Behavior Change for Sustainability

University–National Oceanographic Laboratory System
University of Rhode Island, Graduate School of Oceanography
11th Hour Racing

Green Boats and Ports for Blue Waters III
University of Rhode Island's Graduate School of Oceanography
Narragansett, Rhode Island
April 5–6, 2016

Credit: ALMA C. Padilla (NRAO/AUI/NSF).

Pete McEvoy
Vice President Administration
Associated Universities, Inc (AUI)

Associated Universities, Inc.

Hawaii

Chile

2002–2013

GEMINI OBSERVATORY
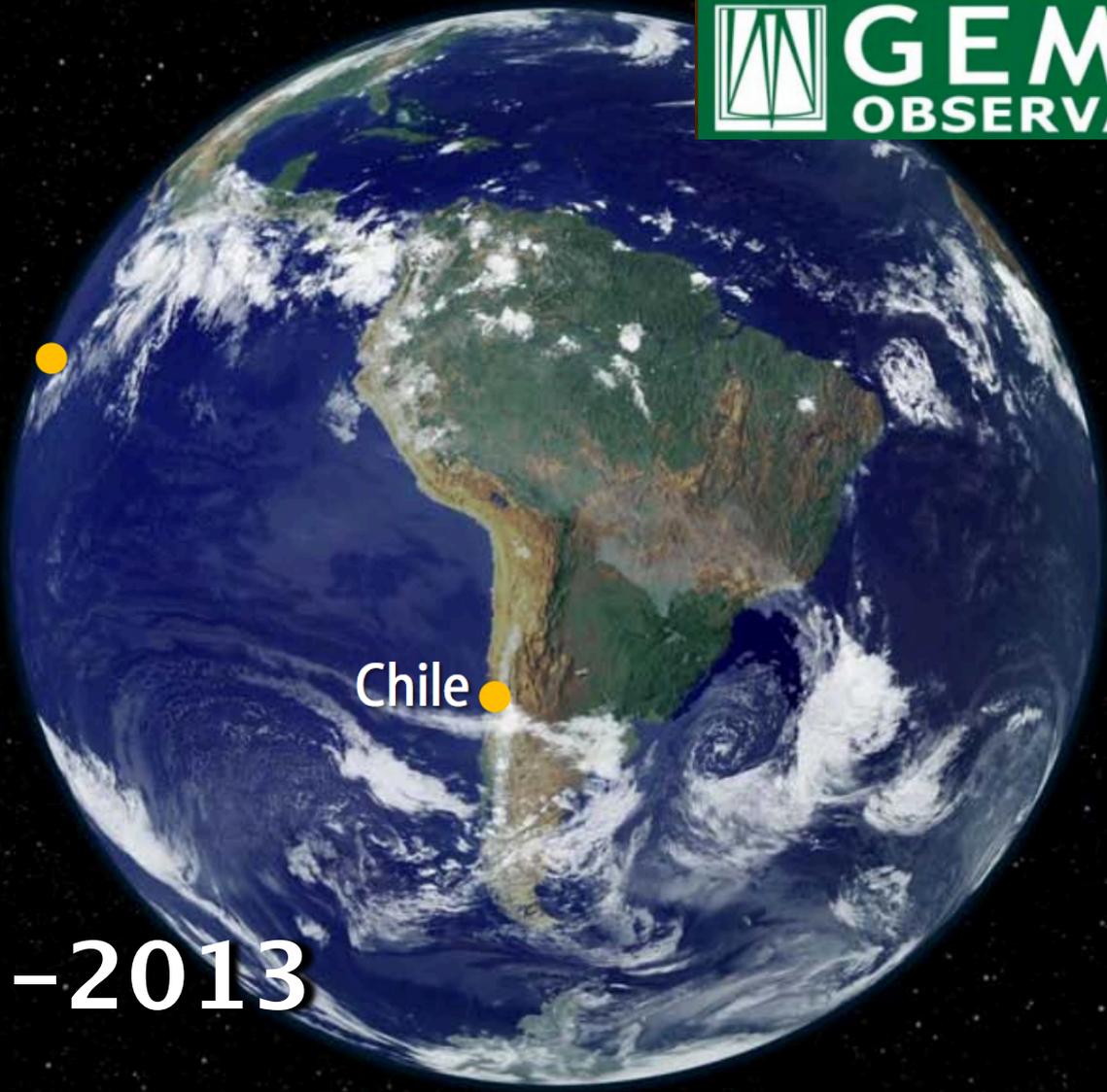
Low-energy astrophysics: How scientists are trying to save the Earth

Listen to the scientists. That's what we say. When lots of different scientists, working separately, are turning up evidence that the Earth is getting warmer and human activities are to blame, then we should heed their warnings.

Scientists, from many different disciplines, say that their research shows we should be concerned about climate change. If we want to reduce our risk, we'll have to start using less fossil fuels. That's a big shift in the way the world thinks about energy. It's bound to change our lives—and we

Mauna Kea, Hawaii
Built : 1999
Building 8,651 sq ft
Dome 26,248 sq ft

Hilo, Hawaii
Built : 1998
Extended : 2008
30,847 sq ft

Built : 2003
17,665 sq ft
La Serena, Chile

Built : 2001
Building 15,199 sq ft
Dome 26,248 sq ft
Cerro Pachón, Chile

DISTRIBUTION OF GEMINI'S ENERGY CONSUMPTION (kWh)

Mauna Kea, Hawaii — 33%

Hilo, Hawaii — 16%

La Serena, Chile — 9%

Cerro Pachón, Chile — 42%

Mauna Kea, Hawaii

Hilo, Hawaii

43%

23%

DISTRIBUTION OF GEMINI'S

ENERGY COSTS (US$)

6%

28%

La Serena, Chile

Cerro Pachón, Chile

| Engineering | Science | Telescope | General | Safety | ISG | | Search |

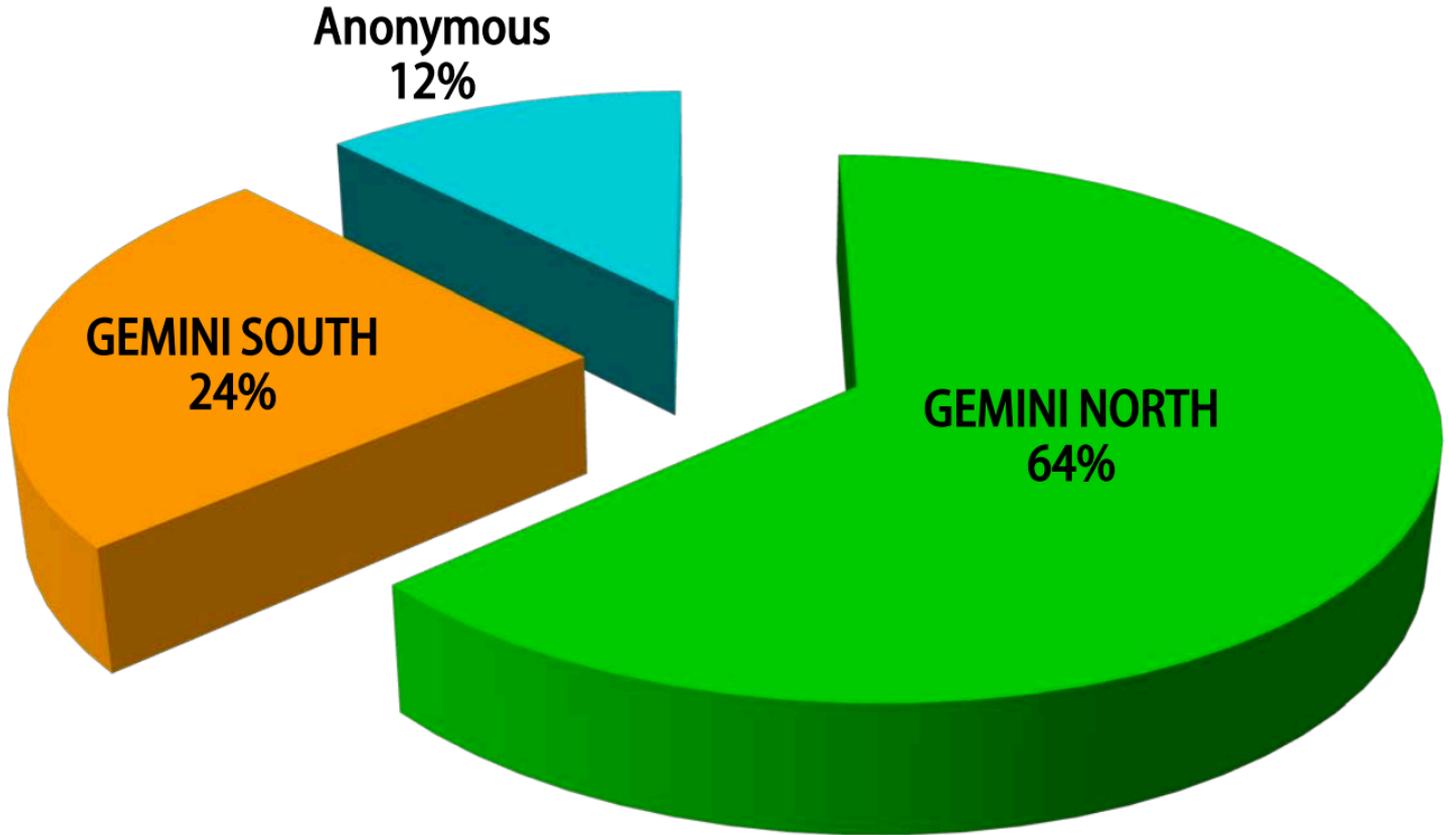Page style ▾

Gemini Green Blog
Written by admin on Mon, 2008-08-04 16:00, updated on August 7, 2008

Gemini Observatory will begin a "green" facilities program in 2009; an issue that is of interest to many of our staff. So, as part of the planning process for next year, we want to obtain staff comments on the subject and have created a blog for this purpose.
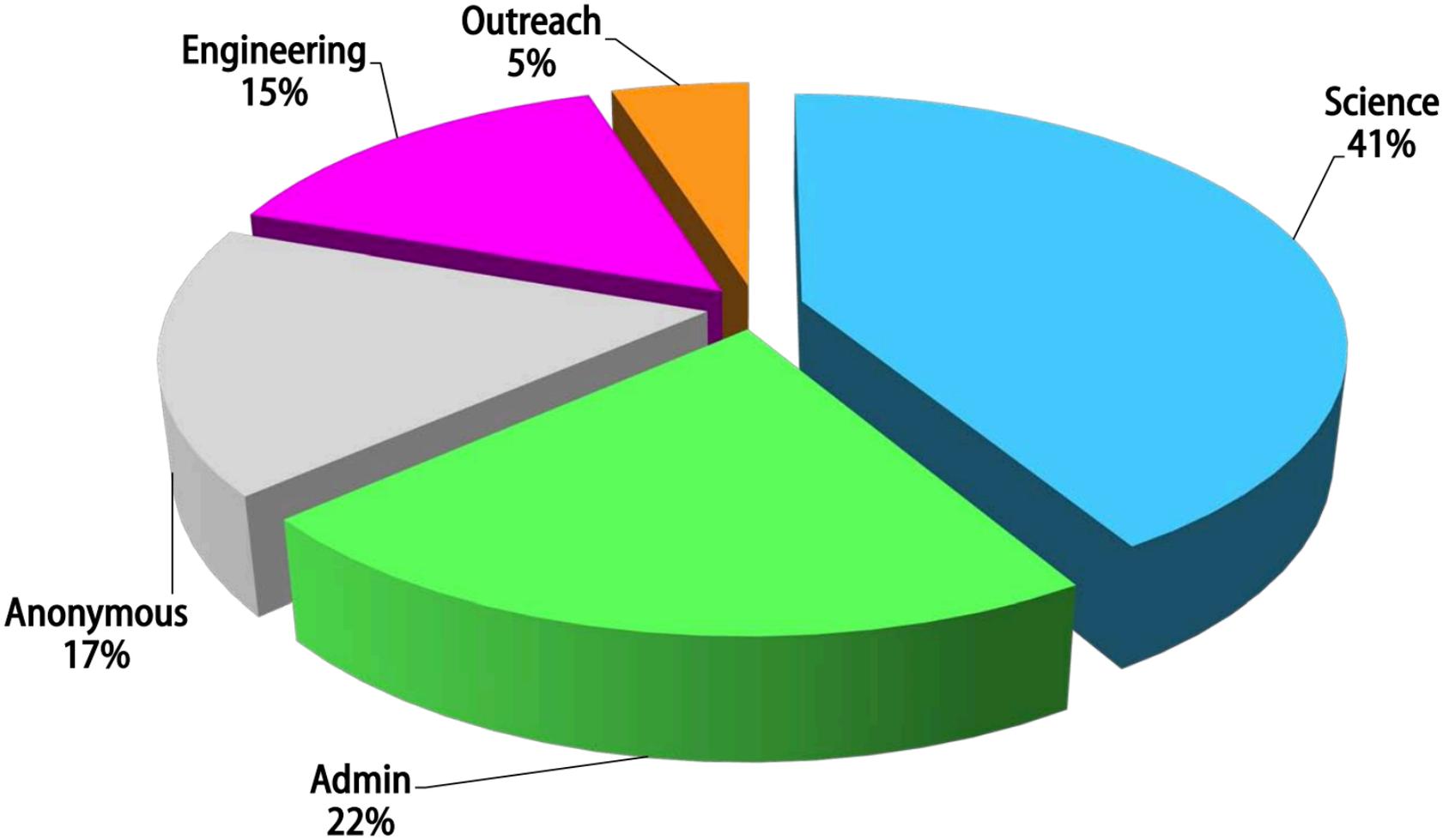
We want to encourage all staff to use this communication channel to establish a knowledge base on green issues that should be of relevance to Gemini. Our aims are high levels of sharing and collaboration on the subject; building a productive green building program from the contributions from all that are interested in the topic, from whatever angle.........
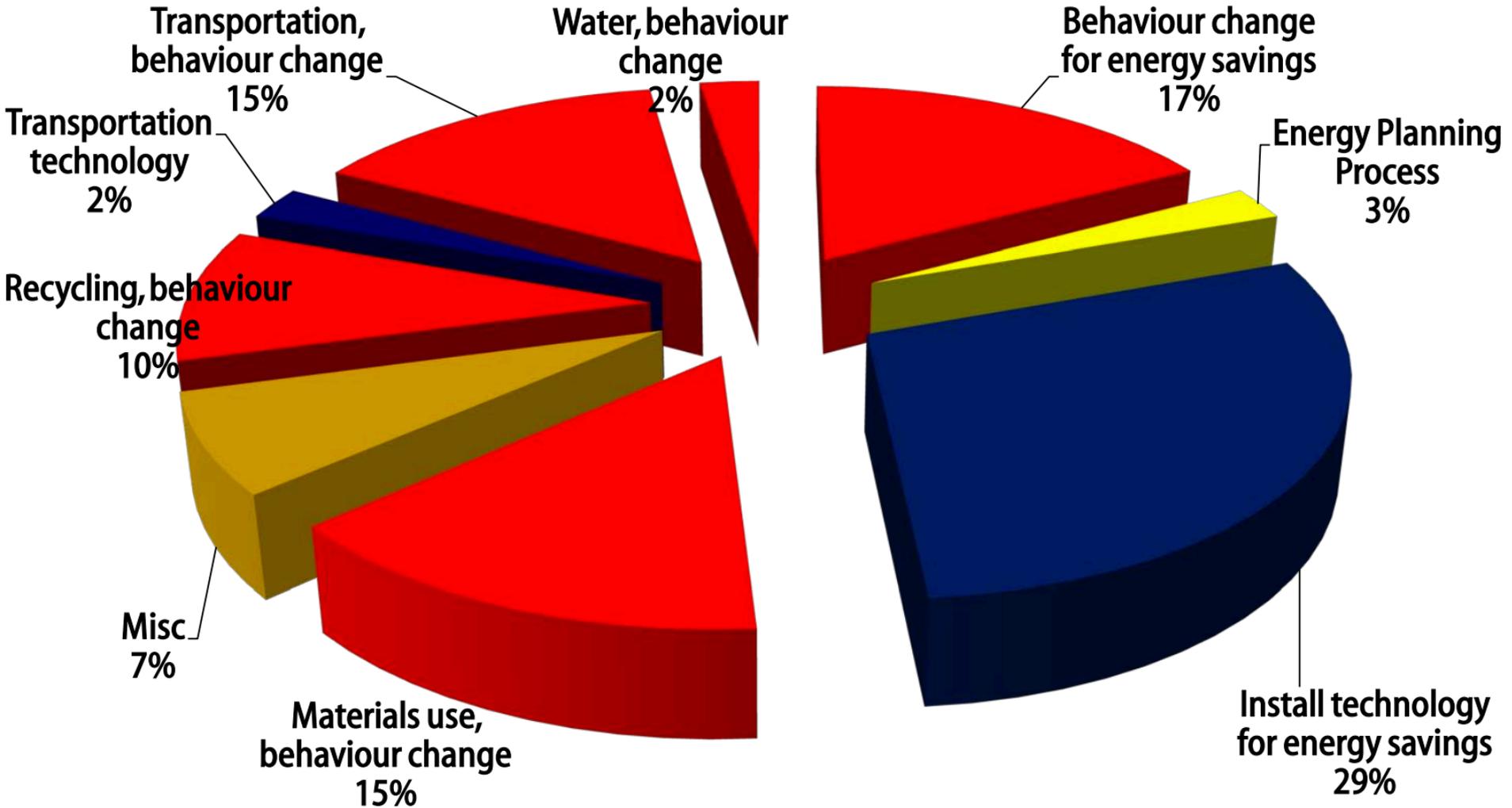
Where did the ideas come from?

Where did the ideas come from?

Science
41%

Outreach
5%

Engineering
15%

Anonymous
17%

Admin
22%

What type of change?

- Transportation, behaviour change 15%
- Water, behaviour change 2%
- Behaviour change for energy savings 17%
- Transportation technology 2%
- Energy Planning Process 3%
- Recycling, behaviour change 10%
- Install technology for energy savings 29%
- Misc 7%
- Materials use, behaviour change 15%

What type of change?

31% of comments promoted technology

59% promoted **behavior change**

What type of change?

Gemini approached the challenge in two ways.....

● Created an internal structure for energy planning

● Began implementing changes where a good start could be made quickly ("low hanging fruit")
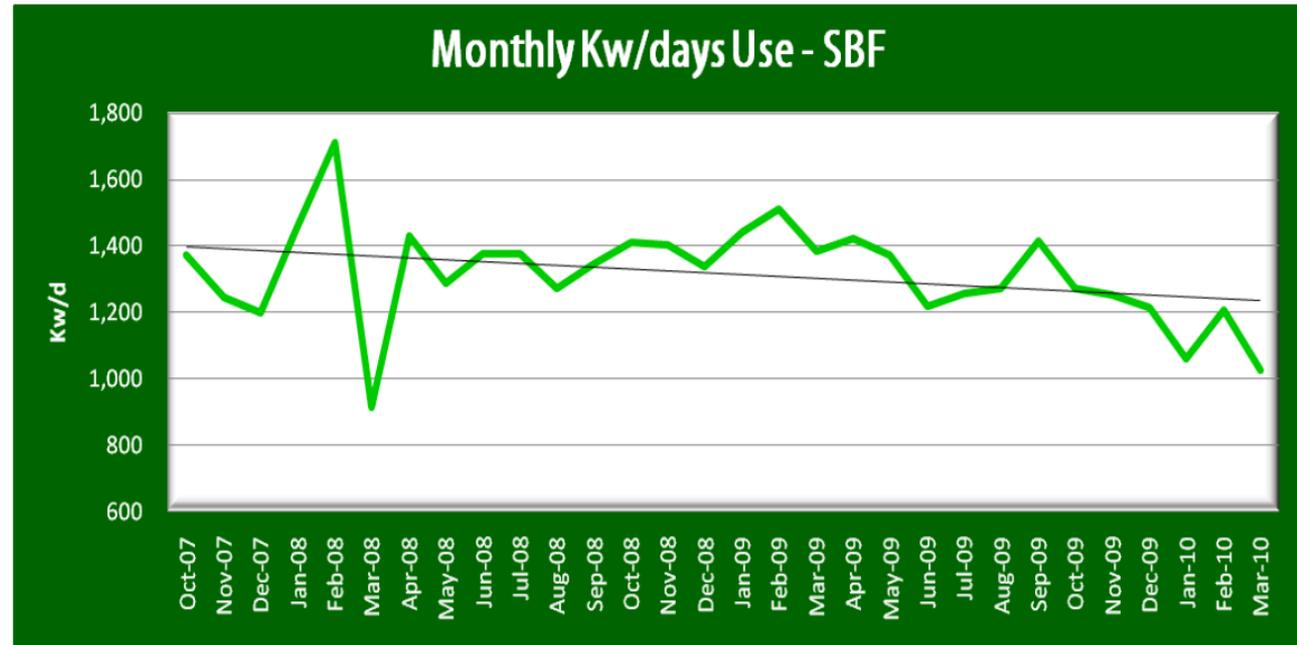
Oversight & Direction

An Energy Planning Oversight & Control Committee was created to set the overall direction of the energy plan and oversee the development of the early initiatives

The Committee comprises personnel from all areas with a direct involvement in energy issues, including facilities management, engineering, information systems, administration and finance

Oversight & Direction

Electricity consumption is reviewed monthly and posted on our website

Monthly Kw/days Use - SBF
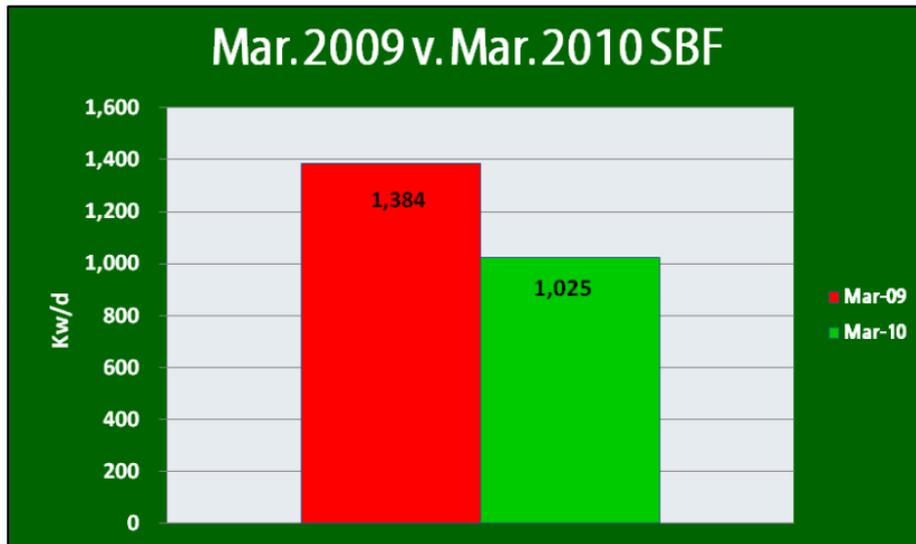
The information is segregated per each facility and identifies long term and seasonal fluctuations

Mar. 2009 v. Mar. 2010 SBF

- Mar-09
- Mar-10

GEMINI GREEN MISSION

"Gemini is committed to operating responsibly in the interests of our communities, local and global, now and always. Our corporate citizenship promotes sustainability through effective, efficient operations and positive environmental stewardship..."

".....We will carefully consider and protect Earth's valuable environmental resources, while fulfilling our commitment to science and applying solid financial principles to our operations...."

AIR CONDITIONING

- Installed programmable thermostats at base facilities

- New program implemented for telescope control device managing the way the observing floor is cooled at the beginning of the observing night

- Replacement of old chillers with more efficient models

Energy ingenuity and the double-whammy

Telescope mirror temperature > dome air temperature = Bad (blurring of image)

Either cool dome via air-conditioning, or cool mirror directly

credit: M. Sarazin
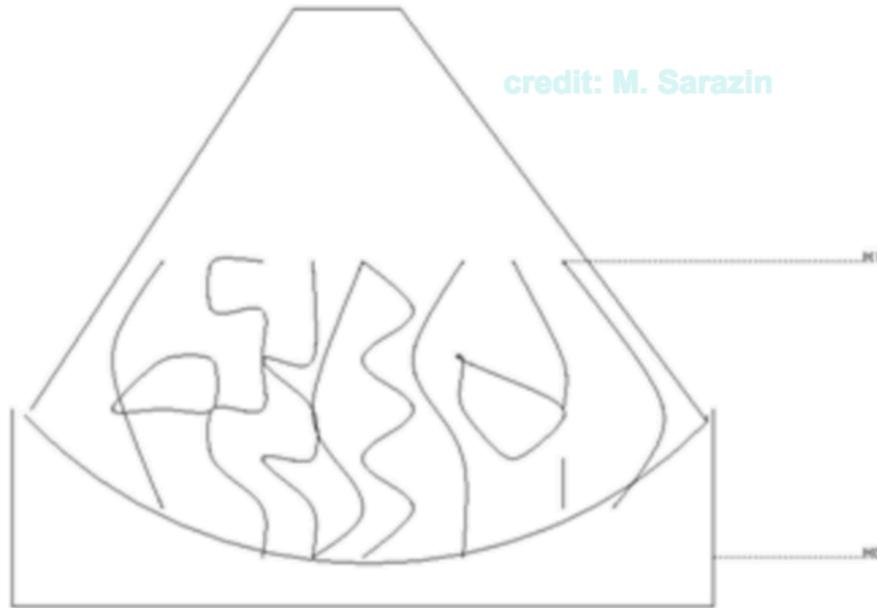
Blurring of image caused by refraction of light waves when traveling through layers of air of differing temperature
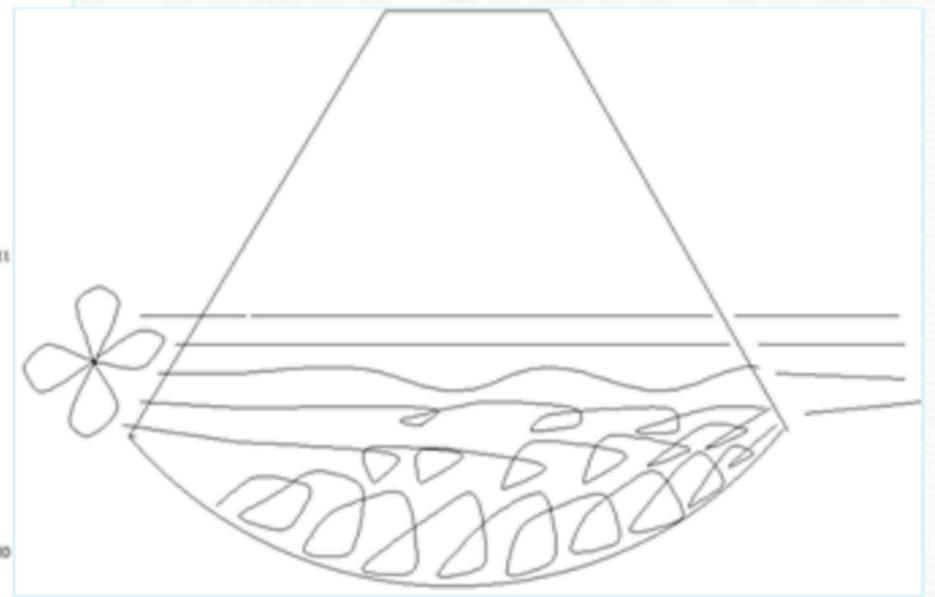
So, ensure that the telescope dome tracks the outside temperatures as close as possible at the beginning of the night, when the shutters open, and through the night

PRINTER & COMPUTER EFFICIENCY

- (More electronic, and fewer paper, forms)

- Rationalizing the number of printers

  - Fewer "personal" printers

  - Intelligent group printers

- Monitoring printer usage

- Discouraging printer use
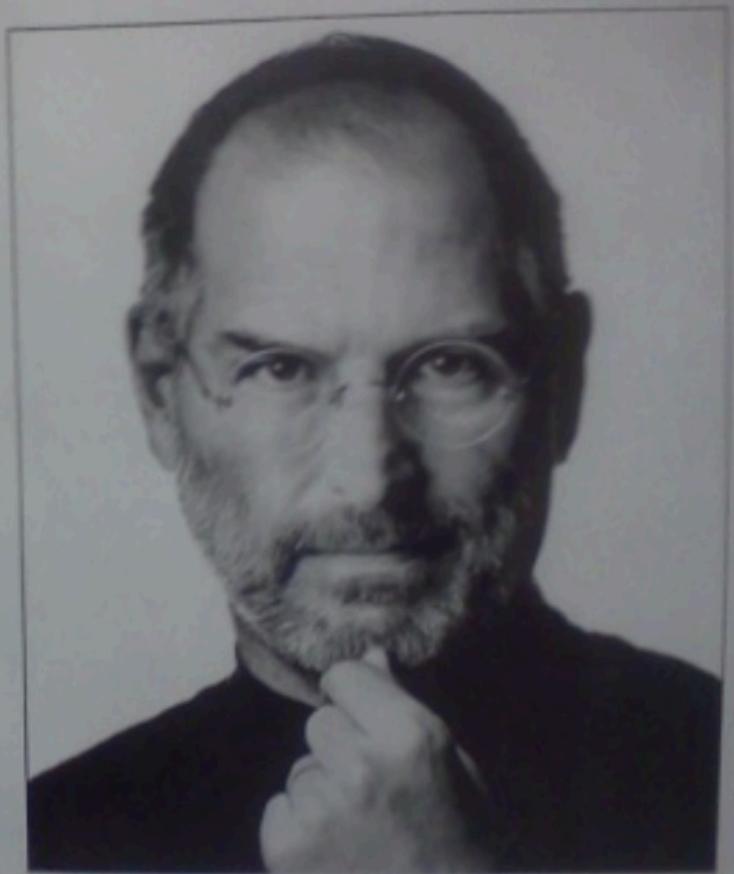
PRINTER & COMPUTER EFFICIENCY

- Survey found 400+ pieces of electrical equipment per site plugged in out of hours and 100+ turned on but not in use.

- Getting staff to turn-off when not in use

- New computer monitoring system provides system-wide uptime and usage statistics

- Initial experimentation with virtualization

TRANSPORTATION

● Collective transport options from base to summit are in place at Gemini South and pending further consideration at Gemini North

● Fuel economy is now much more an issue

● Bicycle racks for staff

Providing specialized bicycles for employees

TRAVEL

- Astronomy @ Gemini = international collaboration = international travel

- Encourage staff to limit travel wherever possible

- We promote virtual meeting technologies

- We remind staff of their "travel CO_2 footprint"

- We publicize our "travel carbon footprint"

Hi Pete,

Here is your itinerary for your trip to San Diego. Please review it and confirm if I should issue the tickets.

Thank you,

Edith

Environmental Note:

We know that air travel is often an inevitable requirement for Gemini staff, but we are also aware that it is an activity that has an unfortunate environmental impact and our CO_2 footprint from travel has been significant. For example, in 2008, the carbon dioxide (CO_2) produced by staff travel was about twice the CO_2 caused by our consumption of electricity on Mauna Kea. Gemini is publishing tables indicating our miles traveled by air to promote general awareness of this issue.

To learn more about the environmental impact of air travel and "carbon footprints," please visit:
http://www.sightline.org/research/energy/res_pubs/rel_air_travel_aug04

Staff who would like to understand the carbon footprint associated with their travel can consult the carbon calculator at http://www.carbonfund.org/Calculators/

Information about Gemini's travel CO_2 footprint is published on the internal web at
http://internal.gemini.edu/index.php?q=afg/afg_goes_green

Edith Bastias

Gemini South Travel Coordinator

Gemini Travel CO2 Footprint : January to March 2009 v. 2010

Admin Accum. Total Miles

Total Tons of CO2
Accum. thru March:
2008 GN = 71.33
2008 GS = 54.10
2009 GN = 60.94
2009 GS = 0.00
2010 GN = 28.31
2010 GS = 30.20

Legend:
GN 2008   GS 2008
GN 2009   GS 2009
GN 2010   GS 2010
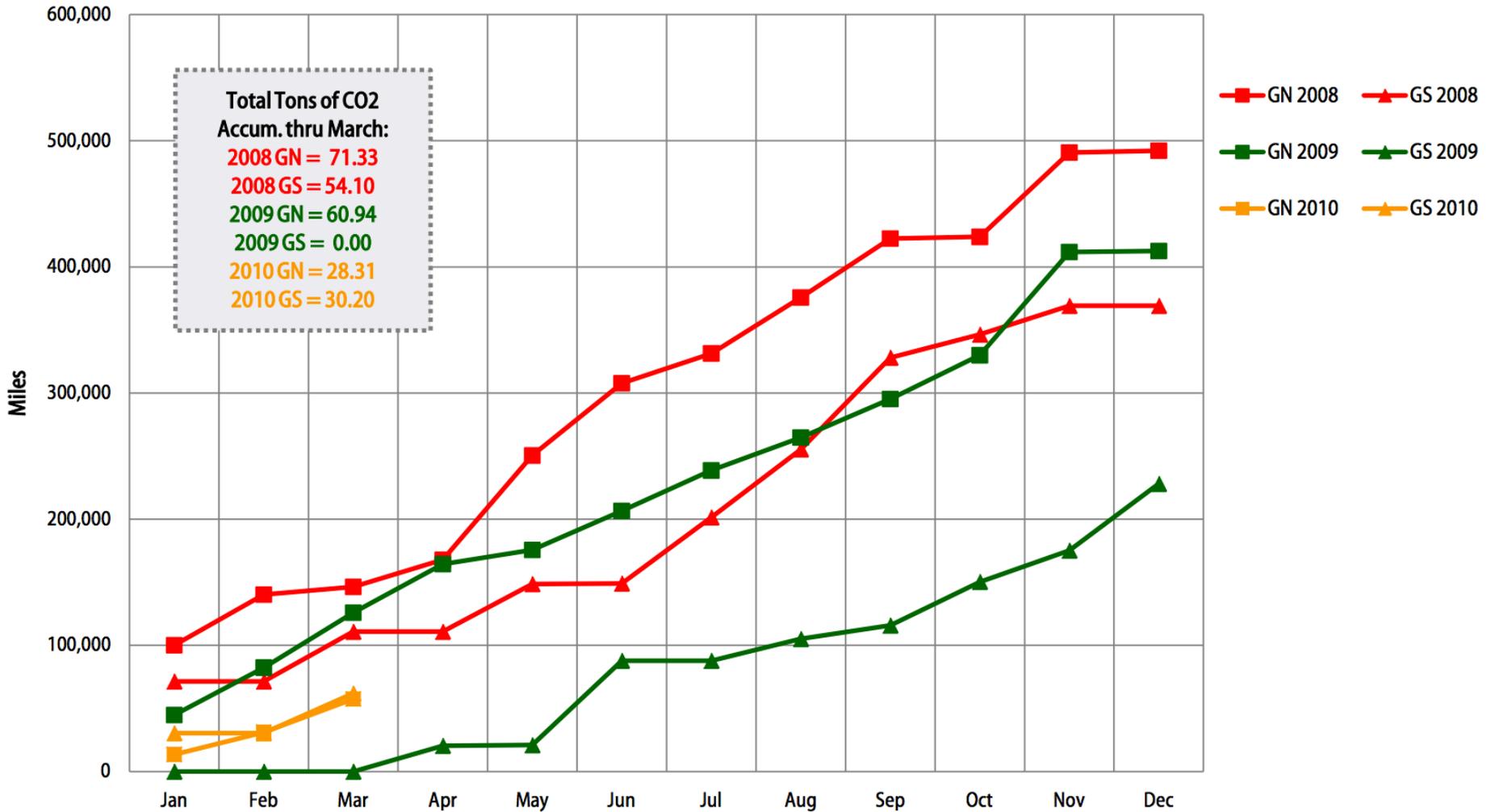
Travel

Gemini Accumulated Travel Miles - Total

Legend: ◆ 2008 Accum. Total Miles ■ 2009 Accum. Total Miles

24% reduction in travel CO2 footprint in 1 year

(3101.35 Tons of CO2)

(2383.24 Tons of CO2)

Y-axis (Miles): 0, 1,000,000, 2,000,000, 3,000,000, 4,000,000, 5,000,000, 6,000,000, 7,000,000

X-axis: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
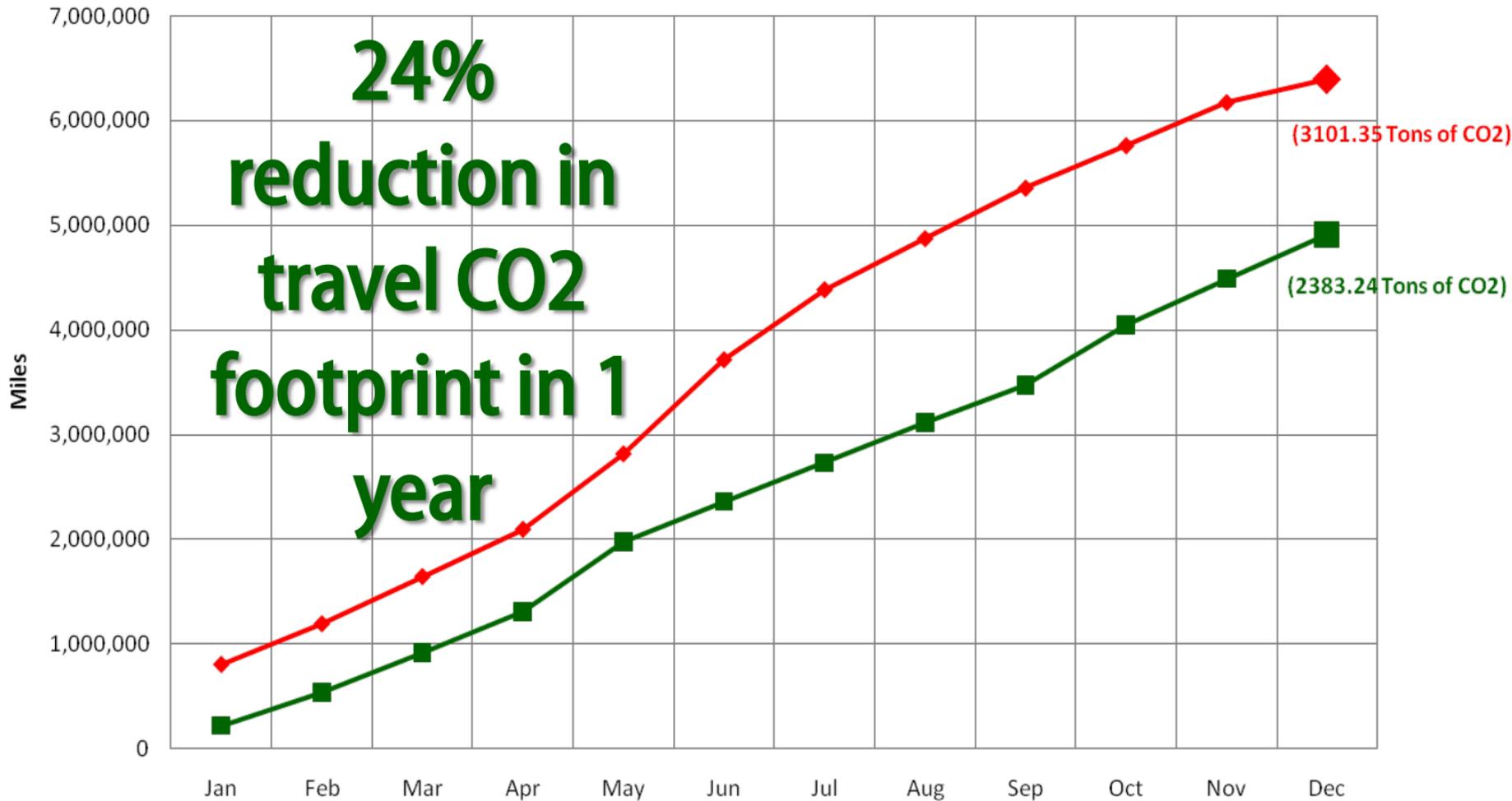
RECYCLING

- Gemini North already had a developed recycling program, based on Hawaii's successful HI-5 beverage deposit program

- Chile lags way behind in recycling and Gemini South had to research and patch together its own recycling program

- The sites now have distinct, but comprehensive recycling plans and their influence is spreading

Recycling

- Paper
- Cardboard
- Glass
- Plastics
- Aluminum cans
- Tetrapak

- Plastics
- Batteries
- E-waste
- Light bulbs & tubes
- Metals
- Tires

David Moe

RECYCLING POINT

PUNTO DE RECICLAJE

SBF

GREEN CLEANING

- Some cleaning products can negatively impact health and the environment

- Cleaning practices can be based as much on perceived risk as actual risk

- We have reviewed and changed some of our practices and amended our purchases of cleaning products

- Our Janitorial staff have played an important part in this initiative and improved our ecological standards

![GEMINI OBSERVATORY]

MISCELLANEOUS

● **ELIMINATION OF DISPOSABLE CUPS**

Objections to disposable cups are environmental concerns

They're cheap but are produced from hydrocarbons such as oil and gas, producing pentane emissions

As they are inert, they remain in landfills for a very long time

MISCELLANEOUS

● UTILITY COMPANY INVOLVEMENT

We sought advice from HELCO in Hawaii and CONAFE in Chile.

Nothing new for HELCO. A total novelty for CONAFE in Chile's IV Region.

Rebates from HELCO.

Good tips from both.

Paul Collins

![Gemini Observatory logo]

MISCELLANEOUS

- ## A FEW "KISS" INITIATIVES

We have reduced lighting in some areas by as much as 50%.

Staff are pleased with the changes.

Motion sensors have been placed in kitchens, bathrooms and places infrequently used (e.g. electrical rooms)

MISCELLANEOUS

- ## A FEW "KISS" INITIATIVES

During hot summer days, when we can take advantage of cooling breezes, we sometimes take the dramatic step.....

..... of opening the base facility doors just before the office opens, so that staff feel far less inclined to use their air conditioning controls

● Data center with smart airflow; more efficient channeling of cold and warm air.

● HVAC Green Timer system. On/off timers switch pumps, chillers, and boilers on at 06.30 and off at 18.30.

![Gemini Observatory]

2nd highest photovoltaic solar panel installation in the World (highest in Tibet by 200 feet approx.) 10% reduction in facility electricity. Limited PV footprint due to

Gemini Roof Camera (2015-08-13 11:26:42 HST)

Gemini North Telescope Powered By The Sun

1:45 / 1:57

Download the high resolution video or low resolution video

GEMINI OBSERVATORY
Our working culture
Nuestra cultura de trabajo

◆ Taking responsibility and accountability for our actions
◆ asumiendo la responsabilidad de nuestras acciones

◆ Acting with integrity in all we do
◆ actuando con integridad en todo lo que hacemos

◆ Having mutual trust in all relationships
◆ confiando mutuamente en todas nuestras relaciones

◆ Nurturing safety of people and equipment in all our actions
◆ fomentando la seguridad de las personas y equipos en todas nuestras acciones

GEMINI OBSERVATORY
Our working culture
Nuestra cultura de trabajo

- ❖ TREATING OTHERS AS WE WOULD LIKE TO BE TREATED
- ❖ TRATANDO A LOS DEMÁS COMO QUERÉMOS SER TRATADOS

- ❖ STRIVING FOR PERSONAL AND INSTITUTIONAL GROWTH OVER STATUS QUO
- ❖ LUCHANDO TANTO POR EL CRECIMIENTO PERSONAL COMO POR EL CRECIMIENTO INSTITUCIONAL SOBRE EL STATUS QUO

- ❖ TAKING RESPONSIBILITY AND ACCOUNTABILITY FOR OUR ACTIONS
- ❖ ASUMIENDO LA RESPONSABILIDAD DE NUESTRAS ACCIONES

- ❖ ACTING WITH INTEGRITY IN ALL WE DO
- ❖ ACTUANDO CON INTEGRIDAD EN TODO LO QUE HACEMOS

- ❖ HAVING MUTUAL TRUST IN ALL RELATIONSHIPS
- ❖ CONFIANDO MUTUAMENTE EN TODAS NUESTRAS RELACIONES

- ❖ NURTURING SAFETY OF PEOPLE AND EQUIPMENT IN ALL OUR ACTIONS
- ❖ FOMENTANDO LA SEGURIDAD DE LAS PERSONAS Y EQUIPOS EN TODAS NUESTRAS ACCIONES

ONE DOES NOT CHANGE

THE BEHAVIOR OF OTHERS
BY COMMENTING ON FACEBOOK

Compliance v. Commitment Framework

Compliance
"I have to do it this new way"

Reaction
"I will react to change if I must"

Testing
"I will absorb this change"

Negative Perception
"I feel threatened by this change"

Commitment
"I want to continue this way"

Action
"I will act to achieve this change"

Testing
"I will put myself at stake for this change"

Positive Perception
"I see the opportunities in this change"

Engagement
"I see the implications for me/us"

Understanding
"I know what it is"

Awareness
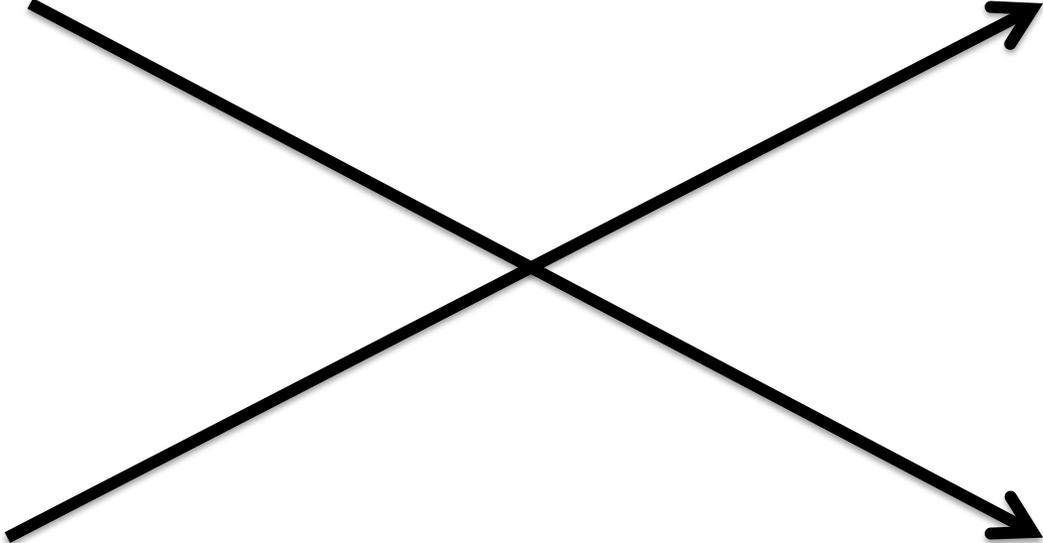*"I am being told about something"*

Control v. Creativity Framework

PREDICTABLE

Standard, Uniform

CREATIVE

Innovation, Growth

CONTROLLED

Contained, Disciplined

UNPREDICTABLE

Variable, Volatile

Participation

participate (v.)

1530s, back-formation from **participation**, or else from Latin *participatus*, past participle of *participare* "to share, share in, participate in; to impart," from *particeps* "partaking, sharing," from *parti*, past participle of *partir* "to divide" (see **part** (n.)) + -*cip*-, weak form of stem of *capere* "to take" (see **capable**). Related: *Participated*; *participating*.

Engagement

engage (v.)

early 15c., "to pledge" (something, as security for payment), from Old French *engagier* "bind (by promise or oath), pledge; pawn" (12c.), from phrase *en gage* "under pledge," from *en* "in" (see **en-** (1)) + *gage* "pledge," through Frankish from Proto-Germanic *wadiare* "pledge" (see **wed**). It shows the common evolution of Germanic -*w*- to central French -*g*- (see **gu-**). Meaning "attract and occupy the attention of" is from 1640s; that of "employ, secure for aid, employment or use" is from 1640s, from notion of "binding as by a pledge;" meaning "enter into combat or contest with" is from 1640s. Specific sense of "promise to marry" is 1610s (implied in **engaged**). Machinery sense is from 1884. Also from the French word are German *engagiren*, Dutch *engageren*, Danish *engagere*.

Participation

parti... "to share, share in, participate in;"

1530s, back formation from *participation*, or else from Latin *participatus*, past participle of *participare* "to share, share in, participate in, to impart," from *particeps* "partaking, sharing," from *parti*, past participle of *partir* "to divide" (see *part* (n.)) + *-cip-*, weak form of stem of *capere* "to take" (see *capable*). R...

"partaking, sharing,"

Engagement

"attract and occupy the attention of"

gage "under pledge," from *en* "in" (see *en-* (1))... "pledge" through English from Proto-Germanic *wadjōną "pledge" (see wed). It shares the common evolution of Germanic *-w-* to central F...

"binding as by a pledge;"

aid, employment or use" is from 1640s, from no... of"...

"promise to marry"

...t. Also from the French word are German *engagiren*, Dutch *engageren*, Da...

Standards & Models about Employee Engagement for Sustainability

ISO 14000
- Family of standards setting requirements for an Environmental Management System.
- "increase leadership and *engagement of employees*."

ISO 26000
- 7 Principles of Social Responsibility e.g. Accountability, Transparency, Ethical Behavior etc.
- Recognizing social responsibility and *engaging stakeholders*
- 7 core social responsibility subjects/issues e.g. Labor issues
- Ways to integrate social responsibility into the organization

BSI 8900
- Key Principles of Sustainable Development: *Inclusivity*; Integrity; Stewardship; Transparency are *minimum principles*
- Sustainability development maturity matrices for different types of organizations

Standards & Models about Employee Engagement for Sustainability

ISO 10018

- Standard to aid Quality Assurance System ISO 9000
- Competence – *the "ability to apply knowledge and skills to achieve intended results."*
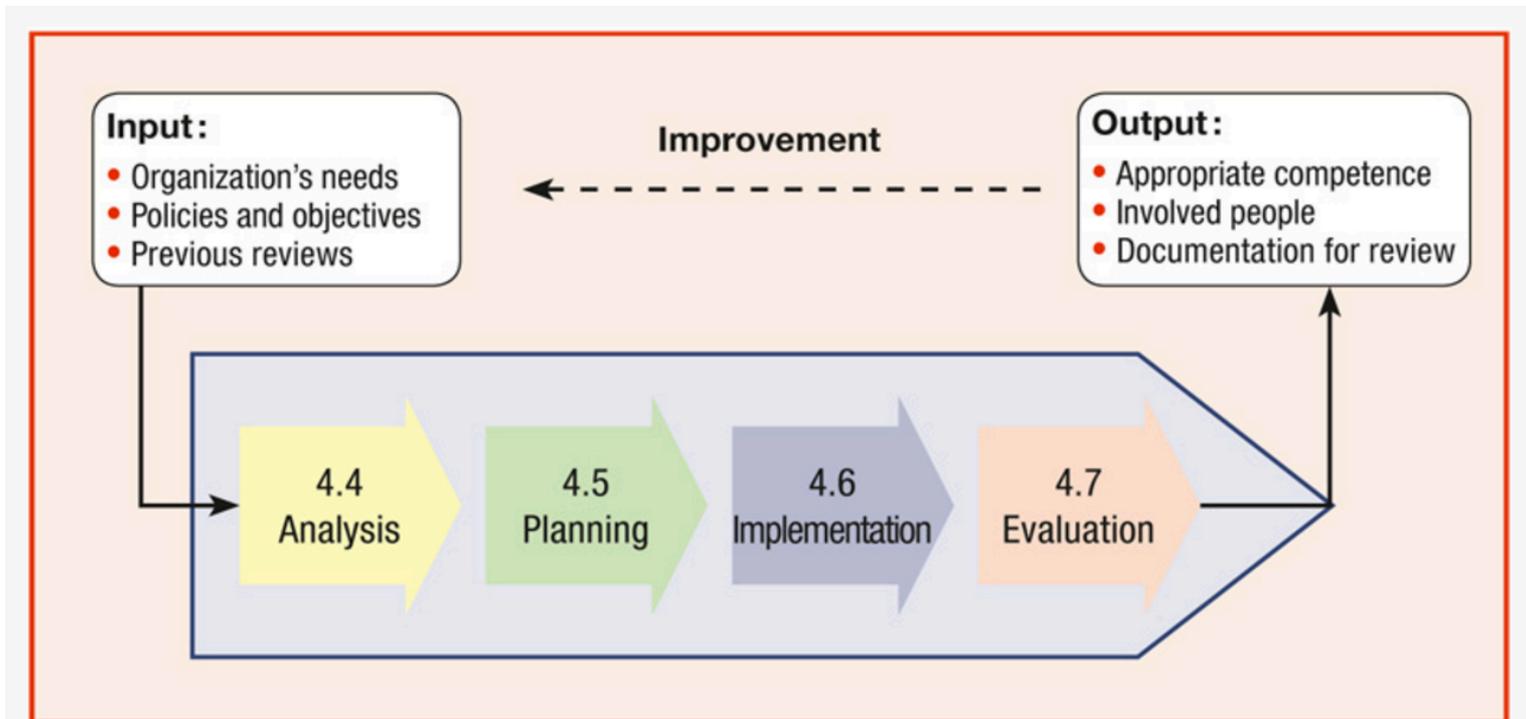- Involvement – *"engaging in, and contributing to shared objectives."*

Input:
- Organization's needs
- Policies and objectives
- Previous reviews

Improvement

Output:
- Appropriate competence
- Involved people
- Documentation for review

4.4 Analysis → 4.5 Planning → 4.6 Implementation → 4.7 Evaluation

Figure 1: The people involvement and competence process.

Stakeholder Management Steps

Step 1 Evaluate Stakeholder Readiness to Change	Step 2 State the Desired Outcomes	Step 3 Diagnose the Sources of Resistance	Step 4 Evaluate Action's Effectiveness
• Does the individual feel that the vision for change is the right one? • What action should you take to clarify or adjust the vision? • How will the changes affect each person's responsibility or role? • Do those who follow your leadership know you are committed to change? • Are employees committed to change? • How well does the organization, at all levels, adapt to change?	• What do you expect as a result of this change? • What will it take to make the changes happen? • What are the risks/ barriers? • What can be done to address the risk and barriers? • What will happen to each individual if s/he does not change?	• Inadequate communication related to the change • Lack of involvement in the change process • Diminished rewards • Inability to identify with the organization's values • Inappropriate timing of change • Low level of trust • High-pressure work environment	• Do stakeholders understand the vision? • Do employees understand the vision? • What additional information do employees need about the vision? • Are employees aware of the risks of not changing? • Are employees clear about their role in implementing the vision? • Are employees aware of your commitment to the change?

Employee Actions

Employee Actions					
Paper	**Recycling**	**Food & Drink**	**Energy**	**Transportation**	**Location**
Paperless Paychecks and Company Information	Office Products Reuse/Recycling Area	Reusable Food & Drink Containers & Utensils	Energy Saving Computer Settings	Bike to Work	Hoteling & Hot Desking
Centralized Planning	Centralized Waste and Recycling Areas/ Containers	Dishwasher Use	Personal Area/ Office Shut-down Procedures	Carpooling	Telecommuting
Personal Printing Code and Expense Report	Waste Audits	Purified Water	Power Strip Use	Public Transportation	Virtual Meetings
Double-sided Printing	Composting	Sustainable and/or Local Food	Lighting Reduction Program		

(Institute for Building Efficiency, Johnson Controls, 2013)

Employer-Employee Engagement Methods

Employer-Employee Engagement Methods				
Acknowledgement	**Team Activities**	**Communications**	**Education**	**Training**
Employee Discounts	Employee Volunteerism	Sustainability Website	Sustainability/ Green Building Tours/LEED certification	Energy Efficiency Training
Employee Rewards/ Recognition	Green Teams and/ or Green Leaders	E-newsletter	Interactive Kiosks	Water Conservation Training
Personal Sustainability Plan	Challenges and Competitions	Sustainability Program Feedback	Interactive Games	Efficient Driving/ Transportation Training
Personal Pledges	Fundraising Campaign	Social Media and Knowledge Sharing Network	Personal Environmental Foot-printing Tools	Waste, Recycling and Material Use Training

(Institute for Building Efficiency, Johnson Controls, 2013)

"All Other Things Being Equal, I would take a 15% pay cut . . . . .

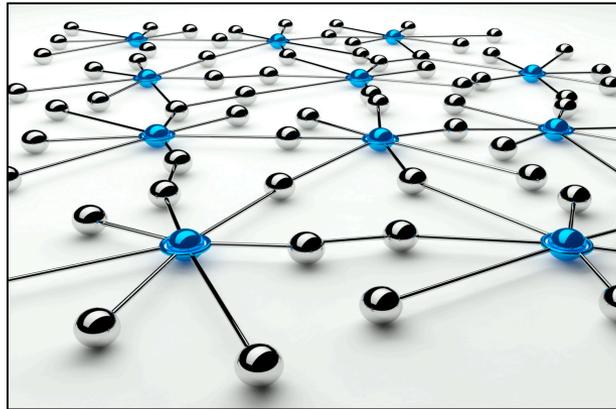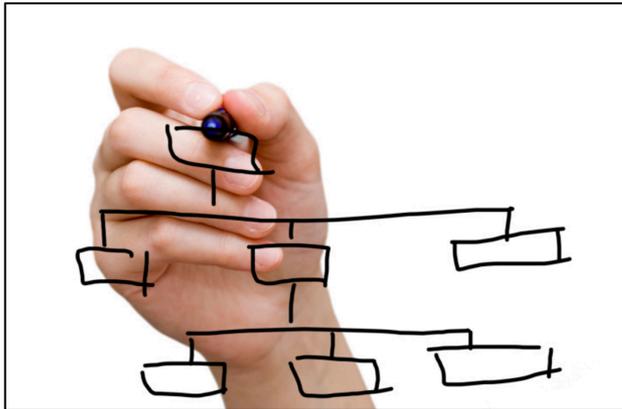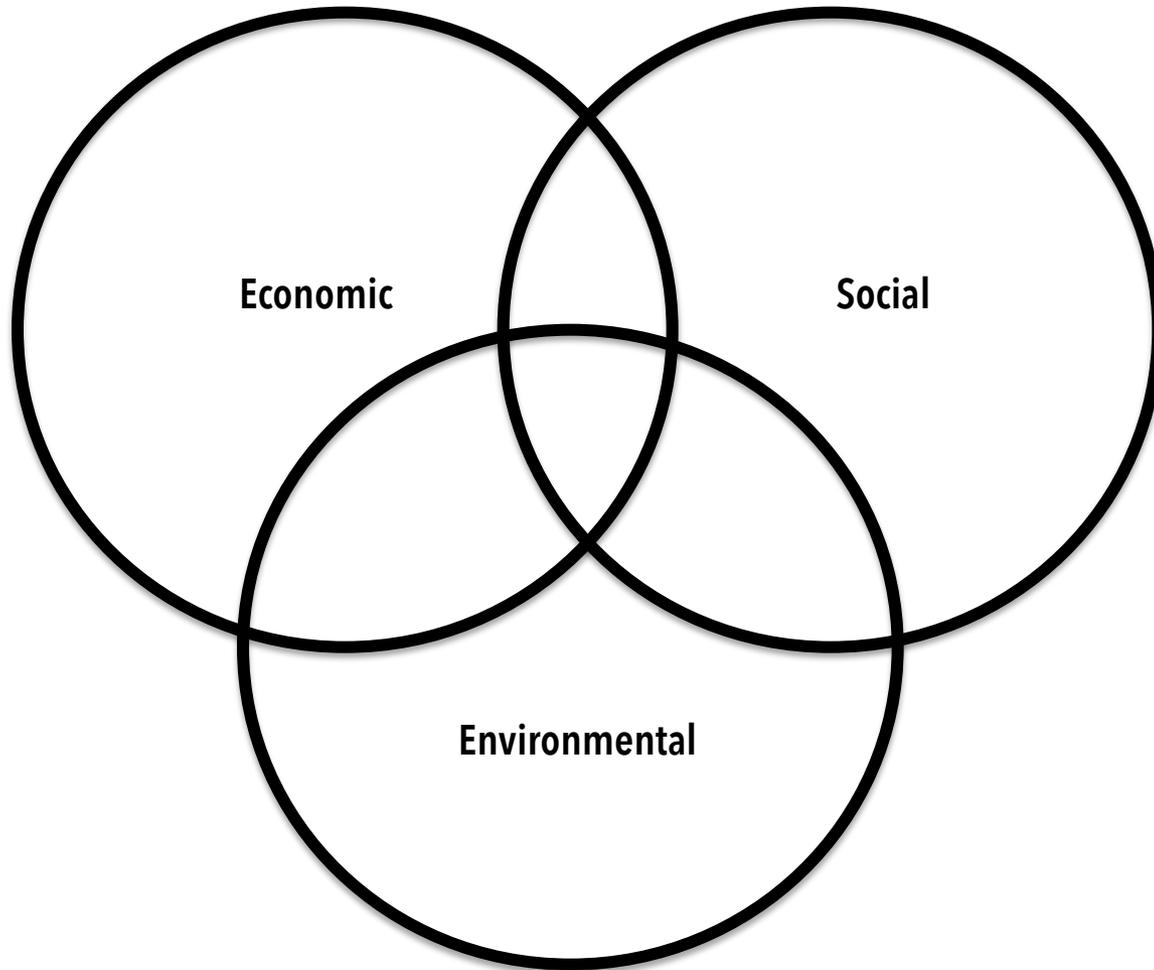|	
. . . . . to work for a company committed to corporate social responsibility."	**35%**
. . . . . for a job that made a positive social or environmental impact."	**45%**
. . . . . to work for an organization with values like my own."	**58%**

"Creativity is intelligence having fun."
Albert Einstein

Think "network"
not hierarchy.
Leadership =
fewer decisions

Make "significance"
the goal

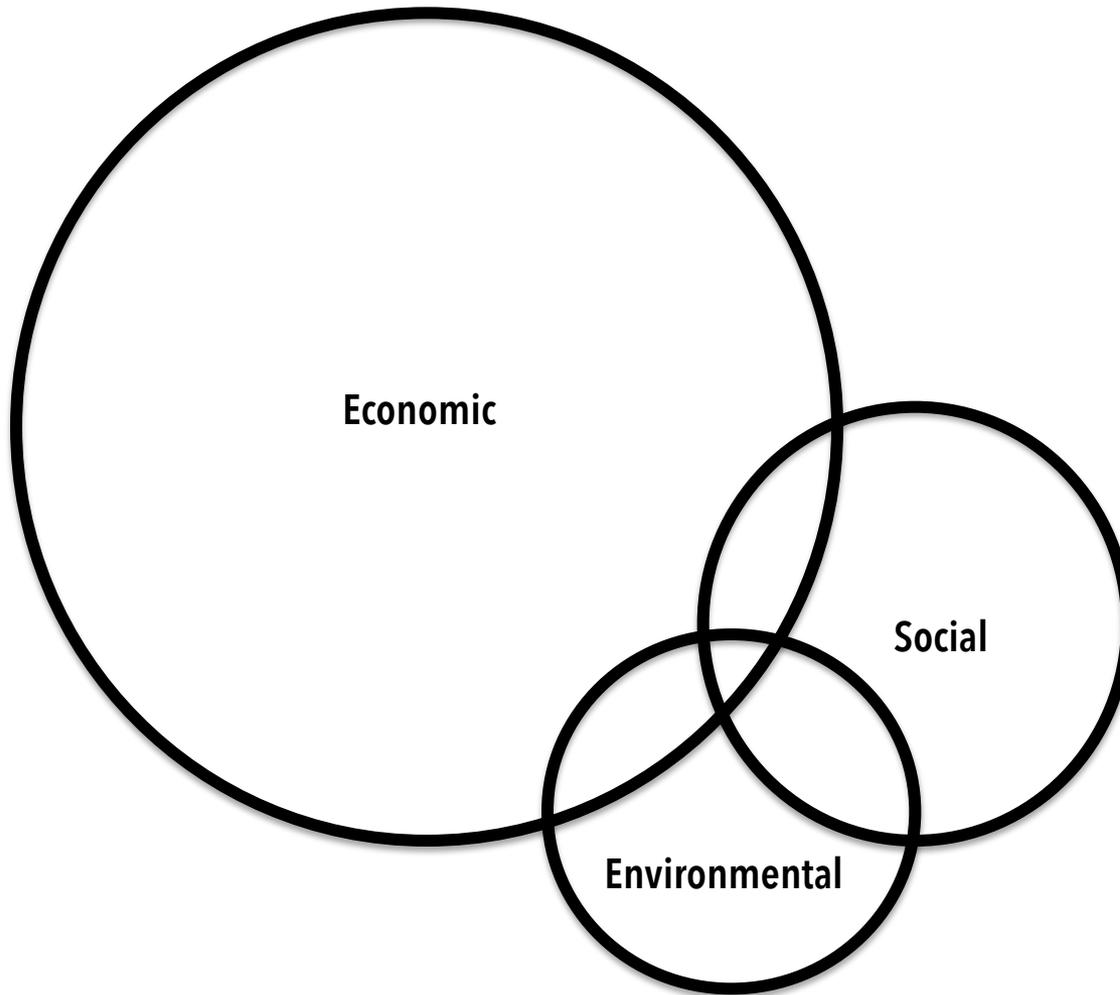"Make meaning,
not money."
Gary Hamel
("What Matters Now")

Circles of Sustainability

Economic   Social

Environmental

THE THEORY

Circles of Sustainability

Economic

Social

Environmental

THE REALITY

Behavior Change for Sustainability

Credit: ALMA C. Padilla (NRAO/AUI/NSF).

THANK YOU