

# Opportunities for Cold Fusion Policy Change

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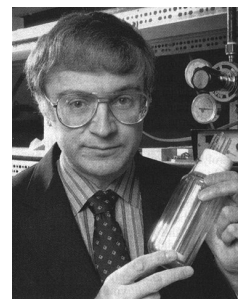
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## Cold Fusion Energy Source *Recognized from the Beginning*

“I would think that it would be reasonable within a short number of years to build a fully operational device that could produce power or drive a steam turbine, for instance.”



*Stanley Pons, March 23, 1989*

*Similar comments were made by Martin Fleischmann*

[http://en.wikipedia.org/wiki/File:Stanley\\_Pons\\_cold\\_fusion\\_gear.jpg](http://en.wikipedia.org/wiki/File:Stanley_Pons_cold_fusion_gear.jpg)

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## Cold Fusion Energy Policy

### *Two Main Questions*

- How do we get it?
- How do we deal with it when it gets here?
- That is...
  - Public support for R&D
  - Dealing with secondary impacts



<http://www.angelamaiers.com/2011/01/pondering-makes-for-a-perfect-new-year.html>

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## Energy Policy Should Be Rational!

- Maximize public benefit
- Minimize adverse collateral (secondary) effects
- Develop policies based on **evidence**
- Make corrections with policy experience
- Apply in particular to energy policy

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## Renewed Policy Opportunities

- Recent favorable developments (“changing landscape”)
- Many potential advances: SKINR, Rossi, Claytor, Celani, commercial(izing) devices
- Radical changes in level of evidence?
- National security implications (geopolitical concerns)
  - Advantages to nation with initial commercial success
  - Energy-related worldwide balance of power

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## Recent Cold Fusion Potential Advances

### *Selected Examples*

- |                           |                            |
|---------------------------|----------------------------|
| • Univ. of Missouri SKINR | • JET Energy “Nanor”       |
| • Rossi’s E-Cat, Hot Cat  | • Defkalion “Hyperion”     |
| • Demonstrations, 2011    | • Brillouin “CECR”         |
| • Levi et al, 2013, 2014  | • Blacklight Power         |
| • Industrial Heat, 2014   | “SF-CIHT” (maybe)          |
| • Claytor Gas Discharge   | • Other Researchers (e.g., |
| • Celani Constantan Wires | ENEA)                      |

*What do these developments mean in aggregate?*

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## Cold Fusion Policy Opportunities

*Back to the Two Main Questions*

1. Public Support for Research and Development?
2. Intervention to Deal with Secondary Impacts?



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## Public Support for R&D

*Ample Precedent*

- Manhattan Project
- Aviation
- Microelectronics & computers
- Internet
- Nuclear power
- Biotechnology
- Space exploration
- Agriculture
- Renewable energy
- Innumerable others



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## Public Policy Responses for R&D

### *Cold Fusion Levels of Evidence*

*LoE – Level of Evidence (origins in law)*

*PoE – Preponderance of Evidence (>50%)*

*CCE – Clear and Convincing Evidence (>70%)*

*BRD – Beyond a Reasonable Doubt (>90%)*

<u>Event</u>	<u>LoE</u>	<u>Policy Response</u>
Initial announcement and investigations soon after	PoE	Equal support with other emerging technologies
25 years of accumulated evidence (since 1989)	CCE	Priority support (hot fusion levels)
Recent developments	BRD?	Crash program?



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## Dealing with Secondary Impacts

### *Evidence-Based Policy*

- Rational policy choices for the public benefit
- Direct – energy industry
  - Current energy supply infrastructure
  - All phases – production, transport, storage, use
  - Disruptive technology
- Indirect – workforce, communities, tax revenues, income redistribution, others
- U.S. and international (geopolitical concerns)
- **Solutions do exist!**

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## Cold Fusion as a Disruptive Technology

### *A Bit of Elaboration*

- “A technological innovation that overturns and replaces existing technologies or products in the market”
- Clayton Christensen, 1997, “The Inventor’s Dilemma”
- Potential impact of cold fusion on full cycle of energy production, transport, consumption
- May be deployed in a dispersed for centralized configuration (household to mega-facility)



## Impact Mitigation

### *Ample U.S. Precedent*

- Intervention for the public benefit
- Great Depression alphabet agencies (WPA, PWA, CCC, FWA, FCA, others)
- American Recovery and Investment Act (ARRA), 2009
- Auto Industry Bailout (2008-2009)
- Many others

## Solutions Do Exist for Secondary Impacts

### *Technology Assessment*

- Rational response to identified impacts
- Proactive approach to mitigate effects
- Intervention for “market failure”
- Well-developed methods and previous track record (OTA)
- Professional analysis with stakeholder participation
- Systematic, staged approach



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## Typical TA Elements

- Technology description
- Delineation of parties at interest
- Direct impacts (and populations)
- Indirect impacts (and populations)
- Policymaking apparatus (legislation, research, regulation, etc.)
- Mitigation measures
- Definition of policy alternatives
- Selection and implementation



White, Blake L, 1988, *The Technology Assessment Process: A Strategic Framework for Managing Technical Innovation*

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## Technology Assessment Example

### *Coal Slurry Pipelines*

- Pipeline and unit train descriptions
- Economic impacts
- Environmental and social impacts
- Legal and regulatory analysis
- 11 major issues and findings



<http://www.epa.gov/region9/tribal/success/03/water.html>



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## Cold Fusion Levels of Evidence

### *Policy Responses for Secondary Impacts*

*LoE – Level of Evidence*

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<u>Event</u>	<u>LoE</u>	<u>Policy Response</u>
Initial announcement and immediate investigations	PoE	Develop detailed mitigation plan (effects, parties, etc.)
25 years of accumulated evidence (since 1989)	CCE	Prepare parties-at-interest and mitigating agencies
Recent developments	BRD?	Mobilize for implementation

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## Summary: Cold Fusion Policy Opportunities

### *Based on Level of Evidence*

<u>LoE</u>	<u>Development Support</u>	<u>Impact Mitigation</u>
PoE	Equal support with other emerging technologies	Develop detailed mitigation plan (effects, parties, etc.)
CCE	Priority support over competing solutions	Prepare parties-at-interest and mitigating agencies
BRD	Crash program	Mobilize for implementation

*LoE – Level of Evidence*

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## Barriers to Rational Cold Fusion Policies

### *Sociology of Science Perspective*

- Thomas Merton – “father” of sociology of science: CUDOS
  - Communalism                      -- Originality
  - Universalism                      -- Skepticism
  - Disinterestedness
- Process of initial CF announcement and rejection
- Cold fusion as “undead science” (Bart Simon)
- Continued “pathological disbelief” (Brian Josephson)
- “Science advances one funeral at a time” (Max Planck)

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## Taking Advantage of Policy Opportunities

- Is proactive intervention feasible?
  - Support for development
  - Preparation for impact mitigation
- Can barriers be overcome for rational policy development?
- Where can opportunities be realized?
  - International?
  - National?
  - Agencies?



<http://www.borgenmagazine.com/public-welfare-foundation/>

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## Cold Fusion Policy Opportunities

### *Summary*

<ul style="list-style-type: none"> <li>• Cold fusion has tremendous potential <u>public benefit</u></li> <li>• CF policy must address both realization of <u>benefits</u> and mitigation of <u>impacts</u></li> <li>• <u>Rational</u> energy policy is the best approach</li> <li>• Policies should be made based on the <u>level of evidence</u></li> <li>• CF evidence shows <u>change is needed</u> in current negative policies for support</li> </ul>	<ul style="list-style-type: none"> <li>• CF will have many secondary <u>social consequences</u></li> <li>• CF promises to be a highly <u>disruptive</u> energy source</li> <li>• <u>Technology Assessment</u> is a rational response to secondary impacts</li> <li>• Significant <u>barriers</u> remain for rational CF policy</li> <li>• The path forward for CF policy opportunities remains <u>uncertain</u></li> </ul>
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<http://www.oilersaddict.com/edmonton-oilers-question-marks/>

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## Questions or Comments?

