**At the end of the second world war our forebears had got used to rationing, which continued here in the UK until nineteen-fifty-four, and they’d become experts in the practice of ‘make do and mend’. Products were built to last a lifetime, and almost nothing was thrown away. Then the Madmen of Madison Avenue came along and started working alongside the fossil fuel industry to literally teach a very reluctant public how to jettison perfectly serviceable items and embrace a bright new disposable world based largely around new-fangled stuff like single use plastics. That profligacy quickly crept into energy use too. Fossil fuels were so cheap and abundant that we could afford to run gas guzzling V8 engines that did about four gallons to the mile and build houses out of a few bits of stiff card and duct tape, because “who cares if all the heat escapes outside – there’s plenty more where that came from, isn’t there?**

**That’s all changed now though, hasn’t it? Our global leaders tell us they’re driving changes in industry, transport and commerce that will radically improve energy efficiency in the march towards our twenty fifty global net zero target.**

**But as many of you folks have pointed out to me over the years, there’s this really annoying effect called the Jevons Paradox, which in essence says that whenever we humans are gifted a way of making something cheaper and more efficient, we tend to consume more of that thing, so the overall rate of energy consumption remains roughly the same.**

**So, can energy efficiency improvements really make a difference in our global decarbonisation challenge?**

**Hello and welcome to Just Have a Think,**

**Here’s a stat for you, courtesy of the US Environmental Defense Fund. Americans spend three hundred and fifty billion dollars a year on electricity, and three quarters of that money doesn’t buy any electrons at all. It simply subsidises inefficiency, mainly because two thirds of primary energy production never reaches the homes, commercial buildings and industrial facilities of the nation. It’s simply vented as waste heat at fossil fuel fired power plants. Apart from the obvious financial daftness of such profligacy, it also means the vast majority of carbon emissions that result from the creation of electrical power could be completely avoided if our societies were set up differently.**

**So, is anyone crunching the global numbers and offering an assessment of how we can improve things in future then?**

**Well, it might not surprise regular viewers of this channel to learn that the most prominent team of industry analysts doing this kind of work is the good old International Energy Agency.**

**I use their data a lot, as you know, not because I’m ideologically wedded to their point of view, but simply because, as far as I can tell, they are the most thorough, data driven organisation in the field and their reports are not only respected but carefully listened to by major operators across all industrial and commercial sectors.**

**And haven’t they been busy in twenty-twenty-three? Their latest offering is the Energy Efficiency Report, which was published just before the recent COP 28 climate conference started.**

**The numbers in here are based largely on a metric called Energy Intensity. It’s apparently what the industry boffins use as a measure of energy efficiency in the global economy. Each country gets a number representing the ratio of total energy supply to gross domestic product or GDP as measured in megajoules per thousand US dollars of so-called Purchasing Power Parity or PPP.**

**So, a higher energy intensity number indicates a combination of higher consumption and lower efficiency in that country or region.**

**Russia gets the wooden spoon for the highest number, and therefore the most rubbish effort at keeping up with the rest of the world. I’m guessing that won’t come as a complete shock to you, given the events of recent years. But you do have to look at the X-axis as well, which represents the real-world size of a country’s energy use, as measured in Exajoules. And as a reference, one exajoule is roughly the equivalent of about a hundred and sixty-three million barrels of crude oil. So, although Russia’s energy intensity is unhelpfully high, their overall energy consumption is relatively small compared to somewhere like China, which currently represents twenty-five percent of total global energy demand, followed by the US at fourteen percent and the European Union at nine percent.**

**The IEA explains that there’s a lot of variation in energy intensity from one economy to another for reasons that don’t necessarily include negligence or incompetence. Very cold or very hot countries have higher intensity levels because of their greater warming or cooling demands, and China gets a small amount of dispensation in the report because, as the IEA points out, it has become the world’s de facto manufacturing hub. So, most of us western countries have sent most of our manufacturing energy consumption and carbon emissions over to our friends in the Far East to deal with.**

**Globally though, the data show that since the start of the energy crisis in early twenty-twenty-two there’s been a major escalation in action, with countries representing seventy percent of global energy demand introducing or significantly strengthening efficiency policy packages. Investment in energy efficiency is up forty-five percent since twenty-twenty. There’s particularly strong growth in the private transport sector with almost one in every five cars sold today being electric, and there are equally encouraging signs in domestic heating, with heat pump sales now outpacing gas boilers in many markets.**

**And, while we’re throwing statistics around, here’s another one for you. According to IEA analysis, a doubling of energy efficiency improvements from two percent per year to four percent per year would reduce energy bills in advanced countries by about a third and contribute no less than fifty percent of required CO2 reductions by 2030.**

**“that’s why for years I have nicknamed it the primary fuel. For the IEA it is, the primary fuel is energy efficiency”**

**The European Union managed an EIGHT percent improvement in energy intensity in twenty-twenty-two and is on track for another five percent improvement this year. The United States is on track for a four percent improvement.**

**China’s strong post-pandemic resurgence of around five percent GDP growth has brought about a very well publicised rebound in energy demand there though, and despite installing more wind and solar every years than just about all the other countries combined, China’s recent growth has nevertheless been far more coal powered than anyone would really have preferred. So, unfortunately, they’ve brought the global batting average down a bit, which in plain English means average global energy intensity will reduce by only one point three percent in twenty-twenty-three compared to two percent last year.**

**Which is irritating.**

**But let’s just jump back to those green technology increases for a moment.**

**Adoption of electric mobility and heating is opening up opportunities for new levels of energy efficiency, say the IEA.**

**Global sales of internal combustion engine cars apparently peaked back in twenty-seventeen, with sales of two-and three-wheeled gas guzzlers peaking a year later, and even diesel truck sales hitting their ultimate height in twenty-nineteen. The result of all that is that global gasoline demand is expected to stabilise at around twenty-seven million barrels a day this year. And even when you factor in all DIESEL-powered vehicles, which drags in the majority of big trucks and buses, the overall combustible fuel demand for road transport will reach a peak of forty-five million barrels per day by twenty-twenty-five.**

**Residential gas demand for home heating has already either peaked, plateaued or is declining in thirty-four of the seventy-eight countries that make up half of all global demand, according to this research. In Europe, residential AND commercial gas demand dropped more than fifteen percent last year compared to twenty-twenty-one, clearly accelerated by Russia’s invasion of Ukraine.**

**And of course, renewables are grabbing a rapidly increasing share of grid electricity production as well. Just as an example, Bloomberg NEF recently published this chart showing that global installations of solar PV doubled in the last eighteen months.**

**All of this, says the IEA, means the energy story is shifting from governments a decade ago telling end users like you and me to use more LED light bulbs and switch stuff off of an evening, because the fossil fuel industry had told THEM that it was basically all OUR fault and nothing to do with those nice rich men who run the oil and gas companies, to an absolutely fundamental paradigm shift in the entire energy supply chain today, with smart devices and meters and a so-called internet of everything enabling demand flexibility alongside the optimisation of variable renewable resources. In those grid systems where this kind of intelligent whole system thinking has been adopted, early evidence suggests that energy bill savings of up to a third are indeed now available.**

**But Mr Jevons and his inconvenient paradox do still creep into the mix even today, not necessarily because of consumer profligacy this time, but largely because of our changing climate.**

**Twenty-twenty-three will be the warmest year ever recorded, and that threatens to trigger a vicious cycle of both higher electricity use and higher carbon emissions in the hottest regions of the planet, which are often in developing nations that don’t yet have the luxury of massive dollops of wind and solar on their electricity grids, and who still rely very heavily on fossil fuel fired power stations.**

**Heat waves can also worsen health disparities, reduce productivity, raise electricity costs, disrupt essential services, and drive migration. Extreme heat puts strains on electricity systems, requiring substantial investments in grid infrastructure and power generation, and it saddles consumers with high cooling costs, especially for the most vulnerable.**

**The report found that sustained average daily temperatures of thirty degrees Celsius in China resulted in a sixteen percent increase in sales of air conditioners between May and September this year.**

**Over in the States, data shows that every one degree increase above twenty-four degrees Celsius in average daily temperatures in Texas results in a four percent increase in electricity demand there, compared to only a two percent equivalent rise in India, where far fewer people can afford air conditioners.**

**The report concludes, unsurprisingly, that international efforts, including those at COP28, have a major role to play in shaping future energy efficiency and demand pathways.**

**In most sectors, governments can make rapid progress towards doubling their energy intensity reduction rate simply by enacting existing policies properly and accelerating the deployment of already-available technologies. I know I mocked the old LED lamps a bit earlier on, but the fact is that lighting standards in the European Union, India, Japan, South Africa and the United Kingdom are already at, or in excess of the level set out in the global Net Zero Emissions Scenario, and similar improvements are being seen in electric motors, air compressors, vehicle standards and building regulations, all of which have a good chance of getting us to that four percent per year improvement in energy intensity – the consequence of which would be a reduction in CO2 emissions of seven billion tonnes a year, or about half of all required emissions reductions this decade, AND, according to the IEA data, it would result in something like four and a half million more jobs in energy efficiency across sectors including manufacturing, building renovations, construction, heavy industry and transport.**

**So, where will the other fifty percent of energy savings come from Dave, I hear you ask? Well, that’s an entire video in its own right isn’t it. Here’s a hint…**

**And rest assured, I will be tackling that apparently contentious issue in the not-too distant future. So, stay tuned!**

**In the meantime, if you’re looking for ways to improve your won energy efficiency, then you might enjoy this video that I made on that subject a couple of years ago.**

**And of course, if you’ve got any useful hints and tips, or great energy saving ideas that have worked well for you, then why not jump down to the comments section below and share your thoughts there. That’s it for this week though.**

**Thanks, as always, to our Patreon supporters, who keep ads and sponsorship messages out of all of these programs. And an extra special thank you to the folk whose names are scrolling up the screen beside me here, all of whom celebrate an anniversary of Patreon support in December.**

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**And you can hugely support the channel right here on YouTube absolutely for free by subscribing and hitting the like button. It won’t cost you a penny to do that, and it’s just a simple mouse click away, either down there somewhere, or on that icon there.**

**As always, thanks very much for watching! Have a great week, and remember to just have a think.**

**See you next week.**