



CALIFORNIA
ENERGY
COMMISSION

**Report on the Future of
the California Biomass Collaborative:
Appendix
Forum Survey Results**

CONSULTANT REPORT

JUNE 2004
Contract 500-01-016



Arnold Schwarzenegger, Governor

CALIFORNIA ENERGY COMMISSION

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California Biomass Collaborative
Report of Future Recommendations

APPENDIX

Forum Policy Survey and Research Survey Results

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Forum Policy Survey and Research Survey Results

Surveys on research needs and policy issues facing the biomass industry were taken of participants at the January 8, 2004 Forum of the California Biomass Collaborative. In the Policy Survey, the audience was asked to list priorities for a series of issues in four categories. Issues were to be listed from 1 (high) to 5 (low). In addition, participants were asked to select their top three issues in each category. The categories were:¹

- **I Greatest Impediments to Continued Use and Expansion of Biomass**
- **II Financial Incentives**
- **III Opportunities for the Continued Use and Expansion of Biomass Fuels, Power and Products**
- **IV Primary Policy Objectives of the Collaborative**

Participants were encouraged to provide comments on any additional issues not covered in the survey and to provide information identifying themselves. Sixty eight policy surveys and 65 research surveys were received by the end of the day. The composition of the surveyed group is exhibited in Table A1 according to the self-reported occupations choices that were listed in the survey. Because respondents were asked to select all occupation or affiliation categories that applied to them, the totals of all groups sum to more than the number of surveys.

Table A1 - Forum policy survey group composition by occupation

Actual No. of Surveys	68
Self Reported Affiliations	Frequency
Researcher	23
For Profit Organization	18
Government	18
Non Profit Organization	16
Planning a Facility	12
Producer	12
Residential Consumer	12
Public Policy	10
Supplier	8
Currently Operating Facilities	7
Business Customer (consumer?)	4
Other*	3
Educator	0

* Survey 5 - Utility

* Survey 24 - CHP organization

* Survey 37 - Electric utility planning biomass facilities

¹ A copy of the surveys appear at the end of this Appendix

The survey results have been compiled and analyzed. The following tables give information on the average score (using the rating of 1 high, 5 low yields a highest rated issue as having the lowest numerical score); the frequency or number of times a particular issue was ranked either 1 or 5; the number of surveys responding to that category; the number of surveys that did not provide a ranking for that particular issue; and the number of times an issue was ranked in the top three.

Following each category table, are graphs of selected results. The first graph(s) for each category displays the average score of each issue broken out by each of seven segments of the audience (broken out for the Policy survey only - the research survey did not ask for occupation/affiliation.) For ease of reading, the level of importance displayed in these graphs is the transform of the average score for the 1-high, 5-low system used in the survey. The separate groupings chosen for group-averaged plotting are listed in Table A2. The Producers, Suppliers, and ‘For-Profit Organization’ groups were combined into one for plotting (because respondents were asked to choose all occupation types that applied, there were some duplications when combining these three groups. The duplications were removed before plotting.). The Residential and Business Customer groups were not plotted because the data were not relevant and the Educator and Other category had too few respondents to be meaningful. Because the first category of “Impediments” has 18 separate issues, the graphing of the average scores has been displayed individually for each group and compared to the global average. The second graph displays the top three picks.

Table A2. Self-selected groups used for individual plotting and number in group.
(Policy Survey)

<u>Groups plotted individually</u>	<u>No. in Group</u>
Producers/Suppliers/forProfit	23
Government	18
Currently Operating	7
Non Profit	16
Plannig Facility	12
Public Policy Analyst	10
Researcher	23
<u>Not Plotted as a group:</u>	
Residential Consumer	
Business Customer (consumer?)	
Other*	
Educator	

* Survey 5 - Utility

* Survey 24 - CHP organization

* Survey 37 - Electric utility planning biomass facilities

Table A3 - Policy Survey Section I : Greatest Impediments to Continued Use and Expansion of Biomass

	Issue	Average Score (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of times as "Top Three"
1	Inconsistent State Regulatory Requirements	2.2	18	6	62	15	9
2	Inconsistent Federal Regulatory Requirements	2.7	10	6	62	18	2
3	State/Federal Regulations Are Inconsistent With Each Other	2.5	10	4	62	18	3
4	Unequal Treatment of Biomass in Renewable Energy Policy	2.0	14	1	62	10	9
5	State Environmental Permitting	2.2	15	2	62	14	9
6	Local Siting & Use Issues	2.3	14	0	62	12	1
7	Feedstock Transport	2.9	11	6	62	12	2
8	Access to Working Capital	2.6	12	4	62	12	9
9	Access to Credit	2.7	12	7	62	14	5
10	Workforce/Labor Issues	4.2	1	21	62	16	0
11	Lack of New and-or Improved Technologies	2.8	13	9	62	10	8
12	Interconnection - Grid & Facilities	2.5	16	5	62	11	8
13	Market Acceptance and/or Public Education	2.7	10	7	62	12	2
14	Lack State Biomass Policy	1.7	28	1	62	8	19
15	Performance vs Technology Stds.	3.5	3	13	62	13	1
16	Lack of Quantifiable Financial Benefit to Offset Higher Costs	1.8	30	2	62	7	15
17	State Procurement Policies	2.8	11	8	62	16	2
18	Access to Feedstock & Fuels	3.0	10	10	62	10	2

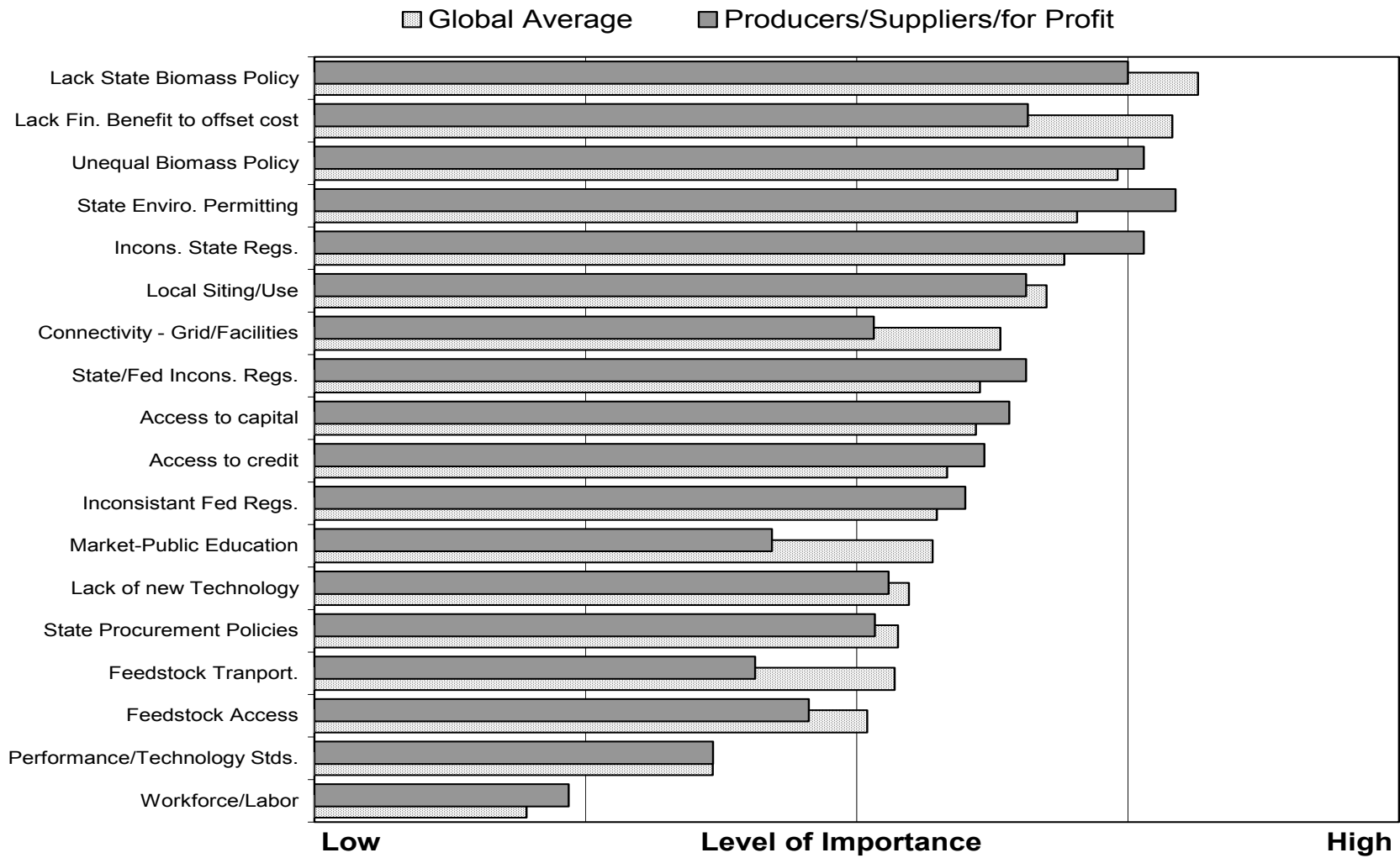


Figure A1. Policy Survey: Impediments - Rating - Producer/Suppliers/for Profit group against Global Average

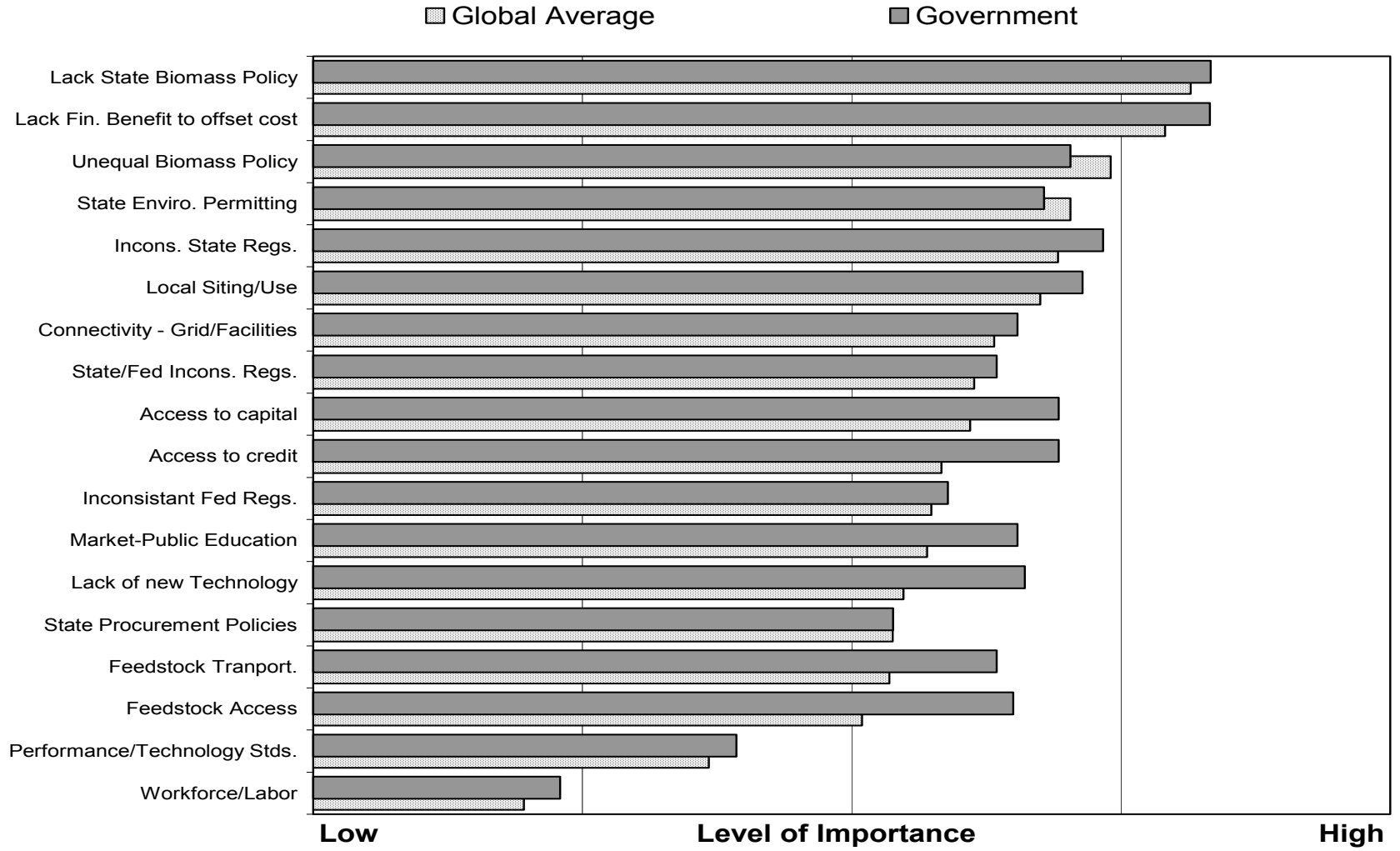


Figure A2. Policy Survey: Impediments - Rating- Government group against Global Average

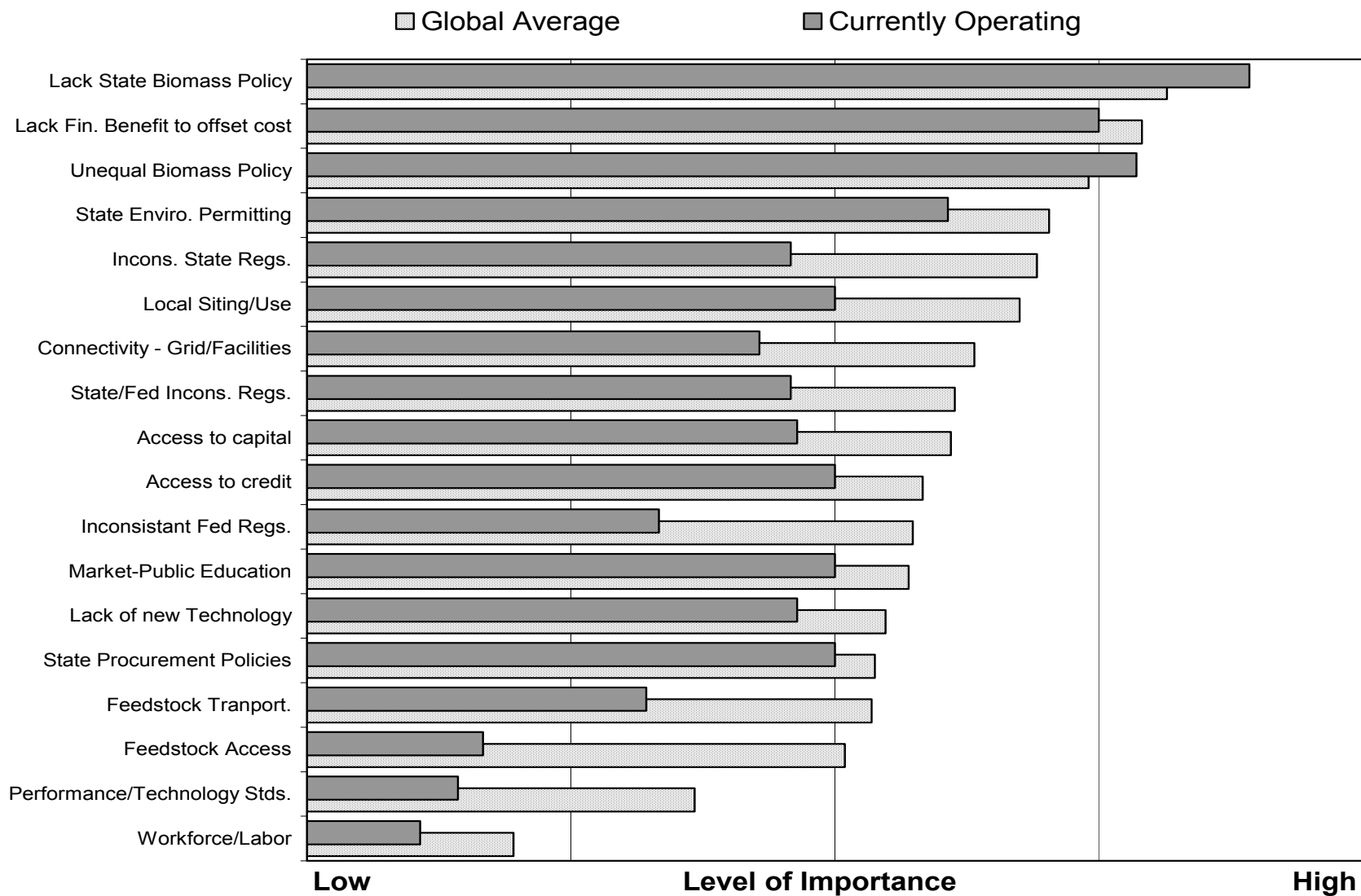


Figure A3. Policy Survey: Impediments - Rating - Currently Operating Facilities group against Global Average

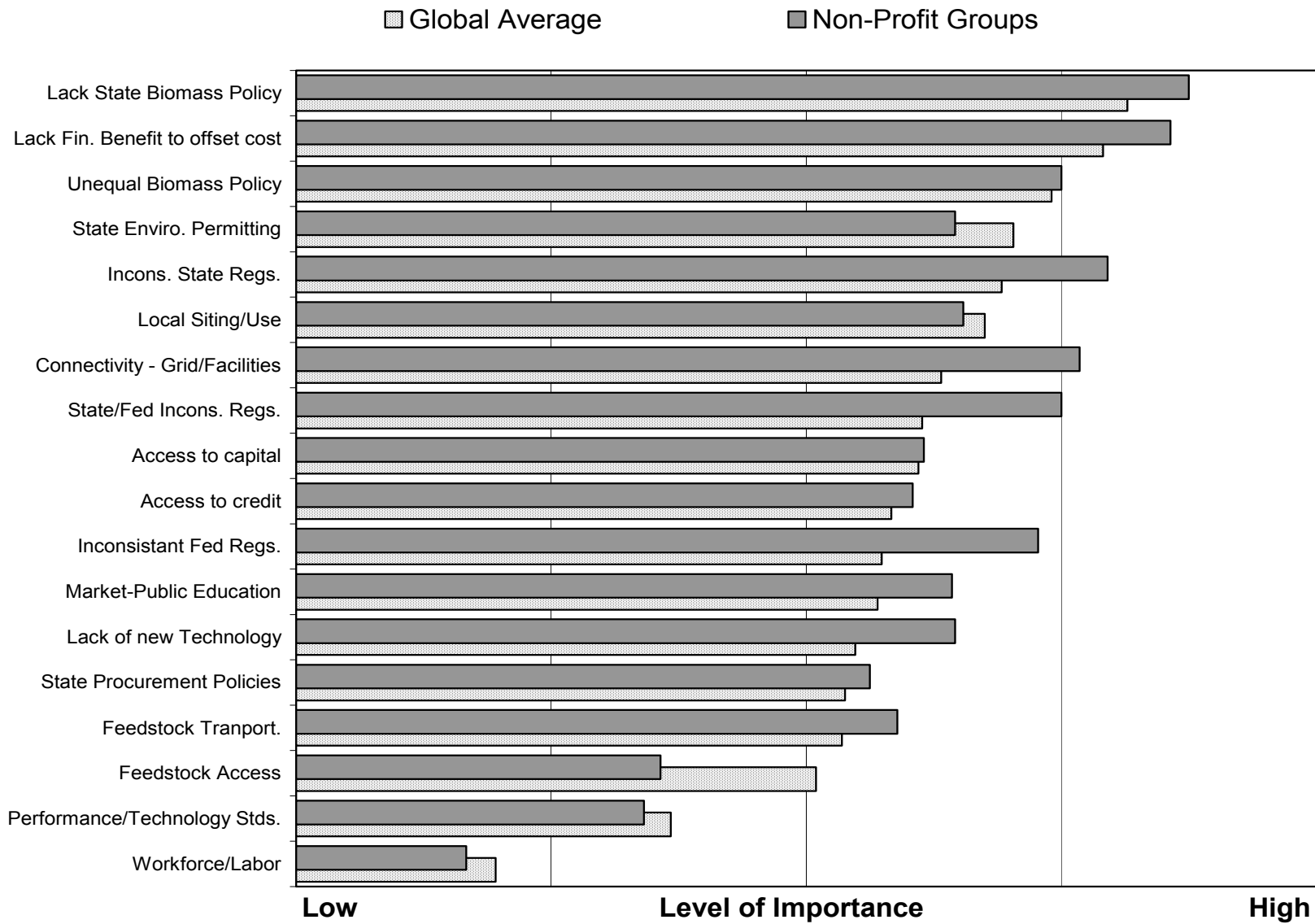


Figure A4. Policy Survey: Impediments - Rating- Non-Profit Groups against Global Average

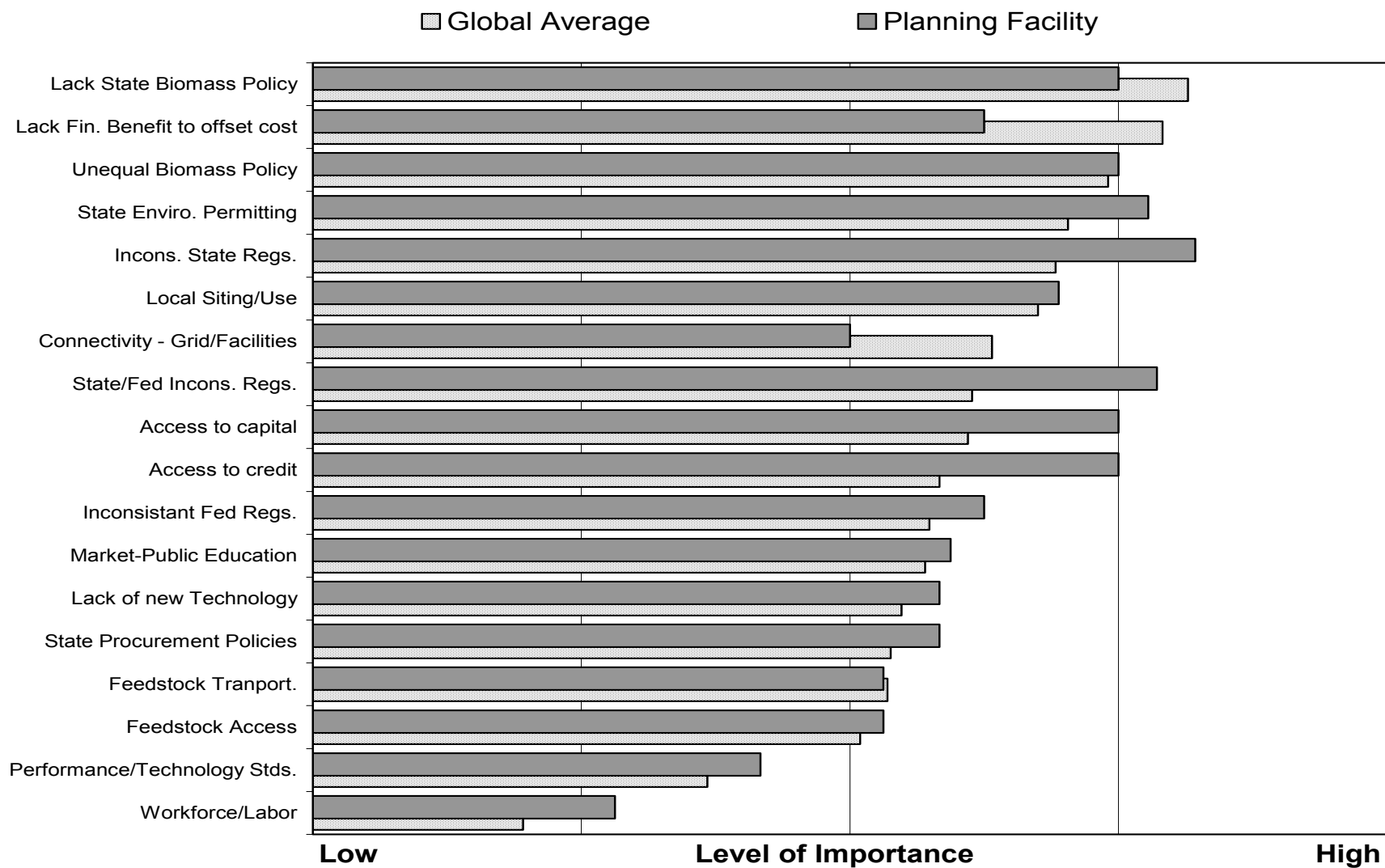


Figure A5. Policy Survey: Impediments - Rating - Those Planning a Facility against Global Average

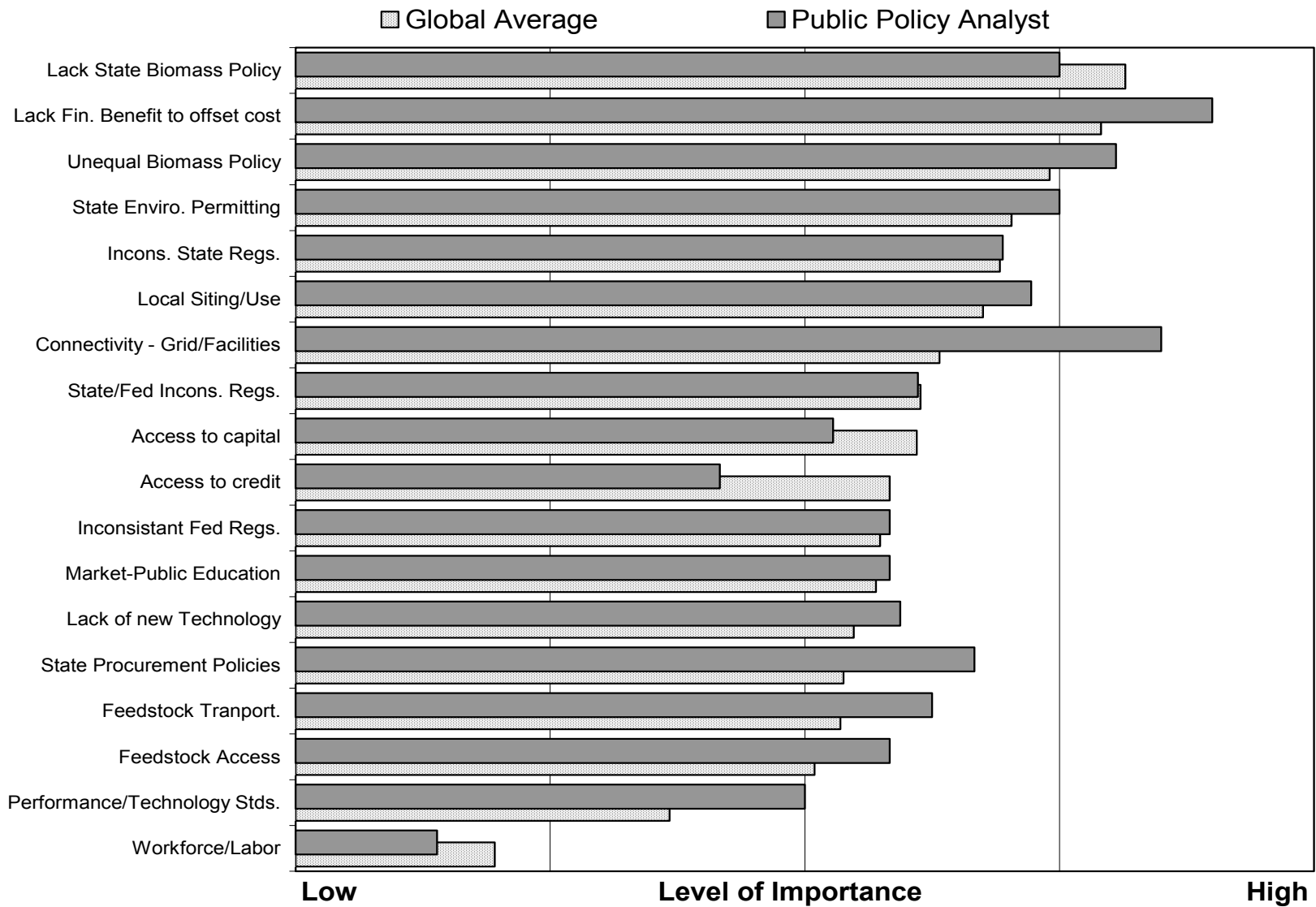


Figure A6. Policy Survey: Impediments - Rating - Public Policy Analyst group against Global Average

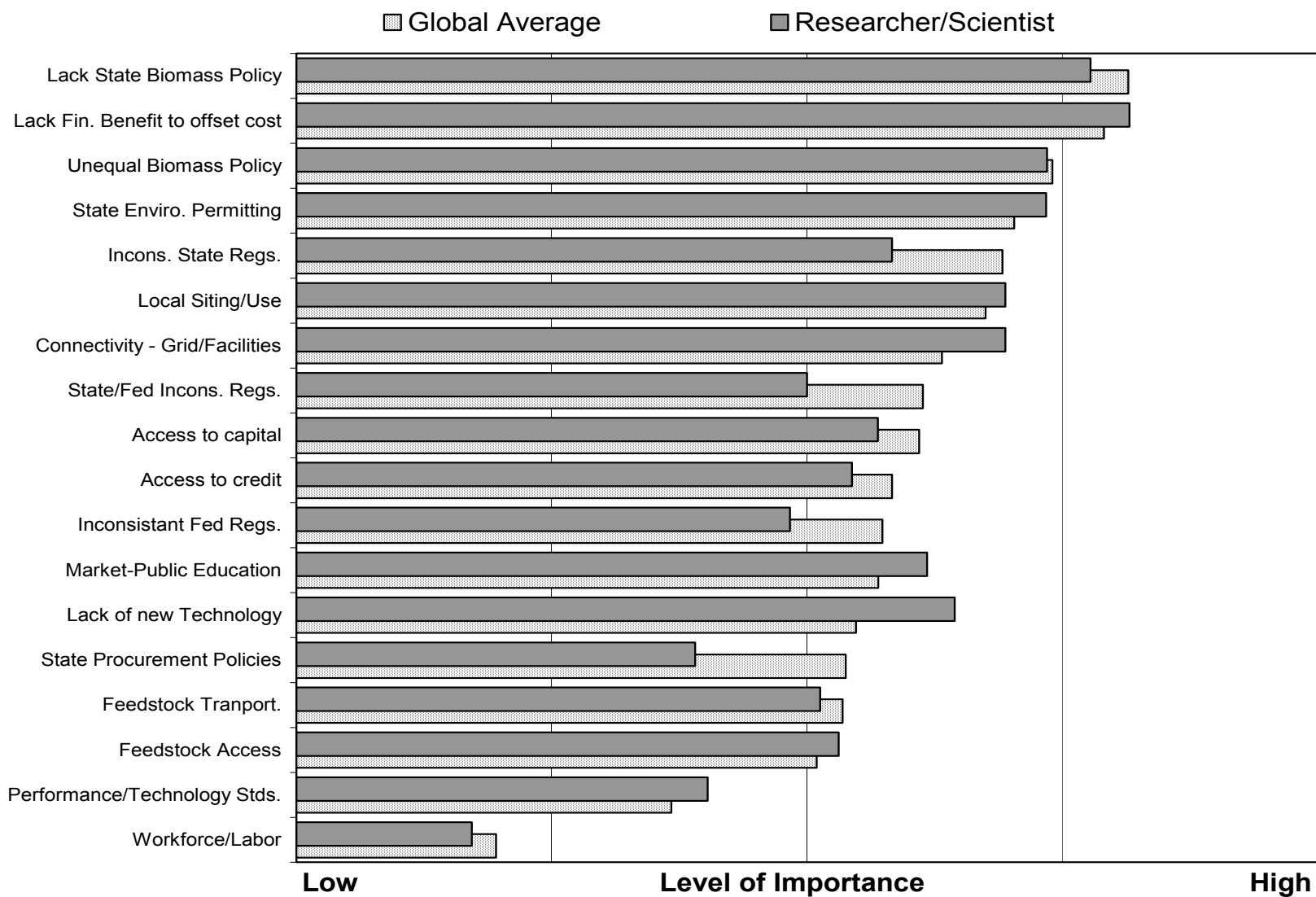


Figure A7. Policy Survey: Impediments - Rating - Public Policy Analyst group against Global Average

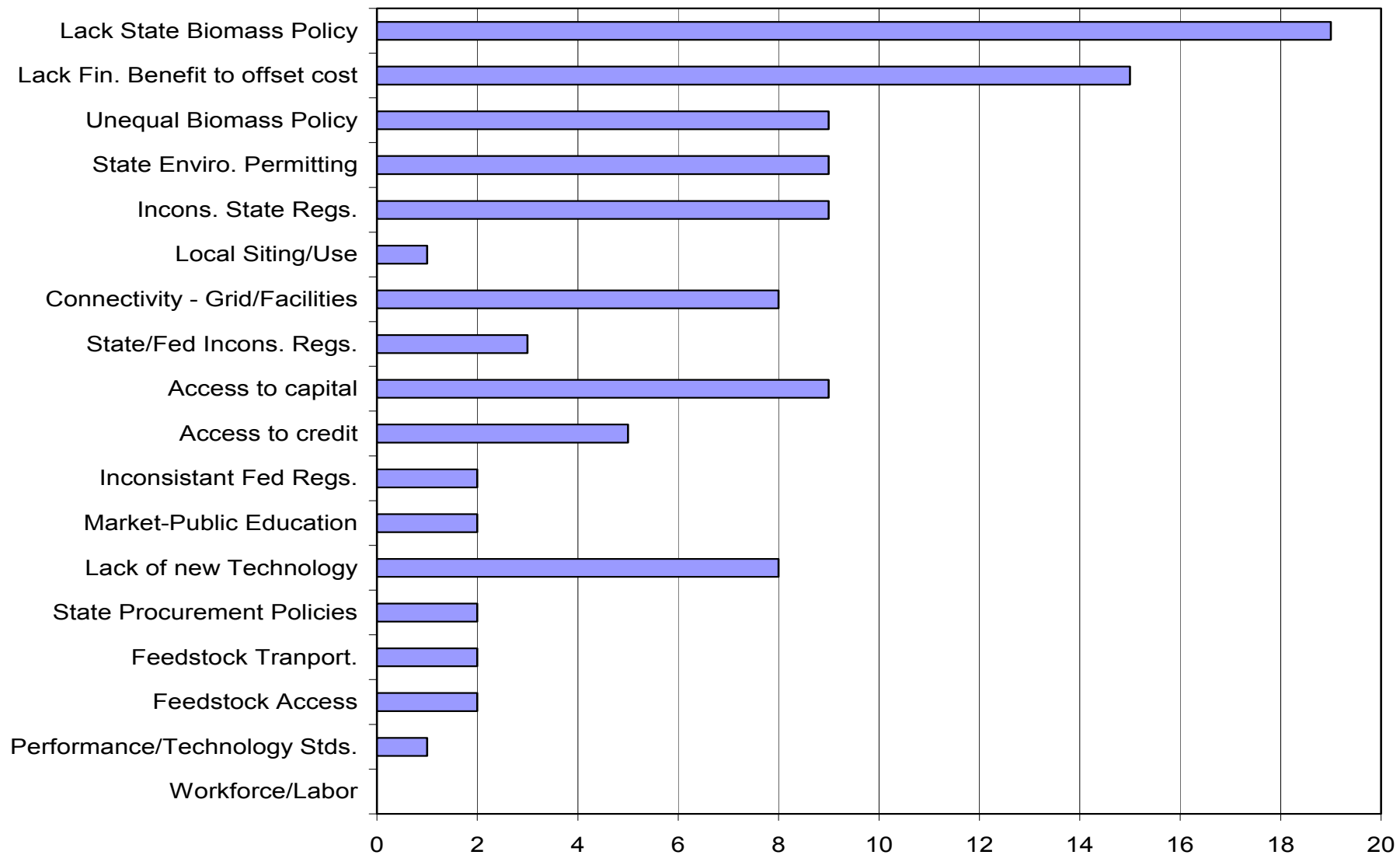


Figure A8. Policy Survey – Frequency selected as a Top Three Impediment

Table A4 - Policy Survey Section II : Financial Incentives

	Issue	Average (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of Times as "Top Three"
1	Grants, Loans, or Rebates to Producers	1.7	37	2	61	4	21
2	Grants, Loans, or Rebates to Consumers	2.8	10	11	61	10	5
3	Loan Guarantees to Producers and Suppliers	2.4	20	9	61	8	11
4	Tax Credit for Sales Tax Expenditures	2.8	12	9	61	10	6
5	Tax Credit for Research Expenditures	2.5	18	8	61	6	6
6	Tradable Tax Credit	2.1	18	3	61	10	7
7	Tradable Renewable Certifications	2.1	23	5	61	10	5
8	Depreciation Schedules	3.0	2	5	61	14	0
9	Personal Income Tax Benefits	3.2	9	12	61	15	1
10	Producer Payments	2.2	17	3	61	12	5

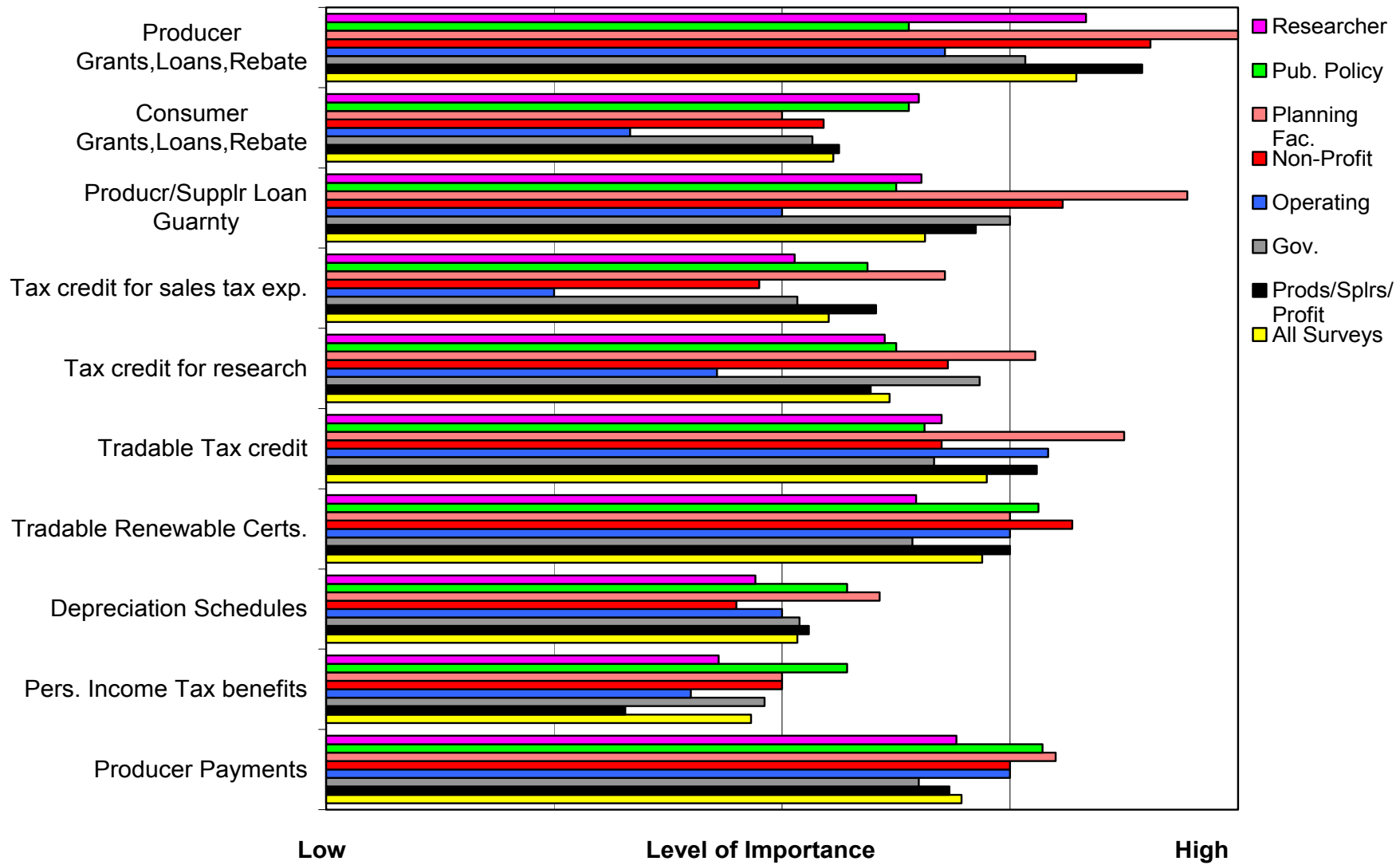


Figure A9. Policy Survey: Incentives - Average of importance by group

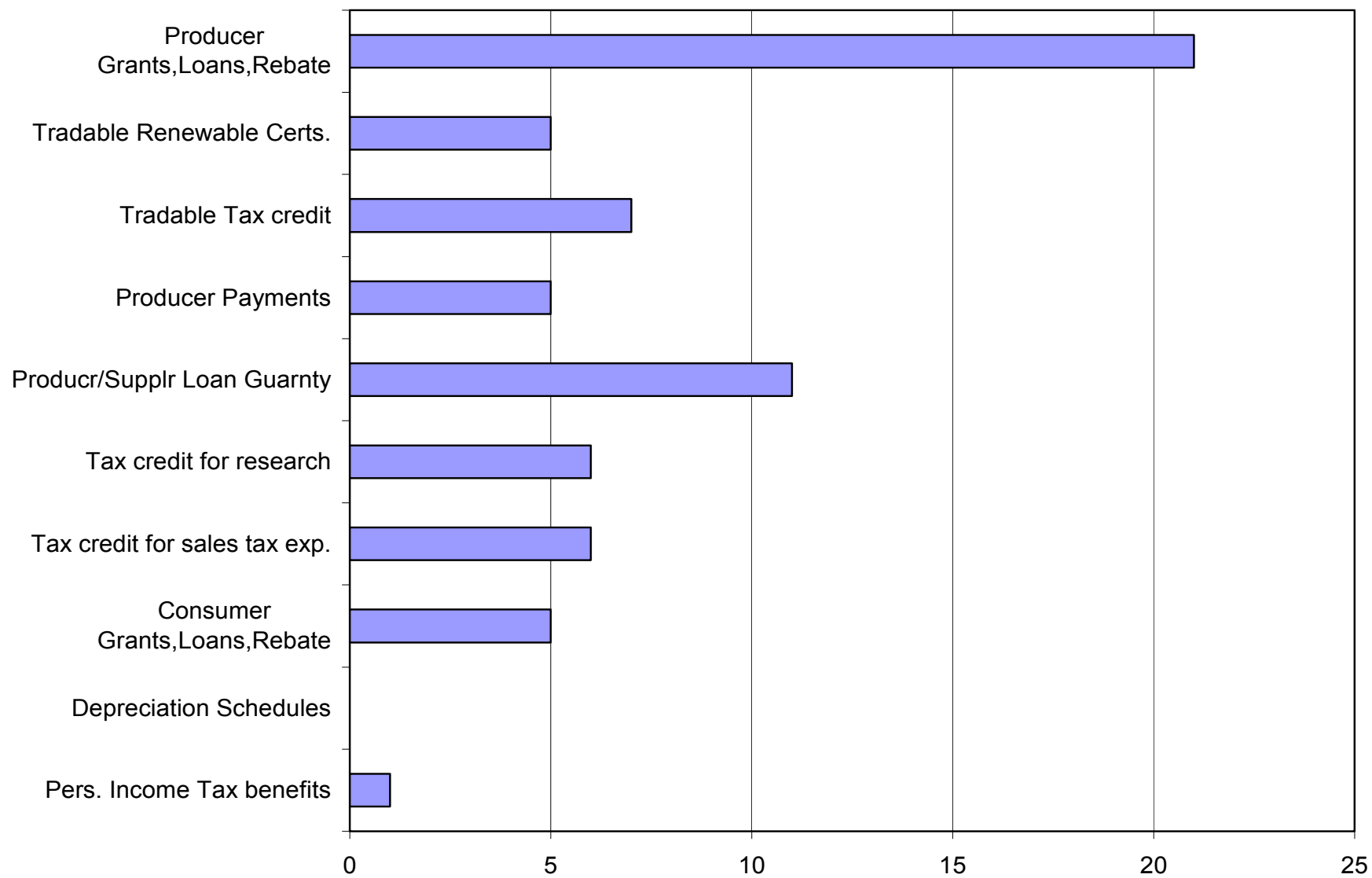


Figure A10. Policy Survey - Frequency selected as a Top Three Incentive

Table A5 - Policy Survey Section III Opportunities for Biomass Fuels, Power, and Products

	Issue	Average (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of Times as "Top Three"
1	California Renewable Portfolio Standard	1.6	36	3	65	12	18
2	Greenhouse Gas Reduction & Carbon Trading	2.2	15	3	65	8	9
3	Energy from Landfills	2.2	14	2	65	12	11
4	Landfill Diversion	2.1	19	3	65	10	19
5	Dairy Waste Management. Alternatives	2.5	9	4	65	19	4
6	Forest Fuels Reduction	1.9	28	3	65	8	22
7	State Procurement Policies for Biomass	2.3	18	5	65	11	10
8	Energy Independence	2.3	16	4	65	10	9
9	Jobs Creation	2.8	13	8	65	11	8
10	Energy Action Plan Recommendations	3.0	6	6	65	22	1

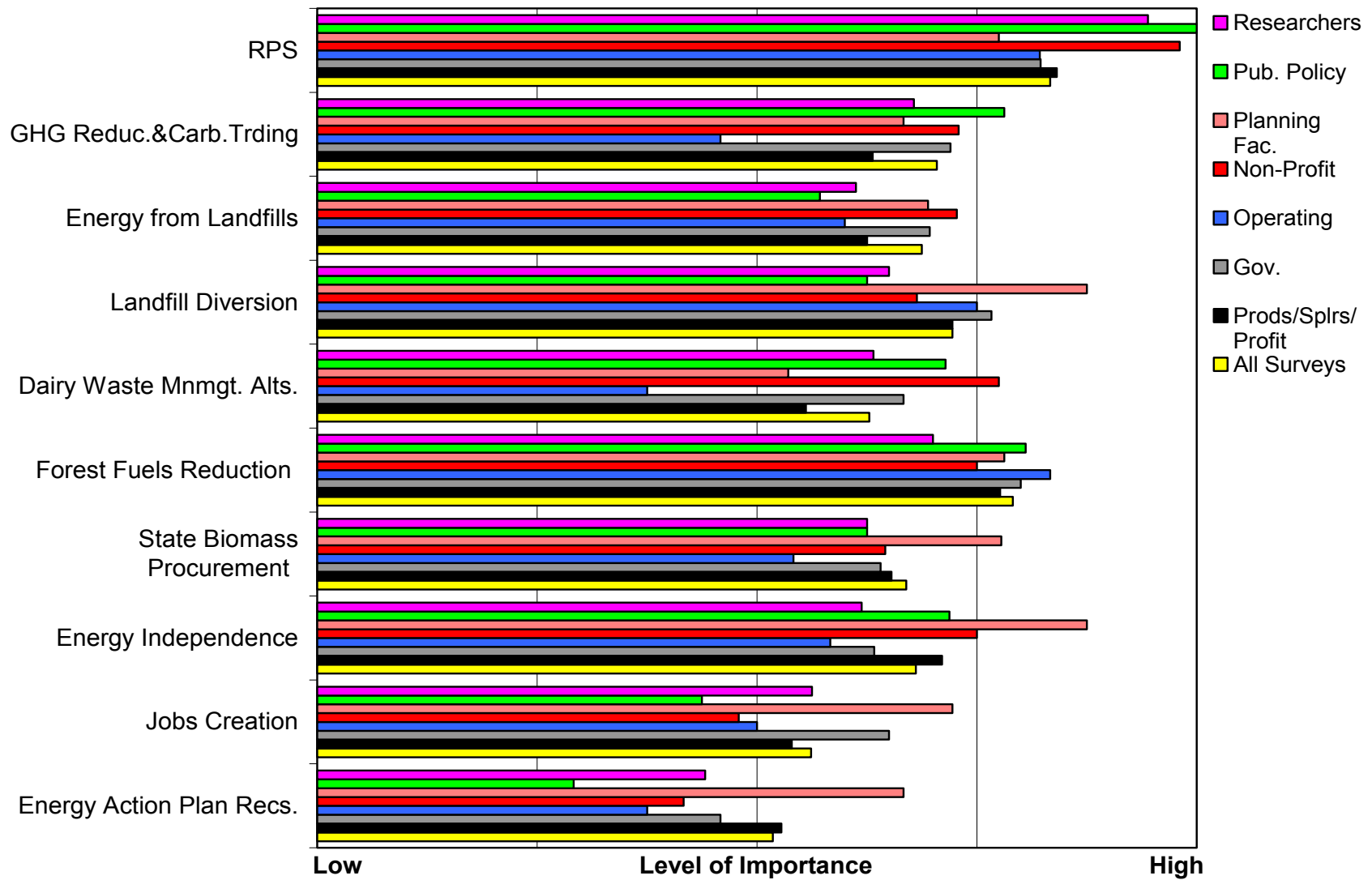


Figure A11. Policy Survey: Opportunities - Average of importance by group

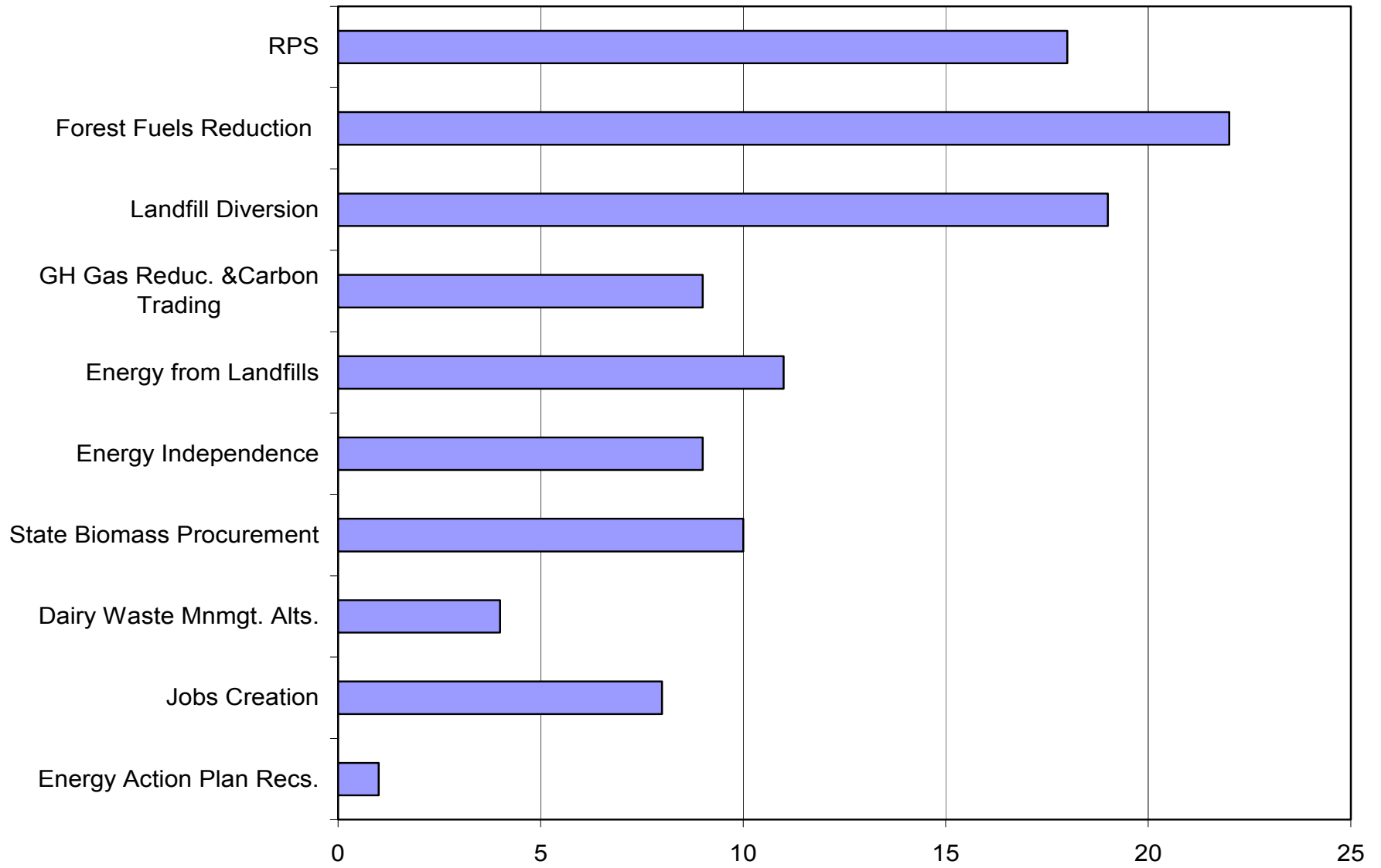


Figure A12. Policy Survey: Frequency selected as a Top Three Opportunity

Table A6 - Policy Survey Section IV : Primary Policy Objectives

Issue	Average (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of Times as “Top Three”
1 Industry, Academia, and Government Platform	1.4	45	0	65	1	28
2 Commercialize Bio-Industry	2.3	20	3	65	4	13
3 Promote Research & Technology Transfer	1.8	31	3	65	7	20
4 Policy & Regulations Changes For Sustainable Biomass	1.5	38	0	65	7	20
5 Align State & Federal Policies	2.3	18	4	65	11	10
6 Rural Economic Development	2.1	20	4	65	12	15
7 Urban & Brownfields Revitalization	3.2	9	14	65	14	3

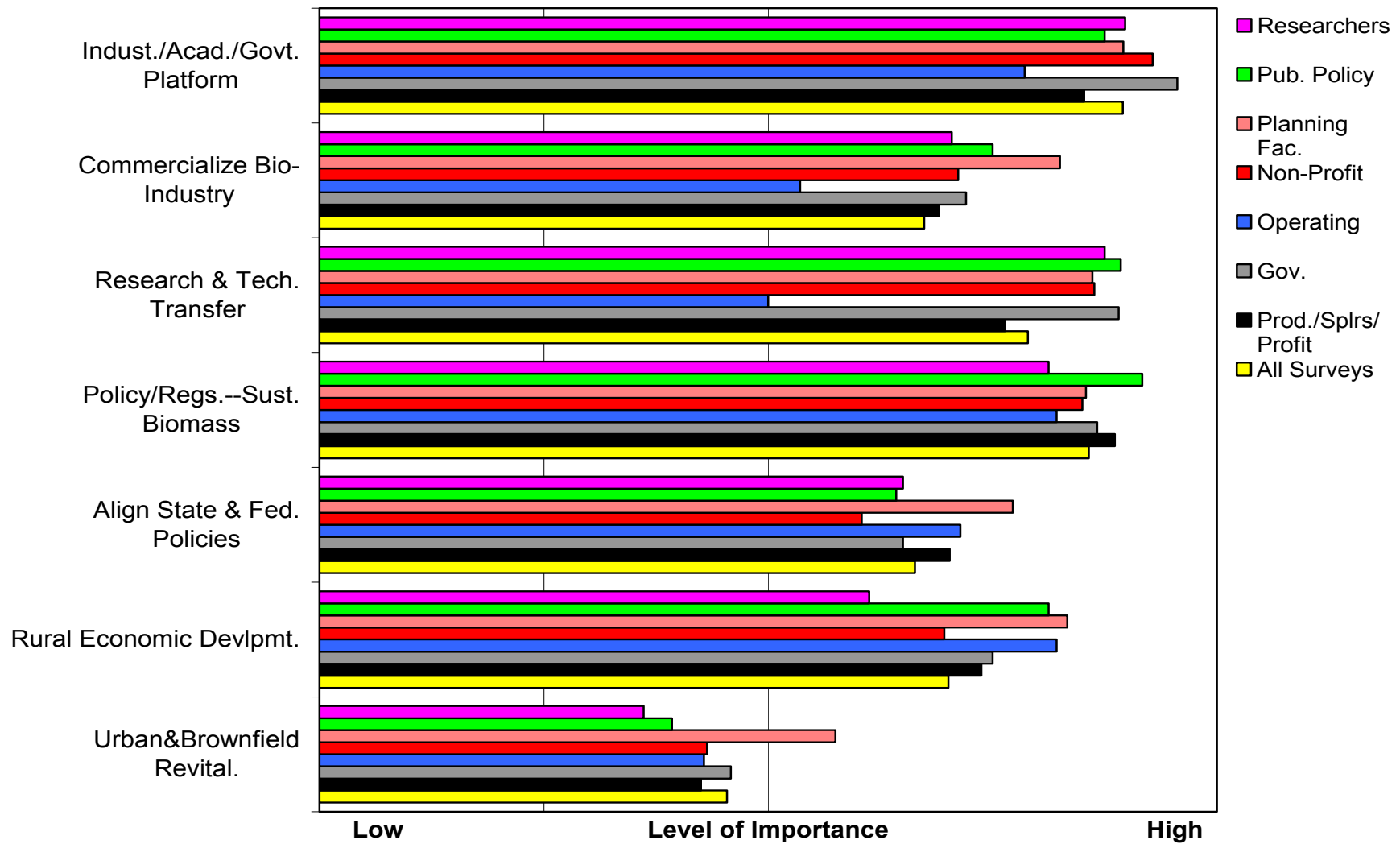


Figure A13. Policy Survey: Policy Objectives- Average of importance by group

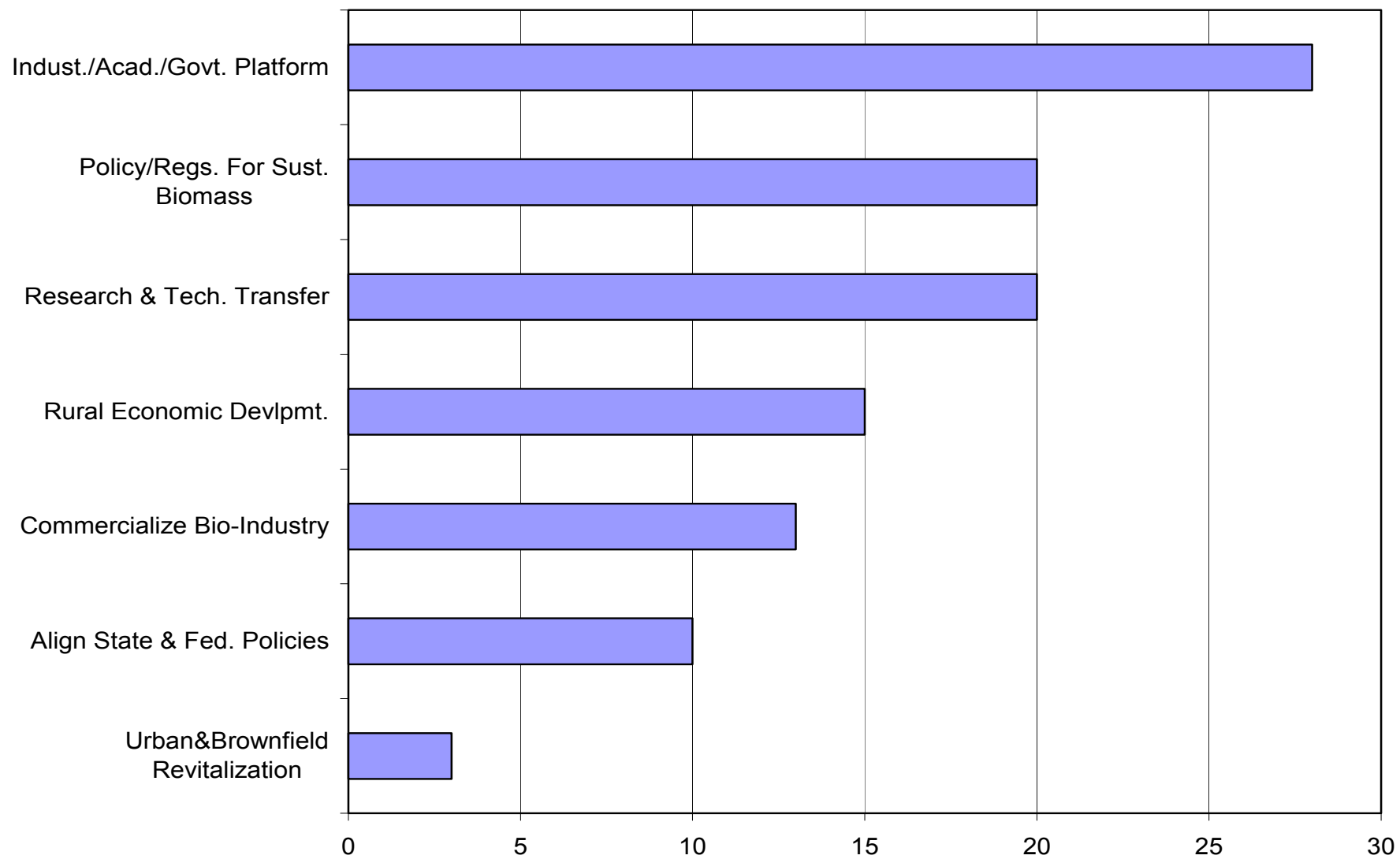


Figure A14. Policy Survey: Frequency selected as a Top Three Policy Objective

Table A7 - Research Survey Results – Feedstock Processing

Issue	Average (1=high) (5=low)	Number of Highest Agreement (1)	Number of Lowest Agreement (5)	Number of Surveys	Number of No Responses
Reduce Costs of Forest Residue	2.2	30	6	63	3
Improve Storage Technologies	3.4	4	14	63	6
Improve In-Field Processing	2.0	21	1	63	4
Develop Fuel Pre-treatment	2.5	18	3	63	5
Improve Resource Estimation	3.4	6	19	63	7

Table A8 - Research Survey Results – Conversion Technologies

Issue	Average (1=high) (5=low)	Number of Highest Agreement (1)	Number of Lowest Agreement (5)	Number of Surveys	Number of No Responses
Improve Emission Control Technologies	2.2	19	4	65	19
Develop Small/Portable Systems	2.3	22	6	65	12
Develop Biorefineries	2.3	14	3	65	16
Demo Integrated Gasifier Combined Cycle	2.4	16	3	65	12
Develop Gasification to Co-fire in GTs	2.7	12	6	65	19
Expand Biogas Systems and Feedstocks	2.1	22	4	65	14
Co-fire in Fossil Fuel Boilers	2.9	8	6	65	22
Repower Existing Facilities	2.3	12	2	65	17
Develop Multifuel Thermal Systems	2.5	10	4	65	17
Demo Cellulosic Ethanol	2.0	28	2	65	14
Improve Biodiesel/Liquid Fuel Conversion	2.7	11	6	65	14
Conduct Life-Cycle Assessments	3.0	7	8	65	19
Quantify Socio-economic Benefits	2.0	23	3	65	13
Produce Hydrogen from Biomass	2.8	11	9	65	19

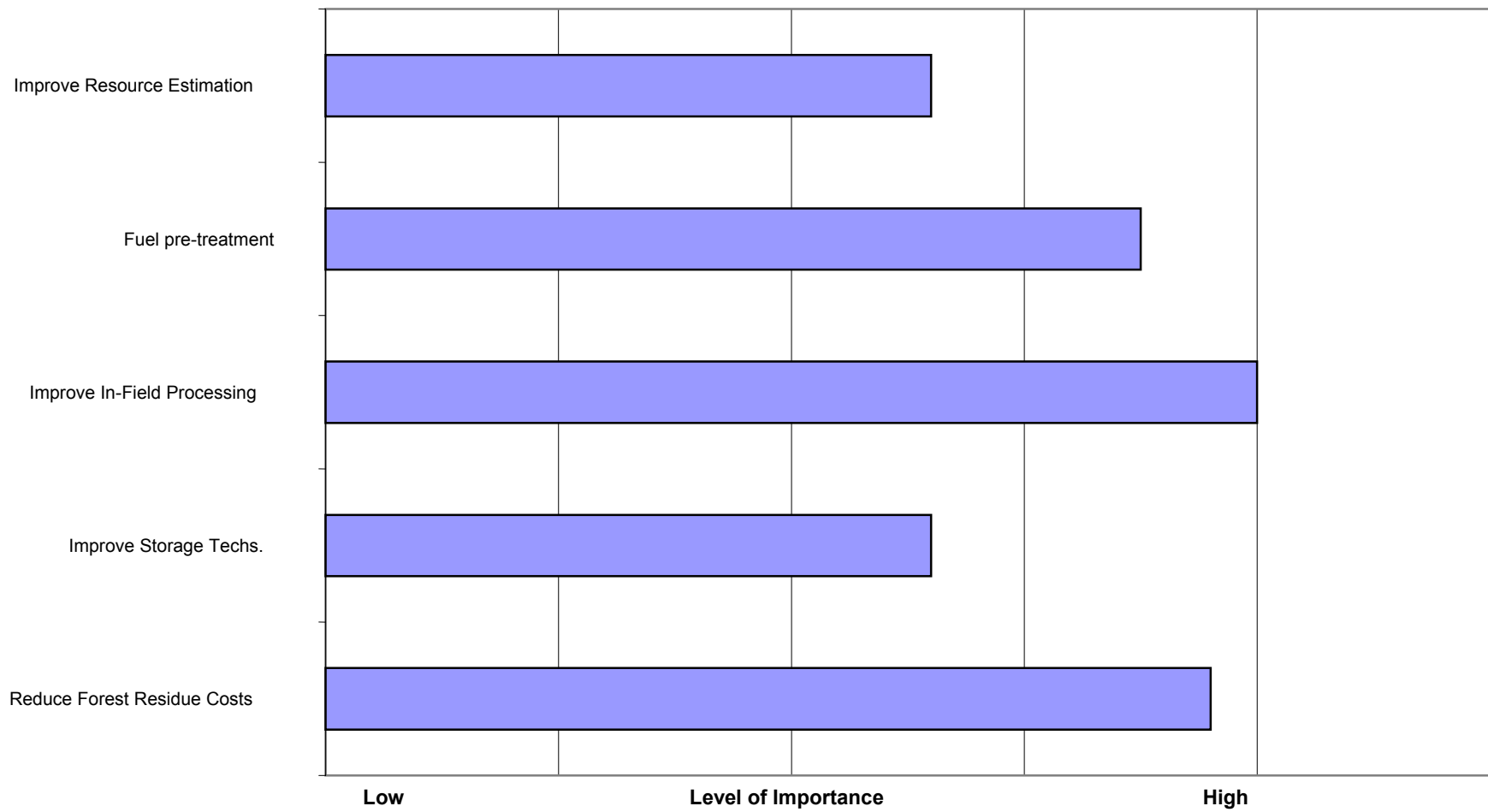


Figure A15. Research Survey : Feedstock/Processing - Average of Importance

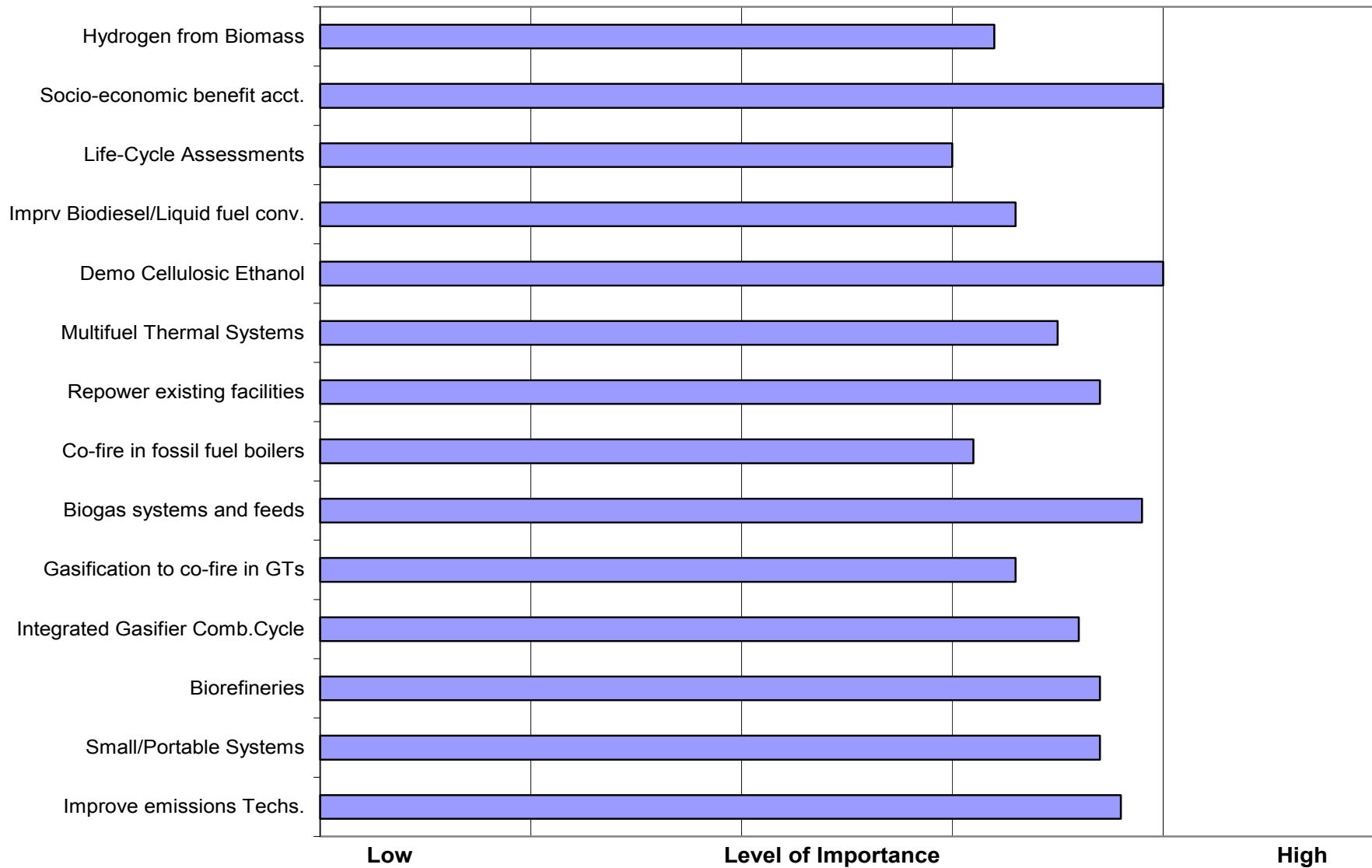


Figure A16. Research Survey : Conversion Technologies - Average of Importance (Stretched the chart some)

Analysis and Interpretation

Impediments

The highest rated impediments coincide well with the most frequently selected “top three” choices. These are:

- 1) lack of state biomass policy on bio-based fuels, power, and products
- 2) lack of quantifiable benefit to offset higher cost;
- 3) unequal treatment within existing policies.

Looking at the breakout of groups, overall the government sector, those planning facilities, public policy analysts and the non-profit sector rated most issues as of greater importance than the survey average, while those operating facilities, biomass producers/suppliers, and researchers rated them lower.

For the separate groups, biomass producers and suppliers felt that inconsistent regulation and state environmental permitting issues posed a greater impediment than the averages of all survey respondents. They also believed feedstock transport, quantifiable benefits, and public education were of less importance. The government sector rated feedstock access and transport and the lack of new technologies as of higher importance than the average and unequal biomass policies as lower. Participants currently operating plants gave much lower ratings to the impediments overall, but feedstock access and transport, inconsistent regulation, and interconnections with the grid were rated particularly low in importance, while the lack of state policy and unequal biomass policies rated higher than the global average of all respondents. The non-profit sector placed greater importance on inconsistent regulation and interconnection with the grid, but lower importance on feedstock access. Participants planning facilities rated inconsistent regulation and access to credit and capital as higher and interconnections and quantifiable benefits as lower. Public policy analysts rated interconnection, design and performance standards, quantifiable benefits, and state procurement policies as higher and access to credit and capital as lower. Researchers and scientists rated lack of new technology and interconnection as of higher importance and inconsistent regulation and procurement policies as lower.

Incentives

The highest rated financial incentives differ slightly from the most frequently selected top three choices. Both agree on the importance of providing grants, loans, or rebates to producers to expand the use of biomass but split with tradeable tax credits and tradeable renewable energy certificates on the average scoring higher and loan guarantees and tradeable tax credits in the top three.

For the separate groups, biomass producers and suppliers were close to the survey average on most issues but rated providing grants, loans, and rebates to producers as of higher importance and income tax credits as lower compared to the global average. The government sector varied more and rated tax credits for research higher than average and tradeable renewable certificates as lower. Participants operating facilities rated most issues lower than average with grants, loans, and rebates to producers and consumers; loan guarantees for producers and suppliers; and tax credits for sales tax and research as significantly lower. The non-profit sector rated grants, loans, and rebates to producers; loan guarantees to producers and suppliers; and tradeable certificates as of higher importance and depreciation schedules as lower. Participants planning facilities rated most incentives as of higher importance than the survey averages with grants, loans, and rebates to producers; loan guarantees; and all tax credits particularly high. Public policy analysts rated grants, loans, and rebates to consumers; tradeable renewable certificates; income tax benefits; and producer payments as higher and grants, loans, and rebates to producers and tradeable tax credits as lower. Researchers and

scientists rated grants, loans, and rebates to consumers as higher and tradeable renewable certificates as lower than average.

Opportunities

The highest rated opportunities for continued use and expansion of biomass coincide well with the top three choices but in reverse order. These are:

- 1) California renewable portfolio standard;
- 2) forest fuels reduction for fire hazard mitigation; and
- 3) diversion of waste from landfills.

For the separate groups, biomass producers and suppliers coincided well with the global averages. The government sector placed greater importance on jobs creation than the survey average. Facility operators once again tended to rate issues appreciably lower than the averages with greenhouse gas reduction; dairy waste management alternatives; state procurement; and Energy Action Plan (EAP) recommendations particularly low. The non-profit sector rated the renewable portfolio standard (RPS) and dairy waste management alternatives as of higher importance and jobs creation as lower than the global average. Individuals planning facilities rated landfill diversion; state procurement policies; energy independence; jobs creation; and the EAP recommendations higher and the RPS and dairy waste management alternatives lower. Public policy analysts rated RPS, greenhouse gas reductions, and dairy waste management alternatives as higher and landfill issues, jobs creation and EAP recommendations as lower than the survey average. Researchers and scientists rated RPS as of higher and landfill diversion of lower importance than average.

Policy Objectives

The highest rated policy objectives for the Collaborative coincide well with the top three choices. They are:

- 1) establish a platform for industry, academia, and government to work together on biomass issues;
- 2) determine policy and regulatory changes necessary to remove barriers to a sustainable biomass system; and
- 3) promote research and transfer of technologies.

The top-rated policy objective (establish a platform . . .) was given the highest level of importance of any issue in all categories of the Policy Survey. It also was selected the most frequently as a “top three” choice.

For the separate groups, biomass producers and suppliers agreed well with the survey averages. The government sector was close to the survey averages but placed greater importance on establishing a platform and promoting research and technology transfer. Facility operators rated enhancing rural economic development as higher and establishing a platform; promoting commercialization; and promoting research and development as significantly lower than the survey average. The non-profit sector rated aligning state and federal policies lower than the average but agreed well with the other issue averages. Individuals planning facilities rated research and technology transfer; policy and regulatory changes; and rural economic development higher and brownfield revitalization lower than the survey averages. Researchers and scientists tended to rank policy issues lower than average with rural development and brownfields revitalization lowest.

Deviation from the average was most pronounced for facility operators, followed by policy analysts, the non-profit sector and facility planners. The other groups – producers and suppliers, government

sector, and researchers - are also the larger groups and would be expected to influence the average value more strongly.

Issues of Highest Importance by Group

Operators of facilities rated highest the lack of state policy on biobased fuels, power, and products, followed in order by need for forest fuels reduction, regulatory and policy changes to remove barriers, and California RPS.

Producers and suppliers rated grants, loans, and rebates to producers highest overall, followed by California RPS, establishing a platform to work together, and environmental permitting issues.

Policy Analysts rated the California RPS highest followed by need for regulatory and policy changes to remove barriers, lack of quantifiable benefits, and promoting research and technology transfer.

Government employees rated establishing a platform to work together as highest, followed by promoting research and technology transfer, lack of quantifiable benefits and lack of state policy.

Judging from some of the differences in the level of importance awarded to the issues by the different groups, there appears to exist a need for education and communication to develop a full understanding of how the different issues affect the varying interest groups.

Overall, the survey responses give a strong signal that all elements of the Collaborative feel that California lacks a coherent state policy supporting the biomass industries, that some form of financial support will be needed for at least the short-term, that the environmental and societal benefits must be quantified accurately to justify the needed support, further research and development will help the industry evolve, and a platform such as the Collaborative is a viable way to achieve these goals.

California Biomass Collaborative - Policy Survey

The Policy Committee of the California Biomass Collaborative, as part of its first year activities, is developing a work plan including policy objectives. These are intended to lead to legislative and regulatory recommendations that will support the continued and expanded use of biomass for energy generation, production of biobased products and the more efficient reuse of waste for societal benefit. Below are a series of inquiries which will assist the Policy Committee in focusing its work.

Greatest Impediments to Continued Use and Expansion of Biomass

Please rate the following from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each impediment, please **circle the top three** impediments.

- | | |
|--|---|
| <input type="checkbox"/> Inconsistent state regulatory requirements. | <input type="checkbox"/> Lack of access to new and/or innovative technologies. |
| <input type="checkbox"/> Inconsistent federal regulatory requirements. | <input type="checkbox"/> Interconnections with the energy grid and other existing facilities. |
| <input type="checkbox"/> State and federal requirements are inconsistent with each other. | <input type="checkbox"/> Market acceptance and/or public education. |
| <input type="checkbox"/> Unequal treatment of biomass within existing renewable energy policies. | <input type="checkbox"/> Lack of state policy on biobased fuels, power and products. |
| <input type="checkbox"/> State environmental permitting issues. | <input type="checkbox"/> Construction and design standards including performance v. technology standards. |
| <input type="checkbox"/> Local siting and use issues. | <input type="checkbox"/> Lack of quantifiable financial benefit to offset higher costs for biomass. |
| <input type="checkbox"/> Transportation of feedstocks. | <input type="checkbox"/> State procurement policies. |
| <input type="checkbox"/> Access to working capital. | <input type="checkbox"/> Access to biomass feedstocks and fuels. |
| <input type="checkbox"/> Access to credit for capital expenditures. | |
| <input type="checkbox"/> Workforce and labor-related issues. | |
-

Specific Key Regulations that Must Be Addressed

Please specify one to four specific laws, regulations or activities that must be addressed in a comprehensive biomass policy to ensure the continued use and expansion of biomass fuels, power and products.

- | | |
|----------|----------|
| 1. _____ | 3. _____ |
| 2. _____ | 4. _____ |

Financial Incentives

Please rate the following incentives for expanding the use of biomass fuels, power and products from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each incentive, please **circle the top two** incentives.

- | | |
|--|---|
| <input type="checkbox"/> Grants, loans or rebates to producers. | <input type="checkbox"/> Tradable tax credits. |
| <input type="checkbox"/> Grants, loans or rebates to consumers. | <input type="checkbox"/> Tradable renewable energy certificates. |
| <input type="checkbox"/> Loan guarantees to producers and suppliers. | <input type="checkbox"/> Depreciation schedules. |
| <input type="checkbox"/> Tax credits against sales tax expenditures. | <input type="checkbox"/> Personal income tax benefits for use of biomass. |
| <input type="checkbox"/> Tax credits against research expenditures. | <input type="checkbox"/> Producer payments. |

Additional Space for Financial Incentives

Opportunities for the Continued Use and Expansion of Biomass Fuels, Power and Products

Please rate the following opportunities for expanding the use of biomass fuels, power and products from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each opportunity, please **circle the top three** opportunities.

- | | |
|---|---|
| <input type="checkbox"/> California Renewable Portfolio Standard. | <input type="checkbox"/> State procurement policies and opportunities for aggregate purchasing of biobased fuels, power and products. |
| <input type="checkbox"/> Growing public interest in greenhouse gas reductions and carbon trading systems. | <input type="checkbox"/> Growing public interest in energy independence. |
| <input type="checkbox"/> Energy generation from landfills. | <input type="checkbox"/> Job creation through expansion of biomass industries and supporting businesses. |
| <input type="checkbox"/> Diversion of waste from landfills. | <input type="checkbox"/> Recent completion of the Energy Action Plan and accompanying research and recommendations. |
| <input type="checkbox"/> Dairy industry’s interest in alternatives to open lagoon storage of wastewater and runoff. | _____ |
| <input type="checkbox"/> Fire hazard mitigation in wildlands and urban interface areas. | _____ |

Primary Policy Objectives of the Collaborative

Please rate the following policy objectives for the CBC from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each objective, please **circle the top three**.

- Establish a platform for industry, academia, government, and others to work together on issues relating to biomass.
 - Promote the commercialization of biobased industries.
 - Promote research and transfer of technologies related to biobased fuels, power and products.
 - Determine regulatory and policy changes necessary to remove barriers to a sustainable biomass system.
 - Align state and federal policies on renewable energy including biomass.
 - Enhance opportunities for rural economic development through agricultural and forestry based bioindustries.
 - Enhance opportunities for urban revitalization through remediation and redevelopment of brownfields.
- _____
- _____

Information about You

Please check all categories that describe you. Type(s) of biomass feedstock(s) used: _____

- | | | |
|---|---|---|
| <input type="checkbox"/> Producer | <input type="checkbox"/> Public policy analyst | <input type="checkbox"/> Planning a new facility |
| <input type="checkbox"/> Supplier | <input type="checkbox"/> Government | <input type="checkbox"/> Educator |
| <input type="checkbox"/> Residential consumer | <input type="checkbox"/> Non—profit private sector | <input type="checkbox"/> Other – please specify:
_____ |
| <input type="checkbox"/> Business consumer | <input type="checkbox"/> For-profit private sector | |
| <input type="checkbox"/> Researcher/Scientist | <input type="checkbox"/> Currently operate a facility | |

Thank You – Your Investment is Valuable

Thank you for your time in completing this survey.
If you would like to continue to participate in the
development of a biomass policy for California
please add your name and contact information
below.

Name: _____
Email: _____ Phone: _____

Please return survey form by **end of lunch at the
Forum**. If you wish to return the survey later,
please send the completed form to:

California Biomass Collaborative
Department of Biological and Agricultural
Engineering
University of California
1 Shields Avenue
Davis, CA 95616
fax: 530 752 2640
email: biomass@ucdavis.edu

California Biomass Collaboration Research Survey:

Please rate the following potential California biomass research topics from 1 (highest priority) to 5 (lowest priority). Add your own suggested research topics on the blank lines below the list provided.

Feedstock/Processing

- _____ Reduce cost of harvesting and transporting forest residues
- _____ Improve storage technologies
- _____ Improve in-field processing technologies
- _____ Develop fuel pre-treatment processes
- _____ Improve methods to estimate biomass resources

Conversion Technologies

- | | |
|---|---|
| _____ Improve pollution and emissions control technologies | _____ Retrofit or repower existing biomass combustion plants to improve efficiency & reduce emissions |
| _____ Develop small, portable conversion units | _____ Develop multifuel capabilities for thermal conversion systems |
| _____ Develop biorefineries for energy and high value products | _____ Demonstrate ethanol production from cellulosic biomass |
| _____ Demonstrate biomass integrated gasification combined-cycle systems | _____ Improve conversion processes for biodiesel and other liquid fuels |
| _____ Develop gasification for co-firing with fossil fuels in gas turbines | _____ Conduct lifecycle assessments |
| _____ Expand use of biogas (new feedstocks, new energy conversion technologies) | _____ Develop better methodologies to account for social and economic benefits |
| _____ Facilitate co-firing with fossil fuels in boilers (coal, natural gas) | _____ Develop systems to produce hydrogen from biomass |

Suggested research:

Thank you for your time completing this form.

Please return survey form by the **end of lunch at the Forum.** If you wish to return the survey later, please send the completed form to:

California Biomass Collaborative

Department of Biological and Agricultural Engineering

University of California

1 Shields Avenue

Davis, CA 95616

Phone: (530) 752-2640 Email: biomass@ucdavis.edu