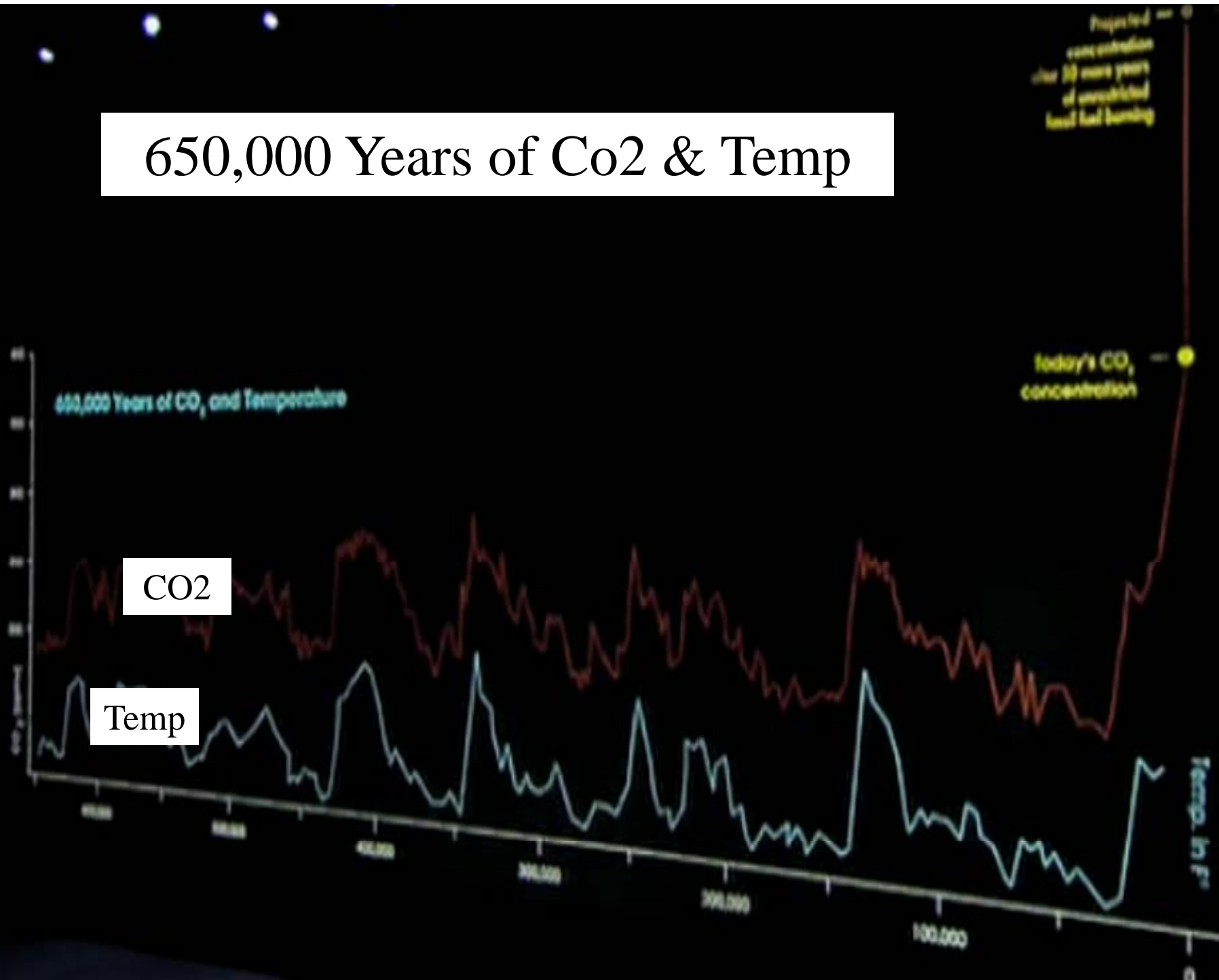


# Clean Development Mechanism (CDM) - LESCO



Presentation at WAPDA House Lahore  
Dated 24 Aug

# 650,000 Years of Co2 & Temp



# The Kyoto Protocol

- Entered into force 16 February 2005
- Developed countries must reduce carbon emissions by 5.2% from 1990 levels by 2008 – 2012 (1<sup>st</sup> Commitment Period; 2<sup>nd</sup> & 3<sup>rd</sup> periods to follow).
- A number of flexible mechanisms were agreed to:
  - International Emissions Trading
  - Joint Implementation (JI)
  - Clean Development Mechanism (CDM)

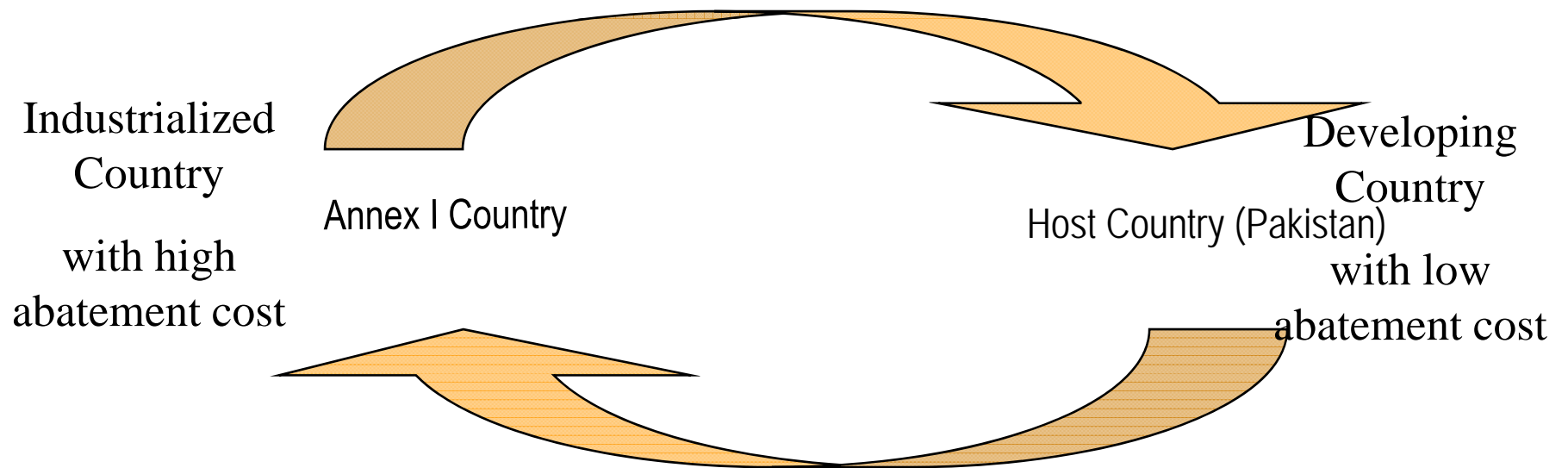
# Clean Development Mechanism

- Dual objectives
  - lower the overall cost of reducing GHG emissions
  - while also supporting sustainable development initiatives within developing countries.
- Establish the baseline and demonstrate **additionality**.

# What does the CDM aim to achieve?

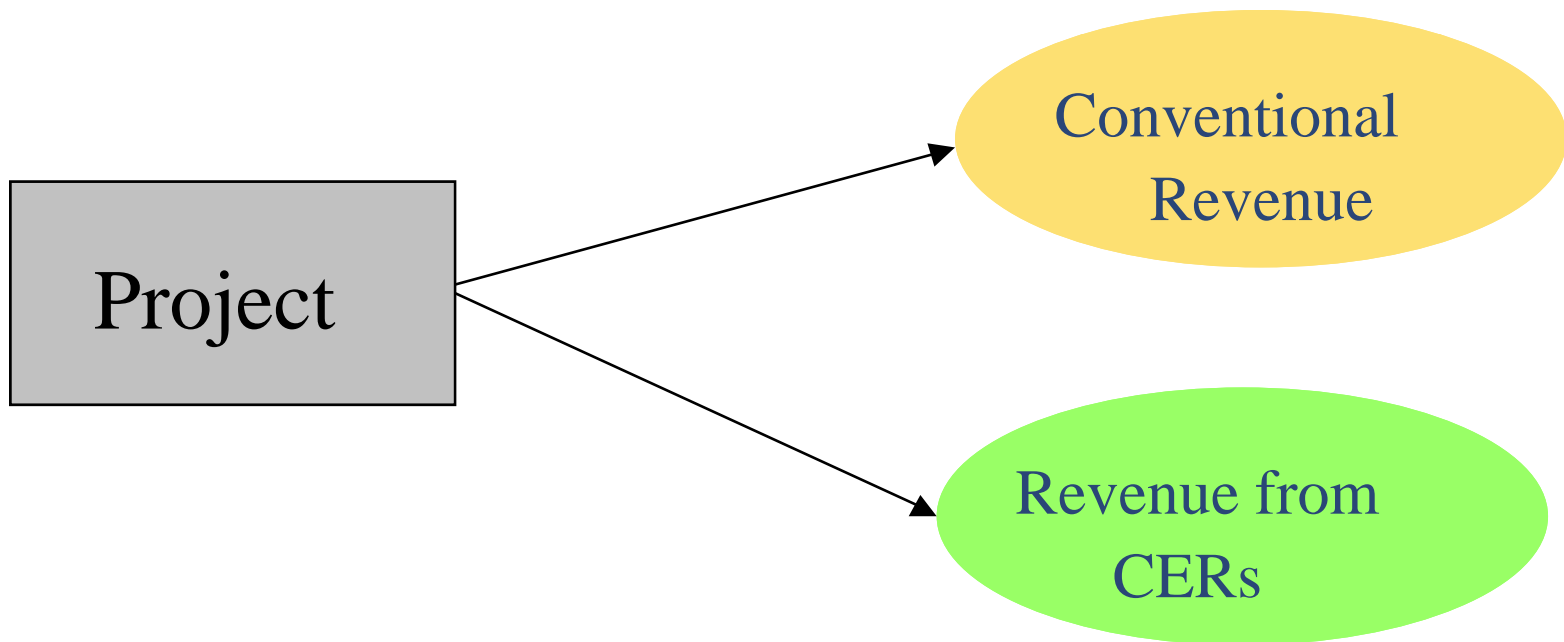
A transfer of finances and contribution to sustainable development in the Host Country

*Flow of Finances*

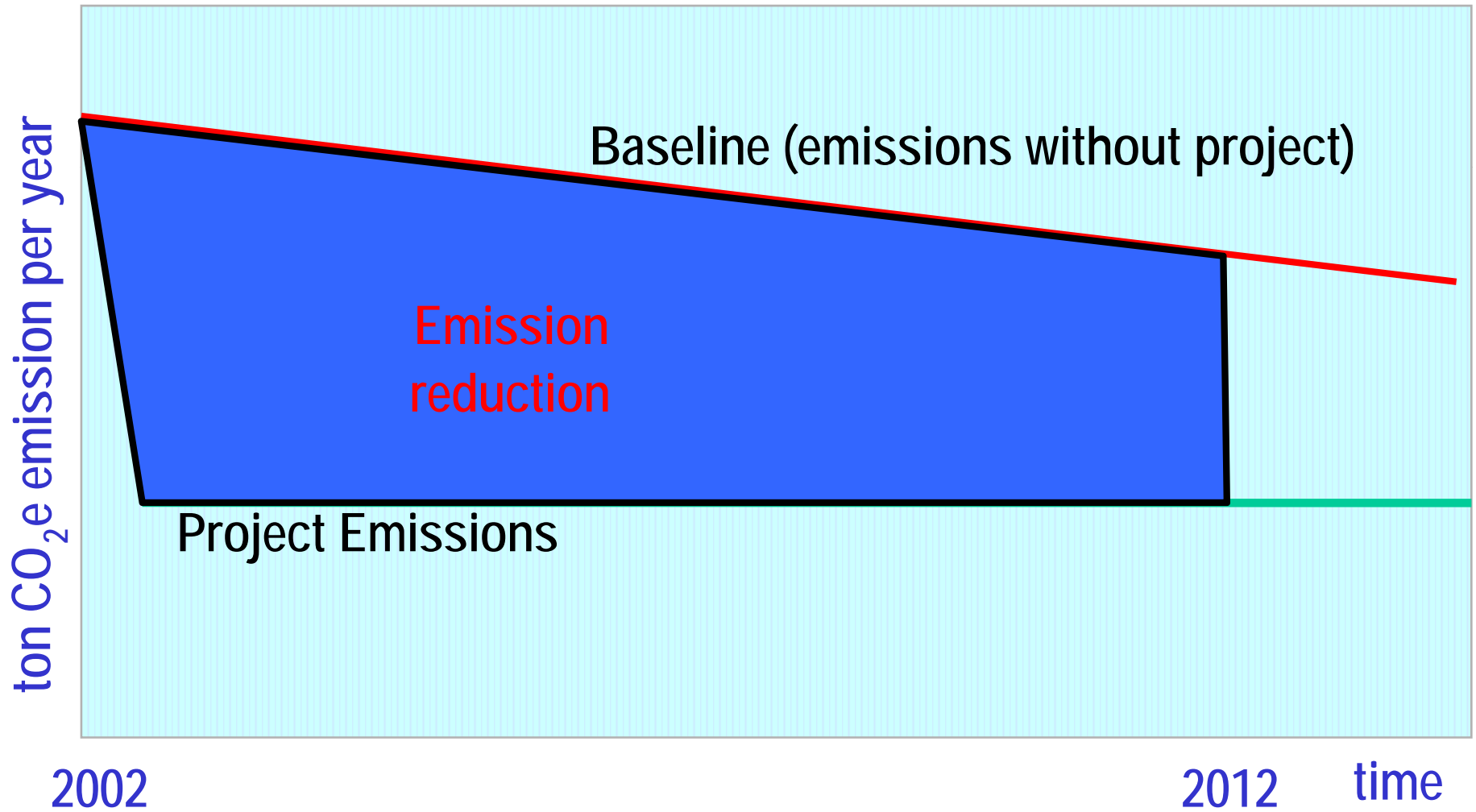


*Flow of Credits*

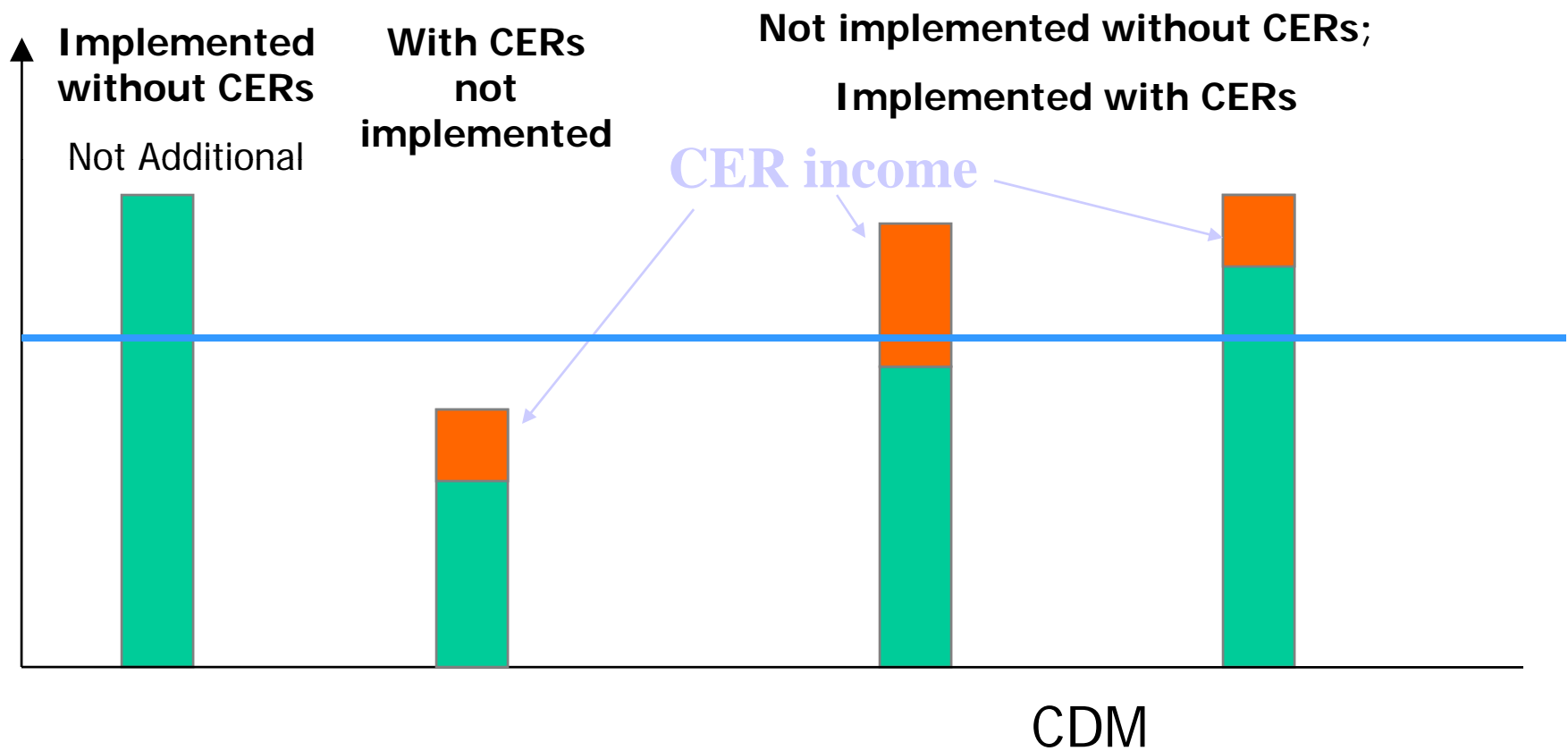
## What does it mean for projects?



# Baseline



# Additional Value From 'Clean' Projects



# CDM Project Approval

- **Project Proponent** develops PDD and asks **Host Country** for Approval of CDM project
- Project Proponent submits Project Design Document to **Validator** (Operating Entity)
- (In case of New Baseline methodology: **Validator** submits Baseline Methodology to Methodology Panel of the **CDM Executive Board**)
- **Validator** evaluates Project Design Document and submits it for approval to **CDM Executive Board**
- **CDM Executive Board** registers project activity as a CDM project

# Energy Efficiency Project Under World Bank's Financing

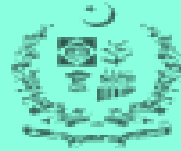
- US \$ 5 Million Project
- Three Sub-Components
  - Distribution of CFLs (US \$ 1.2 Million)
  - Installation of LT Capacitors
  - Installation of AMR Meters
- This Project is integrated with CDM
- 'Additional'

# CDM Integration Process

- Establish & Document Additionality
  - PC-1 for the Government --- CDM
  - Project Description Document (PDD) for Donor --- CDM
- Develop Project Idea Note (PIN)
- Get LoI Based on PIN
- Prepare the Project Design Document (PDD)
- Get Host Country Approval
- Register the Project

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Tel: 92- 51- 9245510  
Fax: 92- 51- 9245533  
Email: [cdmcellpakistan@gmail.com](mailto:cdmcellpakistan@gmail.com)



Clean Development Mechanism Cell

GOVERNMENT OF PAKISTAN  
MINISTRY OF ENVIRONMENT  
4<sup>th</sup> Floor, ENERCON Building,  
off Ataturak Avenue,  
Sector G- 5/ 2, Islamabad, PAKISTAN.  
\*\*\*\*\*

Islamabad, the 5<sup>th</sup> August, 2009

Letter of No Objection for Initiation of CDM Project Activity in Pakistan

Dear Sir,

With reference to your letter No. 155457/CED/M(P&S)-PMU. DNA informed you that we acknowledge your intention to develop the GHG's emission reduction project activity i.e. LESCO Energy Efficiency – CFL Distribution for which CDM Project Registration will be sought in the future.

We are looking forward to receiving the Project Design Document (PDD) for the respective project activity in order to start the process for Host Country Approval inline with our operational sustainable development aims and objectives.

Kind regards

(Syed Amjad Hussain)  
Acting Head CDM Cell

Mr. Omer Haroon Malik  
Deputy Manager P&S (PMU)  
LESCO Head Quarter,  
132 KV Grid Station  
Qartaba Bahawalpur Road  
Mozang Lahore  
Fax #: 042-9214412

# LoI Process

- Project Idea Note PIN was prepared
  - AMS-IIJ
  - Assistance from Winrock
  - Discussions with CDM Cell
- Based on PIN LoI was issued on 5<sup>th</sup> of Aug,2009 by CDM Cell

# Savings Calculations for CFL Project LESCO - Excel File

| S.No   | IB's Vs CFLs<br>(Active, Reactive & Apparent Powers Comparison & Savings)                       |            |   |            |  |
|--|---|------------|---|------------|--|
| <b>CFLs Calculations</b>   |   |            |   |            |  |
| 1  | cosφ  | 0.55       |   |            |  |
| 2  | φ   | 57         | 1.0   |            |  |
| 3  | CFLs Active Power(Watt)   | 23         | Reactive Power (VAR)  | 34.9       | Apparent Power (VA)  |
|  |   | 20         |   | 30.4       | 36.4   |
| 4  | Total Number of CFLs  | 430,000    | 23 Watt Equal (70% of Total)  | 301,000    | 20 Watt Equal (30% of Total)   |
|  | Total Watts for 23 W CFL  | 6,923,000  | Total VARs for 23 W CFLs  | 10,512,445 | Total VA's for 23 W CFL  |
|  | Total Watts for 20 W CFL  | 2,580,000  | Total VARs for 20 W CFLs  | 3,917,681  | Total VA's for 20 W CFL  |
| <b>IBs Calculations</b>  |   |            |   |            |  |
| 5  | cosφ  | 0.995      |   |            |  |
| 6  | φ   | 6          | 0.1   |            |  |
| 7  | IB's Active Power(Watt)   | 100        | Reactive Power (VAR)  | 10.0       | Apparent Power (VA)  |
|  |   | 60         |   | 6.0        | 60.3   |
| 8  | Total Number of IB's  | 430,000    | 100 Watt Equal (70% of Total)   | 301,000    | 60 Watt Equal (30% of Total)   |
|  | Total Watts for 100 W IB  | 30,100,000 | Total VARs for 100 W IB   | 3,021,342  | Total VA's for 100 W IB  |
|  | Total Watts for 60 W IB   | 7,740,000  | Total VARs for 60 W IB  | 776,916    | Total VA's for 60 W IB   |
| <b>Net Saving by Prime Minister's CFL Programme (LESCO)</b>                  |   |            |   |            |  |
| <b>Penetration Factor of CFLs</b>  |   |            |   |            |  |
| <b>70%</b>   |   |            |   |            |  |
| 9  | Total Watts Saved by 23 W CFL replacing 100 W IB  | 16,223,900 | Total VARs Added by 23 W CFL repl. 100W IB  | 5,243,772  | Total VA's Saved by 23 W CFL repl. 100W IB   |
|  | Total Watts Saved by 20 W CFL replacing 60 W IB   | 3,612,000  | Total VARs Added by 20W CFL repl. 60W IB  | 2,198,535  | Total VA's Saved by 20W CFL repl. 60W IB   |
|  | Grand Total of (MW) Saved by 23 W CFL replacing 100 W IB + 20 W CFL replacing 60 W IB           | 20         | Grand Total of (MVAR) Added by 23 W CFL replacing 100 W IB + 20 W CFL replacing 60 W IB | 7          | Grand Total of (MVA) Saved by 23 W CFL replacing 100 W IB + 20 W CFL replacing 60 W IB |
|  |   |            |   |            | 21   |
| 10   | MW saved calculated with appropriate coincidence factor applied will help to chop the peak load |            | MVARs added will require capacitive compensation  |            | MVA Saved will help in reducing the loading of Transformers & Lines                    |
| <b>The only adverse effect will be increase in Total Harmonic Distortion</b> |   |            |   |            |  |
| 11   | Cost of the CFL Project (Million Rs)  | #REF!      | Cost of Adding 1 MW (Million US \$)   | 1.3        | Cost of Adding 1 MW (Million Rs)   |
|  | MW saved  | 20         | Cost of Adding the Saved MW (In Million Rs)   | #REF!      |  |
| 12   | Millions Rs. Saved by this project by delaying the investment in Generation of 198 MW           | #REF!      |   |            |  |
| 13   | Coincidence Factor  | 70%        | Millions Rs. Saved by this project by delaying the                                      |            |  |

## AMS –IIJ used by LESCO for the PDD

- For CFLs replacing IBs. for residential customers
- Aggregate elect. Saving  $\leftarrow$  60 GWh
- Identification
- IBs. return
- Limiting the undesired secondary market effects
- Direct dist. , cost recovery Or restricting the number of Lamps
- If not directly installed --- 3.5 hours usage or more

# AMS –IIJ (Contd.)

- Boundary
- Crediting Period
- Baseline --- Ex ante Survey
- Ex post Survey
- Monitoring
  - Ex ante Survey
  - Ex post Survey
  - Recording of Lamp Distribution Data

# AMS –IIJ (Contd.)

- **Net Electricity Savings Formula**

$$NES_y = \sum_{i=1}^n Q_{PJ,i} \times (1 - LFR_{i,y}) \times ES_i \times \frac{1}{(1 - TD_{,y})} \times BP \times NTG$$

$$ES_i = (P_{i,BL} - P_{i,PJ}) \times O_i \times 365 / 1000$$

- **Emission Reductions**

$$ER_y = NES_y \times EF_{CO2,ELEC,y}$$

# LESCOs Calculations

- IRR without CDM (**Negative**)
- IRR with CDM (**10%**)
- 7 years Crediting period
- Up to a period of 7 years: 61,747 tCO<sub>2</sub>-equivalent
- Up to and including 2012: 350,69 tCO<sub>2</sub>-equivalent

***‘EXCEL SHEET FOR DETAILS’***

| CFLs   |                                       |  |            | Nos                    |                        |            |           |    |     |    |     |     |      |  |  |  |  |
|--|---------------------------------------|--|------------|------------------------|------------------------|------------|-----------|----|-----|----|-----|-----|------|--|--|--|--|
| Total CFLs that could be purchased (with 10% for the awareness campaign & 10 % for overheads ) |                                       |  |            | =                      | 412,235                |            |           |    |     |    |     |     |      |  |  |  |  |
|  |                                       | <table border="1"> <thead> <tr> <th>Base Line I.Bs (Watts)</th> <th>Output Lumens Per Watt</th> </tr> </thead> <tbody> <tr> <td>40</td> <td>415</td> </tr> <tr> <td>60</td> <td>715</td> </tr> <tr> <td>75</td> <td>940</td> </tr> <tr> <td>100</td> <td>1350</td> </tr> </tbody> </table> |            | Base Line I.Bs (Watts) | Output Lumens Per Watt | 40         | 415       | 60 | 715 | 75 | 940 | 100 | 1350 |  |  |  |  |
| Base Line I.Bs (Watts)   | Output Lumens Per Watt                |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| 40   | 415                                   |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| 60   | 715                                   |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| 75   | 940                                   |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| 100  | 1350                                  |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>2009</b>  |                                       |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>NES=</b>  |                                       |  |            | <b>Units</b>           |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>QPJ=</b>  |                                       |  | 412,235    | Nos                    |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>ES=</b>   | $=(Pb-Pp) \times O \times 365 / 1000$ |  | 98         | kWhrs                  |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>1/(1-Tdy)=</b>  |                                       |  | 1.111      |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>BP=</b>   | $=1-(CFL/(IB+T-L+CFL))$               |  | 0.65       |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>NTG=</b>  |                                       |  | 0.95       |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>2010      2011      2012      2013      2014      2015      2016</b>                        |                                       |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>LFRiy</b>   |                                       |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>y-Counter</b>   | 1                                     | 2  | 3          | 4                      | 5                      | 6          | 7         |    |     |    |     |     |      |  |  |  |  |
| <b>X(3.5x365)</b>  | 1277.5                                | 1277.5   | 1277.5     | 1277.5                 | 1277.5                 | 1277.5     | 1277.5    |    |     |    |     |     |      |  |  |  |  |
| <b>L</b>   | 8000                                  | 8000   | 8000       | 8000                   | 8000                   | 8000       | 8000      |    |     |    |     |     |      |  |  |  |  |
| <b>R</b>   | 50                                    | 50   | 50         | 50                     | 50                     | 50         | 50        |    |     |    |     |     |      |  |  |  |  |
| <b>Y x X =</b>   | 1277.5                                | 2555   | 3832.5     | 5110                   | 6387.5                 | 7665       | 8942.5    |    |     |    |     |     |      |  |  |  |  |
| <b>L - (YxX) =</b>   | 6722.5                                | 5445   | 4167.5     | 2890                   | 1612.5                 | 335        | -942.5    |    |     |    |     |     |      |  |  |  |  |
| <b>LFRy</b>  | 0.08                                  | 0.16   | 0.24       | 0.32                   | 0.40                   | 0.48       | 0.56      |    |     |    |     |     |      |  |  |  |  |
|  |                                       |  |            |                        |                        |            | 0.2622309 |    |     |    |     |     |      |  |  |  |  |
| <b>(1-LFRy)</b>  | 0.92                                  | 0.84   | 0.76       | 0.68                   | 0.60                   | 0.52       | 0.44      |    |     |    |     |     |      |  |  |  |  |
| <b>2011      2012      2013      2014      2015      2016      2017</b>                        |                                       |  |            |                        |                        |            |           |    |     |    |     |     |      |  |  |  |  |
| <b>NES (kWh)=</b>  | 25,600,759                            | 23,379,331   | 21,157,903 | 18,936,476             | 16,715,048             | 14,493,620 | 3,210,169 |    |     |    |     |     |      |  |  |  |  |
| GWh  | 26                                    | 23   | 21         | 19                     | 17                     | 14         | 3         |    |     |    |     |     |      |  |  |  |  |
| MWh  | 25,601                                | 23,379   | 21,158     | 18,936                 | 16,715                 | 14,494     | 3,210     |    |     |    |     |     |      |  |  |  |  |
| <b>ER = NESxEF</b>   | 12,800                                | 11,690   | 10,579     | 9,468                  | 8,358                  | 7,247      | 1,605     |    |     |    |     |     |      |  |  |  |  |
| <b>Net Rev</b>   | 128,004                               | 116,897  | 105,790    | 94,682                 | 83,575                 | 72,468     | 16,051    |    |     |    |     |     |      |  |  |  |  |

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Thanks