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SPECIAL ISSUE MARCH WEEK 3




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Special Issue
March (Week 3)

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All you need to know about Covovax vaccine

(Source: [Indian Express](#))

Context: *Serum Institute of India (SII) CEO Adar Poonawalla said this week that the company planned to start its bridging study of the Covovax vaccine “soon”. It will also be stockpiling doses of the vaccine starting April.*

What is Covovax?

- This is SII’s version of NVX-CoV2373, the protein-based Covid-19 vaccine developed by Novavax, headquartered in USA.
- In August 2020, the two companies announced an agreement under which Novavax had given SII the licence to manufacture and supply the vaccine in low- and middle-income countries as well as India. The agreement is expected to support the supply of a minimum of 1 billion doses of this vaccine in these regions.

How does it work?

- Like several other Covid-19 vaccines, Covovax targets the spike protein on the surface of the SARS-CoV-2 coronavirus — the protein that allows the virus to penetrate the human cell. Novavax has achieved this is by engineering copies of the spike protein in the lab using the cells of a moth.
- Modified spike genes are placed in a baculovirus, which is known to infect insects. This virus is then used to infect the moth cells, carrying the spike gene into the cell. The cells then create the spike proteins, which are harvested. After they are purified, a certain dosage of these spike proteins are used as the vaccine.
- Once a person is given a shot of this vaccine, their body is expected to recognise these copies of the spike proteins as a foreign substance and build immunity against them. When the real virus tries to infect the cell, the body is expected to be able to fight it off.

What is its efficacy?

- The vaccine recently showed an efficacy of 96.4% against mild to severe disease caused by the original strain of SARS-CoV-2 from ongoing late-stage global trials.
- It has also managed an efficacy of around 83.4% two weeks after the first dose — potentially promising finding at a time when vaccine makers might face hurdles in scaling up supplies.
- Against mutant variants of the virus, it showed an efficacy of around 86.3% (UK variant) and only 55.4% among HIV-negative participants in its trial in South Africa.
- Compared with this, Covishield (SII’s other Covid-19 vaccine) has an efficacy around 53% when the second dose is given less than six weeks after the first dose, which is the regimen followed in India. The efficacy of the AstraZeneca-Oxford vaccine, which Covishield is based on, varies based on the duration between the first and second shots and can go to nearly 79% if the gap is 12 weeks or longer.

What will the bridging study entail?

- SII is expected to test the safety of Covovax using 1,600 participants in 19 sites across Delhi, UP, Maharashtra, Kerala, Punjab, Puducherry, Odisha, Karnataka and West Bengal. These participants will be between the ages of 18-99 years are supposed to be medically declared as healthy volunteers without acute illnesses, past history of Covid-19 and severe allergic reactions, among other factors.
- The participants will be divided randomly in a way that some receive, 22 days apart, two doses of either Covovax, the original NVX-CoV2373 vaccine made by Novavax, or a saline solution placebo. The company and investigators will not know who has received the vaccines and the placebos. These



participants will be tested to see if they develop any serious adverse events (SAEs) as a result of the vaccine. The test is also expected to check whether Covovax has the same ability to prompt an immune response as NVX-CoV2373.

All you need to know about vaccine wastage

(Source: [Indian Express](#))

Context: *At a meeting with Chief Ministers, Prime Minister Narendra Modi raised concerns on vaccine wastage emerging from the Covid-19 inoculation drive. What are the concerns, and how is wastage determined?*

What is vaccine wastage?

- Vaccine wastage is an expected component of any large vaccination drive, and a vaccine is procured from the maker with an estimated wastage. For each vaccine type, the wastage has to be within recommended limits.
- In general, high vaccine wastage inflates vaccine demand and increases unnecessary vaccine procurement and supply chain costs.
- Vaccine wastage is directly linked to vaccine usage, which is the proportion of vaccines administered against vaccines issued to a vaccination site. The vaccine wastage rate is defined as 100 minus the vaccine usage rate. And the wastage rate directly determines the “wastage factor” that needs to be established for each vaccine in the immunisation schedule to accurately plan vaccine needs.

How is wastage factor calculated? How much is it in the ongoing programme?

- Wastage Multiple Factor (WMF) is calculated from the formula $WMF = 100/(100 - \text{wastage})$. In the Centre’s operational guidelines on Covid-19 vaccination, WMF has been calculated at 1.11 after assuming an allowable programmatic wastage of 10%, so that $WMF = 100/(100 - 10) = 1.11$.
- Vaccine wastage is one of the key factors to be considered for vaccine forecasting and need estimation. The number of Covid-19 vaccines required in a month in a catchment area (state/ district/ block/ sector) for a month is calculated from the formula:
- Requirement = (Total population to be covered in the catchment area) × (% of the population to be covered in this catchment area/no. of months of the campaign) × 2 doses × WMF.

How does vaccine wastage happen?

- It is broadly divided into two categories: wastage in unopened vials, and in opened vials.
- Wastage in unopened vials can occur due to six broad reasons: if the expiry date has been reached; if the vaccine is exposed to heat; if the vaccine has been frozen; breakage; missing inventory and theft; and while discarding unused vials returned from the vaccination site.
- Wastage in opened vials can occur due to five broad reasons: while discarding remaining doses at the end of the session; not being able to draw the number of doses in a vial; submergence of opened vials in the water; suspected contamination; and poor vaccine administration practices.

At what stages can wastage occur?

- Wastage occurs at three levels: during transportation; during cold chain point; and at a vaccination site — both at service and delivery levels.
- At the cold chain point, the operational guidelines state: Issue of vaccine doses should match the registered list of beneficiaries (rounded off to the nearest higher whole number of vials) without any adjustment made for vaccine wastage in terms of the WMF, and vaccine vials with earlier manufacturing dates should be prioritised for issue first.



- At the district vaccine stores, the guidelines state: Vaccine doses issued should be equal to the number of registered beneficiaries for each cold chain point (rounded off to the nearest higher number of vaccine vials) without adjustment for vaccine wastage in terms of the WMF.
- The issue quantity will depend on the supply frequency (e.g. weekly estimate of registered beneficiaries at cold chain points in the district), and vaccine batches with earlier manufacturing dates should be prioritised for issue first.
- At the vaccination session site, the operation guidelines state: Each vaccination session will be expected to cater to a maximum of 100 beneficiaries; however, in the case of remote and sparsely populated areas, the state could organise sessions for a lower number of beneficiaries ensuring that there is no vaccine wastage.
- If the number of beneficiaries at a session is low, then that session site will be clubbed with other sessions.

Why are certain states showing a higher vaccine wastage?

- At the vaccination site, the wastage of vaccines has a direct relationship with session size — the number of beneficiaries per session — and vial size.
- The first reason identified by the Centre is inadequate planning of sessions. For instance, if the vial contains doses for 10 people and only six turn up, four doses can go waste. The Centre has advised the states to mobilise people and not to open the vials if they don't have 10 people.
- The second reason identified by the Centre is inadequate training. Officials said vaccinators are ending up drawing, maybe, only nine doses against ten doses. “We are seeing that those who are trained vaccinators know how to draw a vaccine. These trained vaccinators will tell you that even in a vial of ten doses, you can actually take out 11. This is a crucial aspect to reduce vaccine wastage,” the official said.
- Also, open vial policy guidelines have to be strictly followed to minimise vaccine wastage. In the Covid-19 vaccination drive, the Health Ministry fact sheet sent to the states mandates that both Covishield and Covaxin have to be discarded after four hours of opening.

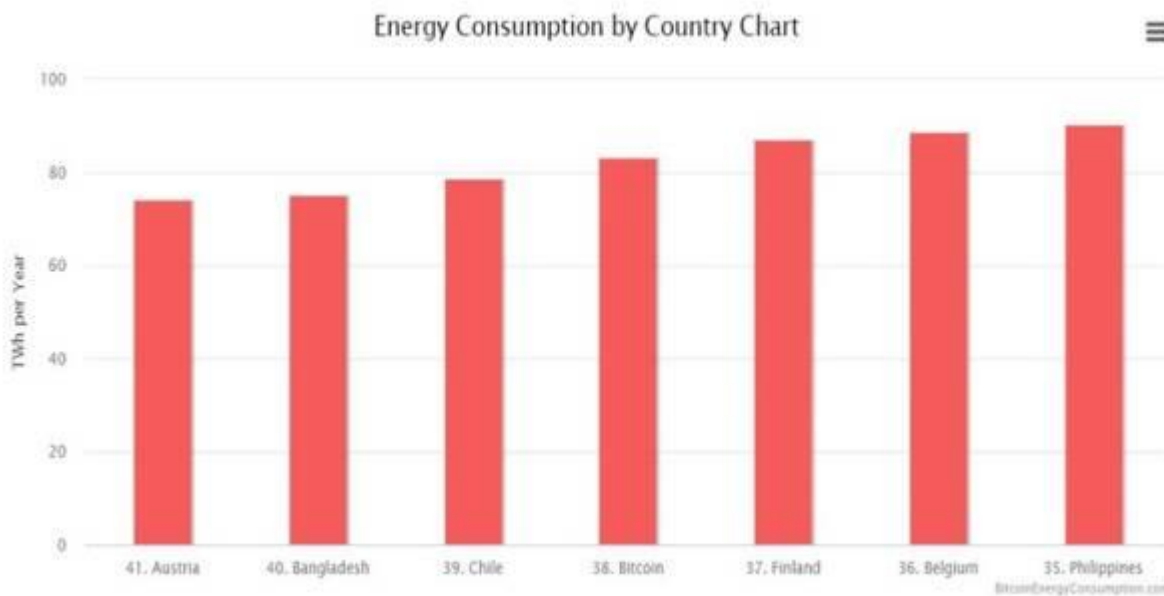
All you need to know about Bitcoin's electricity consumption

(Source: [Indian Express](#))

Context: *At a time when investors around the world are scrambling to follow the newest financial trend, that of Bitcoin which is currently worth around \$1 trillion, very few are bothered about the carbon footprint that the cryptocurrency is leaving behind. The annual carbon footprint of Bitcoins is almost equivalent to that of Mumbai, or to put it to a global perspective, as high as the carbon footprint of Slovakia.*

Relation between creating bitcoins and electricity required

- Bitcoins are created by “mining” coins, for which high-tech computers are used for long hours to do complex calculations. The more coins there are in the market, the longer it takes to “mine” a new one and in the process, more electricity is consumed. As mining provides a solid source of revenue, people are willing to run power-hungry machines for hours to get a piece.
- In 2017, the Bitcoin network consumed 30 terawatt hours (TWh) of electricity a year. However now, according to de Vries's estimates, the network currently uses more than twice as much energy: between 78TWh and 101TWh, or about the same as Norway.
- As such, each bitcoin transaction roughly requires an average 300kg of carbon dioxide – which is equivalent to the carbon footprint produced by 750,000 credit cards swiped.



The energy consumed by Bitcoins annually compared to countries. (Source: Bitcoin Energy Consumption Index)

- If Bitcoin were a country, it would consume more electricity than Austria or Bangladesh.

Calculating the carbon footprint

- The major problem with mining Bitcoin is not its massive energy-consumption nature, it is the fact that most of the mining facilities are located in regions that rely heavily on coal-based power.
- Earlier, determining the carbon impact of the Bitcoin network was difficult as tracking down miners was never easy. However, in 2017, a study by Garrick Hileman and Michel Rauchs identified these facilities and calculated consumption of 232 megawatts a year.
- As per the estimates of De Vries, roughly 60% of the costs of bitcoin mining is the price of the electricity used. In January, the price of a Bitcoin stood at \$42,000 and at this rate, miners would be earning around \$15 billion annually.
- “With 60% of this income going to pay for electricity, at a price of \$0.05 per kWh [kilowatt hour], the total network could consume up to 184TWh per year,” De Vries wrote in his study.
- The paper cites an assumption of 480-500g of carbon dioxide produced for every kWh consumed. That would mean a total energy consumption of 184TWh would result in a carbon footprint of 90.2 million metric tons of CO₂, which is roughly comparable to the carbon emissions produced by London.

Other impacts of Bitcoin mining

- The effects of cryptocurrency mining often spill over to other parts of the economy. With miners using high-tech computers for hours to formulate new blockchains, these machines do not last long.
- Manufacturers of Bitcoin mining devices need a substantial number of chips to produce these machines and recently, during the Covid-19 crisis, the world had witnessed a shortage of these chips. This shortage, now, in turn started affecting the production of electric vehicles around the world.
- To produce 1 million such computers, the largest provider, Bitmain, would have to use a month’s capacity of one of only two chip fabricators in the world capable of producing such high-power silicon – potentially crowding out demand from other sectors such as Artificial Intelligence, transportation and home electronics.
- Besides this, countries like Iran are using cryptocurrency to circumvent economic sanctions that were imposed to prevent a nation from developing nuclear capabilities. De Vries writes that cheap energy has lured in many cryptocurrency miners and the mining activity in Iran now represents 8 per cent of the



total computational power in Bitcoin's network. The country is thus using Bitcoin to boost revenues while its oil exports suffer from international sanctions.

What can be done to control the carbon footprint?

- Given the growing implications of the cryptocurrency mining industry, the Dutch economist asks policymakers to follow the path shown by Québec in Canada, where a moratorium on new mining operations has been imposed.
- Although Bitcoin might be a decentralised currency, many aspects of the ecosystem surrounding it are not. Large-scale miners can easily be targeted with higher electricity rates, moratoria, or, in the most extreme case, confiscation of the equipment used.
- Governments can also ban cryptocurrencies from digital asset marketplaces as it will affect the prices of a digital currency.

India and the cryptocurrency

- The country, at present, has around 75 lakh cryptocurrency investors who have together pooled in over Rs 10,000 crore into Bitcoins and other such digital currencies.
- The prices have surged by over 900%, courtesy the worldwide boom – a single bitcoin that used to cost around Rs 4 lakh in 2020 now costs somewhere around Rs 41 lakh now.
- However, as per a recent **Reuters report**, government sources have said that the Narendra Modi-government plans to pass the pending cryptocurrency Bill that puts a complete ban on and criminalises possession of Bitcoins.
- Finance minister Nirmala Sitharaman, however, has said that the Centre will take a “calibrated approach” and leave a window open for experiments with blockchain technology.