|  |  |
| --- | --- |
| PROBLEM | As fossil fuels reserves of the planet are not inexhaustible and the energy demand is rising year by year, it is essential to adopt alternative sources of energy. |
|  |  |
| GOAL | Provide an open Industry Analysis Report (IAR) in order for global knowledge and development opportunities to become available to anyone. |

# LOGIC MODEL

|  |  |
| --- | --- |
| RATIONALES | IAR beneficial for stakeholders, customers, researchers, industry, and curious people. |
|  |  |
| ASSUMPTIONS | Enough data is available online. |
|  | Hydrogen power has not yet reached its mature stage and will spread to the general public. |

# DATA COLLECTION

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | QUESTION | INDICATORS | METHODS | SOURCES/ SAMPLES | TIMING |
| Product description | How do fuel cells work? | * Principle * Structure * Components * Chemical reaction | * Explain * Display principle | [1–3] | 22/04/2015 |
| Where find hydrogen? | * Energy sources * Chemical process * Impact on the environment * Implementation | * Analyse * Compare | [4–9] | 15/05/2015 |
| How store and transport hydrogen? | * Storage facility * Storage method * Transport method | * Analyse * Draw consequences | [3,6,8,9] | 15/05/2015 |
| What are the different types of fuel cell? | * Number * Names * Components * Reaction * Operating * Temperature * Power output range * Efficiency * Power density | * Compare * Display * Analyse * Rank | [3,10–13] | 15/04/2015 |
| What are their applications? | * Categorization of applications * Applications * Relationship with the characteristics | * Sort * Link with characteristics | [11,14] | 22/04/2015 |
| Market Pespective | What was the state of the industry in the 2014? | * MW sold * Units shipped * Leading countries * Market leaders * Incentives | * Analyse * Rank * Compare | [11] | 30/04/2015 |
| What factors cause Japan to become the leader of this industry? | * Country Energy Plan * Related global affairs * Corporate funding | * Analyse * Review | [11] | 30/04/2015 |
| Law and governmental influence | What are governmental influences in:   * Japan * USA * Germany | * Height of subsidies * Laws and guidelines * Other forms of support | * Analyse * Display |  | 29/04/2015 |
|  | * Height of subsidies * Laws and guidelines * Other forms of support | * Compare |  | 29/04/2015 |
| Comparison with other technologies | What are the alternative technologies? | * Products * Technologies | * Collect data * Review data |  | 29/04/2015 |
| What are the trends of other existing technologies of last years in different nations and regions? | * Sell & usage volumes | * Collect data * Compare * Analysis |  | 29/04/2015 |
| Compared to fuel cell what are the advantages and disadvantages of high sell technologies? | * Product characteristics * Policies & regulations |  |  |  |
| Future perspective | What are the innovation files? | * Company names * Projects * Research perspectives | * Review * Analyse | [15] | 22/05/2015 |
| What are the sales forecasts? | * MW to be sold * Units to be shipped * Projects | * Review |  | 22/05/2015 |
| What is the next Milestone? | * Expected industry event/ step * Date | * Review * Analyse | [15] | 22/05/2015 |

# VARIABLES

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TECHNOLOGIES |  | TOLERANCE |  | TALENT |
|  |  |  |  |  |
| * Fuel Types * Power Output * Chemical components * Efficiency * Power density * Application * Production capacity * System Stability * Compatability with Other Applications * Energy Generation Efficiency * Operation and Maintenance * Design * Distribution Energy Resources (DER) * Fuel delivery module (fuel processor or a hydrogen storage tank) |  | * Implementation * Price * Region * Safety * Distance per fuel load (only in transport application) * Price of Fuel * Portability (Small Devices) * Supply Limit * Market size (Relatively Small) * Regulation Policy * Standards |  | * Governmental incentives * Distance to university * Military interest * R&D of companies * Salary * Global Awareness * High performance * Supported by environmental exposure |

# REFERENCES

1. nedstack, “Fuel Cell Setup,” http://www.nedstack.com/technology/fuel-cell-setup#up.

2. nedstack, “Fuel Cell Principle,” http://www.nedstack.com/technology/fuel-cell-principle.

3. Wikipedia, the free encyclopedia, “Fuel Cell,” http://en.wikipedia.org/wiki/Fuel\_cell.

4. HES, “Hydrogen Fuel Cost vs Gasoline,” http://heshydrogen.com/hydrogen-fuel-cost-vs-gasoline/.

5. EERE, “Hydrogen Production and Distribution,” http://www.afdc.energy.gov/fuels/hydrogen\_production.html.

6. EERE, “HYDROGEN DELIVERY,” http://energy.gov/eere/fuelcells/hydrogen-delivery.

7. EERE, “HYDROGEN STORAGE,” http://energy.gov/eere/fuelcells/hydrogen-storage.

8. Wikipedia, the free encyclopedia, “Hydrogen Production,” http://en.wikipedia.org/wiki/Hydrogen\_production#Partial\_oxidation.

9. FuelCellToday, “Fuel and Infrastructure,” http://www.fuelcelltoday.com/applications/fuel-and-infrastructure.

10. EERE, *Fuel Cell Technologies Program*. *Hydrogen Distribution and Delivery*, 2010.

11. NREL, “Hydrogen Production and Development,” http://www.nrel.gov/hydrogen/proj\_production\_delivery.html.

12. nedstack, “Fuel Cell Types,” http://www.nedstack.com/technology/fuel-cell-types.

13. FuelCellToday, “Technologies,” http://www.fuelcelltoday.com/technologies.

14. FuelCellToday, “Applications,” http://www.fuelcelltoday.com/applications.

15. M. Ball and M. Wietschel, “The future of hydrogen – opportunities and challenges,” International Journal of Hydrogen Energy **34**, 615–627 (2009).