

CalCars-Engineers for A Sustainable World, October 1, 2004 at Stanford: Global and Local Sustainable Solutions *How Engineers Are Defining New Ways to Change the World*

Comments about engineers, then biggest issue if we want to have a sustainable world, then look at kind of case study on what engineers are doing in one car project and what it means.

This talk and slides will be at linked from our "about page" <http://www.calcars.org/calcars-esw.pdf>

As a non-engineer, I curious about word: engine/engineer/ingenious: Latin root "ingeniosus" -- means "skilled."

Most definitions: "Engineers harness scientific knowledge to create solutions to human problems. Then they turn those solutions into objects and processes."

Traditionally work for: corps/research/academic/govt. If goal to create solutions for human problems: new roles there, or find new sponsors/employers or volunteer.

Society needs solutions especially for one ultimate project:: engineers need to join scientists in coming up with solutions to climate change.

(Renamed from more benign-sounding Global Warming.)

Most famous CC SLIDE 2: Intergovernmental Panel on Climate Change: humans caused 30% increase in CO2 in last 200 years.

SLIDE 3 Latest projections: under different CO2 and warming scenarios, average sea levels will rise 4-35 inches.

Warnings: 30,000 died of heat in Europe; Florida's hurricanes (CC-linked or not): more natural disasters ahead.

Past week: reports melting Antarctic glaciers, fly plagues, Alaskan Inuit villages -- and CARB regulations.

I testified (copies with me, online). Most shocking prediction to many was SLIDE 4 SNOW PACK: even with steps to cut down CO2, in 50-100 years, snow pack will be mostly rain pack. Winter floods, summer drought. Delta floods. There goes water supply, rice, fruits, vegetables -- and skiing and wine.

Signs of hope, e.g., 1. Stanford Global Climate Change and Energy Project: raised over \$250M.

2. British PM Tony Blair: situation "alarming and unsustainable," leading to "catastrophic consequences". Persuade US & Russia (yesterday endorsed Kyoto, isolating US).

<http://politics.guardian.co.uk/green/story/0,9061,1305030,00.html>

3. Princeton's Pacala and Socolow's "Stabilization Wedges" detailed strategy using existing tech to address the problem over the next half century is fertile ground for engineers wondering what to do with their lives: fire.pppl.gov/energy_socolow_081304.pdf

Beyond Bush vs. Kerry on CC, don't forget Senate 95-0 against Kyoto accord.

As aerospace engineer Dick Rutan and Spaceship One may collect Ansari \$10M prize, new \$50M Bigelow Prize for orbital flight: we need a prize for new greenhouse gas solutions that could involve carbon reduction, remediation.

That's my plug for what I think is the big issue of our lifetime.

Something has changed in last 10 years. As engineers start thinking about big problems + solutions, maybe they can get paid to work on these issues.

SLIDE 5 PENTIUM: You can track the history of recent engineer activism beginning with this 1994 chip and its math bug.

Email by techies and engineers was what changed the rules.

Jokes: "How many Pentium designers does it take to screw in a light bulb? A: 1.99904274017 -- but that's close enough for non-technical people."

Jokes began zeroing in on Intel: "Our new motto: "United We Stand, Divided We Fall." And "At Intel, Quality is Job #0.99989960954."

Couldn't fight it. Reversal cost Intel \$475M.

First time, organized expression of thousands of tech users changed the balance of power consumers-corp.

Fast forward ten years: web, blogs, and most important: discussion groups.

Communities: talk/learn/work together from anywhere.

Yahoo Groups as prime example. A means for engineers to find each other and work together and spread the word about what they're doing and their solutions.

Often, because so public, goals not to gain competitive advantage, intellectual property. Software's Open Source model.

Case study: '04 Prius

Newsweek just picked up on what many people realized last fall "Toyota's new hybrid may just be the biggest thing in cars since the combustion engine." I can talk more about why later. (e.g., proof that adv tech costs less; train users, etc.)

One year ago, SLIDE 5: PRIUS DISPLAY wave of online enthusiasm for new improved. Search for Prius: 51 Yahoo Groups. About a half dozen groups (not all at Yahoo) include 10,000 members. Engineers "embedded" in Groups with names like: "Prius_Tech_Stuff, Prius_Mods, PriusChat" etc.

Simultaneously: California Cars Initiative, group I founded, was promoting next generation hybrids. "Next hybrids will plug in."

Prius: stealth mode SLIDE 7: TOYOTA'S EV BUTTON. Only Europe + Asia.

Last February, Texas experimenter reverse engineered it. Led to interest in PHEVs.

That inspired a change CalCars' strategy to focus on Prius

SLIDE 8 LICENSE/STICKERS Led us to conversion idea: in March: PRIUS+: pick up on popularity, "soup it up."

In June, engineer found us online: Ron Gremban from Marin, had been involved in first transcontinental Great Electric Car Race, Caltech vs. MIT in '68. Working in solar PV SLIDE 9 RON & DAN: Ron with another Caltech engineer.

Recruited three dozen engineers US/Europe/Asia inviting people whose messages we were impressed by in online groups: to go beyond brainstorming to building:

SLIDE 10 GROUP HOME Set up "priusplus phev conversion group."

With all kinds of people including employees at or retired from automakers and suppliers; EV enthusiasts, car buffs, entrepreneurs.

We began to design prototype: strawman specs, battery options, etc. SLIDE 11 GROUP MESSAGES.

Raised money: first from entrepreneur who insisted on donating online SLIDE 12 SPONSOR.

Ordered components, car SLIDE 13 BATTERIES Finished building Sept 22, now debugging.

And next SLIDE 14 METERS will document performance.



Started with lead acid, soon will switch to NiMH and Li-Ion SLIDE 15 BATTERY SPREADSHEET
SLIDE 16 TEAM We may not look like Vin Diesel in Fast/Furious/Hondas, but we call ourselves garage-based "green tuners."

Maybe there's a model here...engineers integrated into larger community of engaged, tech-savvy consumers.

In early 90s: CA was center of auto-EV innovation. Are we part of a new wave?
Slide 15 Map: California clean energy businesses and research and supporting organizations.

AC Propulsion: SLIDE 16 tZero zero-60 in 4.1 seconds and 1/4 mile in 13.2 seconds.

Also proposing Lithium conversion: SLIDE 17 SCION.

UCS: SLIDE 18 GUARDIAN SUV, NRDC models too; now all env orgs hire engineers.

Engineers can enlist as experts and experimenters

New allegiances: finding a spot for yourself is enabled by new technology.

Many industries for Climate Change: housing, industrial processes, energy, etc.

Back to Yahoo Groups SLIDE 19 RENEWABLE, keywords: Sustainable 1,603; Conservation 1,270; Renewable 245, Global Warming 134, Climate Change 113, Then Engineering 14,903, Engineers 4,916, and Engineer 1,408.

Lots of other places to look, including SLIDE 20 Green Dream Jobs at SustainableBusiness.com

If anyone ever accused you of wanting to save the world, I hope they're right, and you go out and do it!

Slide 21 Contact: see link on our "about" page for this talk.

Engineers for a Sustainable World

Stanford University, October 1, 2004

“Global and Local Sustainable Solutions”

How Engineers Are Defining New Ways To Change the World

(presentation at www.calcars.org “about” page)

Felix Kramer, Founder info@calcars.org

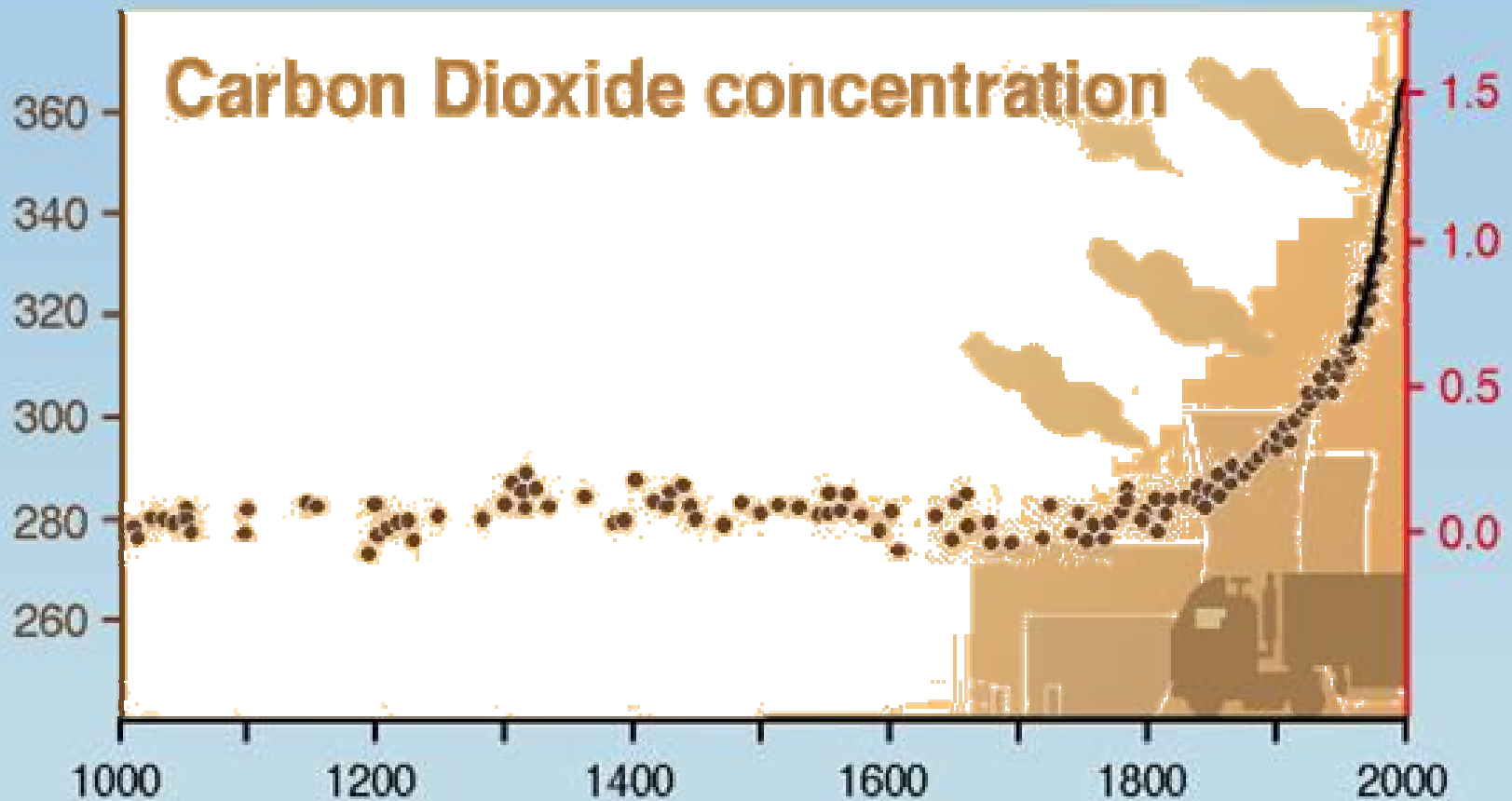


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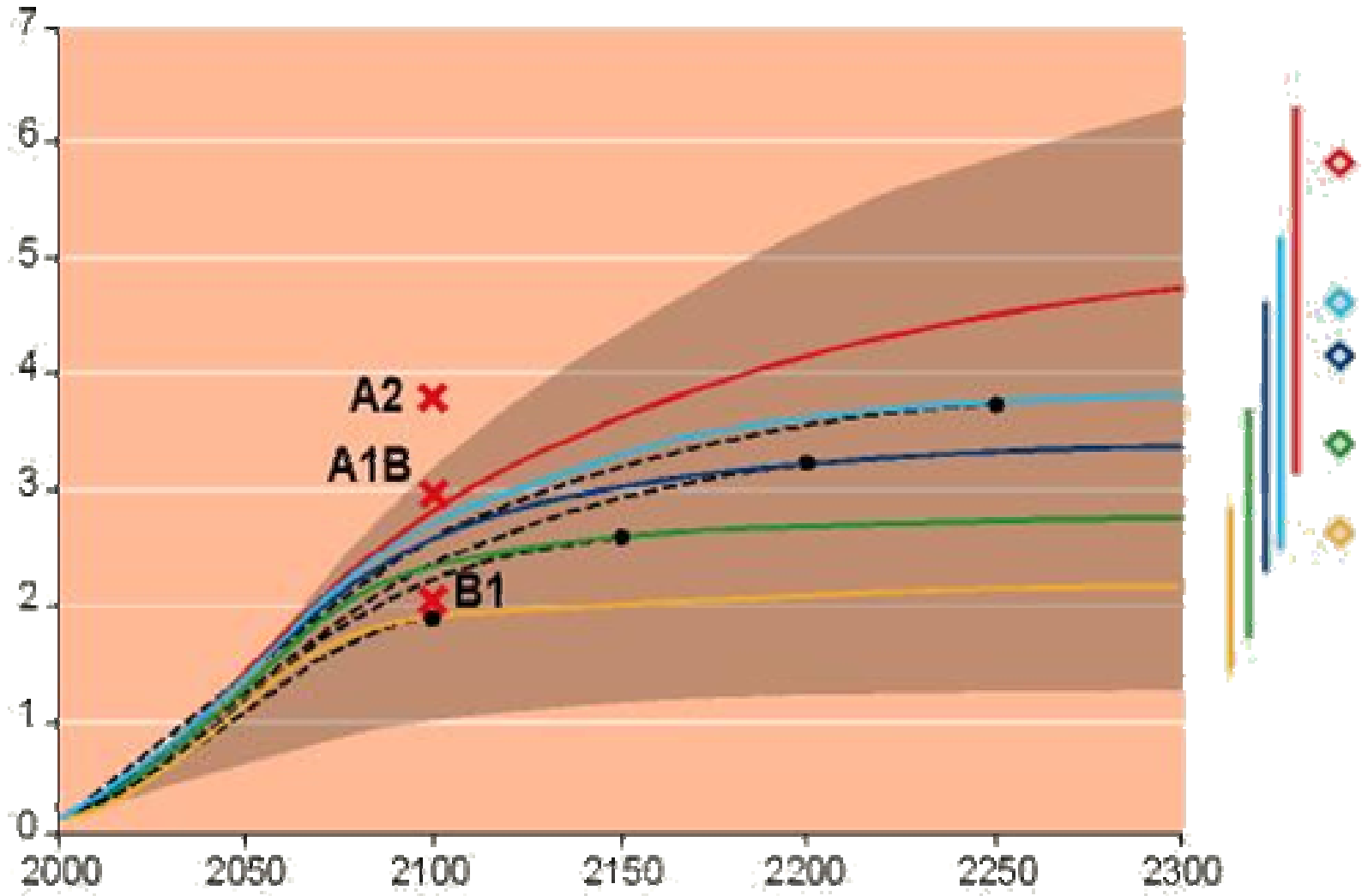
CO₂ (ppm)

Radiative forcing (Wm⁻²)



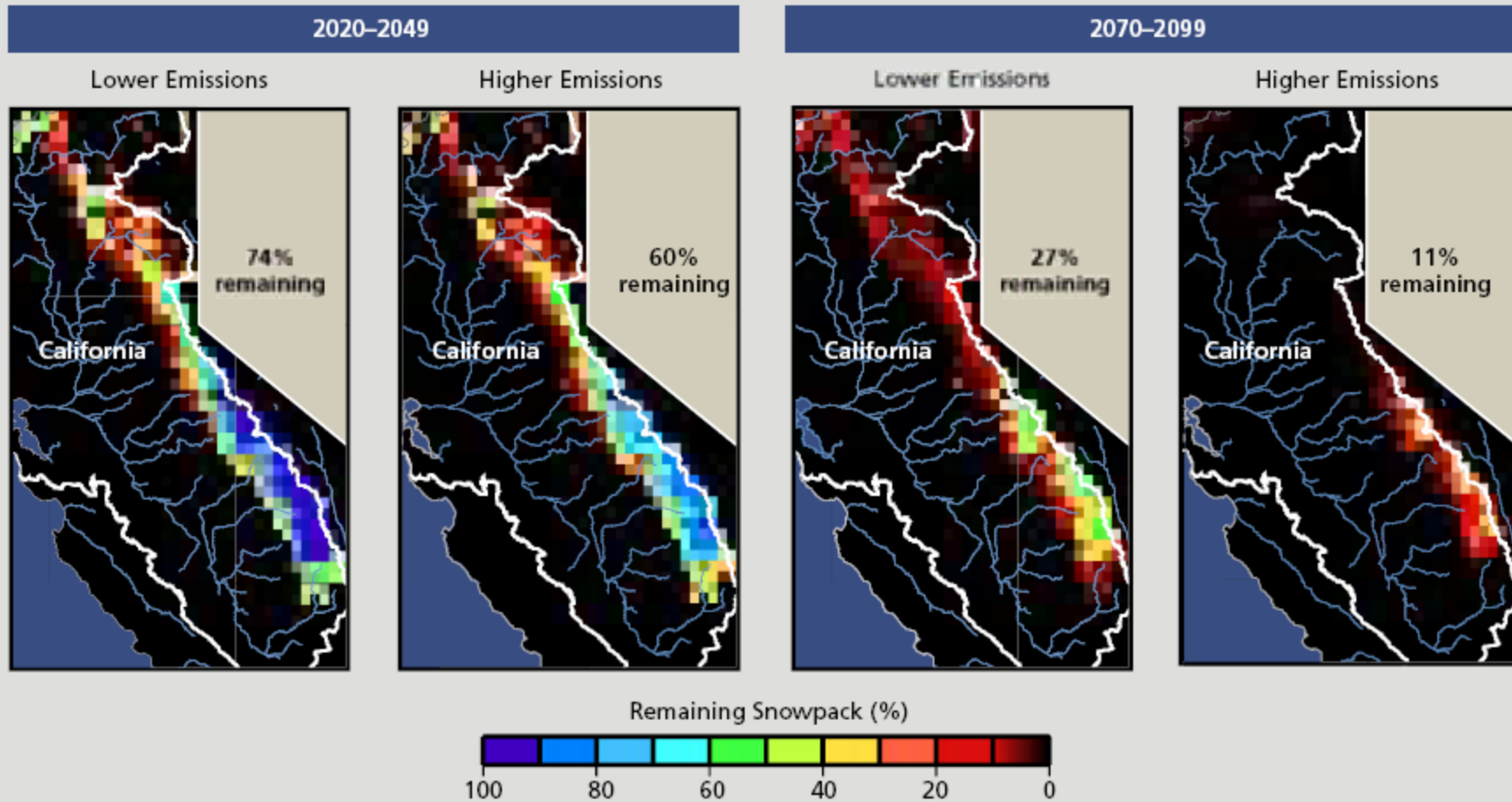
Intergovernmental Panel on Climate Change

(c) Global mean temperature change (°C)



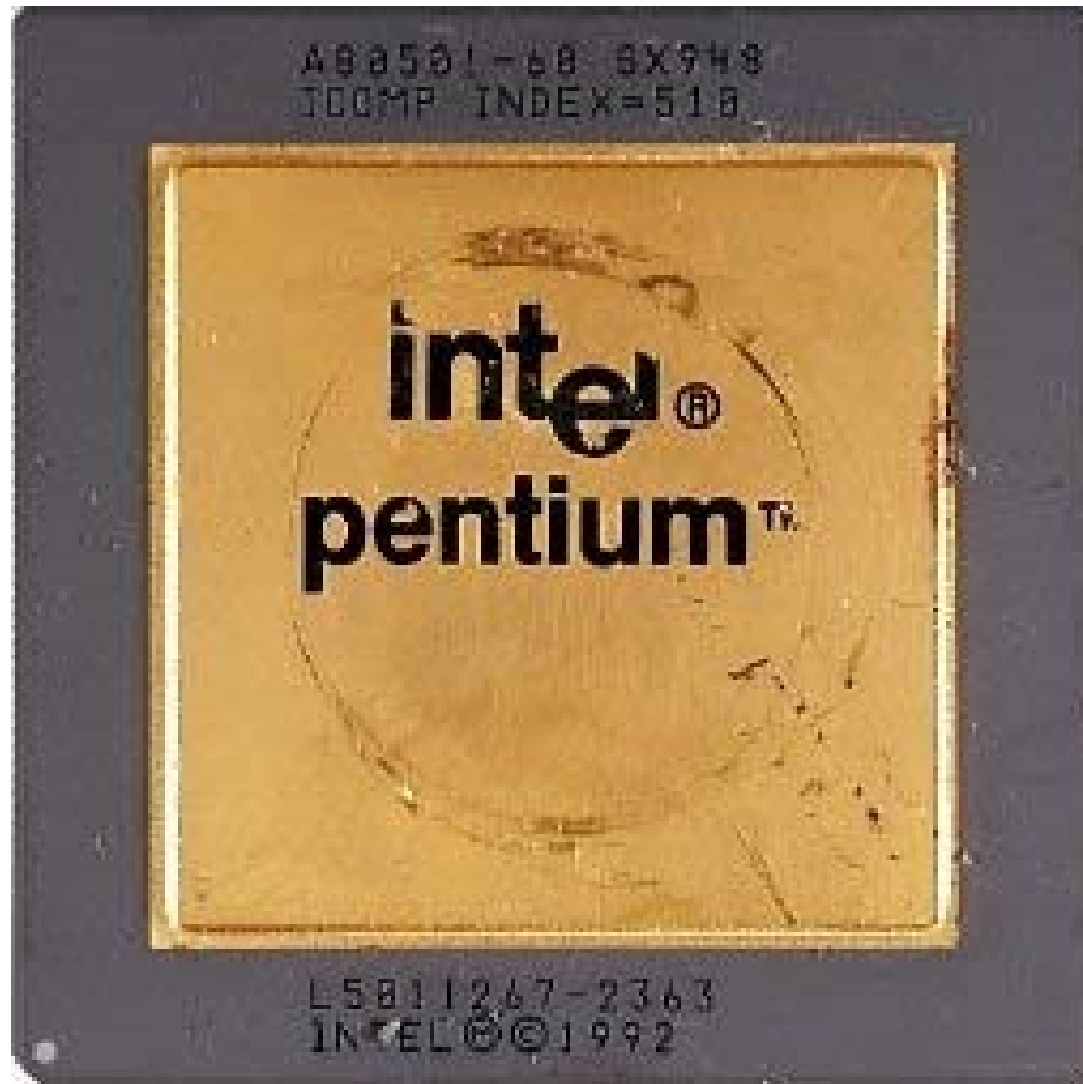
Intergovernmental Panel on Climate Change

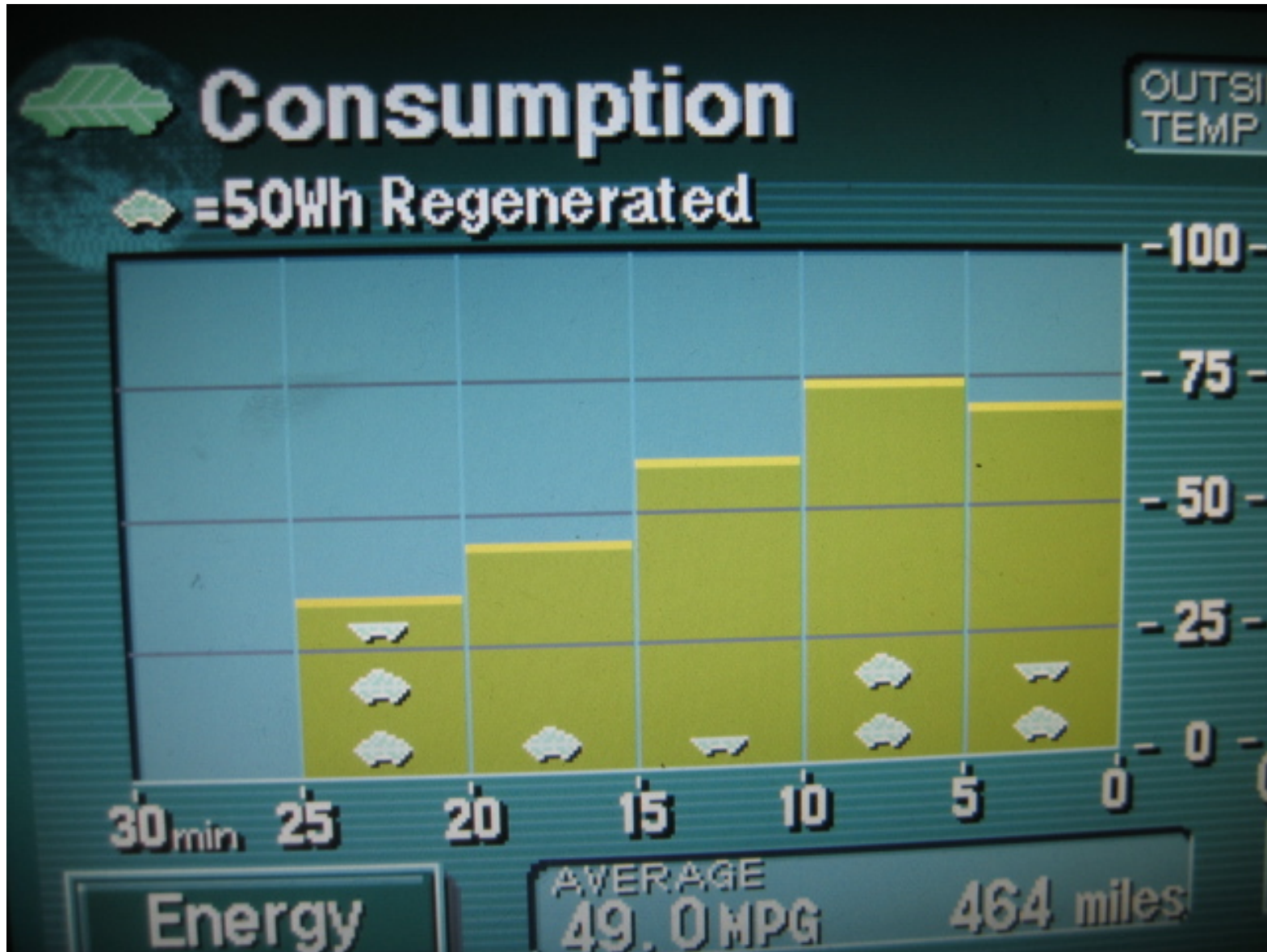
Decreasing Sierra Nevada Snowpack



By the end of the century, Sierra Nevada snowpack could be reduced to less than a third of current levels, even under a lower-emissions scenario. This figure shows projections of spring snowpack in the Sacramento-San Joaquin watershed, which provides water to about 28 million agricultural and urban users in California. (Based on climate projections from the HadCM3 climate model.)

Union of Concerned Scientists









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Welcome! Here you can view or participate in discussions about the project to make the 2004 Prius a plug-in hybrid -- PHEV, also called pluggable, plug-optional or grid-connected hybrid. We're preparing to build a few prototypes as a step toward getting Toyota to produce them. PRIUS+ will have a 15-20+ mile electric-only range at up to 35 MPH. At higher speeds it will act just like any other highway-capable Prius -- see priusplus.org. (It may be possible to achieve even higher electric-only speeds.)

We model our effort on "Open Source" software development projects: We draw on the expertise and solutions of a broad group of experts and no individual owns any resulting intellectual property.

Since we don't keep our discussions secret, our message archives are OPEN to the public. We intend to remain highly focused, relatively low-traffic and spam-free. In this working group, members post messages based on their specialties.

We emphasize anyone can READ messages. To join, if you haven't been invited, submit a membership request (click at upper right of this page). In "comments," please tell us how you heard about us; describe your background and technical expertise or business and strategic experience. You get only 200 characters--to say more, apply and at the same time write to list owner (address below).

If you're just looking, read the first message and recent messages in the archive to learn more about the group. (For those not in the group, key documents uploaded to the Files area are mirrored at www.priusplus.org.)

You may also want to view or join:

<http://www.calcars.org> -- all about PHEVs

<http://groups.yahoo.com/group/gridable-hybrids> -- PHEV talk

<http://groups.yahoo.com/group/Prius-2G> -- 2004 Prius issues

http://groups.yahoo.com/group/Prius_Technical_Stuff -- nuts and bolts

http://groups.yahoo.com/group/Prius_Miniscanner_MarkIII -- a similar working group.

What's New

New within the last seven days:

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Sep 29 [Re: Team/Installation pix, brief CARB hearing report, lessons from E - fonzfrank](#)
Felix: It looks like you are making progress. By the way I counted only 18 bat

Sep 29 [Team/Installation pix, brief CARB hearing report, lessons from Escap - felixkramery](#)

Membership

You are a moderator of this group

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Pending Activity

0 Members
0 Messages

Group Info

Members: 56
Founded: Jun 28, 2004
Language: English

Group Settings


- Listed in directory
- Restricted membership
- Unmoderated
- All members may post
- Public archives
- Email attachments are not permitted



Yahoo! Groups : priusplus Messages : 96-129 of 192 - Mozilla Firefox

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Makers of Earth's first full hybrid SUV.

WHEN IT COMES TO HYBRIDS, THERE'S FULL, THEN THERE'S MILD.

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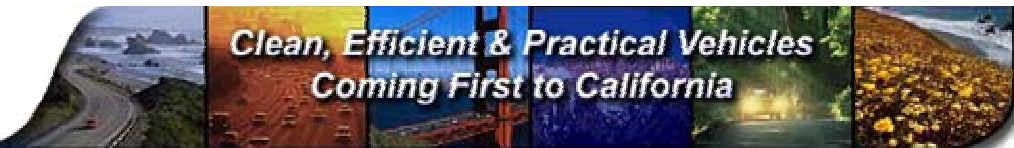
	Subject	Name/Email	Yahoo! ID	Date
<input type="checkbox"/>	96 Thanks. And! Re: The key: chassis dyno	Felix Kramer	felixkramery	Mon 8/2/2004
<input type="checkbox"/>	97 Re: The key: chassis dyno	Dave Goldstein	goldiev1	Mon 8/2/2004
<input type="checkbox"/>	98 Re: The key: chassis dyno	Quin Curran Garcia	dngfrommp	Tue 8/3/2004
<input type="checkbox"/>	99 Exciting challenge: to complete first prototype in 6 weeks	Felix Kramer	felixkramery	Wed 8/4/2004
<input type="checkbox"/>	100 Re: Exciting challenge: to complete first prototype in 6 weeks	Ron Gremban	rgremban	Wed 8/4/2004
<input type="checkbox"/>	101 Re: The key	Dave Goldstein	goldiev1	Thu 8/5/2004
<input type="checkbox"/>	102 Preliminary components list and budget: RFC (request for comment)	Felix Kramer	felixkramery	Thu 8/5/2004
<input type="checkbox"/>	103 PriusPlus Conversion Technical Group Is Open For Viewing	Felix Kramer	felixkramery	Thu 8/5/2004
<input type="checkbox"/>	104 Re: Preliminary components list and budget: RFC (request for comment)	Dan Kroushl	kroushdb	Fri 8/6/2004
<input type="checkbox"/>	105 Re: Preliminary components list and budget: RFC (request for commen	Victor Tikhonov	acr_x_ev	Fri 8/6/2004
<input type="checkbox"/>	106 Where batteries can fit in the '04 Prius	Felix Kramer	felixkramery	Fri 8/6/2004
<input type="checkbox"/>	107 FYI: discussion about approving/denying membership in group	Felix Kramer	felixkramery	Sat 8/7/2004
<input type="checkbox"/>	111 Please keep list on-topic (was: CAN-Database for the new Prius 2004)	Felix Kramer	felixkramery	Mon 8/9/2004
<input type="checkbox"/>	113 Candidate Battery Packs updated: file available to all	Felix Kramer	felixkramery	Mon 8/9/2004
<input type="checkbox"/>	114 Comparison of possible PRIUS+ configurations: please comment	Ron Gremban	rgremban	Tue 8/10/2004
<input type="checkbox"/>	115 Re: Comparison of possible PRIUS+ configurations: please comment	Tom Stangl, VFAQman	talonts	Tue 8/10/2004
<input type="checkbox"/>	116 Re: Comparison of possible PRIUS+ configurations: please comment	Andy Frank	fonzfrank	Tue 8/10/2004
<input type="checkbox"/>	117 Re: Comparison of possible PRIUS+ configurations: please comment	Tom Stangl, VFAQman	talonts	Tue 8/10/2004
<input type="checkbox"/>	118 Re: Preliminary components list and budget: RFC (request for comment)	Ron Gremban	rgremban	Tue 8/10/2004







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*Clean, Efficient & Practical Vehicles
Coming First to California*

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Donate Any Amount by Credit Card, PayPal or Check for PRIUS+ -- or Become a Charter Sponsor!

Several hundred thousand Americans have signed Clean Car pledges (about 25% came from California). Now, at this critical time, you get the chance to do more than express a general intention. Your actions will jump-start a historic change.

Of course, you can give any amount to give CalCars the resources to build the initiative and get the ball rolling on the [PRIUS+](#) campaign (and it's [tax-deductible](#)). See links below.

But if you can, we're asking you to donate \$95 to become a Charter Sponsor, prove there's a viable market for better cars and show we're en route to bringing motivated customers to a major car maker. This will:

- Enroll you as a **CalCars Charter Sponsor**;
- Enable us to **negotiate with car companies** (our claim that we represent serious buyers won't be credible with anything less than \$95 sponsors);
- Get you one of the the unique **bumper stickers** (below) that tells the world you'll soon be switching to a better, cleaner car -- display it on your car or collect it!
- Give you an early opportunity to **join the CalCars Buyers Club** for a plug-in hybrid vehicle -- produced by a car company from its line of compact SUVs;
- Subscribe you to our **email newsletter** with information about our campaign and important automotive, environmental and related developments.

Institutional Charter Sponsors for \$495 are also available.

As a Charter Sponsor, you get your choice of either 10x3-inch bumper sticker:



designed by [Kris Kiger](#)



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PRIUS+ Candidate Battery Packs

Author: Ronald Gremban

Color legend:

Calculated

Guessed

Exceptional

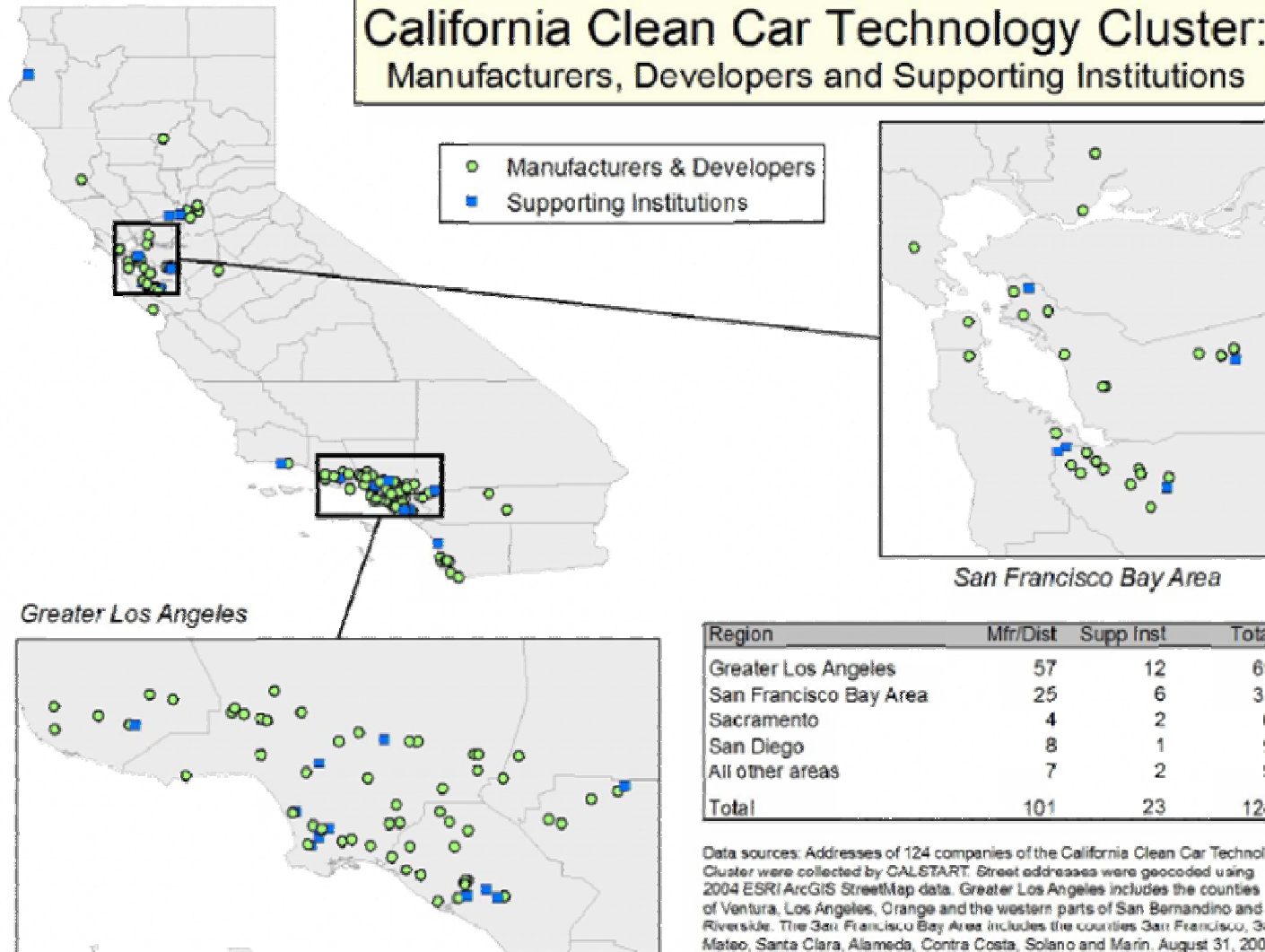
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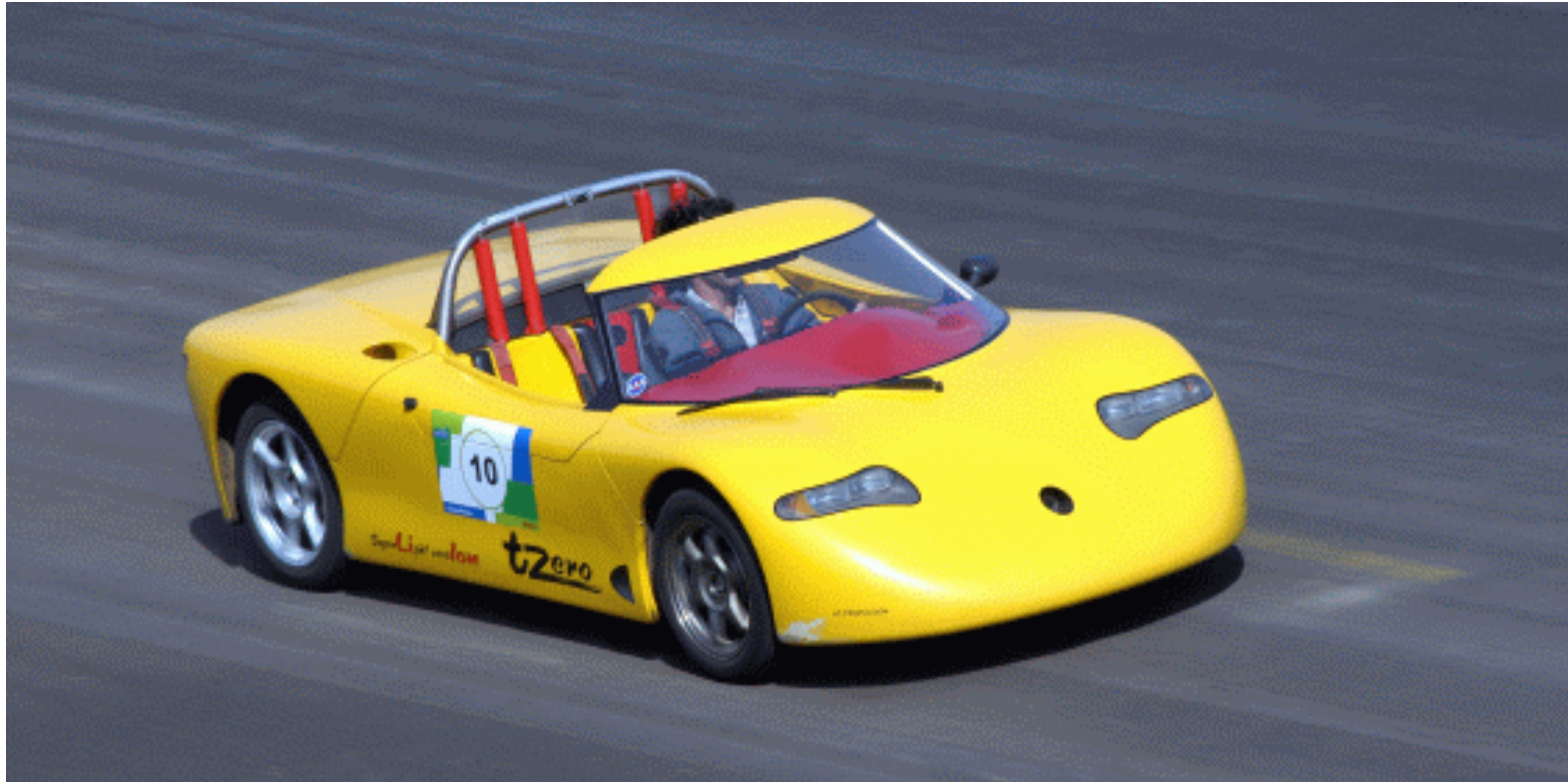
Brand	Model	Chem.	Supplier	Notes	% Dis-charge	V @2C	Rated TypAh	Ah ¹ @2C	Vol. Wt, lb	cu-in	Cells	V sag %/C ⁴	Rated Cont C	Rated Int C	Calc ¹⁰ Max C	\$ info	Retail \$
Suggested requirements ==>																	
Used as separate traction battery (config #3, 260V or config #4, 520V):																	
Valence	U-Charge VU0	Li-ion	N/A	How real?	80%	13.2	21.8	16.8	9.2	130	4	4.6%	1.3	6.6	4.3	Chris J	\$280
Quest	HC-D8500	NIMH	Harding Energy	custom 12-cell module w/fuse	80%	13.2	10.0	8.7	4.62	54	12	2.7%	6.0	12.0	7.4	pure guess	\$126
PowerThat	PWRNM9000D	NIMH	Batteries Plus	custom 12-cell module w/fuse	80%	13.2	9.2	8.1	4.62	54	12	2.3%	4.9	13.0	8.7	cells * 1.5	\$121
Titanium	high discharge D	NIMH	Amondo Tech.	custom 12-cell module w/fuse	80%	13.2	9.0	7.8	4.62	54	12	2.7%	5.0	10.0	7.4	cells * 1.5	\$122
Sanyo	HR-DU	NIMH	TNR Technical	custom 12-cell module w/fuse	80%	13.2	9.0	8.1	4.70	54	12	2.0%	4.4	N/A	10.0	cells * 1.5	\$216
?	18650 module ⁹	Li-ion	Batteries Plus	Module includes protection	80%	6.6	11.0	7.7	1.06	19.6	10	6.0%	2.0	N/A	3.3	Batt ⁹	\$80
BB Battery	EVP20-12	PbAcid	ElectricRider.com	Too heavy	80%	11.0	20.0	12.5	14.3	143	6	1.5%	8.0	24.0	13.3	retail	\$38
Used in place of the Prius' (64 lb) hybrid battery⁸ (config #2; 201.6/184.8V only):																	
Valence	U-Charge VU1	Li-ion	N/A	How real?	50%	13.2	46.4	35.7	14.1	256	4	4.6%	1.3	6.6	4.3	Chris J	\$600
Valence	U-Charge VU1	Li-ion	N/A	How real?	70%	13.2	46.4	35.7	14.1	256	4	4.6%	1.3	6.6	4.3	Chris J	\$600
BB Battery	EVP20-12	PbAcid	ElectricRider.com	Too heavy	70%	11.0	20.0	12.5	14.3	143	6	1.5%	8.0	24.0	13.3	retail	\$38
Quest	HC-D8500	NIMH	Harding Energy	custom 12-cell module w/fuse	50%	13.2	10.0	8.7	4.62	54	12	2.7%	6.0	12.0	7.4	pure guess	\$126
PowerThat	PWRNM9000D	NIMH	Batteries Plus	custom 12-cell module w/fuse	50%	13.2	9.2	8.1	4.62	54	12	2.3%	4.9	13.0	8.7	cells * 1.5	\$121
Titanium	high discharge D	NIMH	Amondo Tech.	custom 12-cell module w/fuse	50%	13.2	9.0	7.8	4.62	54	12	2.7%	5.0	10.0	7.4	cells * 1.5	\$122
?	18650 module ⁹	Li-ion	Batteries Plus	Module includes protection	50%	6.6	11.0	7.7	1.06	19.6	10	6.0%	2.0	N/A	3.3	Batt ⁹	\$80
Sanyo	HR-DU	NIMH	TNR Technical	custom 12-cell module w/fuse	50%	13.2	9.0	8.1	4.70	54	12	2.0%	4.4	N/A	10.0	cells * 1.5	\$216
?	18650 module ⁹	Li-ion	Batteries Plus	Module includes protection	70%	6.6	11.0	7.7	1.06	19.6	10	6.0%	2.0	N/A	3.3	Batt ⁹	\$80
Quest	HC-D8500	NIMH	Harding Energy	custom 12-cell module w/fuse	70%	13.2	10.0	8.7	4.62	54	12	2.7%	6.0	12.0	7.4	pure guess	\$126
PowerThat	PWRNM9000D	NIMH	Batteries Plus	custom 12-cell module w/fuse	70%	13.2	9.2	8.1	4.62	54	12	2.3%	4.9	13.0	8.7	cells * 1.5	\$121
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Sanyo	HR-DU	NIMH	TNR Technical	custom 12-cell module w/fuse	70%	13.2	9.0	8.1	4.70	54	12	2.0%	4.4	N/A	10.0	cells * 1.5	\$216
Panasonic	(HEV-II)	NIMH	Toyota dealer	Too expensive, for comparison	50%	6.6	6.5	6.2	2.30	36.2	6	1.0%	N/A	28.9	20.0	pack price	\$143
Panasonic	(HEV-II)	NIMH	Toyota dealer	Orig Prius battery for comparison	50%	6.6	6.5	6.2	2.30	36.2	6	1.0%	N/A	28.9	20.0	pack price	\$143
Panasonic	(HEV-II)	NIMH	Toyota dealer	Too expensive, for comparison	70%	6.6	6.5	6.2	2.30	36.2	6	1.0%	N/A	28.9	20.0	pack price	\$143
Panasonic	(HEV-II)	NIMH	Toyota dealer	Orig Prius battery for comparison	70%	6.6	6.5	6.2	2.30	36.2	6	1.0%	N/A	28.9	20.0	pack price	\$143



California Clean Car Technology Cluster: Manufacturers, Developers and Supporting Institutions



www.calstart.org



AC Propulsion



A Blueprint for Saving Lives, Money and Gasoline



Union of Concerned Scientists

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Groups	Members	Archive
1 renewable_energy_forum Renewable Energy Forum for Arab Youth	19	For Members
2 renewable_energy User group for producers and firms selling and developing products and technique for renewable energy production. This group is developing a common information and ressource platform of all kinds of renewable energy disiplns. Sun, Wind, Water, Bio, Geo-Thermal Energy etc. Companies in Renewable Energy Field can get a free generic registry at our website. This is at the time a non commercial service, but the goal is to get a international service between producers in Renewable Energy, and a ... more	35	For Members
3 renewable-energy The Renewable Energy/Energy Policy list is sponsored by the American Wind Energy Association (AWEA) to provide an informal forum for news and information about renewable energy technology (wind, solar, biomass, geothermal, hydro). This list is moderated to ensure messages are on-topic. Discussion of free energy systems is not appropriate for this list, and should be pursued elsewhere. AWEA also publishes a "free" time-delayed edition of its newsletter Wind Energy Weekly. To subscribe to this ... more	1312	Public
4 WWU-renewable-energy Fostering a sense of community centered around sustainability through "green" energy on WWU's campus.	81	For Members
5 renewable-energy-systems The Renewable Energy Systems list is sponsored by the American Wind Energy Association (AWEA) to provide an informal forum for news and information about renewable energy (wind, solar, geothermal, biomass, and hydro) systems for household and building use. It is particularly intended for discussion of experiences, ideas, and equipment for such systems. For discussion of energy policy, use the Renewable Energy Policy list. Discussion of free energy systems is not appropriate for this list, and ... more	106	For Members
6 renewable Discussions, news and issues, events, employment and business opportunities in Canada's Atlantic provinces renewable energy industry.	5	For Members
7 cosmic-accounting Cosmic Accounting is much more than 'just an idea' to be kicked around. It actually tells the truth about the physical cost of goods and services. By accounting this way, humanity can place itself in	13	For Members

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 State:
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Skill Level
 (Ctrl selects multiples)

Job Category
 (Ctrl selects multiples)

Keyword:

Job Title	Location	Job Type	Skill Level	Date Posted
Environmental Professionals x 3 New England Interstate Water Pollution Control Commission	Lowell, MA US	Analyst/ Research, Engineering	Mid Level	Sep 28, 2004
Research & Development Engineer Southwest Windpower, Inc.	Flagstaff, AZ US	Engineering, Energy	Mid Level	Sep 2, 2004
Approved DayCare Coach, Jobs - Solar	Halfmoon, NY	Engineering	Mid Level	Jul 5, 2004

Engineers for a Sustainable World

Stanford University, October 1, 2004

“Global and Local Sustainable Solutions”

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