

Ivent Solutions Market Trend Update

September 2022



China on Track to Double Solar Panel Output

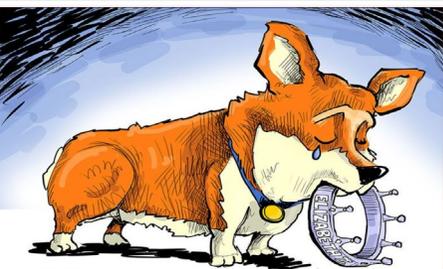
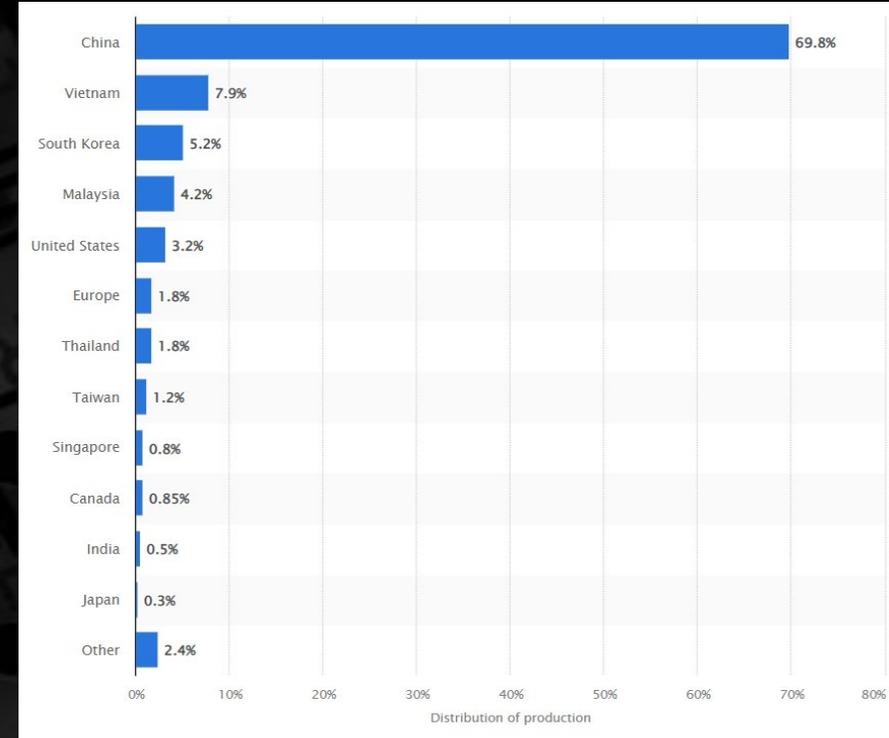
China will add enough new solar power this year to nearly double last year's record number of installations as the country accelerates its clean energy drives.

The nation is set to add 108 gigawatts of solar power to the grid this year, up from 54.88 gigawatts in 2021, state-owned CCTV reported on Monday, citing the National Energy Administration. There are 121 gigawatts of solar projects currently under construction, the NEA said. China currently has the world's largest renewable power fleet with 323 gigawatts of solar and 338 gigawatts of wind. President Xi Jinping is aiming for 1,200 gigawatts combined by 2030, but rapid deployment means the country is likely to reach the target years early.



Distribution of Solar PV Production Worldwide

China still dominates global production of PV cells well through 2022, and is expected to maintain its dominance long-term.



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340 Reactors Worth of Solar Cell Plants in the Pipeline!

Chinese solar panel manufacturers are building, or planning to build, new production facilities that will add combined annual output capacity equivalent to 340 nuclear reactors. This is due to investors being buoyed by strong global demand and new mass-production technologies. "We will double our shipments every year," said Tang Jun, president of Changzhou EGing Photovoltaic Technology. Last year, the midsized player delivered 2.6GW worth of solar panels, with the figure expected to rise to 5GW this year and up to 10GW in 2023. Generally speaking, one gigawatt is the power output of a typical reactor, so from next year its solar cell deliveries would be



equivalent to EGing installing 10 nuclear facilities each year. Solar cell manufacturing is driven by capacity. As bigger production volumes drive down the cost per unit, all players pursue economies of scale. There is also a technological factor. Up until last year, so-called p-type cells were the mainstream due to their superior cost competitiveness. But n-type cells, which generate electricity more efficiently than p-types, are now being mass produced at a lower cost. Anticipating that clients will switch to n-types, solar panel makers are ramping up capital investments to stay ahead of the curve.



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Longi Green Energy Technology, the world's biggest solar panel manufacturer, is building new plants in four locations at a cost topping 10 billion yuan (USD1.44 billion). Trina Solar, which is already building plants in Jiangsu province and elsewhere, has started constructing another plant in the Qinghai province. The plant will produce 10GW of solar panels and cells each year once construction is completed by the end of 2025. JA Solar Technology, the third-largest player in the industry, is spending over 17 billion yuan (USD2.4 billion) on production facilities in Anhui province and in Vietnam.

Altogether, China's solar cell industry is either planning or has started construction on at least **340GW** worth of additional capacity as of June, according to an analysis by Great Wall Glory Securities. The data covers forthcoming facilities that use production processes for n-type cells. Out of China's power-generation capacity totaling 2,380GW last year, 307GW came from solar, according to the China Electric Power Planning & Engineering Institute, a state-backed think tank. If all the solar panel plants in the pipeline are finished, new output would easily overtake 2021's solar power output each year. Solar power is very much enjoying tail winds at present! The sector is on track to produce 33% of the world's electricity by mid-century, according to the International Energy Agency, putting it second only behind wind power's 35%.

Globally, newly installed solar power capacity will surpass 300GW in 2025, according to the China Photovoltaic Industry Association, with China accounting for over 30%. The sharp rise in demand at home and abroad will be a huge boon to the country's manufacturers, which already account for more than 80% of worldwide production. The market expansion is pushing startups into the sector. Cando-solar Photoelectric Technology, which launched last year, developed a solar module that reduces unit production costs by 0.2 yuan per watt produced. Cando Solar has raised funds from multiple backers, including an angel investor. "We plan to soon build a 1-gigawatt mass production line," said Chairman and CEO Huang Qiang.

The aggressive investment race is expected to drive down global prices for solar panels through increased supply. The downward pressure on prices has been a source of friction between the U.S. and China, potentially helping President Xi Jinping politically. Former U.S. President Donald Trump imposed safeguard tariffs on Chinese-made solar panels in 2018 and President Joe Biden extended the measures in February. Earlier this month, the House of Representatives passed the Inflation Reduction Act, a spending bill that would accelerate the transition to clean energy by encouraging investments in the U.S. China's share of solar panels imports to the U.S. was virtually zero last year. However, some Chinese solar cells do reach U.S. shores by way of Southeast Asia, critics say. This means the U.S. solar power industry is not entirely immune to China's investment blitz.



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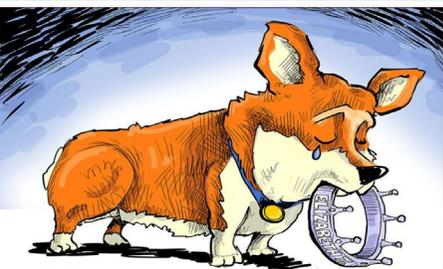
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Solar cells are also subject to rapid cycles of technological innovation. Suntech Power became the first Chinese company to take the global lead in 2010, only to go bankrupt in 2013. Another Chinese maker, Yingli Green Energy, took the top spot in 2012, then saw a financial crunch in 2014. Despite the promising demand for solar, the fierce investment race is leaving manufacturers financially vulnerable. Six out of 11 solar panel makers listed on the mainland suffered net losses last year, according to Chinese analytics firm Wind. The focus on scale instead of profitability may end up forcing out a number of enterprises and redrawing the industrial landscape.

Solar Panel Farms in China

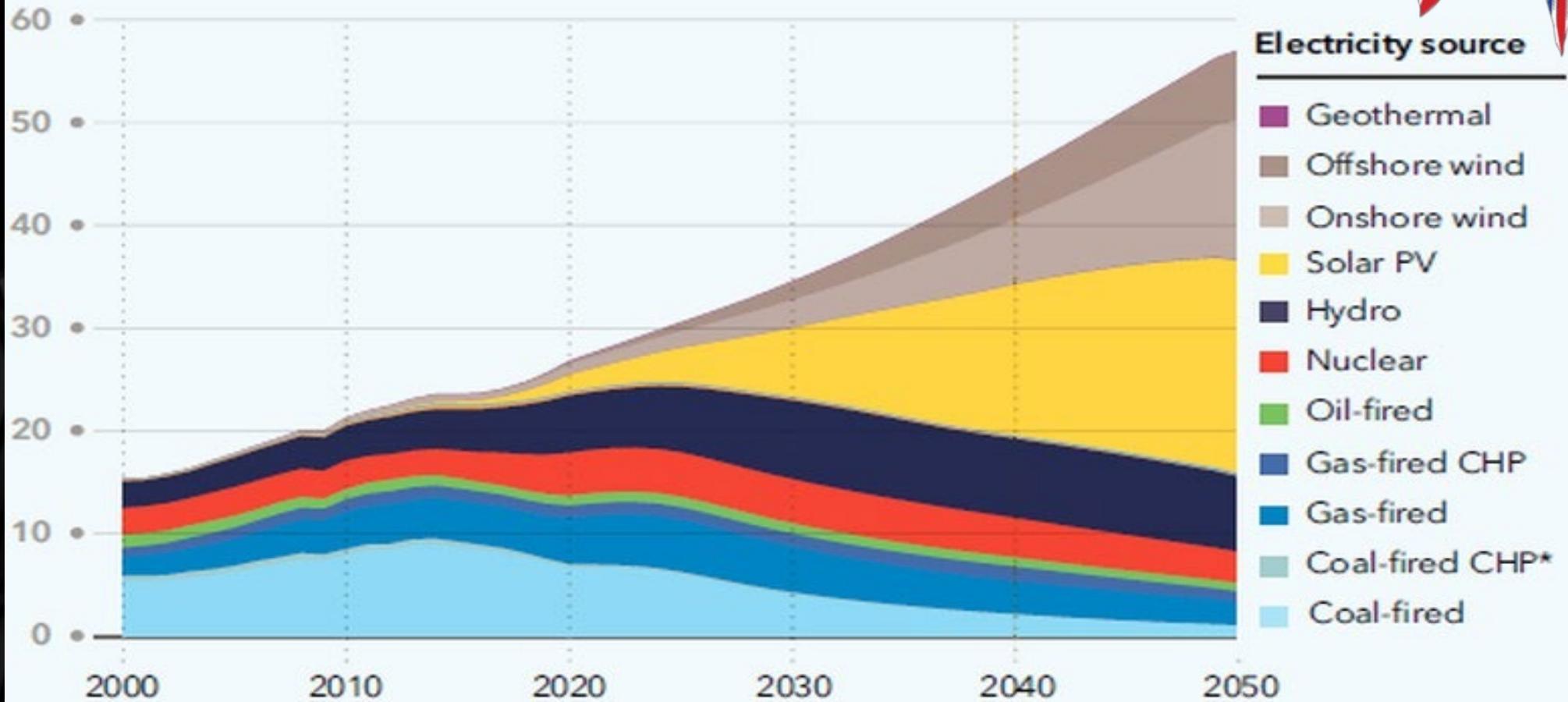


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WORLD ELECTRICITY GENERATION BY SOURCE

Units: PWh/yr



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Memory Market Collapse to Propel TSMC to Top Spot in 3Q22 IC Ranking

C Insights reduced its worldwide IC market growth forecast for 2022 from 11% to 7% in its August Quarterly Update to The McClean Report. The downgraded expectation for this year is almost entirely due to the collapse of the memory market in the second half of 2022. As discussed below, it was as though someone “flipped a switch” to the off position for the memory market beginning in June! The few memory companies that have made statements about the recent developments in the memory market have attributed the swift downturn to a massive inventory adjustment currently underway by their customers. Moreover, most expect this inventory adjustment period to extend into at least early 2023. The following statements and data from a few of the memory suppliers yield some insight into how fast the market has changed over the past couple of months:

- Taiwan-based Nanya is a relatively minor player in the global DRAM market, but its monthly sales data provides some insight into how swiftly the DRAM market can shift gears from boom to bust. As shown in this chart ->, the company’s August 2022 DRAM sales, when shown in U.S. dollars, were 39% of what they were in August 2021 and down 53% from March’s sales, just five months ago!
- When Micron’s fiscal 3Q ended in May, the company gave an early warning of the trouble that was brewing in the memory market. Although the company’s fiscal 3Q sales were solid, it presented 4Q (ending in August) sales guidance of -17%. Moreover, Micron revised this figure to at least a 21% drop in sales for its fiscal quarter that ended in August.
- In its 2Q conference call, major NAND flash memory supplier Western Digital commented that the inventory adjustment currently underway is “definitely very, very sharp in the quarter we are in (3Q22).” Western Digital’s outlook is for a company-wide sales decline of 18% this quarter. With hard disk drives (HDDs) making up about half of the company’s sales and expected to show only a modest decline in 3Q, IC Insights believes that its NAND flash business is likely to register a drop of at least 20% this quarter.



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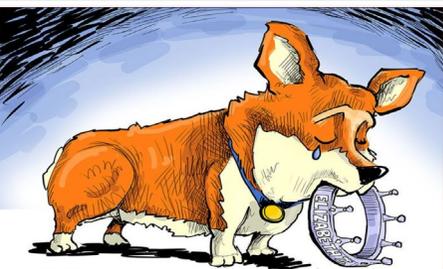
With the memory market currently in a free-fall, IC Insights expects foundry giant Taiwan Semiconductor Manufacturing Co. Ltd (TSMC) to surpass Samsung and take over the top spot in the semiconductor company sales ranking in 3Q22 (chart below). As shown, Intel is expected to move to the third position in the ranking with 3Q22 sales that are 26% less than TSMC's. Illustrating the swiftness of TSMC's rise to the top, TSMC was ranked as the third largest semiconductor supplier in the world in 2021 and had sales that were 31% less than Samsung...

The sheer magnitude of TSMC's semiconductor sales comes more into focus when one considers the "final" sales of company. The "final" sales figure for a pure-play foundry like TSMC is about 2x the total foundry sales number. The 2x multiplier estimates the semiconductor sales amount sold to the final customer (i.e., the electronic system producer). For example, fabless company AMD purchases processors from TSMC but AMD is not the final end-user of these devices. AMD resells these processors to electronic system producers at a much higher price than it paid TSMC for the parts. As a result, a 2x multiplier, which assumes a 50% gross margin for the foundry's customers (e.g., AMD), can be used to arrive at a "final" semiconductor market sales figure for TSMC.

Using a "final" sales figure estimate for TSMC puts its 2021 semiconductor sales at \$113.7 billion and \$40.4 billion for 3Q22! To put the company's "final" 2021 semiconductor sales figure into perspective, at \$113.7 billion, TSMC's "final" sales are estimated to have represented 18.5% of the world's semiconductor market last year. Moreover, IC Insights believes that this percentage has a good chance of rising to 25% in 3Q22. Another good reason for us to watch closely the relationship (or lack thereof) between the Peoples Republic of China and the Republic of China!

Top-3 Semiconductor Sales Leaders Forecast for 3Q22

| 3Q22F Rank | Company | Headquarters | 2021 Total Semi | 2Q22 Total Semi | 3Q22F Total Semi | 3Q/2Q % Change |
|------------|---------|--------------|-----------------|-----------------|------------------|----------------|
| 1 | TSMC | Taiwan | 56,840 | 18,164 | 20,200 | 11% |
| 2 | Samsung | South Korea | 82,019 | 22,623 | 18,290 | -19% |
| 3 | Intel | U.S. | 76,742 | 14,861 | 15,040 | 1% |
| — | Total | | 215,601 | 55,648 | 53,530 | -4% |



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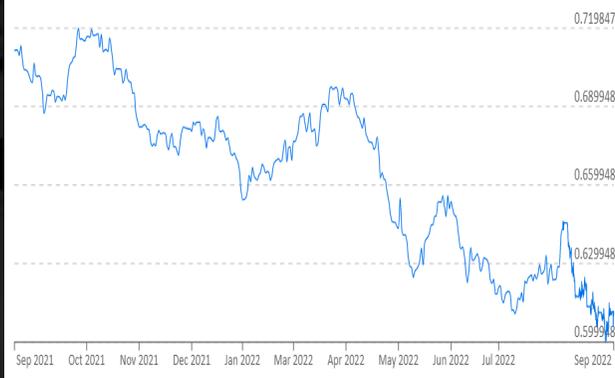
September 2022



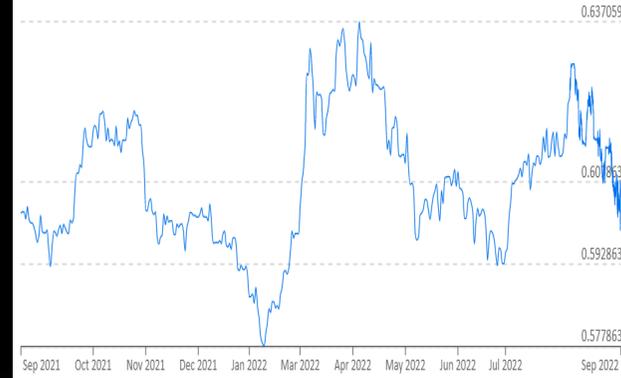
NZD versus AUD - AU\$0.895 vs NZ\$1.00 ↓



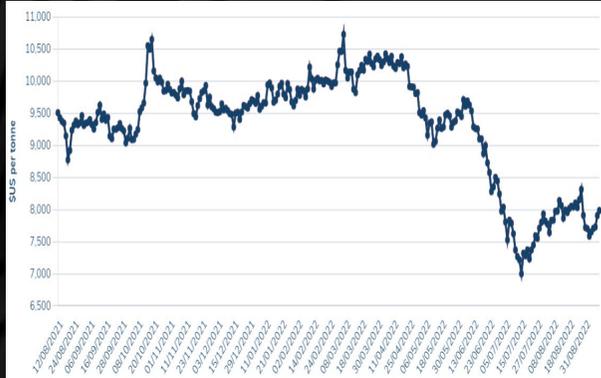
NZD versus USD - US\$0.610 vs NZ\$1.00 ↓



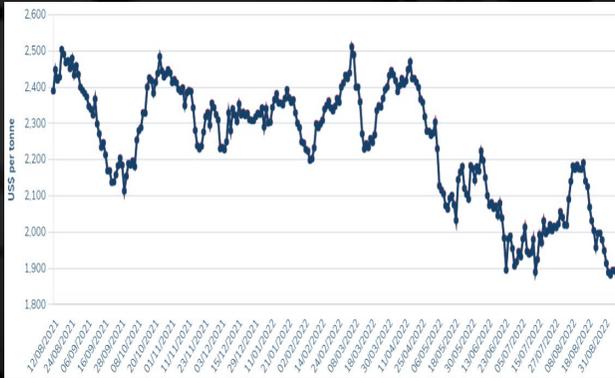
NZD versus EUR - EU\$0.605 vs NZ\$1.00 ↓



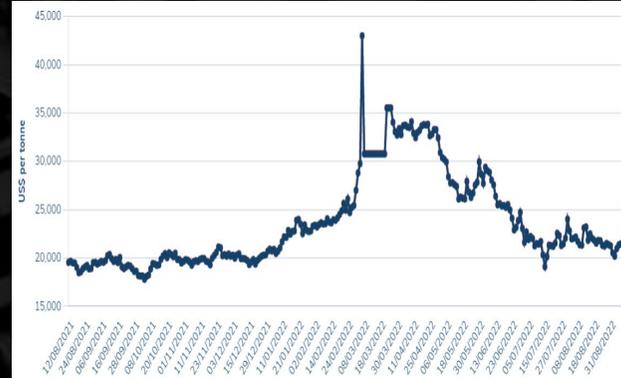
Copper - USD8100 / tonne ↑



Lead - USD1900 / tonne ↓



Nickel - USD22500 / tonne ↑



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This Month in Tech History...



September 12, 1958 – Researcher Jack Kilby demonstrates the first integrated circuit to other researchers and executives at Texas Instruments.

September 25, 1973 – Micro Computer Machines of Canada introduces their MCM/70 microcomputer at a programmer's user conference in Toronto. Possibly the earliest commercially manufactured device that can now be considered a personal computer, the MCM/70 gained customers at companies such as Chevron, Mutual Life Insurance, NASA, and the US Army. The company worked closely with Intel on the design of their computer and made very early use of the Intel 8008 processor, of which the basic design was used for the future Intel 8086.

September 26, 1973 – The supersonic aircraft Concorde makes its first non-stop Atlantic crossing and sets a new speed record in the process. Flying from Washington D.C. to Paris, France in 3 hours 32 minutes at an average speed of 954 miles-per-hour (1526km/h), the Concorde cut the old speed record in half.

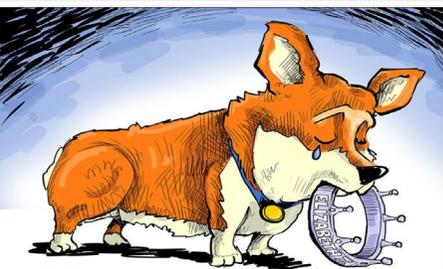
September 30, 1980 – Digital, Intel, and Xerox release version 1.0 of the Ethernet specification, known as the "Blue Book". Since that time, Ethernet has evolved into the de facto networking standard for local area networks (LAN) in businesses and in the home.

September 3, 1995 – eBay launched. Founded as "AuctionWeb", eBay began as a hobby for programmer Pierre Omidyar, who launched the website after spending Labor Day weekend home coding the site. The first item put up for auction was Omidyar's broken laser pointer. He set the starting bid at one dollar. About a week later, he sold the item for \$14.83 to Canadian collector Mark Fraser. AuctionWeb took off immediately. It was the first online auction website that facilitated one-on-one transactions between individuals.

September 27, 1998 – For some peculiar reason, Google has at times chosen the date of September 27th as their birthday, even though it is more officially September 4th or 7th. Google has no explanation for celebrating their birthday on different days over the years other than to say: "Google opened its doors in *September* 1998. The exact date when we celebrate our birthday has moved around over the years, depending on when people feel like having cake".

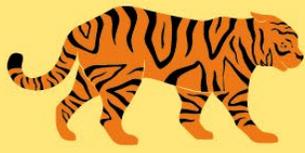
September 21, 2003 – After fourteen years in space, eight of those as the first man-made object orbiting Jupiter, the unmanned NASA spacecraft Galileo is sent into the atmosphere of the giant planet. NASA decided to end Galileo's mission in this manner in order to avoid any possibility of it colliding with one of Jupiter's moons and potentially contaminating it with bacteria from Earth. How sanitary of them... 🌀

September 23, 2008 – Google and T-Mobile introduce the T-Mobile G1 (also known as the HTC Dream), the world's first Android-based smartphone. By raw sales numbers, today Android is the world's most popular smartphone platform. Hard to believe that Android didn't exist only 14 years ago...



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CHINA HOLIDAYS 2022



JANUARY

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FEBRUARY

Chinese New Year

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Lantern Festival

MARCH

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APRIL

Qingming Festival

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MAY

May Day

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Dragon Boat Festival

JULY

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AUGUST

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SEPTEMBER

Mid-Autumn Festival

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OCTOBER

National Day (Golden Week)

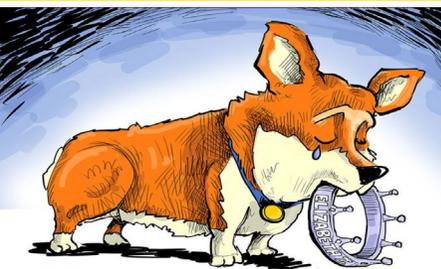
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NOVEMBER

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DECEMBER

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