

EQ presents 3 days training on **GREEN HYDROGEN**

on 26, 27 & 30 August 2021

IST 05:30 to 08:30 PM

Trainer **Dr. John Massey**

Webinar on same topic

on Wednesday, 25 August 2021

IST 07:00 to 09:00 PM

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ABOUT TRAINER

Dr. John Massey is Managing Director of Grey Cells Energy Ltd., where he conducts independent market assessment and opportunity/risk analysis for clean energy technologies. He delivers market briefings, one to-one coaching and training courses worldwide, both online and in-person, along with strategy and business plan consulting to help companies (particularly SMEs) position themselves to best grasp new low-carbon market opportunities. In addition to delivering training globally under his "Grey Cells Energy" brand, John is a co-founder of Astute New Energy, helping firms to navigate the changing power sector through business, strategy and stakeholder communication advisory work.

COURSE FEE

₹10,000 *(18% IGST extra)*

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Trainer Dr. John Massey

ABOUT COURSE

Online, based on 3 x 3-hour sessions. (Each session will typically include a break of 15 minutes and plenty of opportunity for Q&A)

Course objectives – is this for you?

This course is intended for those seeking a time-effective, wide-ranging and independent perspective on clean hydrogen production from renewable power ('green' hydrogen). You will leave with a clearly explained, business-focused perspective on the current status of electrolysis technology, along with its likely future trends. You will understand the inputs and outputs that will determine the cost structures, revenue streams and economics of green hydrogen projects. You will be better placed to critically assess the likely deployment scenarios and practical challenges facing green hydrogen projects. Throughout the course, your trainer will separate what is really happening in the market from some of the headlines and hype, helping you to identify credible near-term opportunities for your business, along with the associated risks. He will evaluate and quantify barriers to long-term scalability and illustrate throughout using examples and benchmarks taken from a global perspective.

Some key benefits of attending

- Gain a clear understanding of green hydrogen market opportunities & deployment considerations
- Clear explanations of electrolysis technologies, metrics and performance considerations (in language accessible to non-technical people)
- Discuss the key project delivery issues for green hydrogen projects
- Review up-to-date examples from around the world and the lessons from them
- Understand the economic variables that impact the production cost of green hydrogen (illustrated using a provided Excel model)
- Stay up-to-date on the critical policy, market competitive and business environment factors driving the growth of green hydrogen

Agenda summary:

SESSION 1: Electrolysis technology & green hydrogen production

SESSION 2: The economics of green hydrogen

SESSION 3: Markets and project deployment: opportunities & risks

Agenda outline

Session 1: Electrolysis technology & green hydrogen production

A clear explainer, for business people, of green hydrogen production (electrolysis) technologies: the components of a green hydrogen system and the performance metrics that matter.

What are the different electrolysis types, how do they compare and what makes up a full green hydrogen production system? What are the key technology trends to look out for? What are the process inputs and outputs?

A business person's guide to electrolysis: what you need to know

- Essentials of the electrolysis process and electrolyser cells
- Comparing and contrasting the competing electrolysis solutions (ALK, PEM, AEM, SOC)
- Balance of system components: what makes a green hydrogen plant?
- Current product examples (examining real specification data sheets)
- Inputs, outputs and key performance metrics
- Technology selection criteria: what are the key considerations?
- Materials & resources, including sustainability
- Water usage and quality
- Downstream considerations: hydrogen purity & pressure
- Process by-products: oxygen and heat
- Reversible electrolysers (electrolyser/fuel cell)
- Future trends and goals in electrolyser technology development

ABOUT COURSE

Session 2: The economics of green hydrogen

Along with example data on current and forecast input costs, a simple Excel model (provided to attendees) is used to highlight which are the important variables in determining how much (\$/kg) green hydrogen costs to produce.

Is equipment cost or electricity cost more important? How valuable might non-hydrogen revenue streams be to green hydrogen projects? What combination of factors will be needed to achieve some of the forecast hydrogen cost reductions that you will see?

Examining the economics of green hydrogen production

- Reviewing and understanding the wide range of published electrolysis cost data
- Balance of system, operational and other cost contributions
- Calculating the cost of hydrogen production (a levelized cost approach)
- Sensitivity analysis: which variables are most important for green hydrogen costs?
- Electricity supply considerations (including source, cost, carbon intensity, variability)
- Revenue stacking and the value of oxygen and waste heat
- Electrolyser load factor and the potential value of flexible operation
- Efficiency gains, equipment lifetimes and other factors
- Considerations in equipment sizing, using the example of green hydrogen from solar power
- Examining forecast future cost reductions: how they can be achieved?
- Downstream and supply chain cost considerations (production vs. delivered costs)
- Green hydrogen from an investment perspective

Session 3: Markets and project deployment: opportunities & risks

In addition to technology choice and economics, successful green hydrogen projects will be built upon a solid appreciation of their market, competitive and policy contexts, along with knowledge of the practical deployment hurdles to be overcome.

What considerations should a market assessment process include? What project development processes are essential, including planning and permitting risks? What are the barriers to scale and realistic timescales for green hydrogen market growth?

Market opportunities and risks for green hydrogen project developers

- Green hydrogen today and targets and forecasts for growth over the next decade
- Trends in the scale of individual projects
- Proposals for gigawatt-scale production and international trade, including timescales
- Market segments: which are the best potential end-use applications for green hydrogen?
- Market entry and assessment considerations
- Electrification and the competitive landscape facing green hydrogen
- The crucial importance of sustainability criteria and certification schemes
- Other current, emerging or proposed policy support mechanisms
- Project planning and permitting essentials, including land footprint, grid connectivity, safety and supply chain
- Will green hydrogen production be centralised or decentralised?
- Green hydrogen projects within hydrogen 'clusters', 'hubs' and 'valleys'
- Closing summary: a green hydrogen project development checklist

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KEY DISCUSSION POINTS

- Electrolysis technology & green hydrogen production
- Components of a green hydrogen system and the performance metrics that matter.
- Essentials of the electrolysis process and electrolyser cells
- Key technology trends to look out for green Hydrogen
- Downstream considerations: hydrogen purity & pressure
- Inputs, outputs and key performance metrics
- The process inputs and outputs?
- Technology selection criteria: what are the key considerations?
- Future trends and goals in electrolyser technology development
- The economics of green hydrogen
- Green hydrogen from an investment perspective
- Downstream and supply chain cost considerations
- Markets and project deployment: opportunities & risks
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- Green hydrogen projects within hydrogen 'clusters', 'hubs' and 'valleys'
- Green hydrogen project development checklist
- Will green hydrogen production be centralised or decentralised?

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