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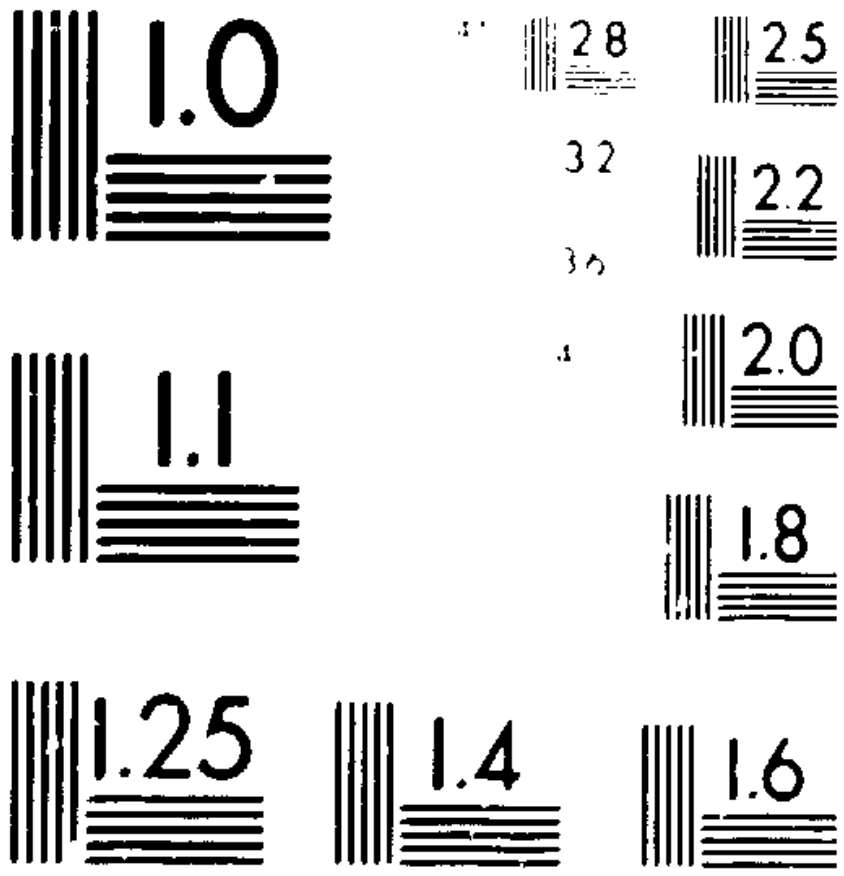

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INTERNATIONAL INVENTORS AWARDS - AN EXPERIMENT IN THE DISSEMINATION OF INNOVATION*

by

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Commercial operators have always understood the need to identify their markets and to produce goods which are sufficiently competitive, in sufficiently large numbers to generate profits. The challenge, now, is to devise programs whereby appropriate, low-cost technologies which meet basic needs to be made available widely to poor people in dispersed rural communities at a cost which provides an incentive to the manufacturer but which the people themselves can, and are willing to, afford.

The programs we are discussing here at this congress should be based on south-to-south inter-enterprise cooperation in the rural energy and agricultural machinery fields.

The International Inventors' Awards, IIA, offer i.e

- an energy prize for methods and devices for decentralized low-cost energy production, its use and storage

- an industry prize for low-cost industrial processes based on local resources

The selection of prizes is governed by the following principles:

- the object of the awards is to advance development by giving recognition to technical innovations which contribute to solving social and economic problems, especially in the Third World.

- the term "innovation" indicates that the target areas selected are those in which there is a high probability that a creative contribution, in the form of an invention, could be translated relatively quickly into a development with positive economic and sociological results.

- if it is apparent that undesirable sociological side-effects are associated with the innovation, such effects must be marginal.

- one consideration in selecting the target areas has been to further the application of "low-cost technology".

- particular attention should be paid to fields in which normal market forces are too weak to convert an innovation into widely used goods.

Especially the last point indicates innovations favouring the topics of this congress.

Let me therefore make you more aquainted with IIA.

To understand the idea with IIA let us look at the background to it.

The Nobel Foundation organized 1969 the first of its three conferences on global issues. This was called "The Place of Values in a World of Facts". At that the late Nobel Laureate Arne Tiselius proposed the establishment of an International Federation of Institutes for Advances Study (IFIAS) as a tool for transdisciplinary cooperation.

1972 in Trieste, under the auspices of the Nobel Foundation in Sweden and the Rockefeller Foundation in the USA, IFIAS was launched, and the Federation now has its secretariate at the Ulriksdal Palace outside Stockholm.

Professor Carl-Göran Hedén, who took a very active part in the preparations for the Trieste meeting, felt that IFIAS ought to give special attention to incentive systems aimed at recognizing outstanding contributions to development. In view of the need to stimulate indigenous creativity by focusing the attention of inventors on important targets he therefore suggested that prestigeous awards might be helpful. This was a natural idea for someone who was familiar with the significance of awards, for instance in the development of the ship´s chronometer or for the process of food canning. The fact that professor Hedén was also associated with two of the institutions that are concerned with the process of selecting Nobel Laureates and with the trends expressed in the initiation of the symposia mentioned, was no doubt also significant.

However, building up a new organization like IFIAS was an absorbing task for its director Sam Nilsson, so the idea was put aside for a few years until the Swedish Inventors´ Association (SUF) - which is the oldest organization of its kind in the world - decided to pick it up as an appropriate initiative for its centenary in 1986. It was felt that an experiment of this sort was needed as a contribution to the efforts made to meet the various need of developing countries highlighted by another budding non-governmental organization, initiated from Sweden, namely the International Foundation for Science (IFS). The Salén Foundation, Sweden, which had followed the development of both IFIAS and IFS very closely, found that the proposal had catalytic potential, so it gave the Inventors´ Association a large grant that permitted the announcement of the project at the Association´s 90 year anniversary in 1976.

The catalytic potential of the experiment rapidly became apparent in the form of additional support, first from the Swedish Board for Technical Development (STU), which made it possible to assemble an international workshop that selected the four target areas, and later from the Swedish International Development Agency (SIDA), which now carries most of the financial burden for the administration. However, additional grants were also provided by the Salén Foundation, which for instance covered the costs for the symposium "Social Innovations for Development" organized by IFIAS in 1979, as well as by the Browaldh Foundation which contributed to the symposium "Innovation for Development" in August 1983.

When IIA was launched, IFIAS´ first chairman happened to be envoyé Nils K Ståhle, who had just retired from running the affairs of the Nobel Foundation for 25 years. He accepted to chair a special Board consisting of representatives from various important Swedish organizations like the Royal Academy of Sciences, the Academy of Engineering Sciences and the National Swedish Museum of Sciences and Technology, besides of course from SUF, IFS and IFIAS. This Board operates through an executive committee and by various subcommittees held together by the executive secretary. One of those subcommittees is concerned with long-range policy matters, and in particular with evaluating the IIA-experiment in the context of initiatives that ought to be considered for the period after 1986.

This brings me to this year´s symposium, since this emphatically underlined that the IIA-initiative was too important to be concluded as a one-shot experiment in 1986. This view, expressed by some of the leading development experts in the world, was accompanied by a wealth of constructive proposals that it would take hours to review.

Suffice it to say that we now face a monumental task in trying to develop a long-range plan that can be presented in 1986. After all, we know that the selection of Nobel Laureates in the classical fields is difficult, and that the problems multiply when one has to add sociological criteria as is the case with the economics prizes.

With the IIA-awards we however enter a new dimension of difficulty, because we can hardly expect the existing institutions to show enthusiasm about adding to their problems by trying to pinpoint inventors in the global jungle of criss-crossing technical devices and social innovations.

However, after the last symposium we can now see how a solution might be found, so we now look at the celebrations 1986 as a "launching pad" for new international initiatives. Those will have to be based on interactions that we hope you all will help us to establish.

So much about the background, I did not go in to a description of the four chosen target areas. Let me do that.

The four target areas for the International Inventors' Awards (IIA), Water, Industry, Forest, and Energy (WIFE) have been selected after very careful considerations by IIA as being some of the most vital factors for the sustainable development of a country. It is important to note that these four areas are strongly interdependent. Water, for instance, is essential for the development of agriculture and thus for Forestry, and similarly Energy is the driving force of the Industry and the economy of the country. A successful Forest management will also improve the access to firewood and thus reduce the ecological pressure and influence the Energy policy in many third world countries.

Common to all four target areas is the strong relation with social and cultural factors.

The Symposium held in Stockholm (Lidingö) in August 1983 recognized this fact and suggested that IIA is unique in that it can serve as a linking mechanism between vitally important resource areas and the social and cultural dimensions. The greatest good to the greatest number of people can thus be seen as one of the lead criteria for the final selection of awards in 1986.

Below is given a summary of some of the most important aspects of the IIA target areas which were discussed at the Lidingö Symposium "Innovations for Development" at which some twenty prominent experts from 26 countries and UN organizations participated.

Water

The following fundamental facts characterize water:

- The total global water resource is fixed.

- Man's dependence on water is absolute.

- There is no substitute to water.

Water is essential for the agricultural production of a country through irrigation and thus for the nutritional standards of the people. Availability of sanitary water for all people is also

essential for the nutritional standard in that it can reduce the prevalence of intestinal and tropical diseases.

Since Water usage is related to technical, social and even legal aspects the approaches to water resource problems must be multi-disciplinary. Managerial innovations are often equally or more important than singular technical arrangements.

For industrial purposes it is necessary to develop methods which allow usage of waste water. A careful selection of existing irrigation techniques for adaptation to prevailing environmental conditions e.g. types of soils, climate, etc. should be made for each country. An interesting example of an innovation in water irrigation is the so called trickle irrigation or drip irrigation technique which has an efficiency of almost one hundred per cent. This technique is used all over the world and gives dramatic increases in crop yields and quality.

The Water target area is particularly important in that it emphasizes, perhaps more than the other target areas, the necessity to see the innovations in a social context and in relation to the quality of life of people.

Industry

If the third world countries are going to reduce their unilateral dependence on the industrialized countries they must themselves begin to establish an industrial production based as much as possible on their own local resources and materials.

It is of primary importance that innovations concerning industrial processes to the greatest possible extent take this into consideration. Such processes will increase the self-reliance of third world countries which was stressed as an important goal by the Lidingö Symposium.

Industrial processes should also consider the importance of decentralized usage of energy because big centralized energy systems using oil, coal or nuclear power are very expensive, require huge investments in infrastructure, and tend to increase the technical vulnerability of the society.

Industrial processes should be such that they create rather than eliminate jobs.

It is recognized that the productivity of industrial processes in most third world countries is very low, which means, among

other things, that they are resource wasteful and polluting.

Existing industrial processes can often be made better and cheaper by the introduction of innovations in the high-technology field. It is a mistake to think that third world countries cannot use technologically sophisticated innovations. Better materials and electronics are appropriate examples.

The Symposium pointed out the strong commonality between the Industry target area and the other IIA target areas.

Forestry

It is estimated that the world is loosing approximately 20 million hectares of forests every year for several different reasons. The situation is particularly alarming in the tropics where local communities depend on the forests as viable ecosystems for their daily livelyhood. It has been estimated that about 1,000 million people on earth have wood as their only source of energy for cooking and heating. Methods for a sound forest management are vitally important for the preservation of soils and water resources, and for the energy policy of countries in the tropical areas. It is a myth that the tropics in general are rich in resources. The soils are notoriously bad for agricultural purposes. For these reasons much greater efforts should be made to save the tropical forests than today. Both technical and social innovations are therefore badly needed.

The Lidingö Symposium suggested that agro-forestry offers great opportunities.

Legumenous trees such as Casuarina, Leucenia and Eritrenia have yields in the order of 20 ton per hectare and year and they can fix the nitrogene in the air and need very little water. These agro-forestry products are already used in many parts of the world as fuel wood, building material and as nutritious fodder for cattle. These species can be further improved and easily transferred from one geographical region to another. Here lies a very great potential but there is a great need for new ideas and further development.

Efforts must also be made to encourage wider utilization of the innovations in forestry made by farmers who have usually developed methods adapted to special local conditions in each country.

Energy

Besides food production, energy is probably the most important ingredient of a self-reliance policy for any country. One might make a distinction between "Energy for Survival" and "Energy for Development". Since energy can be considered as the driving force of practically all sectors of the economy of a country it is essential to take a systems approach to energy policy and the needs for innovations in this area.

An opinion is emerging that the food production has reached a satisfactory level in most third world countries today, but what is lacking is energy for the cooking and other processing of the food. Local energy resources must be used more efficiently and techniques be developed for small-scale decentralized energy use in rural areas. Innovations for this purpose are in great need in most third world countries ("Energy for Survival"). However, in parallel with innovations for small-scale energy usage, the techniques for large-scale centralized energy production and transmission are also necessary in order to increase the efficiency and save resources. An interesting example was given at the Lidingö Symposium of a very successful development in the Sichuan province of the People's Republic of China. Between 1975 and 1979 a special fluidized bed combustion technique for low-calorie coal and for the enormous amounts of waste from the coal mines was introduced on a large scale in this province. The cost of electricity production could be reduced by 52 per cent and hundreds of thousands of ton of high quality coal could be saved. This technique was considered by the Symposium as an excellent example of the type of innovations that IIA should take into account. Incidently the fluidized bed combustion technique has already been given technological awards in China.

The IIA-prizes 1986 are devoted to the above mentioned. At the symposium in August several speeches touched the crucial diffusion problems. For instance Dr Ashok Khosla, President of Development Alternatives in New Delhi expressed himself thus:

Despite their many successes, modern science and technology have yet to fulfil their two most tantalizing promises: of meeting the basic needs of the Third World poor and of achieving a more rational and environmentally sound utilization of natural resources. One direct attack on both poverty and inappropriate resource use is offered by the application of trans-disciplinary systems science for the development and widespread use of "appropriate technologies". This, in turn requires the establishment of certain "appropriate institutions" to promote innovation and to disseminate its results.

A possible target area for future prizes thus might be that of building up appropriate infrastructures - might be that of south-to-south inter-enterprise innovation exchange systems.

Acknowledgements

In addition to the experiences of IIA, this paper draws freely upon material from the IIA-symposium "Innovation for Development", especially

- IIA - Background by C G Hedén

- IIA - Why Four Target Areas by Sam Nilsson

- Innovation as an Incentive to Development by B A Vedin

- The Transfer and Diffusion of Appropriate Industrial Innovation by Denis Frost

- Innovation in the Third World by Ashok Khosla

WORK GROUP ON INDUSTRIAL PROCESSES

1st September 1983

1. TERMS OF REFERENCE

1.1 The group took as its terms of reference the instructions to Chairman of Groups, namely that it should consider:

a) the obstacles which prevent new ideas passing smoothly into general use

b) methods helping towards the achievement of acceptance of the innovation by the intended beneficiaries

c) the characteristics of the innovation process

d) the most important criteria for judging success

1.2 In the event the Group concentrated on the characteristics of the innovation process noting some of the obstacles to the achievement of an innovation and methods of overcoming them, so that the innovation would be able to demonstrate its acceptability to the intended beneficiaries. In examining these characteristics, the Group had in mind the need to help the judges to define appropriate criteria to be used in making the Award for Industry.

2. DEFINITIONS

2.1 The Group examined the main characteristics of industrial processes and recommended that the Award for Industry should be given for an industrial process which could demonstrate that it produced benefits to the intended beneficiaries, either:

a) by the application of the process itself (e.g. by the creation of employment opportunities in operating it); or

b) through the widespread use of the products made by the process.

2.2 It recognised that an industrial process implied the use of

a) plant and machinery (hardware)

b) management operating methods and marketing (software)

It recommended that innovation in either the hardware or the software should be eligible for consideration, provided the objectives of the Award were met. Thus, it considered that the Award should be more concerned with the output or effect of the innovation in relation to Target Groups than with the mechanics which led to that effect.

2.3 The Group recognise that proper industrial processes are an inherent component in the achievement of many innovations in the other Award areas (water, forestry and energy), but the Industrial Award would not be confined to process innovations in that field only.

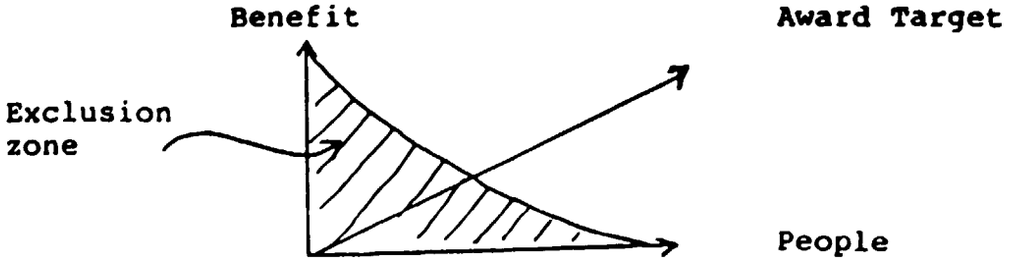
3. OBJECTIVES

3.1 In order to provide an overall objective for the Award which could be commonly understood and widely accepted, the Group recommended that it should be stated as

"An innovation which would bring about the greatest good to the greatest number, on a sustainable long-term basis".

This statement encompasses both a qualitative concept (goodness or benefit) and a quantitative concept (the number of people affected by the innovation).

3.2 The adoption of this general objective would provide the judges with a limitation on the numbers of submissions eligible for consideration and a base line from which other characteristics and criteria could be developed. Clearly, innovation leading to very little benefit but affecting many people, and innovations of great benefit to very few people would be ineligible for consideration.



4. CHARACTERISTICS

4.1 Using the general objective - and bearing in mind the emphasis given by the Group to the effects of innovations rather than the process by which the effect is achieved - the Group suggested that the key characteristics of an industrial innovation were:

a) originality and creativity

b) utility

c) resource efficiency

d) adaptability to the lcoal social context

e) commercial viability

The Group did not think it useful to establish long lists of subsidiary characteristics but, rather, to point to the main features of each of the above.

4.2 By originality and creativity the Group implies the degree of inventiveness employed to mobilize the various technical, managerial, marketing and institutional components required to bring the innovation to a successful conclusion.

4.3 By utility the Group implies the practical usefulness of the innovation to the beneficiaries; it must work .

4.4 Adaptability to the social context implies that the innovation:

a) must be chear enough so that large numbers can acquire it, or its products.

b) it must be simple enough so that large numbers can operate it (or its products) with the skills available to them.

c) it must provide productive employment, where people live.

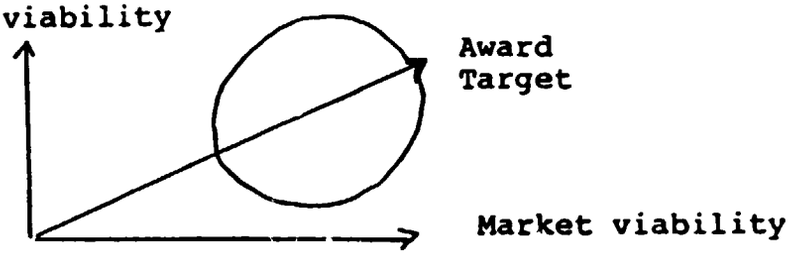
d) it must be flexible, so that it can be used in different geographical and other conditions

4.5 Resource efficiency means that the innovation maximises the use of locally available resources (human, material etc.) in ways that enhance self-reliance and minimises any ill-effects on the human and physical environment.

4.6 Commercial viability implies that the process must be capable of operating and competing in the market structure providing a fair share of benefits to the producers (in the form of profits, wages etc) and to the users (in the form of tools for increased production and/or improving the quality of life). Products and processes must be robust, efficient and competitive. They must carry their own support systems (after sales service, maintenance and spare parts supplies etc).

5 CRITERIA FOR JUDGING SUCCESS

5.1 The Group concluded that good industrial processes should be judged by the extent to which they have overcome the technical issues on the one hand (including the software aspects of production) and on the other, the marketing success.



5.2 Technical Viability

Starting from a proper identification of need a candidate for the award must be able to demonstrate the systematic development of the technical process: from project formulation to R + D; to Prototype Testing; to Pilot Plant installation, modification and demonstration; to development of the production technology (hard and software); to a viable production system based upon good engineering.

5.3 Market Viability

Starting from a proper identification of need, the candidate must be able to demonstrate the conversion of need into

an identified market demand; that such factors as information, packaging and presentation; delivery systems (training, back-up supplies etc); credit/working capital, pricing etc have been planned for.

5.4 The Group recognised that, because of the timescale (1977-86) all submissions might not be able to demonstrate that the innovations have resulted in widespread market penetration and benefit. However, they should have developed sufficiently to demonstrate beyond doubt that the innovation has a real market potential and a potential to create widespread benefit.

5.5 Finally, the Group recognised that local political, bureaucratic, economic and other constraints beyond the control of an innovator might effect the extent to which his process has achieved stated objectives. It recommended that these factors should be taken into consideration provided the judges are satisfied that had it not been for the intervention of such factors, the innovation would succeed.

6. WHO SHOULD BE ELIGIBLE FOR AWARDS?

6.1 The Group recognised that a number of individuals and/or organisations are often involved in the development of an industrial process. In order to identify which of these might be eligible for an award, the Group recommended that the person/organisation receiving the award should be the holder of the intellectual property - implying that the holder has been the main source of intellectual inspiration, that he has guided the intellectual input and he controls the extent to which and manner in which the innovation will be marketed.

THE ENERGY GROUP

Members: Mblima
Kristofersson
Reid
Bokalders (Rapp.)
Pasztor (Chair)

The main aim of the energy working group has been to attempt to set up a methodology, by which a particular energy related innovation could be judged - in its appropriate social and economic context. With this in mind, the group decided to address its report to the Energy Sub-group of the Awards Committee.

I. Objectives of the Prize

In addition to the specific objectives listed in the Statutes of the IIA, the following conditions should also be satisfied:

- Highlight success in order to inspire others.
- Highlight the importance on relying on the systems approach (see for example the matrix developed by Koshla during the Symposium.)
- Contribution to and the speeding up of the socio-economic development of the country, in particular by:
  a) improving the energy situation
  b) using affordable techniques and systems
  c) affecting rural areas, and
  d) contributing to self-reliance
- Have educational effect in transmitting global and national problems to local situations (eg. ecological effects, macroeconomic considerations etc.)

II. The Context

In a successful innovation the technical invention is only a small, although often very important part of a long chain of different processes. The understanding of this - often very complex chain is of utmost importance in being able to judge innovations correctly. In order to do this a detailed profile (quantitative or qualitative) of the energy needs, the users , the potential resources and the constraints will be helpful.

1. Energy needs in rural areas.

A basic division needs to be made about rural energy needs:

(i) Energy for Survival, such as basic needs for health, water, food for self consumption and shelter, and
(ii) Energy for Development, such as for the production of surplus, increased education and other needs as they arise.

In some situations it might be more appropriate to improve the energy situation for survival, so that human and other resources can be freed, and more time is made available for activity towards development. In other situations, the more appropriate strategy may be to improve the energy situation directly in the productive sector, which might then automatically result in the amelioration of the basic needs sector.

2. End-use profile

In order to understand who needs how much and what kind of energy, one has to identify the different users, and the uses for which the energy will be required, such as:

- in agriculture (eg. irrigation, fertilisers, storage)
- for domestic use (eg. cooking, lighting)
- rural industries (eg. shaft power, process heat)
- transportation (eg. liquid fuels, animals etc.)
- export of resources to urban areas (eg. the production of charcoal for cities)
- others

3. Resources available

It is important to identify and quantify if possible the locally available and potentially available resources, such as:

- Energy sources (eg. biomass, direct solar radiation, commercial fuels etc.)
- Technical know-how (eg. ability to exploit the above)
- Manpower (taking account of seasonal variation)
- Information (for the formulation of possible solutions)

- Macro conditions and the general climate (as provided for by the government)
- Other economic conditions (eg. credit facilities)
- Other resources (eg. timber, processed materials etc.)

4. Constraints.

In all situations there are constraints in the way of easy solutions to energy problems, such as:

- The political situation,
- Social structures and cultural traditions (eg. caste problems, taboos etc.)
- Level of poverty (eg. poor people cannot take any risk)
- Non-availability of rural infrastructures (eg. phone, schools, extension workers etc.)
- Environmental considerations (eg. deforestation, erosion)
- Climatic conditions (eg. too cold for a biogas plant)
- Geography (eg. lack of rivers, too mountaineous)
- Economic factors (eg. some economic factors, such as opportunity cost, risk, profits etc. need redefinition.)

III. The Innovation Process

The innovation process must start by a correct perception of the needs, as defined by the people who will be the eventual beneficiaries of the innovation. This means explicit user-involvement at all stages of the process. Outside experts seldom get this right. At the same time we recognise that neither the perception of these needs, nor solutions to them will come automatically. Some kind of a change agent is needed who will link together the different parts of the chain. A major role of this change agent will be to listen to the needs of the people, with sympathetic ears (presuming a great deal of knowledge about these people), and to make communication possible between the following:

- The scientific technological community,
- The users of the innovation,
- Government agencies,
- The market (markets), and
- Other pools of external knowledge and information.

The knowledge and the expression of the needs and the existence of "good" change agents, however, is not yet sufficient for an innovation to be successful. A number of material and non-material inputs, followed by appropriate implementation will also be required. The inputs should be provided locally, but if absolutely necessary can also come from external sources. These will include:

- Technical know-how,
- Tools,
- Materials, and
- Credit or grants.

The implementation process will include:

- Education and training,
- Trials and demonstration projects,
- Adaptation of the prototypes, followed by
- Feedback, evaluation, refinements and further adaptation before final diffusion.

The person (or persons) who take the initiative and the hard work in putting the different parts of this innovation chain together in a way that results in a successful innovation should receive the IIA prize.

IV. Criteria for Success.

We must be clear about who will receive the benefits and who will pay for the costs of a particular innovation, not only from an economic, but also from an overall point of view. Every innovation will have some costs and some benefits. What is essential that at the end when all these are added up, the project should be beneficial.

In addition to the criteria listed in the objectives in part (I), the following criteria should also be considered:

- Wide acceptance and diffusion of the innovation (are people buying it, or are they making other sacrifices for it?)
- Environmental and ecological sustainability (eg. large scale burning of agricultural wastes may be an easy fuel

source, but it is not ecologically sound)

- Promote additional benefits, not only in the other four target areas, as defined by the IIA, but in other important sectors, such as:

  - minimize depletion (or export) of soil nutrients.
  - improve health care by digesting urban organic wastes in biogas plants.
  - produce food as well as energy (or at least not be detrimental to food production)

- It should have multiplication effects in other sectors.

V. Practical Suggestions to the Awards Committee

One of the most important steps is to identify channels, through which eligible innovations will be found and through which information about the awards can be transmitted to as large a public as possible. It is recognised that some channels may be better at identifying innovations, while others at transmitting information. In addition to the obvious channels, such as national scientific foundations etc., we recommend that use be made of the following channels:

- Educational institutions (not only higher education, but also primary schools, etc.)
- Appropriate and Intermediate Technology Groups, Environmental and other similar organisations.
- Other NGOs representing the "grass roots", such as women's organisations, churches etc.
- Mass media.

We recognise the existence of the four target areas as defined by the IIA, namely Energy, Water, Industry and Forestry. We highly recommend that such innovations be given high consideration, which are able to satisfy more than just one of the target areas. Innovations in the area of agroforestry and integrated farming schemes are examples to such..