PRAISE FOR *SOLVED*

'A refreshing, cup-half-full approach to inspire each and all of us that we must and can do the hard work to make the world a better place.' —**Dana H. Born, Harvard Kennedy School of Government**

'In a world of endless outrage, armchair critics and keyboard warriors, *Solved* is that rarest of things: a book that actually offers solutions to the planet's problems instead of just listing them. It is only by listening to positive arguments such as these that we will ever stand a chance of fixing the world's problems.' —**Joe Hildebrand, co-host of Network 10's *Studio 10***

'Andrew Wear offers things valuable and rarely present in a practical book about politics: determined optimism, and real hope.' —**Van Badham, *Guardian* columnist and social commentator**

'At a time of mounting public dismay at the inability or unwillingness of our leaders to address the pressing issues of our time, Andrew Wear's book is a welcome dose of optimism that we can create change. With the positivity of a self-help guide, Wear takes us around the globe, showing us inspiring examples of progress and success across a number of challenging policy areas, from health to education to climate change. Buy it if you are over gloom and doom and ready for action!' —**Rebecca Huntley, author of *Still Lucky* and *Australia Fair***

'The times call for realistic and infectiously optimistic leadership – people are yearning for stories of hope. Andrew Wear's *Solved* inspires optimism, hope and a positive strategy to be the best we can be.' —**Victor Perton, founder of the Centre for Optimism**

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INTRODUCTION

If Other Countries Can Do It, Why Can't We?

On a sunny Saturday, I was browsing my favourite bookshop when I was struck by a sense of gloom. The shelf in front of me was dominated by books that were depressing in their subject matter: our crisis in democracy, the rise of racism and global inequality, the decline of civilisation. I inhaled their sense of panic and malaise almost unconsciously; my previously sanguine mood skirted the aisle and disappeared out the back exit.

The politics section of this bookshop was a dismal place. The titles on display, although likely written with insight and wisdom, focused on the problems our world faces and conjured a bleak and desperate future. Yet just an aisle away, in the self-help and business sections, the books were affirming. They reassured the reader that with the right attitude and an appropriate strategy, change was possible and obstacles could be overcome.

The difference in approach between these categories sat uneasily with me. The world *was* facing serious challenges, but I knew from my work in public policy that there had been enormous progress in a number of areas, with some countries achieving remarkable results. I was fatigued by doom and gloom. I wondered if I could take the positive perspective of self-help and business books and apply it to the politics section. If I could shed some light on how countries around the world are working to crack the big problems, it might help to illuminate what sort of government and community action is required to make a difference. Readers might take heart from other countries' successes and be reassured that we *can* make real progress towards solving humanity's biggest

challenges.

This book is the product of that ambition. I hope that the insights, stories and strategies in these pages inspire you. Because if other countries can do it, so can we.

For every depressing statistic you hear about, somewhere in the world there is also a story of incredible success. These stories show us that with sufficient will and the right approach, difficult problems can be solved.

For example, fifty years ago the average life expectancy in the United States was among the highest in the world. Americans could expect to live two and a half years longer than those in the rest of the developed world.[1] However, with rising obesity, a startling homicide rate and a lack of universal healthcare, life expectancy there is declining. A child born in the United States today will have a shorter life than one born in 2010.[2] Yet spin the globe to South Korea and the improvements in life expectancy are spectacular. In 1960, Koreans could expect to live just fifty-two years.[3] With universal healthcare, a healthy diet and a huge reduction in infant mortality, a South Korean child can now expect to live to eighty-three. Some experts even predict that by 2030, the average life expectancy for Korean women will exceed ninety years.[4]

In 1990, when climate change first began to be taken seriously, Australia's carbon emissions were among the highest in the industrialised world, trumped only by Luxembourg, Estonia and the United States. Subsequently, Australia has torn itself apart with rancorous, highly politicised debates about how to address climate change. The government introduced an emissions trading scheme only to abolish it soon afterwards. Thirty years later, each Australian emits 16 tonnes of greenhouse gas a year, the worst rate in the world, and an *increase* on 1990 figures.[5] But in Denmark, there is a national consensus on the scientific evidence and the moral obligation to respond. The Danes are moving steadily

towards producing 100 per cent of their power from renewable sources. The country has managed to fast-track its economy while scuttling emissions: each Dane now contributes half the emissions they did twenty years ago, and Copenhagen is on track to become carbon neutral by 2025.[6]

Another example: in 2000, New Zealand school students were achieving some of the best results in the world. In reading, the country was third globally, behind only Finland and Canada. Yet the reading performance of New Zealand students has deteriorated. In 2018, fifteen-year-olds were reading at a level more than six months behind their predecessors of fifteen years earlier. By contrast, Singapore has built an education system from scratch, which is now delivering world-best results. Within a government-run system that values and invests in teachers, Singaporean students are reading at a level more than a year ahead of the average in many parts of the world, and achieving results in maths more than two years ahead of their counterparts in New Zealand.[7]

Our political leadership has been disappointing of late. Around the Western world, public trust in government is collapsing.[8] We could be forgiven for being pessimistic about governments' capacity to lead us through the tests that lie ahead. Yet several countries are doing well at tackling the challenges facing the world. Life expectancy at birth is eighty-five in Hong Kong. Sweden's annual per capita carbon emissions are only 3.8 tonnes. The reading performance of fifteen-year-olds in Singapore is almost four years ahead of their peers in Mexico.[9]

Historically, much economic policy was based on theory. Detailed mathematical models were built and hypothetical scenarios constructed. These usually involved many assumptions, including the rather heroic idea that people always behave perfectly rationally. These theories went hand-in-hand with ideologies: liberalism, conservatism, socialism. The ideologies

drove the government policies that have shaped our world.

But theories don't always hold up in the real world. There are myriad complexities that confound the economists' models. For example, many economic models indicate that minimum wages lead to higher unemployment. But as Harvard economist Dani Rodrik writes, this is only the case 'if the labour market is really competitive and employers have no control over the wage they must pay to attract workers'. Many economists now argue that one of the underlying factors of the 2008 global financial crisis was a focus on abstract models that failed to consider the possibility of a systemic collapse in house prices.[10]

In recent years, the study of economics has begun to focus more on what works in practice. Using data, economists are now testing theories to see if they are supported by evidence. Economics has become less like philosophy and more like science, with economists conducting randomised control trials, lab tests and even field experiments.[11] For example, to assess how migrants gain economically from moving across borders, economists studied a group of migrants from the Pacific island of Tonga. The incomes of those who moved to New Zealand after being selected in a random ballot were compared with those not selected. In Australia, novel programs to address homelessness are evaluated by comparing participants to a control groupd.[12] At last, economics is interested in finding out which policy settings actually work.

The same impulse drives this book. Rather than starting from a theoretical or an ideological perspective, I'm interested in exploring real examples. Each chapter focuses on a different country. My starting point was to ask which country is achieving the best global outcome on a particular measure, such as education, crime or gender equity. Next was to gain an understanding of that country: the nation's history and the policy interventions that have led to its current success. Finally, I wanted to draw out the implications for the rest of us. What can we learn

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GONE WITH THE WIND

How to Farewell Fossil Fuels

Although it's a rather agreeable place, there's nothing particularly exceptional about Samsø Island at first glance. Located off the coast of Denmark's Jutland Peninsula, this former Viking outpost is home to a traditional farming community, best known for producing the country's first potatoes each year. After arriving by ferry, as you travel around the largely flat island – perhaps by bicycle – you'll see cows and sheep grazing leisurely, weathered farmers driving tractors, and the occasional farm dog. The clink of ropes against masts resonates from the marina at the small village of Ballen; ducks dabble in the village pond at Nordby, overlooked by thatched houses.

This very ordinariness is what makes it so remarkable that, for the past twenty years, Samsø has been a world-leading green energy community. All of Samsø's electricity comes from massive community-owned wind turbines, while biomass boilers burning local straw meet 70 per cent of the island's heating needs. Each of Samsø's 3724 residents now emits an average of *negative* 3.7 tonnes of greenhouse gas per year.[1]

The Samsø Energy Academy serves as a sort of interpretative centre for those wishing to learn about the island. It hosts visiting scientists, schoolchildren and 'energy tourists' who come to hear more about Samsø's experience in transitioning to renewable

energy. The academy provides advice to companies and homeowners and leads a busy program of tours, workshops and exhibitions about energy, climate change and sustainable development.

Søren Hermansen is the academy's director. When I interview him, he's struggling to make himself heard above the noise of dozens of students visiting the centre.

'We have lots of visitors,' he says. 'We have probably four, five thousand visitors every year from all over the world. It's not so much about the wind turbines or the solar panels but more like, "Hey, these guys did it. It's a little old-fashioned farming community, so if they can do it, we can do it."'

Hermansen's shock of grey hair suggests he is approaching middle age, but he gives the impression of a much younger man. He speaks passionately about Samsø, putting this very local initiative into the context of broader Danish energy policy and the global challenge of climate change. Occasionally a mischievous smile reveals itself, as though he is aware of the sheer audacity of what he has helped to achieve – leading a conservative rural farming community to the point that it's now demonstrating to the world the benefits of cooperatively-owned local energy production.

The success of Samsø Island is indicative of broader efforts in Denmark to address climate change. It ranks second in the world (behind Sweden) on the Climate Change Performance Index,[2] and it has succeeded in halving its per capita greenhouse gas emissions over a relatively short timeframe.[3] However, Denmark is determined to go much further. With a remarkable political consensus, it has committed to energy agreements that by 2030 will see 100 per cent of its electricity generated from renewable sources.

The experience of Samsø Island, and Denmark as a whole, shows that it's possible to almost eliminate carbon emissions using existing technology – we do not have to wait for some

indeterminate future point in which new technology comes to market. It also shows that local communities, with the right leadership and supported by national policy, can drive real change.

Søren Hermansen grew up on Samsø Island. After finishing school in the late 1970s, he left in search of opportunities and adventure, like many of his peers. He spent time fishing in arctic Norway,farming in New Zealand and teaching in a democracy-building project in Lithuania. Hearing Hermansen recount these travels, it's clear that he has a passion for engaging with people from a range of backgrounds and philosophies.

When his parents separated and his father decided to 'realise himself and become an artist', Hermansen found himself suddenly inheriting the family farm. So he 'kind of by chance or coincidence' came back to Samsø in the mid-1980s. While running the farm, growing beets and parsley, he found himself in the midst of a major transition occurring on the island. 'I liked the work and philosophy of farming, but I didn't like the development it was going through,' Hermansen says. 'It was becoming more and more industrialised, with lower and lower prices for farm products, and if you wanted to survive you had to buy the neighbour's farm. This was quite depressing. It takes its toll on the local community because there's no people left.'

Perhaps partly in reaction to this increasingly competitive environment, another change was occurring. A number of local farmers were turning to growing organic produce, dairy products and grain. Hermansen studied organic farming. However, through getting involved in 'all kinds of local development and ideas', he discovered that communication was a greater strength than practical application, and he became a teacher in the field while continuing to farm.

The question that came to occupy Hermansen was: how can you strengthen the local community and plan for future development? 'That kind of became my passion.'

In 1997, Samsø was struggling. The abattoir – the largest

private employer on the island – had just closed, taking with it 100 jobs. Like many rural communities around the world, the island's population was both ageing and declining. The Danish government, looking for a showcase opportunity to demonstrate that the 21 per cent emissions reduction target in the Kyoto Protocol was possible, launched a national competition to find a Danish Renewable Energy Island. It sought to identify the island or area with the most achievable plan for becoming 100 per cent self-sufficient in energy production. The Danish Energy Authority would provide funding to aid the transition.

The national government also wanted to see civic participation. Local businesses, the council and community organisations all had to support the plan. Although the focus was on using existing available technology, the government was interested in exploring new ways of organising, financing and owning the technology.

The winning location was expected to function as a demonstration of Danish renewable energy expertise that could be displayed to the rest of the world. Samsø's municipal government submitted an application, and in 1998 it won, beating three other islands and a peninsula.

The prize included funding for a coordinator to develop a ten-year plan. This role piqued Hermansen's interest. 'Because I had been around for a little while, and I made my voice heard every now and again at meetings, I was asked if I wanted to be the manager of the Energy Island. I accepted the position, just to give it a go, and had to keep on farming. But it very soon turned into a full-time job, so for the last twenty years I've been working in this field.'

The competition win was not like 'a golden ticket', Hermansen says. 'We didn't get a lot of money for it. We had to do it with the same conditions that any community in Denmark had at that time.'

Initially, the project met with some community resistance.

'People were like, "Thank you but no thank you. It sounds really expensive and complicated and we can't do this alone."' To engage the somewhat sceptical locals, Hermansen spent a lot of time talking with them. If a section of the island was holding a town meeting or an event, Hermansen would turn up, bringing sandwiches or beer. He'd go door to door, talking with people in their kitchens.

The plan was to quickly transition the island to wind power. By 2000 – just two years after winning the competition – eleven wind turbines were due to be installed, each with capacity to generate one megawatt of power.

The idea was not universally beloved. Residents had concerns about the potential noise and visual impact of the turbines. The challenge for Hermansen and his team was to bring around the local community. They undertook extensive public negotiations over the location of each turbine.

A crucial step in gaining community support was to invite locals to own the turbines. As Samsø Island's website notes: 'Windmills are much prettier when you are a co-owner, making money when the wind is blowing.'[4] A decentralised structure was created, with cooperatives being formed, or shares being sold in each turbine. Hermansen says that 'everybody who lives in the neighbourhood had a chance to invest their money in the turbines, giving a sense of local ownership that was strong enough to overcome the flip side of the turbines'. Locals signed on to this scheme enthusiastically, contributing enough through cooperatives to purchase two turbines, while individuals purchased the remaining nine. These eleven turbines generate enough power to make each of the island's twenty-two villages self-sufficient.

In 2002, to offset emissions from the island's cars, tractors and ferries, a further ten offshore turbines were installed, with a combined capacity of 23 megawatts of power. These turbines are located in relatively shallow water, with foundations fixed in the

Celsius.[8]

We're already seeing the environmental effects of climate change. Coral reefs in Australia and beyond have experienced severe bleaching and decreased coral cover, causing habitat loss. Ecosystems in North America and elsewhere are being disturbed by an increase in the frequency and intensity of droughts, windstorms, fires and pest outbreaks.[9] The Belgium-based Centre for Research on the Epidemiology of Disasters estimates that in 2018, 5000 people died due to extreme weather, while 28.9 million more needed emergency assistance or humanitarian aid. In that year alone, there was a massive heatwave in the United Kingdom, devastating floods in India, one of the worst hurricane seasons in US history and the largest-ever wildfire in California. Even if we could halt greenhouse gas emissions today, many of the impacts would continue for centuries.[10]

In urban areas, climate change will increase the risk of heat stress, storm surges, flooding and sea-level rise. Rural regions will experience major challenges with water availability and supply, food security, infrastructure maintenance and the protection of agricultural incomes. And the poorest countries, which contribute the least to greenhouse gas emissions, are among the most vulnerable to the impacts of climate change. These nations depend on agriculture and fisheries, are often low-lying and subject to coastal inundation, and lack the financial and technological resources to cope.[11] There's a good chance that coral atolls in the Pacific Ocean will be uninhabitable by 2050, and small Pacific nations, such as Tuvalu and Kiribati, sitting just metres above sea level, are fearful for their continued existence.[12]

The single most important factor driving the change to our climate is the increase in greenhouse gas concentrations. A range of greenhouse gases are emitted due to human activity, including methane and nitrous oxide, but carbon dioxide is the main contributor to climate change. Our carbon emissions are largely due to the burning of fossil fuels.The burning of oil, gas and coal

accounts for two-thirds of the world's electricity generation. Australia generates 86 per cent of its electricity from these sources; India, 82 per cent; China, 73 per cent; and the United States, 67 per cent.[13] The impact of carbon dioxide is worse than that of other greenhouse gases because it remains in the atmosphere for so long: it has a lifetime of fifty to 200 years.

Carbon dioxide occurs naturally in our atmosphere at low concentrations. Two hundred years ago, when Napoleon was emperor of France and Jane Austen was writing *Pride and Prejudice,* atmospheric carbon dioxide was present at about 260 to 280 parts per million, the same as it had been for the previous 10,000 years. Since the start of the Industrial Revolution, the Earth's atmospheric carbon dioxide has risen steadily, and in May 2019 it reached 415 parts per million.[14] The IPCC estimates that if we are to keep warming to less than 2 degrees Celsius above pre-industrial levels, we need to limit the concentration of atmospheric carbon dioxide to, at most, 450 parts per million. To achieve this will likely require a complete transformation of our energy infrastructure.[15]

In 2015, 196 countries signed up to the Paris Agreement, which seeks to limit global warming to less than 2 degrees Celsius and to aim for a target of 1.5 degrees. Although there is no mechanism to force a country to set a specific target, each country is required to put forward their 'best efforts' through 'nationally determined contributions' and to strengthen these in years ahead.[16]

If humanity is to meet the objectives of the Paris Agreement, carbon emissions from the energy sector will need to decline to 90 per cent below 2010 levels in coming decades. By 2050, low-carbon sources of electricity such as renewables will need to supply at least 80 per cent of the world's electricity. To reach this level, annual investments in low-carbon electricity and energy efficiency will need to rise by several hundred billion dollars per year before 2030.

Far from being a cost to the economy, mitigating carbon

emissions may actually contribute to economic growth. The 2017 OECD 'Investing in Climate, Investing in Growth' report notes that taking decisive action to transition to a low-carbon future would involve 'spending or tax measures that will foster productivity in the medium to longer term' such as 'raising spending on soft and hard infrastructure or education'. A key reason for the positive economic impact of this approach is the 'overall boost in investment, including in low-emission infrastructure'.[17]

The OECD argues that addressing climate change could 'add 1 per cent to average economic output' in wealthy countries by 2021 and lift 2050 output by up to 2.8 per cent. [18] This would mean material improvements to living standards across the wealthy countries of the OECD. If the predicted costs of extreme weather events, such as coastal flooding or storm damage, are subtracted, the net effect on economic output rises to 5 per cent.

Denmark has managed to reduce its climate impact while maintaining one of the highest standards of living and being the second-happiest nation in the world.[19] Since 1992, Denmark has reduced its per capita emissions by 46 per cent, performing better than any country in the OECD, except for tiny Luxembourg (see Figure 1 on page 17).

While Denmark has a unique set of attributes, including a reasonably high level of per capita wealth, a significant coastline and strong winds, it is technically and economically feasible for almost every country in the world to transition to 100 per cent renewable energy. For example, researchers from Stanford and Berkeley universities in the United States have developed roadmaps for 139 countries that involve 80 per cent conversion to wind, hydro or solar power by 2030, and 100 per cent by 2050.[20] While this shows that change is possible, Denmark is demonstrating how it can be done in practice.

In 1973, the world experienced its first oil crisis, when a number of oil-producing Arab countries placed an embargo on oil

exports to Israel-aligned countries during the Yom Kippur War. This caused an enormous shock to the global economy, with oil prices rising from US$3 per barrel to US$12 per barrel. Denmark was severely affected, as it had essentially only one source of energy. At that time, 90 per cent of its energy came from oil, almost all from Saudi Arabia.

In response to the crisis, the Danish government introduced a number of taxes aimed at reducing energy consumption, and hence reliance on foreign oil. The already high price of energy in Denmark became even higher. Yet when energy prices began to fall after the oil crisis, a broad consensus formed in Denmark that taxes should be kept high, with a view to reducing energy consumption long-term.

By contrast, US governments, in response to the same crisis, decided to reduce reliance on oil and gas imports by shifting the electricity sector to other fuels. As a result, a slew of new coal-fired power stations were constructed.[21] US president Jimmy Carter called for coal production to increase by 400 per cent each year, and outlined policies 'to ensure the greatest possible conversion of utilities and industrial installations to coal and other fuels'.[22]

In countries such as the United States, Australia and the United Kingdom, where political debate focuses on the need to keep energy prices as low as possible, the Danish consensus may seem somewhat unbelievable. However, according to Danish energy-policy expert Finn Mortensen, Danes 'have gotten accustomed to a very high level of taxation of all kinds of fossil fuels'. This is partly because the high taxation has been paired with financial incentives. Hefty subsidies have been made to business and industry, primarily to encourage renewables. Homeowners have been granted large tax rebates if they insulate their houses or put in new windows in order to lower energy consumption.

Mortensen heads up State of Green, a not-for-profit collaboration between government and industry. It was established in 2008, in the lead-up to the United Nations Climate

Conference in Copenhagen, to secure 'maximum impact from a branding point of view' for Denmark's role as conference host. State of Green assists Danish companies, academic institutions and experts by promoting their knowledge and capabilities in clean energy and sustainability to countries all over the world. This leads to Danish-run projects and business opportunities. For example, Danish company BWSC built a biomass-powered electricity generator in Northern Ireland, and a Danish–Vietnamese partnership is improving water efficiency in Vietnam.[23] Initially home to five or six employees, State of Green has grown to a team of twelve, who work from its 400-metre-square showroom in downtown Copenhagen – host to more than 2500 visitors each year, all of whom come to learn about the Danish energy transition.

Percentage Change in Per Capita Emissions Among OECD Countries 1992–2016

Figure 1. Denmark and Luxembourg are leading the OECD in reducing per capita carbon emissions. Despite a few outlier

Denmark has also focused on improving energy efficiency, which has the triple benefit of reducing carbon emissions, improving productivity and saving energy users money. In 2006 the country introduced a unique program in which energy companies are required to contribute to nationwide energy savings. The Danish Energy Efficiency Obligation Scheme assigns a share of a national savings target to each energy sector (oil, electricity, natural gas and district heating), and the sector's trade associations allot a percentage of that share to individual companies. Companies are able to claim credit for energy savings to which they have contributed, either with technical advice or financial support.[30] Savings certificates can be bought, sold or shared when a company exceeds its annual target.

Energy companies have embraced this scheme enthusiastically, and the national target has been achieved every year since it began. The scheme is effectively cost-neutral for the companies, since the costs of energy efficiency investments are passed on to consumers in the form of network tariffs. It is also extremely flexible, with no specifications on how savings can be achieved. This has driven companies to find the most cost-effective means to achieve savings.

Also fundamental to Denmark's success has been a series of long-term energy agreements with cross-parliamentary support. Every government since the 1980s has made sure to include the opposition in the negotiation of the agreements. This provides for remarkable political certainty, giving the market the confidence for investment.

'If we have a change of government and the opposition comes in, these major agreements still stand,' says Mortensen. 'From an investor point of view, you want to be sure what will happen, or will not happen, in five, six years' time. You can rest assured that the agreements will stand, which is very important. I think this singles out Denmark from most other countries. This has also made it possible for us to have such a high degree of renewables in

our system.'

In 2018, Denmark's centre-right government (political cousins to Australia's Liberal–National coalition, or to the Republican Party in the United States) secured the support of all sitting parties in the parliament for an ambitious new energy agreement. It outlines measures that will see 100 per cent of Denmark's electricity generated from renewable sources by 2030. This means that renewables will contribute 55 per cent of total energy consumption. Key measures in the agreement include three large new offshore wind farms and a complete phasing out of coal in the electricity sector by 2030. There will be fewer onshore wind turbines, as older turbines are upgraded to become more efficient and powerful, and greater emphasis is placed on offshore generation.

It's worth underscoring the significance of this. In a decade, with a credible plan to get there, Denmark's electricity will be generated entirely from renewable sources. By contrast, the European Union has a target of 32 per cent renewables by 2030, the Australian state of Victoria is planning for 50 per cent by 2030, and the US state of California has a target of 60 per cent renewables by 2030.[31]

Mortensen argues that what enables this long-term, bipartisan approach is trust. Trust in others is higher in Denmark than in any other country. Danes' confidence in national government is substantially above the OECD average too.[32] 'If the government comes up with a well-argued idea to do something, there will be some initial scepticism,' Mortensen says. 'But not the scepticism you would see in other countries, where you do not have the same degree of trust in your political system.'

This trust may be aided by the role of public broadcasting. All television stations in Denmark are government-owned, and citizens on both sides of the political divide obtain most of their national news from the same two channels: the Danish Broadcasting Corporation and TV 2 News.[33] The absence of a

fragmented and polarised media is likely more conducive to political consensus. Without media-induced political polarisation, there is scope for constructive debate that can lead to agreement over key national interests. This is a real strength over those countries that have recently seen political fragmentation, such as Australia, the United States and France. In these countries, bipartisan cooperation on policy has proved extremely challenging, and the overall result has tended towards political paralysis.[34]

Denmark's GDP, Gross Energy Consumption and CO_2 Emissions 1990-2017

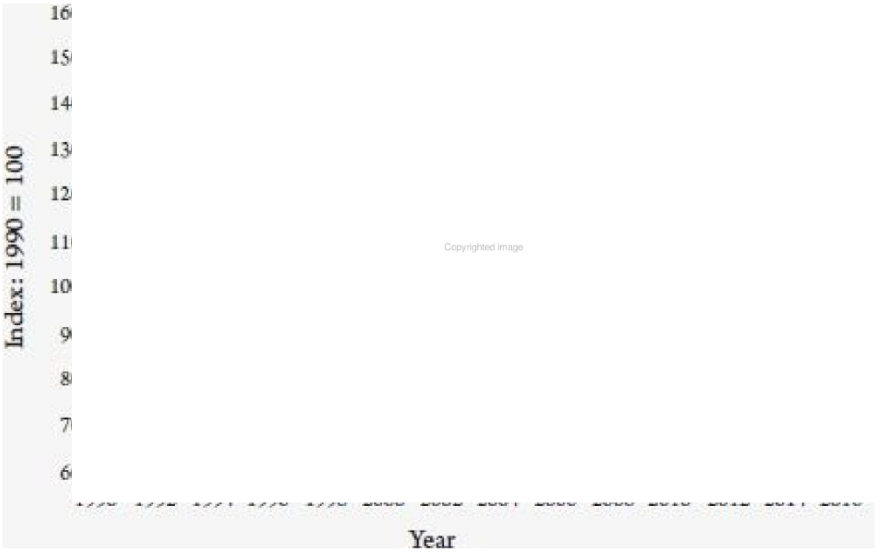

Figure 2. Denmark has seen strong economic growth in recent decades, accompanied by a decline in energy consumption and a huge reduction in carbon emissions.

Denmark's constructive policymaking appears to be working so far. The country is managing the transition to a low-carbon future better than any country in the world. Since 1990, Denmark's economy has grown by about 55 per cent in real terms (around the

same as the European average), while over the same period gross energy consumption has decreased and total greenhouse gas emissions have shrunk by 38 per cent.[35] 'We have been able to decouple economic growth from the use of energy,' Mortensen says.

Building Renewables into the System

The speed at which Denmark is moving to reduce its dependence on fossil fuels is impressive. 'If we look at electricity, about 44 per cent is actually generated from wind today,' Mortensen says. 'It'll be 50 per cent by 2020.' The record figure he refers to – 43.6 per cent of electricity generation from wind in 2017 – is a rapid increase from just 19 per cent in 2009. On particularly windy days, Denmark regularly generates more than 100 per cent of its electricity requirements from wind. At times, wind has even produced up to 140 per cent of electricity demand.[36] When this happens, Denmark exports power to Norway, Germany and Sweden.

The arguments some countries have mounted against wind power do not hold sway in Denmark. According to the Danish Energy Agency, onshore wind is now the cheapest form of electricity generation – cheaper than coal, nuclear or natural gas. Electricity produced by the newest onshore wind plants costs about one US nickel (five cents) per kilowatt hour, far less than the cost of coal.[37] In Australia and the United States, some politicians and think tanks warn of wind's 'unreliability', arguing for coal-or gas-fired generation to 'firm up the system'.[38] But Danes scoff at suggestions that wind power might lead to grid instability and unplanned blackouts. Since 1990, Denmark has been able to maintain continuity of electricity supply 99.99 per cent of the time, ranking it equal first in Europe, along with Switzerland.[39] This equates to the average consumer being without electricity for just nineteen minutes every year. When there are interruptions to the

power supply, they invariably arise from the distribution network. There has never been a blackout due to failure to produce enough electricity.[40]

The stability of Denmark's electricity supply is underpinned by a flexible grid of distributed energy resources, interconnected with the rest of Europe. Grid operator Energinet manages generation and supply for the whole country, and has been central to long-term capacity planning during this transition to renewables. Energinet incorporates weather forecasting into generation, dispatch and control to improve the predictability of natural sources. It also manages ancillary markets that see alternative means of power generation – such as combined heat and power plants, used for district heating – come online when production from renewables is insufficient to meet demand.[41] In many parts of the country, the energy generated from wind and other local sources exceeds demand, meaning local networks become power exporters. The system operates as a web of regional microgrids that can quickly connect or disconnect from the main grid, enabling renewables to be integrated while maintaining reliability of supply.

Denmark's electricity network is connected to Norway, Sweden and Germany by large interconnectors. These countries are part of Nord Pool, a group of nine northern European countries that share electric power. 'If we produce more electricity from wind than we can use – and that happens frequently, for weeks at a time – we can sell it to our neighbouring countries instantly,' Mortensen says. 'Luckily, it seems to be the case that when we are high on wind electricity, they are low on hydropower in Norway, and vice versa. Whenever we're low on wind, we can import electricity from a city in Norway, or from Sweden.'

Aside from providing energy security, Nord Pool also increases the economic value of wind, as it is sold at a predetermined market price. Wind energy has therefore become an important export product for Denmark. Further interconnectors are now planned,

rate is about 50 per cent higher than the European average, and much higher than prices in the United States,[47] although electricity generation costs in Denmark are actually among the lowest in Europe. One analysis shows that 66 per cent of the average Dane's electricity bill goes to taxes and fees, while just 15 per cent pays for the electricity itself, and a further 18 per cent covers the cost of transmission and distribution.[48] But almost all of these taxes on electricity go into general revenue, which helps to fund services such as healthcare, education and aged care. It is not the cost of energy itself that keeps Denmark's electricity prices so high, but a government decision to ensure the nation has a strong social welfare system. Until fairly recently, consumers did also pay an 11 per cent Public Service Obligation, which provided funding for renewable energy such as wind and solar, but this tax has now been abolished. Renewables will instead be funded through general taxes rather than electricity consumption.

Denmark's efforts to reduce its carbon emissions function within the context of the European Union Emissions Trading Scheme. This is a cap-and-trade scheme whereby a maximum (a 'cap') is set on the total number of carbon emissions, and emission credits can be traded. The scheme has been operating – and evolving – since 2005. It has faced a number of challenges and has required modifications. For example, early on, an overly generous cap on emissions meant that no significant emissions reductions were achieved. Nevertheless, the scheme has since had some success. By 2020, the European Union expects to have cut emissions by 20 per cent from 1990 levels.[49] The cost of emissions reductions has been significantly lower than expected – just a fraction of 1 per cent of GDP – and with changes to the mechanism, the cost can potentially be eliminated entirely.

Denmark has not relied on the European emissions trading scheme alone. Government policy – to improve energy efficiency, offer subsidies for renewables and engage communities in turbine ownership – has played a central role in driving the Danish energy

transition. 'The history of Denmark over the past forty-five years shows that you need to have a certain degree of government involvement,' Mortensen says. 'You cannot leave it up to the markets alone.' He believes that the European trading scheme is not yet functioning effectively. 'As long as you don't have an emissions trading scheme that is working properly, you simply need to have something else in place,' Mortensen says. 'It may be a pipe dream, but one day, when you have a carbon tax and an emissions trading scheme in place and working properly, you won't have the need for subsidies.'

While Denmark has made significant progress to reduce emissions from the electricity sector, other sectors have seen less improvement. 'The non-regulated emissions really are the toughest to deal with,' Mortensen says. 'You have buildings, you have agriculture and you have transportation.' Denmark has attempted to address transport emissions by exorbitantly taxing the purchase price of vehicles. 'In Denmark, when you buy a car, you pay for two and a half cars, simply because the taxes are so high.' For vehicles costing up to DKK185,000 (US$29,000), Danes pay a registration tax of 85 per cent. For those worth more than this, the tax is 150 per cent.[50] Although the rate is reduced slightly for fuel-efficient cars, it is still an enormous impost. By contrast, the tax on a vehicle in the United Kingdom is a flat rate of £55 (US$72).

The challenge with such a high rate of vehicle tax is that the government becomes reliant on the revenue it generates. So recently, when the headline rate of vehicle taxation was reduced – from 180 per cent to 150 per cent – the tax was also extended to electric vehicles, which had previously been exempt, in an effort to maintain revenue levels. But sales of electric vehicles plummeted in response, and the government decided to ease the tax for a couple of years.[51] It is grappling with this policy challenge, acutely aware of neighbouring Norway, with some of the world's most generous incentives for electric vehicles.[52] 'It's a really difficult

nut for the Danish politicians to crack,' Mortensen says.

But Danish politicians have made great bounds forward. Through the 2018 energy agreement, all sitting political parties have united behind the goal of ensuring that by 2050, Denmark will have transitioned to 100 per cent renewable fuel sources for all its energy. This means that renewables will completely supply the electricity, heating and transport sectors. The ambition is immense. It means no more coal-fired electricity generation, no more oil boilers for heating, no more petrol-powered cars and no more diesel trucks or tractors. By 2050, Denmark will be independent of fossil fuels.

In 2019, the Danish government took this a step further, adopting a new climate law requiring the country to achieve complete carbon neutrality by 2050. This means zero emissions from the whole economy, including energy, transport, industrial processes, agriculture and waste. It includes a binding commitment to achieve a 70 per cent reduction in emissions by 2030.

What Denmark Can Teach the World

Denmark's experience in addressing carbon emissions provides some illuminating ideas about how we might go about tackling climate change on a global level.

Start Local

Many Danish initiatives have not been about addressing climate change specifically. The phenomenon of a warming globe is an abstract concept that can be difficult to connect with and can lead some to feel overwhelmed or disempowered. The moves to achieve energy independence on Samsø Island and improved liveability in Copenhagen – along with other Danish cities – have been about providing direct benefits to individuals and their communities. Denmark's success in achieving its targets shows that community development and grassroots approaches can foster an engaged

local population, and minimise the social dissent that can result from 'top-down' government interventions.

But Samsø Island is one small community, with less than 4000 people. Copenhagen has a concentrated urban population. Is it realistic to think we could replicate these models across the world? Søren Hermansen is optimistic it can be done, with just a little government assistance. He believes that the success of Samsø Island is 'national policy in practice'. National government support is crucial, but change works best when it is owned and driven by local communities. He says the solution to our energy crisis lies in asking people 'what they are seeking for the future and how they are prepared to help. Make them partners along the way. Harness their ideas and energy.'

Invest in Long-Term Policy for Economic Growth

Denmark is a wealthy country, and over the past decades its economy has grown just as fast as comparable countries. Yet Denmark has shown us that economic growth does not have to rely on increased energy consumption – in fact, growth can be accompanied by huge reductions in emissions. Denmark's experience suggests that it may just be possible to be wealthy *and* save the planet.

Much of Denmark's success can be attributed to the policy certainty that has provided companies with the confidence to invest in technologies to produce cleaner forms of energy and reduce carbon emissions. Given the scale of investment required, and the long lifetimes of electricity generators and other infrastructure, companies are more likely to invest when they have the confidence of long-term, bipartisan-supported energy agreements.

Denmark has also been smart in its methods to raise revenue. It has not relied solely on Europe's imperfect (but vastly improving) emissions trading scheme to fund its success. Instead, Denmark has a long history of taxing energy in order to reduce

consumption. It has also been prepared to directly subsidise renewables and require energy companies to invest in energy efficiency.

Serious responses to climate change require a major shift in global investment patterns towards green infrastructure, such as renewable energy, energy efficiency and sustainable transport. It's critical that adequate finance is available to enable this shift. In the long term, clear and predictable policy frameworks will encourage private investment in low-carbon, climate-resilient options.[53] But unless and until the private sector is investing sufficiently, government needs to lead the way through scaled-up public funding and financial mechanisms. The Danish government partnered with pension funds and other institutional investors to establish the Danish Climate Investment Fund, which provides funding for renewable energy projects in developing countries. Another example is Australia's Clean Energy Finance Corporation, a government-owned 'green bank' that invests in clean-energy projects it deems commercially viable. It aims to deliver a positive return for taxpayers while investing in renewable energy technology.

Encourage More Sustainable Towns and Cities

Every year the world's population is continuing to urbanise. Most people across the globe now live in cities. Denmark has shown the power of municipal governments and councils working within effective national policy to develop attractive, liveable places that are also sustainable. With well-planned and effective transport systems, building regulations and urban planning, cities such as Copenhagen are exemplars of Denmark's success. Cities around the world are taking inspiration from Copenhagen. Melbourne is building 'Copenhagen-style' bicycle lanes on its road network, consultants from Copenhagen are helping to design a cycle network in Kazakhstan, and New York is developing new approaches to becoming more resilient to extreme weather,

standards in residential properties – can achieve reductions in emissions at an extremely low cost and are complementary to a carbon price.

3. **Stop subsidising fossil fuels.** Governments around the world – including wealthy countries in the OECD – spend hundreds of billions of dollars each year subsidising the production and consumption of fossil fuels such as petroleum and natural gas. This directs investment towards carbon-intensive sectors, wasting public funds that could be put to better use. If we're serious about addressing climate change, these subsidies need to stop.

4. **Provide incentives for renewable energy.** Renewable energy incentives such as feed-in tariffs or national targets are important to bring down technology costs and hence the long-term cost of decarbonisation. Some economists argue that when there is a price on carbon, renewable energy incentives distort the market. However, emissions trading schemes in most jurisdictions are far from perfect, and most experts believe that renewable energy incentives are needed even when carbon is priced.

5. **Encourage low-impact methods of transport.** City and local governments are critical in driving change through transport systems, building regulations and urban planning. Cycling has become synonymous with Copenhagen, which has overtaken the Netherlands' Amsterdam and Utrecht as the world's top cycling city. Any community, especially those with a flat topography, can encourage cycling through investment in infrastructure such as dedicated bicycle lanes. Investing in better planned, high-functioning rail, train and bus services will also help to reduce a city's carbon footprint.

2

EDUCATION NATION

How to Better Educate Our Youth

Just fifty years ago, Singapore was an impoverished tropical island with no natural resources, little fresh water and rapid population growth. Its GDP per capita was lower than that of South American countries Chile and Ecuador. Licking its wounds after Japanese occupation during World War II and an ill-fated period as part of Malaysia, Singapore had no compulsory education and only a small number of high-school graduates.[1] With few skilled workers, Singapore faced significant unemployment and a severe housing shortage.

However, in these inauspicious beginnings were the foundations that Singapore built on to achieve the best educational outcomes in the world.

Professor Saravanan Gopinathan's life parallels the story of modern Singapore. Born to migrant parents during the Japanese occupation, Gopinathan went on to become a dominant figure in Singapore's education system, serving for long periods as dean of the School of Education and dean of Initial Teacher Training, and employing new research to revolutionise the way education is delivered. Now an adjunct professor at the Lee Kuan Yew School of Public Policy, he has advised governments around the world. Despite his high profile, when I approach him for an interview he accepts my request enthusiastically, and sends materials for me to

read before we meet. In our phone conversation, he is full of spark, keen to help me understand the journey Singapore has been on.

'The question for post-colonial Singapore was: how could it be viable and credible?' Gopinathan says. 'What could it do to become a nation-state, given that it was small, had no natural resources and had a Chinese population which was viewed with suspicion?'

In the mid-1960s, Singapore, no longer part of Malaysia and with only a small domestic market, sought to shift its economic development strategy away from its role as a trading post and towards the development of an export-oriented manufacturing sector. But to achieve this, the country needed a workforce that was literate and trained.[2]

'This explains the emphasis on education, human capital development, making sure that every child has an opportunity to go to school,' Gopinathan says. 'Because otherwise, we would have nothing.'

Gopinathan was fortunate to study at an English-language school, and he attributes this to much of his subsequent success. 'The social mobility that was available to my family was in part due to an English-speaking education.'

Singapore is a multi-ethnic nation. Today, ethnic Chinese make up about 76 per cent of the population; Malays, 15 per cent; and ethnic Indians, 7.5 per cent.[3] As a consequence, the major languages spoken in Singapore include English, Mandarin, other Chinese dialects, Malay and Tamil.[4] To accommodate this diversity, the government decided several decades ago that English would be the language of instruction, with students also required to study their mother tongue. Over time, this decision has revealed itself to be fortuitous, allowing Singapore to serve as a global business hub in the heart of Asia.

Singapore's ethnic diversity has had other impacts, too. It has led to an intense focus on meritocracy – the belief that people should obtain success or power due to their abilities, not their

money or social position.

'Meritocracy is important as a concept because Singapore left Malaysia in 1965 in part because of ethnic affirmative action,' Gopinathan says. The constitution of Malaysia provides ethnic Malays a 'special position' safeguarded with quotas.[5] 'The Singaporean government said no, we can't go down the route of affirmative action. We can't privilege somebody because they say, "I'm poor because I'm Malay" or "I'm poor because I'm Chinese."'

This decision in the formative stages of modern Singapore's history laid the foundation for an incredible success story. Over just fifty years, Singapore managed to transition from a tiny, third-world island to a wealthy, business-friendly city-state with a high degree of urbanisation and a strong focus on education. Singaporean students now achieve some of the best results in the world, supported by the nation's almost entirely government-run school system. Singapore is near the top of the international education rankings on just about every metric, including reading, science, mathematics and collaborative problem-solving. The average fifteen-year-old reads at a standard a year and a half ahead of their Australian counterparts, and has a skill level in maths three years ahead of students in the United States.[6]

How has Singapore done it?

A gleaming, modern city, Singapore is home to five and a half million people. That's a slightly larger population than Finland or Norway, but squeezed into an area half the size of Greater London, or two-thirds the size of New York City. A South-East Asian finance and trading hub, it is now one of the richest countries in the world, with a GDP per capita higher than Australia or the United States. The World Economic Forum ranks Singapore the most competitive country in the world, with policy settings that are likely to lead to continued high economic growth.[7] According to US-based think tank The Heritage Foundation, it provides among the most economic freedoms in the world (second

only to Hong Kong), with labour, capital and goods able to move freely without government intervention. Transparency International rates Singapore as the third-least-corrupt nation in the world, behind Denmark and New Zealand, and the World Bank ranks Singapore second, after New Zealand, for ease of doing business.[8]

Tax revenue accounts for just 14.1 per cent of GDP, which is about half the rate of countries such as the United States (24.3 per cent), Australia (28.5 per cent) and the United Kingdom (33.5 per cent). Yet when other non-tax revenue is also factored in, such as profits from government-owned enterprises, the difference is not as stark, with the Singaporean government generating revenue equivalent to 23.3 per cent of GDP.[9] Tax rates might be low, but given Singapore's significant wealth, the government actually generates more revenue per person than Australia.[10]

While Singapore is a low-taxing free market country, government plays a huge role. The public sector is used as both an investor and a catalyst for economic development and innovation. 'Government-linked corporations' are found in sectors such as shipbuilding, air transport and development banking; companies such as Singapore Airlines and Singtel owe their success to the role of government funding. Temasek, the state-owned investment fund, had revenue equal to US$75 billion in 2016, or more than 18 per cent of Singapore's GDP that year.[11] Over 80 per cent of Singaporeans live in public housing,[12] and the government more or less runs all of Singapore's schools. (Government involvement does not mean a strong democracy, though. With a political system dominated by one party since 1959, the Economist Intelligence Unit Democracy Index considers Singapore a 'flawed democracy': it scores highly for government functioning but poorly on 'electoral process and pluralism'.[13]

Education in Singapore is well funded, with US$109,060 spent on the education of each child between the ages of six and fifteen.

PISA Scores, Maths and Literacy, 2018

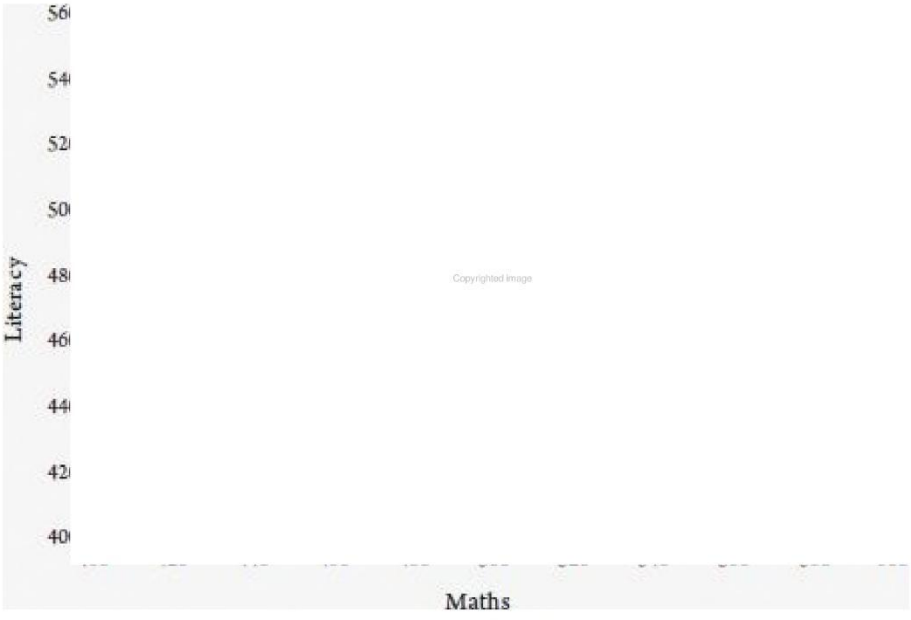

Figure 3. Singapore streaks ahead in student performance, with their students years ahead of those in countries such as Australia, the United Kingdom and the United States.

More than 49 per cent of Singaporean students are among the top performers globally in reading, mathematics or science. No other country comes close. For comparison, the rate in Finland is 21 per cent, Canada is 24.1 per cent and Australia is 18.9 per cent.[18] Sixty per cent of young adults (aged twenty-six to thirty-five) in Singapore have achieved a better level of education than their parents. This rate is higher than any country in the OECD, and the highest of any country surveyed.[19]

And if you think that education in Singapore might be all about rote learning, note that Singaporean students also perform higher than students in any other country in 'collaborative problem solving', which is measured by students' ability to work with two or more people to try to solve a problem.[20] Singapore's education system places great emphasis on collaboration, both in and out of

the classroom. It incorporates co-curricular activities such as spelling bees, school plays, writing competitions and chess clubs, as well as group project work and applied learning programs, where students put the knowledge they have learnt in the classroom to use in practical situations. As the OECD's director for education and skills, Andreas Schleicher, notes, Singapore demonstrates that 'strong academic performance does not have to come at the expense of weaker social skills'.[21]

Singapore's performance in education is a central pillar of its national development agenda. 'One of the reasons Singapore does so well economically is that it's able to signal to investors that it's got a really high-quality labour force,' Hogan says. 'Singapore doesn't have natural resources, it can't farm, it can't dig gold out of the ground, so it invests heavily in human capital. The government emphasises it, the community supports it, and they want a system that will give everyone a shot at doing well.'

A Government School System

Singapore's success is fundamentally a story of its government school system. As Figure 4 shows, 98.5 per cent of Singaporean students are enrolled in public schools.[22] The small number of private schools in Singapore generally admit expatriate students rather than locals.

Percentage of Students in Government Schools

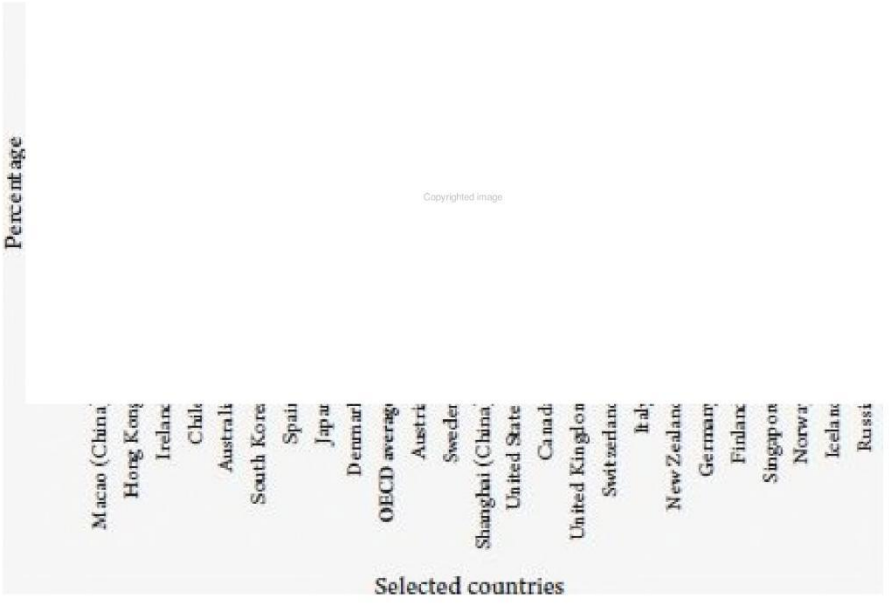

Figure 4. Singapore is a good-news story for government schools. A strong, well-funded public education sector can lead to remarkable results.

By contrast, only 61 per cent of Australians are enrolled in government schools, with large numbers attending Catholic or independent private schools, which charge annual fees of up to US$28,000 per student.

Singapore's system of exams can be brutal, stratifying students into winners and losers at an early age. Yet at its heart is a genuine attempt at meritocracy, and it is arguably fairer than education systems in countries such as Australia, the United Kingdom or the United States, which effectively stratify students into different types of schools, colleges or universities based on their family's ability to pay. The Singaporean notion is that whether you are rich or poor, or whether you are ethnic Chinese, Malay or Indian, the state will support you, and you have a chance to 'make it'.

'The government will commit itself to providing the basic social infrastructure that you need to get ahead in Singapore,' Saravanan Gopinathan says. 'But the rest is up to you. So you have

got to be able to put in the effort. The family has got to be able to put in the effort, and the examinations will show who has managed to meet the requirements of the system.'

Singapore's lack of investment in private schools is sensible, and consistent with the evidence of student performance from across the globe. After analysing results from countries that take part in the PISA assessment, the OECD concluded that 'there is no evidence to suggest that private schools help to raise the level of performance of the school system as a whole' and that 'countries with a larger share of private schools do not perform better in PISA'.[23]

Similarly, many parents are told that smaller class sizes better facilitate learning, but class sizes in Singapore are among the largest in the world. The average class size in lower secondary school is 35.5 students. This compares with an average of 17.8 students in Finland, 23.9 students in England, 24.7 students in Australia and 27 in the United States.[24]

'In Singapore they do have much larger classes,' David Hogan says. 'However, teachers have a lighter teaching load than Australian teachers. Australian teachers have smaller classes but more classes.'

Although Singaporean teachers are some of the hardest-working in the world, with an average of forty-eight hours per week, they spend just seventeen hours in the classroom. By contrast, Australian teachers spend 18.6 hours, English teachers are in front of the blackboard (or whiteboard) for 19.6 hours, and American teachers spend a whopping 26.8 hours in the classroom, more than in any other country.[25]

The evidence on optimal class size is mixed, and leads to a nuanced debate. In a review of the evidence, the Melbourne Graduate School of Education concluded that a reduction in class size in isolation 'has little effect on student academic performance'. There is some evidence that students – particularly in 'the early primary years, and those who have unsatisfactory

results, language background other than English, or low socioeconomic backgrounds' – learn better in smaller classes. But in order to increase student performance across the board in smaller classes, different teaching methods are needed. There is little research on how to instruct teachers to adapt their teaching practice for smaller class settings.[26]

Rather than invest large sums of money to reduce class sizes – which would yield an uncertain outcome – Singapore has instead opted to focus its investment on teaching. 'Good teachers are a much more important factor,' one Singaporean education expert tells me. 'If we have a very good teacher, that will be much more helpful to all the students in the class than reducing the class size by, say, one or two students.' Or even, potentially, ten or more.

Investment in Teachers

Singapore's educational success has been achieved by investing in a quality teaching force, and by raising the prestige and status of teaching to attract the best graduates.

Associate Professor Ng Pak Tee is the author of the book *Learning from Singapore.* Speaking to me via Skype from his office at Nanyang Technological University, Ng explains that Singapore is recruiting from the top one-third of its secondary-school graduates: 'We are hiring very, very good people into our system, and it seems to be working.'

Ng initially started his career as a teacher. As a young man he obtained a scholarship to the University of Cambridge to study mathematics, and 'returned as a maths teacher'. He went on to become an official in the Ministry of Education, and for the last nineteen or so years he's been at the National Institute of Education.

'One of my main jobs is the training and development of school leaders,' Ng says. To date, he has trained more than half of Singapore's school principals. By the time he retires, it's possible he will have trained every principal in Singapore.

important, and they have a very good understanding about what they need to do. And the curriculum, the pedagogy, the teaching, the staff development, are all well aligned.'

Many education systems struggle to find the balance between centralised direction and autonomy for schools. Ng says that Singapore is 'both highly centralised and highly decentralised at the same time'.

The Ministry of Education summarises this approach with the slogan 'tight-loose-tight'. The first 'tight' is a reference to 'the key, non-negotiable objectives of the education system, the reason why education is funded and is so important,' Saravanan Gopinathan explains. The last 'tight' relates to outcomes. 'That has largely been the examinations that we have had, because they become the indicators of both system performance and individual student performance.' And in between there is the 'loose', which means that schools can have a degree of autonomy in developing their curriculums and teaching methods. 'They can run enrichment classes; they can run remedial classes. They can work the timetable according to cohort characteristics. So, it is at the individual school level that the autonomy part comes into play.'

To make this work effectively, there's an intriguing cultural aspect to school leadership. 'A principal in Singapore has two identities,' Ng says. 'One, you are indeed the leader of a local school, so you work with all of your teachers, parents and students. Two, you are also a national leader. That is to say you are, together with other principals, a fraternity of leaders for our system.' Clusters of ten to fourteen schools are led by a superintendent. Every month, principals in each cluster gather together, providing an opportunity to discuss challenges, brainstorm solutions and collaborate.[35] As Singapore has 'one united system', Ng says that 'what one does in one school actually has an effect on other schools. Teachers, educators, school leaders, we are all nation-builders.'

Learning from Around the World

As a young, small, business-oriented nation in one of the world's most strategic locations, Singapore is inherently international in its outlook. The Malaysian city of Johor Bahru is just 1 kilometre away from Singapore's shores, across the Straits of Johor; the country has no domestic flights, so every flight to and from Changi Airport is international; and 45 per cent of the population was born overseas.[36] In Singapore, it is almost impossible *not* to engage internationally.

That is a perspective it brings to its education system, too. 'Singapore basically says, "We will learn from the world,"' Saravanan Gopinathan says. 'But we are confident that we will need to learn how to adapt things for our needs. So it's not copying, it's not borrowing. It's a process of internalising, learning, adapting.' In recent years, Singapore has drawn from the experiences of Australia, the United Kingdom, Hong Kong and the United States to inform the development of its early childhood education and care system.[37]

David Hogan says that in Singapore, 'anyone who is a manager or above will travel overseas at least two or three times a year, and at a senior level, four to five times a year, to go and see what's going on' in education around the world. This is usually not just a quick visit, but several days or weeks spent exploring initiatives in classrooms. 'So they are really focused on learning and adapting initiatives that would work in the Singapore context.' School principals who have served for at least six years are eligible to take one-year sabbaticals on full pay. This allows them to make international study visits, conduct research, write books or undertake further training. The Building Educational Bridges program, which is run by the National Institute of Education together with counterparts in the United Kingdom and Denmark, also offers school leaders the opportunity to spend two weeks exploring 'key leadership issues in national and international contexts'.[38]

Evidence-based policymaking underpins Singapore's approach to education, and substantial national investment is made in educational research. Reforms are tested and outcomes are carefully monitored. The Office of Education Research – which Hogan previously led – has a significant pool of grant funds for researchers in the Ministry of Education, the National Institute of Education and universities. Hogan says that when he was there, the research budget was 'about $150 million' (US$110 million). This approach to evidence-based policy was partially a function of 'outstanding leadership and management from the minister on down'. 'They are really informed,' Hogan says. 'They are willing to learn, they are highly strategic, they invest money – lots of money – in research and in strategic learning and adaptation.'

Singapore's educational research covers an enormous field – from teacher training to better support students on the autism spectrum through to engaging students via social media. A recent study undertaken in collaboration with schools looked at how to encourage a reading culture within individual school communities. This led to incremental changes, such as the way books are displayed in school libraries, and new methods to encourage students and teachers to recommend books to other students. Another research project tested the potential of software that allows students to work collaboratively to create 3D models from sketches. By allowing students to immerse themselves in a game-based virtual world, they learn 'by exploring, collaborating, being, building, championing and expressing'.[39]

There have been enormous improvements in educational outcomes across the world in the last few decades. The World Bank reports that the global youth literacy rate has increased from 77.6 per cent in 1976 to 91.4 per cent in 2016. Over the same period, the adult literacy rate has increased from 68.9 per cent to 86.2 per cent.[40]

But challenges remain. Across the world, there are still 750 million children and adults who cannot read and write. This

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