

THE YOUTH VOICE

NEWS FOR THE YOUTH BY THE YOUTH

COVER STORY

Powering a *Cleaner* Tomorrow

Five young writers on clean fuels, fair transitions, ocean power and the energy system our generation will inherit.

IN THIS ISSUE

01

Sustainable Aviation Fuel and the Future of Air Travel

Payal · BA (English Hons), Miranda House, Delhi University



02

The Environmental Impact of the Global Transport Sector

Bhavesh Khanda · BBA (BFSI), JECRC University, Jaipur



03

A Just Energy Transition for Workers and Communities

Anshu Adarsh · LL.B, Faculty of Law, Delhi University



04

Ocean Energy: Tidal and Wave Power Potential

Adwiteya Sirohi · B.Com (Hons), Gargi College, Delhi University



05

The Future of a Sustainable Global Energy System

Vinita Bimbora · Class 11, DPS Patiala





AVIATION · CLEAN FUELS

SAF

01

Sustainable Aviation Fuel and the *Future of Air Travel*



WRITTEN BY

Payal

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Air travel is one of the hardest sectors to decarbonize because batteries remain too heavy for long haul flights and no other zero emission technology is ready for commercial scale use. Sustainable aviation fuel or SAF offers a practical near term solution by replacing some or all of the fossil jet fuel used in existing aircraft engines without requiring new planes or airport infrastructure.

SAF is typically produced from used cooking oil, agricultural waste or other renewable feedstocks and can cut lifecycle emissions by up to eighty percent compared to conventional jet fuel. Airlines including United, Delta and major European carriers have begun blending SAF into their fuel supply though it currently makes up less than one percent of global aviation fuel use. The biggest barrier is cost since SAF can be two to five times more expensive than standard jet fuel.

Governments are stepping in with mandates and subsidies to help close that price gap. The European Union has set blending requirements that increase over time while the United States offers tax credits to producers. Airports in a handful of countries have started building dedicated SAF supply chains. Scaling production enough to meet global aviation demand will require massive investment in feedstock collection and refining capacity. Even with strong growth SAF alone will not fully decarbonize flying which means airlines are also exploring electric planes for short routes and longer term bets on hydrogen powered aircraft for the future.

Beyond feedstock based fuels researchers are also investigating synthetic aviation fuels created by combining captured carbon dioxide with hydrogen produced from renewable electricity. These power to liquid fuels could theoretically provide unlimited supply since they do not depend on limited agricultural waste streams though production costs remain even higher than conventional biological SAF at present making widespread commercial use still years away.

Airport infrastructure will also need to adapt as SAF production scales including new storage and blending facilities to handle fuel that may arrive from more diverse and geographically dispersed sources than traditional jet fuel supply chains. Industry coalitions bringing together airlines fuel producers and governments have formed in several regions to coordinate this buildout. Most aviation analysts agree that no single solution will fully decarbonize flying and that SAF will need to work alongside efficiency improvements in aircraft design and engine technology to meaningfully reduce the sector's overall climate footprint over the coming decades.

The pace at which sustainable aviation fuel scales will meaningfully shape how credibly the airline industry can claim progress toward its own stated net zero ambitions for the middle of this century. Passengers are increasingly asking airlines about their climate commitments and SAF offers one of the few concrete near term actions carriers can point to beyond efficiency improvements and route optimization. Corporate travel programs in some

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SAF offers a practical near term solution by replacing some or all of the fossil jet fuel used in existing aircraft engines without requiring new planes.

— PAYAL

countries have even begun requesting a minimum share of SAF for business travel contracts adding demand side pressure alongside government mandates. As production

scales and costs gradually fall SAF is likely to move from a niche premium option toward a standard and expected component of commercial jet fuel supply worldwide. ■

SAF AT A GLANCE

Up to 80%

lower lifecycle emissions than conventional jet fuel

< 1%

SAF's current share of global aviation fuel use

2-5×

how much more SAF can cost than standard jet fuel

THINK ABOUT IT

1. Would you pay a little more for a flight if it ran on sustainable aviation fuel?
2. Which kinds of waste in your city could become a feedstock for cleaner fuel?





The Environmental Impact of the *Global Transport Sector*



WRITTEN BY

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Transportation accounts for roughly a quarter of global energy related carbon dioxide emissions making it one of the largest contributors to climate change after electricity and heat production. Cars, trucks, ships, planes and trains all burn fossil fuels that release greenhouse gases directly into the atmosphere and this sector's emissions have grown faster than almost any other in recent decades.

Road vehicles are responsible for the largest share of transport emissions worldwide followed by aviation and shipping. Unlike the power sector which has made steady progress, shifting toward renewable energy transport has been slower to change because it depends on dense energy sources like gasoline and diesel that are difficult to replace especially for heavy vehicles and long distance travel. Beyond carbon dioxide vehicles also emit pollutants such as nitrogen oxides and particulate matter that harm air quality and public health in cities around the world.

Addressing transport emissions requires a combination of strategies rather than a single fix. Electrifying passenger vehicles reduces tailpipe pollution while cleaner fuels help decarbonize aviation and shipping where full electrification is not yet feasible. Urban planning also plays a role since cities designed around walking cycling and public transit naturally produce fewer emissions than those built entirely around private cars. As global population and travel demand continue to rise the pressure to transform this sector will

only intensify making it a central battleground in the fight against climate change.

Freight transport in particular has grown rapidly as global trade and e-commerce expansion have increased the volume of goods moved by truck, ship and plane. This growth has partially offset efficiency gains made in other parts of the sector meaning that even as individual vehicles become cleaner total transport emissions have continued climbing in many regions due to sheer volume increases.

International cooperation adds another layer of complexity to addressing transport emissions since aviation and shipping cross national borders making it difficult to assign responsibility for their emissions to any single country under standard climate accounting frameworks. Specialized international bodies now oversee emissions reduction efforts for these sectors separately from national climate commitments though progress has often lagged behind what scientists say is needed. Addressing the full scope of global transport emissions will require unprecedented coordination between countries, industries and international regulatory bodies working together toward shared decarbonization targets.

Reducing transport emissions ultimately requires rethinking not just how vehicles are powered but how societies design cities and supply chains from the ground up to reduce unnecessary travel altogether. Mixed-use urban development that places homes, workplaces and

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Cities designed around walking, cycling and public transit naturally produce fewer emissions than those built entirely around private cars.

— BHAVESH KHANDA

shops within walking or cycling distance can meaningfully reduce the total number of trips people need to take by car in the first place. Similarly optimizing freight logistics through better route planning and consolidated shipping can cut unnecessary miles traveled by trucks and cargo vessels. These structural changes complement rather than replace the technological shift toward cleaner

vehicles suggesting that the most effective climate strategies will combine both cleaner technology and smarter systems design working together. Only a combination of these approaches taken together offers a genuinely realistic path forward for the sector as a whole.

■

TRANSPORT BY THE NUMBERS

~ 1/4

of global energy-related CO₂ emissions come from transport

#1

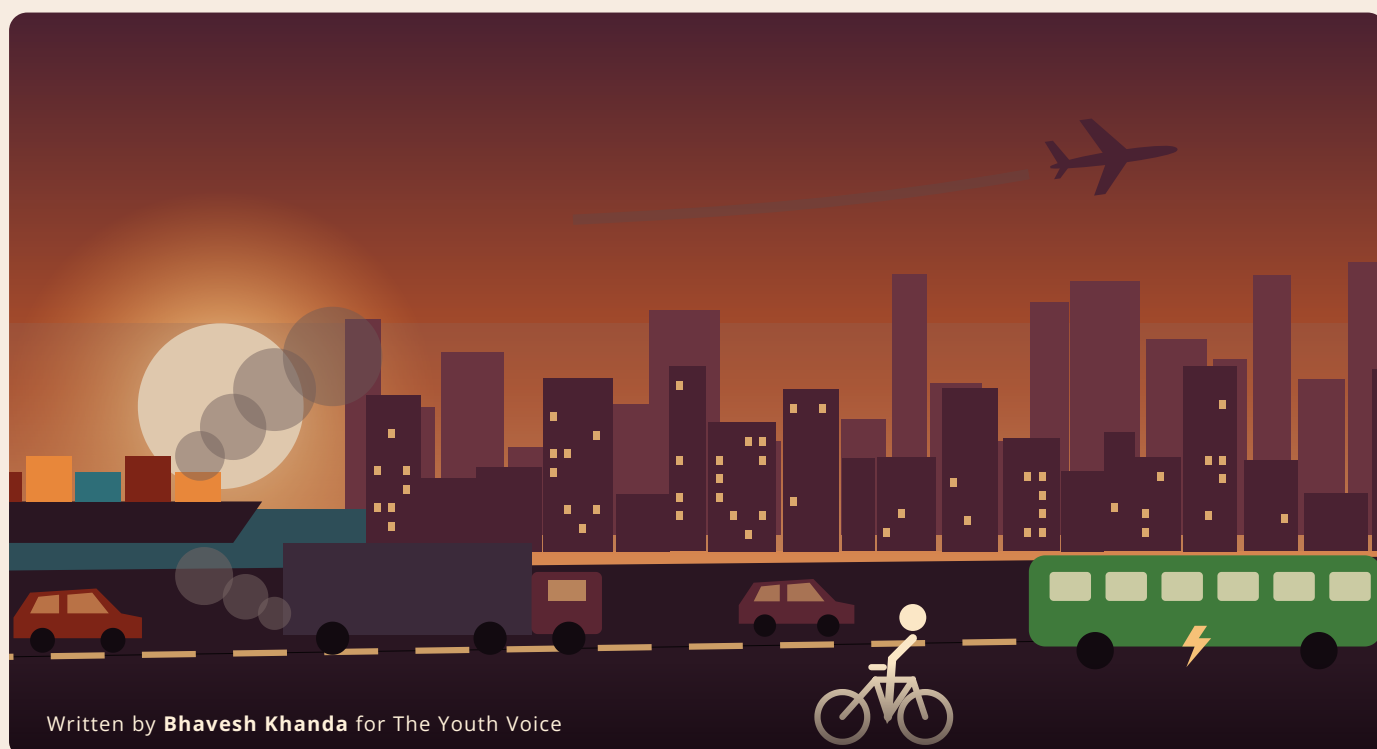
road vehicles — the largest share of transport emissions, ahead of aviation and shipping

2 levers

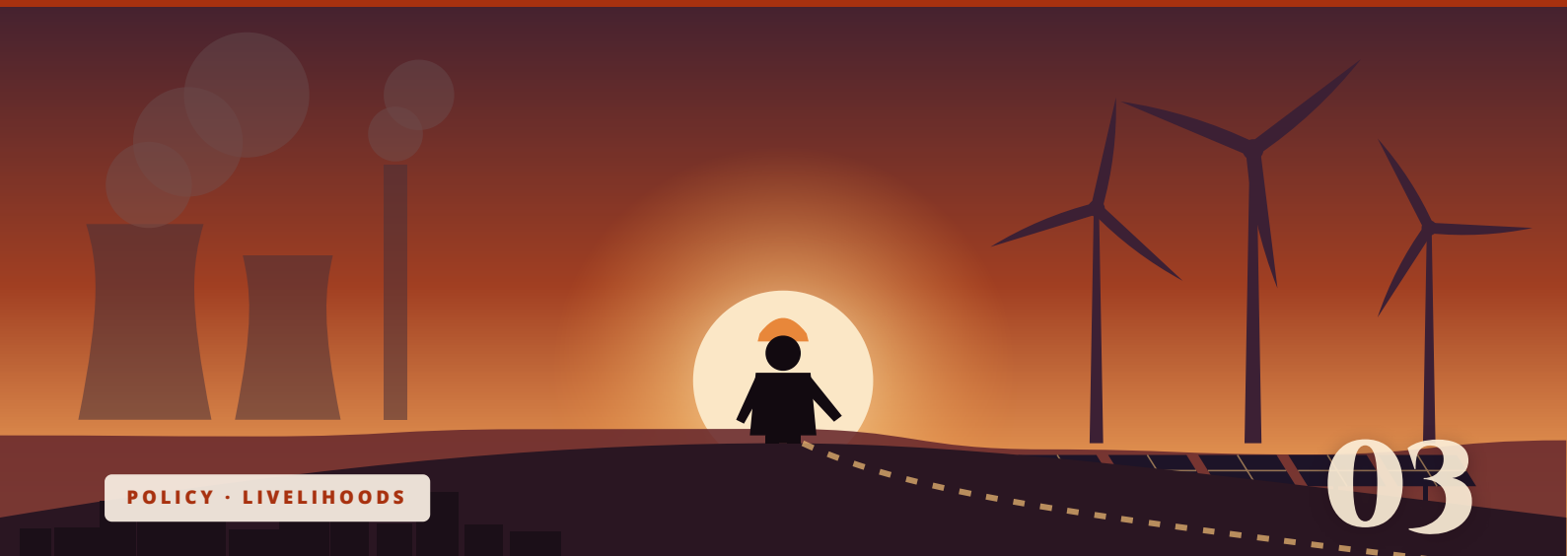
cleaner technology + smarter design of cities and supply chains

THINK ABOUT IT

1. How do you travel to school or college every day — and could that trip be greener?
2. What would make your neighbourhood easier to walk or cycle in?



Written by **Bhavesh Khanda** for The Youth Voice



POLICY · LIVELIHOODS

03

A Just Energy Transition for *Workers and Communities*



WRITTEN BY

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As the world shifts away from fossil fuels toward renewable energy an important question has emerged about fairness. Millions of workers currently employed in coal oil and gas industries along with the communities that depend on these jobs face real economic disruption as the energy landscape changes making a just transition essential to the broader climate effort.

A just transition means ensuring that workers displaced by the shift away from fossil fuels are not simply left behind. This can include retraining programs that help coal miners and oil workers move into renewable energy jobs financial support during the transition period and investment in economic diversification for regions historically dependent on fossil fuel industries. Some countries have begun implementing these strategies with mixed success showing both the potential and the difficulty of managing this kind of large scale economic shift.

Beyond individual workers entire communities built around fossil fuel industries face challenges including declining tax revenue for schools and public services as plants and mines close. Without careful planning these communities risk becoming economically depressed even as the broader economy benefits from cleaner energy. Policymakers increasingly recognize that public support for climate action depends partly on how fairly the costs and benefits of the transition are distributed. Ignoring the human impact of moving away from fossil fuels risks

generating political backlash that could slow climate progress making a genuinely just transition not just an ethical priority but a practical necessity for long term success.

Education and retraining programs form a critical pillar of successful just transition strategies though designing effective programs has proven more difficult in practice than in theory. Simply offering technical training is often insufficient without also addressing wage gaps since renewable energy jobs do not always match the pay and benefits that unionized fossil fuel jobs traditionally provided particularly in the coal sector.

Community investment funds represent another tool some governments have used to support just transitions channeling revenue from carbon pricing or other climate policies directly into affected regions to support infrastructure diversification and social programs. Germany's approach to its coal regions has combined significant direct investment with structured dialogue between government industry and labor representatives to design transition plans collaboratively rather than imposing them from above. These kinds of participatory approaches that give affected communities genuine input into transition planning tend to generate less resistance and more durable long term outcomes than transitions imposed without adequate community consultation and support.

A transition that leaves workers and communities

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A genuinely just transition is not just an ethical priority but a practical necessity for long term success.

— ANSHU ADARSH

behind will struggle to sustain the public support needed to see the broader energy transformation through to completion over the multi decade timeframe required. Political backlash from affected regions has already influenced climate policy debates in several countries demonstrating how quickly public support can erode when transition costs feel unfairly concentrated on specific communities while benefits appear diffuse across

society more broadly. Policymakers who recognize this dynamic and proactively design transition support programs rather than treating worker and community impacts as an afterthought are more likely to maintain the durable political coalition needed to sustain ambitious climate policy across multiple election cycles and changes in government leadership over time. ■

PILLARS OF A JUST TRANSITION

01

Retraining that helps coal and oil workers move into renewable energy jobs

02

Financial support for workers during the transition period

03

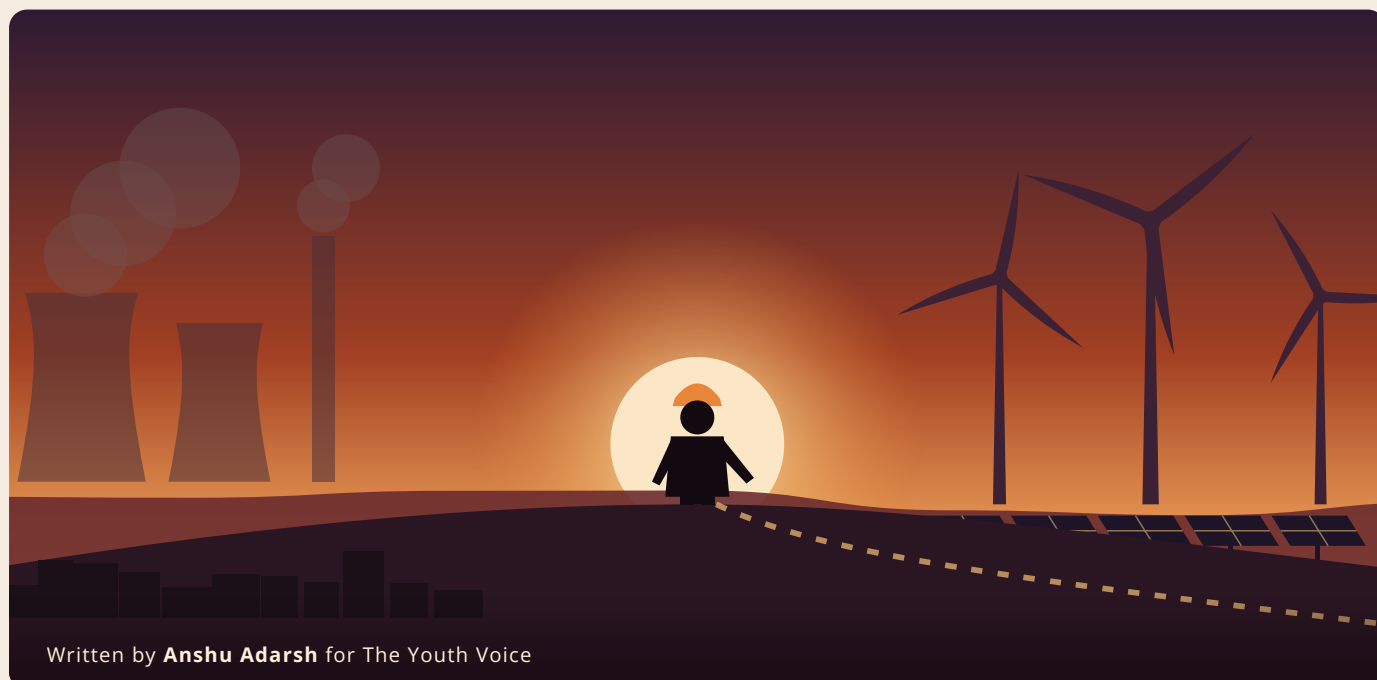
Community investment funds and economic diversification for affected regions

04

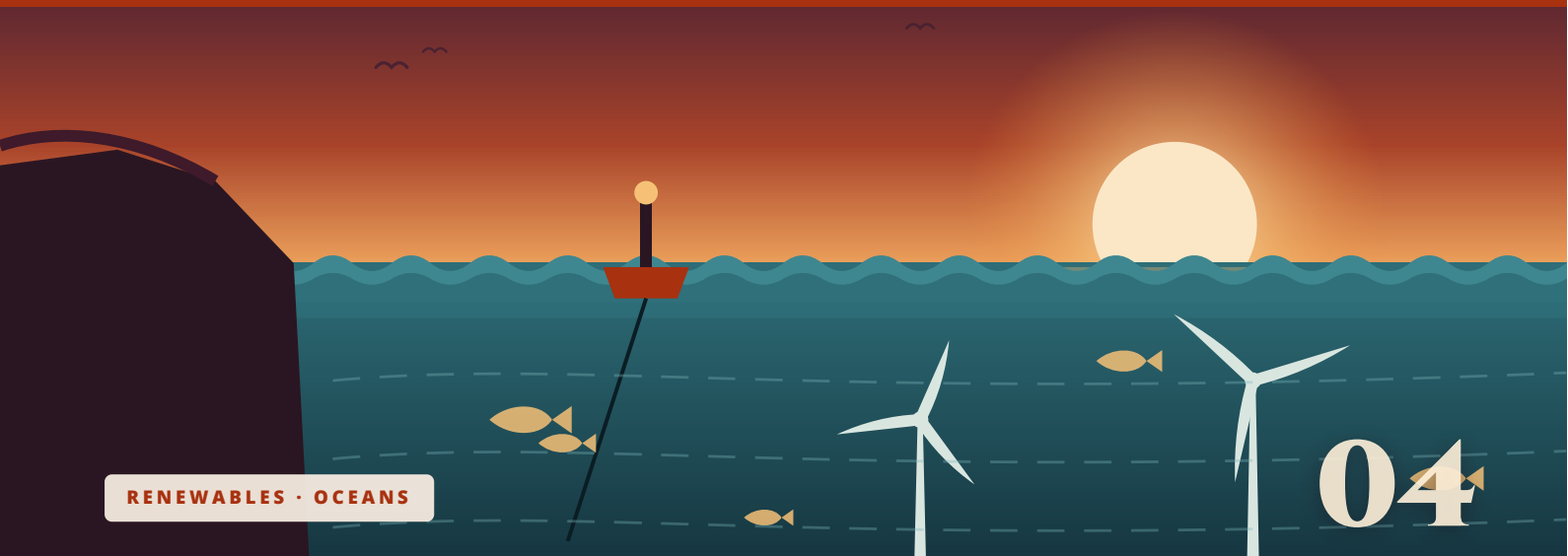
Participatory planning between government, industry and labour

THINK ABOUT IT

1. Who should pay for retraining workers — governments, companies, or both?
2. Why might a community resist climate policies that put local jobs at risk?



Written by **Anshu Adarsh** for The Youth Voice



Ocean Energy: *Tidal and Wave Power Potential*



WRITTEN BY

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Ocean energy technologies including tidal and wave power represent an often overlooked category of renewable energy with significant untapped potential particularly for coastal nations with strong tidal currents or consistent wave activity. Unlike solar and wind power, ocean energy offers the advantage of relatively predictable generation patterns since tidal movements follow consistent astronomical cycles that can be forecast years in advance.

Tidal energy typically works by capturing the kinetic energy of moving water as tides rise and fall using underwater turbines similar in concept to wind turbines but designed to operate in water rather than air. Because water is far denser than air, tidal turbines can generate significant power even at relatively low current speeds compared to what would be required for wind generation. Wave energy technology captures the kinetic and potential energy of surface waves through various mechanical designs though this technology remains less mature than tidal systems.

Despite its theoretical potential, ocean energy has struggled to achieve widespread commercial deployment due to high costs, harsh marine operating conditions that stress equipment and limited suitable locations with strong enough tidal or wave resources. Saltwater environments also present significant engineering challenges related to corrosion and maintenance access for underwater equipment. Countries including the United Kingdom France and South Korea have invested in demonstration projects to advance the technology though

ocean energy remains a small fraction of global renewable capacity today. Continued cost reductions and technological improvements could eventually help ocean energy play a more meaningful role in the renewable energy mix particularly for coastal regions with limited alternative renewable resources available.

Environmental impact assessments for ocean energy projects must carefully consider potential effects on marine ecosystems since underwater turbines and wave energy devices could theoretically affect fish migration patterns marine mammal behavior or seabed habitats in ways that are still not fully understood given the relatively limited number of large scale projects deployed so far to study these effects comprehensively.

Grid connection challenges add further complexity to ocean energy development since many of the most promising tidal and wave resources are located in remote coastal areas far from existing electricity transmission infrastructure. Building the underwater cables and grid connections necessary to bring ocean generated electricity to population centers where it is needed represents a substantial additional cost beyond the generation technology itself often making ocean energy projects more expensive on a total cost basis than their raw generation potential alone might suggest to project developers evaluating the economics of these ventures.

Ocean energy may never rival solar or wind power in overall global scale but it could still play a valuable complementary role for coastal communities with limited other renewable resource options available to them given

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Tidal movements follow consistent astronomical cycles that can be forecast years in advance.

— ADWITEYA SIROHI

their particular geography and climate conditions. For island nations and coastal regions with strong tidal currents or consistent wave activity but limited land available for large solar or wind installations ocean energy

could represent a genuinely important part of their local renewable energy mix even if it never becomes a globally dominant technology on the scale that solar and wind have already achieved worldwide. ■

WHY THE OCEAN?

Predictable

tides can be forecast years in advance, unlike sun and wind

Dense

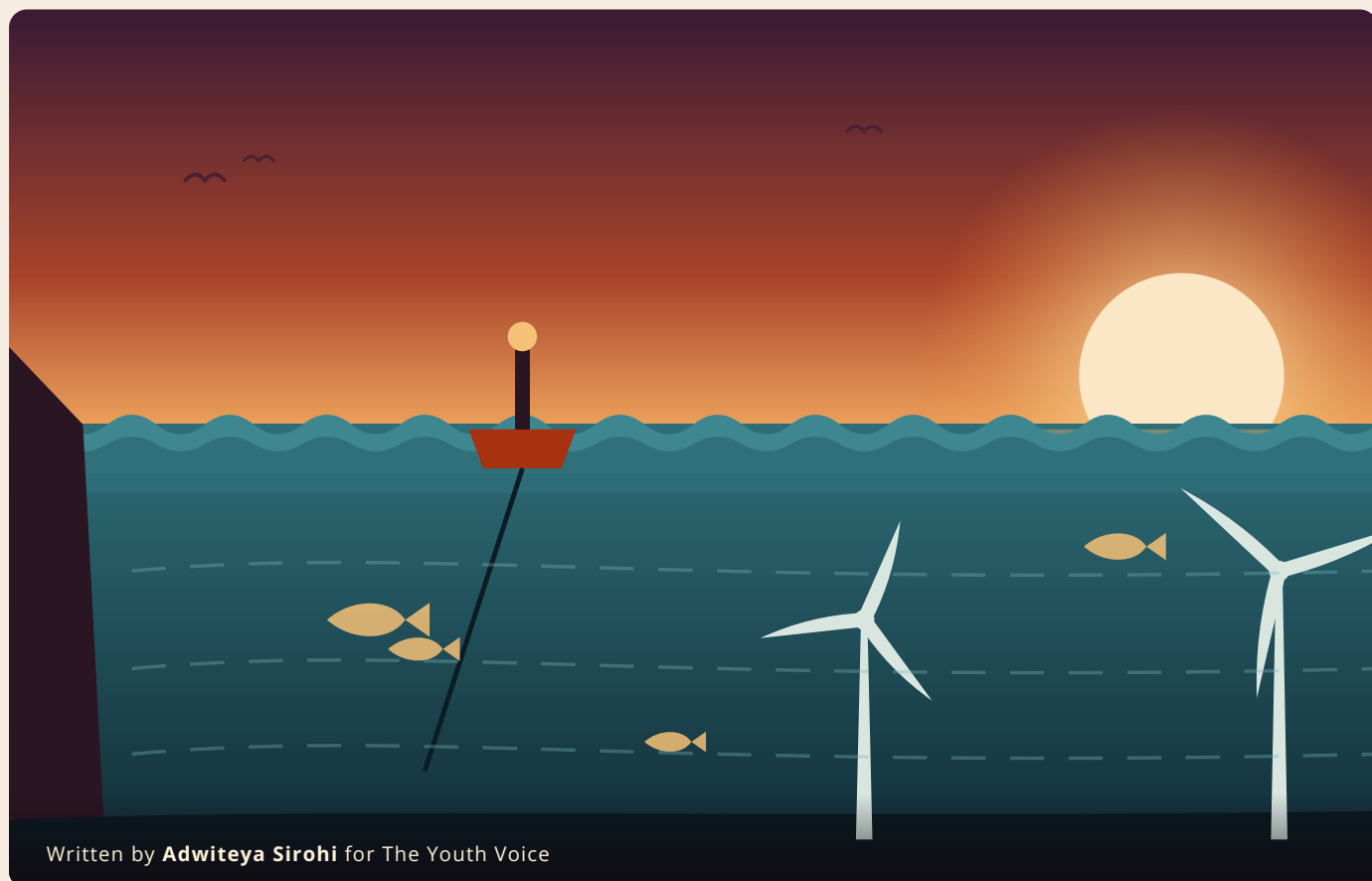
water lets turbines generate power even at low current speeds

Pioneers

the UK, France and South Korea have invested in demonstration projects

THINK ABOUT IT

1. India has a long coastline — where do you think tidal or wave energy could make sense?
2. How should we balance new clean-energy projects with protecting marine life?



Written by Adwiteya Sirohi for The Youth Voice

ENERGY · THE BIG PICTURE

05

The Future of a *Sustainable Global Energy System*



WRITTEN BY

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Class 11 · DPS Patiala

Building a truly sustainable global energy system represents one of the most significant challenges humanity has ever faced, requiring the transformation of infrastructure that has taken more than a century to build around fossil fuels. Achieving this transition within the timeframe needed to limit dangerous climate change demands unprecedented cooperation across governments, industries and communities worldwide.

The technological foundation for this transition is increasingly in place. Renewable energy costs have fallen dramatically making solar and wind competitive with fossil fuels in most markets. Battery storage technology continues improving addressing the intermittency challenges that once seemed like insurmountable obstacles to high renewable energy penetration. Electric vehicles and heat pumps are steadily replacing fossil fuel dependent alternatives across transportation and heating sectors while emerging technologies like green hydrogen offer pathways for decarbonizing the hardest to electrify industrial processes.

Still significant challenges remain before a truly sustainable global energy system becomes reality. Developing nations need support to build clean energy infrastructure rather than following the fossil fuel intensive development path taken historically by wealthier countries. Grid infrastructure worldwide requires substantial modernization and expansion to handle growing electricity demand and increasing renewable penetration. Political will and consistent policy support

remain essential since energy infrastructure decisions made today will shape emissions trajectories for decades given how long power plants and industrial facilities typically operate once built. Despite these challenges the trajectory toward a cleaner energy future appears increasingly clear even if the exact pace and pathway will vary significantly across different regions and countries in the years ahead.

International governance structures will need continued strengthening to support a truly sustainable global energy system given how interconnected energy markets and climate impacts have become across national borders. Existing international climate agreements provide a framework for coordination but implementation still depends heavily on individual national policies and enforcement mechanisms that vary considerably in their ambition and effectiveness from one country to another.

Public engagement and political will ultimately underpin every technical and economic aspect of building a sustainable energy system since democratic societies require sustained public support to maintain the ambitious policies needed over multi decade timeframes. Building this durable public support requires clear communication about both the necessity and the tangible benefits of the energy transition including improved air quality economic opportunity and long term energy security that a diversified clean energy system can provide compared to continued dependence on increasingly volatile and environmentally costly fossil fuel markets.

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Building a truly sustainable global energy system will ultimately remain an ongoing multi decade project rather than a single achievable endpoint.

— VINITA BIMBRA

Building a truly sustainable global energy system will ultimately remain an ongoing multi decade project rather than a single achievable endpoint requiring persistent effort and continued investment across multiple generations to come rather than a problem that can be definitively solved and then set aside. This long term perspective matters for maintaining realistic expectations and sustained commitment since meaningful progress will

likely continue unfolding gradually rather than through any single dramatic transformation. Recognizing this reality can help policymakers, businesses and individuals maintain the patience and persistence needed to sustain climate action across the many years of continued effort that a genuinely sustainable global energy future will require. ■

THE BUILDING BLOCKS

Solar + Wind

now competitive with fossil fuels in most markets

Storage

better batteries tackle the intermittency of renewables

EVs + Heat pumps

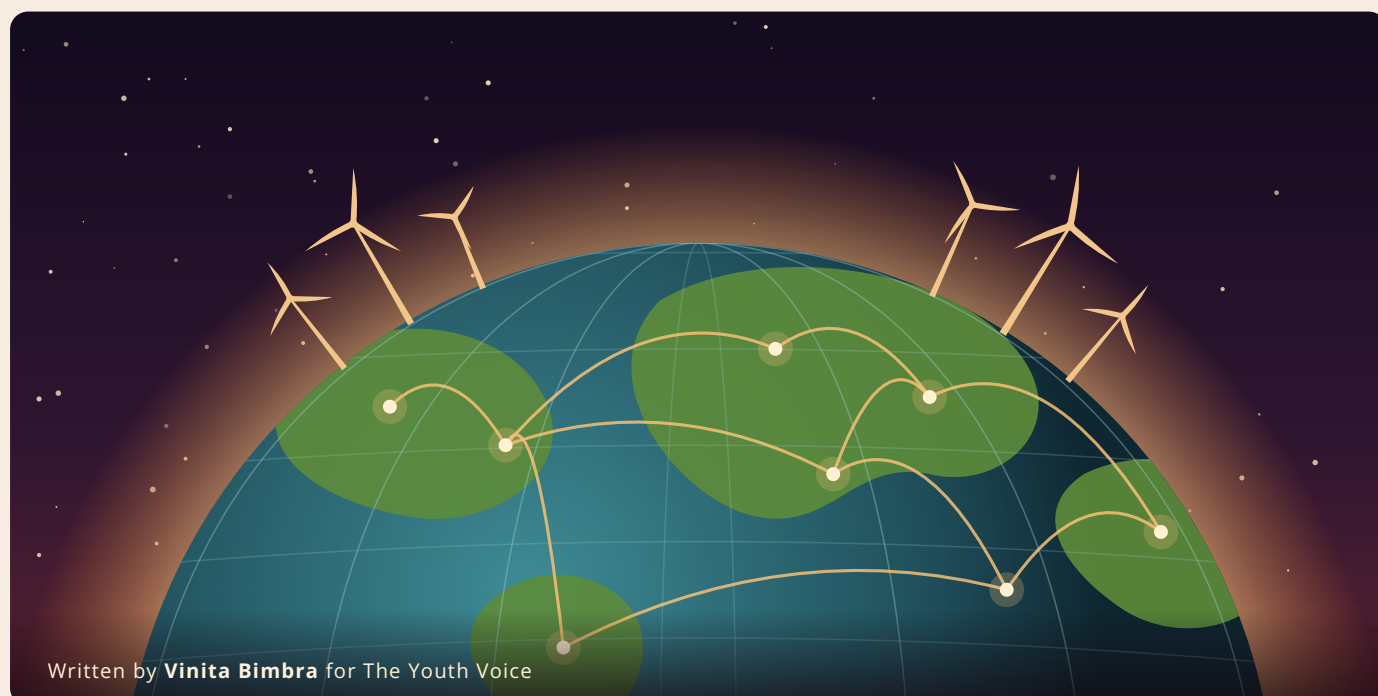
replacing fossil fuels in transport and heating

Green H₂

a pathway for the hardest-to-electrify industries

THINK ABOUT IT

1. Which part of the energy transition can you already see happening around you?
2. What can young people do to keep climate action on the agenda across elections?



1. What does the word “decarbonize” mean?

- (a) To add more coal to a process
- (b) To reduce or remove carbon dioxide emissions
- (c) To clean a car engine
- (d) To measure air temperature

2. Which word is closest to “intermittent”?

- (a) Constant
- (b) Stopping and starting at intervals
- (c) Extremely powerful
- (d) Invisible

3. What is a “feedstock”?

- (a) A share in a food company
- (b) Raw material used to make a product or fuel
- (c) Animal feed sold in bulk
- (d) A stock-market index

4. What does “diffuse” mean in “benefits appear diffuse”?

- (a) Spread out thinly over a wide area
- (b) Highly concentrated
- (c) Dangerous
- (d) Easy to measure

5. What is a “mandate”?

- (a) A friendly suggestion
- (b) An official order or requirement
- (c) A type of fuel tax refund
- (d) A weekly meeting

ANSWERS: 1 (b) · 2 (b) · 3 (b) · 4 (a) · 5 (b)

FUN FACTS

Sustainable aviation fuel can be made from used cooking oil — the same kind left over from frying samosas.

ARTICLE 01

Water is far denser than air, so a tidal turbine can make serious power even from slow-moving currents.

ARTICLE 04

Some companies now ask for a minimum share of SAF in their business-travel contracts.

ARTICLE 01

Tides follow astronomical cycles, so tidal power can be forecast years in advance — something sun and wind can't promise.

ARTICLE 04

Transport produces roughly a quarter of the world's energy-related carbon dioxide emissions.

ARTICLE 02

COLLABORATE WITH US

WE ARE ACTIVELY SEEKING CO-AUTHORS TO CONTRIBUTE TO THE NEWSLETTER
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