

## Scenario 1: Green China dominates

- China develops into the world's economic centre of gravity and uses its power to promote its governance model and shape international institutions and goals.
- China's support for an orderly, multilateral world order, in combination with its military dominance, prevent simmering tensions from developing into open conflicts.
- Climate change impacts are worsening but rapid technological progress is supporting green growth and adaptation measures.

By 2050, China has emerged as the dominant global power shaping international institutions and their goals, as well as the global economy. Empowered with extremely widespread digitalisation and use of artificial intelligence for social control, China's authoritarian, centralised governance has proven extremely effective in steering social and economic development. Corruption and concentration of power by state officials is a continual problem but is pervasive managed through monitoring. Technological breakthroughs have helped offset the steady decline of the Chinese workforce and enabled GDP to continue growing much faster than in North America and Europe. China's economic output is almost three times larger than the US.

China's economic model is rooted in a green growth paradigm that is closely tied in its political agenda of the "harmonious society", implying liveable social and environmental standards for everybody - and suppressing dissident voices. Rapid technological progress has enabled huge improvements in efficiency, although global resource use is still increasing. Supported by Chinese investments, many emerging and developing countries have leapfrogged technologically. The cost of renewable energy sources and a decarbonised mobility system has dropped hugely, resulting in negligible fossil fuel use in most countries. China itself phased out coal well before 2050 to curb the tremendous environmental damage that it was causing. However, the demand for some materials and minerals needed for high-tech industries and transitions in energy and other sectors is growing strongly and leading to increased competition. Climate change impacts are worsening but technological advances and economic growth are helping societies to adapt.

Internationally, China extends its global influence by a variety of means. Substantial investments by China's state wealth fund and disbursements of foreign aid have helped build relationships. Many countries in Africa and South America have adopted variations on China's governance model, creating a global alliance of like-minded but fairly nationalistic states. The political and institutional systems in other parts of the world, including North America and parts of Asia continue to function as liberal market democracies but their influence is declining, in large part because the share of the old-industrial (Western) countries in global population has declined dramatically. Developing and emerging countries are generally growing faster than developed regions, with the result that the level of inequality between countries is declining.

China promotes a strong multilateral system in which it dominates. With the digital Yuan, China has established a new global currency, whereas the US and EU left the field to non-sovereign digital currencies like (the obsolete in 2050) Bitcoin. There are numerous tensions between China and the liberal democracies and within the Chinese sphere of influence, where there is resentment about Chinese nationalism and soft imperialism. However, China's strong concentration of economic and military power generally prevents tensions from becoming open conflicts. Neither China nor the US had a real interest in a new cold war in the Pacific region. However, small cyber-conflicts are daily business. Over the decades, the old rivalry with India has aggravated, and behind a veil of diplomatic speech the struggle for influence in South-East Asia goes from one round into the next.

China also extends its influence through stateowned enterprises, which extract resources and develop infrastructure globally, as well as by influencing multinational corporations, for example in areas it dominates, such as IT, communications and robotics. Economically, the global system is fairly open, with extensive trade and travel. The high levels of physical exchange are based on electrification, even for non-continental flights and inland shipping, and on new technologies like the hyperloop (a low pressure, high speed transport system) – with first large-scale projects in China. A highly effective World Health Organisation, with extremely detailed supported global monitoring, helps manage the health implications of this international circulation of people.



## Scenario 2: Withdrawal society

- Recurrent, interacting crises are overloading societies and international institutions. Many countries turn to populist, nationalist regimes that advocate protectionism, deglobalisation and hostility to migration.
- Inequality is increasing both between and within countries, with low-income countries locked into poverty and conflict.
- The UN has proclaimed a state of "planetary emergency" but the international response is weak and uncoordinated.

By 2050, much of the world population is exhausted, following a series of interlinked crises, affecting the climate, human health, financial systems and geopolitics. These repeated shocks have disrupted global trade and economic growth globally. Short-term measures to protect domestic industries and citizens have evolved into enduring barriers to international commerce and produced debt crises and inflation. Nationalist governments have emerged in many countries, using rising unemployment to promote protectionism and selfsufficiency, and hostility to migration and international collaboration. Faced with disruption and hardship, many people seek to retreat into familiar and well-known environments. Religions have become much more prominent, also in China and Western countries where their influence had been waning. Populist leaders promise a return to an idealised past but seldom provide solutions for society as a whole - instead rewarding the constituencies that brought them to power.

The United Nations has proclaimed a state of "planetary emergency", with environmental degradation producing severe impacts on the economy and society, threatening the livelihoods, health and resource security of populations. Yet the global response is weak and fragmented. The overload of crises and the nationalist orientation of many governments has greatly weakened international cooperation and multilateralism.

Rather than catalysing a concerted response, the repeated failure to achieve environmental targets or protect human health has created a widespread sense of hopelessness and denial. Individual countries and citizens lack motivation to behave more sustainably when they have little confidence that it will make a difference. Consumerist lifestyles persist, particularly in wealthier parts of the world. In the absence of a shift in consumer culture and behaviours, technology-driven efficiency gains simply mean increased consumption. With weak growth and rising debt burdens constraining public and private investment, anticipated advances in transformative technologies such as carbon capture and storage have not delivered as hoped. Resource use and harmful emissions continue to climb.

Inequality is increasing everywhere – both within and between countries. The retreat into protectionism has blocked the export-led route towards prosperity that some countries had previously used successfully. Low-income countries, especially in Africa, are particularly exposed to climate change impacts and lack the resources and institutions to manage recurrent natural disasters and epidemics. Many are locked into poverty, with rapidly growing working age populations unable to find employment, leading to insecurity and conflict. Private military contractors have a growing role and become centres of power. Recurrent crises result in a surge in migration but with borders closed this often leads to violent clashes. Transition of the energy system away from fossil fuels in these countries has stalled and natural resources are managed unsustainably. Large and accessible new oil and gas fields have been discovered because competition for resources has driven increased investments by huge state-owned companies in explorations of remote areas (e.g. Arctic). Due to closed borders, multinationals play a limited role.

Developed regions are far more resilient to the recurrent shocks. For example, in the area of public health, innovations and distribution of new treatments overwhelmingly focuses on the needs of wealthy countries capable of generating financial returns. Nevertheless, weak growth is contributing to polarisation of incomes and segregation of populations, with wealthier population segments retreating into well-protected settlements, while the majority needs to learn to live with the growing difficulties and hazards. Many people – both rich and poor – are escaping into virtual worlds. More encouragingly, the fragmentation and strong focus on the regional and local level is producing some variation and grounds for optimism. Some selfsufficient regions and (mega-)cities have managed the different crisis very well, developing resilient and flexible structures. These "green islands" are seen as possible pioneers for a better future.



## **Scenario 3: Digital divisions**

- New scientific discoveries and technological developments enable cheap and plentiful energy, digital work and lifestyles, as well as home-based and decentralised production.
- Interconnectivity is creating new ways of working and living in many regions, creating opportunities and challenges. Other regions or communities are excluded or actively opt out of the new economic model.
- Power is shifting from national government to businesses and communities. This produces innovation but also leads to division in society and weakens international governance.

By 2050, technological innovations have driven important changes in many parts of the world. In the global North, parts of South and East Asia and even some African countries, daily life is largely managed in the digital sphere. Many aspects of business communication are virtualised. Physical encounters are often limited to the private sphere and in professions involving physical activities. Home working is the norm for most former office jobs but also for remote repair and maintenance and high-tech agriculture practised in parts of North America and Europe. Other regions lag behind, such as rural regions in low income-countries with poor online access (only sufficient for mobile phonepayments), or overcrowded parts of based megacities where access depends on ethnicity or social status. Some communities have even deliberately chosen to disconnect for a more sedate lifestyle, often combined with religious traditions.

This shift to virtual working was decisively accelerated by COVID and subsequent pandemics (or the fear of them). It brought major challenges for businesses and employees. Yet as management approaches, business models and lifestyles adapted, the technologies created opportunities – increasing productivity, reducing travel time and office costs, and increasing flexibility. Many people are more closely connected with local (physical) communities. On the downside, the shift to more virtual education and home schooling still produces social and psychological problems.

Other technologies have reinforced the tendency to decentralisation in pioneering regions and countries. 3D printing has driven the transition to home-based consumerism. Food produced in the lab is commonplace and enables a substantial reduction in impacts from livestock farming – especially in old-industrial countries that previously consumed most meat.

Due to technological breakthroughs and scale effects, renewable energy is available at very cheap prices, with hydrogen and biofuels complementing the system and expanding to novel cultivations, such as algae and bacteria. New, cheaper and less risky nuclear fission fuel technology (thorium and rolling wave) in smaller units replaces traditional nuclear power – at least in countries open to this technology. Old nuclear power plants are retrofitted to burn the new fuel and previous nuclear waste material is burnt off in the process.

Widespread digitalisation of life and work processes governments, businesses means that and individuals work together online. Corporations, networks of municipalities and coalitions of interest groups have a substantial role in governance, helping shape collective thinking and decisionmaking, as well as increasingly fulfilling roles of the welfare state. In general, national governments are declining in scale but remain important as regulators and administrators – and are especially needed to counter organised cyber-crime. Governments – even the "strong" authoritarian ones in some Asian and African countries – are unable to coordinate their governance of the global economy, instead competing to attract investments and jobs.

Collectively, the profusion of governance approaches results is a kind of 'messv polycentricity', with permanent disputes and bargains and uncomfortable compromises on many locations. issues. In some it enables experimentation, learning networking, and generating some good answers to societal or environmental challenges. In others regions of the real and (more importantly) virtual worlds, irrational cults, crackpot religions and conspiracy narratives spread; a kind of permanent "cultural war" results, that cannot be won without restrictions on freedom of speech. Power is concentrated in and transmitted by networks and platforms, and those in control shape discourses and political life – at one place a strong government, at other places media companies or digital giants, at yet others civil society groups. There is no common global model. Politically and, more importantly, culturally the world is increasingly divided.



## Scenario 4: Strong together

- Global crises have created a sense of solidarity and common purpose within and between countries, enabling coordinated action to address social and environmental problems.
- Growing understanding of the value of nature leads to a shift away from consumerism. Technological advances are used to increase leisure time not economic output.
- Innovations and international agreements have delivered substantial progress in climate change mitigation.

In 2050, nation states remain the most influential actors in the global order but they work together through effective multilateral institutions to address global challenges, define legal frameworks and settle disputes. Pandemics, climate change and biodiversity issues have brought the United States, China, the EU and other states together, with interactions based on the UN Secretary General's 2030 vision of "solidarity and collaboration between communities, nations, and international regions". Governments, the private sector, and citizens' networks work closely to experiment with and develop solutions that look beyond GDP to focus on quality of life and environmental sustainability. Political action worldwide is characterised by a high level of ambition and guided by a systems perspective and precautionary approach. However, even in 2050 this is not implemented thoroughly.

The sense of solidarity and collective purpose in response to shared challenges is apparent at all scales. Inequalities have declined both within and between countries. Advanced economies tackle rising poverty and unemployment challenges by implementing far-reaching economic welfare reforms, building on constant efficiency gains in production – not only due to automation and management on AI, but also due to closing material cycles ("circular economy") and a reduction of raw materials needed.

Developing regions continue to grow relatively fast, thus reducing global inequality. Climate change adaptation in poorer countries and regions is supported through generous transfers of financial resources and the fostering of regional and local technological expertise. Migration away from by regions particularly harshlv affected environmental and climate disasters is enabled through the UN's global resettlement programme. Humanity's failure to prevent the flooding of some island nations is regarded as a profound source of shame; affected populations are not treated with cheap global sympathy but real support and new homesteads. Greatly reduced global military

expenditure frees up resources for climate change mitigation and adaptation, as well as enabling a reorientation of innovation towards sustainable technology and environmental restoration.

Growing international awareness of the value and vulnerability of ecosystems for coping with climate impacts and loss of biodiversity leads to a widespread shift in values. In many societies, conspicuous consumption and materialism are widely seen as vulgar and anti-social, and this shift in public discourse is reflected in news media and popular culture. This evolution in worldviews also means that in many countries automation and technological innovation lead to an increase in leisure time, rather than ever greater consumption.

International agreements regarding climate change mitigation lead to a steady increase of renewable energy supply, which becomes the primary energy source. Meanwhile, the establishment of an international mechanism of energy consumption quotas helps overall reduction in energy demand (i.e. 'sufficiency') that allows proper back-up by existing energy storage technologies. The global transition to low-carbon energy systems significantly reduces greenhouse gas emissions.

Over time, the increasingly complex system of international rules and institutions has begun to resemble a world government in some respects. While national governments remain paramount, there is an increasing transfer of sovereignty to global institutions. Attempts to democratise these structures – for example by creating a world parliamentary assembly – actually reinforce the sense that power is draining away from national and local levels. In some places this is provoking resistance, with certain countries and regions discussing the need to assert their independence.

Despite these tensions, there is a sense of optimism. After decades of struggle to achieve sustainability goals, in 2050 humankind is beginning to win, little by little.