WORLD BANK CARBON FINANCE UNIT
CARBON PARTNERSHIP FACILITY
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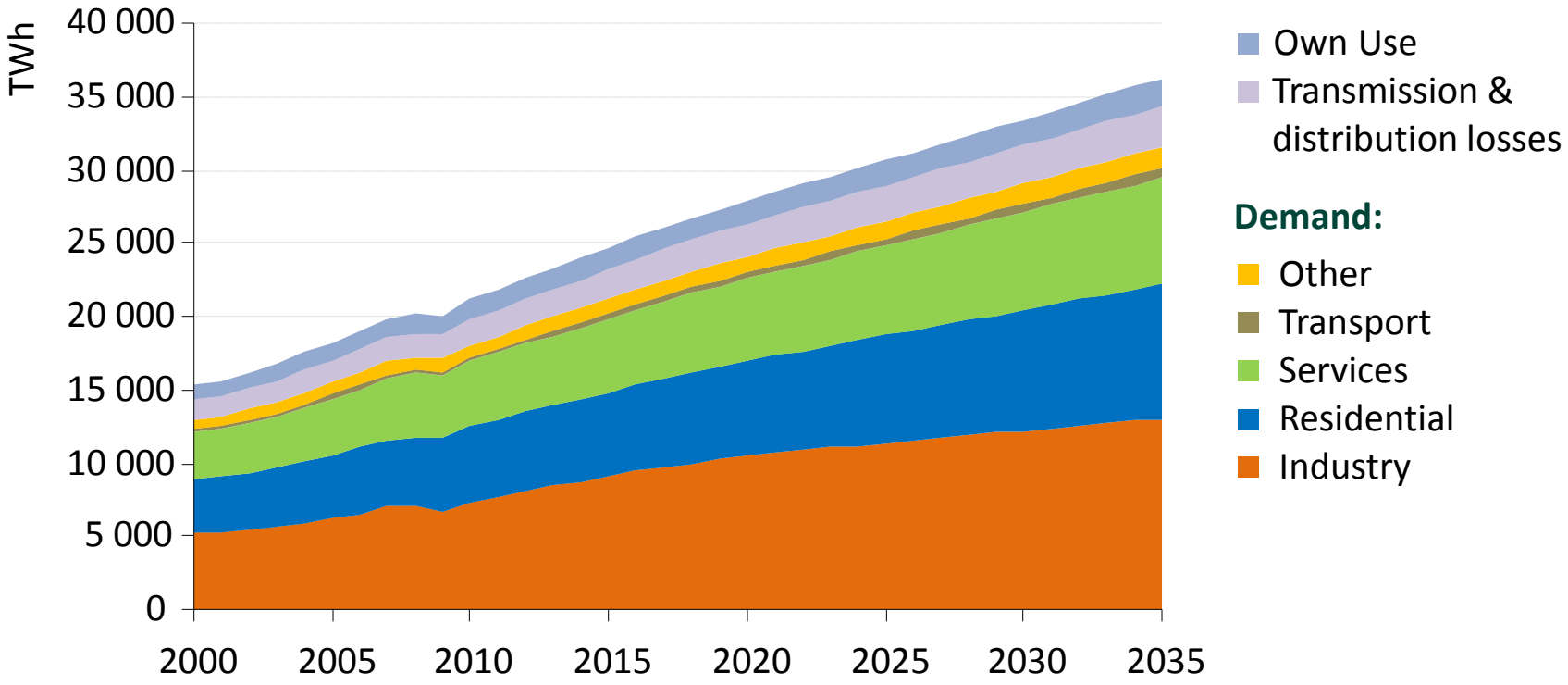
DESIGN ELEMENTS FOR PILOTING NEW MARKET MECHANISMS – POWER SECTOR (PRELIMINARY IDEAS)

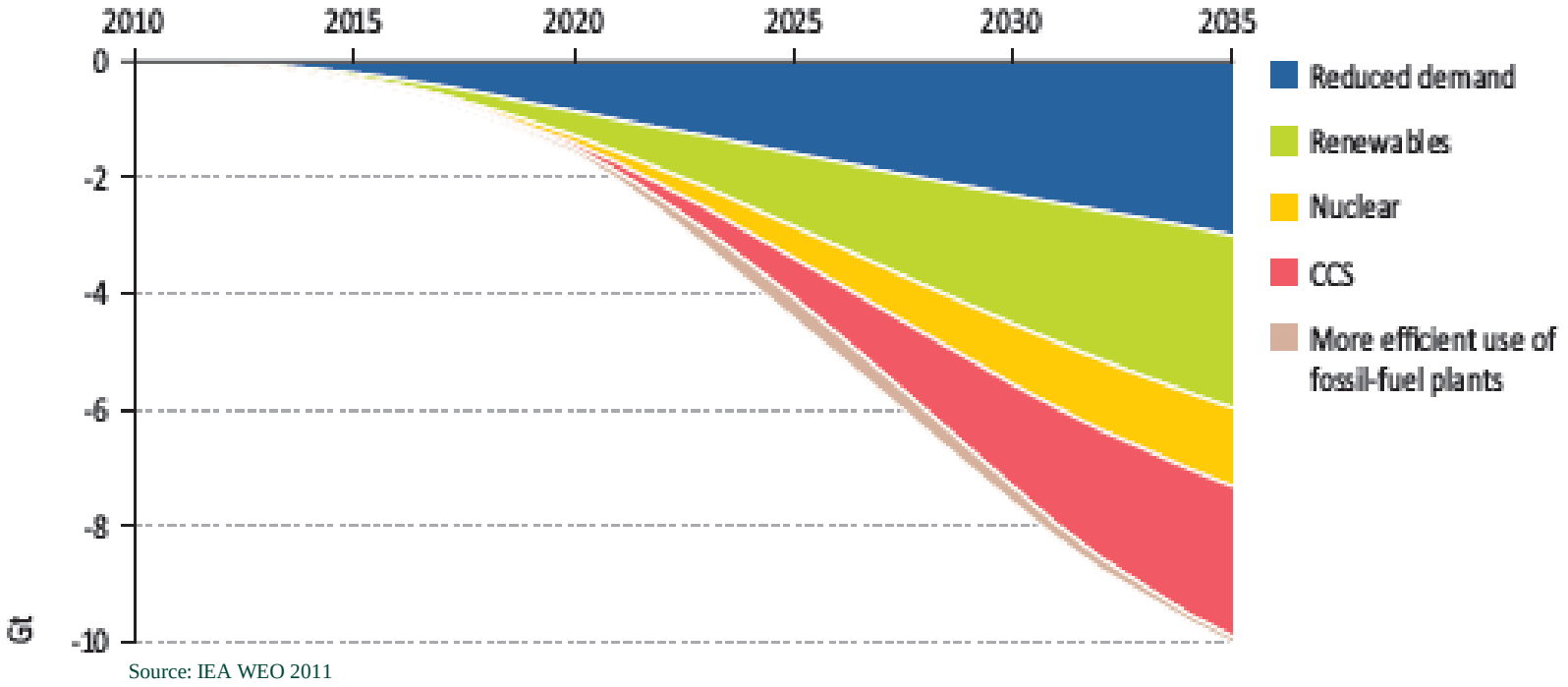
Power sector, a largest contributor of global emissions, is continue to be a large emitter for years to come.

- 11.8 GtCO2e in 2009, around 25% of global GHG emissions
- Annual generation growth up to 2035 expected to be between 2.3% and 2.7%
- Emissions expected to grow to 14.8 GtCO2e in 2035 – 25% rise.



Source: IEA WEO 2011

No single action in the power sector will deliver the full abatement potential



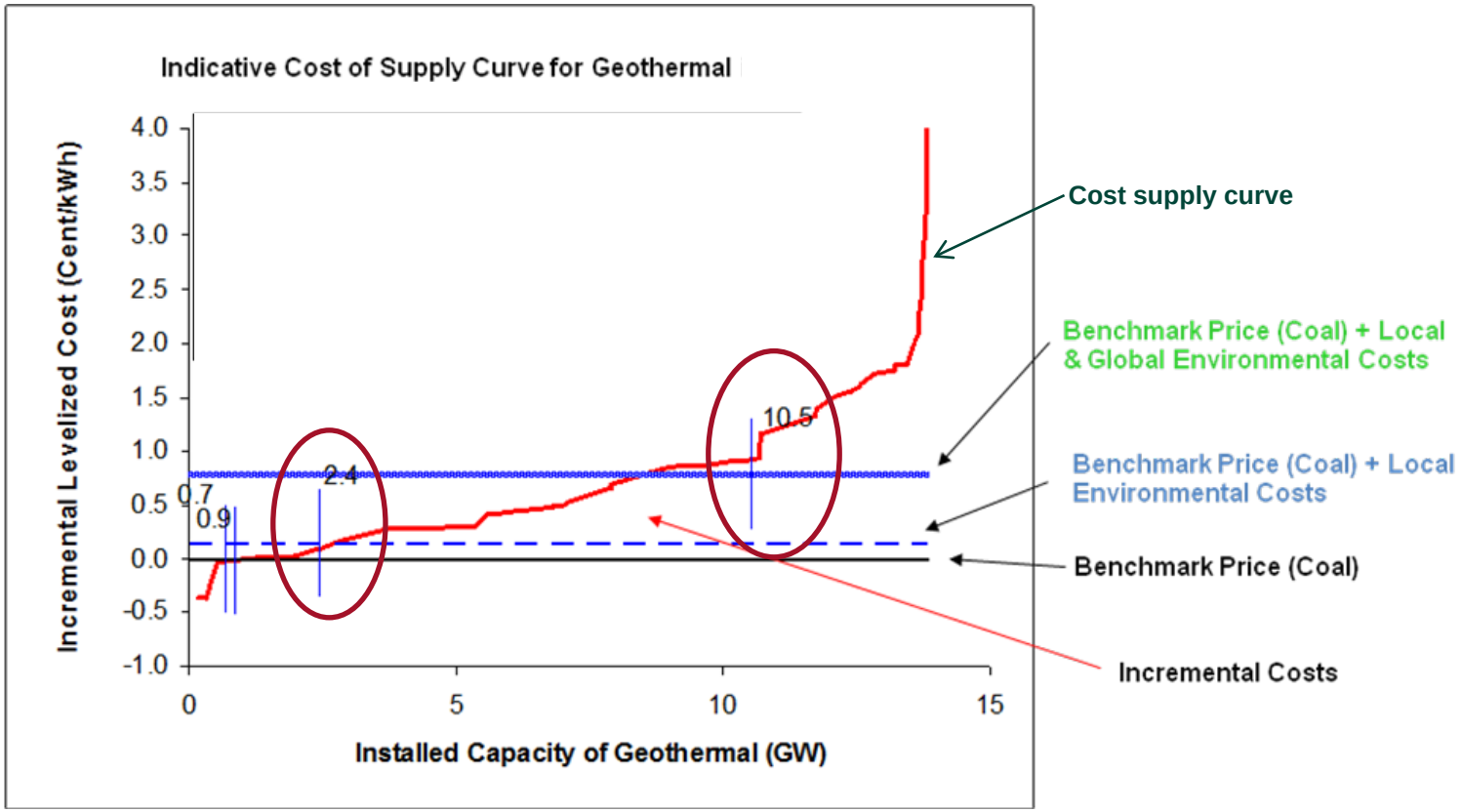
Source: IEA WEO 2011

- Reduced demand (EE) and RE offers significant abatement potential
- Introduction of CO_2 price, enabling policies and higher support for RE technologies are needed

Consideration of environmental externality costs likely to increase viability of RE technologies..

Example (where coal generation is BAU):

- Consideration of **local** environmental costs increases potential for geothermal development from 0.9 GW to 2.4 GW
- Consideration of **local** and **global** environmental costs increases from 0.9 GW to 10.5 GW



Source: WB Analysis

Aggregated approach is most suitable for the power sector

Sector specific conditions	Design elements	Sector level incentives (example)

• High mitigation potential
• Technologies used are global
• RE technology is almost mature and accessible; but costly
• Policies, in general, cover entire sector
• High interaction between supply and demand side initiatives
• High co-benefits
	• Homogenous in nature
	• Clearly defined grids
	• Most countries have a sector wide target
	• Baseline setting relatively straight forward
	  • Elements of ACM0002
	  • Can be dynamic/fixed based on economic growth/demand for electricity services
	• MRV can be relatively easy (few parameters to monitor for quantification)
		• Tariff policy (FiTs)
		• Mandatory off-takes
		• Tax incentives
		• Competitive bidding
		• RPOs

There are enough incentives for participation

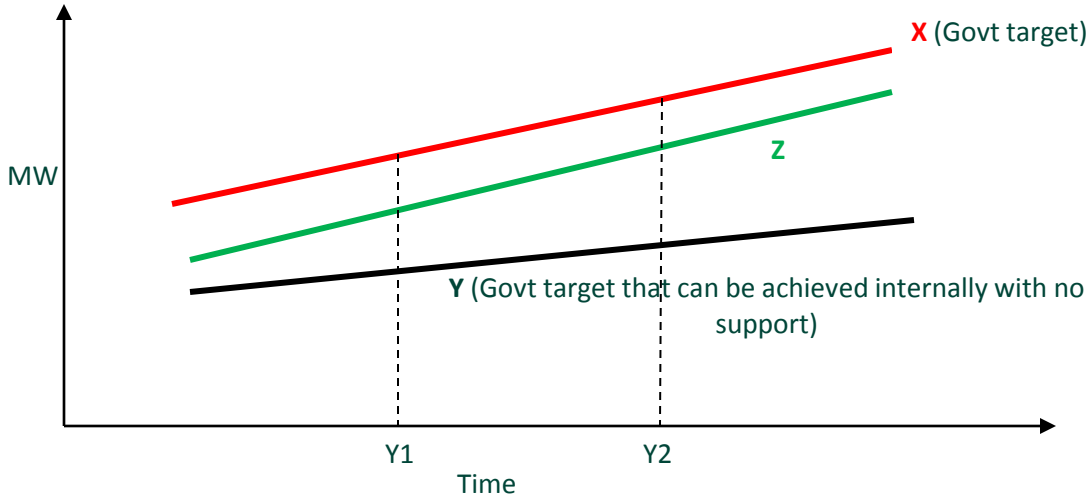
- Opportunity to integrate carbon to support policy implementation and 'development'
- Systematic impact on the financial incentive to developers
- More flexibility on technology selection
- High cost of generation for most RE technologies
- Investor's need certainty and support
- Potential for scalability
- Increased technology transfer

Design elements - Supply Side (RE)

Boundary and scale	• All new grid-connected renewable power installations in a country
BAU reference line	• Power system under least cost expansion plan
Crediting baseline	• Derived from planned domestic expenses for renewable power and associated technology costs • Beyond domestic target or toward more ambitious targets?
Crediting period & schedule	• Along pre-defined milestones (including for planned expenses) • Based on the cost trends of technologies
Institutional & financial structure	• Method 1: • Auctioning of guaranteed tariff for off-taking generation of X MW • Crediting for the Y MW with highest tariff (Y<X) • Method 2: • Setting Operating Margin & Build Margin values based on the planned expansion of power sector and hence X tCO2/MWh • Crediting for the Y tCO2/MWh with ambitious OM & BM values (Y<X)
MRV	• Records of renewable power fed into grid • Emission baseline includes capacity corresponding to domestic contribution

Conceptual Model #1 (preliminary idea)

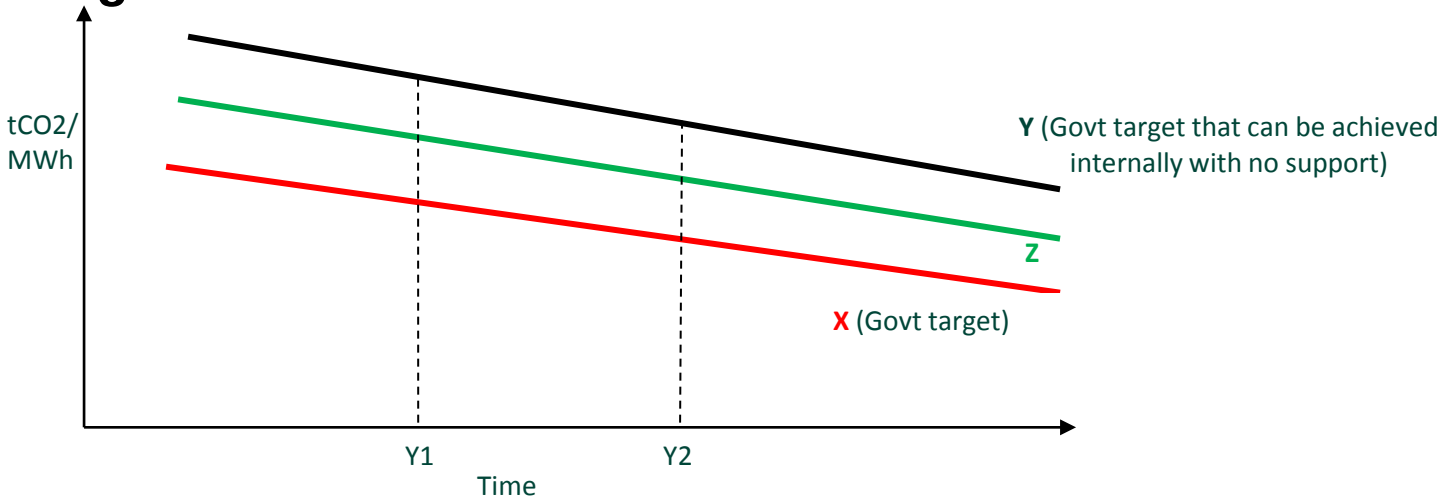
Method # 1: Based on the capacity targets (MW) set and agreed



- Government set a target of X MW (high ambition) and an achievable target (Y) with the help of domestic resources
- The support (partial) for meeting the difference which is either (X-Y) or in between, based on a realistic assessment (Z-Y) MW, can come from external support through sale of carbon credits
- Under this method, government can also set phased targets (at Y1, Y2 etc.) in order to obtain support when the government achieves the intermediate (or short term) targets

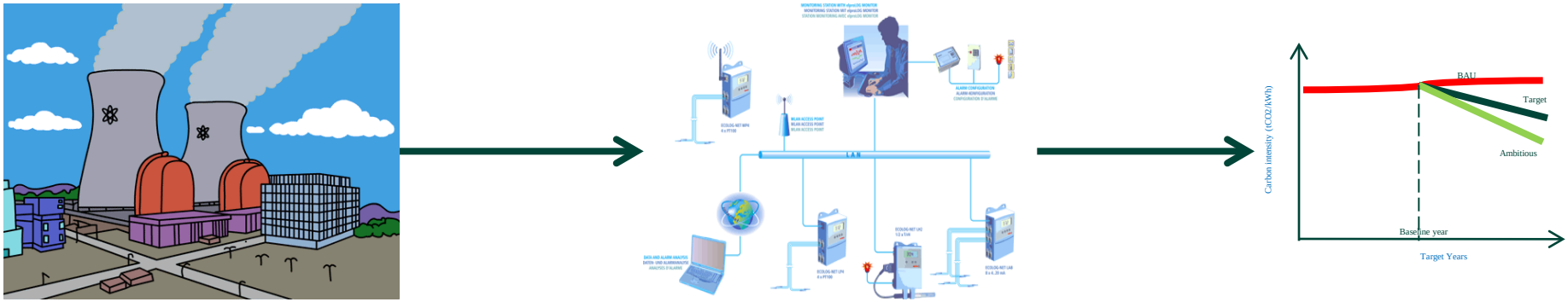
Conceptual Model #2 (preliminary idea)

Method # 2: Based on the grid emission intensity targets (tCO2/MWh) set and agreed



- Government set a target of X tCO2/MWh (high ambition) and an achievable target (Y) with the help of domestic resources
- The support (partial) for meeting the difference is either (Y-X) or in between, based on a realistic assessment (Y-Z) MW, can come from external support through sale of carbon credits
- Weightage (proportion) of Operating Margin and Build Margin for setting X, Y and Z can be negotiated and set for calculating the emission reductions
- The more ambitious the government sets the weightages, the higher the support it receives

MRV



- Relatively easy to establish compared to other types of sectors (e.g. industrial)
- Monitoring of electricity generation and supplied to the grid, fuel consumption in each power plant is needed
- tCO2/kWh for each grid is available in many countries
- QA/QC procedures are key and needs further strengthening
- A system to monitor the efficiency of power plants is needed
- On line and centralized system and real time data reporting/compilation is useful

Design elements - Demand Side (EE)

Boundary and scale	• All targeted consumers in a targeted area and the system supply electricity to consumers
BAU reference line	• Historical trend of transmission & distribution losses or simulation/modeling of the system and considering other 'low' cost options available for their implementation • Emissions from average grid mix or marginal power plant (s)
Crediting baseline	• Derived from planned coverage and domestic expenses for implementing measures/technologies over conventional ones and their associated costs • Credit only for achieving beyond the government target with the implementation and resulting savings taken in to account domestic targets
Crediting period & schedule	• Along pre-defined milestones (including for planned expenses) • Based on the cost trends of technologies used to reduce losses
Institutional & financial structure	• Consumption of targeted consumers (average or peak times??) and potential for reduction in the consumption and hence losses (and load??) in the system connected to them • Crediting for the reduction in losses (or load) with adoption of 'costly ' demand side measures (?)
MRV	• Records of electricity fed into the system • Emission baseline includes capacity corresponding to domestic contribution

Summary

Elements	Yes/No	Remarks
Sector Context		
Need for 'markets'	√	High mitigation potential; Higher upfront costs; high incremental costs; govt. needs to bear the incremental costs and compensate
Incentives		
Sectoral Policy	√	Already in place in many countries; tariff policy; mandatory off take, RPO, subsidies
Target setting	√	Many middle income countries have; others in the process
Design elements		
Boundary	√	Relatively easy to define; single output (electricity); limited competitiveness issues
Coordination	√	Relevant line ministry can play a major role with coordination from other agencies
Data availability	√	Reasonable, can be improved further
Baseline/Target setting	√	Elements of ACM0002 can be used; intensity based calculations are appropriate