

## **G1: Governments Get in Gear**

By 2020 almost all world leaders take the threat of severe climate change seriously and embrace the need to cap emissions as quickly as possible. A rapidly growing and passionate grassroots movement delivers voting majorities in the world's democracies giving leaders support for bold moves and increasingly demonizing the deniers and advocates of dirty energy. In most of the world there is no ideological battle. The science is clear and you would be a fool to ignore it. The US and China lead and much of the rest of the world quickly follows. In the US it dawns on conservatives that not stopping global warming would be a tremendous gift to Russia while seriously damaging the southern US. Since conversion of the world's energy infrastructure will take decades, priority is put on steps that make the biggest difference soonest: eliminating coal use, hunting down and stopping all sources of methane, drastically lowering black soot levels and halting deforestation. A global system of emissions pricing is built into the international trade system and effectively stops freeloaders. This ends the dumping of fossil fuels on the world market while making clean energy the low cost option. Developing nations leapfrog into clean energy infrastructure the same way they leapfrogged into mobile communications networks. Global emissions are pared by 80% of 2005 levels by 2040 and everyone sees co-benefits along the way.

## **G2: Bottom Up Progress**

Although lots of national commitments are made, they are rarely met, and often rescinded, by succeeding administrations in the US and elsewhere. The US never ratifies the Paris accords and the IPCC process becomes irrelevant. Instead a diverse set of local and regional incentives, regulations and taxes sprout up throughout the world in line with local support, and evolve with experience. The impacts and implications of climate change are felt differently in each locale, leading to different priorities and motivations. Almost all adaptation is local and rebuilding better after storms is just common sense. After some states and smaller countries prove you can make major changes in energy infrastructure, and save money in the process, it is easier for others to get on board. In reality, for a long time climate change work was actually being done, but largely under the radar. When opinion rallies sufficiently to make it OK to come out in the open, we find that a lot of progress has already been made and that planning for a changing climate and clean energy is integrated into most processes of government and the private sector. The early adopters of clean energy make it cost effective for the majority to adopt later on. Progress isn't universal, but it is accelerating and the necessary pieces to a full solution are in place and understood by 2040. Pressure on world leaders to implement consistent and comprehensive policies is finally compelling. Many fear we have let things go too far, but we have finally turned the corner.

### **G3: Private Sector Leads the Way**

Early on transnational corporations take the risks of unfettered GHG emissions seriously. The implications of the science are clear and they start factoring expected changes into their strategic plans. Once they realize this isn't going away, they strive to get out front and exploit the enormous opportunities presented by the extraordinary changes needed in energy production and other infrastructure. Having learned from other disruptive changes like the Internet, they ignore this at the peril of their business going away or competitors taking the lion's share of the profits. In sector after sector (insurance, large scale project engineering, agriculture, defense) climate risks are put front and center. Momentum builds as the potential for new jobs and cheaper, better technologies are increasingly evident. Who could be against lowering their energy costs? The auto industry embraces the challenge of step-function increases in fuel efficiency, surpassing the 56mpg CAFE standards. NGOs offer prizes for innovative solutions (e.g., in transportation and fresh water production) as had been done with fighting malaria and jump starting private space travel. The hand wringing and predictions of economic collapse prove wrong. The corporate world sees it can do this: save the planet and make a fortune too. Zero emissions is as much of a business mantra as zero defects. Global capital markets enable the rollout of clean energy at scale. Even the fossil fuel companies eventually see the writing on the wall and diversify into clean energy and new markets for water exploration. Large numbers of companies and organizations see the strength, depth, and power of the marketplace to solve problems at scale. Leading organizations adopt internal carbon pricing to put them a step ahead of competitors. Facing a patchwork of local mechanisms for carbon pricing, global business leaders demand a consistent systems that removes the uncertainty in the payback on clean energy and efficiency investments.

## **G4: The Oblique Path to Progress**

Humans and governments are not wired to deal with long-term, abstract problems like climate change. Instead the problem is recast as solving other more immediate and tangible problems like deadly air quality in India and China, or protecting tropical forest ecosystems. Even in 2040, climate change is not seen as either the number one social or environmental problem, but it is a mainstream factor in almost all planning and policy. There are no longer any climate change task forces or special climate offices. Investing to reduce poverty, improve education and healthcare, and raise standards of living in the developing world gives them the ability to adopt clean energy infrastructure and build new resilient public works, while causing birth rates to drop fast. Many emerging countries are able to leapfrog in technology and practices to the latest and cleanest. Policy makers and environmental NGOs see habitat destruction and the global spread of invasive species as more damaging to the environment than climate change at this point. Water issues of various kinds are the most compelling and the public is highly motivated to deal with them. Reductions in GHG emissions are a side-effect rather than the justification for most efforts. Converting to clean energy is seen as a cost saver, a public health improvement and a reduction in the adverse side-effects of fossil fuel extraction. The focus is on “no regrets” investments in resilience that are cost effective now and make sense under a variety of possible future climate scenarios. Once the low hanging fruit is addressed, technology and science will have advanced sufficiently to make the next few steps clear. The really hard problems are put off rather than being put front and center in a way that set up big battles between powerful competing interests. This is not the fastest route to mitigation, but it’s the most realistic.

## **G5: Time to Panic**

The global response never got in gear and even by 2040 it is completely insufficient. The developing world makes little progress in reducing emissions, convinced they have must exploit cheap fossil fuels to lift their people out of poverty. Entrenched interests effectively thwart high-level policy changes until devastating impacts are clearly unavoidable. It proves impossible to drastically cut emissions from fossil fuels given the complexity, vast scale and sunk costs of the existing energy system. Changes are taking decades in most of the world even when the goal is clear and the incentives aligned, neither of which is usually the case. What becomes really detrimental to progress is the global glut of fossil fuels that keeps them really inexpensive for a long period of time. It seems the fossil fuel industry is intent on monetizing its assets before it is too late. By 2040, it is clear that global emissions will not be 80% lower than 2005 levels by 2050, not even close. Inertia will carry us past 600ppm of CO<sup>2</sup>. The bad effects of this are obvious everywhere: extreme weather events, extended droughts, very large fires, new pandemics, etc. More than one major city has severe water outages. Growing numbers of climate refugees leave the coasts and the subtropics. Measurements show that several positive feedback loops are kicking in, such as the melting of the permafrost and the near complete elimination of arctic sea ice in summers. Some nations are seriously consider geoengineering programs. Panic is in the air.