

Reclamation Practices and Procedures for Carbon Sequestration

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I. How can current reclamation *practices be modified* to enhance carbon storage and other collateral benefits?

Compaction and grading

7 - Don't compact the soil or minimize compaction

7- Minimal grading (or no grading) is better for growth of trees

5- Sub-layer compacted to address acid mine drainage with top layer of non-compacted soil for vegetation growth

1 - Compaction is expensive for operators – financial trade-offs

Change current practices of back filling and grading to prevent compaction

Organic material and other soils modification

3-Management of pre-mining organic material

Spoil/soil selection for trees, not grass

Require stockpiling of topsoil: currently required but miners get waivers; re-visit approval of waivers.

Use of coal combustion by-products to help pH and compaction.
(Hauling costs are limiting.)

Vegetation

2-Adaptability of tree species to sequester CO₂ in acid soils

Coal company prepare area with potential for forests and let others reforest (utilities)

Clarify the differences between forest and agricultural reclamation

Other

- 5 - Undo/re-educate traditional reclamation practices (operators, regulator)
- 4 - Regulators need to be encouraged and rewarded for making a site (no \$) productive
- 2-Better and faster carbon measurement
- Re-define the concept of “good” reclamation (Stymied by tradition)
- “Master Re-claimer” program for regulators/mines (similar to Master Logger Program)
- Make carbon sequestration part of permit conditions

What are the *economic impediments* to carbon sequestration in mined lands?

Expense

- 6 – It is expensive
- 5-Expense of ripping of soil and tree-planting and associated risks to mine operator
- 4 – Cost of topsoil segregation – including surface spoil – to save a large amount of surface spoil is very costly (double handling)
- 3 - Cost of pH management to accommodate acid-tolerant vegetation in combination with ability to sequester CO₂
- 3- Expense of preparing soil to grow trees (pH, nitrogen, poor soils)
- 3- Cost of planting seedling compared to planting grass

Bond Release Issues:

- 6 - Bond release requirements are a major disincentive
 - 3 - Bond release requirements for vegetative cover
 - 3 - Forestland is “lower land use value” in ag areas yet it costs more, so it is minimized
 - 2 - Costs more to reforest vs. grassland reclamation
- Groundcover required for erosion control even before trees planted

Landowner values and perceptions

- 3 – Misconception of landowners – they expect flat useable land after mining – housing development, grazing, etc.
- 2 - Trees grow slower than grass
- 2 - No financial advantage to operator of trees over growing pasture (hay). Trees aren't of value, especially when the operator is not the landowner.
- 2 - Perception that cost is higher
- 1 – Tree revenue (logging) long term. Grass revenue quick (grazing)

Other disincentives

- 5 - Failure of past projects (perceived)
- No incentives to offset economic benefits
- No economic value of carbon to the landowner

What changes could make these alternatives more *economically attractive*?

- 7- Federal govt. lead is necessary

Carbon credits

- 4- Make carbon a viable commodity in the marketplace.
- 2- Utilities receive carbon credits by buying and re-foresting abandoned lands
- 1 - Full cost/carbon accounting
- 1- Carbon Credits pre-1990 (de-forested)
- Use carbon credits – to offset costs for preparing the land for forests

Other Incentives/flexibility with regulatory agency (not all of these were financial)

- 5 - Demonstration project (Starfire in Kentucky; Powell River Project in Virginia.

- 4 – More flexibility with SMCRA (Regulators’ lack of flexibility gets in the way)
- 4 – Alter landowner incentive programs to include several degraded lands (Abandoned Mine Lands)
- 4 - Identify incentives for coal companies to grow trees
- 3 - Demonstrate bottom line improvement to coal companies
- 3 - BMPs required before coal is marketed
- 2 - Assign partial re-forestation responsibility to Power Companies
- 2 – landowner assistance
- 1 - Use “coal tax” to reforest land
- 1 – partnerships with landowners utilities/state/nonprofits

Misc. (Strategies)

Ally with NGOs

Coal companies could sell “green” coal, from reclaimed sites with carbon offset

Green Power Program

Coal Company that is respected lead by example

Specific regulations requiring

- 4 feet of suitable material for top soil
- native noncompetitive herbaceous species
- pre-mining land use or one of higher “real” value
- minimal compaction