







Reality Check



We live in a
very artificial
environment

Rely on
mechanical
systems

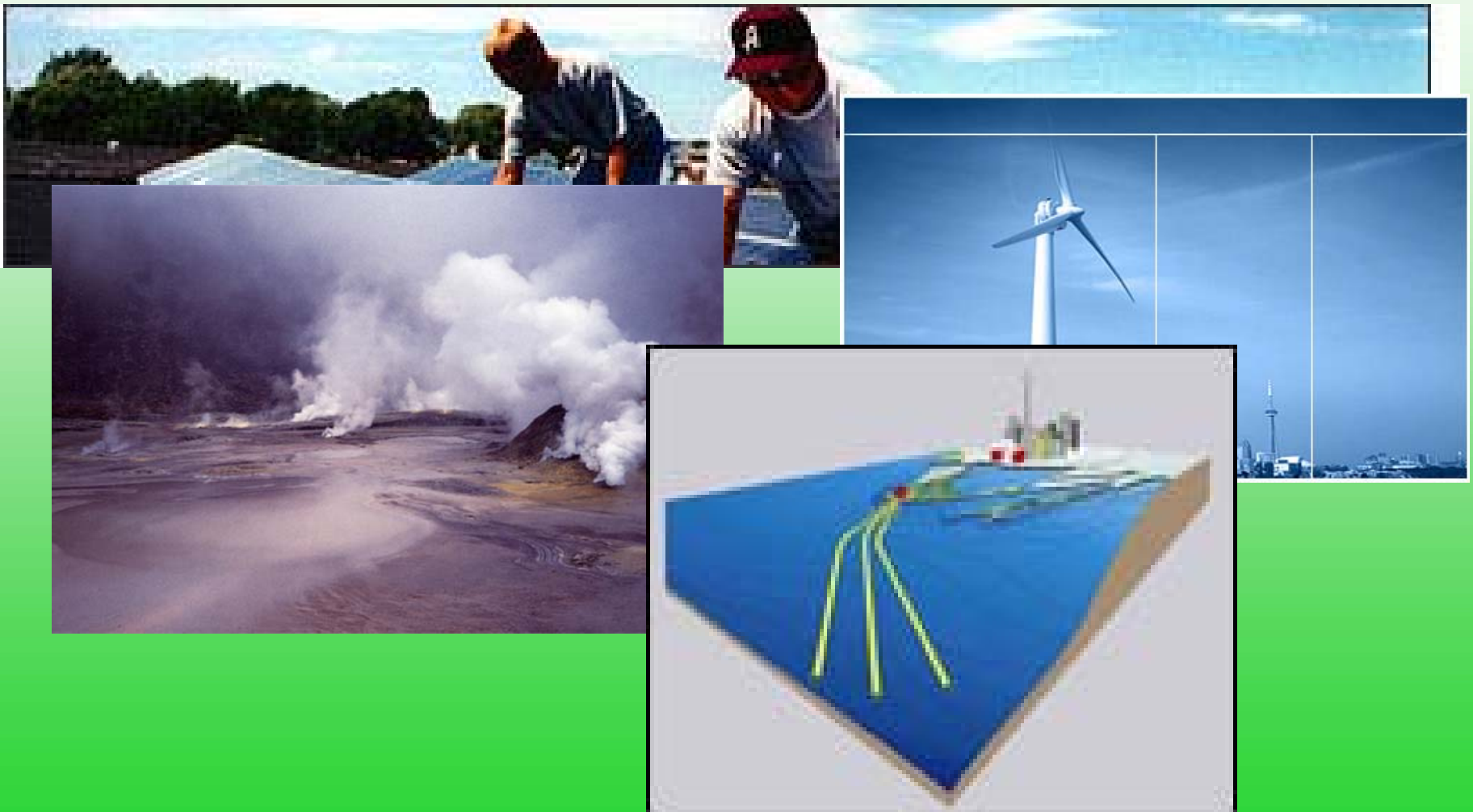


Why Include Plants?

- Plants are not an expense but a means to improve the bottom line
 - Accept that inclusion of green technologies actually can save money
 - It's the same for plants



Already using *Physical Environment*





Looking to Nature: Biomimicry

- Using nature as a template to design solutions to problems
 - Velcro® based on barbs and hooks on feathers
- Accepted design/engineering approach



Natural Solutions Exist

- Many “natural” solutions do not require mimicry
- Solution exists: must be integrated into the built environment
 - *Bio-engineering*



Why not Take Advantage of *Biological Environment?*



- *Bringing the good parts of nature indoors*



Nature has the Solutions

- Alternatives to manufactured or engineered solutions
- Improve occupant well-being
- Reduce operating costs
- Improve environmental quality





We live in aquariums



- Use plants to add value





Why included Plantscapes

- Humans have a bond with natural world
- Expressed in our behaviour



What Our Behavior Shows

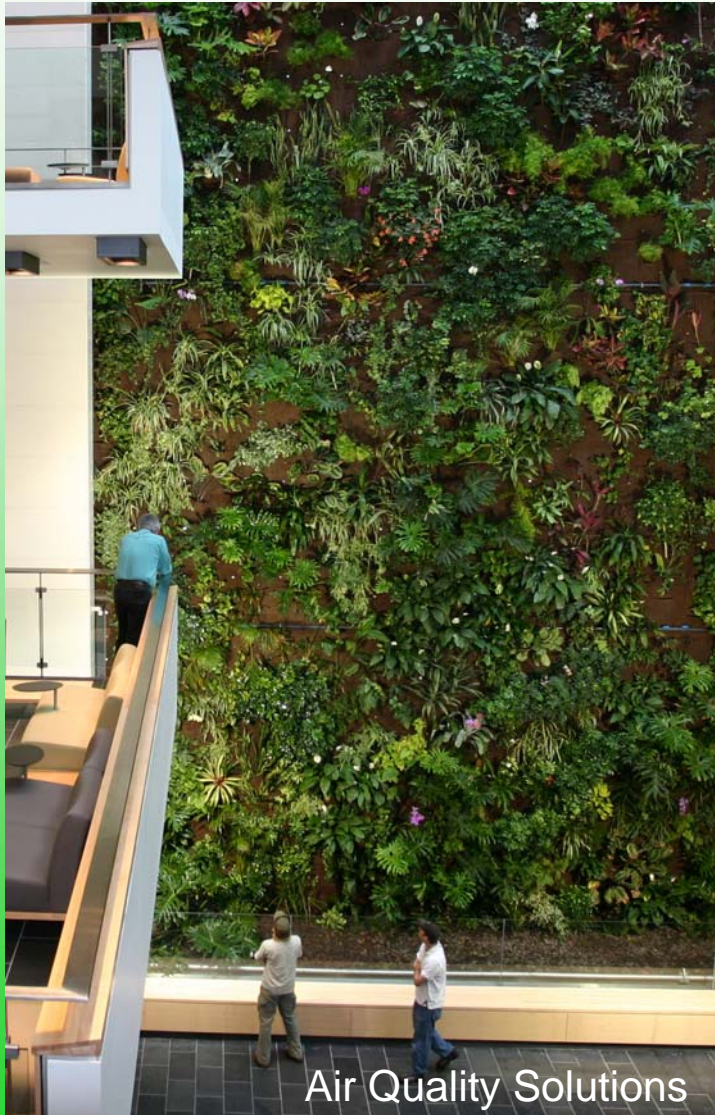


People enjoy
interacting with plants
...Gardening is the
most popular hobby in
North America

Source: Gallop Poll



When Plants are present...



Exposed to plant settings people have more positive emotions.

Source: Health Benefits of Gardens in Hospitals, Roger S. Ulrich, Ph.D., 2001



When Plants are present...



Plant Management Group

In a plantscaped office, people recover from stress quicker.

Source: The Effect of Interior Planting on Stress by Helen Russell; Surrey University

When Plants are present...



Workers who spend at least 4 hours per day on a computer show a significant improvement in their efficiency and concentration.

Source: Berg, J. A.; Constructing for people - perception of the quality of the working environment



When Plants are present...



12% quicker reaction on computer tests.

- we are more productive

Source: Lohr, V.I., C.H. Pearson-Mims, and G.K. Goodwin. Journal of Environmental Horticulture 14(2):97-100



When Plants are present...



Genetron Systems

Problem solving skills, ideation and creative performance all improve substantially in a workplace with plants and flowers

Source: Roger Ulrich, Ph.D., Texas A&M University



When Plants are present...



Green Design

- Green workplaces help recruit and retain workers

Source: ASID Report - What Factors Really Motivate Employees To Accept Or Leave Jobs?



When Plants are present...



When we shop in a plantscaped environment we visit more frequently, stay longer, rate quality higher and are willing to pay more.

Source: Retail and Urban Nature
by Kathleen Wolf, PhD



“The issue of office square footage allotted to various ranks is becoming increasingly important to managers and to the bottom line of organizations. All but ignored is the key strategic advantage attained by employee intermingling.”

Source: Tom Peters — Liberation Management



“Developing a spaces to facilitate employee intermingling can further a company’s strategic plan and help achieve sustainable goals.”
People have a positive response to plants and need them in their workplace

Source: Edward M. Hallowell — The Human Moment at Work





Occupant Health

The indoor environment affects our well being

- *1/3 of illness related absenteeism related to Indoor Air Quality*
- Indoor air quality one of the top ten environmental issues
- Source EPA

When Plants are present...



Ailment	% Reduction with plants
Fatigue	20%
Headache	30%
Sore Throats	30%
Coughs	40%
Dry Skin	25%

People enjoy greater well-being in workplaces with plants

Source: Fjeld, T., et al. "Effect of Indoor Foliage Plants on Health and Discomfort Symptoms Among Office Workers,"



When there aren't plants...



Without plants workers were absent 3.6 more days because of poor air quality complaints

Source: John Bergs, The Effect of Healthy Workplaces on the Well-being and Productivity of Office Workers

Plant Improve Indoor Air Quality



Stems

Plants contribute to creating environments that match the human comfort needs.

Source: Lohr, V.I. 1992. The contribution of interior plants to relative humidity in an office



Plant Systems Improve Indoor Air Quality

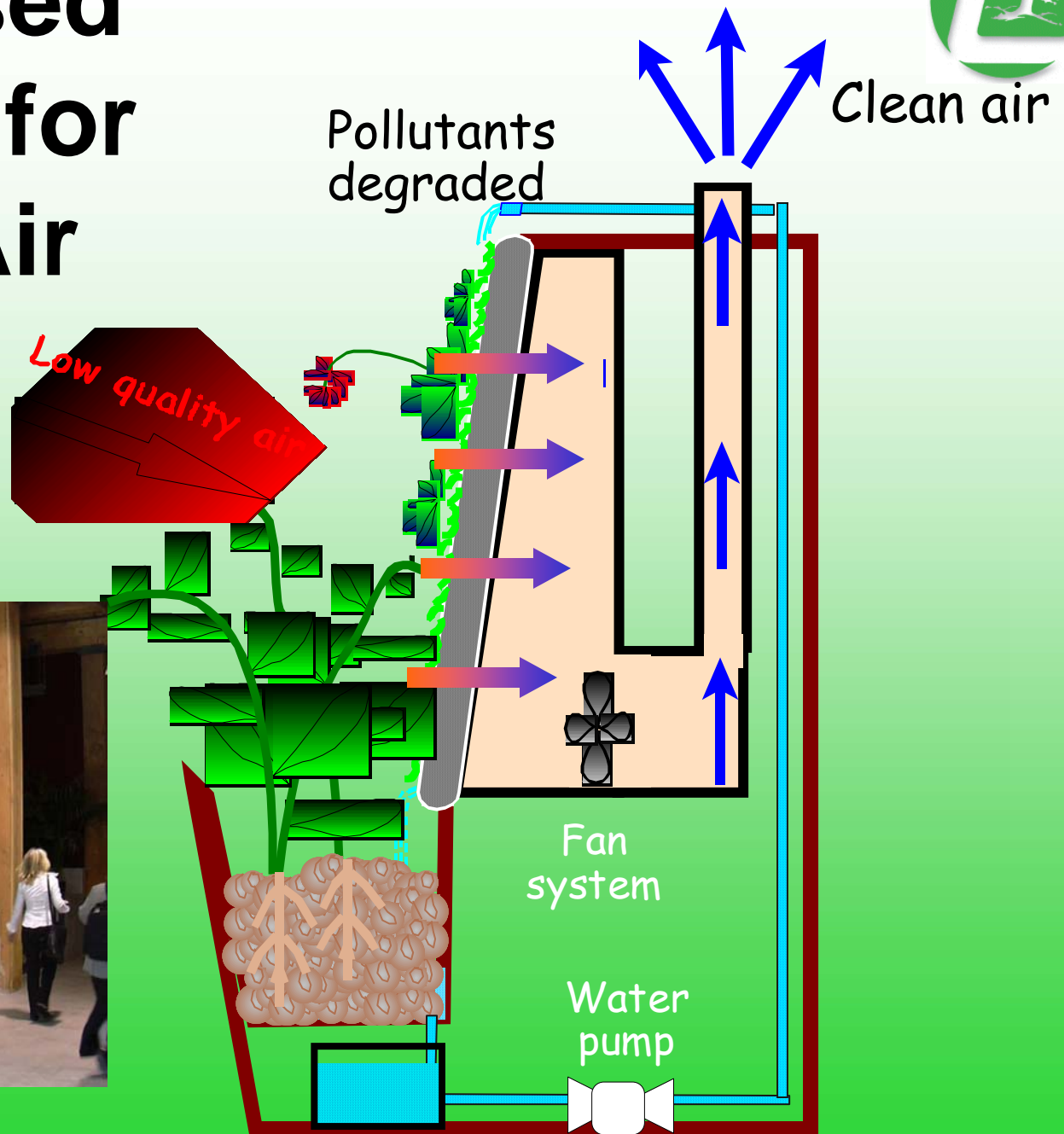
- Plants act as self controlling humidifiers
- Reduce components in HVAC



Plant-based Biofilters for Indoor Air

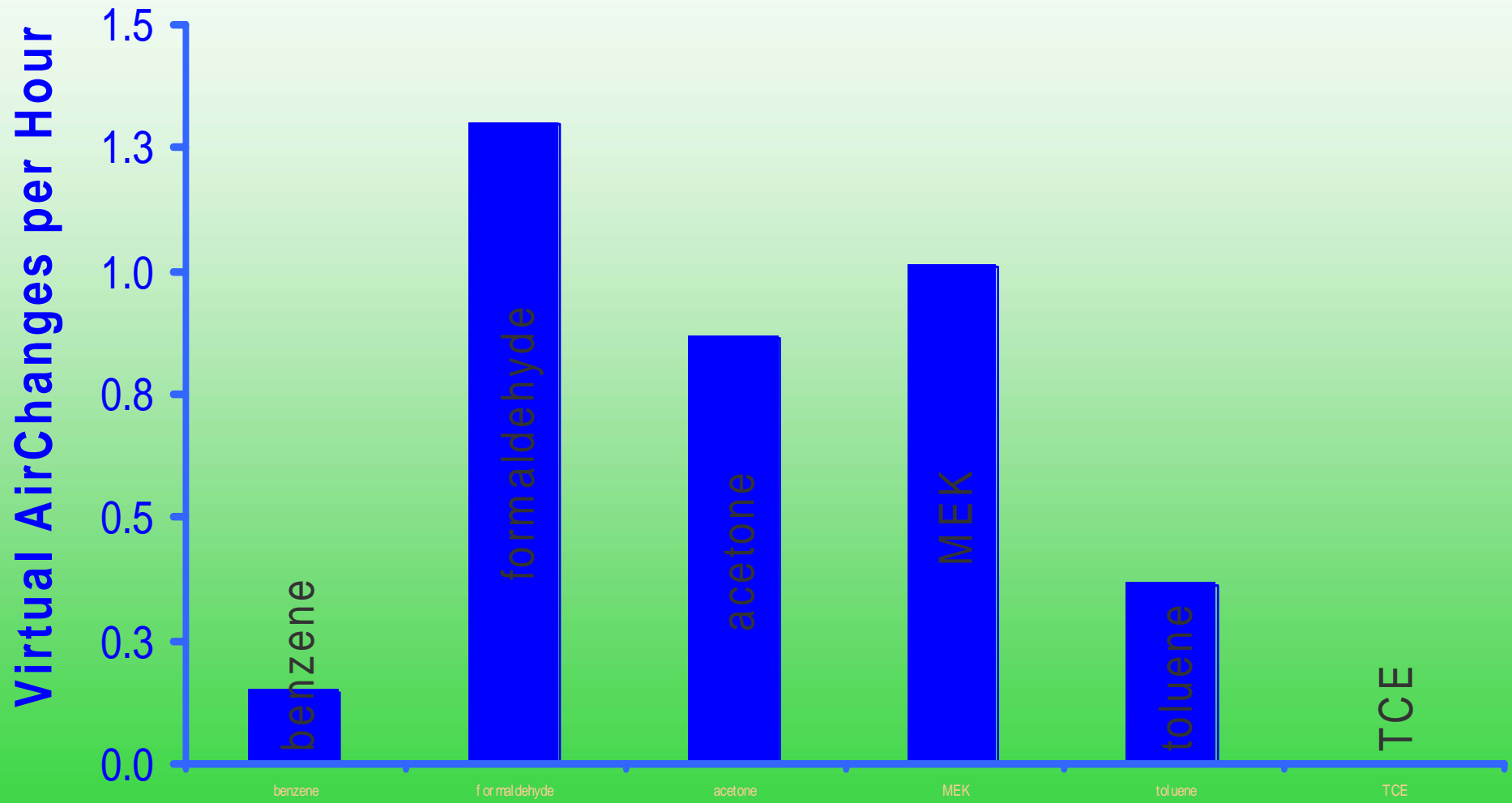


Air Quality Solutions





Virtual Air Changes from Biofilter





Biofilter's Energy Advantage

(Theoretical)

- 1 m² biofilter generate 25 l s⁻¹ of *virtual* outside air
 - able to reduce make up air by 60%
- Reduce peak energy consumption by 0.36 to 0.45 KW per occupant



Potential Energy Savings

- Energy Cost per \$2.50 sq ft per year (2002)
- 10-20% of energy cost due to bringing in outside air
- Biofilter could save between \$0.25 and \$0.50 per sq ft per year



Real Savings

- Cost of occupancy (cost of putting someone into the space)
- \$100 to \$125 per sq ft per year
- Absenteeism reduced by 3.6 days
- Improved bottom line by \$1.44 per sq ft per year
- Equivalent to reducing utilities by over 55%



Real Savings

- Improved productivity
 - Lohr results suggest +10% improvement
- Assume 3% increase
- Improved bottom line by \$3.00 per sq ft per year
- Equivalent to saving 120% of utility costs



Cost/Benefit analysis (per occupant)

	Cost	Benefit
Interior plantscape maintenance	\$20.22	
Potential energy savings		\$100.00
Reduced absenteeism		\$170.00
Improved productivity		\$330.00
Total	\$20.22	\$600.00



Cost/Benefit analysis (per occupant)

- Benefit does not include recruitment and retention
- What number/key result your customer wants to change?



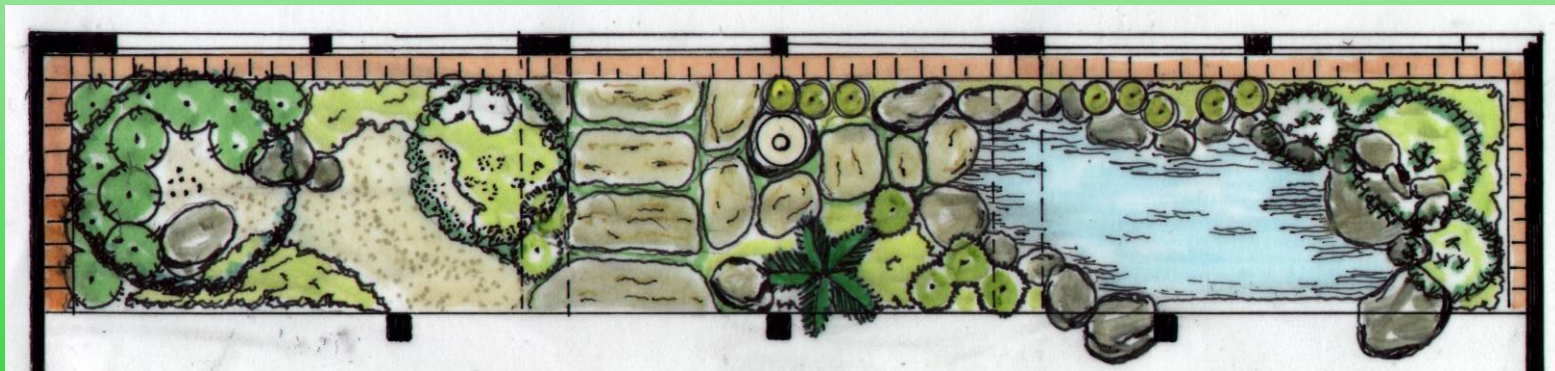
Bring Plants into the Indoor Environment

- Support from entire team is a prerequisite.
 - Get those people who should be involved, *Involved*



Planning the Project

- The client must understand the benefits.
- You must understand the benefits!





Planning the Project



- Establish Your Measurements ... the Key Result Areas
- Consult a Plantscape Professional
- Put plants to work for you



In conclusion

- Already using a range of “nature-based” technologies
- Start looking at interior plants as living natural technology
 - Benefits well being of occupants
 - Improve indoor environmental quality
- Plants add value



More information

- Plants at Work
 - www.plantsatwork.org
- Landscape Ontario
 - www.landscapontario.com
- Alan Darlington
 - Alan@nature.com









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