

2011 CAMPUS WATER RECYCLING AND REUSE PROJECTS

Conducted by the C2E2



Summary Findings

- 42% of campuses in survey are capturing and recycling rainwater
- Only 12% of campuses are capturing and reusing graywater
- 22% of campuses are using reclaimed/treated water
- Water recycling driven by potential cost savings, sustainability/leadership and potable water conservation
- Multiple implementation challenges with graywater and water reclamation projects
- Demonstrated cost savings with rainwater and reclaimed water recycling projects
- A number of projects in planning or coming on line soon
- Caveat: Sample size for this survey was small (n=91)

Survey Protocol



- **Developed by C2E2 and its members**
- **Sent/advertised through C2E2, CSHEMA, APPA, Directors Roundtable and assorted smaller or regional listservs**
- **Survey conducted in January 2011**

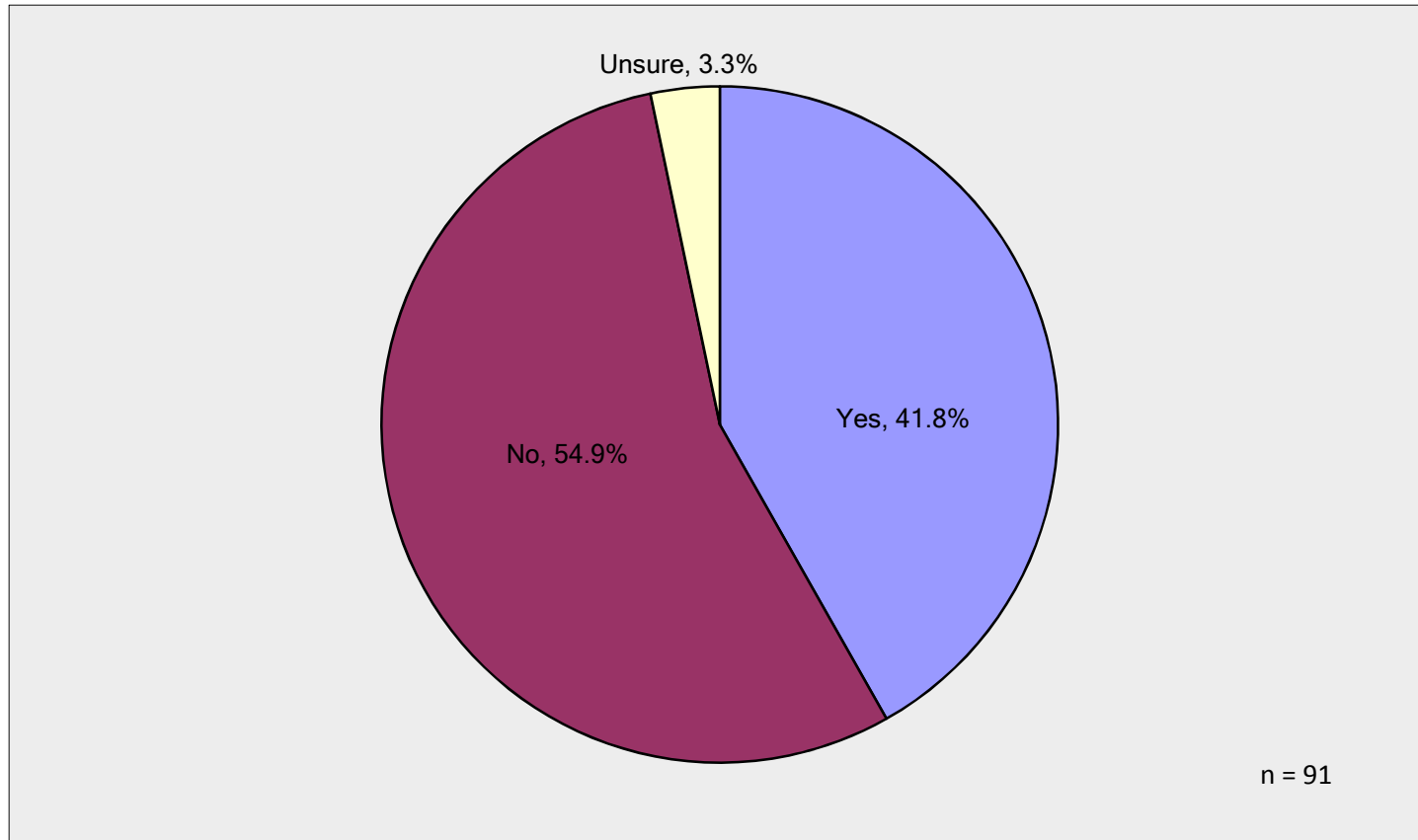
Survey Respondents



State	Responses
MA	10
TX	6
CA	5
CT	5
WI	4

91 total respondents
35 states and DC represented

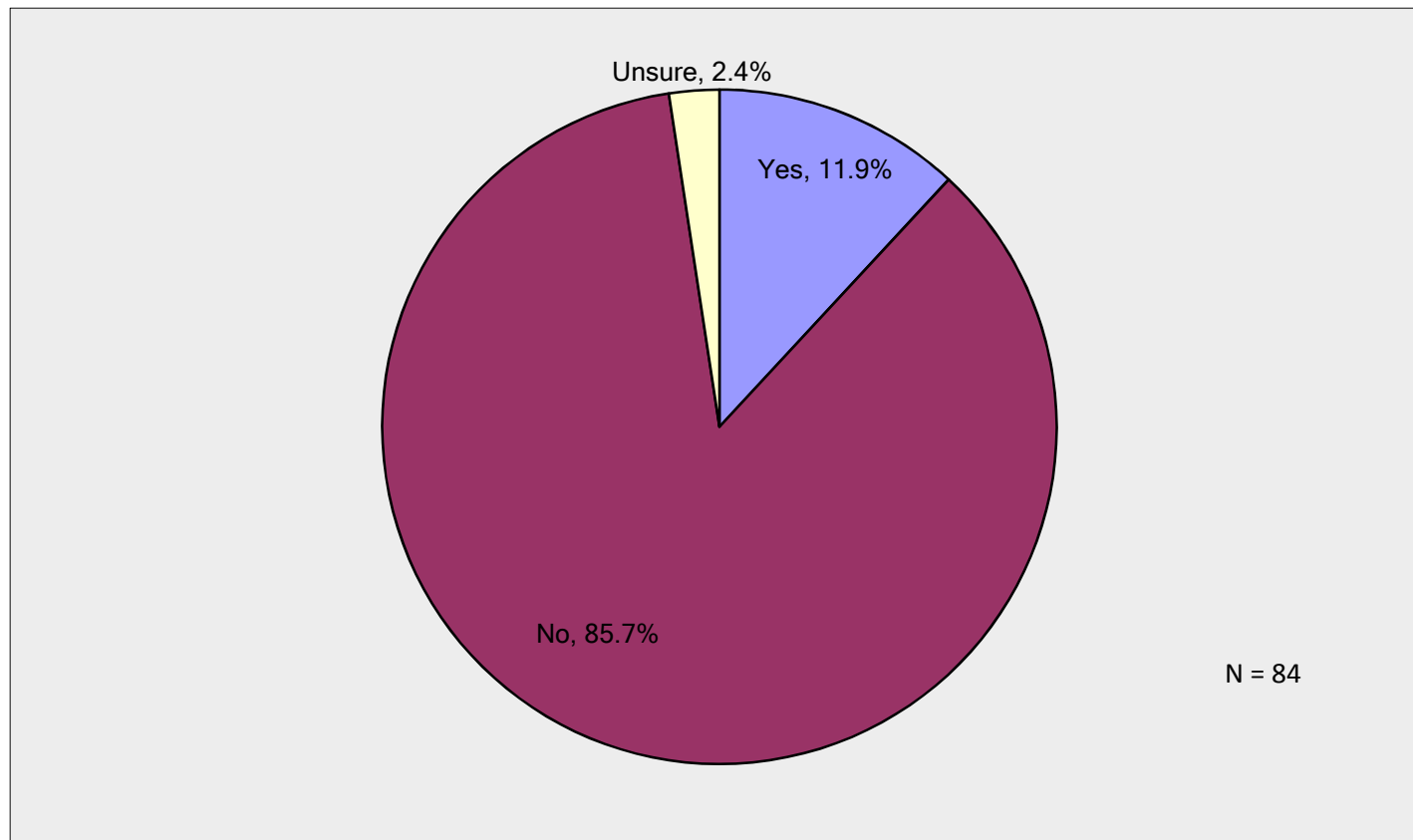
Is your campus capturing and reusing RAINWATER?



Nearly 42% of campuses are capturing and reusing rainwater

Is your campus capturing and recycling GRAY WATER?

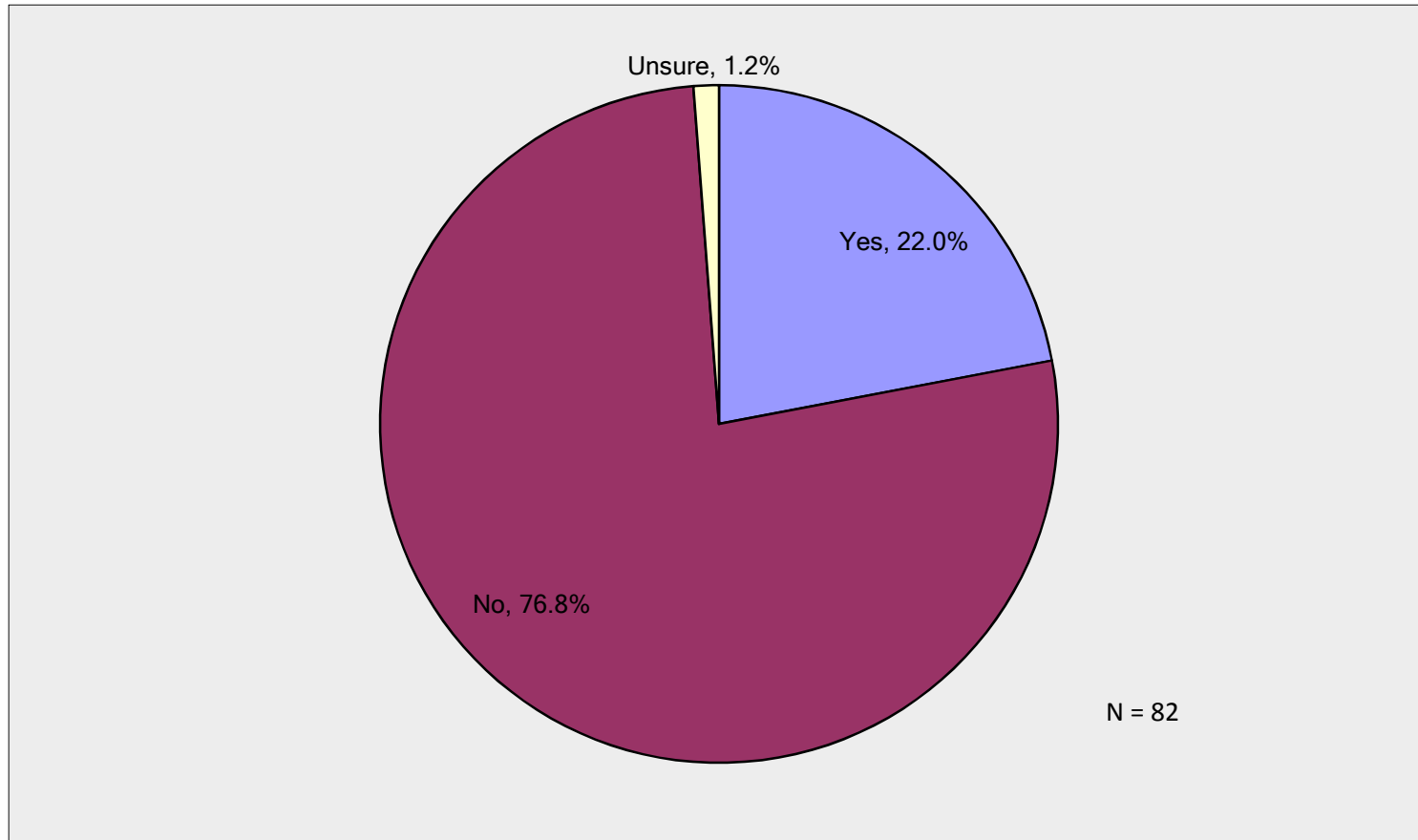
Defined as untreated wastewater from such sources as a shower, bathroom washables, or clothes washing machines



Only 12% of campuses are capturing and reusing graywater

Is your campus using RECLAIMED WATER?

By treating or using treated non-potable water and reusing the water on site for approved purposes other than drinking water



22% of campuses are using reclaimed water

No Correlation Between Water Recycling Methods

- Of campuses that recycled rainwater (n=38)
 - 6 also captured and used gray water (16%)
 - 9 used reclaimed water (24%)
- Of campuses that used graywater (n = 10)
 - 40% also used reclaimed water

RAINWATER



How is your campus recycling the rainwater?

Answer Options	Response Percent	Response Count
Irrigation of lawns	78.6%	22
Irrigation of athletic fields	14.3%	4
Cooling towers	10.7%	3
Boiler makeup	0.0%	0
Toilet flush water	53.6%	15
Laundry wash water	0.0%	0
Other Uses		8
<i>answered question</i>		28

What were the top drivers?

Answer Options	Response Percent	Response Count
Cost savings	45.2%	14
Local municipal pressure	22.6%	7
State agency pressure	6.5%	2
Sustainability initiative	93.5%	29
Called for in landscaping plan	12.9%	4
Drought/weather unpredictability	16.1%	5
Risk management initiative	0.0%	0
Change in plumbing code	0.0%	0
ASTM E2635-08 water reuse standard	6.5%	2
Other Drivers		10
<i>answered question</i>		31

What were the major implementation challenges?

1. Existing infrastructure challenges
2. Capital costs
3. Technical treatment and engineering challenges
4. Inspection and monitoring

Institutional inertia, perceived health risks or Interdepartmental program coordination were not highly ranked as major or definite challenges

Who were the key stakeholders?

- Facilities Department
- Campus Administration
- Sustainability

**EH&S, state and local government were not key stakeholders
Compliance is not a key driver or impediment to rain water
reuse projects**

What were the key benefits?

- Demonstrated Leadership
- Cost savings
- Improved local relationships

GRAY WATER RECYCLING

defined as recycling of untreated wastewater from such sources as showers, bathroom washbasins or clothes washing machines



What kind of graywater are campuses capturing and reusing?

- Showers or bathtubs (63%)
- Bathroom washbasins (63%)
- Clothes washing or laundry tubs (25%)
- AC condensate (13%)
- Water cooled equipment (13%)
- Steam condensate (13%)

n = 8

How is your campus recycling the graywater?

Answer Options	Response Percent	Response Count
Irrigation of lawns	57.1%	4
Irrigation of athletic fields	0.0%	0
Cooling towers	28.6%	2
Boiler makeup	0.0%	0
Toilet flush water	85.7%	6
Laundry wash water	0.0%	0
Other Uses		2
<i>answered question</i>		7

What were the top drivers?

Answer Options	Response Percent	Response Count
Cost savings	62.5%	5
State regulatory/agency pressure	0.0%	0
Local government pressure	0.0%	0
Sustainability initiative	100.0%	8
Called for in landscaping plan	12.5%	1
Drought/weather unpredictability	25.0%	2
Risk management initiative	12.5%	1
Change in plumbing code	0.0%	0
ASTM E2635-08 water reuse standard	0.0%	0
Other Drivers		1
<i>answered question</i>		8

What were the major implementation challenges?

- Technical treatment
- Capital costs
- Technical engineering
- Existing infrastructure
- Coordination of design with A/E requirements

Broader array of “major” and “definite” challenges hints at the difficulty of these projects

Who were the key stakeholders?

- Facilities
- Sustainability
- Campus Administration
- EH&S

More complicated project brings in more stakeholders -
definite code and compliance issues

What were the key benefits?

- Demonstrated leadership (67%)
- Cost savings (11%)

While 63% of respondents suggested that cost was a major driver of a graywater recycling project, only 11% identified cost savings as a key benefit

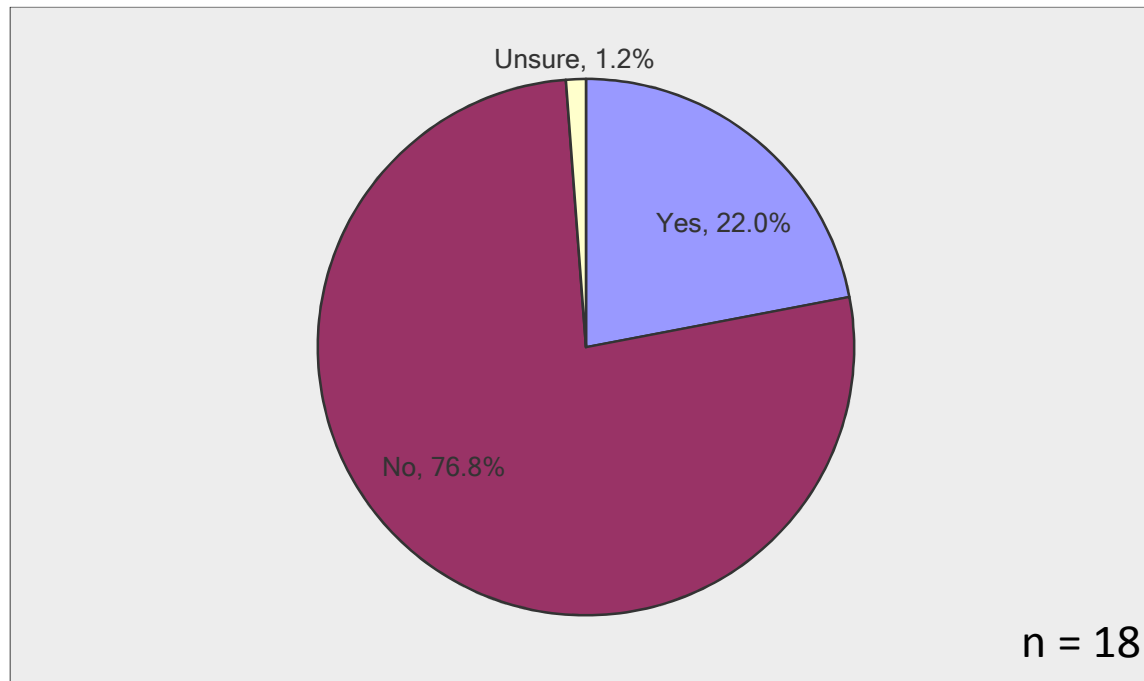
n = 9

RECLAIMING WATER

defined as treating nonpotable water and reusing the water on site for approved purposes other than drinking water



Is your campus using RECLAIMED WATER?



What level of treatment did the reclaimed water receive at the treatment facility?

Answer Options	Response Percent	Response Count
None	35.7%	5
Secondary (Biological treatment and disinfection)	28.6%	4
Tertiary (Filtration and disinfection)	21.4%	3
Advanced treatment (e.g., reverse osmosis)	14.3%	2
Other/Comment		4
<i>answered question</i>		14

Was additional treatment required at the point of use prior to reuse?

Answer Options	Response Percent	Response Count
Yes	31.3%	5
No	43.8%	7
Don't Know	25.0%	4
Comment/Please Specify the Type of Additional Treatment		4
<i>answered question</i>		16

How is your campus reusing the reclaimed water?

How are you reusing the reclaimed water? Check all that apply.

Answer Options	Response Percent	Response Count
Irrigation of lawns	47.1%	8
Irrigation of athletic fields	29.4%	5
Cooling towers	41.2%	7
Boiler makeup	23.5%	4
Toilet flush water	29.4%	5
Laundry wash water	0.0%	0
Other Uses		5
<i>answered question</i>		17

What were the top drivers?

Answer Options	Response Percent	Response Count
Cost savings	61.1%	11
Regulatory/agency pressure	27.8%	5
Sustainability initiative	77.8%	14
Called for in landscaping plan	16.7%	3
Drought/weather unpredictability	38.9%	7
Risk management initiative	0.0%	0
Change in plumbing code	0.0%	0
ASTM E2635-08 water reuse standard	0.0%	0
Other Drivers		3
<i>answered question</i>		18

What were the major implementation challenges?

- Existing infrastructure
- Capital costs
- State permits/agency requirements
- Technical engineering and treatment challenges

Who were the key stakeholders?

- Facilities
- Campus Administration
- EH&S Office
- Sustainability
- Trades

Many key players including
EH&S and trades

What were the key benefits?

- Demonstrated leadership (71%)
- Improved local relationships (53%)
- Cost savings (59%)

Campuses With Water Recycling or Reuse Projects

Colorado State	University of Connecticut
Luther College	Lasell College
University of Wisconsin – River Falls	Washington University in St. Louis
Ringling College	MIT
University of Massachusetts Amherst	University of Texas Austin
Kansas State	Vanderbilt
Georgia Institute of Technology	Penn State University
University of Georgia	Indiana University

Next Steps?

- Distribution of report
- Compile case studies
- For more information or feedback, contact Tom Balf at tbalf@c2e2.org or 978-281-5020