



Report of a Panel discussion on
“Towards the National Policy for Sustainable Green
Hydrogen Economy in Nepal”

Organized by
Green Hydrogen Lab, Kathmandu University

October 8th, 2020

Summary

Scientists and engineers across the globe celebrate Hydrogen and Fuel Cell Day on October 8, aptly chosen for the atomic weight of hydrogen (1.008). Hydrogen and fuel cells can be used in multiple sectors for transportation, stationary power, and industrial applications enabling energy security, resiliency, and a strong domestic economy in emerging technologies. We celebrated the Hydrogen and Fuel Cell Day with a discussion to contribute to the National policy on Green Hydrogen Economy.

Moderator

Ms. Anmol Parajuli, Environmental Engineer, Intern RA, Green Hydrogen Lab.

Speakers

Prof. Bhola Thapa, Professor at the Department of Mechanical Engineering at KU, Member of operation and management committee of TTL, Advisor of GHLab at KU.

Dr. Biraj Singh Thapa, Assistant Professor at the Department of Mechanical Engineering at KU, Faculty In-charge of TTL, Team leader of GHLab at KU.

Prof. Bhakta Bahadur Ale, former Head of Department at Pulchowk Campus, Campus Chief of Thapathali campus, and director for the centre of Applied Research and Development, Institute of Engineering.

Prof. Amrit Man Nakarmi, coordinator at Energy Systems Planning and Analysis Unit, former vice president at Chaudhary Group.

Er. Pratik Man Singh Pradhan, vice-president for Business Development and Project Function at Butwal Power Company.

Dr. Bishnu Prasad Gautam, member of the Planning Commission, Province 5, Nepal.

Prof. Govinda Raj Pokharel, former Vice Chairperson of the National Planning Commission of Nepal.

Er. Ganesh Shah, former Minister for Environment, Science, and Technology.

Rapporteurs

Ms. Anmol Parajuli, Environmental Engineer, Intern RA, Green Hydrogen Lab.

Mr. Pranabh Regmi, Mechanical Engineer, Intern RA, Green Hydrogen Lab.

Program Schedule

14:00 – Ms. Anmol Parajuli, Welcome and MC

14:05 – Prof. Bhola Thapa, Setting up the stage: Hydrogen Technologies- Why now?

14:15 – Assist. Prof. Biraj Singh Thapa, Academic Perspective: Dream Agendas for Hydrogen Economy in Nepal

- 14:30** – Prof. Bhakta Bahadur Ale, Technological Perspective: Challenges for local adaptation of end-use of hydrogen technologies
- 14:40** – Prof. Amrit Man Nakarmi, Economic Perspective: Putting hydrogen in the centre of energy economy of Nepal
- 14:50** – Er. Pratik Man Pradhan, Industrial Perspective: Hydrogen based paradigm shift of hydropower business in Nepal
- 15:00** – Dr. Bishnu Prasad Gautam, Policy Perspective: Holistic approach to solving two national crises of Energy Surplus and Fertilizer Deficit
- 15:10** – Prof. Govinda Pokharel, Planning Perspective: From possibility to policy
- 15:20** – Er. Ganesh Shah, Political Perspective: Beginning the process of transformation
- 15:30** – Open Discussions and Question Answers
- 15:50** – Summary and Conclusions
- 15:55** – Vote of Thanks and Closing by KU Official

Summary Notes of the Speakers

The opening of the panel discussion was done by Anmol Parajuli, Research Assistant at Green Hydrogen Lab, Kathmandu University. She briefly introduced Green hydrogen lab and the work being carried out by the lab. She also highlighted that the discussion was to be done on the occasion of hydrogen and fuel cell day.

Prof. Bhola Thapa started by welcoming the panel and all the participants. He briefly mentioned the revolutions in energy sector that took place from 1990. He reminded everyone as to how Nepali people struggled with effects of under developed energy and how the concerned people took the step to encourage hydropower growth in students as well as within the industry. He claimed that having successfully removed load-shedding problems, we now face the problem of energy wastage. The production of energy will soon be greater than the demand and he expressed his concerns over how it can potentially could cast a shadow in the growth of engineering sector. He suggested that at this time we must encourage employment and to solve the aforementioned situation we must concentrate on producing hydrogen from hydropower. By doing this we can help financially struggling hydropower plants. He also mentions that the reason for establishing Green Hydrogen Lab was to identify new alternatives, understand the technology and identifying the support we may need both from government and private sector.

Prof. Govinda Pokharel started by stating that there is an energy surplus during the wet season and if the trend is followed in years to come, energy generation will be surplus to requirements for a long time. He also mentioned the need of consumption of the surplus energy, which can be done by investment in green hydrogen. He stated that he believes city transport, ambulances, bus service can run using green hydrogen. To achieve this he suggested that there is a need to identify a sector like 'Safa Tempo' and grow within the sector. He also stated that industrial, private and academic sector need to get together and develop a demonstrative pilot project to convince policy makers.

Asst. Prof. Biraj Singh Thapa presented opportunities from Hydropower to Hydrogen in Nepal and the initiatives of Green Hydrogen Lab. He put forth the importance of investing in alternative forms of energy due to the rising concerns of climate change and environmental concerns at the global level and surplus energy in the country. He also presented multiple examples of usage of hydrogen in the form of heavy duty trucks, buses, aviation, rails, maritime etc. and gave his opinion on how we can integrate those usage cases in Nepal. He presented examples of development in hydrogen technology in political as well as industrial front in different countries. He shared the dream agenda carried by the Green Hydrogen Lab for developing a hydrogen ecosystem in Nepal by the year 2040.

Prof. Bhakta Bahadur Ale shared his take on importance of hydrogen production through a different approach. He pointed to the fact that hydro-electricity in Nepal is RoR so when there is no demand at night the energy will go to waste. He mentioned how hydrogen can be produced from Renewable Energy. He identified food processing, fertilizers and metal processing as the areas for hydrogen in Nepal. He shared the development in Green Hydrogen initiatives in IOE and briefly talked about the 1st attempt by IOE to produce hydrogen by building an electrolyser. He also presented the potential challenges of hydrogen production. He stated that fuel cell technology cannot replace electric vehicle as of now but initiatives should be taken today. He also underlined the importance of electricity charges reduction to promote production of hydrogen.

Prof. Amrit Man Nakarmi started by presenting the energy mix and sectoral energy consumption in Nepal. He mentioned that NRs. 200 billion is spent in importing electricity and petroleum product. Because of this Nepal currently ranks bottom in energy security and also rank low on energy equity out of 125 countries on Energy Trilemma index . He pointed out to the fact that there was increase in the consumption of electricity (around 20%) in 2019 which

has dropped down to 2% in 2020. At the same time the demand and consumption of petroleum product was alarmingly high. He summarised his points by stating that although hydrogen production is expensive as of now but it is decreasing. He stated that investment in green hydrogen can be highly beneficial.

Er. Pratik Man Pradhan discussed on the industries' perspectives focusing on Hydrogen based hydropower business in Nepal. He said that Hydropower sector in Nepal is very much progressive as we compare with the past that we were facing load shedding. He also mentioned that the topography of Nepal supports Hydropower businesses. He expressed that hydropower sector is also very challenging. He focused on the how durability and reliability is so important to run this sector successfully. He said that energy intensive production is really persistent because there is energy surplus. He said that Green Hydrogen can be a step in the future and it is in the nascent stage now. He also gave few examples of European nations strongly dedicated in Green Hydrogen production. He said that he is ready to conduct pilot projects to produce Hydrogen in joint cooperation during monsoon when it won't hamper the business.

Bishnu Prasad Gautam began with the energy status focusing on the energy surplus not being utilized. He said that the energy consumption system can be ruined because of regressive policies. He said that the plan focuses almost entirely for powerhouses but not for load centres and said that chemical fertilizers can serve as a massive load with excellent surplus management capability. He mentioned that chemical fertilizer status has not improved since 5 decades. He highlighted that policies should not be made in 'this or that' basis but in 'this and that' basis. He highlighted that system development should be collective and should be based on the resources that are available to us. He presented Hydrogen as the new incarnation. He also said that electricity should be focused rather than gas when it comes to production of fertilizer plant in Nepal.

Ganesh Shah said that the celebration of Hydrogen and Fuel Cell day on 8th October, 2020 is historical. He said that the future energy scenario is going to be mixed energy. He said that KU has taken a good initiative to work on R&D and KU should collaborate with NEA, NOC and AEPC for research and development activities. The collaborative advocacy is important in terms of new technologies and advocates should also work on policy sector because only academia alone cannot work on the sector to make it possible.

The session was followed by the discussion session led by Biraj Singh Thapa. The floor was open for discussion. Pratik Man Pradhan discussed about hydropower sector and to export

energy, it should be competitive market. Bishwash Neupane asked about on what basis the target policy is made considering the cost of production through different source and pathways. Bishnu Prasad Gautam answered by saying that the pricing is relative and how the research is important when it comes to developing policies. Biraj Singh Thapa thanked the participants for posting their queries in the chat box.

Bhola Thapa thanked the participants and panellists. He said that the younger generation interns who are working as researchers can move ahead in this sector and this is the right time to train them beforehand. He said that Nepal being a small nation cannot escape from the fact that we also do have responsibility towards cleaner energy production and environmental sustainability. The program was then closed by Damber Bahadur Nepali. He thanked the organizing committee and expressed his gratitude to all the panellists who presented their ideas in the event.

Conclusion

- 1) Need to focus and encourage government as well as new innovation towards hydrogen from hydropower from the ground level.
- 2) Industrial, private and academic sector need to get together to select a niche for hydrogen development in Nepal, selecting a sector and present a demonstrative case to convince policy makers.
- 3) Nepal should be inspired by other countries and their developments and integrate the potential of green hydrogen through academics.
- 4) Hydrogen economy demands more expenses and research should be carried out to reduce the cost both technically as well as politically.
- 5) The potential usage area of hydrogen currently is in producing fertilizers and hydrogen peroxide.
- 6) Initiatives should be carried out to favour hydrogen production and give it a huge advantage from government level.
- 7) Nepal ranks 118/125 on Energy Trilemma index thus, we have to urgently change policies and encourage change in trends to improve our conditions.
- 8) Although hydrogen production is expensive but initiatives should be taken as it promises to be economical in few years' time.

- 9) Green Hydrogen production from Hydrogen is pertinent in terms of Nepal whose topography supports the process and it is beneficial when the pilot projects can be conducted during monsoon when it doesn't hamper hydropower businesses.
- 10) Policies should be far sighted and should analyse global trend, regressive policies should not be adopted.
- 11) Chemical fertilizers can serve as a massive load with excellent surplus management capability.
- 12) Development practises should proceed on the basis of the resources that are available to us and the production should be addressed by the demand.
- 13) Hydropower sector should be competitive to focus on the export, and spill energy only won't let the Green Hydrogen sector sustain unless there is dedicated production.