

Summary Record of Discussions of the Twenty-second Meeting of Scientific Advisory Committee to the Cabinet (SAC-C) held on 2nd February, 2011, at CSIR Science Centre, New Delhi.

The twenty-second meeting of the Scientific Advisory Committee to the Cabinet (SAC-C) was held on 2nd February, 2011, under the Chairmanship of Dr. R. Chidambaram, Principal Scientific Adviser to the Government of India (PSA to GOI) and Chairman, SAC-C.

The agenda of the meeting and the list of participants are at **Annexure-I** and **Annexure-II** respectively.

M22A1 Opening remarks by Chairman, SAC-C.

The Chairman welcomed all members and invitees to the twenty-second meeting of SAC-C and introduced the new members Dr. Dinesh Singh, Vice-chancellor, University of Delhi, Prof. A.N. Rai, Vice-chancellor, North-Eastern Hill University, Dr. Krishan Lal, President, Indian National Science Academy and Shri T. Chatterjee, Secretary, Ministry of Environment and Forests to the committee. He also mentioned that Dr. P.S. Goel, Director, Recruitment and Assessment Centre, DRDO, would be continuing as a member in his personal capacity.

He added that due to certain commitments, Prof. P. Balaram could not be present and therefore the agenda item "Bio-medical Research: Interface between clinical and basic approaches" would be deferred and the presentation by Dr. T. Ramasami on "Enhancing Academia-Industry Interactions" which could not be made earlier would be taken up in this meeting.

Before starting with the agenda, Chairman gave an overview of the topics. He stated that the technology road map for machine tools got evolved as a result of initiating a Core Group for Research and Development in the Machine Tools Sector (C-MAT) by the Office of the Principal Scientific Adviser to the Government of India. This was similar to other core groups in the field of automotives (CAR) and electronic hardware (CAREL).

He stated that the subject of geo-engineering was more closely related to preservation of environment. He also added that shale-gas production was in an advanced stage in the USA and would be pertinent to energy safety for our country. However, he said that a section of the scientific community in India and abroad felt that the production of shale-gas may also give rise to environmental pollution.

M22A2 Technology Road Map for Machine Tools - Shri P.J. Mohanram, Senior Adviser-Technology, Indian Machine Tool Manufacturers' Association.

Shri P.J. Mohanram had presented the details of Technology Roadmap for machine tools. His presentation covered, importantly, the aspects of import dependence for critical items, product and technology gaps and an integrated plan for R&D. The details of his presentation are at **Appendix 'A'**.

During subsequent discussions, following were suggested by the members:

- Selection of few domains and consideration of commercial opportunities need to be emphasized.
- HRD requirements also need to be included after discussions with MHRD.
- A high powered apex committees need to be formed for monitoring and guiding the R&D. This could consist of members from DHI, O/o the PSA to GoI, Industry Association and academia.
- The committee recommended larger R&D funding by DHI, which is, currently, almost non-existent.
- For obtaining the larger R&D funding the O/o the PSA to GoI, DHI and Representative of Industry Association can work jointly to bring out a document for 12th plan. He requested Dr. V. Sumantran, Honorary Scientific Consultant in the PSA's office, to provide guidance and help to the team in the preparation of this document. Dr. Sumantran readily agreed to do so.

M22A3 Bio-medical Research: Interface between clinical and basic approaches - Dr. Padmanabhan Balaram, Director, Indian Institute of Science.

Due to unexpected last minute engagement, Dr. P. Balaram could not be present and give his presentation. This topic was deferred to a subsequent meeting.

M22A4 Geo-engineering - Dr. G. Bala, Associate Professor, Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science.

Dr. G. Bala had give a presentation on “Climate Stabilization via Geo-engineering” and described various methods under two broad categories ie, Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR). The pros and cons and the present status of research in these two areas were explained. He had also presented the details of his own research studies in modeling for climate forcing of CO₂ and solar radiation, cloud brightening, etc., At the end of his lecture, he brought out the challenges in geo-engineering. A summary and the details of his presentation are at **Appendix ‘B’**.

M22A5 Shale Gas - Shri Ravi Misra, Chief Geologist and Project Incharge (Shale Gas), Keshava Deva Malviya Institute for Petroleum Exploration, Oil and Natural Gas Corporation Limited.

Shri Ravi Misra had given a presentation on “Shale Gas: A promising energy supplement”. He brought out the relevance of un-conventional resources like Shale Gas in the context of increasing import content and rising global prices in oil. After explaining about the shale gas production trends in USA, Canada, Europe, he described about India’s potential in shale gas and about the pilot project in Damodar Basin. He also brought out that all necessary methodology, technology and concepts are well established and shale gas production involves low exploration risk, low per well cost and large in-place gas volumes which make it very attractive. He elaborated further on socio-environmental, techno-economic and regulatory issues. The details of his presentation are at **Appendix ‘C’**.

Subsequent to the presentation, the members brought out the following aspects:

- Technology of fracturing and techniques for prospecting may need more investigation.
- Scientists need to be involved in studying the pollution related issues.
- This should be a high priority area for our country and the Office of the PSA to GoI may take the initiative to catalyse related science and technology projects.

M22A6 Any other item with the permission of the Chair.

Chairman requested Dr. T. Ramasami, Secretary, Department of Science and Technology, to give a brief presentation on “Enhancing Academia-Industry Interactions”.

Dr. Ramasami, in his presentation, brought out that a policy shift is needed to converge social issues with industry-academia-research based on the demand of society for knowledge rather than on supply of knowledge by the academia. To illustrate this point, he explained about the recent examples of technology partnerships of DST in the areas of potash based fertilizers, clean energy needs for decentralized generation and consumption and also solutions for water challenges. He also shared with the members about the recommendations made to the PM’s Council of Trade and Industry. The details of his presentations are at **Appendix ‘D’**.

The meeting ended with a vote of thanks to the Chair.

**Twenty-second Meeting of the Scientific Advisory Committee
to the Cabinet (SAC-C)**

Date : 2nd February, 2011.
Time : 1030 hrs.
Venue : Lecture Room (1st Floor) of the CSIR Science Centre (CSIR Guest House), K.K. Birla Lane, Opposite World Bank, New Delhi - 110003.

Agenda

- M22A1** Opening remarks by Chairman, SAC-C.
- M22A2** Technology Road Map for Machine Tools - Shri P.J. Mohanram, Senior Adviser-Technology, Indian Machine Tool Manufacturers' Association.
- M22A3** Bio-medical Research: Interface between clinical and basic approaches - Dr. Padmanabhan Balaram, Director, Indian Institute of Science.
- M22A4** Geo-engineering - Dr. G. Bala, Associate Professor, Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science.
- M22A5** Shale Gas - Shri Ravi Misra, Chief Geologist and Project Incharge (Shale Gas), Keshava Deva Malviya Institute for Petroleum Exploration, Oil and Natural Gas Corporation Limited.
- M22A6** Any other item with the permission of the Chair.
- M22A7** Concluding remarks by the Chair.

List of participants of the twenty-second meeting of the Scientific Advisory Committee to the Cabinet (SAC-C)

1.	Dr. R. Chidambaram, Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi - 110011
2.	Dr. Jamshed J. Irani, Director, Tata Sons Limited Bombay House, 24 Homi Modi Street Fort, Mumbai-400001
3.	Prof. S.K. Joshi, Vikram Sarabhai Professor & Honorary Emeritus Scientist, 252, National Physical Laboratory, Dr. K.S. Krishnan Marg, New Delhi - 110 012
4.	Dr. Shailesh Nayak, Secretary, Department of Earth Sciences, Ministry of Earth Sciences, Block No. 12, CGO Complex, Lodhi Road, New Delhi - 110003
5.	Dr. V. M. Katoch, Secretary (Department of Health Research) & Director-General, Indian Council of Medical Research, Post Box No. 4911, Ansari Nagar, New Delhi
6.	Dr. T. Ramasami, Secretary, Department of Science & Technology, Technology Bhawan, New Mehrauli Road, New Delhi - 110 016
7.	Prof. S.V. Raghavan, Scientific Secretary, Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi - 110011
8.	Shri T. Chatterjee, Secretary, Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, Lodhi Road, New Delhi - 110003
9.	Ms. Vibha Puri Das, Secretary, Ministry of Human Resource Development, (Higher Education), Shastri Bhawan, New Delhi - 110001
10.	Dr. B. K. Gairola, Director-General, National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology, A-Block, CGO Complex, Lodhi Road, New Delhi - 110003
11.	Dr. Dinesh Singh, Vice-chancellor, University of Delhi, New Delhi -110007
12.	Dr. P.S. Goel, Director, Recruitment and Assessment Centre, DRDO, Ministry of Defence, Lucknow Road, Timarpur, Delhi - 110054
13.	Prof. Vijayalakshmi Ravindranath, Professor and Chairman, Centre for Neurosciences, Indian Institute of Science, Bangalore - 560012
14.	Dr. V. Sumantran, Scientific Consultant, Office of the Principal Scientific Adviser, to the Government of India, Door 7/1, Valli Ammai Aachi Road, Kotturpuram, Chennai - 600 085
15.	Dr. S.K. Sikka, Scientific Consultant, Office of the Principal Scientific Adviser to the Government of India, Bhabha Atomic Research Centre, 6th Floor, Central Complex, Trombay, Mumbai - 400085
16.	Prof. A.N. Rai, Vice-Chancellor, North-Eastern Hill University, Shillong - 793022

17.	Dr. Milan K. Sanyal, Director, Saha Institute of Nuclear Physics, Department of Atomic Energy, 1/AF, Bidhan Nagar, Calcutta - 700064
18	Dr. Juzer Vasi, Professor, Indian Institute of Technology, Bombay, Powai, Mumbai - 400076
19.	Dr. Krishan Lal, President, Indian National Science Academy, 2, Bahadur Shah Zafar Marg, New Delhi -110 002
20	Prof. Asis Datta, President, The National Academy of Sciences, India, 5, Lajpatrai Road, New Katra, Allahabad - 211 002
21.	Dr. M.S. Vijayaraghavan, Advisor, National Technical Research Organization, Block No. 3, 4th Floor, Old JNU Campus, New Delhi - 110016
22	Shri Ravi Misra, Chief Geologist and Project Incharge (Shale Gas), Keshava Deva Malviya Institute for Petroleum Exploration, Oil and Natural Gas Corporation Limited, 9, Kaulagarh Road, Dehradun - 248 195, Uttarakhand
23	Shri P.J. Mohanram, Senior Adviser-Technology, Indian Machine Tool Manufacturers' Association, 10th Mile, Tumkur Road, Madavara Post, Bangalore - 562 123.
24	Shri C.P. Rangachar, MD and past president of IMTMA, Yuken India Ltd., Whitefield Road, Whitefield, Bangalore 560 066
25	Shri S.G. Shirgurkar, MD and past president of IMTMA, Ace Designers Ltd., Plot No. 7 & 8, II Phase, Peenya Industrial Area, Bangalore 560058
26	Shri N.K. Dhand, Chairman & MD and past president, IMTMA, Micromatic Grinding Technologies Ltd., C-27 & 28, Industrial Area, Meerut Road, Ghaziabad, Uttar Pradesh - 201 003 Ghaziabad
27	Shri V. Anbu, Executive Director, Indian Machine Tool Manufacturers' Association, 10th Mile, Tumkur Road, Madavara Post, Bangalore - 562 123.
28	Shri Srinjoy Das, Indian Machine Tool Manufacturers' Association, 10th Mile, Tumkur Road, Madavara Post, Bangalore - 562 123.
29	Dr. G. Bala, Associate Professor, Centre for Atmospheric and Ocean Sciences, Indian Institute of Science, Bangalore - 560012
30	Shri Harbajan Singh, Joint Secretary, Department of Heavy Industry, Udyog Bhawan, New Delhi - 110011
31	Dr. Neeraj, Deputy Director, Associated Chambers of Commerce & Industry (ASSOCHAM),1, Community Centre Zamrudpur Kailash Colony, New Delhi - 110 048
32	Shri D. K. Agrawal, Executive Director, NETRA, NTPC Limited, NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi - 110003
33	Shri Anjan Das, Senior Director, Confederation of Indian Industry (CII), The Mantosh Sondhi Centre, 23, Institutional Area, Lodhi Road, New Delhi - 110003
34	Dr. Debashis Dutta, Scientist 'G', Department of Information Technology, Electronics Niketan, 6, CGO, Complex, New Delhi - 110003

35	Shri C.B. Singh, Director (E), Ministry of Petroleum and Natural Gas, Shastri Bhawan, New Delhi - 110011
36	Shri Sushil Lakra, Industrial Adviser, Department of Heavy Industry, Udyog Bhawan, New Delhi - 110011
37	Dr. G.V. Subrahmanyam, Adviser, Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, Lodhi Road, New Delhi - 110003
38	Shri R.R. Rashmi, Joint Secretary, Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, Lodhi Road, New Delhi - 110003
39	Shri B. Rajendiran, Adviser, Office of the Principal Scientific Adviser to the Government of India Room No. 313A, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi - 110011
40	Shri Neeraj Sinha, Scientist 'F', Office of the Principal Scientific Adviser to the Government of India Room No. 326, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi - 110011
41	Dr. (Mrs.) Ketaki N. Bapat, Scientist 'E', Office of the Principal Scientific Adviser to the Government of India Room No. 320, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi - 110011