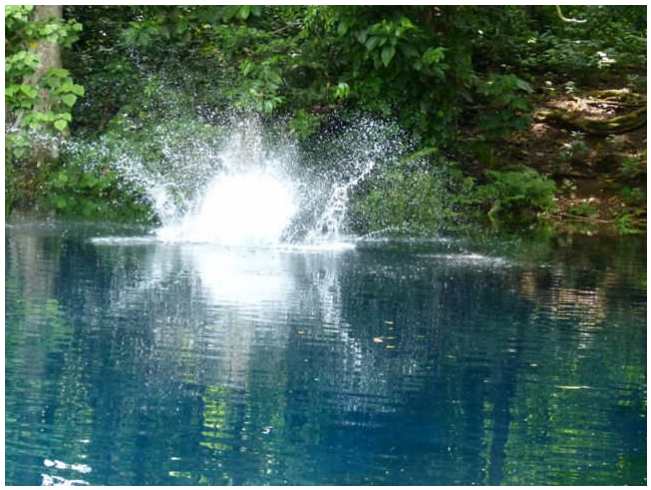
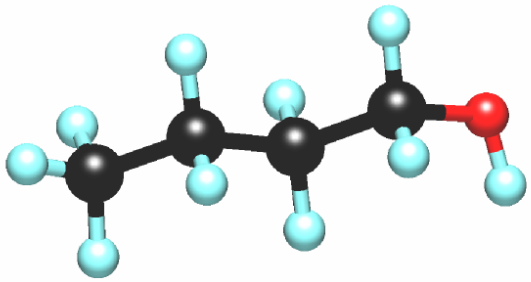
BIOFUELS: ADDRESSING MAJOR POLICY RISKS





Professor Paul Martin

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Social licence: Whose problem?

- For biofuels vs other energy sectors, how strategically important is legitimacy?
- Why should we believe super-industries deliver social justice and ecological gain?
- Who wins, and who loses, from weak governance?
- In governance who loses most from complexity and transaction costs?
- Do we really believe that government has the capacity to put in place governance that will preserve your license?

A constructively skeptical view of governance risks

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What is policy risk?

The risk that a policy may:

1. Fail to be politically implemented
   - Through formal political processes; or
   - Informal political resistance.
2. Be accepted politically but fail because of design failures
   - Transaction costs
   - Implementation platform failings
3. Cause excessive harmful ‘spillovers’.

Policy stages

Policy Stage	Typical transactions
Design	Consultation, modelling, instrument design, implementation design
Political adoption	Consultation, bargaining, parliamentary process, legislation
Agency adoption	Policy evaluation, resource analysis, workforce analysis, implementation strategy, budget allocation, workforce preparation.
Field-adoption	Evaluation of implications, resource bargaining, consultations, training and system design, trialling.
Implementation	Communication, in field-action, systems testing and refinement, transacting, political response and refinement.
Institutional action	Enforcement or withdrawal, adaptation and refinement
Evaluation	Formal review, political review, media review

Policy design strokes the ego. Taking responsibility for it working effectively, economically and fairly is far tougher.

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Task 43 Objective 2

1. Using policy and market based instruments to effectively promote sustainable development.
2. Using science based sustainability criteria and standards...." given regional/feedstock variables".

"Sustainable development" = environment, economy and social justice

For every complex problem, there is a solution that is simple, neat, and wrong. Henry Louis Mencken

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How will government deal with biofuel risks?

- Risks to economic values
  - Subsidy / mandate economic distortion
  - Input competition effects (e.g. water use)
  - Investment risks (public and private)
  - Failure to realise the real opportunities
- Risks to the social values
  - Displacement and monopolisation
  - Nth/Sth inequities
- Risks associated with politics
  - Policy distortion
  - 'Public choice' effects
- Environmental risks
  - Resource use/damage
  - Monocultures and biodiversity
  - Invasive species
  - Resource depletion, consumption

Relying on normal tools:
- Regulation
- Bans
- Incentives and subsidies
- Market creation and support
Within a politically contested context

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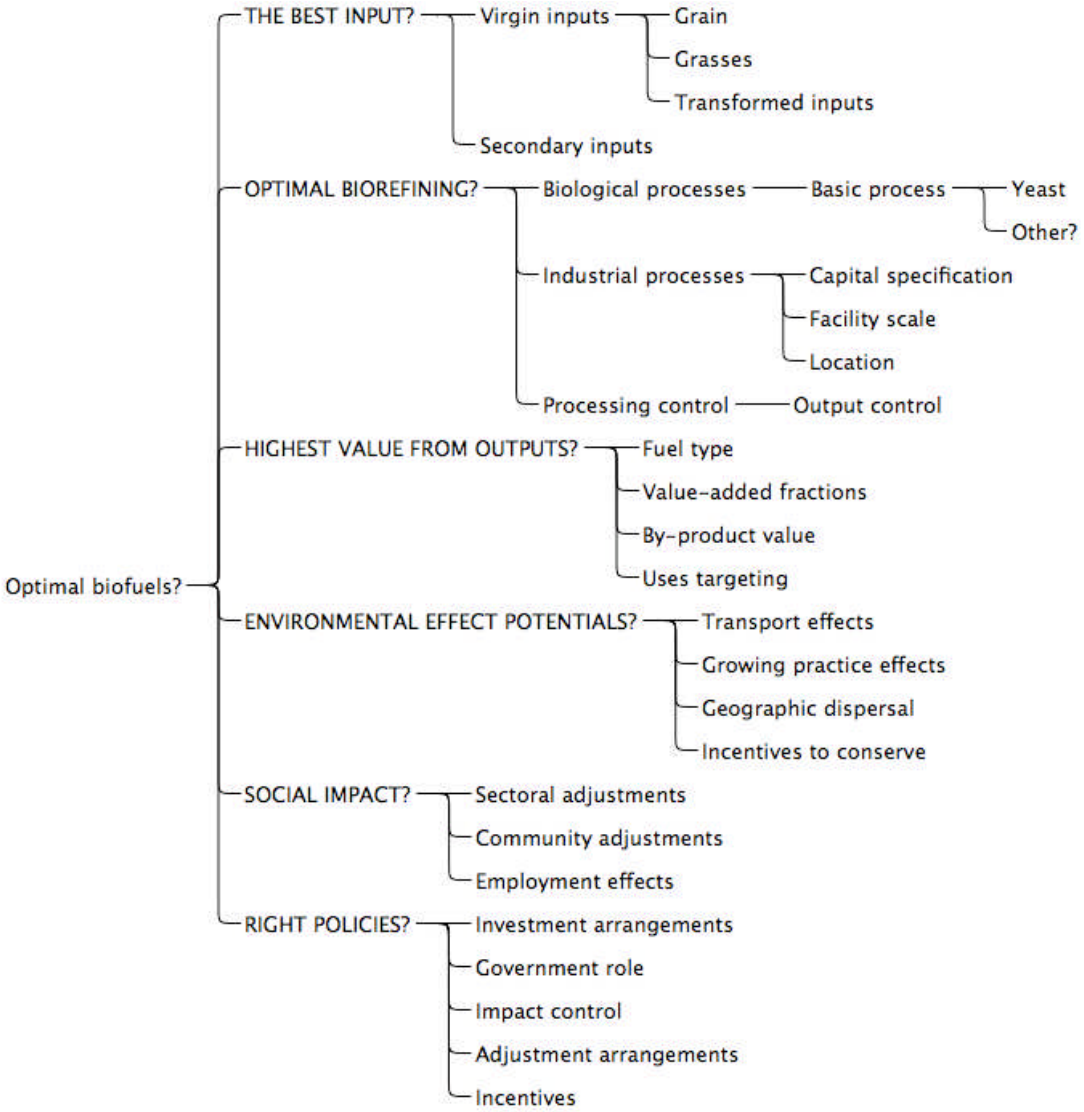
What biofuels paradigm?



Biofuel commerce = a villager in Africa selling firewood, to an American fuel company selling elaborately transformed fuel and food product from a biofuel refinery in Indonesia.

National biofuel policy goals?

- National energy security?
- Industry development?
- Input competition control?
- Environmental protection?
- Social justice?

… all of these at the same time?

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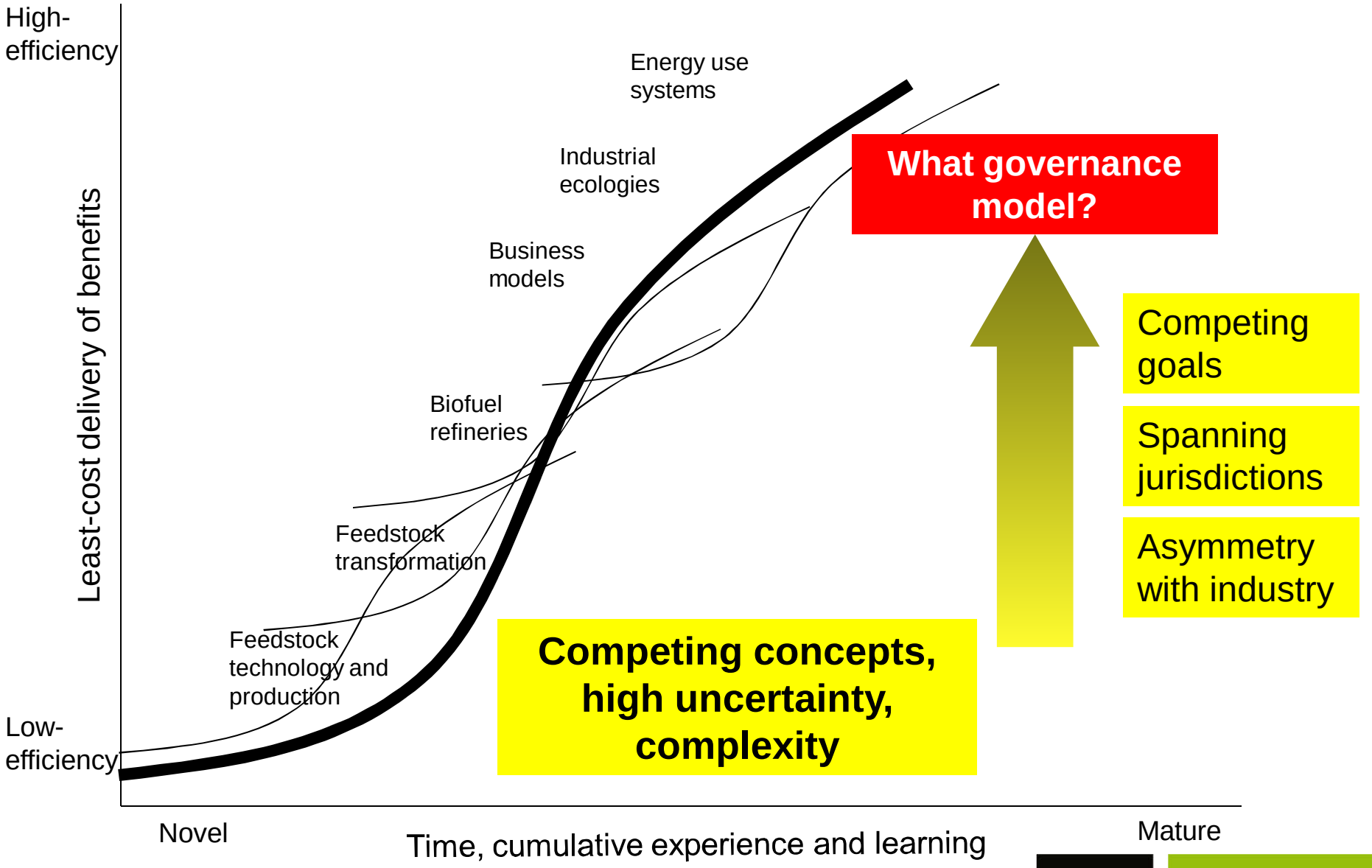
The vicious nature of the problem



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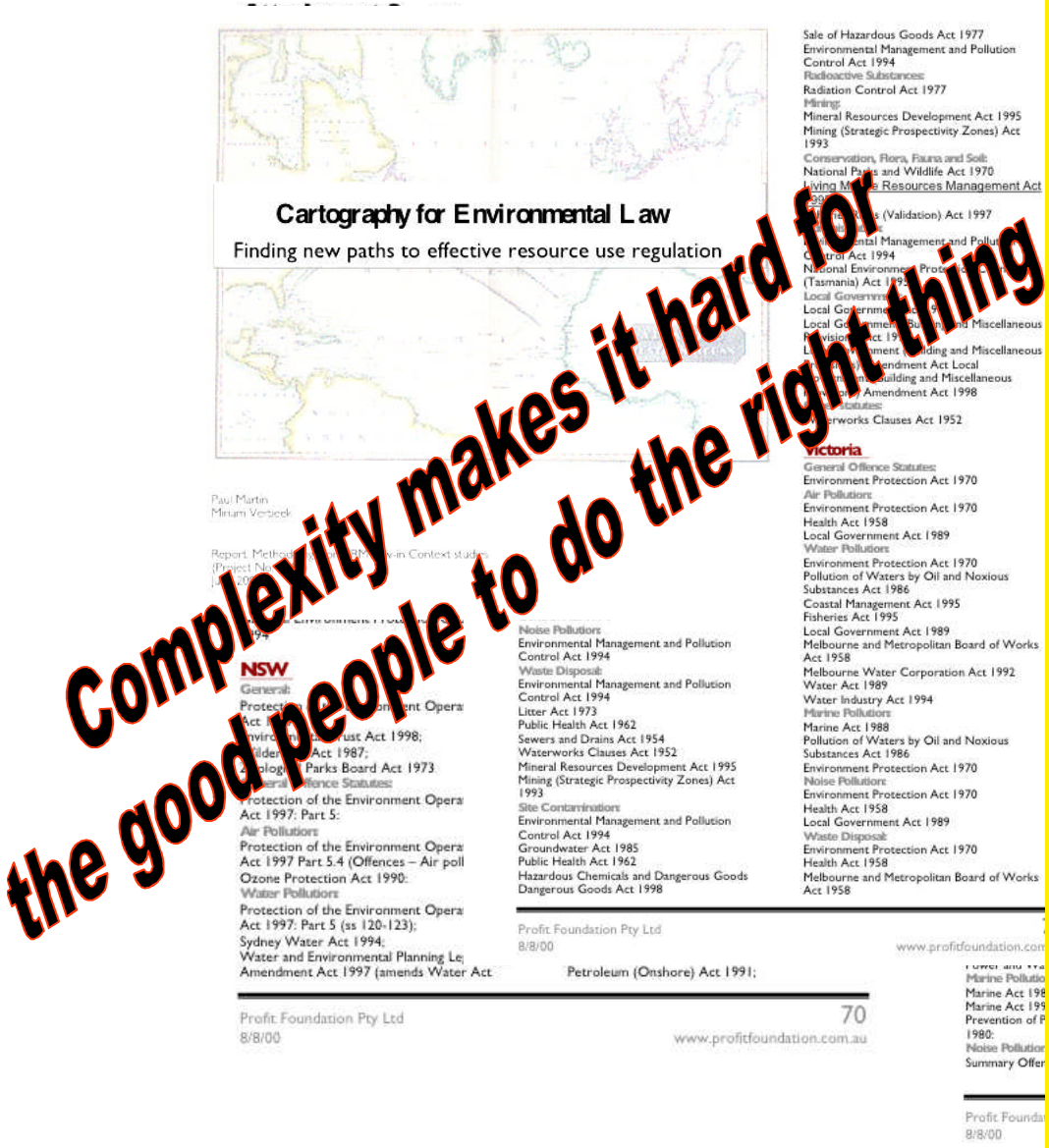
Could good instruments be bad governance?



Many rules, many market instruments, programs. Too little effectiveness

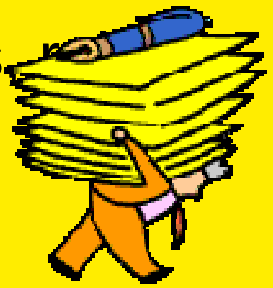
>250 State and National resource laws.

+ regulations, rulings, strategies and plans.

+ Local government rules.

+ Industry and market chain codes, standards

+A myriad of plans, reports and advisories



Limits to biofuel policy instruments

- Instruments are clumsy relative to the issues.
- Standards are many, confused and weak.
- Governments are state bounded, trade is not.
- Private funds flows are more powerful than government funds.
- Governments have less information than the governed industry.

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Water : part of the challenge...

- Biofuels = eWater (and eSoil and eWork) moving around the world (flows following the money)?
- Managing biofuel “industrial ecologies” for TBL outcomes (eg integrated biofuel, farming and industrial enterprises)?
- Water parsimony = high harm potential (e.g. biofuel weed risk, marginal lands industrialisation)?

e.g. Water saving crops

- The ideal biofuel species = perfect weed?
- Genetic modification directions
- The perfect weed storm
  - Scale and unit value of biofuel
  - Economic vulnerability of growers
  - Fiscal capacity to protect/remediate?

Forum

Nonnative Species and Bioenergy: Are We Cultivating the Next Invader?

JACOB N. BARNEY AND JOSEPH M. DITOMASO

Biofuel feedstocks are being selected, bred, and engineered from nonnative taxa to have few resident pests, to tolerate poor growing conditions, and to produce highly competitive monospecific stands—traits that typify much of our invasive flora. We used a weed risk-assessment protocol, which categorizes the risk of becoming invasive on the basis of biogeography, history, biology, and ecology, to qualify the potential invasiveness of three leading biofuel candidate crops—switchgrass, giant reed, and miscanthus (a sterile hybrid)—under various assumptions. Switchgrass was found to have a high invasive potential in California, unless sterility is introduced; giant reed has a high invasive potential in Florida, where large plantations are proposed; miscanthus poses little threat of escape in the United States. Each biofuel crop shares many characteristics with established invasive weeds with a similar life history. We propose genotype-specific postintroduction screening for a target region, which consists of risk analysis, climate-matching modeling, and ecological studies of fitness responses to various environmental scenarios. This screening procedure will provide reasonable assurance that economically beneficial biofuel crops will pose a minimal risk of damaging native and managed environs.

Keywords: biofuels, ethanol, invasive species, weed risk assessment, bioenergy

Growing energy demands, a desire to reduce reliance on fossil fuels, and greater awareness of climate change have led both state and federal governments to pursue alternative energy sources. Biomass-derived energy has been pursued for decades in the United States and Europe, but recent renewed public and political interest has sparked explosive growth in the biofuel industry. The United States initiated a research program in the late 1970s to identify candidate crops for dedicated biofuel production, whereas Europe began biofuel research in the 1980s (Lewandowski et al. 2003). However, a recent surge in bio-based fuel research has incited concern regarding rapid adoption of novel crops that may become invasive pests (Raghu et al. 2006). Herbaceous and woody species are being selected, bred, and transformed for desirable agronomic traits, including tolerance to drought, salinity, and low-fertility soils, as well as increased aboveground (harvestable) biomass and enhanced competitive ability to reduce fertilizer, irrigation, and pesticide use. However, the very traits that characterize an ideal biofuel crop also typify much of our invasive flora. Indeed, the most promising biofuel crops are nonnative to the regions proposing cultivation, compounding the potential risk of future invasions. For example, California and the Pacific Northwest are pursuing switchgrass (*Panicum virgatum* L.), which is native to most of North America east of the Rocky Mountains; a private firm in Florida is initiating a biofuel program centered on the Eurasian giant reed (*Arundo donax* L.), so-called e-grass; and Europe and the United States are screening Asian miscanthus hybrids (*Miscanthus* × *giganteus*) (Lewandowski et al. 2003).

Many invasive species have horticultural or agronomic origins with long periods of cultivation that precede their escape, naturalization, spread, and subsequent environmental impacts (Mack 2000). A classic example is kudzu (*Pueraria montana* [Lour.] Merr. var. *lobata* [Willd.] Maesen and S. Almeida), first promoted by the federal government as a forage species and later widely planted for erosion control (Forseth and Innis 2004). The rooting structure, perennial habit, and extraordinary growth rate of kudzu made for an ideal erosion mitigator, although these same traits fostered its eventual escape and dominance in the southeastern United States. The Southeast met a similar fate with johnsongrass (*Sorghum halepense* [L.] Pers.), introduced as a forage crop and now a noxious weed in 19 states. The sequence of

Jacob N. Barney (e-mail: jbarney@ucdavis.edu) is a postdoctoral scholar interested in the factors determining invasion success, and Joseph M. DiTomaso (e-mail: jmditomaso@ucdavis.edu) is an extension specialist interested in invasive weed ecology and management; both are in the Department of Plant Sciences at the University of California–Davis.

Innovations in governance?

- Redesign transaction systems.
- ‘Smart regulation’, multiple instruments.
- Improve behavioural sophistication.
- Streamline the architecture.
- Improve regulatory evaluation and review.
- Use ‘collaborative governance’.
- Enable citizens to take action.
- Cut ‘front-line’ transaction costs.
- Reflect commercial risk management.
- Apply the scientific model

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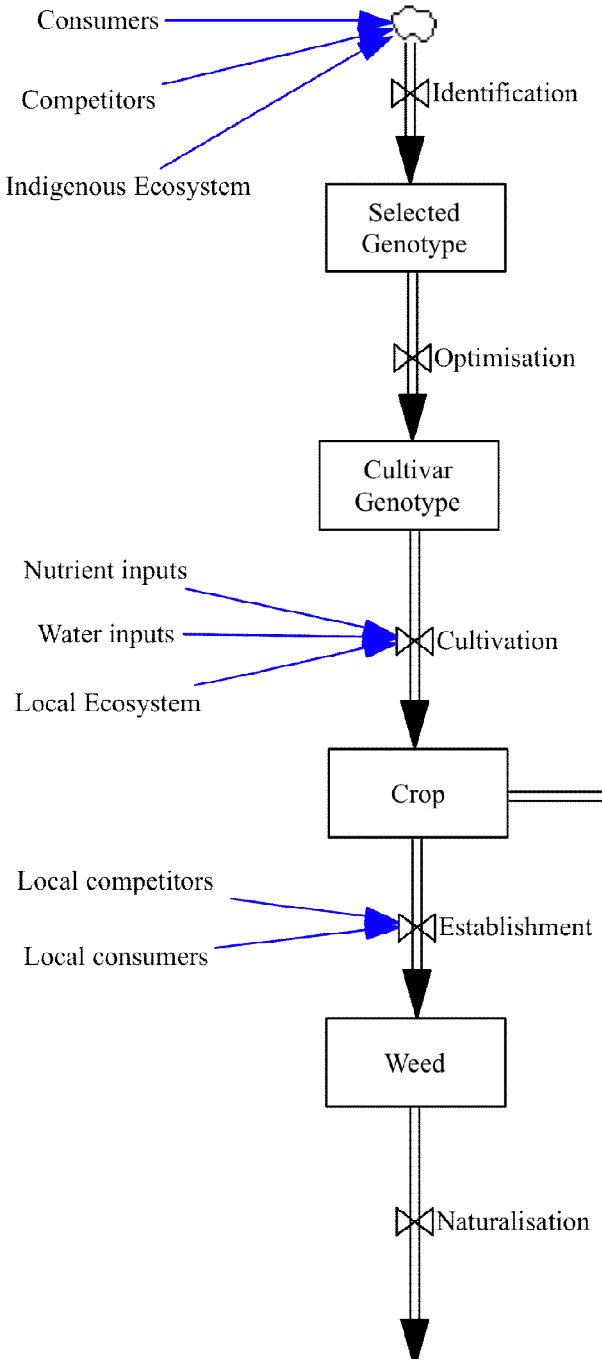
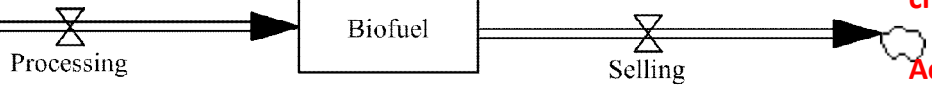
Weed pathway

Whose decisions?

What institutions?

Risk themes ?





Field scientist
Lab scientist

Industry Entrepreneur

Risks expert
Customs Bureaucrat

Commercial Propagator
Development agency staff
Site investor/owner
Land-use approver

Plantation entrepreneur
Plantation manager

Biofuel processor
Biofuel investor
Biofuel consumer

Extension officer
Rural NGO activist
Plantation neighbour

Government weeds manager
Regional environmental officer
Local weeds manager
Weeds officer

Field scientists

Science institutions

Enterprise investors

Bio-security agencies

Policy agencies

Commercial insurers

Land-use agencies
Economic agencies
Property investors
Industry organisations
Primary industry agencies

Standards Certifiers
Public media

Fuel companies

Legal system

Consumer organisations

Conservation agencies

Science institutions

Monitoring agencies

Risk/context scientific evaluation

Closing the risk-responsibility/reward cycle

Risk-calibrated management options

Economic incentive for risk management

Informed, harm-accountable investors

Risk-control by the industry

Risk-informed consumer choices

Active harm monitoring

Compensation

Knowledge for avoidance/control/remediation

Incentives for control/remediation

Funds for control and remediation

A biofuels governance strategy?

- Systems-based, using ‘smart regulatory’ approaches.
- Harnessing private sector knowledge and power, reflecting game theory.
- Credible co-regulation – a new government/industry relationship.
- Innovation in instruments, with greater commercial sophistication

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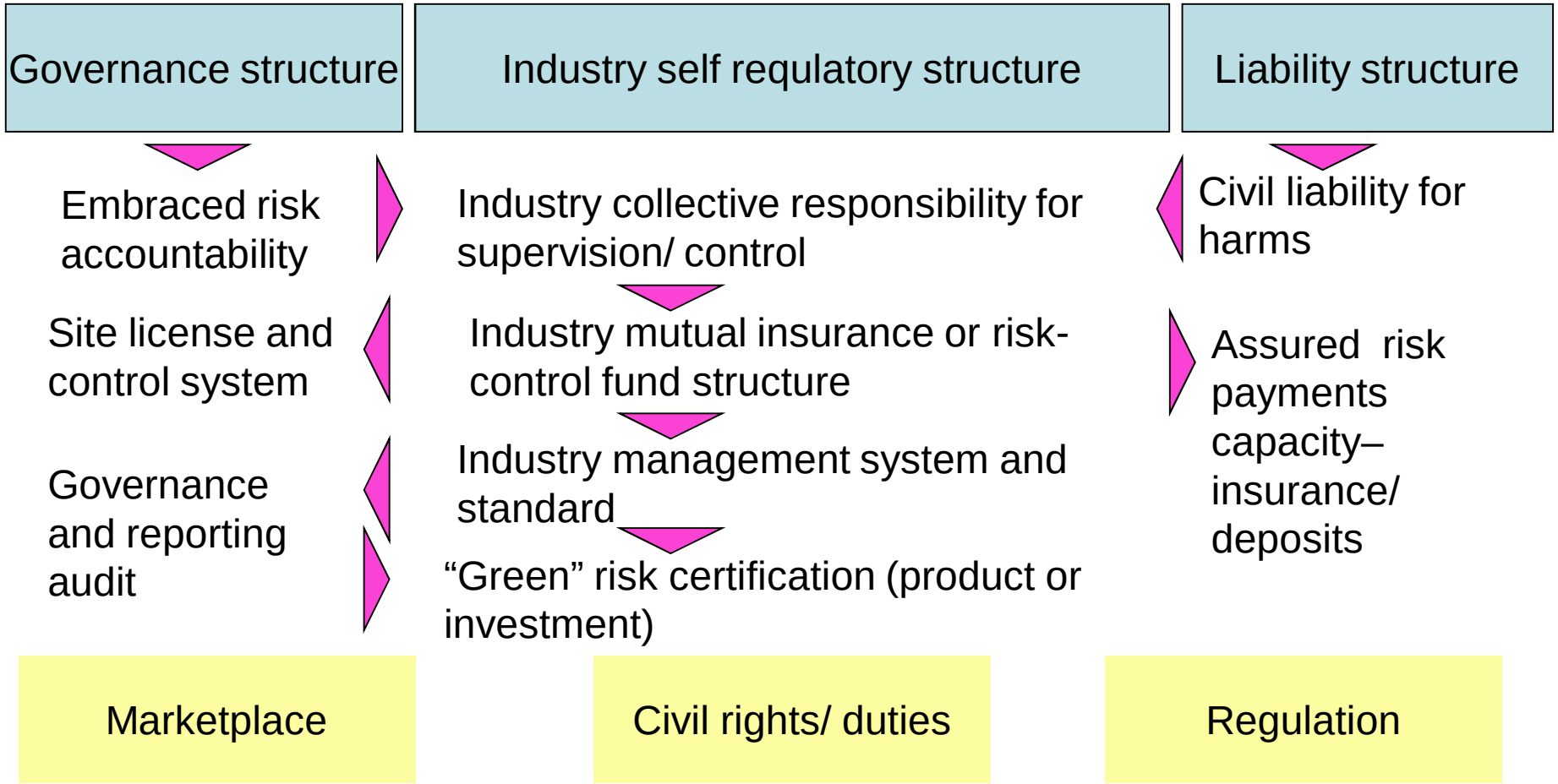
What might this look like?



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Impediments to innovation

- Informational impediments
  - Risk assessment
  - Monitoring
- Resource flow impediments
  - Funding
- Decision impediments
  - Community trust and incentives to reform
  - Capacity impediments
- Institutions
  - Level playing field

For he who innovates will have for his enemies all those who are well off under the existing order of things, and only lukewarm supporters in those who might be better off under the new

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The challenge for the industry

- There is a commitment to lead, but ..
  - The public choice problem. Some will benefit from governance failure.
  - Consensus problem. Innovation is risky, the issues are complex, real solutions untested.
  - Path dependence. Known “solutions” may fail, but at least they are known.
- Governance innovation is essential and in the interest of the industry, but it is a large strategic challenge.
- **How will the industry meet it?**

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