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Topics Covered

- Relevance to the UPSC Prelims and Mains syllabus under the following topics:
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- Prelims:
- Mains:
- Interview (Personality Test):

Summary:

- Amara Raja Infra has launched India’s first green hydrogen fuelling station in Leh, supporting NTPC’s green mobility initiatives.
- The station produces 80 kg of green hydrogen daily, fueling five hydrogen fuel cell buses in the region.
- Inaugurated by Union Power Minister Manohar Lal, the station aligns with India’s National Hydrogen Energy Mission.
- Built in extreme conditions (temperatures from -25°C to 30°C), the project showcases Amara Raja Infra’s capability to handle challenging infrastructure.
- This station is a crucial step in expanding hydrogen infrastructure across India, promoting sustainable, emission-free transport.

What is the news?

- India has made significant strides toward reducing carbon emissions and embracing cleaner energy solutions, and a recent **project by Amara Raja Infra** has furthered this agenda.
- The company has launched **India’s first green hydrogen fuelling station in Leh, Ladakh, for NTPC Ltd.,** marking a crucial development in India’s green mobility initiatives.
- This innovative step is expected to not only boost hydrogen mobility but also set the stage for large-scale infrastructure development across the country.

What is Green Hydrogen?

Before delving into the project, it’s essential to understand what green hydrogen is and why it matters.

- Green Hydrogen is hydrogen gas produced using renewable energy sources, such as wind, solar, or hydropower, through a process called electrolysis.
- Unlike traditional methods of hydrogen production, which rely on fossil fuels and result in significant CO2 emissions, green hydrogen is produced in an environmentally friendly manner,

making it a vital component in the global transition to sustainable energy.

Why is Green Hydrogen Important?

- Green hydrogen plays a key role in decarbonizing sectors that are difficult to electrify, such as heavy transport, industrial processes, and energy storage. It can be used in various applications, including fuel cell vehicles, power generation, and as an industrial feedstock, thus contributing to emission-free transport and cleaner air.

Amara Raja Infra's Green Hydrogen Fuelling Station in Leh

- Amara Raja Infra, part of the Amara Raja Group, has achieved a remarkable feat by establishing the first-ever green hydrogen fuelling station in India. Located in Leh, at an altitude of 3,400 meters, this station will be pivotal in India's journey toward a hydrogen-powered future.

Key Features of the Project

- **Location:** Situated in Leh, a region with extreme weather conditions and challenging geography, this station is a technological marvel.

- **Capacity:** The station is capable of producing 80 kg of green hydrogen daily, which will be used to power hydrogen fuel cell buses.
- **Purpose:** It supports NTPC Ltd.’s green mobility initiatives, under the framework of the National Hydrogen Energy Mission.
- **Technology and Operations:** The project includes comprehensive work in designing, engineering, supply, construction, testing, commissioning, and maintenance for three years on a turnkey basis.

Why is This Project Important?

1. Environmental Impact:

- The primary significance of this project lies in its contribution to reducing emissions. With hydrogen fuel cell buses powered by clean, renewable hydrogen, Leh will experience emission-free transport, which is a vital step in combating air pollution and reducing carbon footprints.

2. Supporting National Initiatives:

- This station is a critical part of India’s National Hydrogen Energy Mission, which aims to develop and promote hydrogen as an alternative fuel source for the future. It serves as a pilot project that demonstrates the feasibility of using

green hydrogen in real-world applications.

3. Strategic Location:

- Leh, due to its remote location and high altitude, is an ideal site for testing such projects, which are expected to scale up across various parts of the country. The challenging terrain and harsh climate conditions offer a unique opportunity to test the resilience and reliability of hydrogen-powered infrastructure.

Challenges Faced During the Project

- Building a hydrogen fuelling station in Leh, which faces extreme temperatures ranging from -25°C to 30°C, presented several challenges. These extreme weather conditions, combined with the difficult geography, made the construction process complex and time-consuming. However, Amara Raja Infra's expertise in handling such conditions allowed them to complete the project in two years, showcasing their ability to overcome these obstacles.

What's Next for Green Mobility in India?

- The launch of India's first green hydrogen fuelling station is just the beginning of a larger

vision to expand hydrogen mobility infrastructure across the country. The success of this project will likely pave the way for more hydrogen fuelling stations to be established, especially in other remote regions where emissions from conventional vehicles are a significant concern.

Why is Expansion Necessary?

- India’s growing energy demands and its commitment to reducing carbon emissions necessitate the adoption of alternative, cleaner fuels. Hydrogen, being versatile and clean, offers a long-term solution for transportation and energy storage. The expansion of hydrogen fuelling infrastructure will not only support the operations of hydrogen fuel cell vehicles but will also contribute to the development of a hydrogen economy in India.

Conclusion

- Amara Raja Infra’s green hydrogen fuelling station in Leh is a significant milestone in India’s transition to a sustainable energy future. The project highlights India’s commitment to green mobility and clean energy solutions, setting the stage for further developments in the hydrogen sector. With its potential to reduce emissions and support hydrogen fuel cell buses, this project is a crucial step in creating a cleaner, greener, and more sustainable India.

Key Terms Explained:

- **Green Hydrogen:** Hydrogen produced using renewable energy, typically through electrolysis of water.
- **Hydrogen Fuel Cell Buses:** Buses powered by hydrogen fuel cells, offering zero-emission transport.
- **Electrolysis:** A process of using electricity to split water into hydrogen and oxygen.
- **National Hydrogen Energy Mission:** An Indian government initiative aimed at developing hydrogen as a clean alternative fuel.
- **Emission-Free Transport:** Vehicles or technologies that do not emit pollutants such as CO2, NOx, and particulate matter.

Why is the Hydrogen Economy Important for India?

- With its rising energy consumption and growing environmental concerns, India needs to diversify its energy sources. The hydrogen economy offers a sustainable solution to meet both energy demands and climate targets.

Key Takeaways from the editorial:

- **Innovative Veterinary Breakthrough:** Pinfenon (S) (R) is the first patented animal supplement globally, addressing cardiac health in dogs by lowering Atrial Natriuretic Peptide (ANP) levels.
- **Dual Utility:** The supplement functions both as a treatment and a preventive measure for canine cardiac disorders, showcasing a holistic healthcare approach.
- **Economic and Market Impacts:**The patent strengthens Japan’s leadership in veterinary pharmaceuticals, opening avenues for exports, market diversification, and economic growth.
- **Broader Applications:**The patented technology is extendable to consumer products like shampoos and essences, enhancing accessibility and usability.
- **Global Research and Collaboration:**This milestone promotes investments in veterinary health research, encouraging international collaborations and technological advancements.

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General Studies

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- Click on - Check Result
- Scroll down - Check out Solutions too.

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Category: **General Studies**

What is the production capacity of the green hydrogen fuelling station in Leh?

○ 50 kg per day

○ 80 kg per day

○ 100 kg per day

○ 150 kg per day

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Category: **General Studies**

Which initiative is the green hydrogen fuelling station in Leh supporting?

○ National Green Mobility Mission

○ National Hydrogen Energy Mission

○ National Energy Development Initiative

○ Clean India Movement

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Category: **General Studies**

Which of the following technological processes is used to produce green hydrogen in a sustainable manner?

- ○ Steam Methane Reforming (SMR)
- ○ Electrolysis using renewable energy
- ○ Coal Gasification
- ○ Pyrolysis of organic waste

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Category: **General Studies**

What is the primary benefit of green hydrogen?

- ○ It is produced using fossil fuels.
- ○ It is a source of clean, renewable energy.
- ○ It causes high carbon emissions.
- ○ It is used in the production of plastic.

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Category: **General Studies**

Which of the following was a major challenge faced during the construction of India's first green hydrogen fuelling station in Leh?

- ○ Lack of skilled labor
- ○ High operating costs
- ○ Extreme weather conditions

○ Technological limitations

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Category: **General Studies**

Which of the following locations is home to India's first green hydrogen fuelling station?

○ Delhi

○ Leh

○ Bangalore

○ Mumbai

Prev Finish

Check Rank, Result Now and enter correct email as you will get Solutions in the email as well for future use!

Check the Result

Your score is

0%

Restart quiz

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Mains Questions:

Question 1:

Green hydrogen is considered a key player in achieving energy security and reducing carbon emissions." Discuss the potential of green hydrogen in India's energy transition.(250 words)

Model Answer:

- Green hydrogen, produced using renewable energy sources through electrolysis, is emerging as a key solution to India's energy and environmental challenges. As a clean fuel with zero carbon emissions, green hydrogen has the potential to contribute significantly to India's energy security, decarbonization, and sustainable development goals.

Role in Energy Transition:

- India’s growing energy demands, reliance on fossil fuels, and the need for cleaner alternatives make green hydrogen a promising solution in the nation’s energy transition. It can be used across sectors such as transport, industry, and power generation, which are difficult to electrify using traditional renewable energy sources like wind or solar.
- Energy Security: Green hydrogen can reduce India’s dependence on imported fossil fuels by providing a domestically produced, clean alternative. The ability to produce hydrogen locally using abundant renewable resources such as solar and wind energy ensures energy resilience.
- Decarbonization of Hard-to-Abate Sectors: While renewable electricity can power vehicles and households, sectors like steel manufacturing, cement production, and heavy transport need cleaner alternatives. Green hydrogen can play a significant role in decarbonizing these industries, where other low-emission options are limited.

Economic Benefits:

- The development of a hydrogen economy offers India the opportunity to create new industries, jobs, and business models. With the falling cost of renewable energy and hydrogen production

technology, India can position itself as a leader in the global hydrogen market, attracting investment and technology.

Government Support and Initiatives:

- India’s National Hydrogen Energy Mission aims to scale up hydrogen production, infrastructure, and application across the nation. The government is also focused on developing hydrogen fuelling stations, encouraging hydrogen-powered vehicles, and promoting public-private partnerships.

Challenges and Way Forward:

While the potential of green hydrogen is immense, several challenges remain:

- High Cost of Production: Currently, green hydrogen is more expensive than conventional hydrogen. The cost of renewable electricity and electrolyzer technology needs to decrease for it to become economically viable.
- Infrastructure Development: Hydrogen fuelling stations and distribution networks need significant investments to ensure widespread adoption.
- Storage and Transportation: Hydrogen is difficult to store and transport due to its low energy density. Advancements in storage technology are necessary for the widespread use of hydrogen.

Conclusion:

- Green hydrogen holds significant potential to accelerate India's energy transition and decarbonization efforts. With strategic investments, policy support, and technological advancements, it could play a central role in ensuring India's energy security and achieving its climate goals.

Question 2:

The establishment of India's first green hydrogen fuelling station in Leh is a significant step towards green mobility." Discuss its significance and challenges in the context of India's sustainable development goals.(250 words)

Model Answer:

- The establishment of India's first green hydrogen fuelling station in Leh, Ladakh, marks a critical milestone in India's pursuit of green mobility and sustainable development. This project, developed by Amara Raja Infra for NTPC Ltd., is an essential step towards reducing carbon emissions in the transport

sector while promoting clean energy solutions.

Significance of the Green Hydrogen Station:

- Promotion of Green Mobility: The station will fuel hydrogen-powered buses in Leh, a region known for its challenging terrain and harsh climatic conditions. Hydrogen fuel cells offer zero-emission transport, helping to reduce air pollution and dependency on fossil fuels.
- Supporting National Hydrogen Energy Mission: This station aligns with the National Hydrogen Energy Mission launched by the Government of India. It demonstrates the feasibility of using green hydrogen in public transport and encourages further infrastructure development across the country.
- Regional Impact: Located at an altitude of 3,400 meters, Leh presents unique challenges due to extreme temperatures and geographical conditions. The successful implementation of the station here showcases the potential for green hydrogen in remote areas, where traditional fuel-based infrastructure is limited.

Challenges in Green Hydrogen Adoption:

- Extreme Weather Conditions: Constructing the station in Leh, with temperatures ranging from -25°C to 30°C, posed significant challenges. However, Amara Raja Infra’s expertise in managing such conditions allowed for the successful

completion of the project.

- Infrastructure and Cost: The establishment of hydrogen fuelling stations and the production of hydrogen are capital-intensive. Scaling this infrastructure nationwide requires substantial investments in technology and supply chains.
- Storage and Distribution: Hydrogen storage and transportation remain major technical challenges due to the gas's low energy density. Advances in hydrogen storage technologies are crucial for the success of hydrogen as a fuel source.

Conclusion:

- The launch of India's first green hydrogen fuelling station in Leh represents a significant step toward achieving sustainable mobility and reducing carbon footprints. While challenges remain in terms of cost, infrastructure, and technology, the project serves as a beacon for the future of green hydrogen in India. It aligns with India's broader commitment to sustainable development and climate action goals, marking a turning point in the country's journey toward environmental sustainability.

All Mains Questions: Read Here

Remember: These are just sample answers. It's important to further research and refine your responses based on your own understanding and perspective. Read entire UPSC Current Affairs.

Relevance to the UPSC Prelims and Mains syllabus under the following topics:

Prelims:

- **Science and Technology:**Current Affairs: Innovations in clean energy technology, including green hydrogen, its potential applications, and its role in India's energy transition.
  Environment and Ecology: The environmental implications of hydrogen as an alternative fuel, its role in decarbonization, and the promotion of green energy solutions in India.
- Sustainable Development Goals (SDGs): Green

hydrogen is related to SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). The UPSC Prelims may cover topics related to sustainable energy sources and climate change mitigation strategies.

- **General Issues on Environmental Ecology, Bio-diversity, and Climate Change:**The Prelims syllabus includes current developments in environmental policies, sustainable energy, and the adoption of clean energy technologies, such as green hydrogen and hydrogen-powered vehicles.

Mains:

- **GS Paper II: Governance, Polity, and International Relations**
- This paper covers government policies related to energy and sustainability, and green hydrogen may be discussed in terms of India's energy policy, National Hydrogen Energy Mission, and international cooperation in green technologies.
  International Relations: Green hydrogen initiatives can also be linked to global cooperation on climate change and energy security, where India's role in global climate accords (e.g., COP meetings) can be explored.
- **GS Paper III: Technology, Economic Development, Bio-Diversity, Environment, Security and Disaster Management**
- Technology and Innovation: Green hydrogen is directly related to technological innovations in clean energy, hydrogen fuel cells,

electrolysis, and hydrogen-powered vehicles.
Economic Development: The establishment of green hydrogen infrastructure (such as fuelling stations) and its role in India's transition to a low-carbon economy can be linked to sustainable economic development. Questions can cover the cost and scalability of green hydrogen, the government's role, and its impact on the energy market.
Environment: Green hydrogen plays a significant role in reducing carbon emissions and addressing climate change. This can be linked to India's environmental commitments under SDGs and international agreements.

- **GS Paper II: Social Justice and Governance**
- Public Policy: Green hydrogen aligns with India's national energy policies aimed at reducing carbon emissions, improving air quality, and promoting sustainable development.

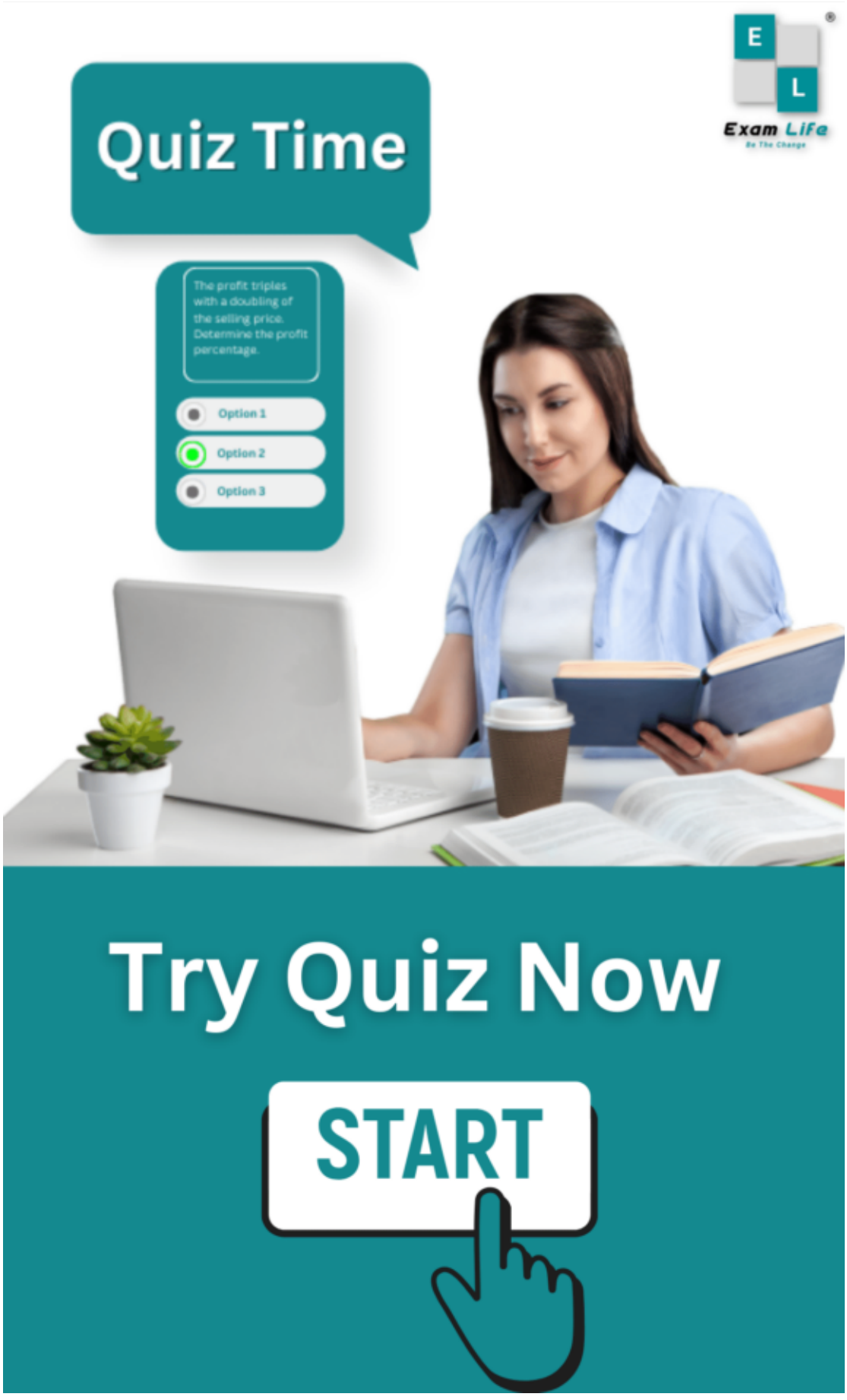
Interview (Personality Test):

- The UPSC Personality Test (Interview) assesses a candidate's overall personality, communication skills, and awareness on a wide range of topics, including current affairs and general knowledge. In the interview, candidates may be asked to discuss or provide insights into:

- The role of green hydrogen in India's energy transition and its potential to contribute to achieving India's climate goals (e.g., Paris

Agreement).
Government policies or schemes such as the National Hydrogen Energy Mission and the role of public-private partnerships in promoting green energy.
Sustainability and Environment: How can green hydrogen help India achieve its sustainable development goals (SDGs)? How does it fit into the broader policy landscape of energy security and environmental conservation?
Ethics and Governance: Green hydrogen adoption may also prompt questions on the ethical considerations of transitioning to cleaner energy sources, especially the potential socio-economic impact on different sectors.

- **Example Interview Question:**
- How do you think green hydrogen can play a role in India's strategy to reduce carbon emissions and enhance energy security? What challenges do you foresee in its large-scale adoption?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