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## The Big Picture: Budget 2021 for Green Energy

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### Why in News?

- The **Union Budget for FY 2021-22** presented by the Union Minister of India, has exclusively focussed on **Green Energy initiatives**.
- Budget 2021 has proposed the launch of the **Hydrogen Energy Mission** in this fiscal year.  
Additional capital infusion for solar energy and renewable energy aspects has also been proposed.

### Key Points

- The reforms in the budget have particularly focussed on **green-growth**.  
The initiative is expected to enhance the uptake of cleaner fuels in India.

- Budget 2021-22 talks about **PLI scheme** in Solar Manufacturing, **Vehicle Scrappage Policy** and the **Hydrogen Energy Mission**.  
The PLI scheme has also been extended to the **ACCs**.
- The emphasis on **green hydrogen** in the budget was in line with technological development and with a long-term vision towards **reduced dependency on minerals and rare-earth element**-based batteries as energy storage.  
Hydrogen is the key clean fuel for the future.
- For the first time there is **private financing of ₹18,000 crore for 20,000 buses** and innovative financing with **Public Private Partnerships** which would revolutionise the way public transport systems and buses function in India.  
The initiative is to promote **less dependency on personal vehicles** and eventually **bring down the carbon footprints**.

### Hydrogen Energy Mission

- The National Hydrogen Energy Mission **aims to reduce petroleum use, greenhouse gas emissions, and air pollution**, and contribute to more diverse and **efficient energy infrastructure**.
- It is now proposed to launch a Hydrogen Energy Mission in 2021-22 for generating **hydrogen from green power sources**.
- Green Hydrogen Mission is not only **essential to decarbonise heavy industries** like steel and cement, it also **holds the key to clean electric mobility** that doesn't depend on rare minerals.

### Vehicle Scrappage Policy

- The policy will be launched to **phase out old and unfit vehicles**.  
Under the scheme **private vehicles older than 20 years and commercial vehicles older than 15 years** will be eligible to be scrapped.
- This will help in **encouraging fuel efficient, environment friendly vehicles** thereby reducing vehicular pollution and oil import bill.  
Vehicles would undergo **fitness tests in automated fitness centres** after their defined period is over.

### Green Energy and Government

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- **India in leading countries:** India comes in the list of the leading countries in terms of the **Power Sector** or the **Renewable Energy** sector.
  - India ranks at the **fifth position among the countries of the world** when it comes to the size of its **energy economy**.
  - India is the **fourth largest solar installed capacity country** in the world and **third largest renewable energy installed capacity** country in the world.

- **Solar energy:** The Jawaharlal Nehru National Solar Mission (JNNSM) aimed to achieve **20 GW** solar capacity by the year **2022**.
  - However, the target was increased from **20 GW to 100 GW by 2022** in the 2015 Union Budget of India.
  - India's total solar power capacity alone has increased by more than 11 times since 2014 to June 2020, from **2.6 GigaWatts (GW) to 38 GW**.
  - To encourage domestic production, the duties on **solar inverters** have been increased from **5% to 20%**, and on **solar lanterns** from **5% to 15%**.
- **Renewable energy:** The Government of India had set a target of **175 GW** renewable power installed capacity by the end of 2022.
  - This includes **60 GW from wind power, 100 GW from solar power, 10 GW from biomass power** and **5 GW from small hydro power**.  
The renewable energy capacity in India is **currently 136 Giga Watts**, which is about **36%** of its total energy capacity.
  - The **2030 renewable targets** were announced to be **450 gigawatt**.
- **Green energy and infrastructure development:** The budget primarily focuses on spending on infrastructure development and no infrastructure project can be completed without energy involved in it
  - However, in the present context, the energy involved has to be **clean energy**.
  - The solar energy at present is **available at 2 rs/unit** which is even cheaper than the energy generated from a new coal power plant.
  - The domestic manufacturing capacity has been enhanced by the PLI schemes for manufacturing solar panels.  
Through the 2021-22 budget, the PLI scheme has been extended to the 10 sectors including **automobile, pharma, electronic/technology** products and manufacturing of **advanced chemical cells battery** (for electric vehicles).

## Advanced Chemistry Cells (ACCs)

ACCs are the new generation advanced storage technologies that can store electric energy either as electrochemical or as chemical energy and convert it back to electric energy as and when required.

## Green Hydrogen

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- The Hydrogen Energy Mission is one of the biggest announcements in the union budget 2021-22, specifying the **hydrogen as green hydrogen**.  
When hydrogen is extracted from water using electrolysis powered by renewable energy, it is called green hydrogen.
- Green hydrogen energy is vital for India to meet its **Nationally Determined Contribution (INDC) Targets** and ensure regional and national energy security, access and availability.

- Currently, about **6 tonnes of hydrogen is produced** in the country which will go up by **5 times in 2050**.

## Why Green Hydrogen?

- Hydrogen can act as an **energy storage option**, which would be essential to meet intermittencies (of renewable energy) in the future.
- In terms of mobility, for long distance mobilisations for either urban freight movement within cities and states or for passengers, it is a very promising initiative.
  - Hydrogen can be used in railways, large ships, buses or trucks where electric-vehicles have a limitation for not having enough capacity for long distance travels.
- Hydrogen has the potential to be the key renewable target in supporting infrastructure as well.
- Hydrogen can be used:
  - As a carrier
  - As a fuel cum energy storage alternative for petrol and diesel
  - Directly as a **fuel**
- Countries across the world such as **Japan** are banging on hydrogen as a future energy media.
  - **Germany** and many other **EU countries** have already set an **ambitious green hydrogen policy**.
  - Even countries like **UAE** and **Australia** that are traditionally considered as the laggards of climate action have moved towards green hydrogen.

## Challenges Associated

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- In terms of challenges the **cost of renewable electricity from** hydrogen specifically, is the major problem. Public investments need to strategize and channel well.
  - Moreover, currently hydrogen is around **\$6- \$8/kg** which is a price too high to bring it into conventional use.
- The other main hurdle is **transporting hydrogen** to long distances.
  - Hydrogen in gaseous form is highly inflammable.
  - To ship liquid hydrogen, it needs to be chilled to **-253°C**.
- Compared to other gases (or fuels), **hydrogen lacks smell**, which makes any **leak detection almost impossible** thus increasing the potential dangers.

- To succeed as a renewable energy based economy, it is **not just the manufacturing sector** where India would want to excel but the **entire supply chain**.
  - Currently, India is at about **2-3 gw of solar photovoltaic** module manufacturing capacity.
  - For the given 450 gw renewable targets for 2030, India needs **30-40 gw of capacity addition** of renewables per year which requires having:
    - Maximum domestic manufacturing capability
    - Increasing the custom duty on solar panels as it will incentivise domestic players in india to set up manufacturing of solar panels and making the entire supply chain robust.

## Way Forward

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- **Pilot initiatives:** India needs a strategy in place to launch such a big mission, such as a few **pilot initiatives**.
 

Hydrogen is one of the alternative sources of energy that India really needs to consider from its energy security perspective and transportation or mobilisation.
- **Efforts at all levels:** The budget perspective presses that a lot more needs to be done **not only at center but at state level too**.
 

More than 11 states in India now have rolled out their own electric mobility plans and are focussing not only at manufacturing or job but also in **demand creation**.
- **Exploring “All”ternatives:** Not sticking to just one alternate resource but exploring other sources too.
  - For either intra or inter-city movements, different technologies can co-exist and can give different contributions.
  - 1 kg of hydrogen can work about 100 km but roughly it would take 7-8 litres of petrol for the same distance.
- **Incentivising the concept of green and clean energy: Green labelling of products** needs to be in place so that consumers are aware that what they are consuming is environment friendly.
 

In order to push them into using green energy, they must be **made aware of the benefits** of the energy they are consuming. Also, there can be **extensive marketing and awareness campaigns**.
- **Capacity building:** It should not only be about awareness but also about building the capacity of the industries so that we have manufacturing in place and eventually more job opportunities.
 

Planning a road map where we generate employment while setting up green energy infrastructure and reducing carbon emission.

- **Exclusive expenditure on R&D:** There should be a good spending on R&D and technology adoption in hydrogen energy and e-Vehicles because that is one area where India had a setback in Solar Photovoltaics.  
More capital infusion in R&D and infrastructure is needed to reap the benefits of various geographical locations in terms of solar energy and an emerging untapped option of hydrogen energy to replace conventional energy.

## Conclusion

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Moving towards Green Energy is indeed a win-win situation; it will lead to not only the usage of cleaner energy for a cleaner environment but also it will boost various sectors of manufacturing and employment.