Energy Transition: Mapping an Appropriate Role for Government

Is Subsidizing Commercial Energy Projects the Best Way for America to Achieve it Energy Goals?

Heritage Foundation and the
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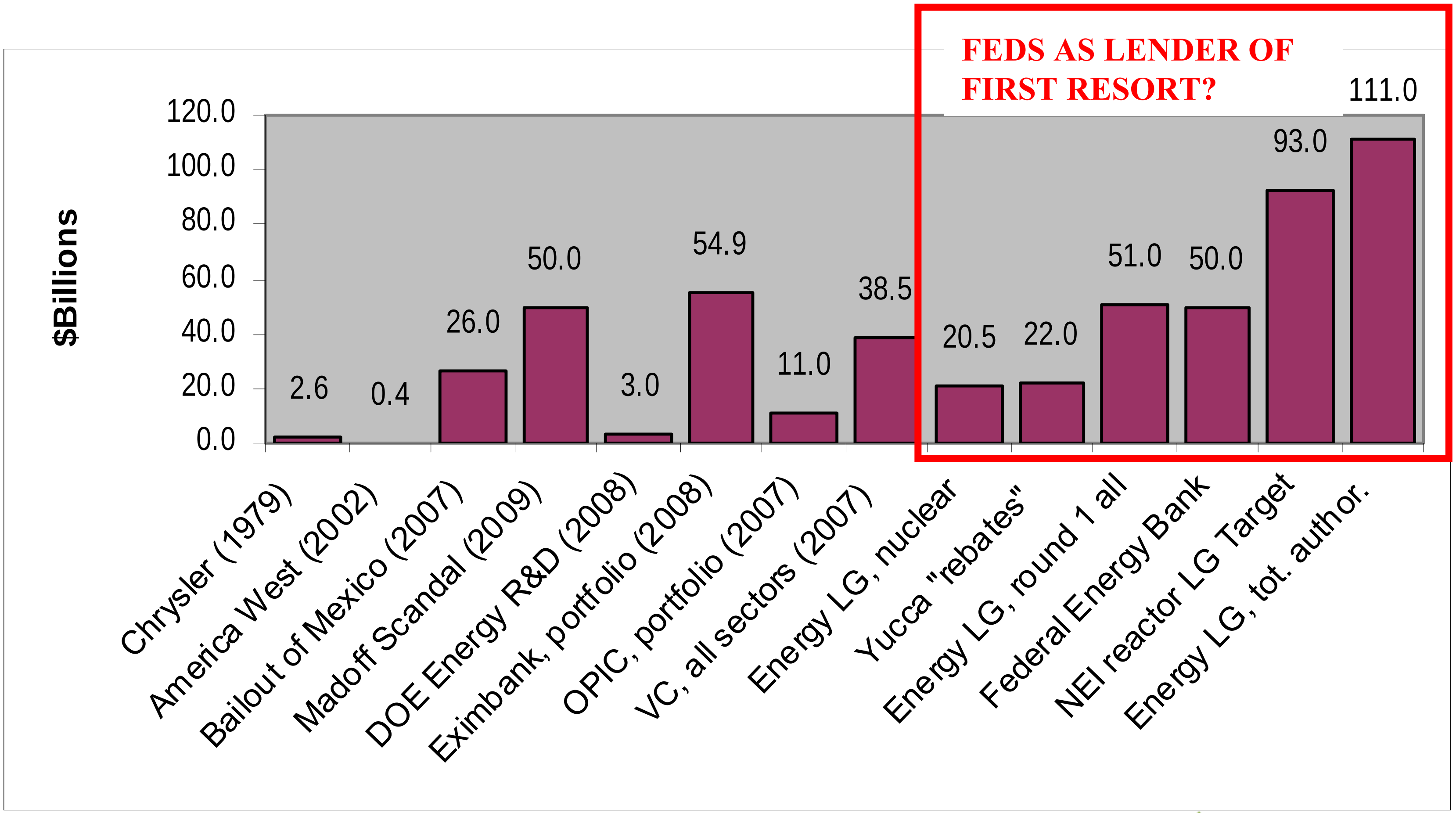
Energy Transition: What are Our Constraints?

- **Money**. We can't do everything, and we are not starting with a blank slate.
- **Interactions**. Climate change, poverty, geopolitics.
- **Time**. Speed of impact, at scale.
  - Technology risk; managerial, technical issues on scaling.
  - Recognizing ineffective solutions quickly is also critical.
- **Failure rates**. Not every promising solution will work, or will work cheaply and quickly enough.
  - What failure rate should be expected?
  - What implications does this have for the number and types of innovations we are seeking?
- **Expertise**. What are the critical skills to vet and implement solutions, do they exist, and if so, where?
  - Despite the focus of most government efforts, it is not all about technology.

Scale of Energy Initiatives are Massive: Replaying Fannie Mae?



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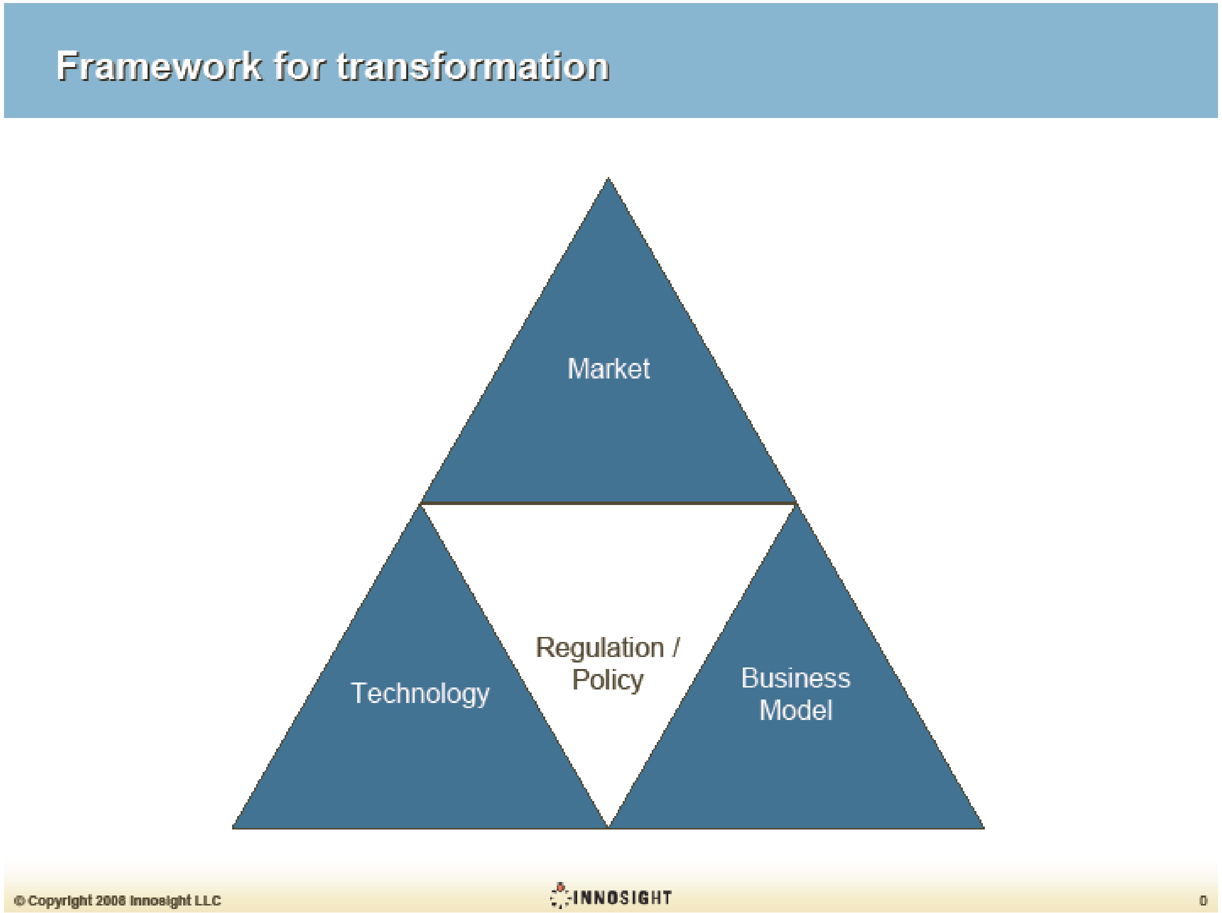
Maximizing Liquidity ≠ A Good Structure for Solvency or Venture Success

DOE Loan Guarantees – Joint Bank Comments on Proper Program Structure – July 2007

citi — $$$ 45b + guarantees on 300 billion in risky assets	CREDIT SUISSE
LEHMAN BROTHERS X	Goldman Sachs — Δ to Commercial Bank $$$ 10b + $13b via AIG
Merrill Lynch X	Morgan Stanley — Δ to Commercial Bank $$$ 10 billion

Innosight LLC: Transformation is Much More than Technology Alone



Included courtesy of Mark Johnson, Innosight, LLC, www.innosight.com.

Government and Energy: Bad Policies Can Slow Transition

- Federal Initiatives:
  - Keep growing and have multiple objectives.
  - Objectives sometimes conflict within or across plans.
  - Most rely on government as prime mover and funder.
  - Assume staff skills, retention, and incentive alignment beyond what normally exists inside of government.
- Energy problem has multiple pathways to a solution, not one.
  - Best pathway(s) are not known in advance.
  - Side-effects of current favorites also somewhat uncertain (e.g., biofuels).
- Where is government leadership useful, where is it counter-productive?
- If the plans are advocating a public role for functions normally done by private actors (e.g., clean energy bank):
  - Why have the old models failed?
  - Is the proposal the most cost-efficient alternative path?

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Full Cost of Nuclear: Subsidies Exceed Private Investment

	Low	High	
	Cents per kWh		
I. Private investment in Calvert Cliffs III			
Base case of Calvert Cliffs	5.7	5.7	Constellation estimate, Oct. 2008
II. Public investment in Calvert Cliffs III			
A. Selected EPACT subsidies			
Production tax credits	0.5	0.5	Constellation estimate assuming 50% access to PTCs
Loan Guarantees, 100% of debt	3.7	3.7	Constellation estimate, Oct. 2008
Industry total estimated cost	9.9	9.9	
B. Additional subsidies ignored in Constellation models			
Accelerated depreciation	0.3	0.6	15 yr 150% DB vs. service life.
Price-Anderson cap on reactors	0.5	2.5	Based on Heyes (2002); values uncertain.
Waste fund short-fall	-	0.2	Based on Rothwell (2005); needs updating.
Calvert Co. property tax abatement	0.0	0.0	$20m/year.
Cost of capital value of delay insurance, first two reactors	0.7	0.8	Based on Bradford (2007).
Add-in missing subsidies	1.5	4.1	
III. Total cost of nuclear power			
Public subsidy	**5.7**	**8.3**	
Public/private share	**99%**	**145%**	
Subsidy/avg. wholesale rates, 2002-06	**129%**	**189%**	
Full cost of power	**11.4**	**14.0**	

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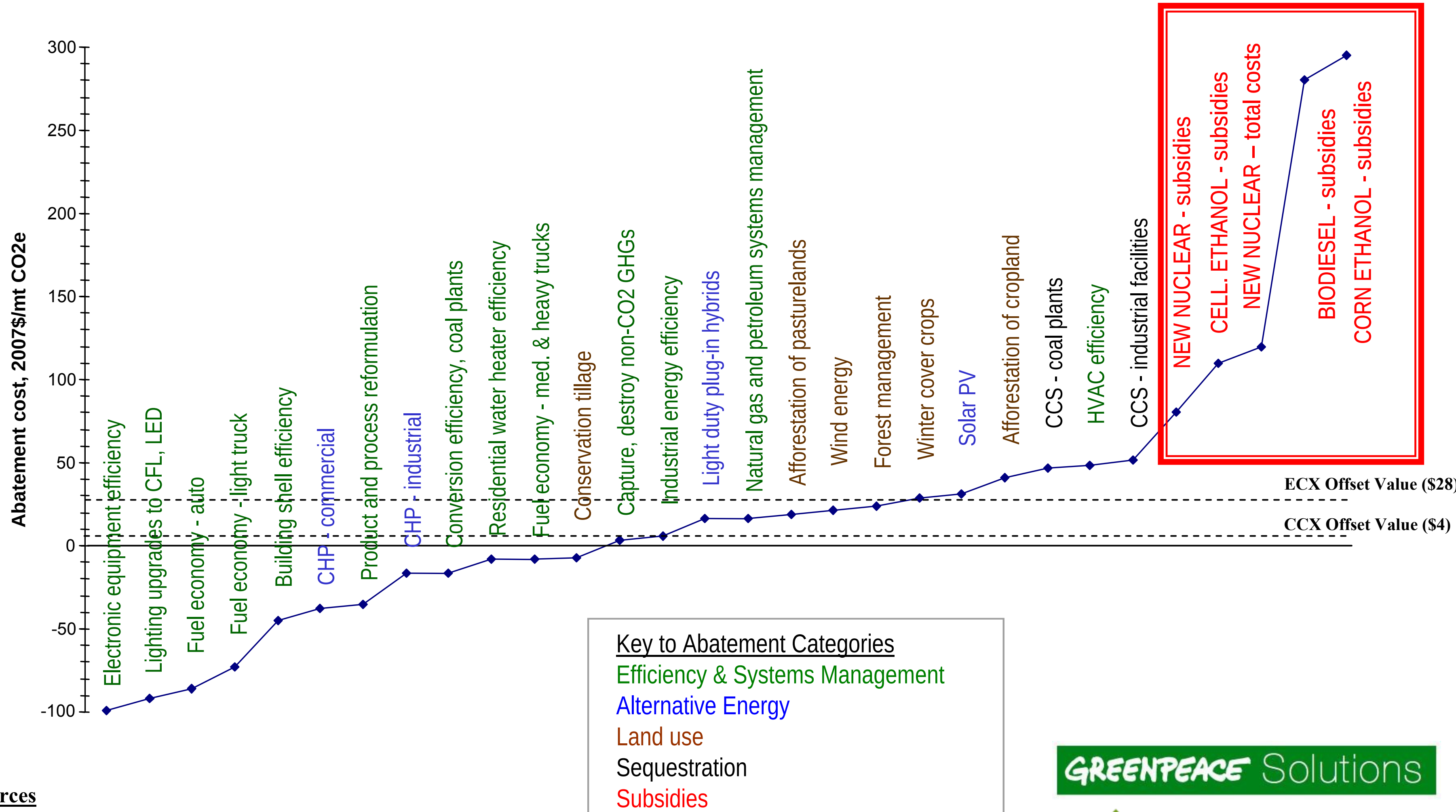
Government-Led Solutions: Politics Often Directs Money in Highly Inefficient Directions



Sources
Abatement technologies: McKinsey & Company, mid-range case.
Offset prices: Average of contract values from CCX (2008-10) and ECX (2008-12).
Subsidy data: Earth Track, Inc.

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Segmenting the Problem Can Help Identify Useful Strategies

Analog	**Manhattan Project**	**Standard Setting in Computer Industry**	**Dynamic Competition**
Application	Key bottlenecks where gaps in basic understanding will constrain most or all responses to transition from oil.	Deficits in market structure that impede proper allocation of research and investment dollars, and slow the deployment of existing or near term technologies.	Multiple pathways exist to meet policy end-points, but it is difficult to identify the optimal (cost, time, skills, environmental impact) ahead of time.
Possible Examples	-Basic science of CCS, climate change, energy storage. -Core grid operating rules, interconnections to make fluid market entry, exit possible.	-Standardization of rules for rapid grid entry, exit. -Pricing transparency (nodal pricing, carbon tax, desubsidization, retail price differentiation). -Standardized metrics of impact. -Visual energy operating cost data in real estate sale and rental markets. -Policy neutrality (including demand side). -Property rights regimes for public sector R&D.	-Most situations where technologies are one of multiple options for addressing oil consumption. -Government rules may be needed to set competitive parameters and endpoints. -Can use subsidies; they should just be competitively tendered (e.g., alt fuels, drive trains, fleet management, improved efficiency).

Vetting Plan Ideas: Design Elements Can Increase the Probability of Success

Higher Chance of Success	Lower Chance of Success
Allocation of resources	
Highlight price differentiation across energy solutions	Masking price differentiation to support particular technologies
Many small investments	A few very large bets
Lower expected cost per unit impact	Higher or very uncertain cost per unit impact
Larger share of risk borne by private sector	Financial risks borne by government
Public subsidies allocated competitively	Public subsidies earmarked to each potential solution
Subsidies earned based on enterprise performance	Subsidies earned based on enterprise investment
Technology selection and oversight	
Apply incremental changes to existing systems	Require multiple, large, structural transformations
Shorter, more certain time until deployment; rapid, decentralized scaleability	Longer, less certain time until deployment; slow scaleability
Solutions integrate better management, retrofits to existing capital base	Solutions require mostly new capital, accelerated scrappage
Solutions congruent with related big problems (e.g., climate change)	Solutions conflict with related big problems (e.g., coal-to-liquids)
Required skills can be procured, compensated in a flexible manner	Managing party (e.g., government) requires new skills at compensation rates not normally available
Performance measurement and mid-course corrections	
Metrics, management structure allow frequent comparisons, options to defund	Performance not (well) tracked; long intervals without ability to defund and redeploy resources
Potential negative effects of solution scaling properly vetted	Negative effects ignored or finessed (e.g., indirect land use in biofuels)

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