most anxious. It's the one who speaks last and quietly and speaks truly for the whole group.

**Hartmut Bossel** suggested that a 2B culture will not need to do leadership training. The need to train leaders comes from the faults of the A1 culture.

(Clearly we were not helping Gillian very much! How about suggesting that what leaders need is what the Balaton Group gives — interconnection, networking, and mutual support?)

In 2B people would graciously and easily change roles, said **Tony Cortese**, from leading to following and back again.

It's easier to train managers than leaders, said **Gilberto Gallopin**.

What you learn implicitly, if not explicitly, in management school, said **Jeff Sayer**, is: you do it this way because you get higher returns this way, but if you can get higher returns some other way, forget this way.

That's a profound violation of the spirit, said **Will Keepin**.

All these objections are the very reasons why LEAD is shifting its entire methodology, said Gillian. We are very open to new ideas. We are listening to a lot of people. In the program as currently structured, people stay in their jobs, but they come to training sessions for 80 days, in 2-week intervals, over 2 years. At the end of that time they get a laptop and an email network so they can stay in touch with each other. There is a project fund for "graduated" fellows to draw upon — they also contribute to future trainings. But all this is being rethought. Thanks for your help.

\* \* \*

*It doesn't interest me what you do for a living.  
 I want to know what you ache for,  
 and if you dare to dream of meeting your heart's longing.  
 It doesn't interest me how old you are,  
 I want to know if you will risk looking like a fool for love,  
 for your dreams, for the adventure of being alive.  
 It doesn't interest me what planets are squaring your moon.  
 I want to know if you have touched the center of your own sorrow,  
 if you have been opened by life's betrayals or  
 have become shriveled and closed from fear of further pain.  
 I want to know if you can sit with pain, mine or your own,  
 without moving to hide it or fade it or fix it.  
 I want to know if you can be with joy, mine and your own;  
 if you can dance with wildness and let the ecstasy fill you  
 to the tips of your fingers and toes without cautioning us to be careful,  
 to be realistic, or to remember the limitations of being human.  
 It doesn't interest me if the story you're telling me is true.  
 I want to know if you can be faithful and therefore trustworthy.  
 I want to know if you can see beauty, even when it is not pretty every day  
 and if you can source your life from God's presence.  
 I want to know if you can live with failure, yours and mine,  
 and still stand on the edge of a lake and shout to the silver of the full moon, "Yes!"  
 It doesn't interest me to know where you live or how much money you have.  
 I want to know if you can get up after the night of grief and despair,  
 weary and bruised to the bone, and do what needs to be done for the children.  
 It doesn't interest me where or what or with whom you have studied.  
 I want to know what sustains you from the inside when all else falls away.  
 I want to know if you can be alone with yourself,  
 and if you truly like the company you keep in the empty moments.*

—Oriah Mountain Dreamer,  
 Indian Elder

As **Will Keepin** read this, we became very quiet, drinking in the truth of it.

Everyone in this room has responded to a Call, Will said, a Call to work on sustainability. It took courage for each of us, a leap of faith. Think of it — though we often walk around fearing that no one will respond to that Call, our own deepest experience is of someone — ourselves — saying yes! to it. Turn to your neighbor for a minute, and each of you share what were the key turning points that brought you to this work.

My own story started out in physics, Will said, which then turned to an impassioned advocacy for solar energy. I spent years pushing the World Bank and the IMF, and finally began to get somewhere. Then I saw that the nice PV panels we installed were being used to link the most rural, remote areas to MTV! (It never would have happened with nuclear power and long lines — it would have been too expensive!) I saw how that kind of programming could devastate cultures, especially young people. They have no defense against the onslaught of Western consumerism.

Then I saw that in the absence of larger changes, even solar power can serve an A1 agenda. So I decided

to work on the larger changes, which took me way beyond physics and technology — or maybe not so far beyond.

I ask you to entertain the possibility that there is no fundamental contradiction between scientific and spiritual worldviews, said Will. You don't have to believe that, just open yourself to entertain the possibility.

From many areas of science, from Prigogine and chaos theory and quantum physics and the logic of self-ordering systems, there has emerged the belief that behind what we can observe are elegant invisible patterns. David Bohm, a physicist at Princeton, a colleague of Einstein, called this underlying pattern the "holomovement." He pictured it as a single, unified wholeness in ever-flowing movement, and he regarded it as the basic nature of reality.

Picture two cylinders, one inside the other, with a viscous liquid between them. Start turning the inner cylinder, while holding the outer one still, and put a drop of ink in the liquid. As the cylinder spins, the ink drop disappears. But if you then turn the inner cylinder in the reverse direction, it gradually reappears. The order in the ink drop was not actually destroyed, it was

just made implicate. Turning the cylinder back made it explicate again.

It's easy to miss these implicate, subtle patterns. Chaos theory is the best example; it looks un-ordered, but the order is just on a different level from the one we expect. The explicate order is the space-time universe we can sense — like waves on the ocean. The implicate order is like the ocean that puts forth and re-absorbs the waves. It is beyond space and time, present everywhere, visible nowhere, not directly measurable or testable (but neither is quantum theory). Matter and energy are explicate, *meaning* is implicate. The evolution of consciousness in the universe is the unfolding of *meaning*.

Will showed classic pictures of the beautiful Mandelbrot set, the mathematically generated (equation implicate) fractal universe where each descending level of magnification of the pattern (pattern explicate) still contains the fullness of every level above it. Modern science discovers the ancient wisdom of the Vedas: "As above, so below. As within, so without."

Could it be so with US?

Imagine YOURSELF, embedded within the cosmos. As you explore within your own nature, you begin to see yourself being sourced by an implicate order, maybe something like the Mandelbrot equation — and everything else sourced that way too. We are all one with each other and with the process that gives rise to the whole cosmos. People have been seeing this for thousands of years. It is the Hindu equivalent of enlightenment equaling *atman* (the individual) equaling *brahman* (the cosmos). It is Zen master Dogen's remark, "We study the self to forget the self. We become one with the ten thousand things." It is Indra's web, in which reality is a lattice of jewels, each reflecting all the others. It is the dictum of Tantra: if you come to know the truth of the human body, you come to know the truth of the cosmos.

What does any of this have to do with sustainability?

It says that when we tap the universal in ourselves, we tap something that can impact the world. We tap the source. We become the leaf that can heal the tree. Martin Luther King, following Gandhi, laid out four steps for total revolution. Document the injustice. Negotiate fairly with the powers. Purify yourself with inner work. Take direct action.

Too often we omit that third step, the purification of our intention. It looks too much like doing nothing. But it actually causes us to work in total clarity about what we're serving and what our motivation is.

To spell it out in more detail, here are 13 principles of spiritual activism compiled by Will Keepin and Jed Swift for the Shavano Institute:

- 1. Transformation of motivation from anger, fear, despair to compassion, love, purpose.** This is not to deny the noble emotion of appropriate anger. Rather it entails a subtle shift from fighting against evil to working for love. The long-term results are very different, though the outer activities may be virtually identical.
- 2. Non-attachment to outcome.** This is difficult, but if we are attached to the results of our work, we rise and fall with our short-term successes and failures. That is a path to burnout. Our work has intrinsic value far beyond the perceivable concrete results.
- 3. Unification of means and ends.** Integrity in means cultivates integrity in the fruits of one's work. A noble goal cannot be achieved using ignoble means.
- 4. Integrity as protection.** If your work has integrity, you can deal with negative energy from others by becoming "transparent" to it, allowing it to pass through you with no effect. This is a consciousness practice that might be called "psychic aikido."
- 5. Don't demonize your adversaries.** It makes them defensive and less receptive to your views. Move from arrogance to inquiry. Challenge your own views. People respond to arrogance with their own arrogance, creating rigid polarizations.
- 6. Find your own unique calling.** "It is better to tread your own path, however humbly, than that of another, however successfully." (Bhagavad Gita)
- 7. Have compassion for your enemy.** This does not mean indulging falsehood or corruption. It means moving from "us/them" consciousness to "we" consciousness, from separation to cooperation, recognizing that we humans are far more alike than we are different. Be hard on issues, soft on people. As you struggle with your adversaries, pray for their souls.
- 8. Your work is for the world, not for you.** The full harvest of your work may not take place in your lifetime, yet you are sowing seeds in the implicate order. Be fulfilled by your gratitude in being called to do this work, and by the opportunity to do it with as much compassion, authenticity, and forgiveness as you can muster.

**9. Selfless service is a myth.** In serving others, we serve our true selves. Service work is enlightened self interest, because it cultivates an expanded sense of self.

**10. Do not insulate yourself from the pain of the world.** Let your heart break open and learn to move in the world with a broken heart. Gibran says, “Your pain is the medicine by which the physician within heals thyself.” When we allow our hearts to break, the world can enter and genuine transformation can begin.

**11. What you attend to, you become.** You become that upon which you focus your attention and actions. If you constantly engage in battle, you become embattled. If you constantly give love, you become love.

**12. Have faith; let go of figuring it all out.** Who could have predicted the crumbling of the Berlin Wall? Faith is trust in the intrinsic benevolence of the cosmos. Be open to the possibility of total transformation of what you think is most stuck. Let go of that stuckness, don’t carry it around with you.

**13. Love creates the form.** Not the other way around. The work of the heart overcomes obstacles in ways unthinkable to the mind. Let your heart’s love infuse your work, and you cannot fail, though your dreams may take forms different from what you imagine.

Be careful, said **Niels Meyer**, about misusing your authority as a physicist. By definition Bohm’s theory is unprovable. Quantum theory is not unprovable.

I want to add the Shadow, said **Alan AtKisson**. The best leaders are fully aware of their Shadow sides. I want to put Shadows into 2B.

I have been practicing yoga for 30 years, said **Bishan Singh**. I have learned that experiencing the whole is the same as experiencing yourself. I experience the Balaton Group as a wonderful mixture of friendship, overflowing creative ideas, sharing, love, and criticism.

The further you go toward science, said **Hermann Knoflacher**, the farther you go away from life.

It’s also a problem, added **Ashok Gadgil**, to give the authority of religion to science.

\* \* \*

Some final (insofar as anything in the Balaton Group is final) observations from members of the group about the week:

A1 and 2B are not worlds or destinations or goals, they are paths, journeys. I’ll take home a renewed conviction to talk more about processes than about end states.

Can one region or nation pursue 2B on its own? The system is a global one. I take Will’s point about creating a new meaning in one place and having it impact every place in the implicate order, but I think we should also put more emphasis on international relations!

Having watched Chirapol’s films about energy efficiency, I’m going to make more of a personal effort to “divide by two!”

I’m beginning to question the whole scenarios approach. I keep wanting to factor in diversity, quality, feedback.

I work with many scientists trying to institute 2B at the level of \$250-\$400 million a year. The work is basically failing at the local level, because the prevailing global system is going so strongly in another direction. But that much money suggests that some power brokers *like* 2B, even though they might not like it for *themselves*. This meeting will have a strong impact on a speech I’m about to make.

In many ways these scenarios are the standard North/South debate. In this meeting I see the beginnings of a global citizenship, an integrated approach instead of a polarized one. Everyone here shares a common vision of collective stewardship, responsibility for our own resource use, the need for social justice and economic equity, a sense of spirituality and connectedness between people and nature, a respect for diversity and for freedom of thought and action. Are we not 2B people? From so many parts of the world? If there are so many of us, all educated and articulate and in a position to be heard, 2B can’t be impossible.

I’m bothered by the idea of either/or. I’m thinking there will probably be some mixture of A1 and 2B for a long time to come.

I’m always surprised at how the thinking at Balaton meetings does come together. This is the first meeting where we’ve actually tried to produce a concerted outcome. I think we’ve produced more than that outcome.

I am full of inspiration and confusion. I have never before been with such an interesting group of people for such a long period. I am inspired by many ideas, from ecovillages to 2B paths to the future. I also see

how important it is to *communicate* the results of models.

I have a saying: There may be lots wrong with human nature, but we don't have to make social institutions that bring out the worst in us. The Balaton Group somehow manages to be an institution that brings out the best in us, and I'm not sure anyone knows how that happens.

The relaxed atmosphere here was very striking to me. It was a sharing, not a pushing of ideas. There was time for dialogue and reflection; the meeting was not overdetermined, overscheduled. I'll use insights about this in planning my future meetings.

I've been carrying around some passionate questions. Can people in the developing countries skip right past the pitfalls of overconsumption? Will the voluntary simplicity movement develop a social agenda? Now I see that the social agenda pops right out of the voluntary simplicity agenda — they need each other!

I see, especially from the presentations of Vicki and Will, how I carry the future around in me all the time — not only my future, or my institute's future, or my farm's future, but the world's future. I can easily carry around a future based in fear and cynicism and hopelessness — and that makes a very frightening scenario! — or a future based on real belief in the benevolent unfolding of an implicate meaning for the whole system, a meaning I try to listen to and serve. The A1 scenario as we've described it here brings up all my fear and cynicism and resentment of the power-wielders of the world. I

kind of *want* them all to crash. I think it's not only realistic but *just* that they do so — though not that they will take so many innocent people and species with them. That's obviously not a scenario based on love or compassion! So I have to center myself on the other future, the human transformation to 2B, the sexy, juicy, holistic, diverse, friendly, slower, quieter, more beautiful, musical, delightful future. After all, if I want it, why wouldn't everyone want it? I think everyone actually does. Some day we will just all create it, some equivalent of the Berlin Wall will fall down, and there it will be!

It might be useful to conclude with a distinction made once by Garrett Hardin among three types of truths — a distinction we were trying to articulate throughout our meeting. **A Type I Truth does not change, no matter what anyone thinks or believes about it.** Examples would be the amount of embedded energy in a solar array or the response of the global climate to greenhouse gas emissions. **A Type II Truth becomes less true, the more people believe in it.** Example: my act of pollution doesn't make any difference. Or, there really are no nearby limits to growth. **A Type III Truth becomes more true, the more people believe in it.** Such as: the USA will never have a carbon tax. Or a 2B future would be easier to achieve and more desirable to live in than an A1 future.

Type I Truths are applicable to physical systems. Types II and III Truths are applicable to human systems and to human behavior. Be very careful what kinds of Truths you tell and to whom. Be careful to ask how you really know anything about the future.

## REPORTS FROM WORKSHOPS

Groups that met on the following topics:

- Education and training,
- Influencing decisionmakers,
- Balaton training facility,
- Ecovillages
- Complexity

did not submit written reports to the editor of the *Bulletin*, so their excellent discussions will not be immortalized in this space.

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### Arts and Sustainability (reported by **Alan AtKisson**)

A small group considered the question of what role the arts should play in promoting sustainability. After a brief review of current trends in contemporary arts and the problems associated with “message” art, the group shared stories about artistic experiences (in any medium) that had truly moved them. As Alan remembers it, the group decided — based on this review of shared experience — that art at its most profound seemed not to depend on whether it did, or did not, attempt to convey a particular message. Good and powerful art could be “about” anything. There is room for “art for sustainability” among the arts in general. The sustainability movement — and the human spirit — would benefit from more of it.

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### Electricity Deregulation (reported by **Dana Meadows**)

We started by going around the group, telling stories of deregulation as it has come to different parts of the world.

**Bart Strengers** told of his father-in-law who was trying to set up a windmill in Amsterdam. Holland has a target to achieve 5% of electricity from wind in 2000 (it’s about 2% now). But the tax incentives were removed and the whole system collapsed. The rules were too complicated, the price of hooking up to the grid too high. Also in Holland there is a green-labeling requirement for appliances, but no punishment for noncompliance, so it isn’t working very well.

**Henk Moll** added, we Dutch make great plans, but implementation is always difficult. So then we make new plans. Until 1990 the utilities set the rules and the government followed. Then the government created a strong push for wind. It created opposition, especially because of landscape impacts. Utility restructuring in the 1990s broke down the monopoly of producers and gave power to distributors, who started taking advan-

tage of excess power from cheaper, decentralized industry generators. Central power station began losing money.

*We reached an agreement that the driving force behind electricity liberalization is large companies, which are increasingly tempted to do their own generating (often cogen, often combined-cycle gas). Therefore they are pressuring utilities — give us a better deal, or we’ll go off-line, leaving you with huge excess capacity and unpaid debts.*

The World Bank and USAID forced electricity deregulation for ideological reasons in Orissa, India, said **Ashok Gadgil**, without any public discussion or protections. And it is a disaster. The process was much better in California, where there were public hearings, and an awareness that someone would have to look out for the public interest, as the old Public Utility Commission did. The University of California successfully proposed a tax of 1.5% on all energy sold in the state, to raise money for “lifeline” rates for poor users, for environmental protections, and other ratepayer protections. There was a huge fight about how to pay for “stranded costs” of big nukes and other unpaid-for past mistakes. These costs will be charged to ratepayers as a surcharge on electricity price over the next 5 years.

As a consequence, electricity to the ordinary consumer is not cheaper. The big utilities immediately sold off all their big generators to private owners. Windpower died, because gas is cheaper. The tax brings in \$180 million a year, 1/3 of which subsidizes poor consumers, 1/3 goes to research on efficiency and environment (used to fund dumb proposals, Ashok and **Bob Wilkinson** both agreed), and 1/3 toward “green” marketing. There are a number of competitive “green” suppliers, ranging from bright green (no big hydro) to dirty brown (no nukes or coal). The rate structure that rewarded companies for helping customers with efficiency gains is now completely gone.

**Will Keepin** added that a new windfarm in Colorado quickly sold out its entire capacity to the “green power” market.

It’s easy to set up rewards for renewables, but not for conservation, observed **Jørgen Nørgard**.

**Zoltan Lontay** reported that after the Hungarian transition, the six major distribution companies all went into private (and German) hands. The generation companies are really competing hard now to sell to them. They are still regulated by the Hungarian Energy Office. Integrated Resource Planning and Demand-Side Management are completely gone.

How can we preserve the good parts of the old system, but build in healthy competition? we all asked. How can we keep community and customer control? How can we internalize environmental externalities?

**Bob Wilkinson** gave us a larger vision within which to think about this problem. The whole current change has been triggered by a real technical improvement, combined-cycle gas generators, which *broke the logic of economies of scale and centralized huge power plants*. Now large and even medium-sized customers can install their own generators at almost any size, for less than the cost of buying from the big plants. Pacific Gas and Electric says this transition is just beginning; within ten years we will have fuel cells and photovoltaics generating electricity everywhere, in units of many sizes. (**Amory Lovins** says we'll even plug our hypercars, each of which has a small efficient generator, into the grid whenever we park.) It will be unnecessary and way too expensive to maintain huge regional grids — electricity will come from roofs and cellars in your own neighborhood. Whole new companies will arise to sell *electric services (warmth, light, turning motors), not electricity*. These companies will figure out which kind of generators to install where and how to match generation to demand.

This is a transition we should welcome and encourage. The clearest way to do that is to *remove all subsidies, internalize all costs, keep anti-trust regulations in place*, and let the market fight it out. We *shouldn't make the mistake of setting up another set of stranded costs* by subsidizing now what we think will win the competition

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## Energy Scenarios

(reported by **Bert de Vries**)

We divided ourselves into four groups, according to the four world regions used in the IPCC: OECD, Eastern Europe and CIS, Asia, and Rest of World (Africa, Latin America and the Middle East). Most participants of each group came from that region. Each of the groups was asked to outline a scenario up to 2020 for their region, sketching what they thought was a probable or a desirable future.

After an afternoon of intense discussions and hard work, the results were presented during the afternoon of the following day. The 'rich' OECD group started. They presented a full-fledged 2B future for the OECD-countries, in which all the seeds for a really sustainable future were supposed to gather momentum. Foreign policy of this group was defined as that which would help the other groups also achieve a 2B future. Other policies identified by the group were:

- green taxes,
- abolish perverse subsidies,
- infrastructure reform, no further port/road expansion, user pays —> polluter pays, hence surface transport costs go up,
- stronger antitrust measures, limits to company size,
- advertising regulated/taxed
- governance democratic, all private finance out of elections
- foreign policy based on cooperation and partnership instead of domination and aggression,
- fair and balanced trade principles, trade protections for domestic social and environmental goals,
- NGO coalitions across countries,
- philanthropy refocused to eliminate the need for philanthropy,
- personhood of corporations denied,
- code of ethics for entertainment industry,
- health as a major driver

The second group, Eastern Europe and CIS, had a less optimistic view on how the future would look. Hence, they came up with four different scenarios that reflect the great uncertainties the people in these countries are facing.

### A1 Dreamworks — CEE Inc.

- A1 for true believers
- fast integration into EU and world economy
- liberalized markets
- TNCs rule
- social/environmental costs low (or they don't matter)
- equity?
- urbanization up

### A1 II Reference

- A1 in reality
- options: 3rd worldization or southern europeanization

- liberalized markets
- integration and transition problems
- strong inequity
- further erosion of the state

#### B Garden[s] of Eden

- return to ethics
- strong emphasis on regionalization
- localization of development
- reliance on intellectual capital, value added products
- property rights revised - increased equity
- better environmental quality and diversity

#### A2 Freefall

- world financial system collapses
- options: balkanization, transition to B2?
- TNCs close down

- employment down, export/import down
- mafias and black economy take over
- rapid breakdown of infrastructure (70% of Russian train system now not maintained, etc.)

The Asian and Rest of World groups also based their discussion largely on feelings of despair about present developments - many of them in the wrong direction. [Sorry, but we didn't get copies of the scenarios developed by these groups.]

When the four regions presented their scenarios to each other, obviously the future sketched for the OECD made a huge difference to the expectations of the rest of the world. A rich discussion followed. It became clear that a) if the rich countries actually changed their behavior in 2B directions, that would create great hope and freedom and possibilities for the rest of the world, and b) the rest of the world definitely doesn't trust that the rich countries would ever really do that.

## BALATON BUSINESS

### Steering Committee Members

**Joan Dutoit** (South Africa) and **Chirapol Sintunawa** (Thailand) were re-elected to another 3-year term, to expire in 2001. Other members with expiration dates are:

**Zoltan Lontay** (Hungary) and **Hermann Knoflacher** (Austria) — 1999.

**Hartmut Bossel** (Germany) and **Aromar Revi** (India) — 2000.

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### Next Steering Committee Meeting

... will take place November 20-22, 1998 at Joan Davis's house in Zurich, Switzerland. Non-steering-committee members are welcome to attend, but please let Joan know that you're coming.

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### Next Balaton Meeting

... will take place (if the funding can be raised)  
**SEPTEMBER 8-14, 1999.**

Possible plenary topics suggested by the group were:

- Problems of sustainability in developing countries. (Meeting to be organized by our members from the South, and ideally held in the South.)
- Trends and lessons from the globalization of the market
- Transition strategies — green politics, sustainable investment, etc.
- Communication
- Agriculture — how to feed the world sustainably
- Connections and interconnections (physical, social, information networks)
- What have we achieved? Let's report on our work, celebrate ourselves, review our strategy, offer our training programs in a more concerted fashion,

- North/South exchanges — trade, information, etc. Who really has what to offer to whom?
- Leadership — how to create/recognize/encourage it
- Resource conflicts
- After socialism and capitalism, then what?
- Resilience and the erosion of resilience (with the Y2K computer bug as a case study)
- The next 10 years of the Balaton Group
- After Kyoto, then what? What will it take to get to actual climate sustainability? What other benefits will be realized along the way?
- Ecological, social and economic risk assessment
- Climate change update — what's happening? What do we know and not know? What can we do?
- Biodiversity — what's happening? What do we know and not know? What can we do?
- Ethics and the erosion of ethics
- The new sciences of complexity
- Simplicity
- Complicity
- New modeling paradigms.

Other topics can be suggested any time up to November 20. The best way to get your topic chosen is to volunteer to be the organizer, and to present the Steering Committee with a plan of the topics and speakers you would like to invite. Another good way is to identify a source that might like to help fund a meeting on your topic. The people to lobby, if you would like to push your topic are: **Hartmut Bossel, Joan Davis, Joan Dutoit, Hermann Knoflacher, Zoltan Lontay, Dana Meadows, Dennis Meadows, Aromar Revi, Chirapol Sintunawa.**

## Funding and Long-Term Futures:

During the excursion afternoon, the fundraising committee got together to review options for the coming year. The fundraising committee, which created itself at the last Steering Committee meeting, consists of **Alan AtKisson, Aromar Revi, and Joan Davis**. We were joined for this meeting by **Bert de Vries, Hartmut Bossel, and Dana Meadows**.

### KEY FACTS

- With Dana's MacArthur grant ending, new sources of funding need to be found if the group is to continue in its current form at current budget. There is at the moment no guarantee of enough funding to hold next year's meeting.
- With Dana's new institute and community being a focus of her attention, she is easing herself out of the central administrator/fundraiser role. She is available to help, but not to lead.
- A change in hotel ownership etc. may force us to find a new location for the annual meeting. (Probably not next year, but perhaps the year after next.)

### VISIONS

We each shared our current vision for the group's long-term future. While we acknowledged the option to disband the group, we did not seriously consider it. Here are highlights from our visions:

- Alan: The BG seeks and builds an endowment and acts more and more like a small foundation, with enough income to fund the annual meeting and basic operations. Foundations supply project grants but not basic support.
- Hartmut: Ditto, plus a willingness to tighten our belt, have a smaller meeting next year if necessary.
- Dana: Raise a \$4 million endowment, from a handful of wealthy donors. That would allow us to double our current budget, ensure the annual meeting and *Bulletin* and provide for regional meetings or project grants. The Sustainability Institute can be the administrative base for the BG. Interested in building a global consulting network of Balaton people.

- Aro: Use the network more, especially as people like Hartmut and Joan are freed up by official retirement. Build consulting network. And build a sense of vision.
- Bert: Talk about sustainable development is becoming "boring." Demonstrate it in a real place. Provide training in systems, etc. and consult. The group may "ebb" a bit during a transition period.
- Joan: Zurich could be a European base. She may be able to identify future endowment money. Interested in consulting as well.

### CONCLUSIONS

Of course, there were no "conclusions", but some consensus did begin to emerge:

- Basic Operations: Strong interest in continuing the basic operations of the group — i.e., annual meeting, networking functions.
- Endowment: Willingness to pursue the endowment vision.
- Training Centers: Strong interest in developing the vision of a network of training and capacity-building centers.
- Consulting: Growing interest in developing a consulting network, probably parallel to the Balaton Group itself, symbiotic to it.
- International Presence: Initial plans to more firmly establish Zurich (Joan's home/office) and New Delhi (TARU offices) as the European and Asian "bases" of the Balaton Group, for fundraising, administrative, and other purposes.

### UNRESOLVED QUESTIONS

The following are unresolved issues that need to be addressed at the next Steering Committee meeting. We thought a three-day meeting this time would be a good idea, given the importance of the issues, but it's unclear whether that is logistically possible.

The overarching unresolved question is still: What will the Balaton Group be in the future? Others:

- Leadership: If Dana is not to be the group's coordinating leader, what new leadership is required, and who will provide it?

- **Funding:** What will be our source of funds for the next year? (Complicating factor: Some of the foundations that might support Balaton are now supporting Dana's Sustainability Institute.) What are we asking for funding for? [Note: Alan does not feel there is sufficient clarity to approach large foundations.]
- **Meeting:** What changes to the annual meeting, if any? Should we consider a new location? (This seems to have been resolved by Dennis in conversation with Tamas, and an agreement made to meet in Hotel Petrol again next year.)
- **Meeting Topic:** In our small group, there was talk of devoting next year's Balaton Meeting to the Group itself, focusing on its accomplishments and its future. This should be added to the list of proposed topics for consideration.

## THANKS!

To **Bert de Vries** for organizing this year's plenary sessions.

To all the speakers.

And the singers.

To **Joan Davis** and **Wim Hafkamp** for their ever-willing stewardship of the Final Banquet Award Presentations.

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Joseph and Michelle Fortier

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To the many Balaton attendees who contributed their own travel or room and board costs.

## BOOK REVIEWS

### Environmental Degradation, Malthus and Long-Term Cycles – Some Recent Books by Garry Peterson.

**Dana Meadows's** long wave article (included with this *Bulletin*) caused me to recall a few books and articles that I have been reading by Jack Goldstone and David Hackett Fisher. These works are not explicitly about long waves, but address similar issues of cyclical change in human society. They propose that slow dynamics drive social organization. Period of success bring about their own downfall by causing stresses to accumulate. Both authors argue that Malthusian pressure leads to these revolutionary periods and that the revolutionary periods decrease Malthusian pressure by increasing mortality and decreasing fertility. I thought that this focus on the dynamic interaction of human societies and environmental limits would be of interest to the Balaton Group.

Jack Goldstone is a sociologist who studies revolutions at University of California Davis. Recently he has worked with Thomas Homer-Dixon of the University of Toronto, who works on environmental conflict. David Hackett Fisher is a historian at Brandeis University who has written on a wide variety of topics.

#### Malthus and State Breakdowns

David Hackett Fisher's *The Great Wave* uses data on price changes to present a compelling history of inflation and its direct causes in European history. He shows that at least three waves of social unrest swept Europe in the 14th, 17th and late 18th century. He argues that population growth produced inflation. Population growth also produced social and ecological stresses, often leading to currency mismanagement and disease, further amplifying inflation, and encouraging social unrest. Fisher argues that price records provide a rich, integrative indicator of a society's Malthusian stress, because a region's carrying capacity depends upon organization and technology as much as on absolute population. *The Great Wave* explicitly addresses the long wave literature, and has a rich set of extensive footnotes. The book is well written, and quite gripping. It provides a terrific history, but does not present a theoretical framework to explain how or why this occurred.

Goldstone presents a more sophisticated analysis of Malthusian pressure and social dynamics and a general theory of revolution. Jack Goldstone in his book *Revolution and rebellion in the early modern world*, proposes that state breakdown occurs when there is simultaneous crisis at several different organizational levels in society. He proposes that state breakdown occurs when state fiscal distress, elite alienation and conflict, and a high potential for mass mobilization all coincide.

The forces able to produce such stress depend upon the institutional and technological organization of a society. However, whatever the form of social organization, the driving forces of revolution are slow processes that are not adapted to by existing institutions. Institutions fail to cope with these slow changes either because the changes are invisible to the institutions, or they are so complex and contested that no action can be agreed upon.

After a period of calm, 17th century Eurasia experienced a wave of revolutions, and Goldstone argues that during this period, population growth put stress on each social level, leading to state breakdowns, then revolution. Goldstone demonstrates that population growth produces societal stress by increasing the number of marginalized people, rather than increasing the absolute number of people. In a society with relatively inflexible social and economic structures, population growth leads to: increased demands being placed upon states (as population increases and elite taxes depreciate due to inflation), the redistribution of wealth (high rates of both upward and downward social mobility), and increased real prices for goods (especially food). As stress accumulates within each of these three levels of social organization, any external stress or internal fluctuation, such as a war, a bad harvest, or new policies, can lead to a state crisis. Once a state crisis begins, elites struggle for power and attempt to mobilize the general population for revolution.

The period of state breakdown is somewhat like a landslide; strain accumulates until, eventually, a state falls apart. However, the struggle for power following a state breakdown follows a different dynamic. During a revolution ideas propagate and ideologies of social reorganization are developed and spread. In this way a revolutionary period is more like an evolving epidemic, in that, depending upon the organization of society, the revolutionary ideology can evolve toward either innocuousness or virulence. The social vulnerabilities that have brought about crises are unlikely to be eliminated by the collapse of the state; consequently, while moderates may initially gain power, their policies are too mild to bring about change. Therefore ideas calling for more radical change will be able to proliferate. Radical mobilization can lead to a period of revolutionary terror, and mass political violence. Terror is usually unsustainable, society collapses as people flee and are killed, and that allows an authoritarian group to seize power and establish order. However, usually order is maintained through violence and terror. Once such a state is reached, it often will take at least a political generation, or decades, before a more civil society can begin to emerge.

## Modern State Breakdowns

Goldstone has attempted to extend his theory to the modern world. With collaborators Gurr, and Moshiri he edited a book on *Revolutions in the Late Twentieth Century*. In this book he argues that changes in technology and the organization of society mean that processes other than population growth are needed to drive state breakdown today. Gurr and Goldstone propose five indicators of weak regimes:

1. Does a regime have a store of accomplishment that provide it with good will, or has it experienced recent failures (e.g. disaster relief, military conflict)
2. Does a regime control resources, is it financially healthy? Or is the regime dependent upon foreign aid or buffeted by runaway inflation.
3. Does the loyalty of a state's bureaucracy and military depend upon discipline or corruption? Discipline allows a regime to cope with stress, while corruption has a doubly negative impact, as it produces contempt for the regime while also decreasing the effectiveness of the regime.
4. Are elites outside the central government (e.g. business, labor, religion, local politicians)? Are they integrated into the regime or are they indifferent, excluded or hostile to the regime.
5. Is there evidence of popular mobilization led by elites?

Applying these criteria to China has led Goldstone to conclude that China is vulnerable to a state breakdown. In the article 'The Coming Chinese Collapse' Goldstone presents his view that China is facing a Malthusian crisis of increasing population and decreasing agricultural yields. China's population will likely increase by about 300 million people, over the next 20 years, but communist development has led to urban expansion, erosion and environmental degradation, causing the area of arable land to decline in both quality and quantity. Unlike the situation in the past, the problem in modern China is how to resolve these Malthusian pressures with continuing communist party control.

Currently, even with its spectacular economic growth China shows stress within its government, elites and general populace. China's banking system and state finances are unstable. To deal with this, China's banking system is engaged in complex financial engineering projects to provide the government with funds at the cost of massive, unsecured debts.

The economic growth needed to escape from Malthus requires modernization, and modernization requires the training of large numbers of people. These people have the capacity to organize against the state if they are not provided with adequate opportunities. Similarly, rural poverty has led to a massive internal migration of about 100 million Chinese from the countryside to cities. This migration and technological change has decreased the ability of the state to regulate organization and communication in Chinese society, increasing the ability of people to organize and mobilize.

While these problems are stressing the current Chinese state, they do not mean that state breakdown is inevitable. Vaclav Smil has estimated that environmental degradation costs China an amount equal to 5-10% of its GDP, but he suggests that there are positive signs of reform, and governmental flexibility. Indeed, following this year's record floods, the government has halted the logging of the remaining forested areas in the upstream portions of the Yangtze.

### In summary

Goldstone's theory is appealing, because it is simple, but not too simple. Stress can be adapted to or ignored depending upon the institutional structure and culture of the area in question. That idea provides a way of linking a general theory to the particular. Goldstone also marshals convincing evidence that the merits of revolutions are overrated. The empirical evaluation of the consequences of revolutions suggests that they usually lead to terror, mass death, and destruction of civil society. I think that there are clear parallels between state breakdown and the collapse of environmental management regimes. Hopefully, we can use models such as Goldstone's to help us reorganize our societies to reduce the many ecological and human stresses that threaten humanity.

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**Which World? Scenarios for the 21st Century**, by Allen Hammond, Island Press, Washington, DC, 1998. 320 pp. \$24.95. ISBN 1-55963-575-4.  
Reviewed by Carl Folke

(This review appeared in *Science*, Volume 281, Number 5381 Issue of 28 Aug 1998, p 1293.)

Human actions now have the capacity to shape tomorrow's world, for better or for worse, as never before in history. Where is humanity heading—what destinations can we plausibly reach within the next half century? Addressing this question is the overall objective of Allen Hammond's thought-provoking book, *Which World? Scenarios for the 21st Century*. The author does not fall into the traps of trying to predict the future or simply extrapolating partial data, errors so common in the debates about development and environment. Instead, he recognizes that the world is complex and nonlinear, and that uncertainty and surprise are more the rule than the exception—making the future inherently unpredictable.

*Which World?* is a product of the "2050 Project" on long-term sustainability, a joint venture of the Brookings Institution, the Santa Fe Institute, and the World Resources Institute. Hammond, a member of the Global Scenario Group supported by the Stockholm Environment Institute and formerly editor-in-chief of the annual World Resources reports, has synthesized insights and information from a diversity of sources on seven major regions of the world.

A key point of the book is that our destinies can change; social attitudes can shift dramatically and many negative trends can be reversed if societies so choose and can summon the will to act. Deciding which actions are critical requires that we know more about what the future may hold. To this end, Hammond portrays three different scenarios — carefully posed stories — for human society and explores their implications.

In the "Market World: A New Golden Age of Prosperity," individual initiatives, technological change, economic growth, and global integration are the engines of development. In this scenario, free market forces and expansion of the global market through free trade bring prosperity, stability, and social progress to a larger and larger share of humanity. But we have heard this story before, and we know it is only partially true. Market prices seldom account for social realities or environmental necessities and are not good indicators of welfare or prosperity. Many believers in Adam Smith's invisible hand remain ignorant of the dependence of the global economy on the environmental resource base, and do not recognize that it is the content of growth — not economic growth as such — that matters (1).

Choosing the market world, with its partial truths, is to unwittingly play a too risky game and to promote a

global monoculture of the mind that may throw humanity into the "Fortress World of Instability and Violence." This fundamentally pessimistic scenario holds that unconstrained markets will eventually destroy the environment and the social frameworks on which they depend. I leave it to the readers to imagine the consequences.

The solution, although not promoted as such in the book, lies in the "Transformed World: Changing the Human Endeavor." Here fundamental social and political change gives rise to enlightened policies and voluntary actions that direct and supplement market forces. A complex web of effective institutions (incorporating basic property rights, well-run legal systems, and uncorrupt bureaucracies) is in place. Cultural norms and values are modified, and humans are seen as a part of, not apart from, nature. Hammond argues that such fundamental social and political changes for a better world are already on the way, as attested by the greening of global corporations, altered governmental policies, the rise of citizens groups, and a new age of philanthropy.

In the book, four sets of critical trends — demographic, economic, and technological; environmental; security; social and political — are comprehensively analyzed region by region in the context of the three scenarios. Lacking is a more explicit treatment of how the trends may influence one another, by feedback among the scenarios and regions. For example, demographic and economic trends in one region might cause environmental change influencing security elsewhere. Furthermore, looking at trends is not sufficient. To shape the future, we also need to understand, respond to, and actively manage processes of change. Certainly, with increasingly interdependent human activities and a population that may exceed 9 billion in the year 2050, we must learn to live in a complex world that is even less predictable than the present one. It is thus critical that societies learn how to respond to feedback in the combined system of humans and nature (2).

Hammond's purpose in writing this book is to illustrate that it is possible for human societies to create more positive futures for themselves. *Which World?* is not about predicting the future. We cannot predict the future, but we can shape it. The distinction is very important and well stated throughout the book. But social choices are not independent of the environmental preconditions for human well-being. This important point is present in the book, but could have been made more clear. Nevertheless, Hammond offers an excellent con-

tribution to the growing literature on the human predicament and the challenge of sustaining the Earth's legacy. The book will open the eyes of the ignorant, and fulfill its purpose of stimulating further thought and action.

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## NEWS FROM THE MEMBERS

**Joe and Barbara Alcamo**, with their children Julia and Lucas, are pleased to announce the arrival of Loretta Vita Charlotte Alcamo on July 2, 1998. 3.7 kg, 53 cm. The announcement card says:

*eyes shut,  
delicate mouth  
puckers and peeps, dreaming  
of mother, her wonderful warm  
cuisine*

\* \* \*

Carlos Quesada sends a post-meeting fax:

As always it was great to see the wonderful friends of the BG to to observe the ever valuable, multifaceted perspectives brought by old and newcomer participants.

Here's a summary of my presentation about changes in the Costa Rican forest from 1986/7 to 1996/7. It was a detailed GIS study done by our Research Center on Sustainable Development (CIEDES) of the University of Costa Rica jointly with the Tropical Science Center.

There is both good and bad news about the country's forests. The good news is that the deforestation rate has dropped significantly, to an average of 16,000 ha/year, compared to 50,000 ha/year in the 1960s and 70s.

Also there has been a significant amount of regeneration of secondary forest, amounting to about 126,000 ha over the 10-year period. There are also a growing number of reforestation projects, funded by the National Forestry Fund (FONAFIFO).

The well-known system of national parks and other nature reserves, which has evolved since the first national park in 1970, is still playing a key role in protecting important primary forests. In total the results show an impressive 40% of the national territory with forest cover, a significant part of it primary forest.

The bad news is that the 164,000 ha deforested in the 10-year study period are concentrated in some major, important areas, particularly the north and the Atlantic regions. A great deal of forest fragmentation is taking place and important options for maintaining valuable corridors connecting life zones are being lost.

Our center has continued with a quantitative analysis of forest cover change by life zones (as defined by Dr. Leslie Holdridge) and have found that several life zones are in good shape in terms of percentage remaining and degree of fragmentation. But several other life zones are poorly represented in the national system of wildlands. They are severely threatened with irreversible damage. The most critical life zones are small, not protected, and losing significant areas.

We are about to publish the maps, and I am sure they will force us to rethink the way protected areas should evolve, especially on a regional basis. Of special interest are areas of opportunity to protect higher quality remaining primary forests to increase forest island size and interconnections with forests already protected.

Once the analysis is complete, we will be able to answer many questions, and there will be many options for further interdisciplinary research.

\* \* \*

News from **Victor Gelovani**, one of the founding members of the Balaton Group:

I regret that present circumstances are so tough, that we see each other not as we would wish. However, being a Georgian I hope that years make old friendship and wine still better.

It is really a wonder, that the Balaton baby born 17 years back is still living and more than that is so interesting! I have been watching it with pleasure along *Balaton Bulletin* lines. I shall do my best to take part in the 18th session in September 1999.

My son Archil is a student at Boston University and lives in Boston. I propose to visit him before the end of this year.

Yours,  
Victor

Victor Gelovani  
Head of Department  
Institute of System Analysis of the Academy  
of Sciences of Russian Federation  
Tel/Fax: (095) 135-60-73  
E-mail: aswl@isa.ac.ru

\* \* \*

Joyful news from **Drew Jones**:

Dear Friends, Family, and Colleagues:

It's a girl!!

Anne Fitten gave birth to Annabelle Glenn Jones at 11:41 last night (September 1)! Both Mama and baby are healthy and happy.

Stats:  
Weight: 7 pounds, 8 ounces  
Height: 20 inches  
Eyes: blue

Hair: dirty blonde  
We feel so lucky — she looks so beautiful to us!

Love,  
Drew and Anne Fitten

Andrew Jones w:(828) 236-0884  
118 Coleman Ave. h:(828) 252-1266  
Asheville, NC 28801 e: apjones@cheta.net  
(Backup area code — 704)

\* \* \*

**Gillian Martin Mehers** of the LEAD program appreciated her first Balaton meeting:

I just wanted to write you a short note to tell you how much I appreciated the recent Balaton Group discussions and community, and to thank you for including me this year. I came away with so many new ideas and a real commitment to try to integrate this global discussion on future scenarios, issues of consumption and general visioning into our training. Now I have the challenge to do it! Thankfully, the Group provides ample expertise of all kinds for this task and I will look forward to more communication on this. (I am starting slowly, by first inviting **Alan AtKisson** to sing at the opening of our upcoming International Session next April, and will go on from there!)

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\* \* \*

**Dana Meadows** is happy to announce that since the Balaton meeting her farm has acquired two more Jersey calves (making a total of five — Maple, Butternut, Linden, Alder, and Birch). They are the beginning of the milking herd in the new eco-village. The eco-village is proud to announce that it has finally decided on a name — Cobb Hill Farm. Cobb Hill is the name of the slope upon which the farm lies. A site plan for 22 houses and a common-house is just about completed. The next step is official permitting for construction, water supply, sanitation, etc. (The current plan, if permits allow, is for low-flow appliances, composting toilets, leachfield disposal of graywater, passive solar heating with wood backup. Domestic hot water will be

heated by active solar if it turns out to be affordable and otherwise by a combination of gas and wood.)

Dana's Sustainability Institute is deep into the study of the commodity systems for shrimp, corn, and forest products. Preliminary computer models are begun, and meetings are being held with players in these commodity systems to incorporate their knowledge and their problems. **Drew Jones**, who is one of the Institute's researchers is also working on a city growth model with the city of Tucson, Arizona.

\* \* \*

**Laszlo Pinter** sends "a soundbite from Central Canada, as of October 6, 1998":

There is a LOT of anxiety among prairie farmers about the impact of the global financial mess. The harvest has been excellent, but commodity prices are half what they used to be just 2-3 years ago, and as one commentator put it one rarely hears nowadays the relaxed comment "well, we will make it better next year.". As a commentator put it on the CBC this morning the gap between global market demand for food and hungry people is increasing by the day and there seems to be little hope for pulling it together soon. Nothing new, but perhaps never more timely.

\* \* \*

**Aromar Revi** passes on some gossip about **Haruki Tsuchiya** and **Chirapol Sintunawa** (HAHA! If you don't send in your own news, others will do it for you!):

Spent a long evening with Haruki at his office and a congenial, but almost empty Sushi bar in central Tokyo (the economic downturn is real). He's doing well, working very hard balancing his commercial projects (an electronic book for NEC — very interesting prototype) and his work on energy. I've got an English copy of his report to WWF on CO<sub>2</sub> emission options for Japan - which has put him on a number of official panels etc. His office is worth visiting - mega-piles of English and Japanese books, with a number of BG authors on them. He's still sailing — was off the next day with friends on a Tokyo Bay expedition.

Spoke with Chirapol in Bangkok (wonder of wonders to get him) just after Dennis spoke to him about a LEAD course in Thailand. Multi-tasking as usual, was reading his e-mail while talking to me — not my vision of an opening to a new day — but he's evidently well and hasn't visited a hospital or a gas station to sleep for a while — which probably means that he's being kind to himself.

\* \* \*

**Anupam Saraph** meets the press, not happily:

After more than 3 months of very long days our team of 16 completed the massive environmental audit of Pune. The team meet with every local, state and central government office in town, with many key industries and NGO's. Processes that involve the flow of people, land, air, water, soil, materials, energy, traffic and flora and fauna were all mapped out in great detail, the states of the processes were illustrated in detailed graphs. The key regulators were identified, key recommendations made! The resulting transparency and ease to manage was so astounding! We were sure nothing like this has ever been done before! We thought we were in for at least a Magsaysay award!

On Thursday the report was presented before the city fathers. For the first time ever, they requested time to think on the report in order to debate on it.

Then came the big surprise: the press. The report got the worst slander I could imagine. Decried as one without Eco-sense, without data (every page has at least 2-4 graphs!) as vague (because it does not explain the geographical conditions of Pune!). Much of this response seems to be engineered by those in the business of equating environment with pollution. Pollution management Mafia (as many government officials identified them) are big business. Our report just dilutes pollution to be a symptom of an unhygienic environment. It's taken a while to sink it all in and try to understand, to learn and to heal.

I do not know if we do understand, if we have learnt the right lessons or we have healed. It feels so heart-breaking that the a part of the soul of all the young team members be destroyed by slander... And when they had all begun to believe, if you believe in good, you can create good. They had inspired many of the officials they met to begin doing work with a different conviction in their visits!

Then I wondered what you and the World III team must have gone through GLOBALLY for the enormous effort and unique insights you had to offer. I realise we could all do with learning from you on learning and healing from the unkindness of the world around you.

The newsletter arrived at the same time, as if by design. Wouter's summary stared back at me: fighting against, fighting for, letting go...

On Wednesday the city fathers will debate the report.

I pray for the city's soul.

## STORIES, QUOTES, JOKES, SONGS

*God speaks to each of us as he makes us,  
 then walks with us silently out of the night.  
 These are the words we dimly hear:  
 You, sent out beyond your recall,  
 go to the limits of your longing.  
 Embody me.  
 Flare up like flame  
 and make big shadows I can move in.  
 Let everything happen to you: beauty and terror.  
 Just keep going. No feeling is final.  
 Don't let yourself lose me.  
 Nearby is the country they call life.  
 You will know it by its seriousness.  
 Give me your hand.*

Rainer Maria Rilke, the *Book of Hours*,  
 as translated by Anita Barrows and Joanna Macy  
 and sung by **Alan AtKisson**

*Chock-full with the very dynamics he sat contemplating, Einstein experienced a birth that permeated him whole, his mind, his muscles, his viscera. Effortlessly, and as a form of these very dynamics, he jotted down the field equations. This chunk of the Milky Way jotted down the dynamics of the Milky Way. This region of space-time rich with the interactions of the universe jotted down the symbolic form of the interactions of the universe....*

*Making room for the immensities, Einstein experienced their inrush, when suddenly the Milky Way as Great Self became this Einstein reflecting upon his deepest nature, which is the nature of the galaxy and the cosmos too.... In that great moment, in that state of consciousness coming from years of disciplined preparation, Einstein was not contemplating something apart from himself.... That Great Power that had, there, at the birthplace of the universe, gushed forth in all the energies and galaxies, was now bringing forth its own self-portrait in the symbols of Einstein's field equations.*

Brian Swimme, *The Hidden Heart of the Cosmos*

## **The Ageless Spirit Ages**

(sent to us by the tireless **Isa Daudpota**)

*I think it takes tremendous courage to live well, and that holds at any age in life. The courage comes out of knowing that if you don't persist, you fail. The courage to be is the courage to dare. To dare to explore all one's guilts, one's shames, one's defeats, everything that has happened to you — all that is part of life, and beautiful if you can turn it into art. Nothing is alien to art, nothing is forbidden, nothing is impossible, as long as you create the form, as long as you create something whole and something true. That's what I aspire to do.*

*In one's early years, one writes out of one's glands — really out of the juices of the libido — and everything seems absolutely marvelous and right and easy. But in one's early years you don't know enough, you are not wise enough, to say the important things; you are merely reacting to experience. In late life you have the wisdom to draw from.*

*One ought not to delude oneself that a degree of recognition involves being a success. The only success that ought to mean anything is in terms of one's appraisal of oneself. Have I done as much as I could have done? Have I really fulfilled all my expectations? And, of course I haven't. I am constantly in a state of discontent. So, as far as I'm concerned, I'm not a success, and I never will be, and I don't want to be.*

*I suppose if you live as I have you are bound to have encountered along the way many disappointments: early disappointments in love, disappointments in your work, failures in expectations — there are so many of them I could hardly count them. The death of friends, people you love; it's a history of losses, much of it. And it reinforces your essential tragic sense. I suppose my basic view of experience is that our life is tragic and yet it is full of comedy, and the very fact that you take yourself so seriously is one of its comic aspects.. Measures against the cosmos none of us is important.*

*I don't think it is possible to build a full and creative life out of anger or frustration or resentment ... The only basis for art is affection. You have to begin by liking yourself and you have to like others more. If you don't have that feeling of living in an affectionate universe, I think you'll perish, simply out of bile and bitterness.*

*In a curious way I think that with age comes a diminishing of barriers. You can take greater risks at a certain point because you don't care anymore. You've tested yourself, you know what you can do, you know better than anyone else and who's to stop you from daring to do something that is not expected from you?*

*You have learnt through the cycles of nature, through the seasons, and the stars, the tides, that there's a time for everything, and there's a time to go too. And as you age there is a greater acceptance of this whole phenomenon of dying as well as of living.*

— Stanley Kunitz

## The System Zoo Song

By Alan AtKisson

(Debuted at the 1998 Balaton Group meeting, with Alan singing lead, and Vicki Robin, Nanda Gilden and Tony Cortese doing highly animated backup.)

Your system's crashing and you don't know why.  
 You want to hang down your head and cry.  
 Pull yourself together, there's no need to be blue,  
 I'm gonna tell you just what to do:

Go to the zoo

Take a walk around the zoo.

Every system is a zoo.

It can enlighten you.

And if you listen to the animals they'll talk to you.

### CHORUS

You got your *sources and sinks*,

You've got to know how to think about it.

*Stocks and flows*. That's where it stops and where it goes.

*Oscillations, delays and rates of change*.

You've got *nonlinear effects* that are really strange.

You've got these signals running round in *feedback loops*

That's the way it goes, down in the Systems Zoo.

Na-na-na-nahh-nahh- na-nah-nah.

Loop! Loop!

Na-na-na-nahh-nahh-na-nah-nah

Loop! Loop!

So if something's going wrong and you don't know what to do,  
 Just take yourself down to the Systems Zoo.

Every system's idea of fun

Is to maintain equilibrium.

If you push it to grow too fast,

You're gonna reach overshoot and collapse.... Now let me tell you a little story....

A man goes fishing, he fishes better than the rest,

He buys a few more boats with the rewards of his success,

Takes the money that he makes and buys a whole damn fleet,

Till the ocean's full of boats but there's no fish in the sea.

Now what didn't he do?

Go to the zoo.

Get your butt down to the zoo.

Yeah the Systems Zoo

Can enlighten you,

You better listen to the animals, they'll talk to you.

### CHORUS

You got your *sources and sinks*.....

Doctor, doctor, give me the news,

Got a bad case of the dynamic blues,

I'm desperate for a model — need an analytic frame

And I wish to God I'd made my mistake in a simulation game!

(Well, it's a whole lot better than screwing up the *real* world!)

Take me to the zoo.

I want to go down to the zoo.

Yeah the Systems Zoo:

### CHORUS

You got your *sources and sinks* ...

Before your systems crash, you know what to do.

Got to take it on down to the Systems Zoo!

## Designer Genes

by Jan Harmon, recorded by Marcia Taylor  
sung at the 1998 Balaton meeting by **Tony Cortese, Nanda Gilden, and Alan AtKisson**

My wife and I, we decided maybe  
It was time for us to have a baby,  
But our family trees looked so pathetic  
We decided that it must be genetic.  
So why take a chance on natural selection,  
When with a little engineering, we could produce perfection?  
So we called the local baby mart  
And said "ahem," won't you bring us some of them?

### REFRAIN

Designer genes, designers genes  
Gonna look just like a model in a magazine  
In your designer genes.

Well, the man said he'd be right down to meet us  
And he was gonna mix us up a custom fetus.  
He said, let's make it a boy just like Mick Jagger  
With a body like Arnold Schwarzenegger,  
And I'm sure you'd like a few extra features —  
A face like Redford, a soul like Jesus,  
A great big brain like Albert Einstein,  
And jeans by Calvin Klein.

### REFRAIN

Well, the man said "Fine, but let me tell you cousin,  
You can order just one, but they're cheaper by the dozen,  
Now I'm telling you the truth, that once you own 'em,  
It's no trick at all to, you know, clone 'em!  
You'll have a supply of pleasant events,  
Complete with DNA recombinant,  
And all of them are gonna look so slick  
In their genes by Watson and Crick!"

### REFRAIN

So we ordered a dozen and they all called me "mother,"  
But I can't tell 'em one from another.  
They hang around the house, waiting for their dinners,  
Lifting weights and forgiving sinners.  
You'd think they'd learn to take the garbage out.  
How I wish they were a little less esoteric  
And a lot more generic.

### REFRAIN

My wife and I, we're gonna try once more,  
But this time we're gonna lock the door,  
And pray Dear Lord, if the occasion arises,  
All we're asking is won't you please surprise us  
With a regular baby full of fire and notions,  
Subject to diseases and human emotions,  
A one-of-a-kind neat little cuss,  
With genes designed by us!

### REFRAIN

Designer genes, designer genes,  
Gonna look just like a model in a magazine  
In your designer genes.

## A Garden Beyond Paradise

Everything you see has its roots in the unseen world.  
 The forms may change; the essence remains the same.  
 Every wondrous sight will vanish,  
     every sweet word will fade.  
 But do not be disheartend.  
 The source they come from is eternal,  
 Growing, branching out, giving new life and new joy.

Why do you weep?  
 That source is within you,  
     and this whole world is springing up from it.  
 The source is full, its waters are ever-flowing.  
 Do not grieve. Drink your fill.  
 Don't think it will ever run dry, this is the endless ocean.

From the moment you came into this world,  
 A ladder was placed in front of you, that you might escape.  
 From earth you became plant.  
 From plant you became animal.  
 Afterwards you became human being,  
 Endowed with knowledge, intellect, and faith.  
 Behold the human body, born of dust.  
 How perfect it has become.  
 Why should you fear its end?  
 When were you ever made less by dying?

When you pass beyond this human form,  
     no doubt you will become an angel and soar  
     through the heavens.  
 But don't stop there — even heavenly bodies grow old.  
 Pass again from the heavenly realm,  
 And plunge into the vast ocean of consciousness.  
 Let the drop of water that is you become a hundred mighty seas.

But do not think that the drop alone becomes the ocean.  
 The ocean, too, becomes the drop.

*The reason of a thing is not to be enquired after, till you are sure the thing itself be so.  
We commonly are at “what’s the reason of it?” before we are sure of the thing.*

— John Selden, *Table Talk*, 1689.

*The bitter taste of poor quality remains long after the sweetness of a  
cheap price is gone.*

— Herb Ogden (a Vermont farmer and mini-hydro operator)

*Suppose you had had the revolution you are talking and dreaming about. Suppose your side had won, and you had the kind of society you wanted. How would you live, you personally, in that society? Start living that way now! Whatever you would do then, do it now. When you run up against obstacles, people or things that won't let you live that way, then begin to think about how to get over or around or under that obstacle, or how to push it out of the way, and your politics will be concrete and practical.*

— Paul Goodman, quoted in David Korten's forthcoming book. *The Post-Corporate World*.















