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Economics of IP and International Technology Transfer

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Objectives and Scope

- The studies in this presentation focused on three aspects that would provide major policy support to the WIPO Development Agenda.

These were:

- Operationalizing Article 7 of WTO TRIPS: State of Art, Constraints and Prospects
- Innovation, Financing Mechanisms and Transfer of Technologies
- Strategizing Innovative Enabling Conditions for Transfer of Technology to developing Countries

To substantiate the proposals made on the three themes the following case studies were elaborated upon

- Case Study on the Drugs and Pharmaceutical Sector
- Case Study on Climate Change Technologies

Remarks on ToR for the study

- Survey current state of art
- Provide cases from different parts of the world not just Asia
- Provide new approaches for new problems

Underlying Economic Theory

- IPRs lead to deadweight Loss since they are not conducive to Marginal Costs Pricing – competition issues
- All the same IPRs can create new products that are valuable to humanity
- Research on such products call for sunk costs which may or may not be infructuous – high risks of new technology failure
- Hence 'financing' through hybrid mechanisms are required to reduce capital costs on the one hand and absorb the risk of technology failures
- The option value of a new drug or a climate friendly technology provides a good 'price discovery mechanism' for new and innovative products protected by an IP and also can be critical in determining financial needs that reduce capital costs and cushion technology failure risks.
- This in turn enables the supply price of a new and innovative product which can set the normative returns to technology that is demanded to be transferred

The approach of this study

- Link financing to innovation and technology transfer
- Establish a price discovery mechanism that objectifies license fee / royalties that is associated with a new and innovative product with tremendous social impact
- Those with low intrinsic (option) value but with high present use as a public good would command a lower price than those which high intrinsic value and which have had a high degree of innovative character. It is in the case of the former that the flexibilities / Article 7 of the TRIPS need to be applied

Ongoing International Efforts to Operationalize Article 7 of the WTO-TRIPS

- There are two broad approaches to dealing with IPRs. The first one involves a regulatory approach , while the second one involves promoting market based approach to IPRs

- The regulatory approach which, while preserving the essential characteristics of intellectual property rights, seeks to intervene in the market for technology so as to rectify perceived inequalities in that market as between the technology owner and the technology recipient. Regulatory intervention in technology transfer transactions may involve the outlawing provisions in technology transfer transactions that unduly favor the technology owner. Such measures are backed by performance requirements on the part of the technology owner as a pre-condition for transfer related transactions. (WIPO, 2011).

- A second track views transfer of technology as best undertaken through the market based operations. The emphasis is neither on regulation or intervention in the technology transfer process, but on creating conditions to enable free market transfer of technology.

Currently Advocated Traditional Instruments

- Compulsory Licenses: Under the TRIPS agreement, there is considerable flexibility provided to WTO Member States on the grounds for issuing compulsory licenses:
- Use of other TRIPS flexibilities including exemption from patentability;
- Technology pooling through a collective approach;
- Global system to share know-how and trade secrets;
- Understanding of initiatives on publicly funded technologies;
- Parallel importation, exemptions and competitive behavior;
- Rigorous criteria to assess the novelty and inventive step of patent applications to pharmaceuticals should be applied and provisions in Patent Acts which provide for 'evergreening' patents should be removed;

Novel Instruments

- (i) Market making functions: linking appropriate buyer to appropriate seller;
- (j) Encouraging public institutions in developed countries to buy out essential drugs for supply to least-developed countries through Second Order Price Discrimination;
- (k) Setting up a multilateral fund for operationalizing for drugs and pharmaceuticals that are novel and deserve higher rate of return

INNOVATION, FINANCING MECHANISMS AND TRANSFER OF TECHNOLOGIES: NEED FOR AN INTEGRATED VIEW

- Establish a publicly-funded global financial mechanism to promote innovation and transfer of technology;
- Finance implementation of WIPO Development Agenda;
- Provide other avenues of support such as the development of SMEs and NEMs;
- Finance technology transactions exchanges;
- Finance development of Information/ data base on Technology failure risks to alert research communities to focus their resources on R&D activities that minimize risks.

STRATEGIZING INNOVATIVE ENABLING CONDITIONS FOR TRANSFER OF TECHNOLOGY TO DEVELOPING COUNTRIES

- a) Stimulate optimum competition environment through enabling policies;
- (b) Stimulate strategic use of patent and related IPRs;
- (c) Put in place sound and effective regulatory devices;
- (d) Build complementary capabilities in terms of capacities and R&D support systems;
- (e) Facilitate negotiations for technology transfer to ensure efficient, effective and result based technology transfer;
- (f) Have in place facilitating policies in relation to foreign direct investment (FDI) and non-equity modes (NEMs) of business of overseas origin;
- (g) Provide Government commitments in both developed and developing countries to set up joint R&D systems through public-private partnerships;
- Quality improvements in Patents grants to prevent patent failures

STRATEGIZING INNOVATIVE ENABLING CONDITIONS FOR TRANSFER OF TECHNOLOGY TO DEVELOPING COUNTRIES

- (h) Set up market making functions that link appropriate buyers to appropriate sellers and thus promote an efficient technology market;
- (i) Encourage joint need assessment for drugs and environmental technologies to facilitate joint R&D programs involving partners from North and South;
- (j) Set up an efficient multilateral funding mechanism to facilitate financial transactions connected to transfer of technology;
- (k) Provide information base to prevent technology failure risks;
- (l) Encourage public Institutions in developed countries to procure essential drugs for supply to least developed countries by applying second order price discrimination principles.

Innovation, Financing Mechanisms and Transfer of Technologies: Need for an Integrated View

- The term 'incentives' in Article 66.2 includes financial and fiscal incentives both of which are key concerns insofar as financing of innovations are concerned.
- Similarly, WIPO's CDIP programme as well as the emphasis in WIPO (2009) about 'supportive intellectual property-related policies and measures' for transfer of technology, cannot escape the notion of financing innovative products and processes that are relevant to developing countries.

Blending of Financing Sources

- The greatest challenge of financing innovation in the public goods sector is to find financial resources on a sufficient scale and in a predictable manner for goods and technologies that are critical to livelihoods of poorer communities in developing countries.
- Since public financing sources such as ODA are inadequate and private capital is hard to come by, on account of low return on investments, there is a strong case for inter-source blending of funds to support innovation in socially critical sectors.

- •Private investment can be stimulated through the targeted application of concessional and non-concessional public financing. Careful and wise use of public funds in combination with private funds can generate truly transformational investments.
- •Flows of private investment will depend on a mix of Government policies and on the availability of risk-sharing instruments.
- •Loan price differentiation for ‘low versus high’ carbon investments could prove an alternative means of internalizing the cost of carbon within the terms of the loan (in the absence of standard practice across the MDBs for integrating a shadow price for carbon into project decisions).

Blending Platforms

- According to Anonymous (2011), the concept of blending platforms introduced by the European Commission, European donors and European Financing Institutions represent innovative financial mechanisms that seek to mobilize additional funding to cover the investment needs of specific countries and projects.
- As a financing platform, the blending approach generates a high grant to loan leverage ratio. Further, they make use of existing finance delivery mechanisms of eligible European Finance Institutions.
- For recipient countries the advantage is the high volume for capital made available by such platforms for intensive infrastructure projects at concessional rates.

Supply Side Constraints: Drugs and Pharma

- Thus ‘increasing costs of drug discovery’ and ‘decreasing productivity’ can lead to lowered access for the medicine by consumers on account of higher than average prices.
- Narrowing Pipelines for NMEs and Lowering Access to Quality Drugs
- Neglected diseases
- Sourcing and mobilizing financial resources for ‘neglected diseases’ is therefore a crucial priority. In recent times there have been a few initiatives by way of PPPs and collaborative research that holds promise. However these efforts need to be strengthened to promote innovation and create conditions for transfer of technologies to developing countries, so that the demand for drugs relevant to neglected diseases is achieved.

New Age Creative Financing Models

- Some of the key new age development models attempted in USA and Europe, include:
- • Research Collaboration Alliances
- • Contract Research
- • In licensing and Out licensing arrangements
- • Investments by High Net worth Individuals (‘HNI’)
- • New stock markets (eg: the ’Alternative Investment Market’)
- • Project financing that entail
- •Combination investments
- •Combinations of Venture Capital and Angel Investment
- •Combinations of Bioincubators and Corporate Venture Capital (one of the most
- developing forms of investment in recent times in India)
- •Public Private Partnerships (PPP’s)

New Age Creative Financing Models

- As Trauliier et al (2002) state, 'Developed countries offer viable market incentives for research and development through individual purchasing power and purchasing through government-run health insurance programmes.
- In Europe, for instance, these mechanisms cover two-thirds of drug costs for 80-100% of the population as opposed to 35% in Latin America and less than 8% in Africa.
- With public spending on drugs at around $239 per head per annum in countries belonging to the Organisation for Economic Cooperation and Development (OECD), the pharmaceutical industry has a strong incentive to develop drugs for this market.

New Age Creative Financing Models

- The formation of the African Network for Drugs and Diagnostics Innovation (ANDI), which operates under a regional governance and management.
- ANDI hopes to provide a time-efficient, cost-effective, and inclusive model to meet critical health care challenges in the continent.
- It is anticipated that leads emerging from the NCDS, NN, and WHO/TDR collaboration could, for example, be further optimized and developed through regional innovation networks in developing regions like ANDI or other partners.
- Particularly useful for neglected tropical diseases

Emerging Trends in Indian Solar PV space

- Technology: Technologies that lower poly-silicon consumption like thin film technology lead to lower reliance on imports for PV material. This enables cost reduction and is being viewed as the next wave that will drive solar power costs down.
- Business Models: It is observed that different players start off at different segments in the value chain based on their advantage (both technical and commercial). Thus Moser Baer started with PV module manufacturing, Tata BP Solar with EPC space and Bosch India also in the EPC space.
- There is no integration trend observed across the value chain . Had this been there, cost reduction for solar technologies would have occurred
- But ToT is a requisite

Figure 1 Share of Country (Regional block) - Renewable Patents

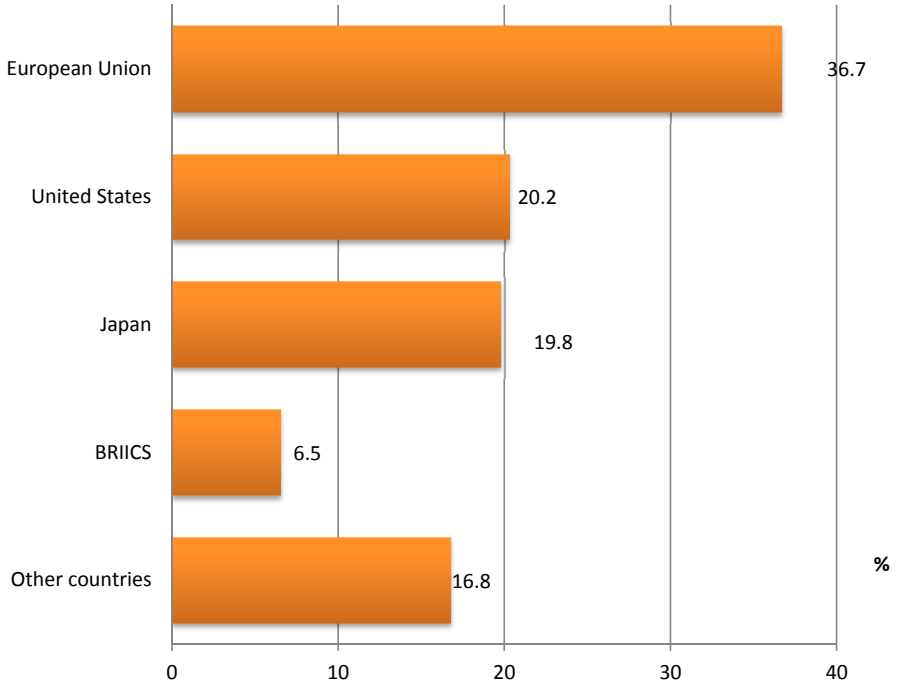
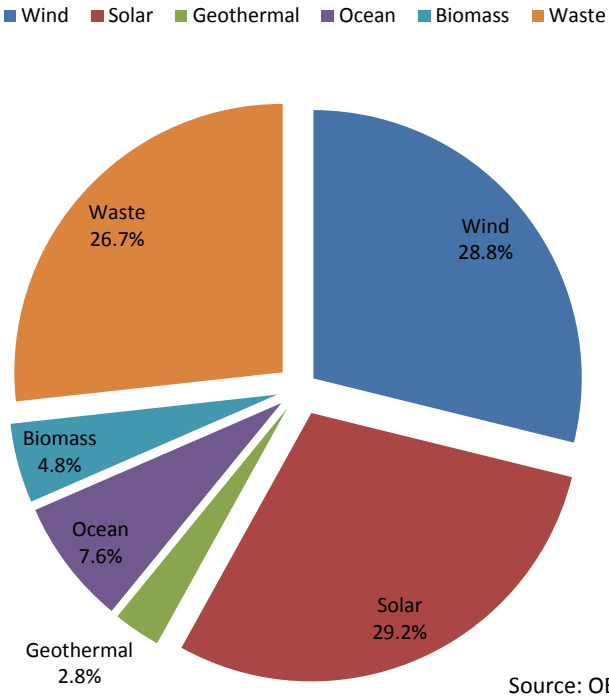
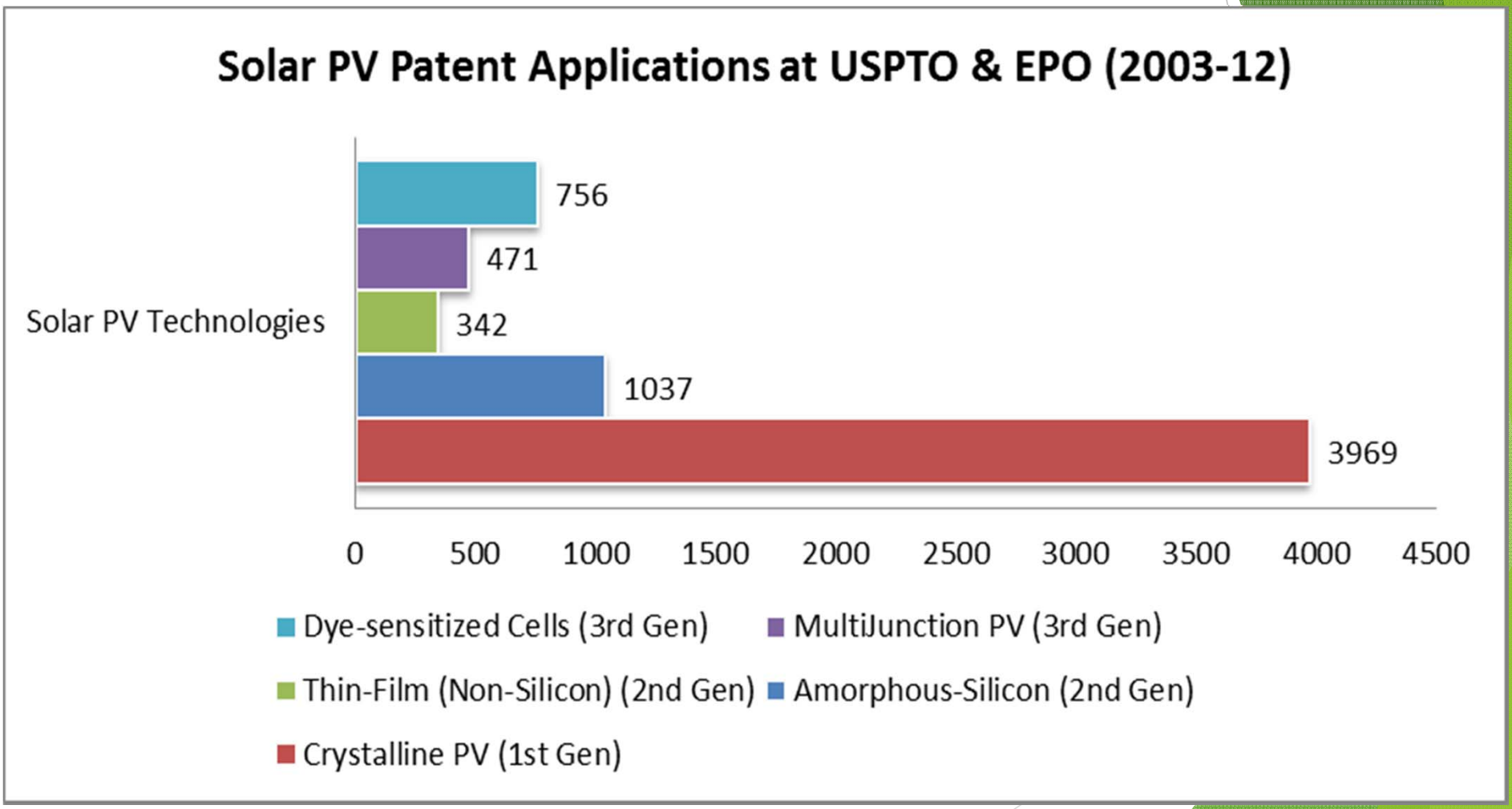
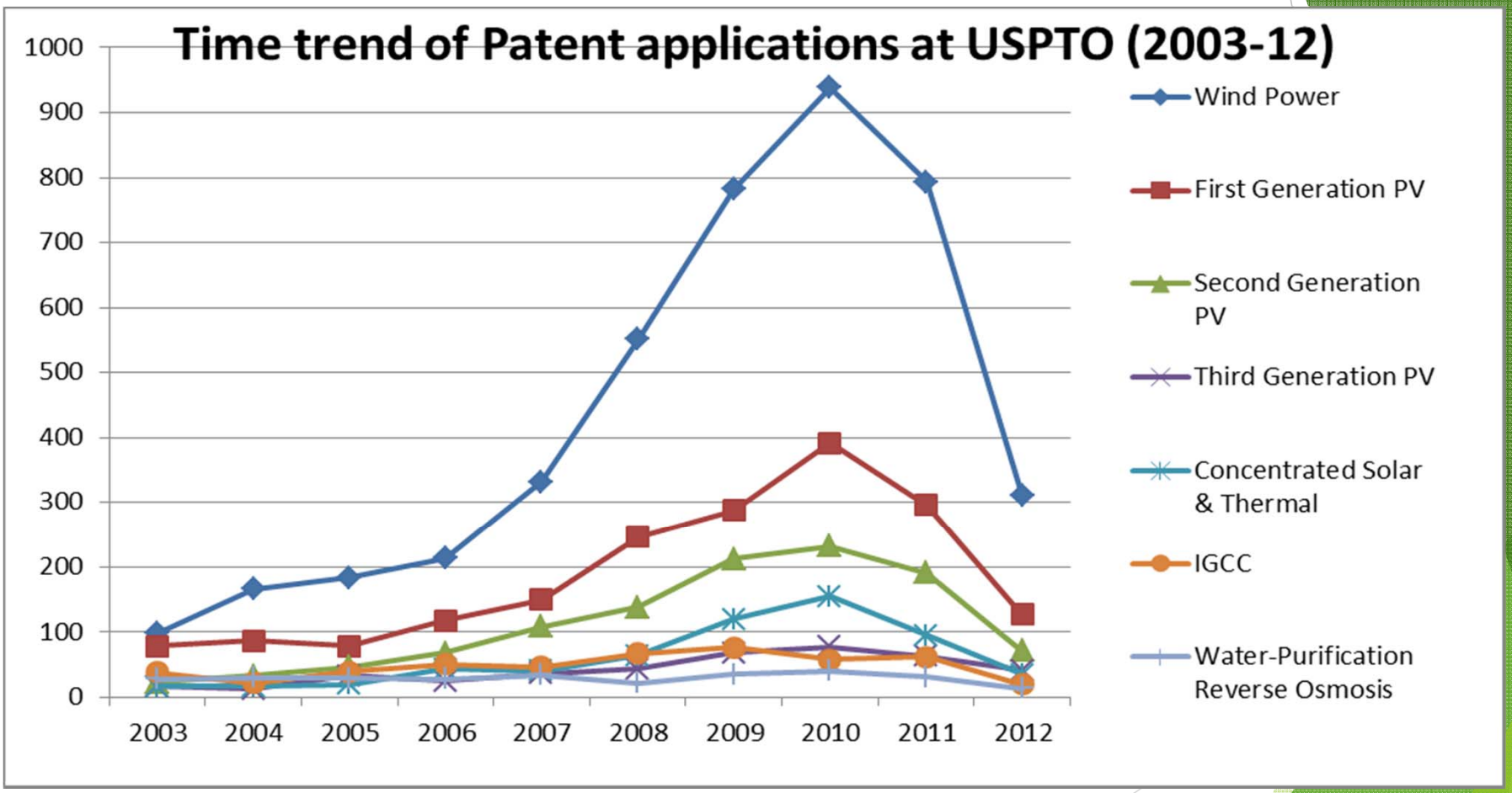


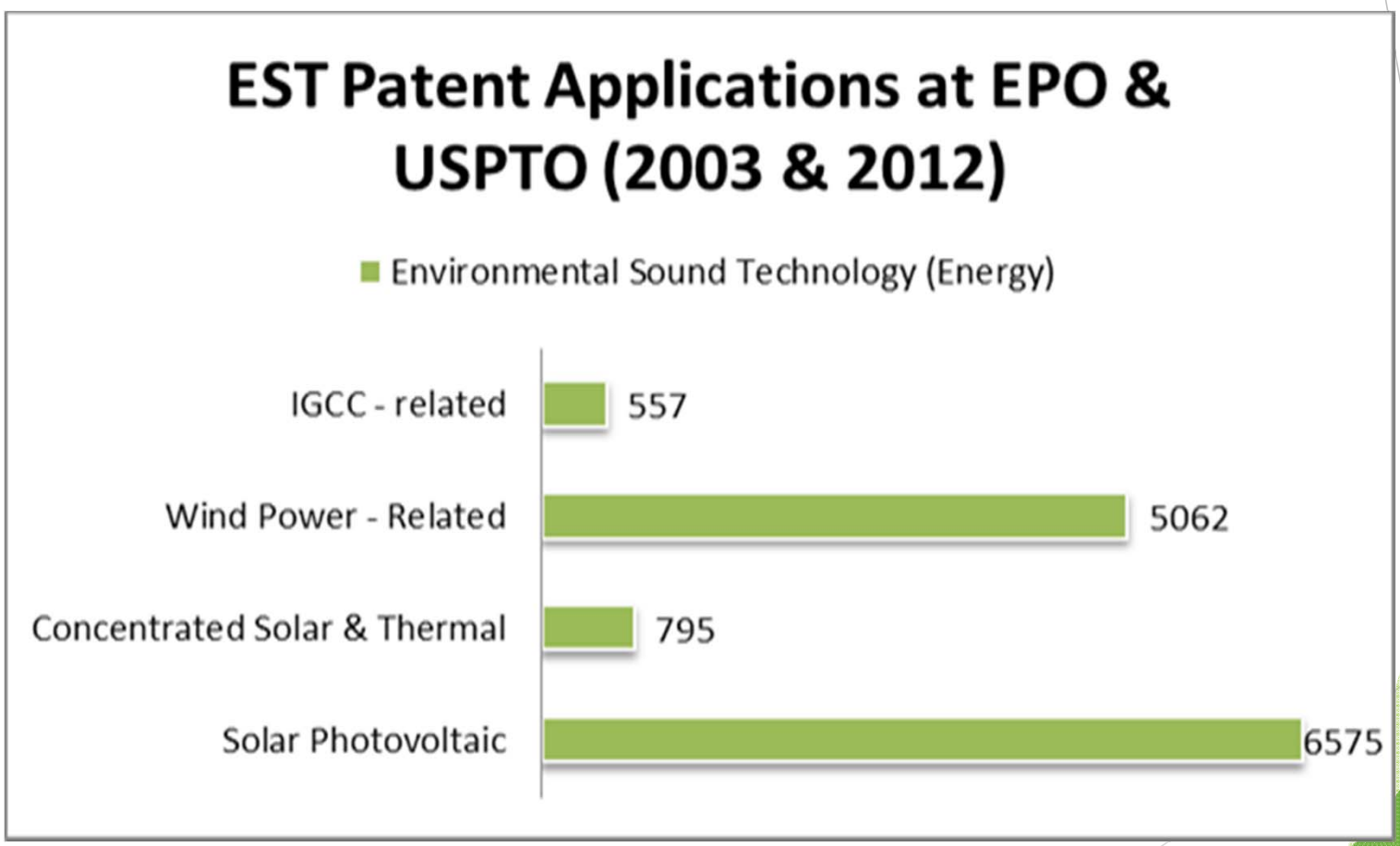
Figure 6: Share of Patents in Renewable Energy 2003-2005



Source: OECD 2008


Solar PV Patent Applications at USPTO & EPO (2003-12)
Solar PV Technologies
756
471
342
1037
3969
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Dye-sensitized Cells (3rd Gen)
MultiJunction PV (3rd Gen)
Thin-Film (Non-Silicon) (2nd Gen)
Amorphous-Silicon (2nd Gen)
Crystalline PV (1st Gen)


Time trend of Patent applications at USPTO (2003-12)
1000
900
800
700
600
500
400
300
200
100
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Wind Power
First Generation PV
Second Generation PV
Third Generation PV
Concentrated Solar & Thermal
IGCC
Water-Purification Reverse Osmosis


EST Patent Applications at EPO & USPTO (2003 & 2012)
Environmental Sound Technology (Energy)
IGCC - related
557
Wind Power - Related
5062
Concentrated Solar & Thermal
795
Solar Photovoltaic
6575

Addressing Reviewer's Points

The Design of the Read –

- Though all the three papers are inter-linked – they need to be read separately (reason for overlaps) as well as in terms of the unifying themes (the Executive Summary) – Admittedly the reading schema could have been specified in the preface
- Financing of clean technologies is conventionally 'IPR unrelated' in WIPO and other IPR forums. In the Climate Change and other Environmental Agreement and Biodiversity Conventions innovation, technology transfer and IPRs are discussed inconclusively for want of their connect to financing.
- True matters were excessively discussed. This will be edited after discussing with the reviewer

Addressing Reviewer's Points

- Readibility will be improved through editing and a list of acronyms will be provided
- Concede that the aspects of use of IP in university-industry technology transfer and discussion of the possibility of anti-commons effects and endangering of universities' research exemptions and the ongoing debate concerning the malfunctioning of IPRs as property rights (IPRs as a source of uncertainty) has not been covered and will be worked upon based on the works of the scholars, in consultation with the Reviewer
- Conceded that the paper could also be improved by elaborating on the flexibility within TRIPs for the use of patents as technology transfer tool through a structured discussion . There could be some discussion on how patents could obviate uncertainty deriving from excessive litigation (as it may occur in the absence of public coordination). Look forward to discussing with the reviewer on this point)

Addressing CDIP Member Concerns A

- Whether Reviewer Comments incorporated– No, since some of the substantive issues questions raised by the reviewer require detailed discussions with him before attempting change
- Readibility, language and quality problems – Will be subjected to quality Editorial corrections
- Quantity – no of pages too unwieldy – it is long – but had to be long as multiple country cases from various continents had to be discussed ( )
- Unsupported analysis – will have a re-look at the same
- No evidence for recommendations – admittedly some recommendations are forward looking and normative (Para 1.1 , Paper 1)
- No coherent review of literature – yes, in some directions as pointed to by the reviewer
- Cases are on obvious and well known issues – the case of climate change technologies is nascent

Possible Agendas of Convergence: Enabling Mechanisms for Development Based IP Protection

- Overcoming Innovation Restricting Provisions in Patent Laws and Procedures
- Objective valuation of ideal Returns on IPR by Facilitating Optimal Licensing Agreements based on an option value index -
- Building Complementary Capabilities
- Setting up a Technology Exchange
- Provide infrastructure facilities for Demonstrating Nascent Technologies
- Providing Due Diligence on IP Enforcement
- Capacity Building in Technology Licensing negotiations

Possible Agendas of Convergence: Enabling Mechanisms for Development Based IP Protection

- Market Making Functions: Linking Appropriate Buyer to Appropriate Seller …linking it to quality of patent a la *USPTO Strategic plan 2010-15* (inventive step / new safety aspect/which enhances employee productivity, revenue, value added, import substitution – loss by way of future patent invalidity minimized)
- Encourage joint need assessment for drugs and environmental technologies to facilitate joint R&D programmes
- Setting up an Efficient Multilateral Funding Mechanism to facilitate Transfer of Technology which recognizes the quality of patented medicine . This could act to cushion sunk costs and risk of innovating company products besides seeking a solution for neglected tropical diseases

A

- ToT – the voluntary element is missing so also aspect of mutually agreed terms – the aspect of market based solutions and innovation financing in Paper 2 is philosophically based on voluntary element , though not emphasized explicitly- pl also see Box 2 , Paper 2,(pp 61-62) on voluntary pooling initiative of WHO
- No economic analysis – **Admitted -** basic point of deadweight loss and the theory could have been discussed
- Policy recommendation one- sided – in fact it combines both market based (paras 71 to 73, para 123, Paper 1, Box 1, Paper 1) and command and control solutions (paras 53-55, Paper 1) (Fig 1, p 41, para 1.14- Paper 1,p 48-49) Multiple modes of ToT recognized apart from involuntary measures (p 19-29) also cases where patents have facilitated ToT have been pointed out as much as instances where they have not (Paper 1 , Box 1,paras 62-63)
- Conflicting findings – effort was made to look at current solutions advocated and offer one's own solutions as listed in para 2.12.1 and 3.4.2 to 3.6, 3.7,3.8,3.9,3.10 and 3.11

A

- Fails to address incentives to innovate –might have got shrouded in the maze of information but is there in pages 67 in Paper 1 : Footnote 2 of Para 68 and the main findings of Paper 2 , paras 2.5.4 and 2.5.5 , 2.9 and its sub-sections relating to drug and pharma. Also pl see Box 2, Paper 2 on voluntary pooling)
- Short Term Technology transfer emphasized to long term innovation advantage –para 2.5.7 in Paper 2 pp 56-57 is on long term innovation financing – also paras 205-210 pp in Paper 2 pp 59-61 on supply side factors of quality drugs based on R&D) Also 2.9.5 on neglected diseases in Paper 2.
- Limited References: conceded – was comprehensive for the issues addressed (180 references in total)- but there were some redundancies and omissions example (University Autonomy, IP Legislation and academic patenting, Italy 1996-2007)

AI

- New Approach
- Length not the issue
- Requires detailed discussions - Agreed

B

- Dimension of Voluntary Licensing
- Cost of drugs to be lowered through effective ToT University – Box 3.1 p 80-81
- P 90: Para 337: Braga and Willmore (1991)state that more open economies benefit from effectiveness of IPR protection because of greater capacity to innovate.
- Based on US TNC activities in 16 countries during 1982-99, Branstetter et al (2006) analyze how patenting , royalties and R&D expenditure vary after patent reform. They find that after Patent Law reforms, US TNCs experienced increased royalty payments and patenting in countries concerned. More R&D investments also happened in these countries.
- Considering the fact that developing countries are likely to emerge as NEM hubs which carry out R&D activities, clinical trials and contract manufacturing in the drugs and pharma sector(for cases on India and Brazil see Appendix 1), it may be important for developing countries to provide prospective investors with 'Rapid assessment Studies / Reports of investment climate'.

C

- Emphasis to be on Patent Failure (para 53, paper 1 on PF and way of obviating it)
- Length not the issue
- Evidence of poor linkage between IPRs and ToT (para 53 above)

Thank You