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India | Equity Research | Sector Update

Capital Goods

Green Hydrogen: The beginning

India has the advantage of lower cost of renewables. It is looking to establish itself on the green hydrogen (GH2) map. Note that manufacturing of GH2 needs: 1) lower cost of renewables and 2) an electrolyser manufacturing ecosystem. In the last few days, India took its initial footsteps towards starting the ecosystem, conducting the first rounds of incentives for: 1) GH2 production and 2) electrolyser manufacturing. It has set aside INR 190bn towards incentives for the green ecosystem. L&T, Adani and Reliance were the key beneficiaries for electrolyser manufacturing, while Reliance, ACME and Greenko were the key beneficiaries for GH2 production. We expect the hydrogen purchase obligations to be announced in the next few months – this will be critical for the sector development.

Incentives for GH2

Indian government had set aside INR 190bn – 1) INR 170bn towards GH2 production and 2) INR 20bn for electrolyser manufacturing. India conducted its first round of bidding for allotting incentives to developers and manufacturers of electrolyser. To allot the incentives for GH2, it has asked for bidding for incentives for three years. For electrolyser incentives allotment, it has set the incentives for three years and is awarding it to the companies with highest local value addition and efficiency (details inside).

GH2 key beneficiaries: Reliance, ACME and Greenko

Under its first GH2 tender, India awarded incentives to various bidders for a total production of 420kt per annum. Reliance, ACME and Greenko have been allocated 90kt capacity each with incentives of INR 19/kg, INR 30/kg and INR 30/kg, respectively. Welspun Energy and Torrent Power were allocated 20kt and 18kt for incentives worth INR 20/kg and INR 29/kg, respectively. JSW received 6.5kt capacity for incentive of INR 35/kg.

Electrolyser: All came for alkaline electrolyser

Under another bid for electrolyser manufacturing, it awarded incentives worth INR 22bn to set up 1.5GW of capacity. Reliance, Jindal and Greenko were awarded 300MW of alkaline electrolyser capacity with maximum incentive of INR 4.5bn each. Adani was awarded 200MW, HomiHydrogen and Advait Infra were awarded 100MW each. LT was awarded 63MW. Ohmium was awarded 137MW for PEM (Proton Exchange Membrane) capacity.

Renewables: Increasing total addressable market

1mt of GH2 requires 25GW of RE capacity; thus, we expect incremental RE capacity addition of 8-9GW to meet the demand from these tenders of GH2 manufacturing, along with total demand of 4GW of electrolysers.

The next steps

India had announced incentives worth INR 175bn – 1) INR 130bn for GH2; and 2) INR 45bn for electrolysers. Total incentives payable, based on the above two tenders, is expected at INR 55bn. We believe, more of such tenders are likely to surface in the near to medium term as the current round will exhaust merely 30% of the budget. In order to develop the GH2 ecosystem, GH2 obligations on user industries is critical, in our view.

Mohit Kumar

kumar.mohit@icicisecurities.com
+91 22 6807 7419

Ashwani Sharma

sharma.ashwani@icicisecurities.com

Nikhil Abhyankar

nikhil.abhyankar@icicisecurities.com

Bid result for GH2 and electrolyser manufacturing

Exhibit 1: Electrolyser manufacturing for any stack technology

S No.	Name of Bidder	Capacity (MW)	Type of Electrolyser	Year-wise LVA Factor					Year-wise LVA Factor					Selection parameter	Capacity to be awarded (MW)
				Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5		
1	Reliance Electrolyser Manufacturing	300	Alkaline	1.00	1.00	1.00	1.00	1.00	1.20	1.20	1.20	1.20	1.20	6.00	300
2	Ohmium Operations Privated	137	PEM	1.00	1.00	1.00	1.00	1.00	1.20	1.20	1.20	1.20	1.20	6.00	137
3	John Cockerill Greenko Hydrogen Solution Private	300	Alkaline	0.70	1.00	1.00	1.00	1.00	1.12	1.12	1.20	1.20	1.20	5.50	300
4	Advait Infratech Limited (consortium with Rajesh Power Service Private)	100	Alkaline	0.70	0.80	1.00	1.00	1.00	1.20	1.20	1.20	1.20	1.20	5.40	100
5	Jindal India	300	Alkaline	1.00	1.00	1.00	1.00	1.00	1.04	1.04	1.08	1.08	1.08	5.32	300
6	L&T Electrolysers	300	Alkaline	0.80	0.80	1.00	1.00	1.00	1.12	1.12	1.12	1.16	1.20	5.27	63
7	Matrix Gas and Renewables Limited in consortium with Gensol Engineering	105	Alkaline	0.70	0.80	1.00	1.00	1.00	1.08	1.12	1.16	1.16	1.20	5.17	-
8	HHP Seven Private	100	Alkaline	0.60	0.80	0.80	1.00	1.00	1.12	1.20	1.20	1.20	1.20	4.99	-
9	ACME Cleantech Solutions Private	100	Alkaline	0.60	0.70	0.80	1.00	1.00	1.16	1.16	1.20	1.20	1.20	4.87	-
10	Adani New Industries	300	Alkaline	0.70	0.80	0.80	1.00	1.00	1.04	1.08	1.12	1.16	1.16	4.81	-
11	Waree Energies	300	Alkaline	0.60	0.70	0.80	0.80	0.80	1.04	1.04	1.08	1.12	1.12	4.01	-
12	Avaada Electrolyser Private	300	Alkaline	0.50	0.60	0.70	0.70	0.80	1.00	1.04	1.04	1.08	1.08	3.47	-
13	Green H2 Network India Private	100	Alkaline	0.40	0.80	0.80	0.80	0.80	1.00	1.00	0.96	0.96	0.92	3.47	-
14	Hild Electric Private	100	Alkaline	0.40	0.40	0.40	0.40	0.40	0.88	0.88	0.88	0.92	0.92	1.79	-
Total (in MW)		2842													1200

Source: I-sec research

Exhibit 2: Electrolyser manufacturing bids for indigenously developed technology

S No.	Name of Bidder	Capacity (MW)	Type of Electrolyser	Year-wise LVA Factor					Year-wise LVA Factor					Selection parameter	Capacity to be awarded (MW)
				Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5		
1	Homihydrogen Private	101.50	AMSE / Solid Oxide	0.800	1.000	1.000	1.000	1.000	1.040	1.040	1.120	1.160	1.200	5.352	101.5
2	Adani New Industries	300.00	Alkaline	0.700	0.800	0.800	1.000	1.000	1.040	1.080	1.120	1.160	1.160	4.808	198.5
3	Livehy Energy Private	40.00	Alkaline	0.700	0.800	0.800	1.000	1.000	1.000	1.040	1.080	1.120	1.160	4.676	-
4	C Doctor and Company Private	10.00	Alkaline	1.000	1.000	1.000	1.000	1.000	0.840	0.880	0.920	0.960	1.000	4.600	-
5	Pratishna Engineers	19.00	Alkaline	0.700	0.700	0.800	0.800	0.800	0.920	1.000	1.080	1.160	1.160	4.064	-
6	Bharat Heavy Electricals	10.00	Alkaline	0.500	0.600	0.700	0.800	0.800	0.840	0.840	0.840	0.880	0.880	2.920	-
7	Newtrace Private	6.00	Any other type	0.600	0.600	0.600	0.700	0.800	0.800	0.800	0.800	0.800	0.800	2.640	-
Total (in MW)		486.50													300

Source: I-Sec research

Exhibit 3: GH2 tender bids

Bidder	Allocated Capacity (MT)	Average Incentive (INR/kg)	Average Incentive (US\$/kg)	Total Incentives for 3 years (INR m)
UPL	10,000	0	0	-
CESC	10,500	0	0	-
Reliance Green	90,000	18.9	0.227	5,103
Welspun New Energy	20,000	20	0.24	1,200
HHP Two	75,000	25.04	0.3	5,634
Torrent Power	18,000	28.89	0.347	1,560
ACME	90,000	30	0.36	8,100
Greenko	90,000	30	0.36	8,100
JSW Neo	6,500	34.66	0.416	676
Total				30,373

Source: I-Sec research

Key highlights of GH2 tender

- **The tender was to select GH2 manufacturers to set up GH2 manufacturing facilities with total capacity of 450,000MT/year**
- **The capacities are split under two buckets**
 - Technology agnostic method – 410,000MT/year
 - Biomass based method – 40,000MT/year
- **Minimum and maximum quantity to allocable to a single bidder under the tender was –**
 - Technology agnostic method – Min – 10,000MT/year and Max – 90,000/year
 - Biomass based method – Min - 500MT/year and Max – 4,000MT/year
- **Commissioning of GH2 Production Facilities – Within 30 month of letter of award (LOA) for both the methods**
 - Penalties on delay in execution will be calculated on per day basis for any delay beyond 30 months after LOA
 - $\text{Penalties} = \text{performance bank guarantee} \times (\text{no. of days of delay}/180) \times (\text{unexecuted capacity} / \text{total capacity allocated})$
- **Disbursement of incentives will start after the commissioning and sale of GH2 from the capacities.**
- **Bidding and selection winners**
 - The manufacturer needs to quote total capacity to be set up and incentive on per/kg basis for the initial 3 years
 - Note that incentive for subsequent year has to be equal or lower than last year
 - Capacity under the tender will be allocated based on lowest cumulative incentive quoted for 3 years
- **Incentives**
 - Incentive payment will start after commissioning of projects
 - Total incentives to be paid will be based on the incentive quoted and actual production in that year

Key highlights of electrolyser manufacturing tender

- The tender was to select electrolyser manufacturer with a total capacity to be allotted of 1500MW
- The capacity to be allotted is split between two buckets –
 - Electrolyser manufacturing capacity based on any stack technology – 1200MW
 - Electrolyser manufacturing capacity based on indigenously developed stack technology – 300 MW
- Minimum and maximum quantity to allocable to a single bidder under the tender was –
 - Electrolyser manufacturing capacity based on any stack technology – Min 100MW and Max 300MW
 - Electrolyser manufacturing capacity based on indigenously developed stack technology – Min 0 and Max 300 MW
- Performance criteria for the bids

Exhibit 4: Electrolyser performance requirement criteria

Parameters		Min Value for 1st year	Min Value for 2nd year	Min Value for 3rd year	Min Value for 4th year	Min Value for 5th year
Specific Energy Consumption (SEC)		SEC should be less than 56kwh/kg of H2 production				
Local Value addition	For Alkaline Electrolyser	40%	50%	60%	70%	80%
	for PEM, SOE, Anion exchange membrane	30%	40%	50%	60%	70%
Guaranteed Life of electrolyser		Guaranteed life of at least 60,000 hours				

Source: I-Sec research

Local value addition = (Sale value of electrolyzers – Value of imports) / Sale value of electrolyzers

- Evaluation of bidders
 - The bidders will be evaluated based on the yearly LVA and performance quotient it has quoted in the bid
 - So the capacity will be allocated to the bidder who has higher –
 - Selection parameter = LVA factor (defined earlier) X Performance quotient (Lower the SEC higher is performance quotient)
- The Incentives will be paid on actual sales of electrolyzers after the commissioning of the project.

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Name of the Compliance officer (Research Analyst): Mr. Atul Agrawal, Contact number: 022-40701000, **E-mail Address** : complianceofficer@icicisecurities.com

For any queries or grievances: [Mr. Prabodh Avadhoot](mailto:Mr.Prabodh.Avadhoot) Email address: headservicequality@icicidirect.com Contact Number: 18601231122
