

BIO GAS STANDARDS

23RD AUGUST 2013

IIT, DELHI

CHITRA GUPTA

SC`E'(PCD)

BUREAU OF INDIAN STANDARDS, NEW DELHI

ABOUT BIS

- ◉ NATIONAL STANDARDS BODY OF INDIA
- ◉ MAIN ACTIVITIES
- ◉ STANDARD FORMULATION
- ◉ CERTIFICATION
 - ◉ PRODUCT
 - ◉ MANAGEMENT SYSTEMS
 - ◉ REGISTRATION SCHEME
 - ◉ SCHEME FOR FOREIGN MANUFACTURERS
- ◉ LABORATORY
- ◉ NATIONAL INSTITUTE OF TRAINING
- ◉ For details please visit BIS website www.bis.org.in

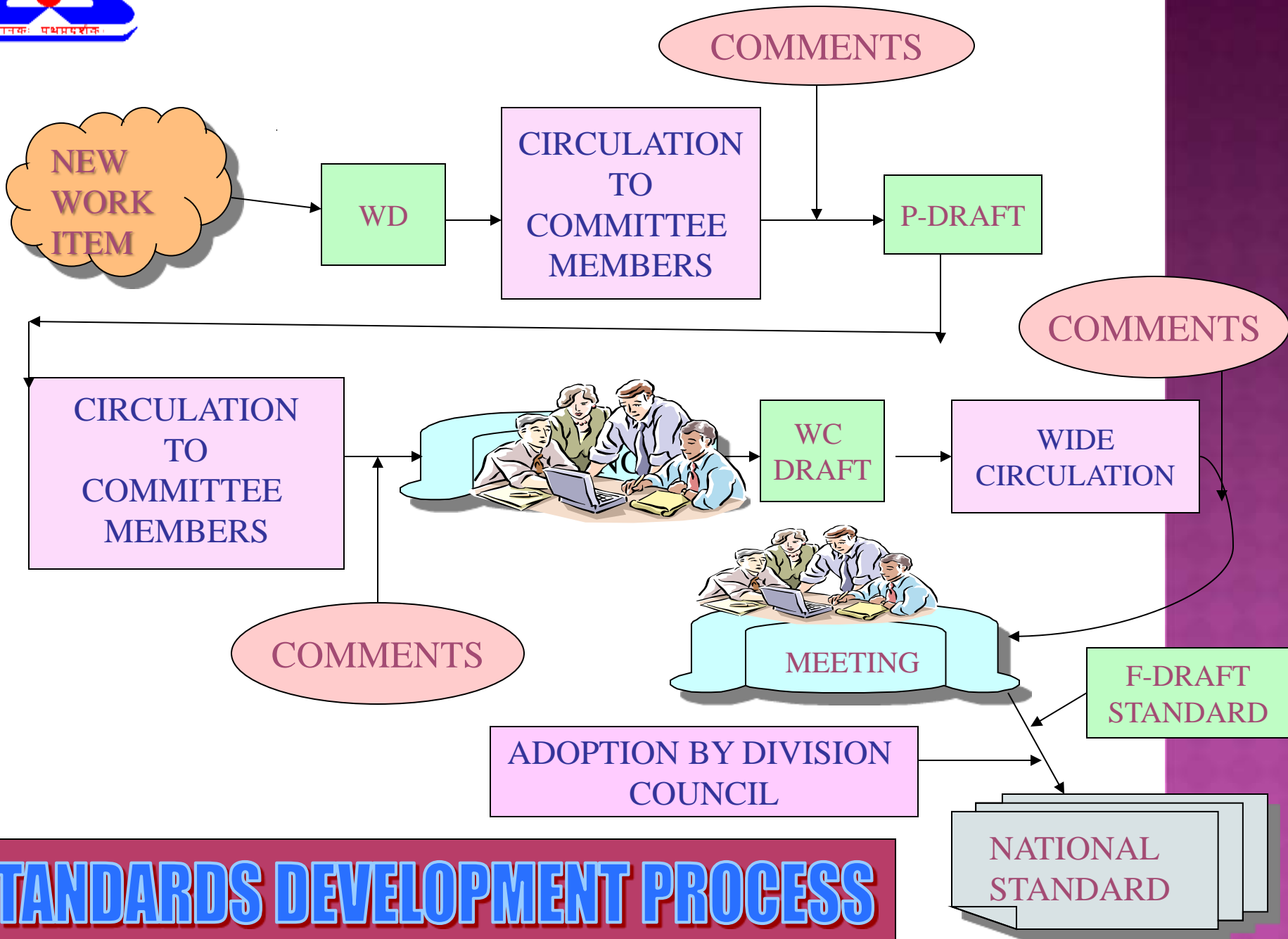
FORMULATION OF NATIONAL STANDARDS

- ◉ Indian Standards are formulated in a transparent manner through a **consensus** process by the Technical Committees comprising of experts from all concerned areas such as Consumers, Producers/ Manufacturers, R&D Centres, NGOs, Regulatory Bodies etc.
- ◉ The Bureau has published over 18000 standards so far.

PROCESS

- ◉ Division Councils
- ◉ TECHNICAL COMMITTEES
 - SUBCOMMITTEES
 - WORKING GROUPS/PANELS

COMPOSITION - Members from Industry, Users, Consumer Organizations, Regulators, Small Scale Industries, R & D Institutes, Industry Associations



STANDARD FORMULATION

◎ 14 DIVISION COUNCILS

- ◎ 1. Production and General Engineering
- ◎ 2. Civil Engineering
- ◎ 3. Chemical Engineering
- ◎ 4. Electrotechnical
- ◎ 5. Food & Agriculture
- ◎ 6. Electronics & Information Technology
- ◎ 7. Mechanical Engineering
- ◎ 8. Management and Systems
- ◎ 9. Metallurgical Engineering
- ◎ 10. Petroleum, Coal and Related Products
- ◎ 11. Transport Engineering
- ◎ 12. Textiles
- ◎ 13. Water Resources
- ◎ 14. Medical Equipment & Hospital Planning

PETROLEUM COAL AND RELATED PRODUCTS DIVISION COUNCIL

◎ 11 SECTIONAL COMMITTEES

- ◎ 1. Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants, PCD 1
- ◎ 2. Petroleum and Their Related Products, PCD 3
- ◎ 3. Bitumen, Tar and Their Products, PCD 6
- ◎ 4. Solid Mineral Fuels, PCD 7
- ◎ 5. Organic Chemicals, Alcohols & Allied Products and Dye Intermediates, PCD 9
- ◎ 6. Plastics, PCD 12
- ◎ 7. Rubber and Rubber Products, PCD 13
- ◎ 8. Natural and Synthetic Fragrance Materials, PCD 18
- ◎ 9. Cosmetics, PCD19
- ◎ 10. Plastic Containers, PCD 21
- ◎ 11. Lubricants, PCD 25

PETROLEUM AND ITS RELATED PRODUCTS SECTIONAL COMMITTEE,PCD 3

**CHAIRMAN- SHRI P PADMANABHAN, EXECUTIVE
DIRECTOR, BHARAT PETROLEUM CORPORATION
LTD, MUMBAI**

SCOPE OF PCD 3

SCOPE -a) To formulate Indian Standards for terminology; petroleum, petroleum products, biofuels, specification for natural gas, methods of tests and sampling of natural gas and codes of practice for storage, handling, transport and application;

- b) LIAISON
- a) ISO/TC 28 Petroleum Products and Lubricants so far as it concerns its own scope
- b) ISO/TC 193 Natural gas
- c) ISO/TC 197/WG 12 Hydrogen Fuels Products Specification
- d) ISO/TC 238 Solid Bio Fuels
- e) ISO/TC 255 Biogas
- f) TED 2 Automotive Prime Movers
- g) PCD 1 Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants
- h) PCD 25, Lubricants and their related products Sectional Committee, PCD 25

SUBCOMMITTEES PCD3

- ⦿ i) Automotive, Aviation and Industrial Fuels Subcommittee, PCD 3:1
- ⦿ ii) Aromatic hydrocarbons, Petroleum solvents and Preservatives Subcommittee, PCD 3:2
- ⦿ iii) Gas Fuels Subcommittee, PCD 3:5

- ⦿ TOTAL NUMBER OF STANDARDS FORMULATED BY PCD 3 - 36

GASEOUS FUELS

- ◉ **IS 4576 : 1999 Liquefied petroleum gases - Specification (second revision)**
- ◉ **IS 14861:2000 (Liquefied Petroleum Gases for automotive purposes)**
- ◉ **IS 15958 : 2012 Compressed Natural Gas (CNG) for Automotive Purposes**
- ◉ **IS 16087: 2013 - Biogas-Specification**

IS 16087: 2013 BIO GAS- SPECIFICATION

- ◉ FORMULATED BY GAS FUELS
SUBCOMMITTEE,PCD 3:5 AND A SPECIAL
PANEL PCD3:5/P1
- ◉ COMPOSITION- ANNEX

IS 16087

◎ SCOPE

- ◎ This standard prescribes the requirements and the methods of sampling and test for the biogas (biomethane) applications in stationary engines, automotive and thermal applications and supply through piped network.

BIO GAS AS DEFINED IN STANDARD

- ⦿ Biogas (biomethane) is primarily methane gas which is generated from an anaerobic digestion of organic wastes by micro organisms.
- ⦿ It has methane as the main component around 50-70 percent, CO_2 around 30-40 percent and H_2S and moisture in trace quantities. It varies in composition depending upon the substrates used. It is a natural product produced from the biodegradable substrates like cattle dung, poultry waste, food waste, sewage waste etc.

REQUIREMENTS FOR BIOGAS TO BE USED AS FUEL

- ⦿ a) provide the safe operation of the engine whether stationary or automotive and associated equipments;
- ⦿ b) protect the fuel system from the detrimental effects of corrosion, poisoning and liquid or solid deposition; and
- ⦿ c) not emit any pollutants or the greenhouse gases after combustion, beyond prescribed limit.

REQUIREMENTS

- Biogas (biomethane) shall be free from liquids over the entire range of temperatures and pressures encountered in the storage and dispensing system, fuel containers, engine and fuel system and piped network.
- The biogas (biomethane) fuel shall be free from particulate matter such as dust, dirt and mist.

ODOUR

- Biogas (biomethane) delivered to any vehicle, stationary engine or piped network, shall be odorized similar to a level found in the local distribution

REQUIREMENTS FOR AUTOMOTIVE APPLICATION AND PIPED NETWORK

- ⊙ CH₄, Percent, *Min* 90
- ⊙ Moisture, mg/m³ *Max* **16**
- ⊙ H₂S, mg/m³ *Max* **30.3**
- ⊙ CO₂+N₂+O₂, *Max* (v/v) **10%**
- ⊙ CO₂, *Max* (v/v), **4%**
(When intended for filling in cylinders)
- ⊙ O₂, (v/v) 0.5%

SUPPLY

- ⦿ Biogas (biomethane) shall be stored and transported through cylinders conforming to IS 7285 (Part 2). For automotive use, it shall be filled in cylinders conforming to IS 15490.
- ⦿ It may be transported through piped network or injected into existing system of pipelines as per regulatory requirements.

OTHER STANDARDS FORMULATED BY BIS ON THIS SUBJECT

- **IS 8749 :2002 Biogas Stove** (formulated by Mechanical Engg Department)- covers construction, operation, safety requirements and tests for stoves intended for use with biogas.
- **IS 12986 (Part 1) :1990 Biogas Plants - Glass Fibre Reinforced Polyester Resin Gas Holders - Part 1 : With Steel Frame** (formulated by Mechanical Engg Department)- specifies the requirements for contact moulded glass fibre reinforced polyester resin biogas holders with steel frame suitable for floating drum type biogas plants.

CONTINUED

- ◉ **IS 7285 (PART II)- 2004 Refillable Seamless Steel Gas Cylinders - Part 2 : Quenched and Tempered Steel Cylinders with Tensile Strength Less Than 1 100 MPa (112 kgf/mm²)** - (formulated by Mechanical Engg Department)- sets out minimum requirements for the material, design, construction and workmanship, manufacturing processes and tests at manufacture of refillable quenched and tempered seamless steel gas cylinders of water capacities from 0.5 litre up to and including 400 litres for compressed, liquefied and dissolved gases exposed to extreme worldwide ambient temperatures (normally between -50 and + 65° C). this part is applicable to cylinders with a maximum tensile strength *R_m of less than 1 100 MPa (112 kgf/mm²)*.

ISSUE OF CONCERN

- FOR THE USE OF ABOVE SPECIFIED CYLINDER FOR FILLING BIO GAS, THE STEEL STRENGTH IS RESTRICTED TO 950 MPa, OTHERWISE SULPHIDE STRESS CORROSION AND HYDROGEN IMBRITTEMENT OF CYLINDER OCCURS. THIS ISSUE HAS BEEN RAISED BY CHIEF CONTROLLER OF EXPLOSIVES AND DESIRES MODIFICATION IN BIO GAS SPECIFICATION.

INDIAN STANDARD ON CNG IS 15958

- i) Wobbe index, *Min* MJ/ m³ 48.8-51.0
- ii) Water content, mg/m³, *Max* **5.0**
- iii) Hydrocarbons (volume percent of total organic carbon present):
 - a) Methane, *Min* 90.0
 - b) Ethane, *Max* 6.0
 - c) C3 and higher HC, *Max* 3.0
 - d) C6 and higher HC, *Max* 0.5
 - e) Total unsaturated HC, *Max* 0.5

CONTINUED

- iv) Corrosive components:
 - a) Total sulphur), mg/m^3 , *Max* **20.0**
 - b) Oxygen, volume percent, *Max* 0.5
 - v) Carbon dioxide and nitrogen, volume percent, *Max* 3.5
- vi) Other species (mole percent)
 - a) Hydrogen, *Max* 0.1
 - b) Carbon monoxide, *Max* 0.1
- vii) Methane number, *Min* 90.0

- NOTE – The requirement of oil content shall be added at a later stage when the test method for the same is available.

COMPARISON CNG VS BIOGAS FOR AUTOMOTIVE USE

Parameters	CNG	Biogas
Moisture, mg/m ³ ,Max	5.0	16
H ₂ S/S, mg/m ³ ,Max	20.0	30.3
CO ₂ +N ₂ +O ₂ ,Max	3.5% O ₂ 0.5%	10% (CO ₂ as 4% max & O ₂ 0.5%)

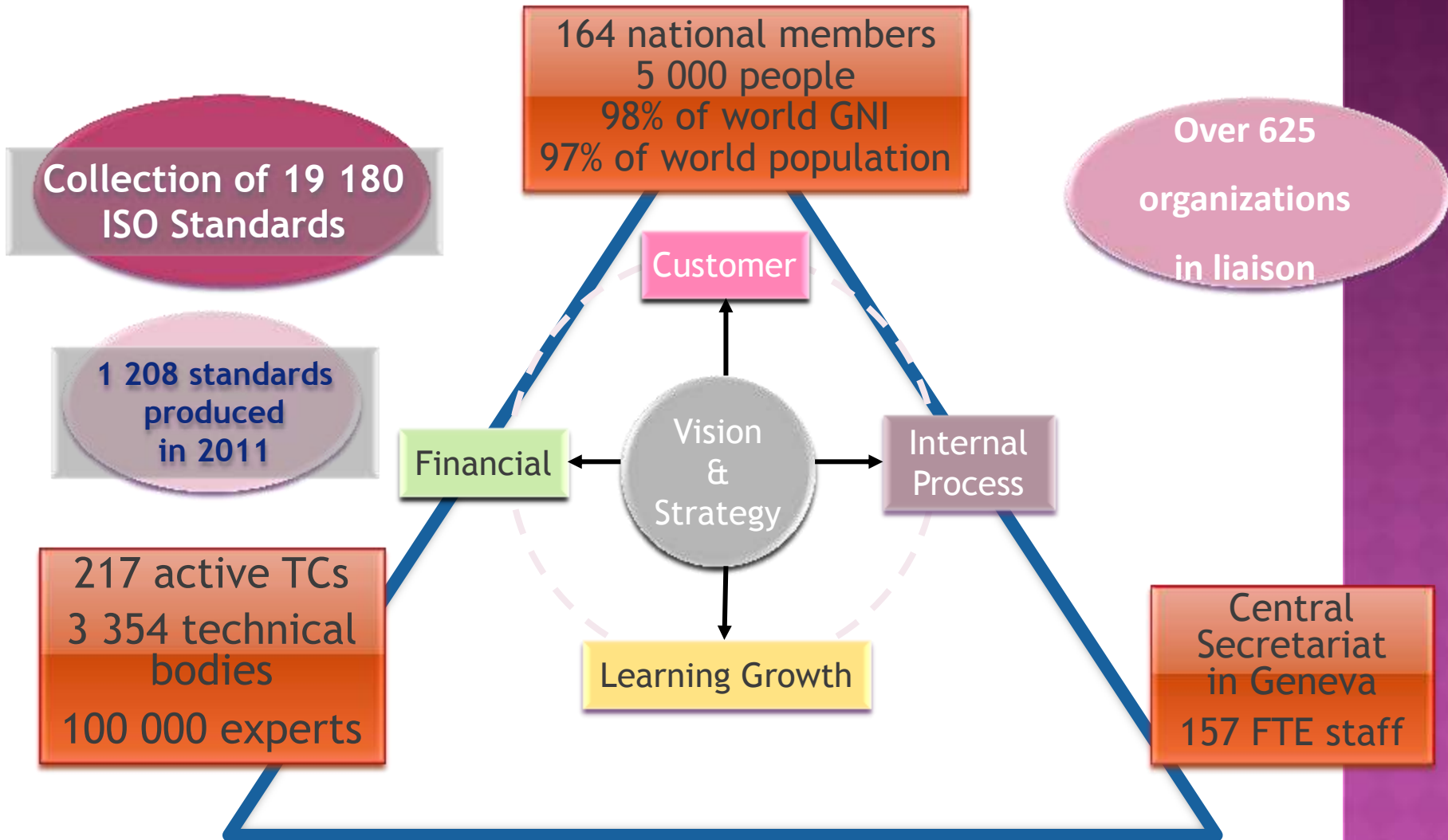
MAY BE NEEDED FOR FUTURE SPECIFICATION- (SIMILAR TO CNG)

- ◉ Regulatory provisions by the statutory authorities in this respect shall be mandatory.
- ◉ Biogas shall be supplied in accordance with the instructions given by the automotive vehicle manufacturers using CNG/biogas.
- ◉ Receipt of natural gas/biogas through pipelines by the retail outlet, storage, compression and dispensing shall be done in accordance with the instructions given by the gas suppliers.

INTERNATIONAL WORK AT ISO

- ◉ WHAT IS ISO
- ◉ INTERNATIONAL ORGANIZATION FOR STANDARDIZATION- CAME INTO BEING IN 1947
- ◉ HQS- GENEVA
- ◉ MAIN ACTIVITY - STANDARDIZATION

ISO - A GLOBAL SYSTEM



PARTICIPATION STATUS

- ◉ TWO TYPES OF MEMBERSHIP
- ◉ PARTICIPATING `P`
- ◉ OBSERVER `O`

IMPORTANT DATES

- TMB provisionally established ISO/TC 255 on 2010-09-01:
 - Committee is allowed 18 months during which the members will need to
 - review their title and scope,
 - establish a preliminary work programme and structure, and
 - elaborate a draft business plan.
- ISO/TC 255 first plenary meeting 2012-10-23

TITLE & SCOPE

ISO/IEC Directives Part 1, 2012, 1.5.10

A new technical committee shall agree on its title and scope as soon as possible after its establishment, preferably by correspondence.

The scope is a statement precisely defining the limits of the work of a technical committee.

- Biogas
- Standardization in the field of biogas.
- Secretariat - China
- The chairman - Mr. Li Jingming,

LAST MEETING

- 21-23 OCTOBER 2012 AT BEIJING CHINA
- ONE MEMBER INDIAN DELEGATION FROM MNRE PARTICIPATED AND MADE PRESENTATION ON INDIAN STANDARD
- WAY FORWARD AGREED DURING MEETING

RESOLUTION OF THE MEETING

- ◉ Name of TC255: ‘Biogas (anaerobic digestion, AD)’
- ◉ Working scope: ‘Standardization in the field of biogas in production, utilization and management in rural, urban and industrial sectors’.

Proposal Discussed in the meeting - To formulate international standards in the following sectors :Household Biogas, Farm Biogas and Manufacture of Biogas

PROPOSED SUBJECTS BY CHINA

- i) **Flare for Biogas Plants**” specifies classification of biogas flare, system structure, technical performance requirements, test methods and inspection instructions, and applies mainly to biogas hot water boiler with methane flame burner, the normal production of the biogas project and the design and quality control of emissions of methane gas torch burner exceptional circumstances, not including civilian stove and biogas lamps.

CONTINUED

- ◉ **Household Biogas Design Specifications-** specifies household biogas digesters in the production and construction design. Household biogas as an important aspect in the application of biogas technology has been promoted into nearly 40 million households in China, South-east Asia and Africa as well as other developing countries where this technology has been extensively introduced and employed. Due to the absence of corresponding international standards, large number of non-standard situation has been posed in use of national household biogas, and thus, has resulted in insufficient performance of household biogas use and security problems. Therefore, it is necessary to develop household biogas international standards to regulate, promote household biogas international standardization construction.

INDIAN VIEW POINT ON THE ABOVE SUBJECT

- ◉ Reservations about the need for developing Standards for Household Biogas plants indicating that the Standards for biogas plants would need to be entirely different for different countries and even in respective regions of some of the countries due to differences in ambient temperatures, feed materials, gas usage, building materials, and operational regimes, etc.
- ◉ the Standards for household biogas plants could be kept out of the purview of the standardization exercise, which could at the most taken up for developing Standards for certain components such as biogas stoves, piping and accessories and not for biogas plants as such. The Chinese delegation agreed to shelve their proposal and it was decided that a Drafting Committee consisting of a representative each from Kenya, France and China would prepare another note on the subject for inviting comments from the participating countries before moving further.

THANK YOU