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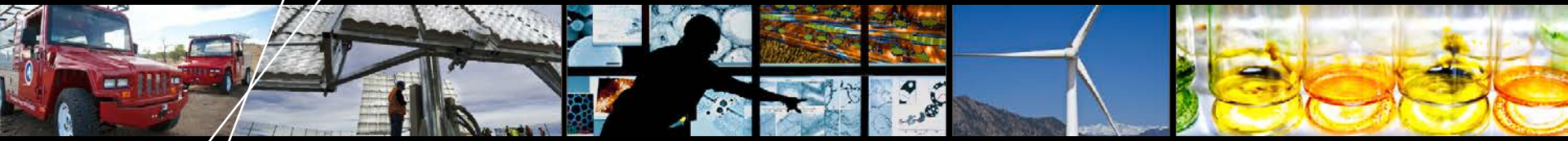
Overview of the Hydrogen Financial Analysis Scenario Tool (H2FAST)



H2USA Modeling Overview Webinar

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12 May 2015

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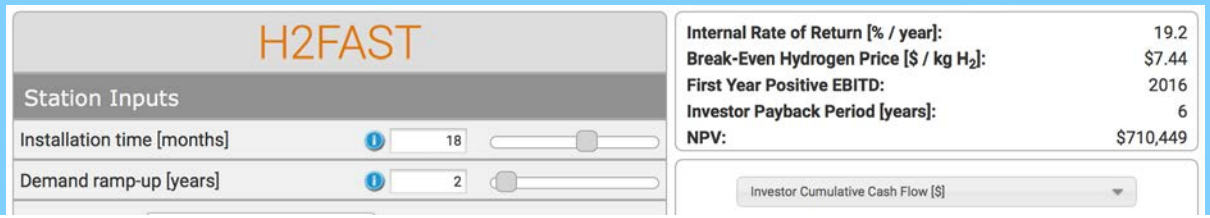
Presentation Outline

- **Introduction: what is H2FAST and what questions can it answer?**
- **Review each version of H2FAST**
  - H2FAST Web Tool
  - H2FAST Excel Tool
  - H2FAST Business Case Scenario tool (beta)
- **Summary**

The H2FAST framework has been implemented within multiple tools

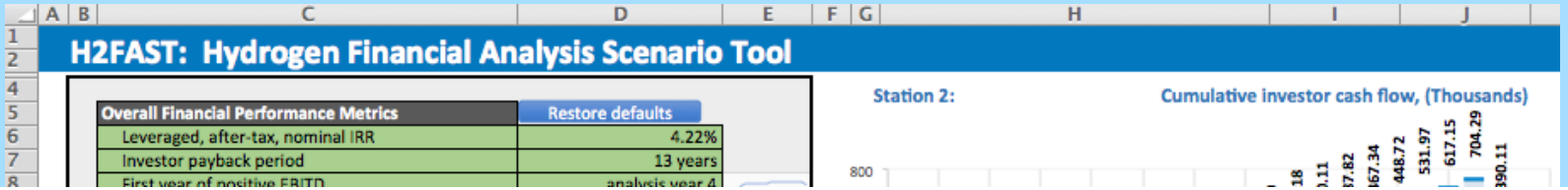
Consistent financial calculations are deployed across the H2FAST web and spreadsheet tools and SERA scenarios

H2FAST-Web is a simple, easy to use online calculator

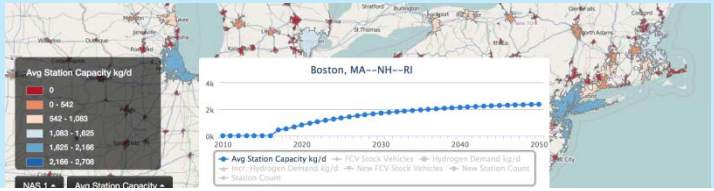


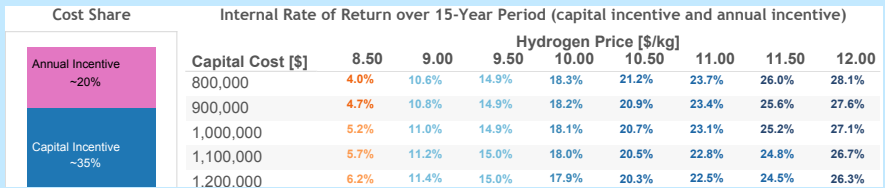
Tool interface designs have been tailored to distinct end-user groups

H2FAST-Excel allows for more detailed inputs and elaborate outputs



Business Case Scenario tool explores the full range of SERA outputs





What types of questions can H2FAST help to answer?

- **H2FAST: Web**
  - How will a $1 million capital incentive change the outlook for our station project?
  - What if we gain $10,000 per year (~$30/day) in additional convenience store sales due to hydrogen customers?
- **H2FAST: Excel**
  - What if our demand ramp-up rate is sluggish the first couple years, but then increases rapidly in the 4th year?
  - What if we put $5 million into a project with 7 stations?
- **H2FAST: BCS-Vis**
  - What kind of investments and incentives would be needed for a network of stations covering an entire metropolitan area or region?
  - How can we prioritize investments in one region or city compared to another?

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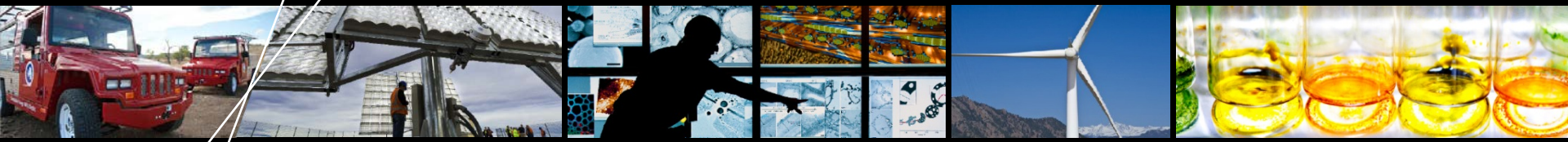
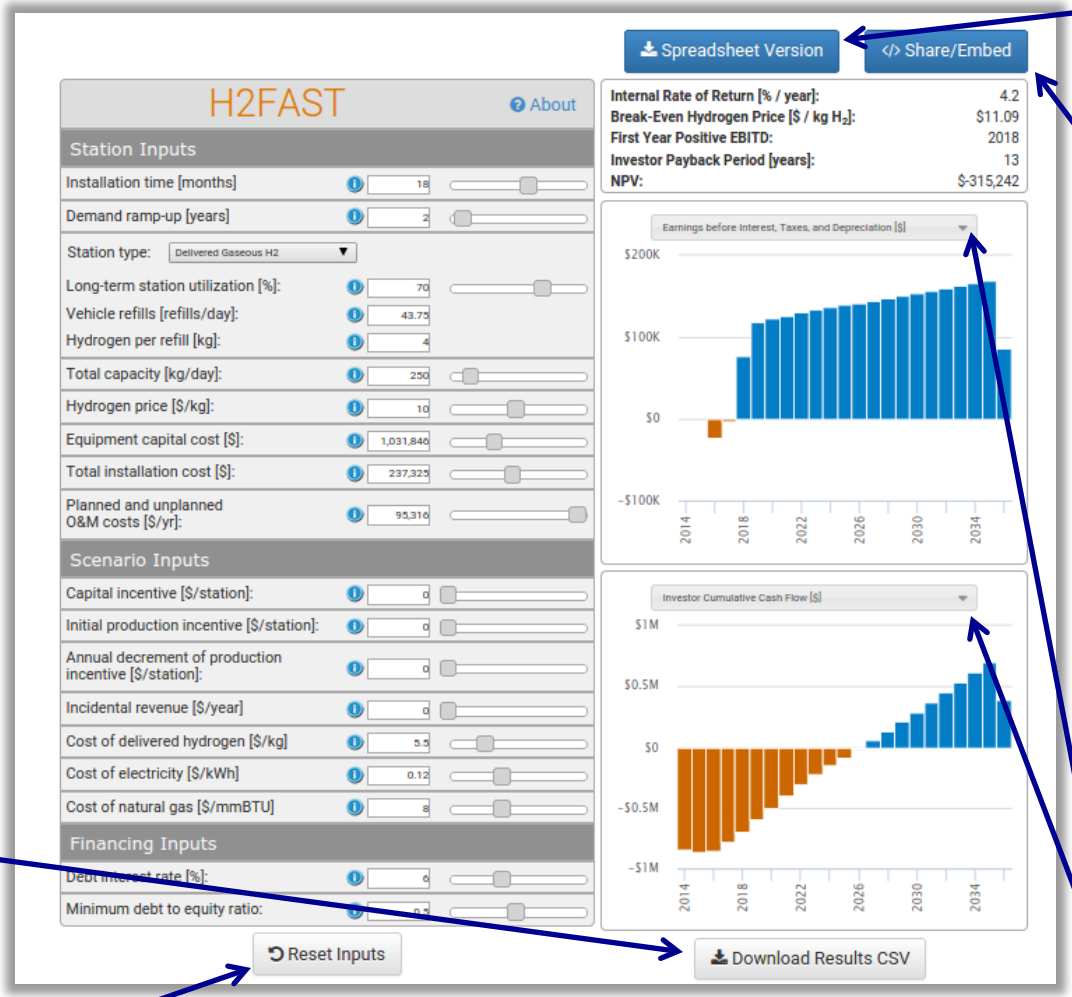


H2FAST Web Tool

H2FAST: A simple, user-friendly online tool

Visual results are provided instantly as inputs are changed by users



Introductory Language

Inputs

Download full financials for case

Reset Inputs

Link to Download Spreadsheet Version

Embed widget

Single Value Results

Graphical Outputs (1)

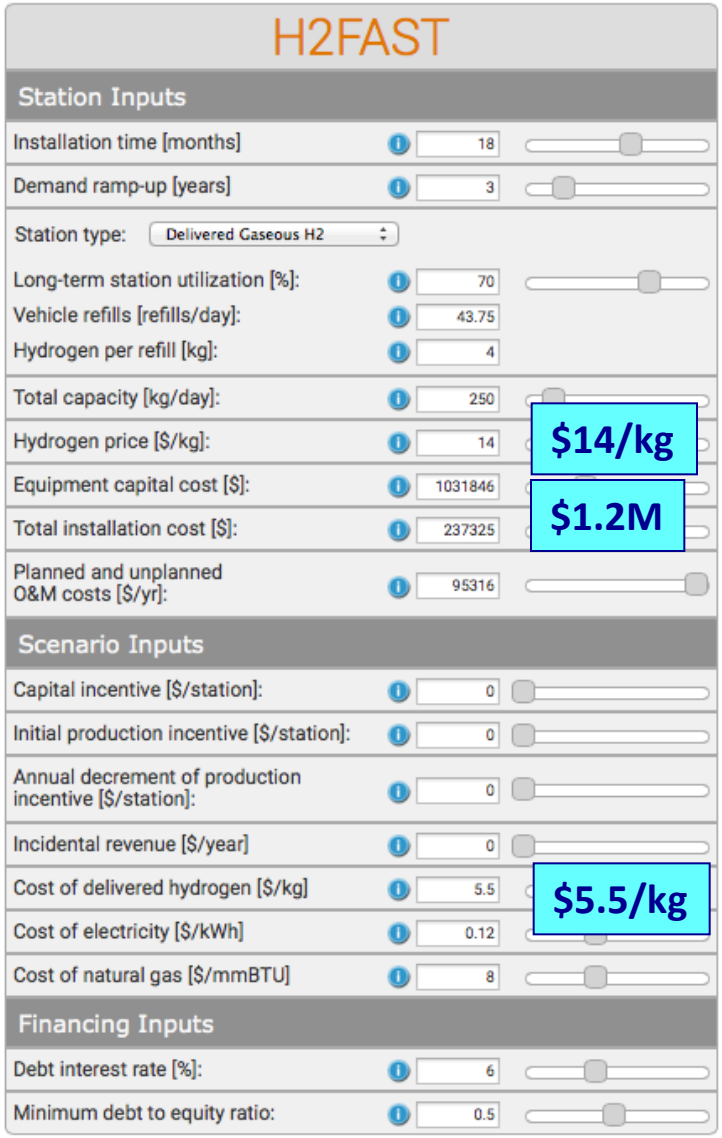
Graphical Outputs (2)

Change Graphical Output metrics

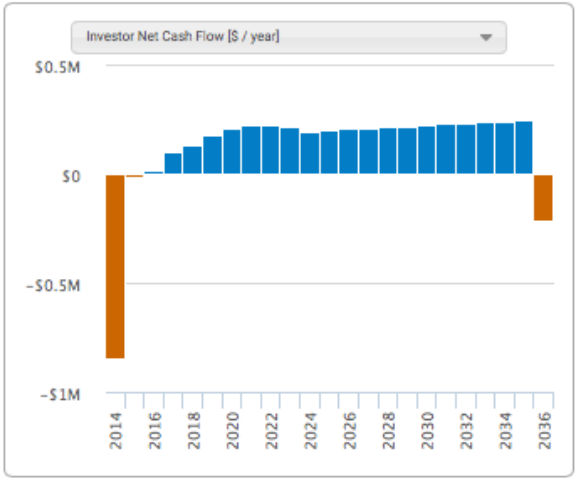
Example Case A: $1.2 M station, no subsidy, $14/kg price at the pump

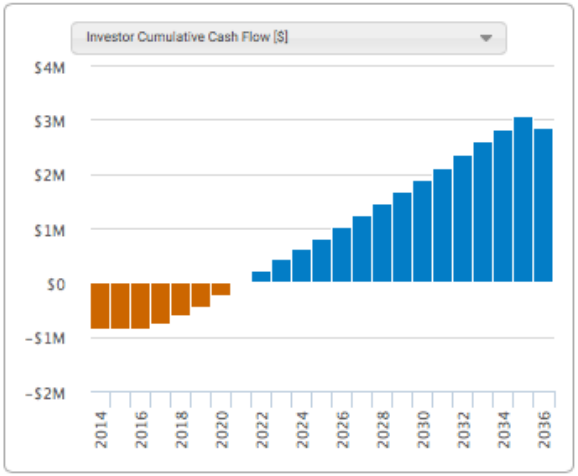
15% IRR, 8 yr investor payback

- A nominal gaseous tank truck delivery station: 250 kg/day
- $1.2 million in capital and installation
- Hydrogen delivered for $5.50/kg and sold for $14/kg
- Top graph shows net investor cash flow; Bottom graph shows cumulative
- Result: $12.4/kg as breakeven price for a 10% IRR



Internal Rate of Return [% / year]:	15.1
Break-Even Hydrogen Price [$ / kg H_2]:	$12.37
First Year Positive EBITD:	2017
Investor Payback Period [years]:	8
NPV:	$450256



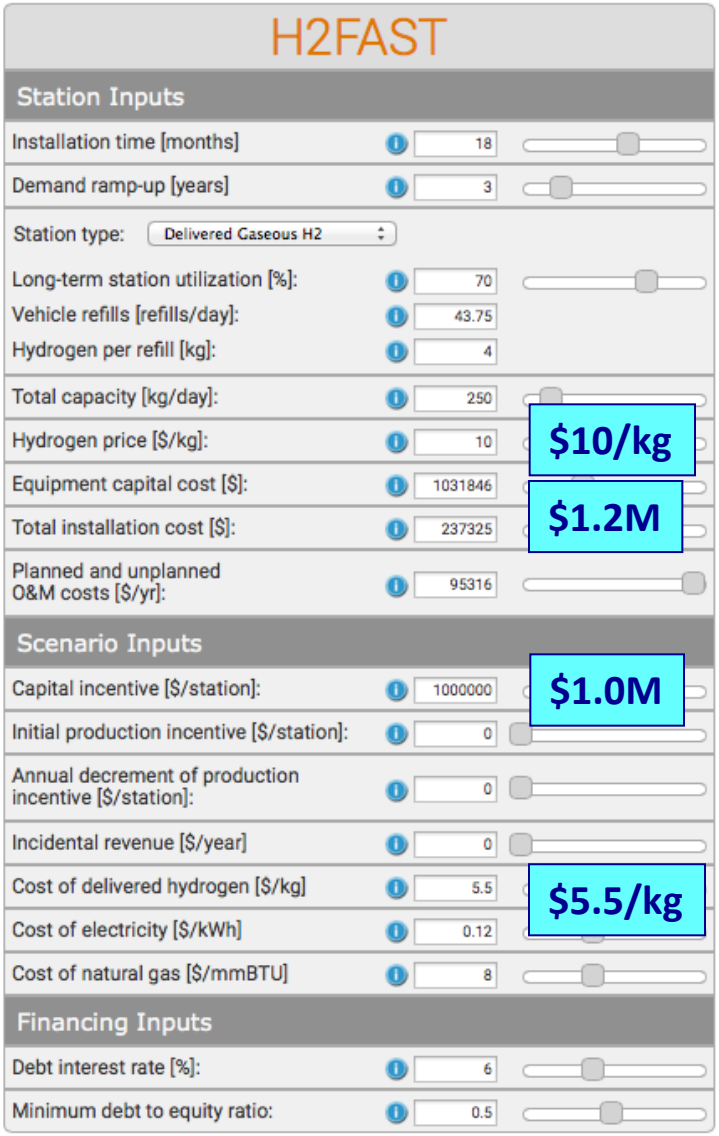


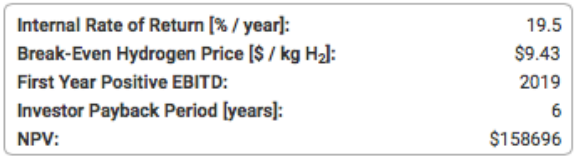
Example Case B: Assume a $1.0 M Capital Incentive and $10/kg price

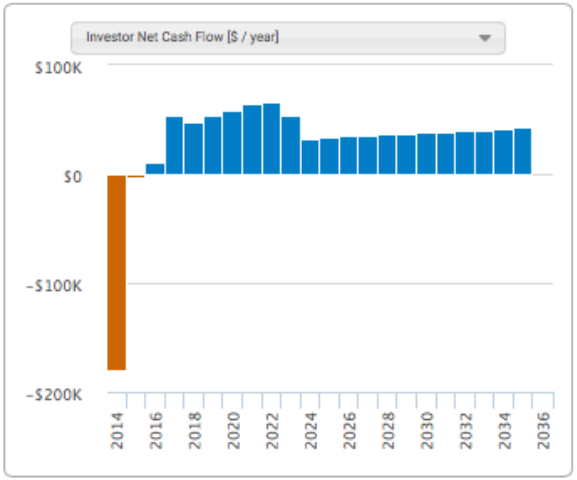
19.5% IRR, 6 yr investor payback

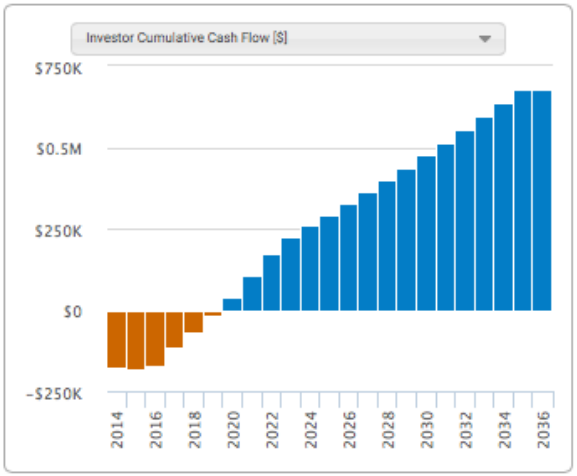
- Assume $1 M capital incentive in the first year
- Change pump price to $10 per kg
- Increase in IRR and investor payback period
- Result: $9.4/kg as breakeven price for a 10% IRR

H2FAST provides rapid assessments of the influence of incentives







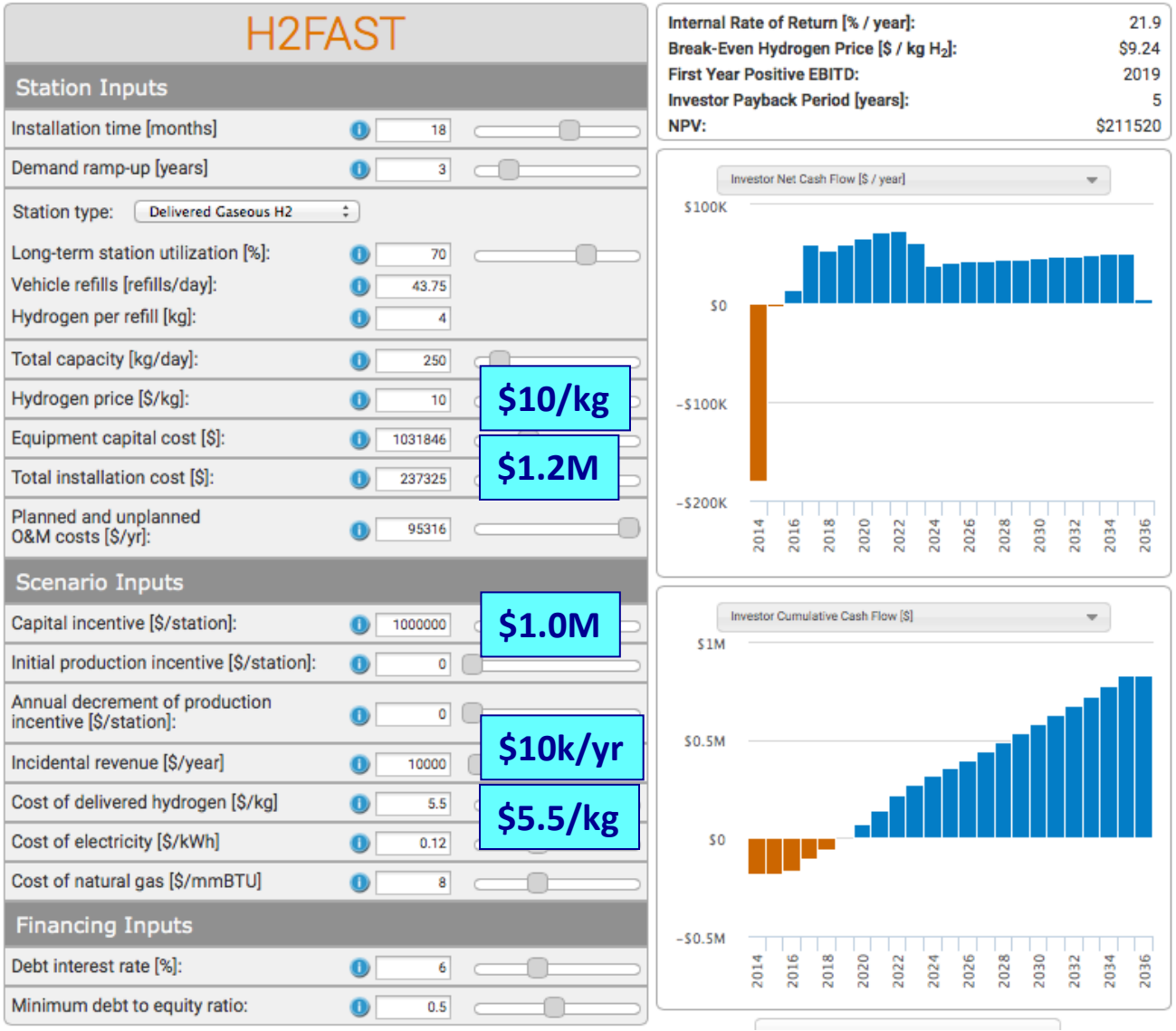


Example Case C: $1.0 M Incentive, $10/kg price, $10k incidental revenue

22% IRR, 5 yr investor payback

- $1 M capital incentive
- $10 per kg price
- Add an incidental revenue stream of $10k per year (~$30/day)
- Increase in IRR and investor payback period
- Result: $9.2/kg as breakeven price for a 10% IRR

Many financing options can be explored quickly



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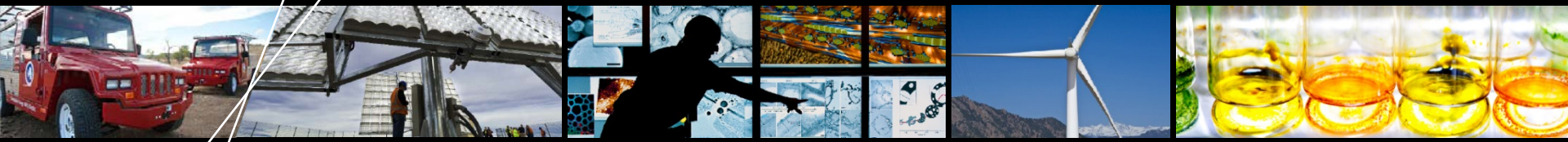


H2FAST Excel Tool

H2FAST Spreadsheet: Summary of Capabilities

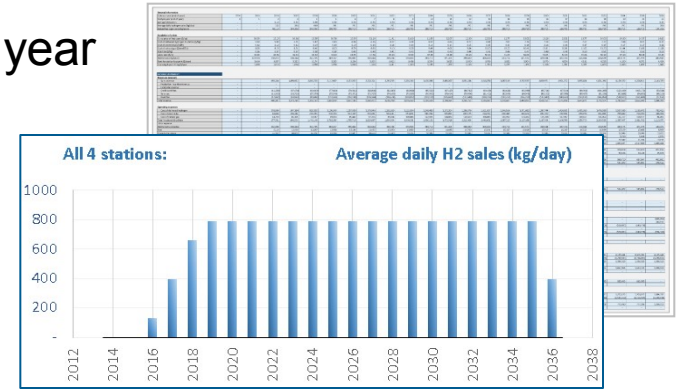
The spreadsheet version allows for greater control of inputs and more elaborate exploration of outputs

Inputs and User Interface

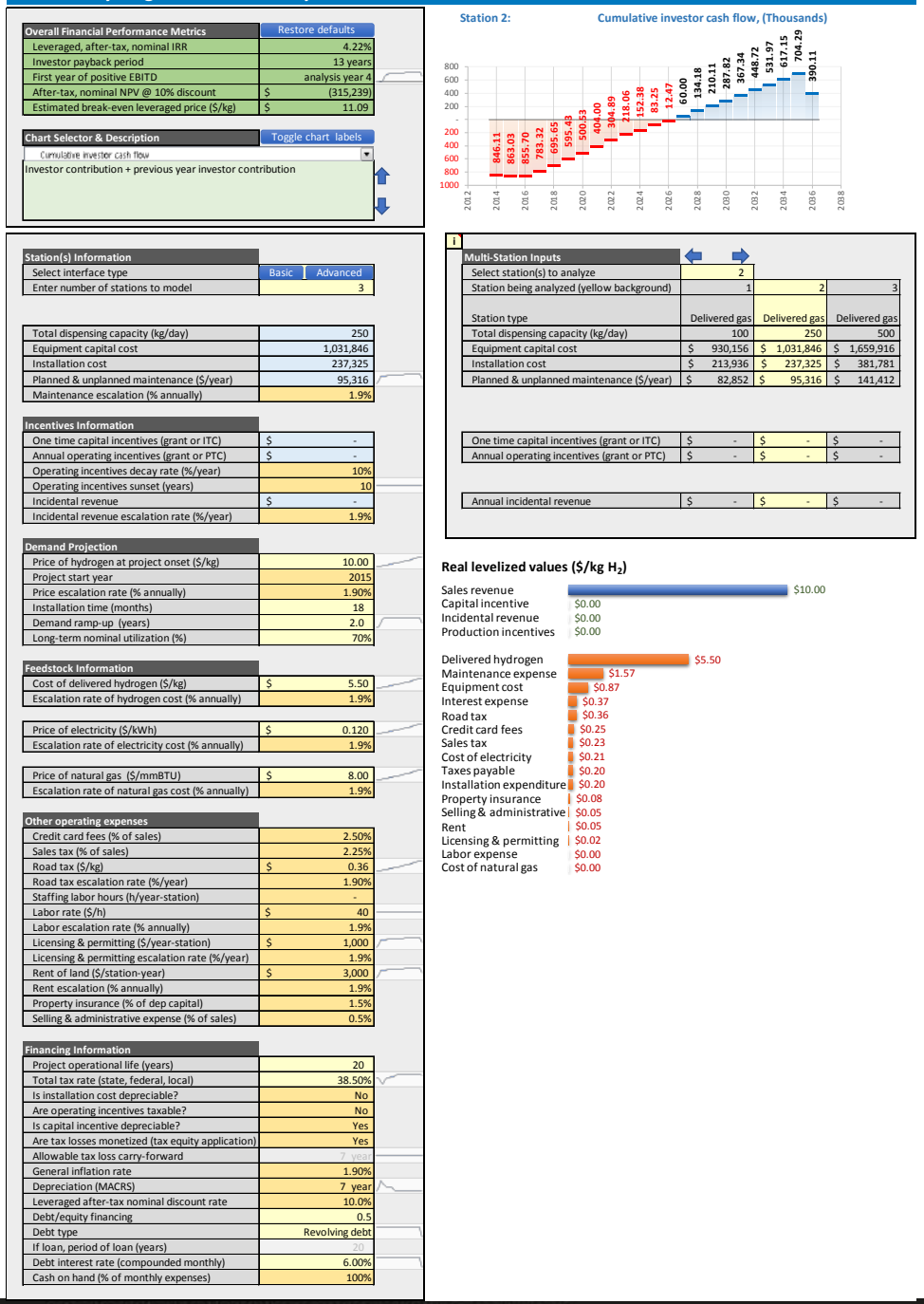
- Enter information for up to 10 stations and assess finances individually or as a cluster
- Side-by-side comparison of station projects
- There are two modes for users to provide inputs:
  - Basic mode: 20 parameters
  - Advanced mode: 51 parameters
- Inputs and outputs have hover-over descriptions to orient users

Outputs

- Detailed report tables are provided for each project year
  - Scenario parameters (e.g. volumes of sales)
  - Income statement
  - Cash flow statement
  - Balance sheet
  - Select ratio analyses



User Interface Overview



Color coding facilitates navigation

- Basic user inputs
- Advanced user inputs
- Calculated values
- Key results

User Interface Overview

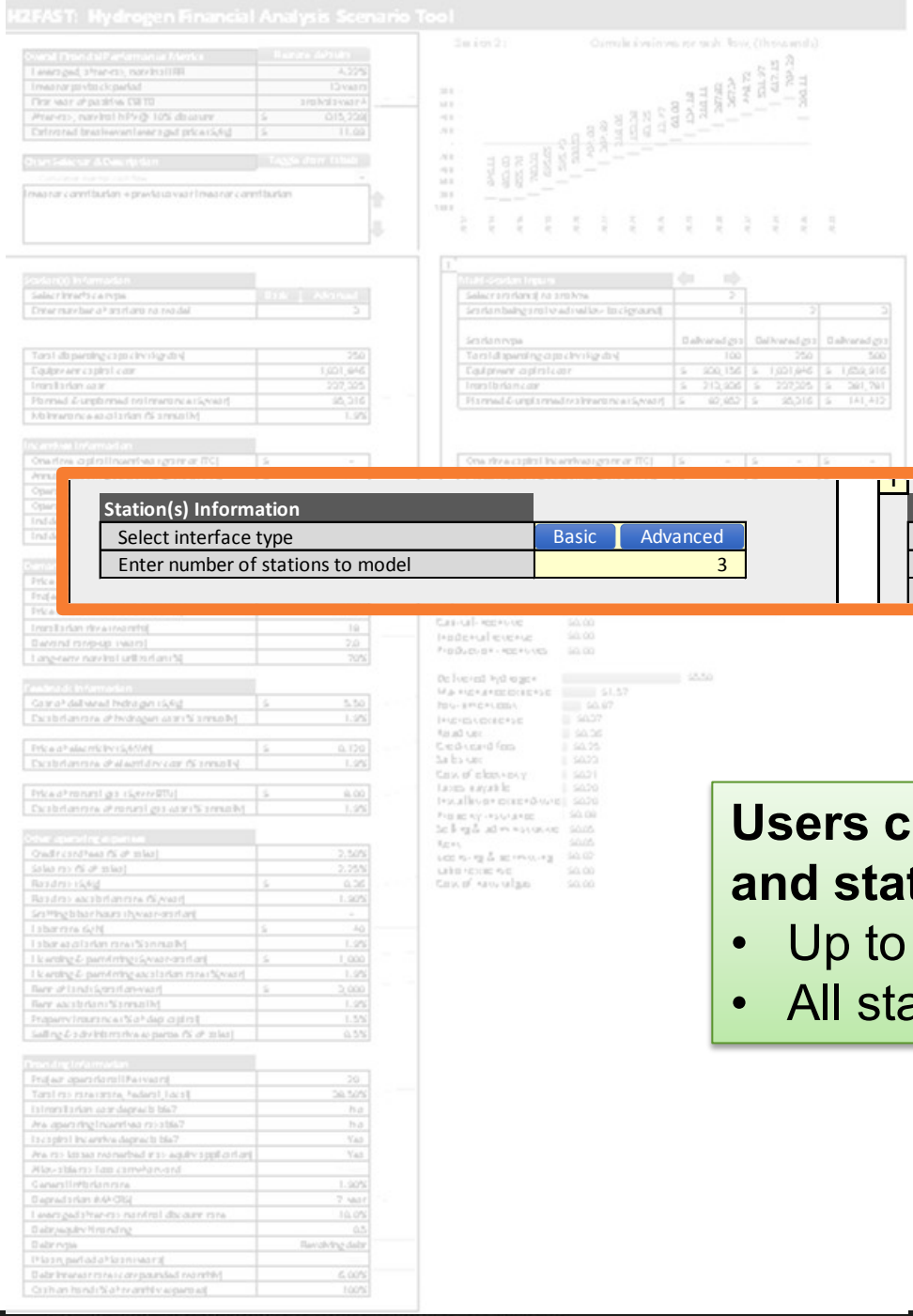
i

Multi-Station Inputs			
Select station(s) to analyze	2		
Station being analyzed (yellow background)	1	2	3
Station type	Delivered gas	Delivered gas	Delivered gas
Total dispensing capacity (kg/day)	100	250	500
Equipment capital cost	$ 930,156	$ 1,031,846	$ 1,659,916
Installation cost	$ 213,936	$ 237,325	$ 381,781
Planned & unplanned maintenance ($/year)	$ 82,852	$ 95,316	$ 141,412
One time capital incentives (grant or ITC)	$ -	$ -	$ -
Annual operating incentives (grant or PTC)	$ -	$ -	$ -
Annual incidental revenue	$ -	$ -	$ -

Cost specifications can be entered for multiple stations

- Users can select individual or all stations
- Users can specify different station types
- Costs should be changed by the user
- Pre-populated values are derived from HRSAM

User Interface Overview



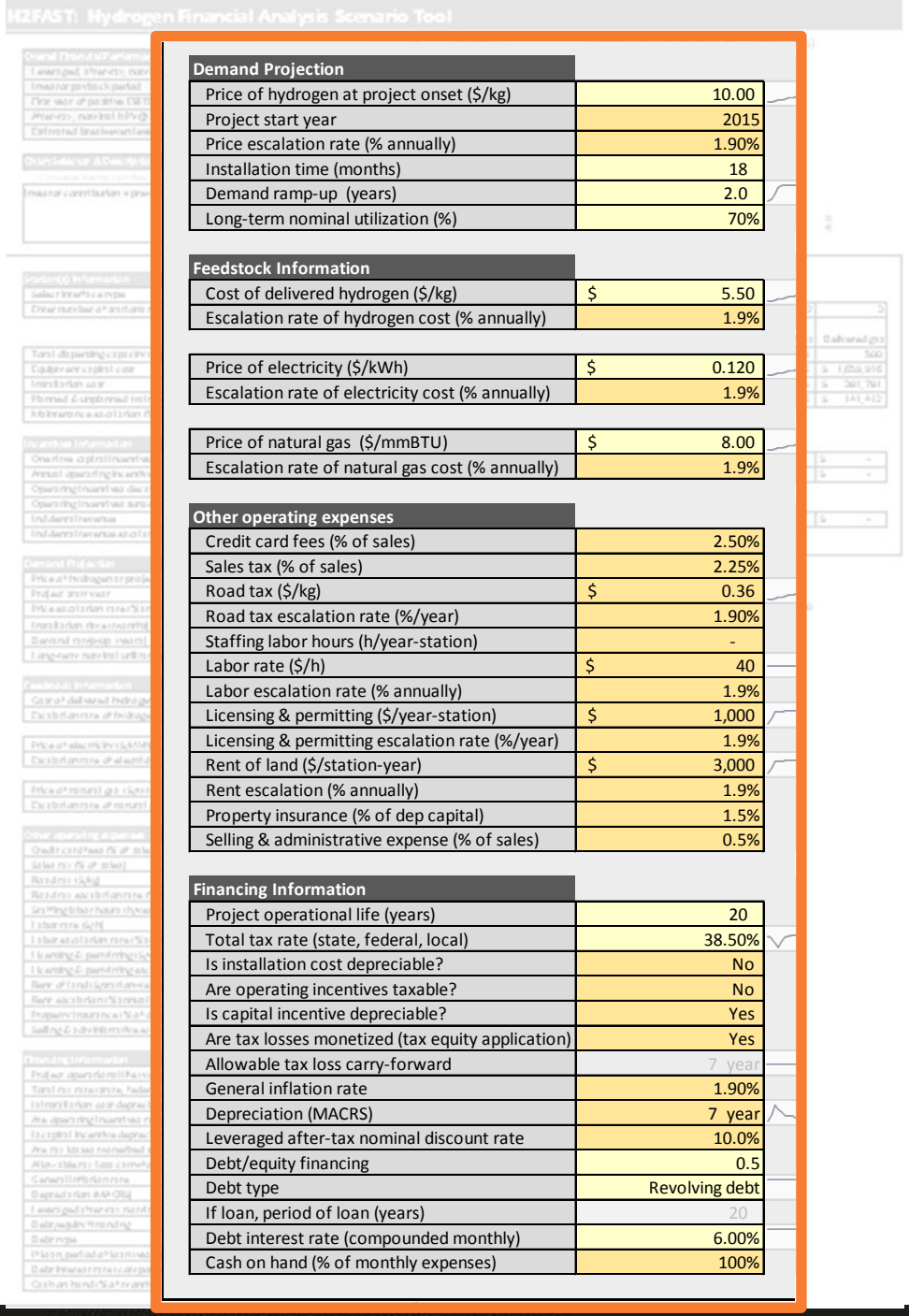
Station(s) Information		
Select interface type	Basic	Advanced
Enter number of stations to model	3	

Multi-Station Inputs			
Select station(s) to analyze	2		
Station being analyzed (yellow background)	1	2	3

Users can switch between model modes and stations to be analyzed

- Up to 10 stations can be modeled
- All stations can be modeled as a cluster

User Interface Overview



Demand Projection	
Price of hydrogen at project onset ($/kg)	10.00
Project start year	2015
Price escalation rate (% annually)	1.90%
Installation time (months)	18
Demand ramp-up (years)	2.0
Long-term nominal utilization (%)	70%

Feedstock Information	
Cost of delivered hydrogen ($/kg)	$ 5.50
Escalation rate of hydrogen cost (% annually)	1.9%
Price of electricity ($/kWh)	$ 0.120
Escalation rate of electricity cost (% annually)	1.9%
Price of natural gas ($/mmBTU)	$ 8.00
Escalation rate of natural gas cost (% annually)	1.9%

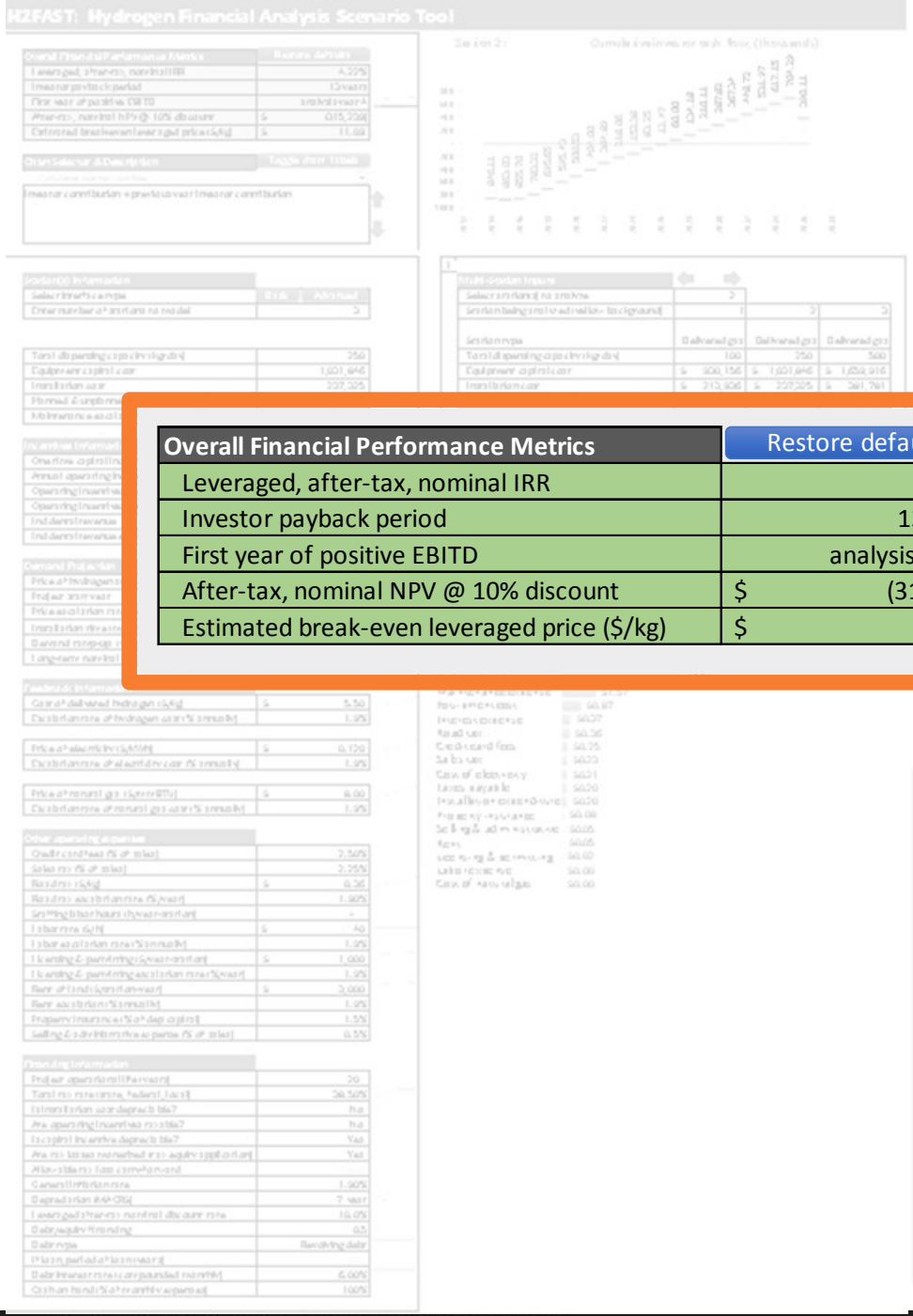
Other operating expenses	
Credit card fees (% of sales)	2.50%
Sales tax (% of sales)	2.25%
Road tax ($/kg)	$ 0.36
Road tax escalation rate (%/year)	1.90%
Staffing labor hours (h/year-station)	-
Labor rate ($/h)	$ 40
Labor escalation rate (% annually)	1.9%
Licensing & permitting ($/year-station)	$ 1,000
Licensing & permitting escalation rate (%/year)	1.9%
Rent of land ($/station-year)	$ 3,000
Rent escalation (% annually)	1.9%
Property insurance (% of dep capital)	1.5%
Selling & administrative expense (% of sales)	0.5%

Financing Information	
Project operational life (years)	20
Total tax rate (state, federal, local)	38.50%
Is installation cost depreciable?	No
Are operating incentives taxable?	No
Is capital incentive depreciable?	Yes
Are tax losses monetized (tax equity application)	Yes
Allowable tax loss carry-forward	7 year
General inflation rate	1.90%
Depreciation (MACRS)	7 year
Leveraged after-tax nominal discount rate	10.0%
Debt/equity financing	0.5
Debt type	Revolving debt
If loan, period of loan (years)	20
Debt interest rate (compounded monthly)	6.00%
Cash on hand (% of monthly expenses)	100%

Users can specify all financial parameters

- Projected demand
- Feedstock & utility costs
- Other operating expenses
- Capital structure
- Taxes

User Interface Overview



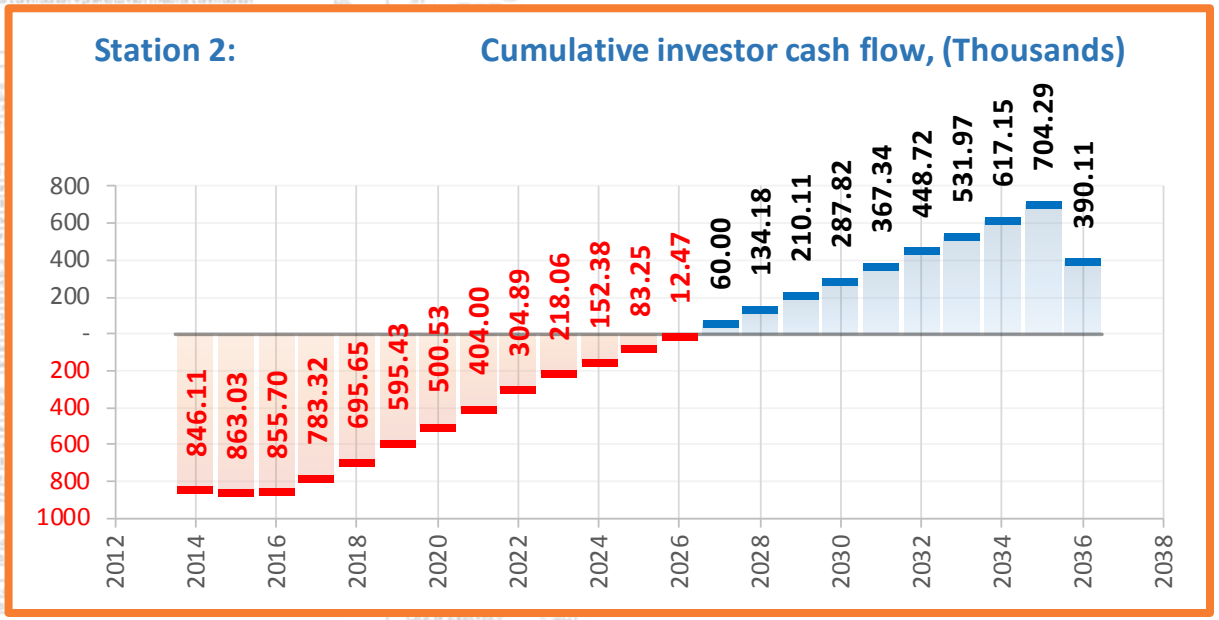
Overall Financial Performance Metrics	Restore defaults
Leveraged, after-tax, nominal IRR	4.22%
Investor payback period	13 years
First year of positive EBITD	analysis year 4
After-tax, nominal NPV @ 10% discount	$ (315,239)
Estimated break-even leveraged price ($/kg)	$ 11.09

Key outputs are highly visible

- IRR
- Payback
- Year of positive earnings
- NPV
- Break-even price of hydrogen

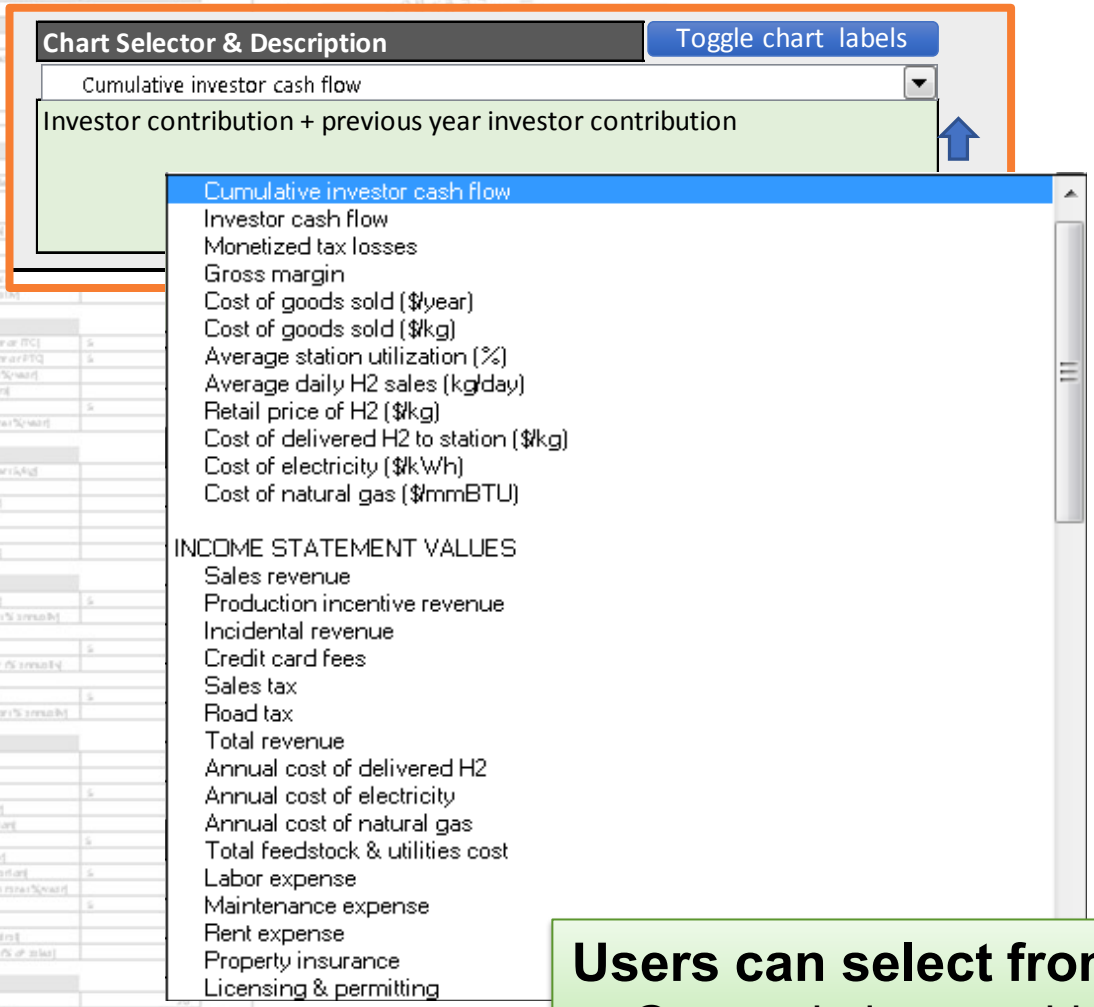
Note: values are leveraged, based on equity investors cash flow.

User Interface Overview



Visualization of time series results

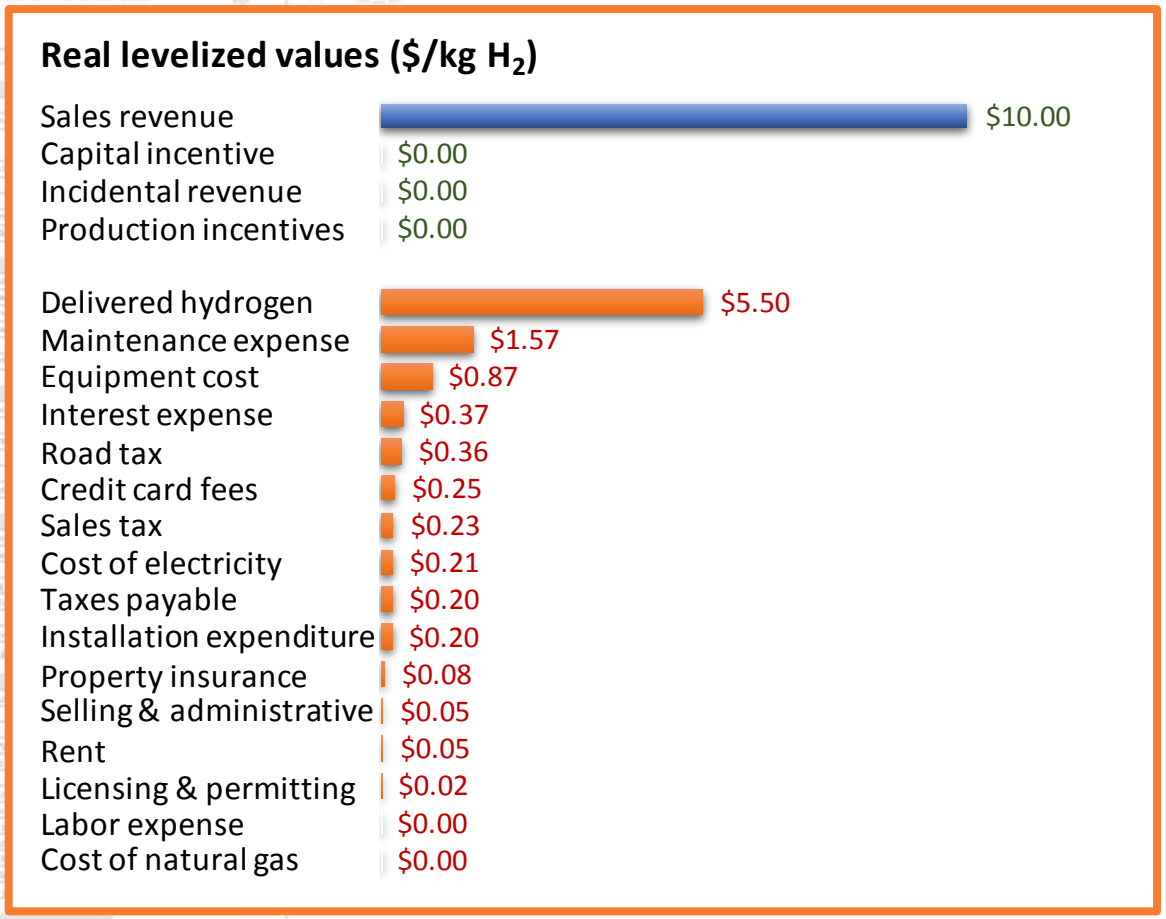
User Interface Overview



Users can select from 65 different metrics

- Green window provides parameter descriptions

User Interface Overview

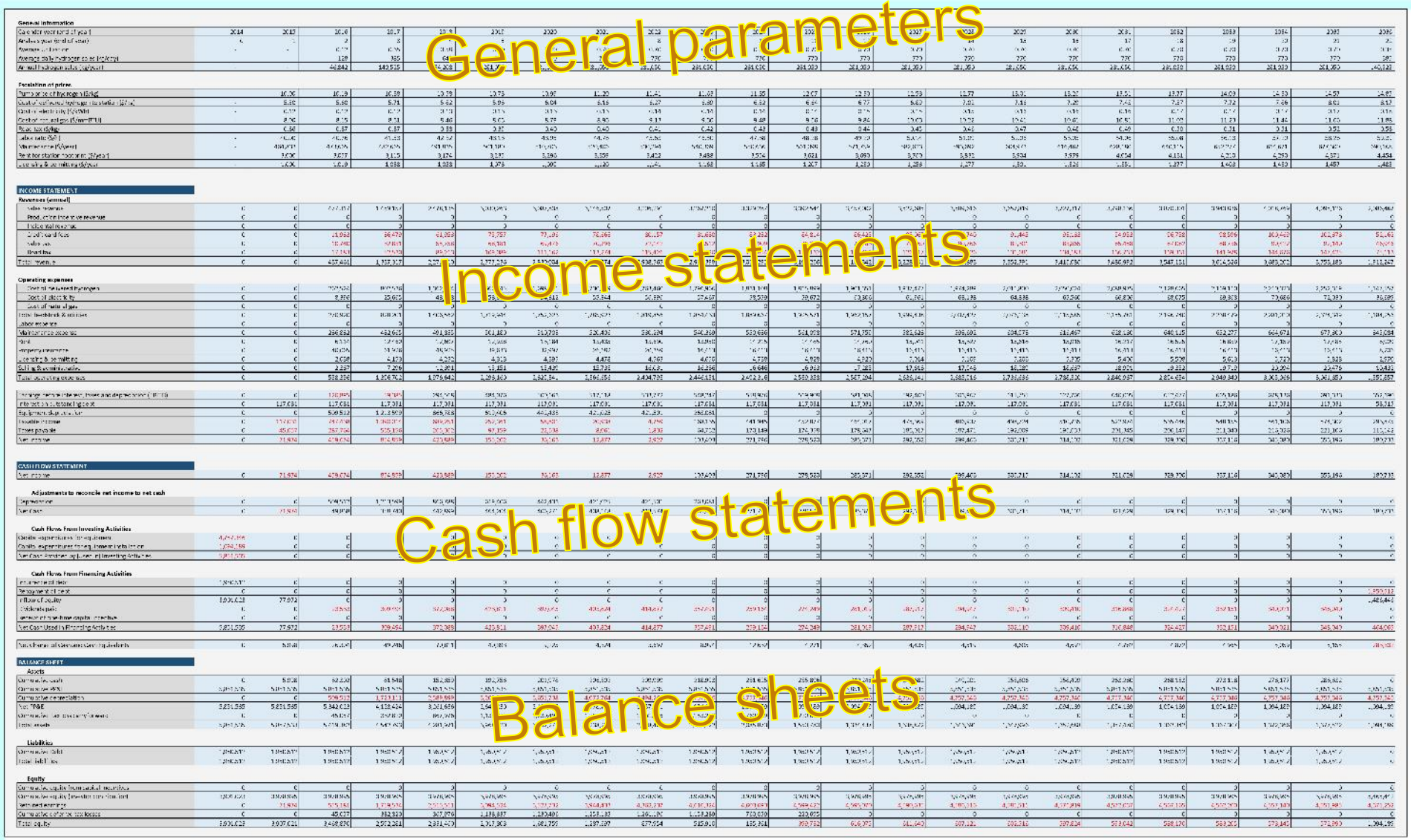


Users are provided with a detailed breakdown of revenues and expenses

- Values are reported on per-kilogram of hydrogen sold

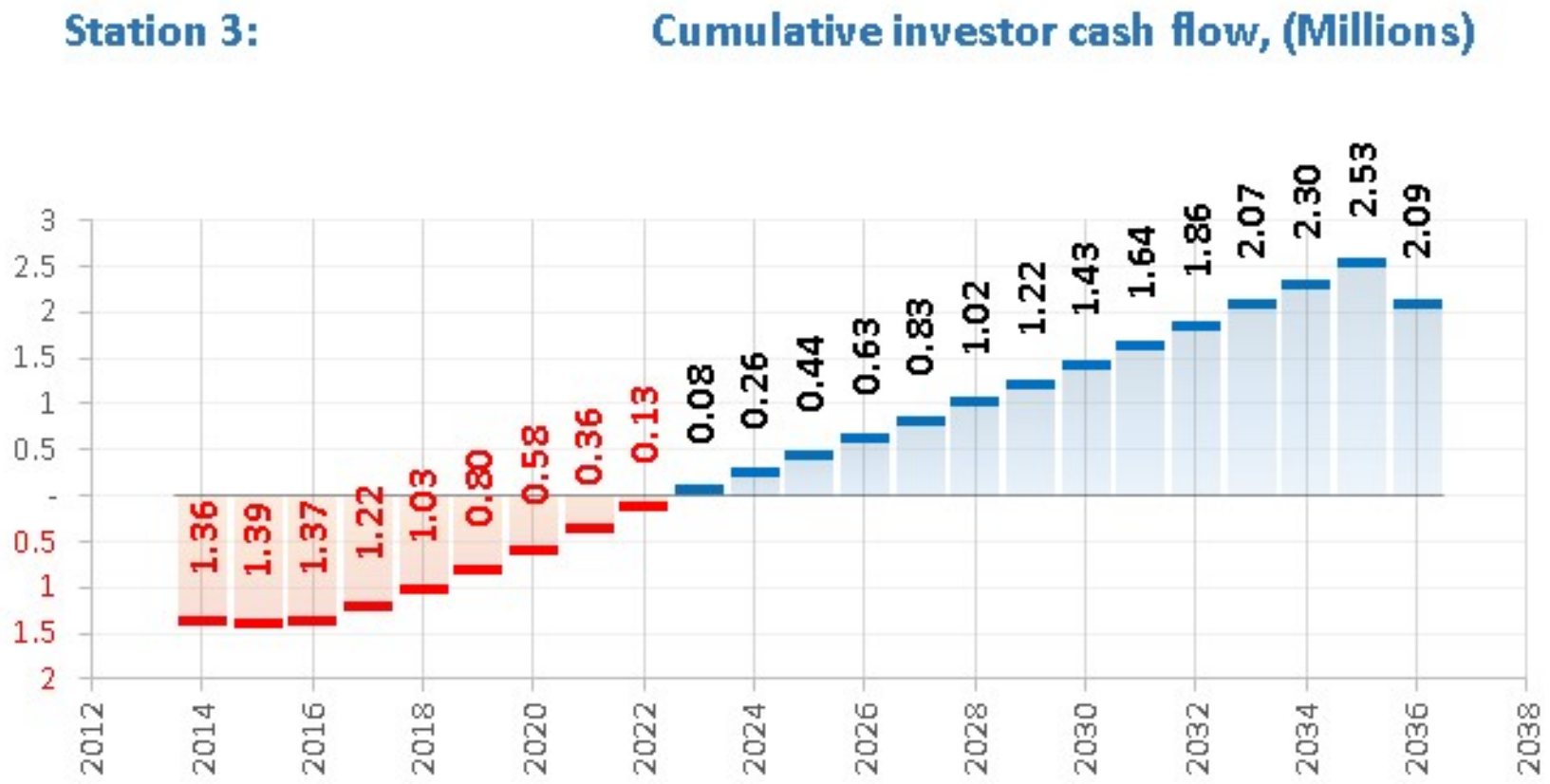
Report Tables

All typical US GAAP report values are displayed for each analysis year



Time Series Examples

Range of tables satisfied most end user inquiries



- User can select from 65 common reportable time series
- Detailed description is available for each time series
- Labels can be turned on and off to show numeric values

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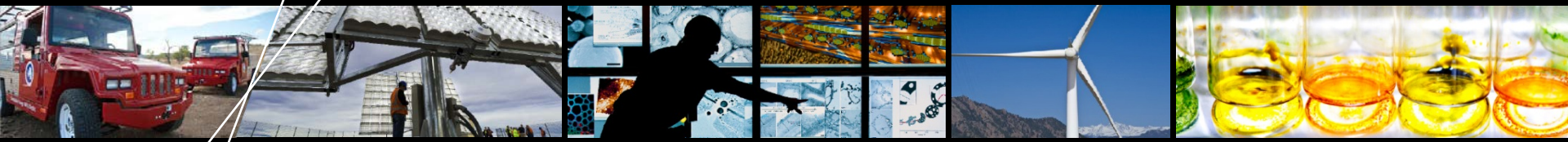


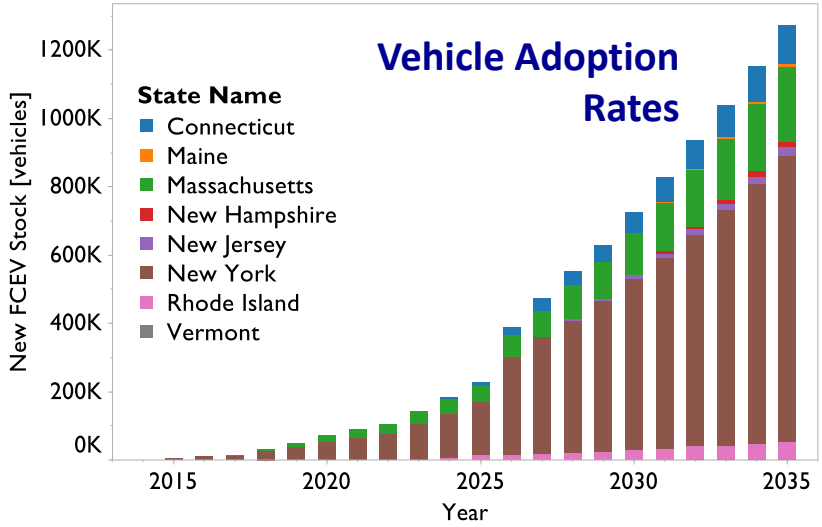
H2FAST Business Case Scenario – Visualization Tool

Multivariate visualization provides access to large scenario data results

- The SERA model can generate a large volume of scenario results
- The H2FAST framework can be applied across the entire hydrogen supply chain system and a broad range of scenario parameters
- Some engaged audiences, such as H2USA WG members, are interested in exploring ranges of inputs assumptions and multiple sets of scenario outputs

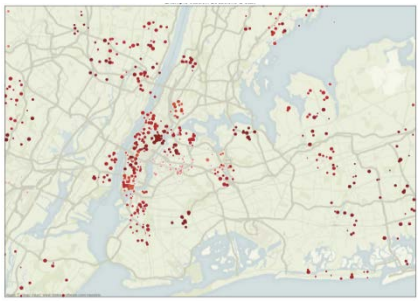
Demand and Delivery by City

Regional/State-level Subsets of Results

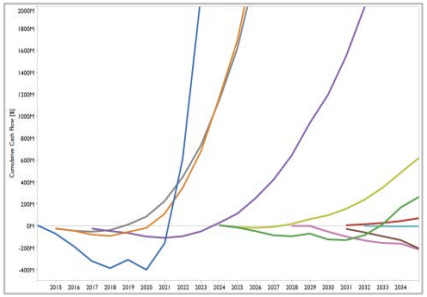


Stand-alone reports cannot capture the full range of possible outputs

Station Placement

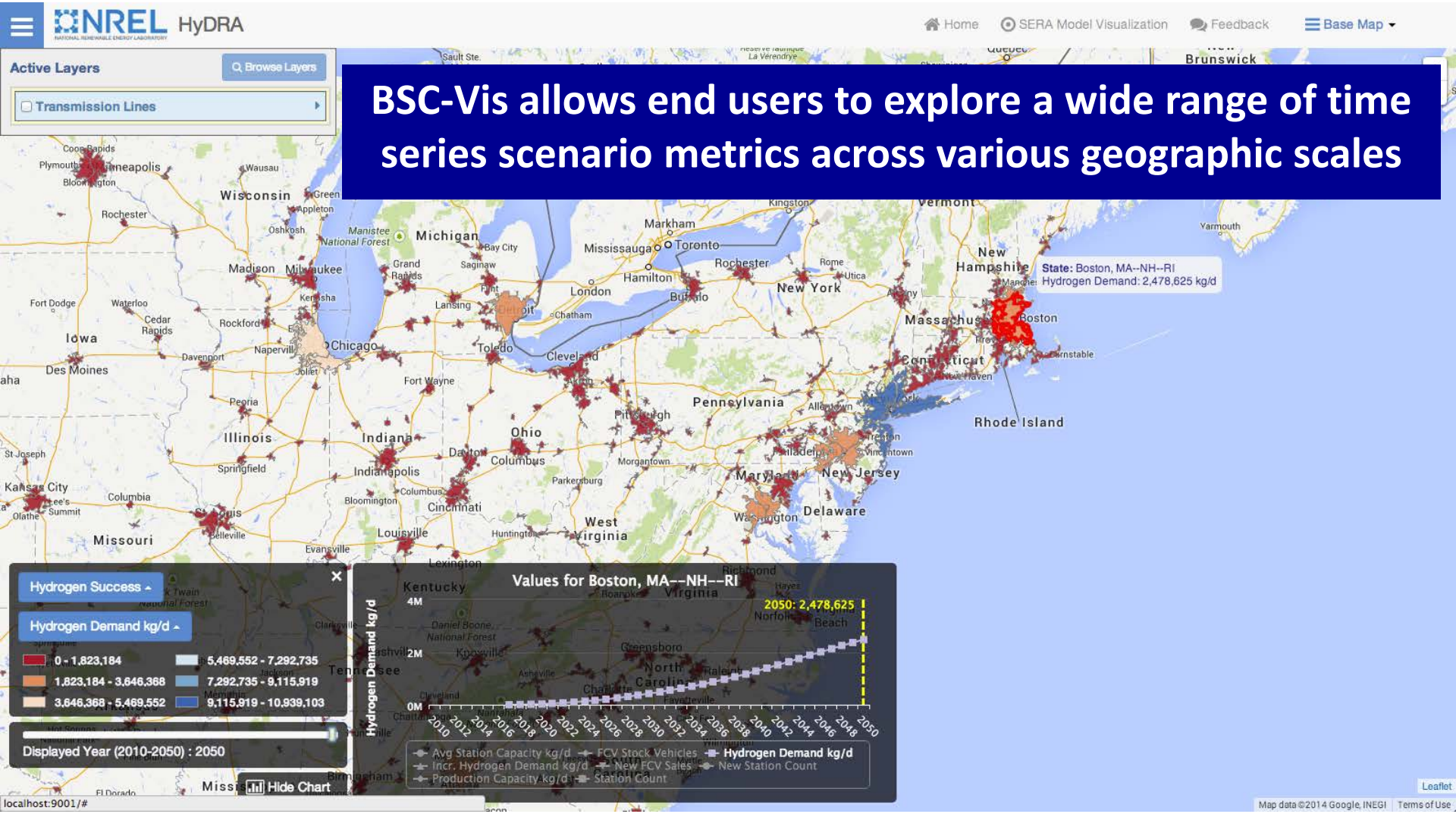


Cash Flows



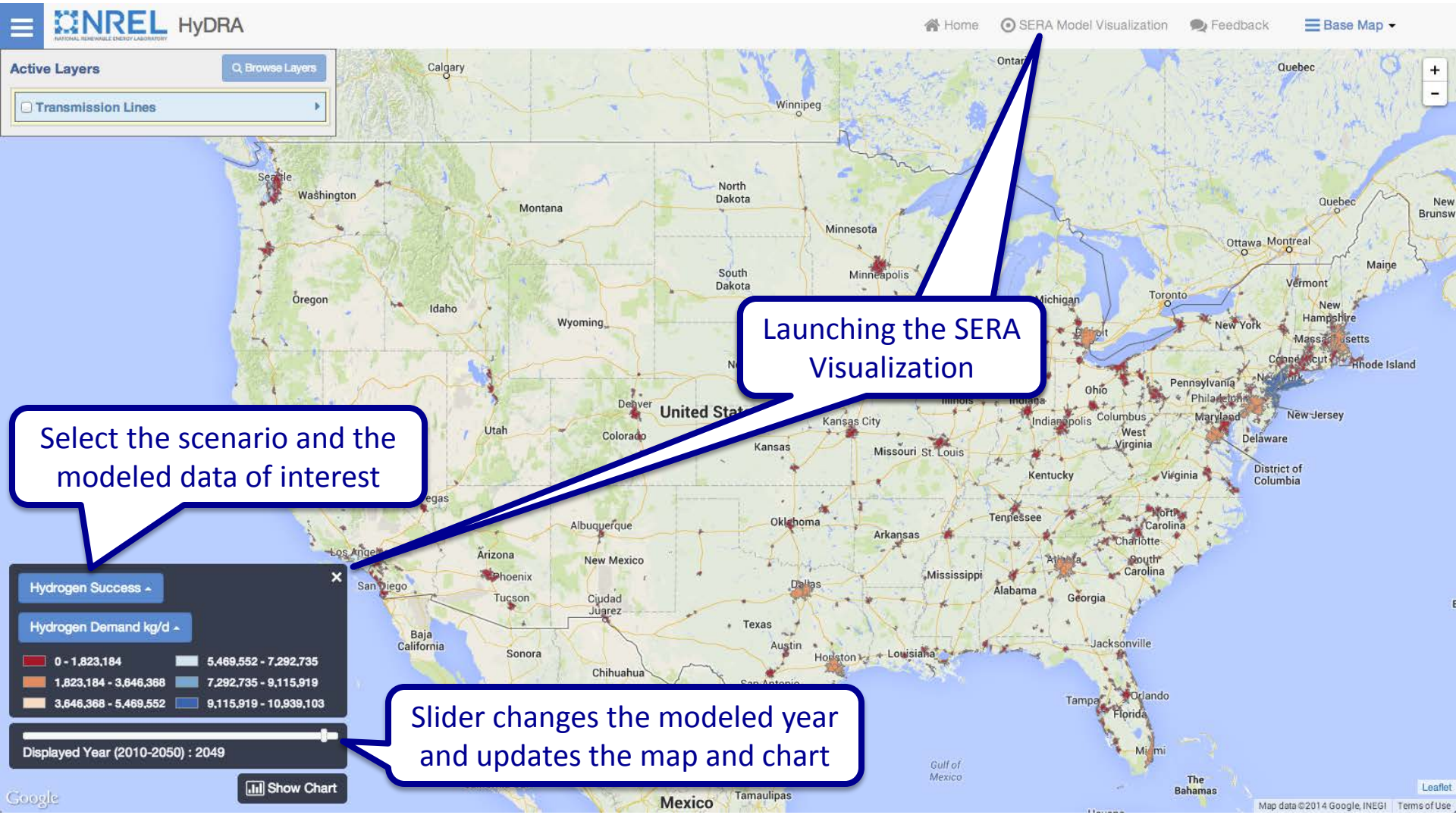
The Business Case Scenario Visualization tool (BCS-Vis) is being developed to allow end-users to explore a wide range of inputs and outputs

Business Case Scenario tool explores the full range of SERA outputs

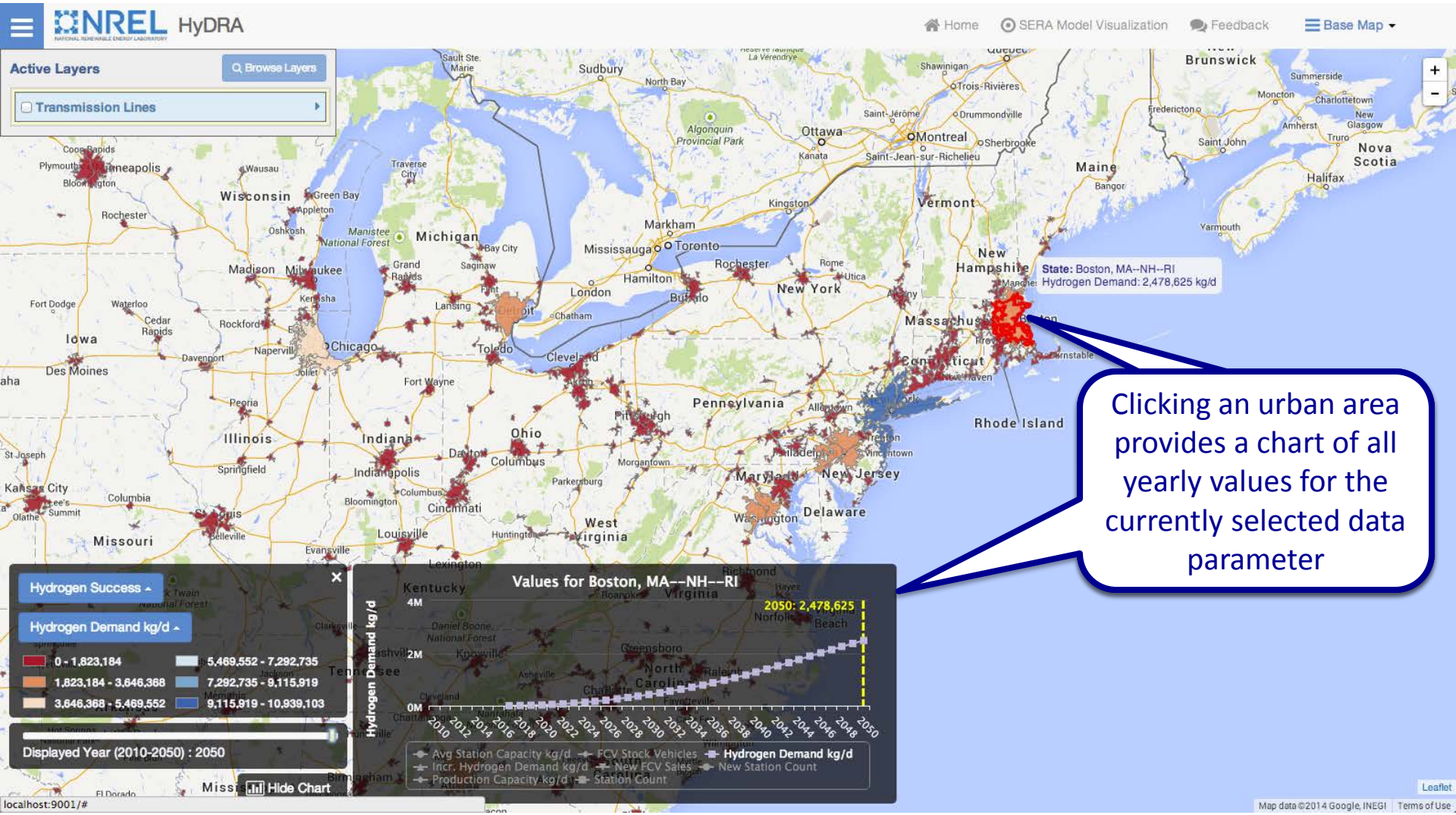


4-min video demonstrates the multivariate visualization tool: http://youtu.be/J7y51c-dldo

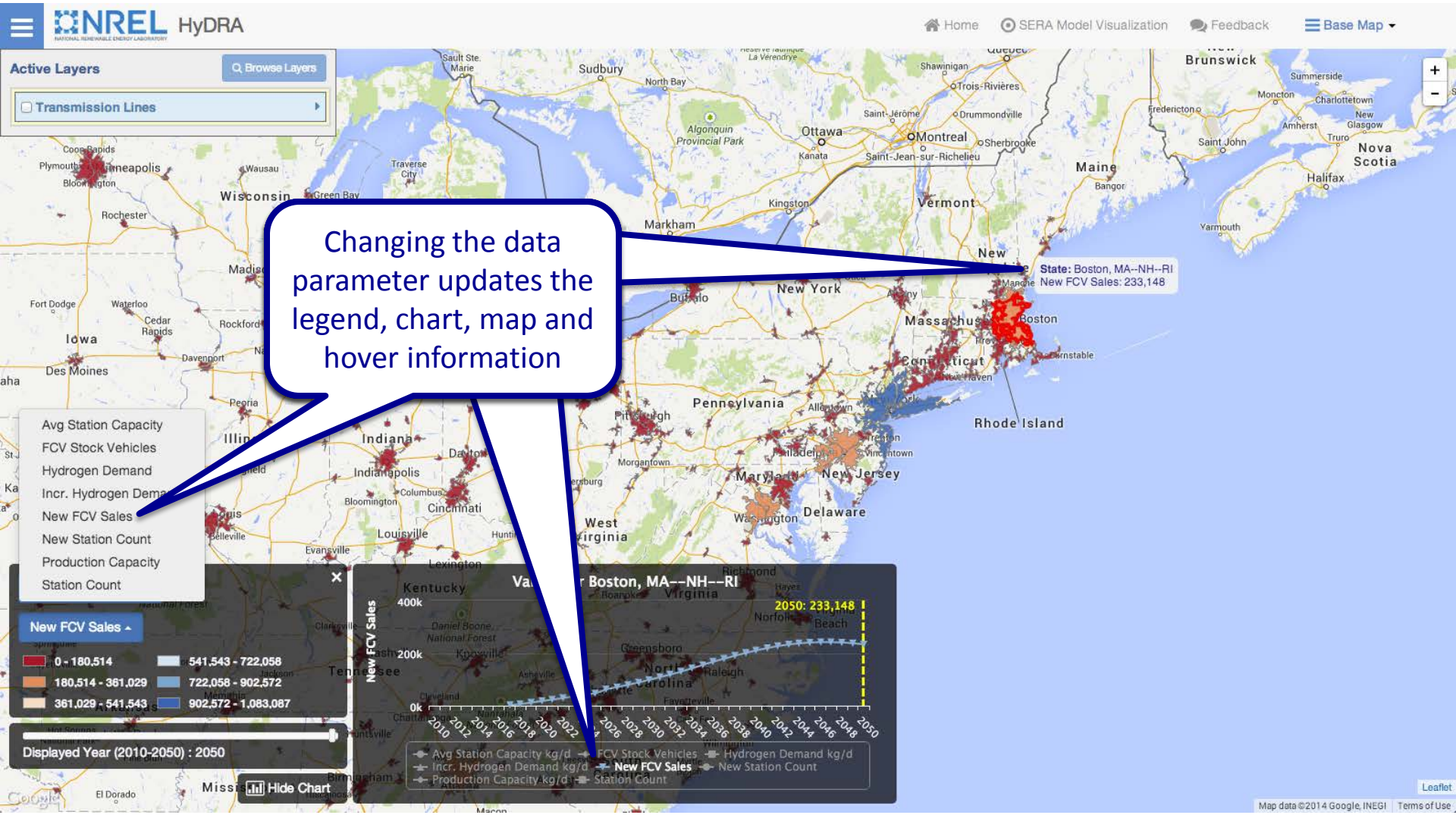
Selection of years



Selection of urban areas



Selection of metrics and output variables



Summary

- **The H2FAST *Web* and *Spreadsheet* tools are an effective means of informing investment decisions on hydrogen station projects**
  - Developed for end-users requiring a simple, first-cut analysis (*web version*) as well as more detailed and elaborate analyses (*spreadsheet version*)
- **The H2FAST framework can also be applied to the entire hydrogen fuel supply chain to evaluate the financial implications of infrastructure development at the city, region, or national levels**
  - This framework is currently being used internally to inform H2USA IFWG members in scenario exploration
  - A beta version of a visualization tool has been developed to allow access to these multivariate results to a broader audience

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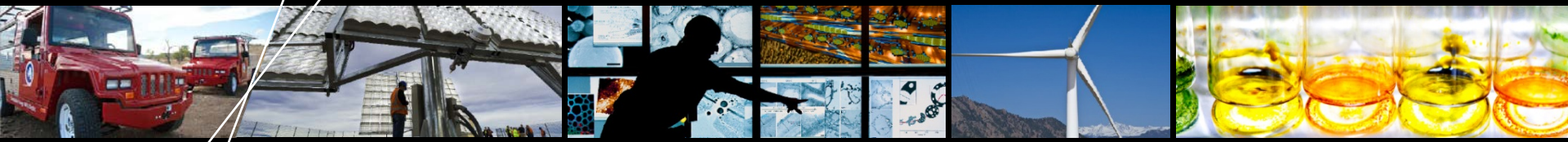
Questions?



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