ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

SAHYOG

SEVENTH FRAMEWORK PROGRAMME

An Overview of the project "Strengthening networking on biomass research and biowaste conversion – biotechnology for Europe India integration"

Neeta Sharma, Coordinator SAHYOG
ENEA Research Centre, Italy

SAHYOG Mini-symposium & Twinning Workshop, Utrecht
The Netherlands, 28-29 October 2013

ENEA - RESEARCH CENTRES

ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development

ENEA's activities are targeted to "research, innovation technology and advanced services in the fields of energy and sustainable economic development".

www.enea.it

FACT SHEET SAHYOG

Type of funding scheme: **Coordination Action**

Topic Code: FP7-KBBE. 2011.4-05: **EU - India Partnering Initiative** on biomass production and biowaste conversion through biotechnological approaches -Mandatory India- Call: FP7-KBBE-2011-5

Project duration: **3 years** (December 2011–November 2014)

SAHYOG Consortium: **13 partners**

SAHYOG CONSORTIUM

EU PARTNERS

1. Italian National Agency for New Technologies, Energy and sustainable Economic Development **(ENEA), Italy**
2. Ministry of Economic Affairs **(NL Agency)**, **The Netherlands**
3. Deutsches Zentrum Fuer Luft - Und Raumfahrt Ev **(DLR), Germany**
4. Wageningen University & Research Centre Food & Biobased Research **(DLO/WUR),** The Netherlands
5. Vlaamse Instelling voor Technologisch Onderzoek **(VITO)**, **Belgium**
6. Wirtschaft Und Infrastruktur GMBH & Co Planungs KG **(WIP), Germany**
7. National Technical University of Athens **(NTUA), Greece**

INDIAN PARTNERS

8. The Energy and Resources Institute **(TERI), New Delhi**
9. Council for Scientific & Industrial Research **(CSIR/IICT), Hyderabad**
10. GB Pant University of Agriculture & Technology **(GBPUAT), Pantnagar**
11. Tezpur University **(TU), Assam**
12. Appropriate Rural Technology Institute **(ARTI), Pune**
13. Jawaharlal Nehru University **(JNU), New Delhi**

Sub-contractor EPSO - European Plant Science Organisation

SAHYOG Funding

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Department of Biotechnology
Ministry of Science & Technology,
Government of India

&

SEVENTH FRAMEWORK PROGRAMME

by the Department of Biotechnology (DBT) of the Indian Ministry of Science and Technology.

OBJECTIVES

- **The main aim of India Partnering Initiative is to map out what the European Union and its Member States could do together with India to find solutions to challenges/needs – to help accelerate economic and sustainable development in both regions.**
- **To promote program-level cooperation in both regions, in line with the scope and priorities of the SFIC (Strategic Forum for International S & T cooperation).**
- **To integrate the dispersed findings from Europe and India for the identification of common areas and knowledge gaps in the biomass production and conversion in the both Regions.**

PROJECT HIGHLIGHTS

- **Bringing together the leading organisations** in the field of biomass production and bio-waste conversion research, carried out on one side by the European research programmes (EU Framework Programmes and EU Member State's national programmes) as well as by related research programmes coordinated by Indian national institutions.
- **Prepare and analyse an inventory** of the **biomass and bio-waste potentials** and **existing research projects** - basis for the **joint Strategic Research Agenda.**
- Broad **networking** of respective scientific communities, **twinning** of large sets of research projects, **short term exchange** visits of researchers
- Prepare a **roadmap** through consultation with stakeholders at the governmental, research and industrial level, to present a concerted planning of future research initiatives in this area - the way for integrated biomass management towards 2050.

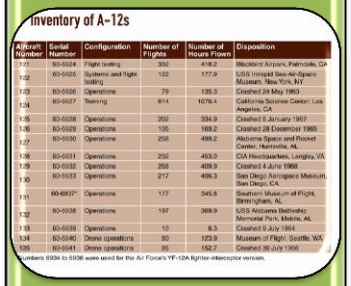
MAIN ACTIVITIES

PROJECT WORKPLAN

A major coordination approach, split into 5 work packages.

Each WP has one leader from both the EU and India - to enhance participation and integration on both sides

SAHYOG WORKPLAN


Inventory of A-12s

Aircraft Number	Serial Number	Configuration	Number of Flights	Number of Hours Flown	Disposition
121	60-6924	Flight testing	592	418.2	Blackbird Airpark, Palmdale, CA
122	60-6925	Systems and flight testing	122	177.9	USS Intrepid Sea-Air-Space Museum, New York, NY
123	60-6926	Operations	79	135.3	Crashed 24 May 1963
124	60-6927	Training	614	1076.4	California Science Center, Los Angeles, CA
125	60-6928	Operations	202	334.9	Crashed 5 January 1967
126	60-6929	Operations	105	169.2	Crashed 28 December 1965
127	60-6930	Operations	258	499.2	Alabama Space and Rocket Center, Huntsville, AL
128	60-6931	Operations	252	453.0	CIA Headquarters, Langley, VA
129	60-6932	Operations	268	409.9	Crashed 4 June 1968
130	60-6933	Operations	217	408.3	San Diego Aerospace Museum, San Diego, CA
131	60-6937*	Operations	177	345.6	Southern Museum of Flight, Birmingham, AL
132	60-6938	Operations	197	369.9	USS Alabama Battleship Memorial Park, Mobile, AL
133	60-6939	Operations	10	8.3	Crashed 9 July 1964
134	60-6940	Drone operations	80	123.9	Museum of Flight, Seattle, WA
135	60-6941	Drone operations	85	152.7	Crashed 30 July 1966

*Numbers 6934 to 6936 were used for the Air Force's YF-12A fighter-interceptor version.

INVENTORIES

- BIOMASS-BIOWASTE
- RESEARCH PROJECTS

NETWORKING

- TWINNING OF PROJECTS
- SHORT TERM EXCHANGES
- STAKEHOLDERS WORKSHOP

STRATEGIC RESEARCH AGENDA

- STAKEHOLDERS WORKSHOP
- SRA
- ROAD MAP

COMMUNICATION TRAINING

- CONFERENCE
- SUMMER SCHOOL
- GENERAL COMMUNICATION & DISSEMINATION

COORDINATION & MANAGEMENT

Current Status of Project Activities

Inventory on available Biomass and Bio-waste resource potential

***Renewable bioresources use through eco-efficient processes – basis of biobased economy**

Biomass Resources

- ✓ **Forests**
- ✓ **Agriculture & Fisheries**
- ✓ **Wastes**

➢ An overview of all the available biomass potential from different categories of biomass and biowaste resources in EU 27 Member States and in India, is presented.

➢ on-line searchable database of SAHYOG Biomass Inventory

Indispensible tool for all work to be performed to prepare the Roadmap for the SRA that will be used as main cooperation tool to fill in the gaps for biotechnology interventions

Main database sources and recent reports consulted for Biomass Inventories

1. The NREAP - **templates as a base** - extended with other relevant biomass sources.
2. IPCC SRREN report - gives a realistic projection for the global biomass scenario.
3. EUBIONET III (2005-2007 - updated in 2009 only for few countries)
4. AEBIOM – updated report 2012 with data of 2010 based on nREAP data & BIOMASS FUTURE– Most completed report
5. BIOMASS FUTURES project - the results of the **BEE project**
6. Nova Institute Report published in Feb. 2012 on data on biomass industrial use in tons; cat used not similar to SAHYOG database/nREAP -thorough assessment only for Germany – first estimations
7. For Greece, data is mainly taken from the national project reports and EUBIONET with Greece as a partner
8. For other European countries, some recent national project reports also consulted.

Main Database Sources and Recent Reports in India

- Non-availability of central databases for biomass resources- major limitation
- available information in various formats and focused mostly on the production and yield of various agricultural and plant products
- limited to academic reports and publications but specific to the objective of that study or limited to local or regional levels.

Considering limitations, the inventory was prepared by doing certain extrapolations on the data from available sources.

Sources for Biomass from Forestry- India

- No information available from authenticated sources
- Moreover, data on TOF (Trees outside forest) is very limited
- no recent information is present in any secondary sources.

Data not reported in SAHYOG Inventories

Total forest cover in India **= 692, 027 Km^2 (**21.05 % of the total geographical area of the country).

Current bottlenecks

In Europe

- Incomplete data in existing databases
- Different categorization at main or sub-cat level in databases
- Ref. year different for different biomasses, even in the same database
- Lack of data from some countries
- Lack of data at main category e/o sub-category level
- Lack of uniformity in units, even in the same database (ktoe, ha, tons)
- Biomass used in conversion processes: missing in most of the databases
- Lack of consensus on the meaning and use of different biomass resource **potentials/unclear definition of virgin, residual and waste** biomass
- Studies for biomass availability and supply deliver **strongly ranging results**

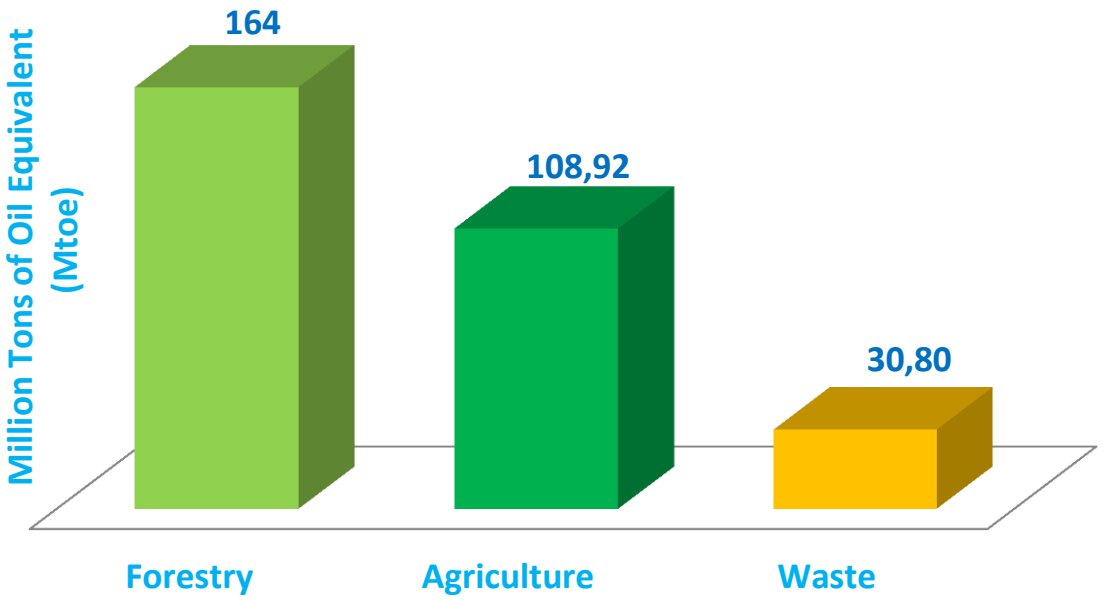
In India

- only few estimates exist,
- a lot of discrepancies in the available data.

Evaluation of biomass availability and more adequate estimation of future potential is necessary to program future Research and forecast markets.

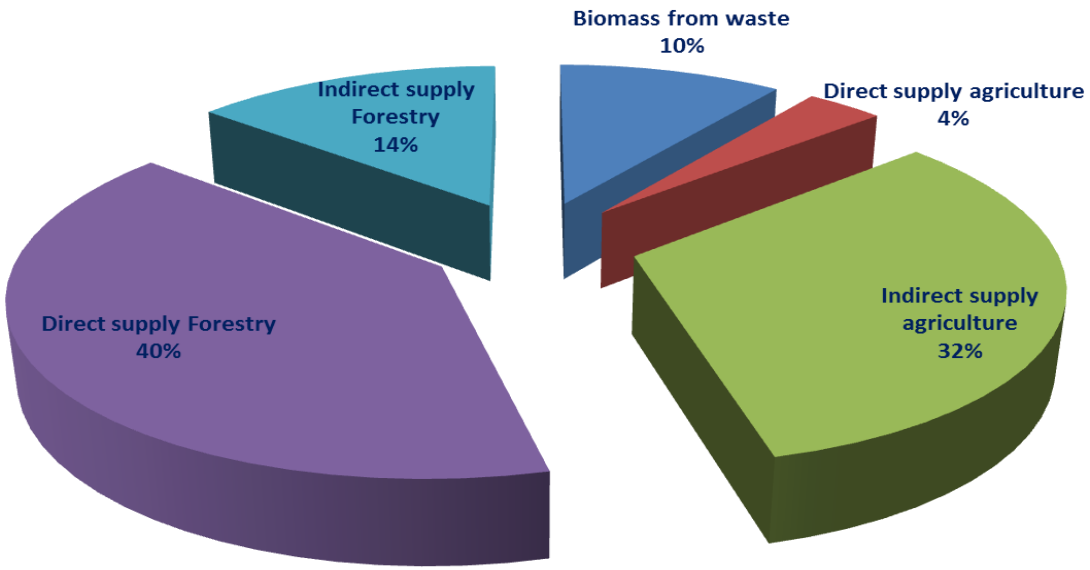
RESULTS – Biomass Inventories

Biomass availability in EU-27



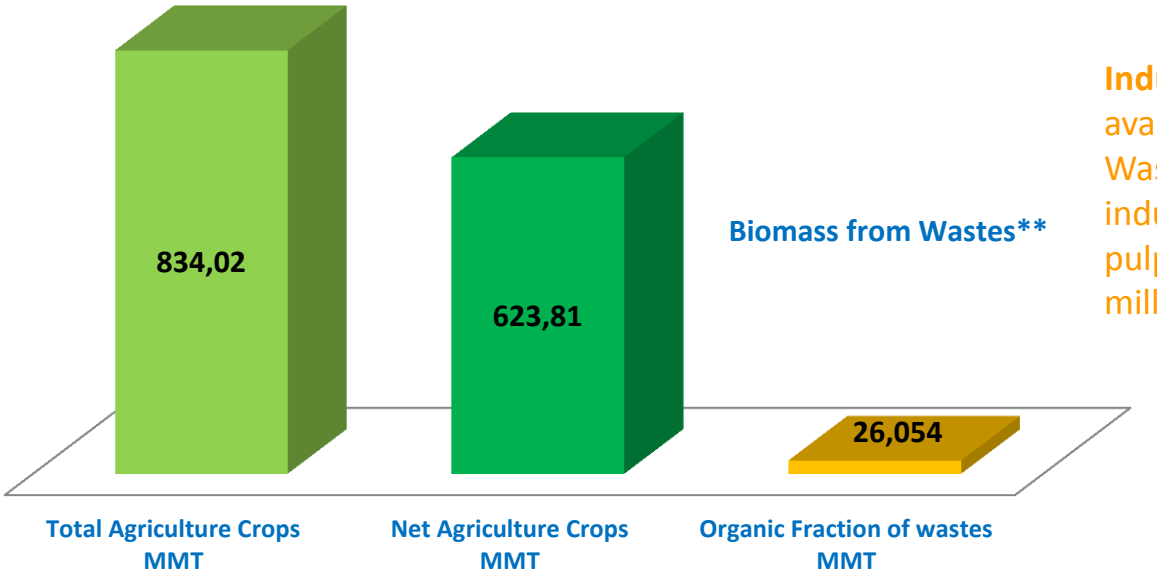
Biomass in EU27 (ktoe)

(reference years 2006-2010)



Biomass availability in India

Biomass from Agriculture (Direct & Indirect)*
As per Govt. Crop production data, 2012



Industrial Wastes – no data is available on the Organic Solid Waste generated from agro-industries, sugar industries, pulp & paper, tanneries, Sago, milk & dairy industries.

*Direct Biomass - Sugar, Oil & Starch; Indirect Biomass - Rice, Wheat, Maize, Pulses, Bajra, Jowar & Cash crops

** Municipal Solid Waste and Sawage Sludge

Inventory - Research Programs and Projects

The inventory presents an overview of existing programs and research projects in Europe and India, with **proper guidelines for its use and searchable with respect to the categories**:

- Upstream/Downstream
- Type of Biomass
- Production and pre-treatment
- Biomass conversion technology
- Product
- Type of research
- Organisation type
- Drivers, and
- Sectors.

Sources of Information

EU

- **Cordis**
- Intelligence Energy Europe
- **Netwatch**: for ERANETs, and Becoteps
- **Star Colibri**: for Biorefinery projects
- **Member States specific sites with information**

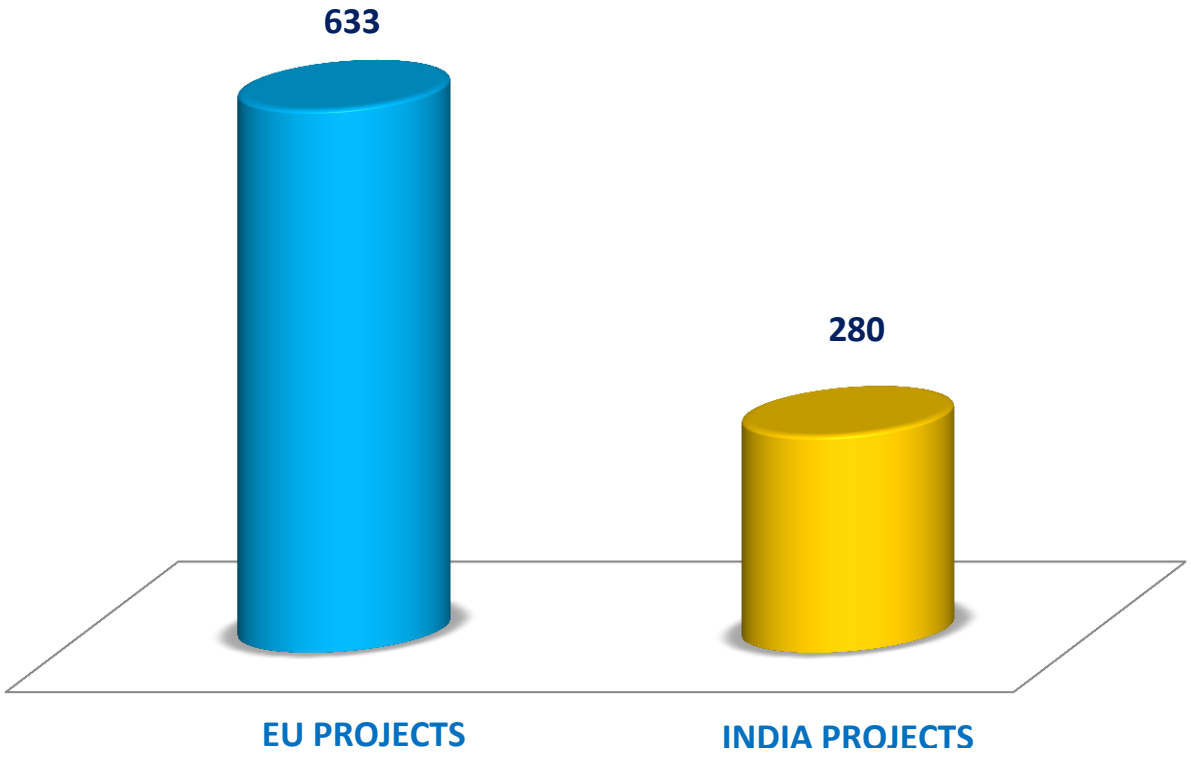
INDIA

- **National Science & Technology Management Information System (NSTMIS) website** - the only central database available in the country but only very basic information is updated in this website);
- **Personally visiting the major funding agencies and research institutes** falling under the geographical area distributed among the Indian partners.

Criteria: **Time period:** year 2007 -2012 (completed and on-going);

Minimum funding: **In India** €16.600,00 as per current conversion rate, **in EU** €500.000,00

Biobased Projects identified in EU & India



Funding of Projects related to Biobased Economy

Period 2007 -2012

EU: >1,5 billion of Euro

India: 350 million Euro

Inventory database

A fully **Searchable Online Database** including more than 700 projects has been established under www.sahyog-projects-database.eu

TWINNING of projects from India and Europe - supported by the identification & categorization of projects from India and Europe working in the same research areas, within the database.

RESULTS of inventories were discussed with stakeholders at the two Stakeholders Workshops organized in - Europe and India.

SAHYOG Networking and Exchange

- **Kick-off-Meeting,** Jan. 2012 at the ENEA – EU Liaison Office in Brussels, Belgium
- **First Stakeholders meeting** on "EU-India Cooperation on Biomass Production and Biowaste Conversion", in May 2012 in Bruges (BE)
- **Second Stakeholders Meeting** on "Biotechnological interventions in Biomass and Bio-waste availability for sustainable bio-economy" in Nov. 2012, New Delhi
- **Third Stakeholders Workshop** on "EU – India Cooperation on Biomass and Bio-waste Research and Development" in June, Copenhagen, Denmark.

- **Mini-Symposium and Workshop on Twinning of Projects**, 28-29 Oct. 2013, Utrecht, The Netherlands
- **Final conference & Brokerage event,** 3-5 Feb. 2014, TERI, New Delhi, India
- **SAHYOG Final SAHYOG Meeting** - Nov. 2014

Twinning activity – 28-29 Oct. 2012

Aim : to bring together project and programme leaders, under the seven thematic areas selected in the field of biomass production and bio-waste conversion research, for increased networking and matchmaking - by reviewing a large set of on-going projects and industry initiatives in EU and India.

- to discuss many interesting examples of successful ongoing cooperation activities in research and innovation between India and the Europe
- to bring all the various activities in other relevant projects/programs in a coherent package to provide added value and impact and
- to identify major areas for future collaboration and to further exploit synergies at bi- multilateral level.

Training Programs

To improve the societal, political, scientific and industrial vision toward the new sustainable strategy

Focus on the priority strategic research theme areas

- Feedstock production and genetic improvement of plants
- Bioethanol production from lignocellulosic biomass
- Thermochemical conversion technologies (pyrolysis, gasification)
- Anaerobic digestion technologies (biogas, biomethane, hydrogen)
- Algae production and conversion systems
- Biomass to chemicals – the biorefinery approach
- Sustainability and life cycle assessment

- Short-term Exchange programme **EU - India,** 14-23 Nov. 2013
- Short-term exchange **India - EU**, March 2014
- **First Summer School, 9-15 June, 2013, at NTUA Athens, Greece**
- Second summer school, **May 2014**, in India

Strategic Research Agenda

- indicate the needs and the gaps in research for the implementation of the **Roadmap**

General Vision

- towards a Bio-based economy (drivers, needs & challenges in Europe and in India)

1) **Feedstock** 2) **Biorefineries** 3) **Markets, Products and Policies**

Summary: key facts and recommendations
Vision
Current Status
Strategy and recommendations (short, long and mid-term)

Challenges and Recommendations

- In Europe: much attention exists, but no adequate estimation of potential
- In India: only few estimates exists –more improvement required
- Biomass flow chart necessary for each raw mat. from cultivation and import to final application, including sectors food/feed, energy & industrial mat. use at National level.
- Need for consolidated methodologies for estimations and improved data systems and models responsive to changing conditions on long-term basis
- Databases: Good, friendly user with simple access to the information
- Need to create Specific technological platforms bet EU & India
- Development of high yielding biomass crops to be grown in a sustainable way
- Long-term stability of regulations
- Easy proc. in issuing implementation decrees for getting permits and gaining incentives
- Public awareness and support for industrial biotech processes and products
- Involvement of research communities to choose Priority themes

Concluding remarks

- The concept that addresses a number of big challenges
- Highly encouraging progress with several highlights during the first half
- An exciting opportunity and collaboration with India – a tangible sign of multi-lateral cooperation
- Bilateral collaboration extremely effective/promote mobility of people in both counterparts

The knowledge gained during the activity will lay the cornerstones for scaling up the EU-India collaboration and provide the basis of novel applications in a sustainable bio-economy of the future - the so called Knowledge based bio-economy (KBBE).

THANKS!

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For more information visit our web-site
http://www.sahyog-europa-india.eu/