

Islamic Republic of Iran

Iran Ministry of Energy

Brief of Operational Program

Fuel Cell Development council

The secretariat of fuel cell steering committee

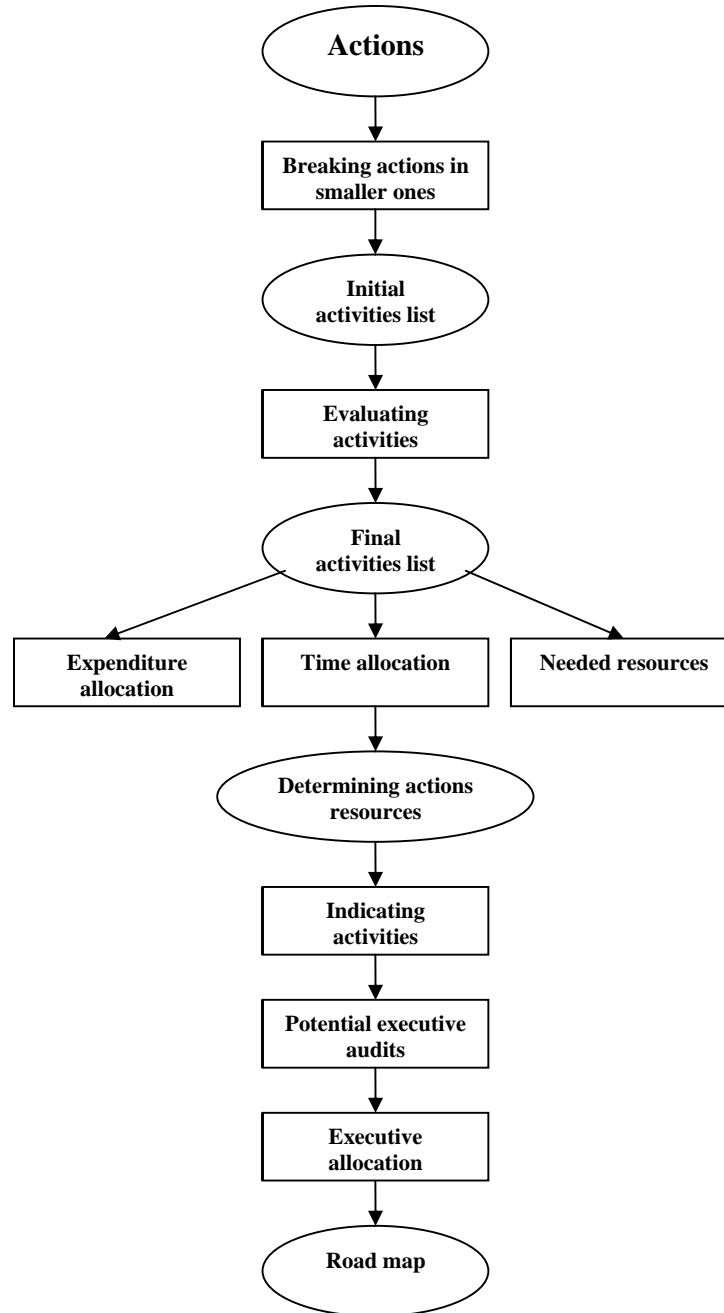
Pursuant to feasibility studies analyzing the fuel cell attraction, and formulating strategy of its technology development in Iran (basic studies) and the formulating of "National Strategy of Iran Fuel Cell Technology Development" draft in mid 2004, this draft was approved by government council after confirming in the steering committee of fuel cell.

In June 2005, fuel cell steering committee decided to plan actions in order to authorize the document through conferring with the energy commission of Islamic parliament and government infrastructure commission. Therefore, this activity started in July 2005 and the document was submitted to fuel cell steering committee after four months in November 2005.

According to committee members' emphasis, the scientific methodologies of strategy and actions plan implementation were evaluated in the first part of national strategy of fuel cell technology development action plan. Among them, appropriate methodology was chosen according to consultants of action plan team. Based on basic studies and access to required information to make the plan, indicator of achievement has been defined for all levels of the document including vision, major goals, strategies and actions. Each level has been changed into smaller activities and for the last level of activities, indicators of achievement, development, direct and indirect expenses, suggested executive and

required time was determined and gant chart of actions was designed. Then, road map of three strategic technologies was prepared according to results of activities and gant chart.

The following graph shows steps of the model in actions level.



The road map will be formulated as the final step in operational planning process. The road map shows fundamental pillars of implementation strategy process and output of operational planning process. The road map presents all strategic levels from vision to activities, primacy and lateness in different levels especially in measures and activities levels, timing for fulfilling of each level with allocated resources and presenting responsible apparatus for each level.

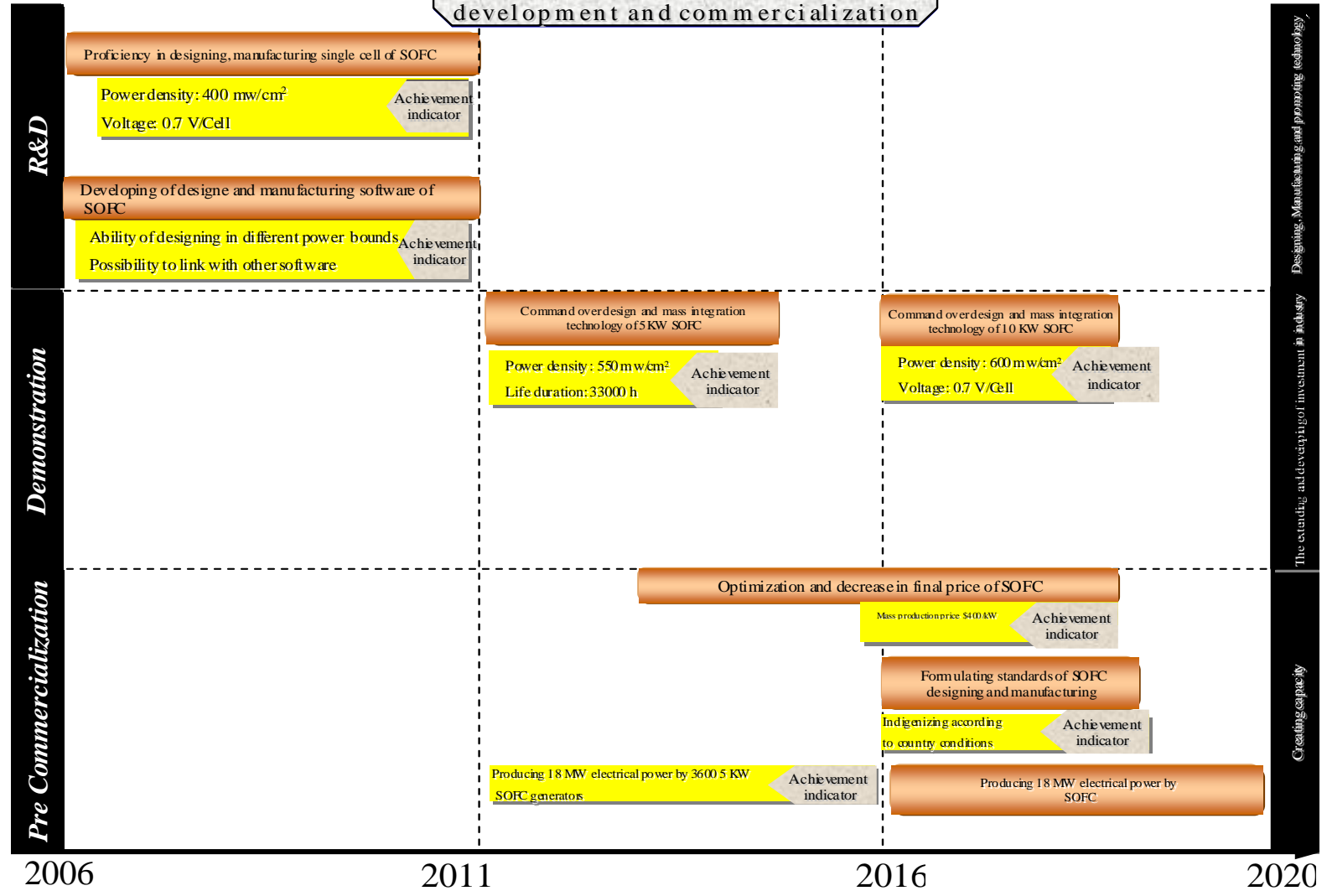
Experience of formulating strategic plan project in organization shows that some strategies implemented or during never have implementing have faced a lot of difficulties. There are two primary reasons: first organizations are usually managed by management capabilities whereas implementing strategies needs planning beside management capabilities. The second reason is the gap between strategic and operational layer of organizations. As in some cases, despite valuable strategies, planning and making decision implement without considering determined strategies. Although both reasons are correlated, lack of suitable mechanism to change strategy into a plan or operational and routine goals is a main reason in this condition. Formulating operational plan so that is the final stage (or one of final stages) in strategic planning process and preparing roadmap is one of the most important achievements in this stage that indicates fundamental pillars of strategy implement process. It is emphasized that roadmap never takes guide or leader place and

the key of using pattern in implementing strategy is guide's artistic capabilities. As using techniques and methodology of formulating and implementing strategy without leadership capabilities can not make any organization revolution.

The roadmaps are as follows:

- The roadmap of fuel cell national innovation system in Iran
- The roadmap of PEMFC development and commercialization.
- The roadmap of SOFC development and commercialization.
- The roadmap of Fuel Processing system development and commercialization.

The road map of SOFC fuel cell development and commercialization

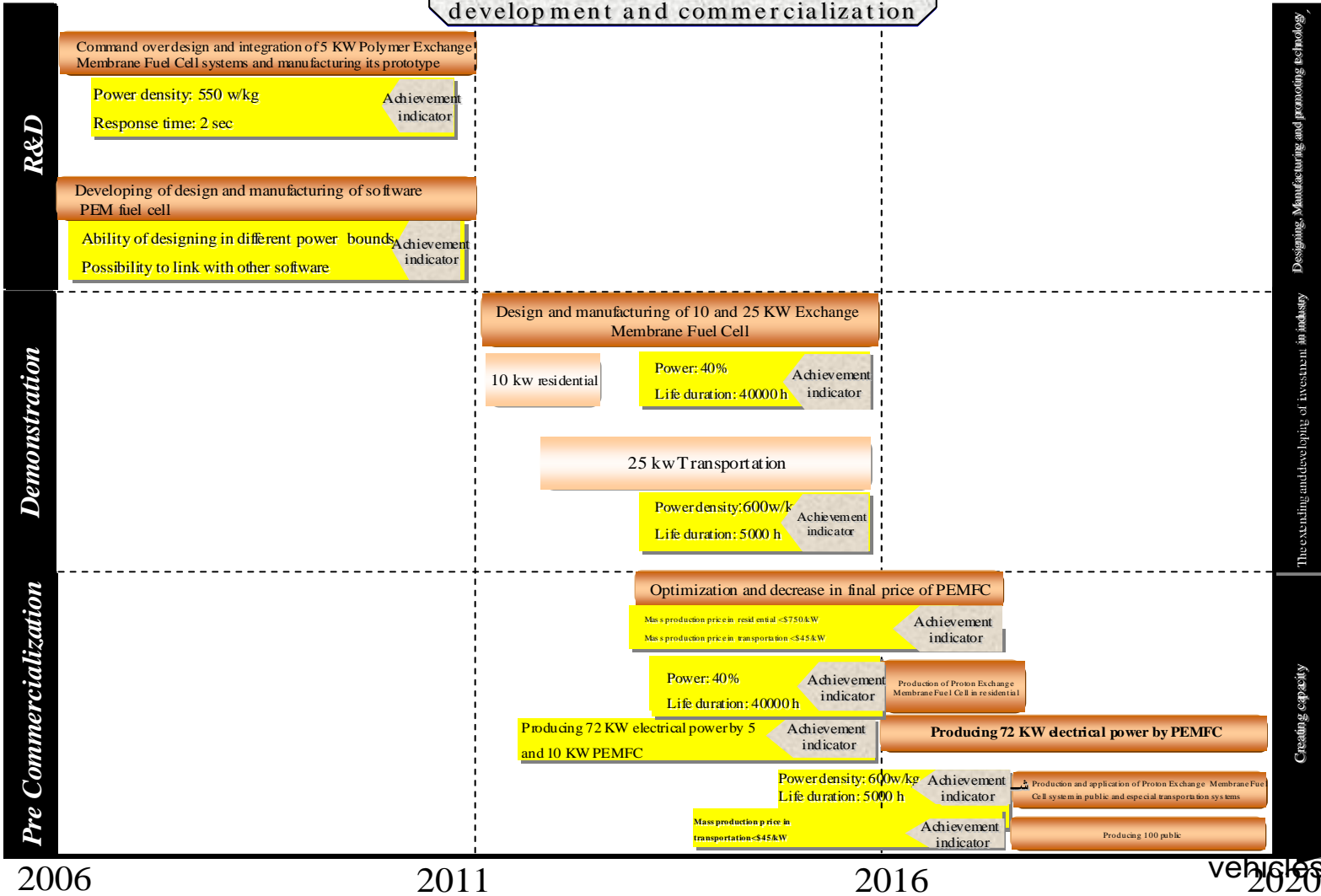


The extending and developing investment in industry

Designing, Manufacturing and promoting technology

Creating capacity

The roadmap of PEM fuel cell development and commercialization

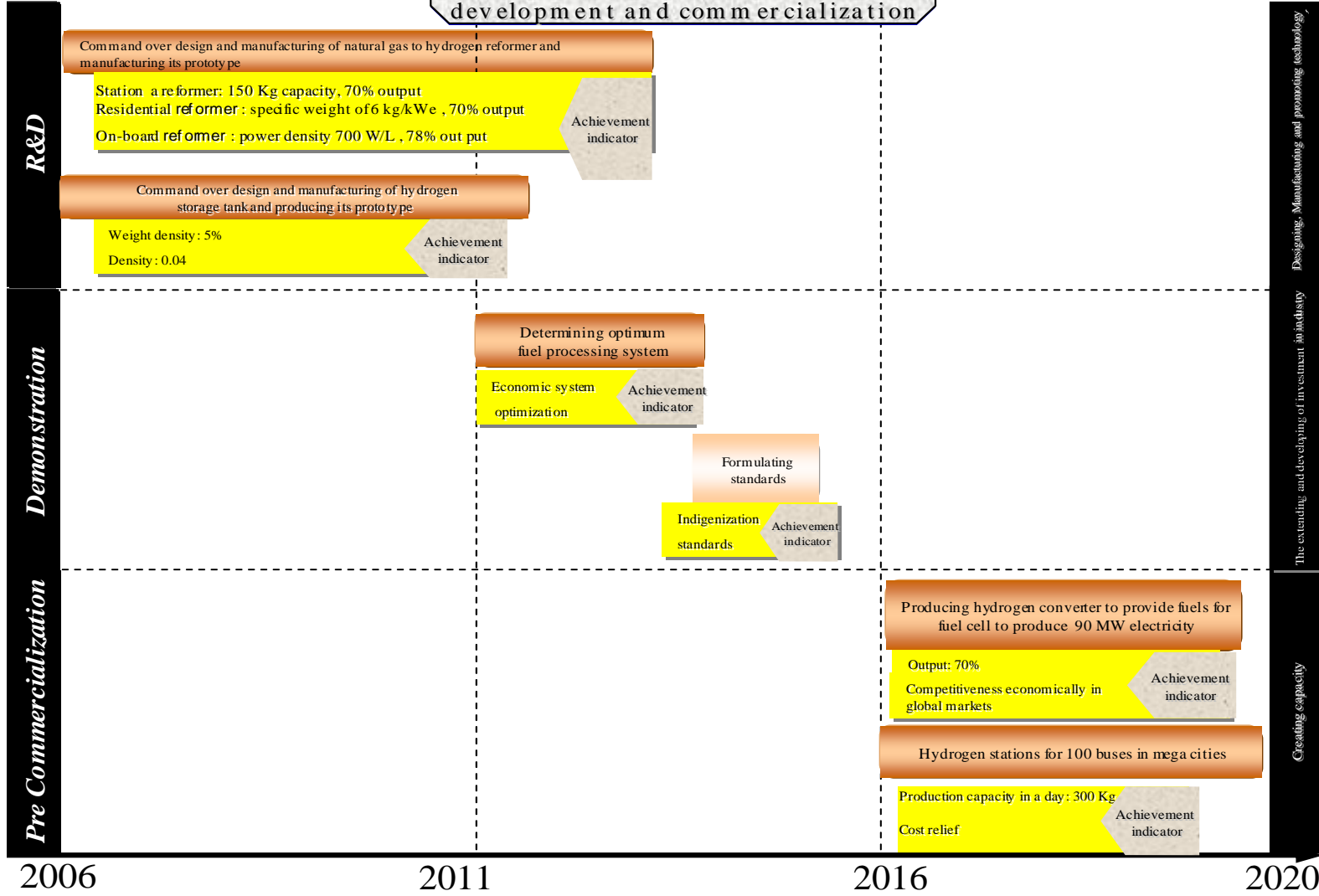


Designing, Manufacturing and promoting technology

The extending and developing of investment in industry

Creating capacity

The roadmap of fuel processing development and commercialization



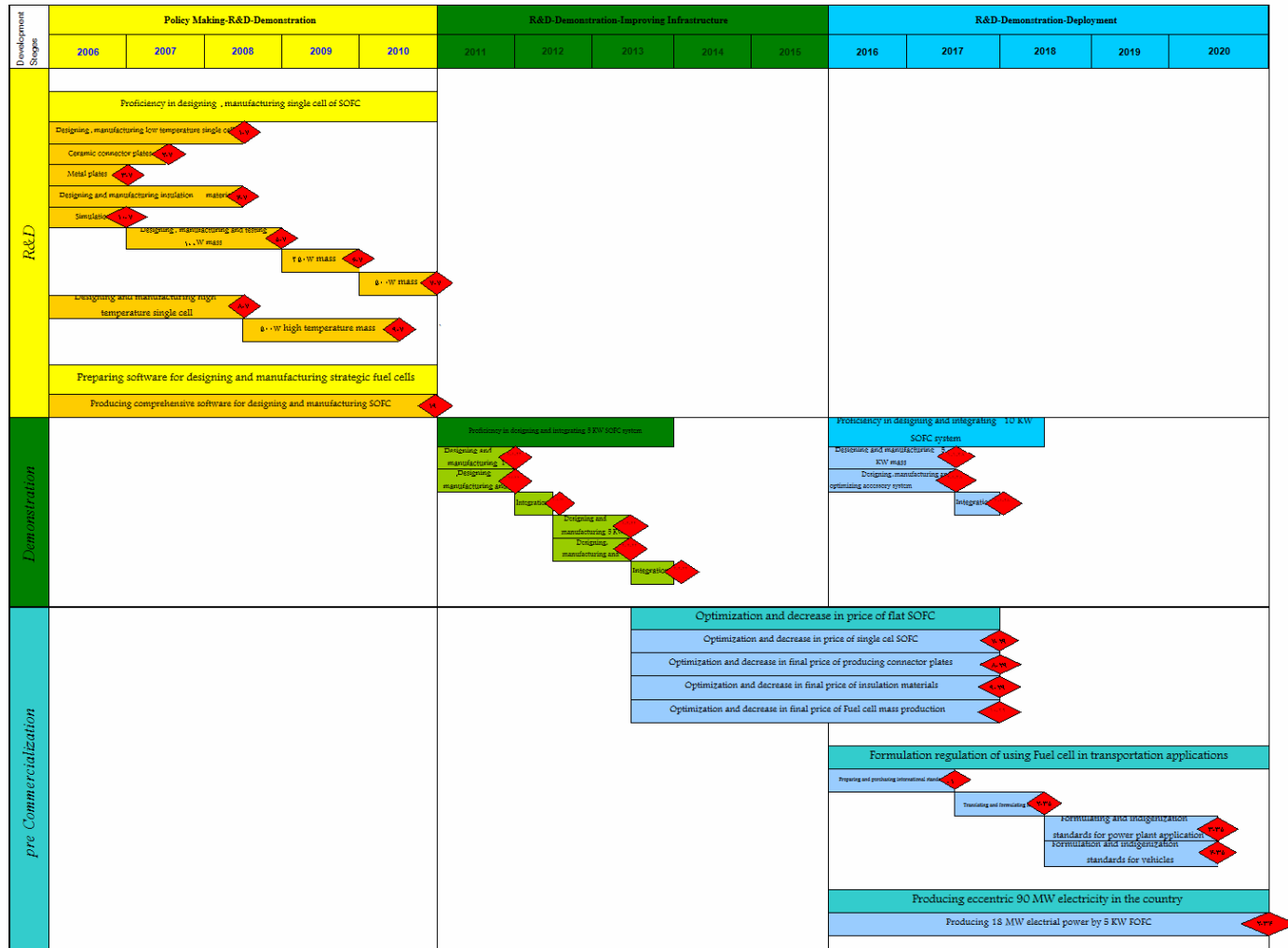
Designing, Manufacturing and promoting technology

The extending and developing of investment in industry

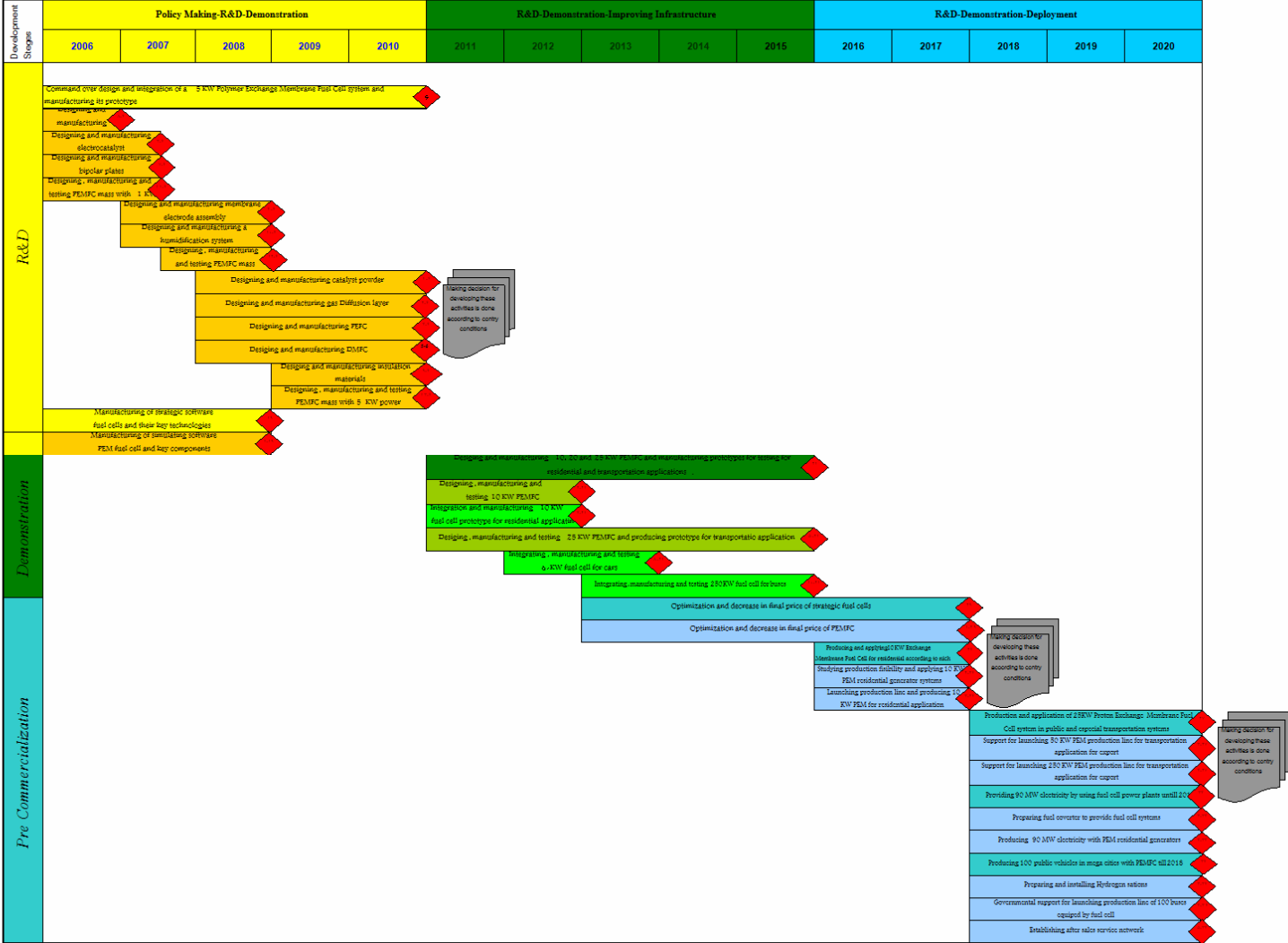
Creating capacity

As the graphs show for each measure, achievement indicator, time and time arrangement beside other relevant measures have been presented. It is considered that each measure has separated activities with their achievement indicators, timing, costs and executives. The roadmaps are as follows.

The roadmap of strategic SOFC



The roadmap of PEM fuel cell development and commercialization



According to the national innovation system prerequisites as a proper model for implementing technology development strategy, another roadmap called "the roadmap of developing national fuel cell innovation system in the country" has been prepared to support and provide infrastructure for fuel cell technology development.

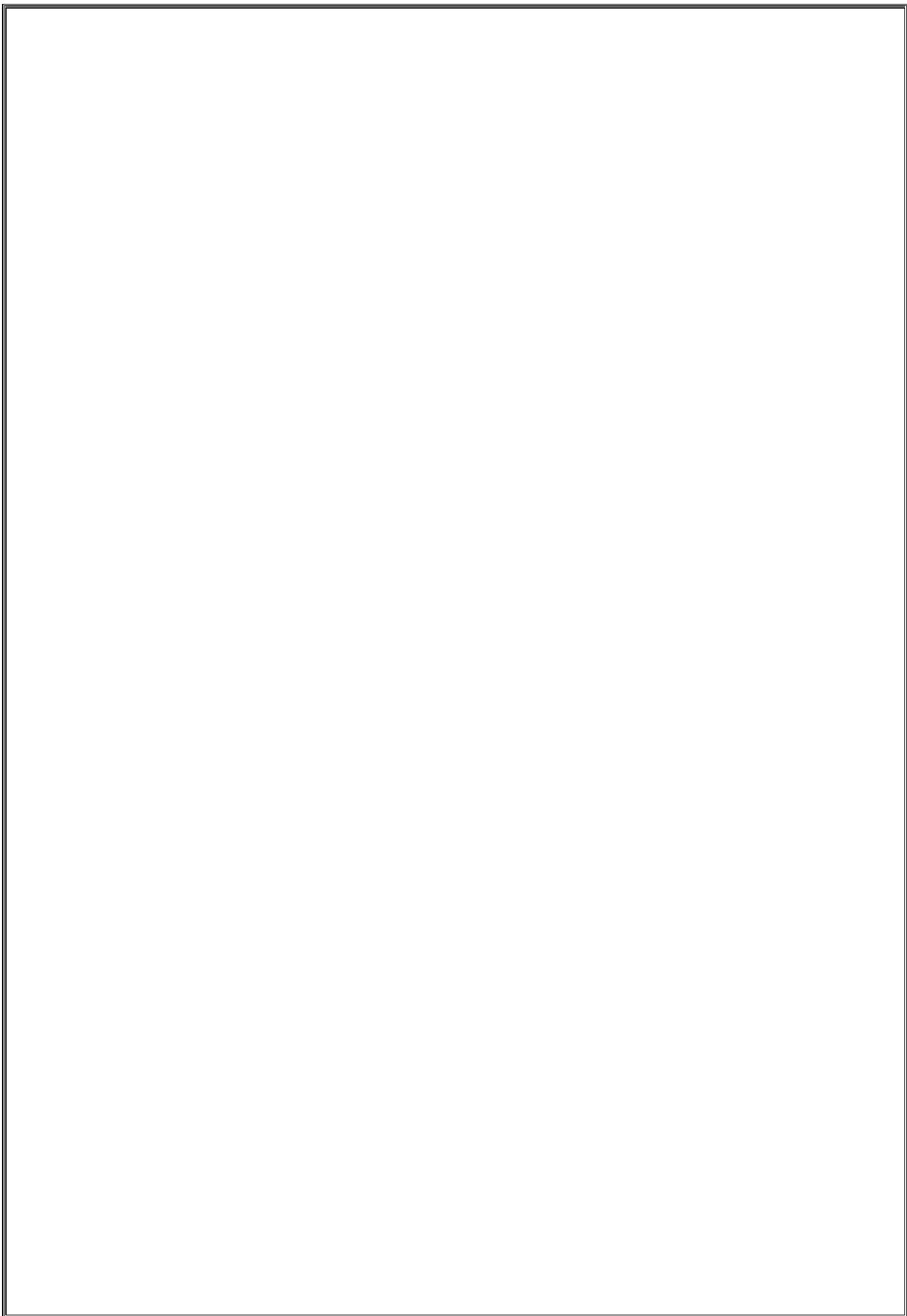
In conclusion, required costs in different time terms and required time for each measure are summarized in the following table.

The table of budgets of national strategy for fuel cell technology development in the country

Number	measure	First year budget	First 5 year budget	second 5 year budget	third 5 year budget	Total budget	Time (month)
1	Establishing fuel cell development council	7020	7020	0	0	7020	9
2	Formulating and suggesting rules and regulations and rules related to support fuel cell technology development in Iran	0	0	0	0	0	60
3	Facilitating scientific, corporation and non government organizations foundation supporting fuel cell technology development	400	4222	2940	2940	10102	180
4	Foundation and operation of fuel cell technology development inistitute	16175	54239	0	0	54239	58
5	Foundation of supportive fund for fuel cell technology development independent or from supportive fund for energy efficiency and renewable energies	11200	11200	0	0	11200	19
6	Command over design and integration of 5 KW Exchange Membrane Fuel Cell systems and manufacturing its prototype	10807	74949	0	0	74949	63
7	Command over design and manufacturing of single cell and production of Solid Oxide Fuel Cell (SOFC) model	4217	29750	0	0	29750	60
8	Command over design and manufacturing of natural gas to hydrogen reformer and manufacturing its prototype	8830	55440	7300	0	62740	81
9	Command over design and manufacturing of hydrogen storage tank and producing its prototype	8000	37200	13700	0	50900	84
10	Purchasing, installation and exploiting of some models of different fuel cell systems	1445	1692	67978	67978	137647	180
11	Development of web sites and publication of news bulletins on fuel cell technology achievements in Iran and in the world	1448	7878	9604	15352	32834	180
12	Continuity of strategic studies needed for fuel cell technology	0	0	0	0	0	3
13	Preparing action plans needed for operational actions	300	300	0	0	300	4
14	Employment and training of expert human resources to implement actions	11418	41988	17763	4338	64088	180
15	Conducting joint educational courses with reputable international centers	3310	14310	13750	0	28060	126

16	Supporting the master and PhD theses on strategic fuel cells and fuel processing	2510	13050	2000	2500	17550	180
17	Supporting innovators and inventors achievements in fuel cell technology field	1198	4638	11800	22300	38737	180
18	Interaction with international technology consortia	1363	8664	17900	17900	44464	180
19	Produce of designing and manufacturing software in strategic fuel cell and their key technologies	2467	8429	0	0	8429	30
20	Study and select an optimum system for fuel processing application for automobiles	0	0	2800	0	2800	30
21	Design and manufacturing of 10 and 25 KW Proton Exchange Membrane Fuel Cell (PEMFC) systems and manufacturing prototype applied in residential generators and transportation systems	0	0	26604	0	26604	60
22	Design and manufacture Solid Oxide Fuel Cell (SOFC) models	0	0	10000	0	10000	36
23	Formulating of manufacturing, distribution and formulation standards for hydrogen and fuel cell	0	0	900	0	900	12
24	Establishing of fuel cell technology growth centers	0	0	20000	0	20000	39
25	Developing supportive mechanisms for Intellectual Property (IP) for innovations and inventions in fuel cell technology field	0	0	10110	6000	16110	126
26	Production and application of 10 KW PEMFC system in residential electrical generators proportionate with target market size	0	0	0	1174	1174	136
27	Production and application of 25 KW PEMFC system in general and especial transportation systems	0	0	0	1273	1273	60
28	a- Design and manufacturing of 5 and 10 KW SOFC	0	0	0	6500	6500	24
29	Design and manufacturing of 5 and 10 KW Solid Oxide Fuel Cells (SOFC)	0	0	0	68324	68324	60
30	Encourage various incentive mechanisms for economic institutes producing fuel cell and its related technologies	0	0	0	7560	7560	60
31	Tax free grant for strategic fuel cell and its related technologies, with legal permissions based on specific set of guidelines and regulations	0	0	0	1630	1630	13

32	Awarding financial bank facilities with proper investment condition needed for implementing developmental projects based on strategic fuel cell technology with relevant set of guidelines and regulations	0	0	0	7090	7090	60
33	Formulating guidelines for purchasing electrical power from private sectors which produce electricity via strategic fuel cell technology	0	0	0	22050	22050	60
34	Providing 90 Mega Watt decentralized electrical power from Iran power using fuel cell power plant till 2020	0	0	0	1005	1005	60
35	Formulating rules and regulations for using fuel cell in transportation systems	0	0	0	5500	5500	54
36	Producing and exploiting 100 buses in metropolitan cities with PMEFC till 2020	0	0	0	1000	1000	72
Total		92108	374969	235148	262413	872530	



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