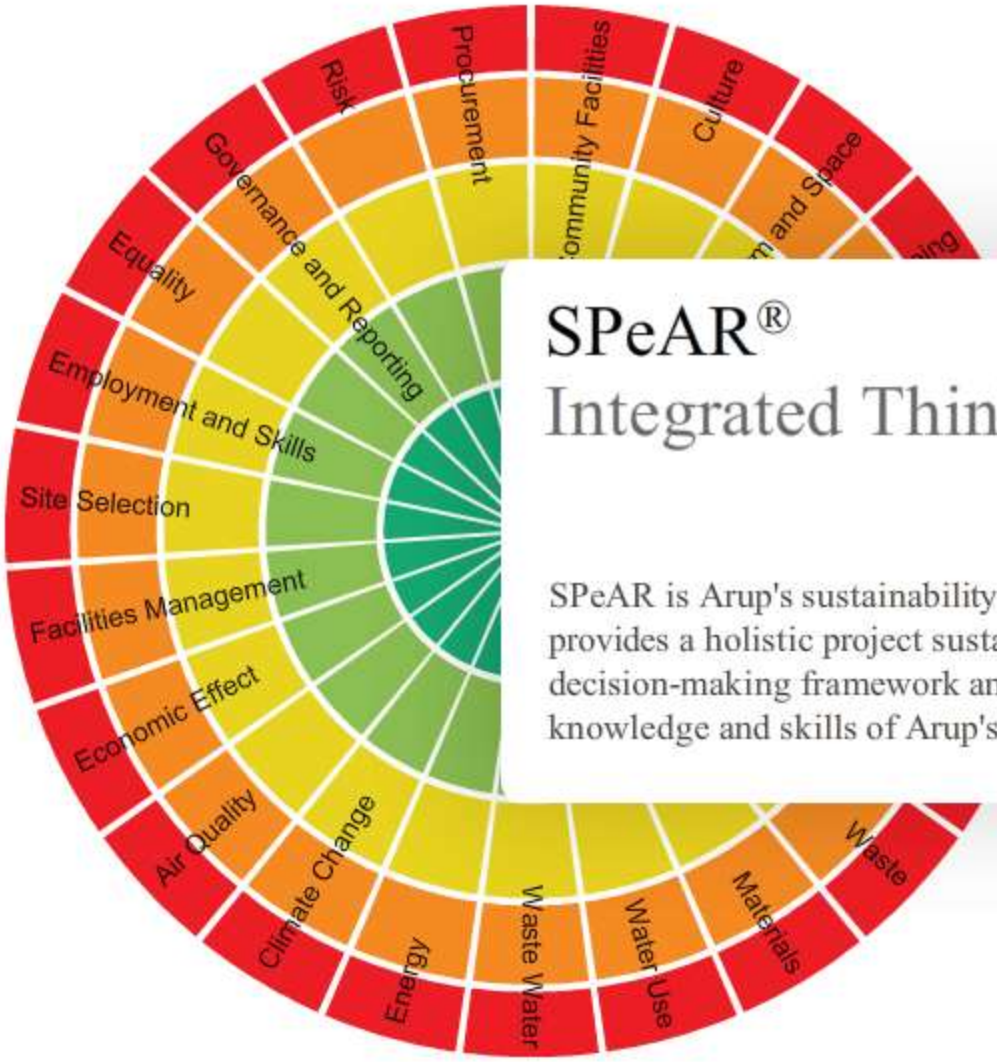
Integrated Resource Management (IRM)

ARUP



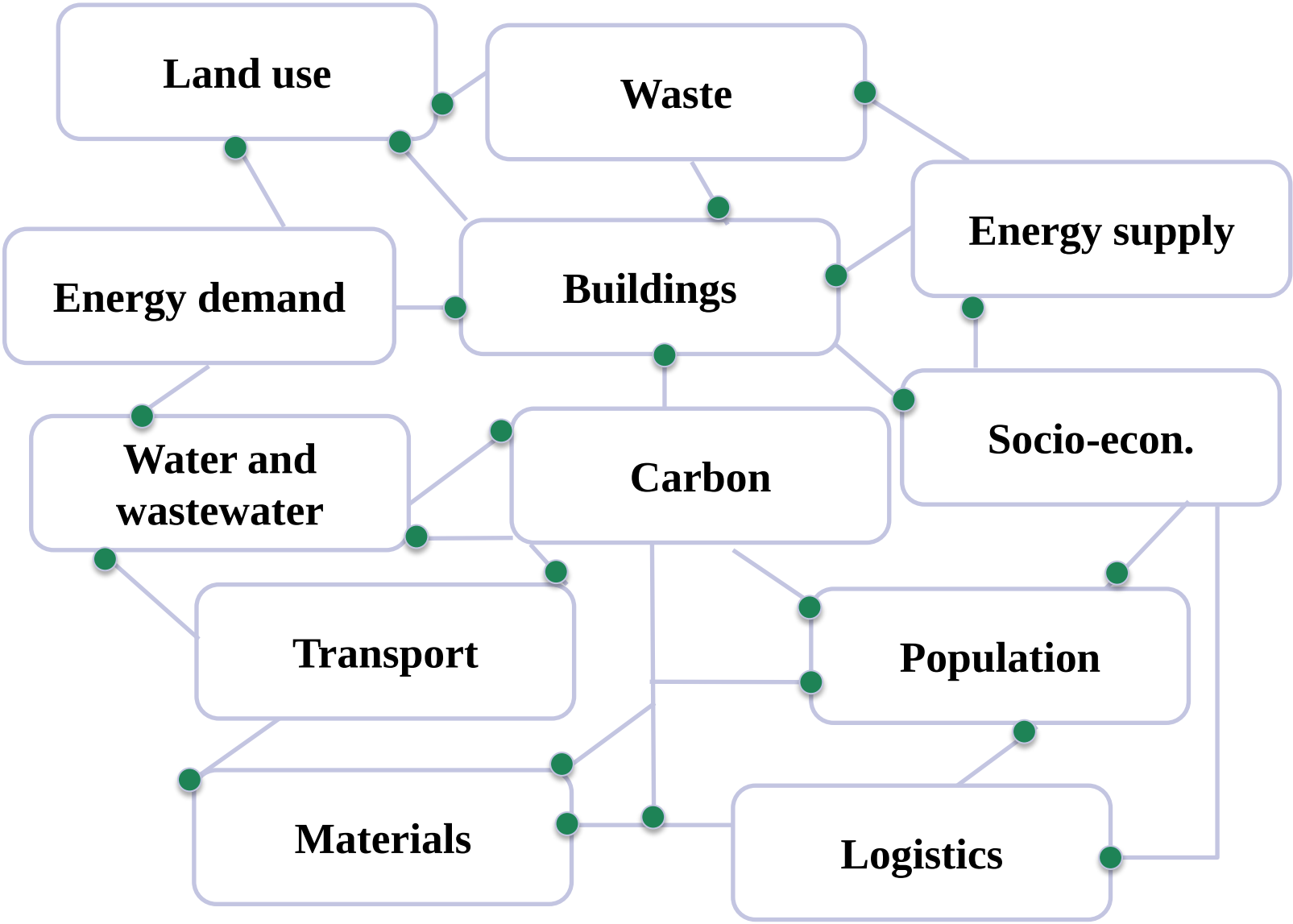
SPeAR®

Integrated Thinking

SPeAR is Arup's sustainability appraisal tool. It provides a holistic project sustainability decision-making framework and access to the knowledge and skills of Arup's global experts.

Sustainable Project Appraisal Routine

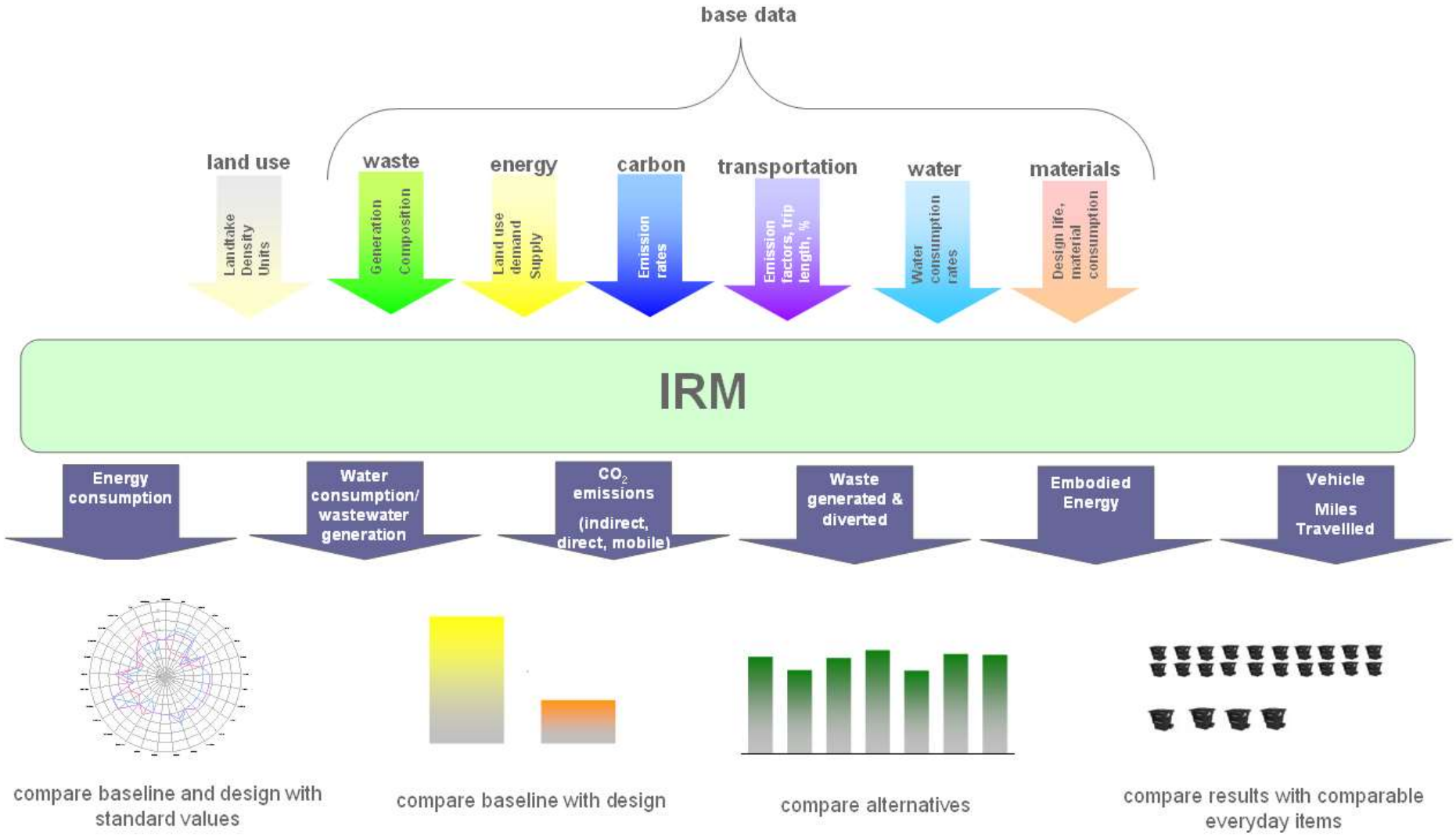
ARUP


Land use
Waste
Energy supply
Energy demand
Buildings
Socio-econ.
Water and wastewater
Carbon
Transport
Population
Materials
Logistics

Integrated Resource Management

A holistic quantitative model for improved **understanding of** urban systems and **the impact of decisions**

Integrated Resource Management



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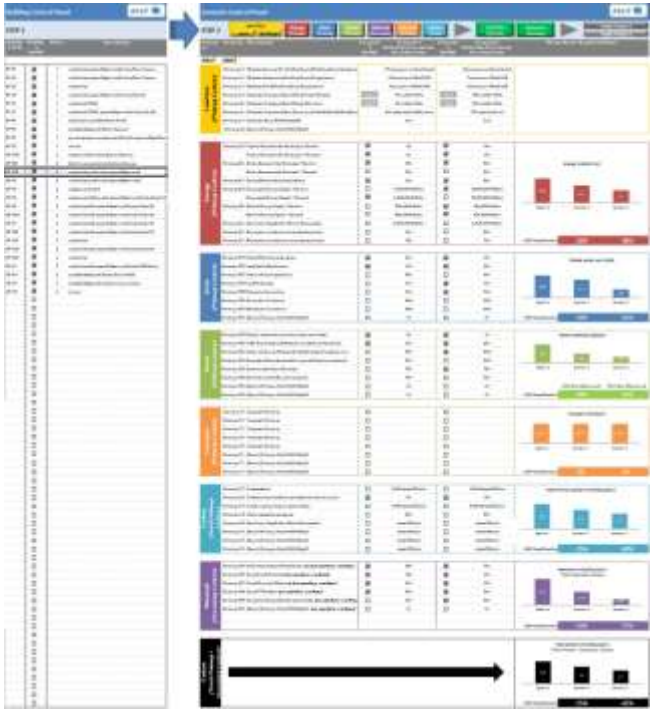
Waterfront Toronto Carbon Tool

- 32 hectares
- 6,000 new residential units
- 9.3 hectares of parks and public space
- Home of Toronto 2015 Pan/Parapan American Games Athletes' Village

Waterfront Toronto Tool

Control Panel



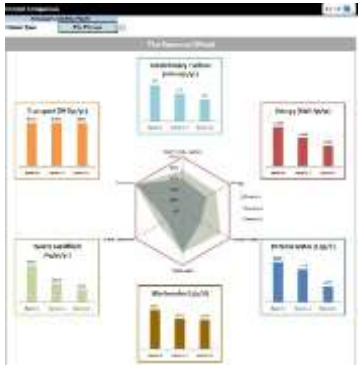
Baseline Inputs

- Land/Bdgs
- Energy
- Water
- Waste
- Transport
- Carbon
- Materials

Calculations

- Land/Bdgs
- Energy
- Water
- Waste
- Transport
- Carbon
- Materials

Output



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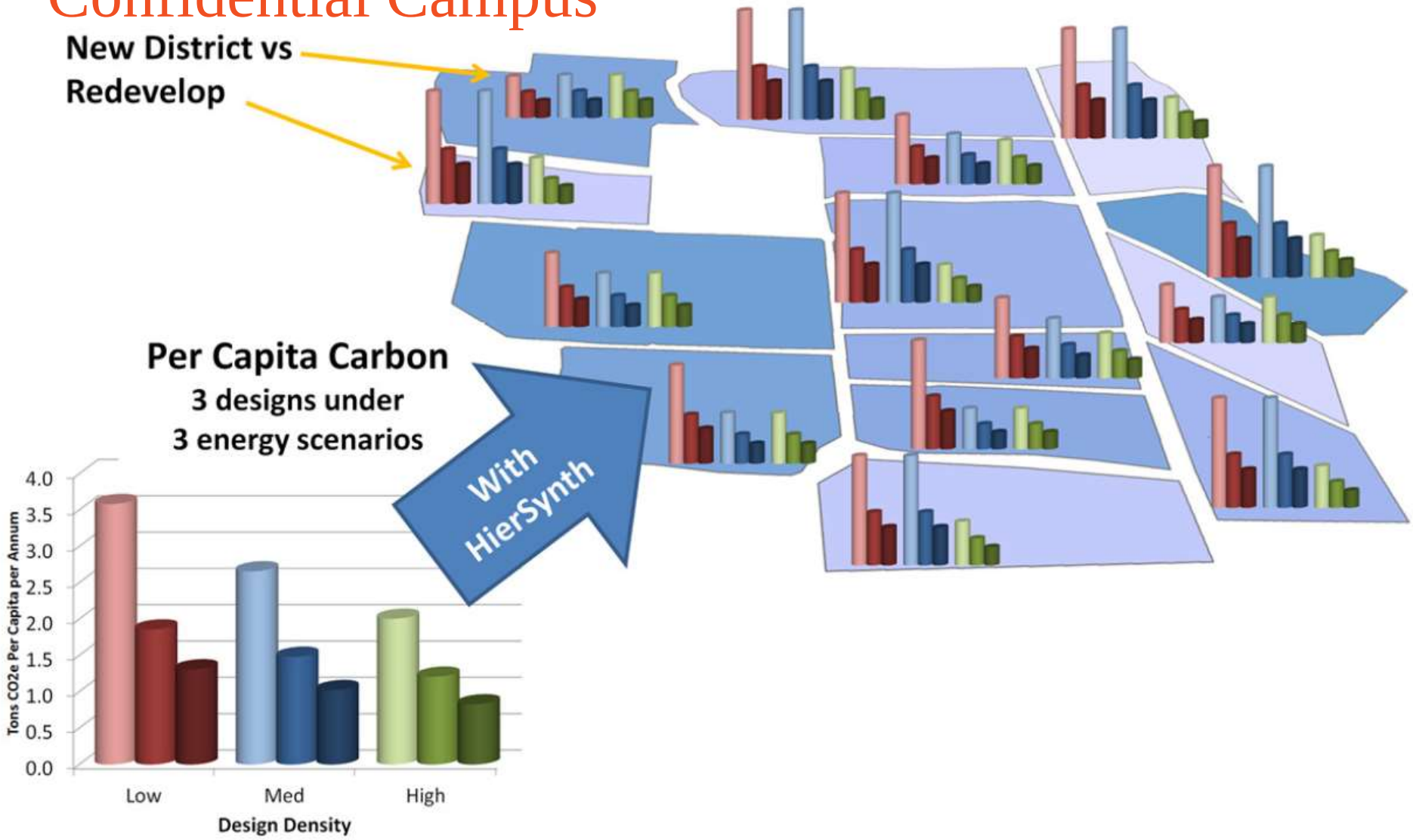
Confidential Campus



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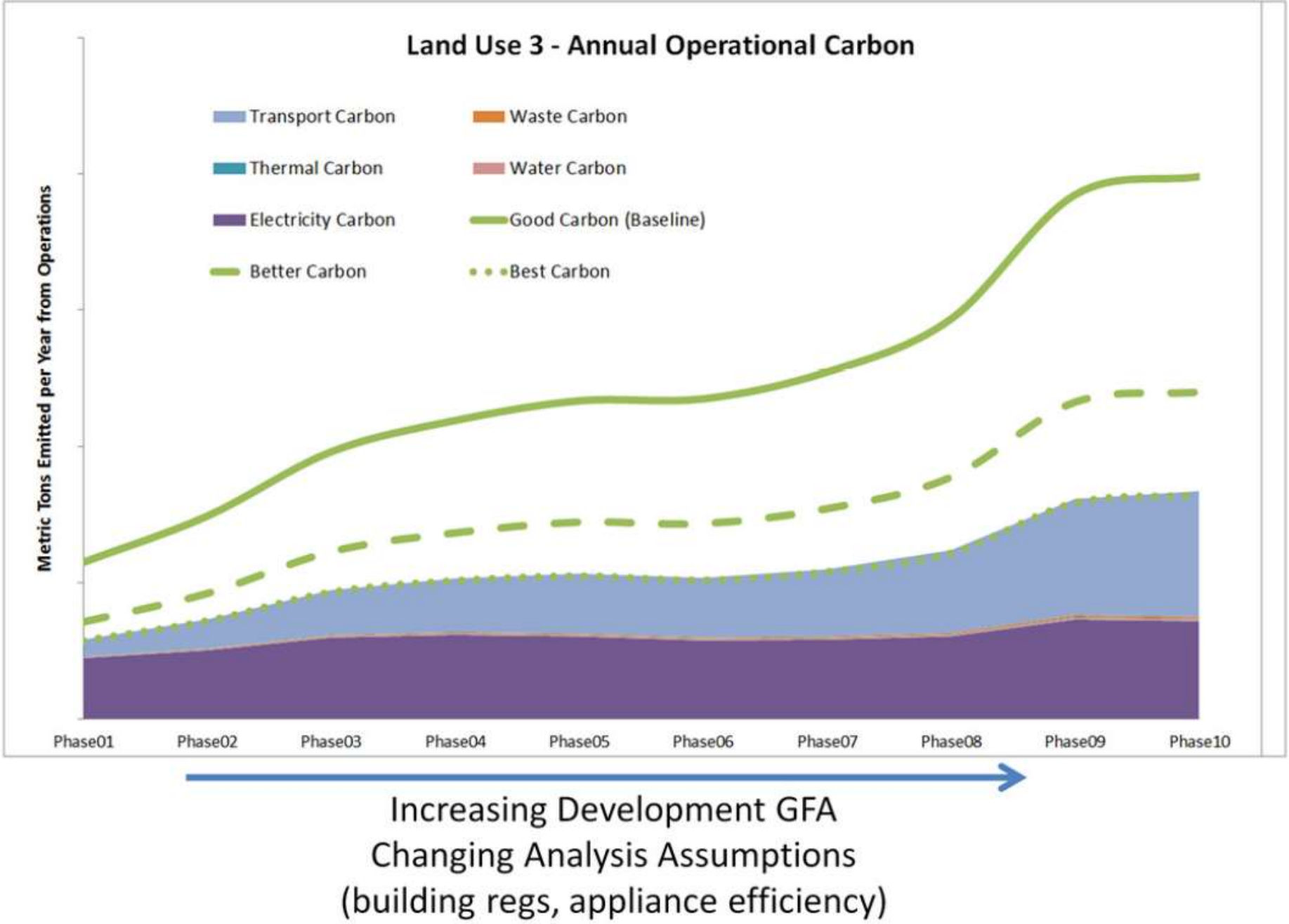
Land Use 3 - Annual Operational Carbon
Transport Carbon
Waste Carbon
Thermal Carbon
Water Carbon
Electricity Carbon
Good Carbon (Baseline)
Better Carbon
Best Carbon
Metric Tons Emitted per Year from Operations
Phase01
Phase02
Phase03
Phase04
Phase05
Phase06
Phase07
Phase08
Phase09
Phase10
Increasing Development GFA
Changing Analysis Assumptions
(building regs, appliance efficiency)

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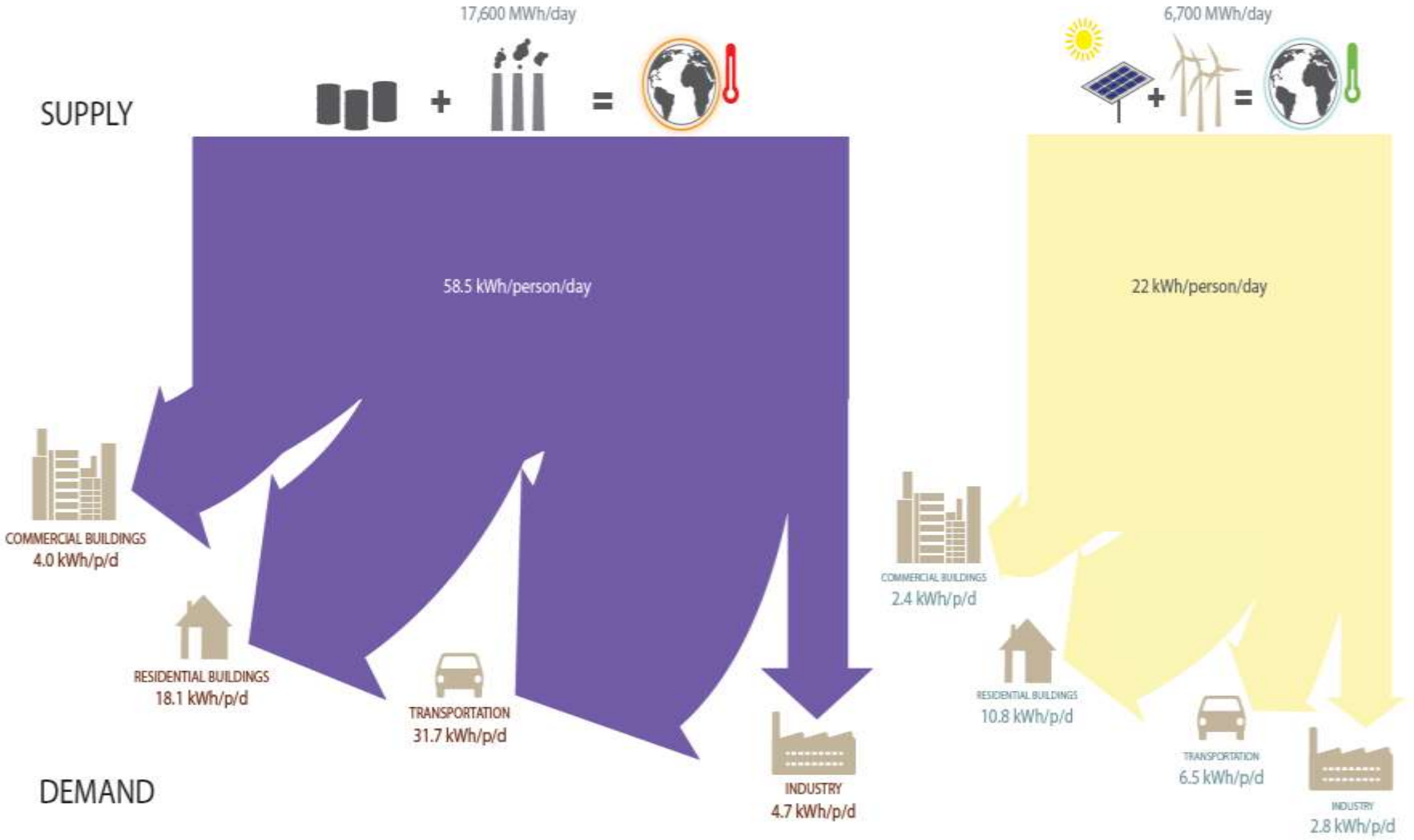
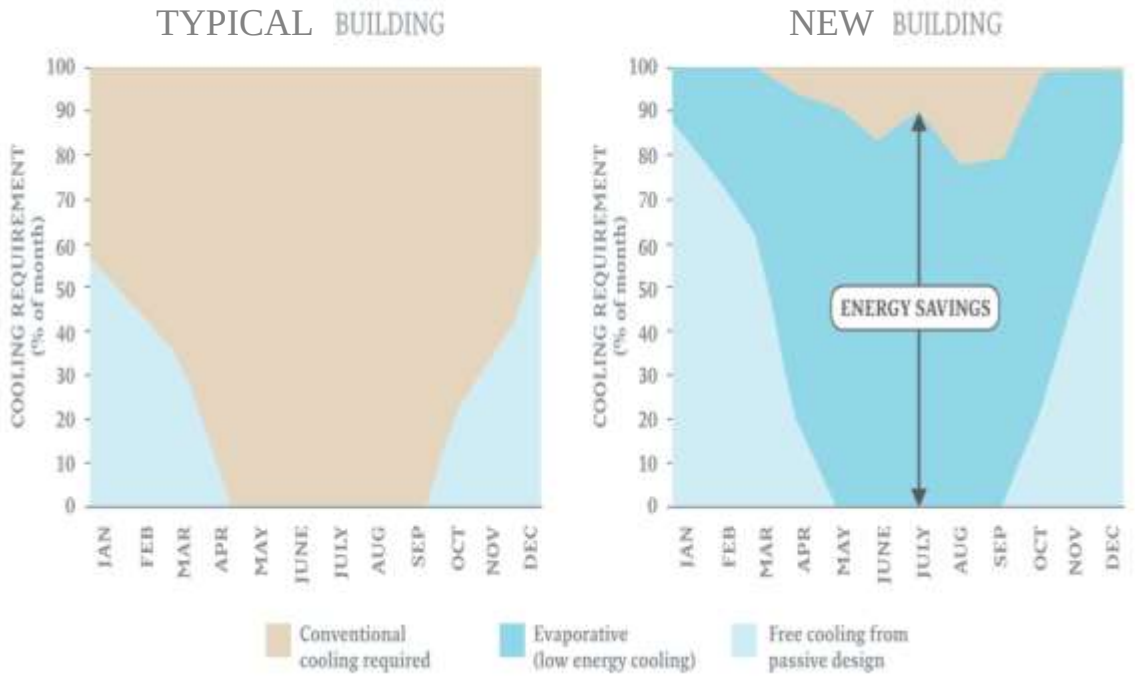
KA-Care City for Atomic and Renewable Energy

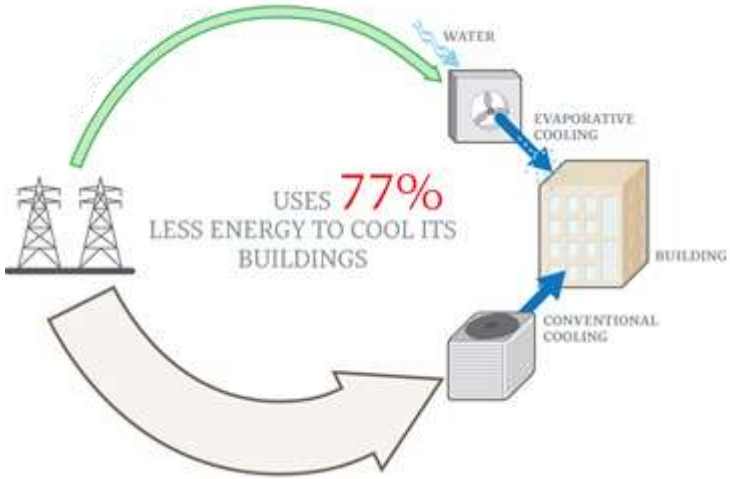
Energy reduction



ARUP

Energy reduction – cooling strategy





Low energy cooling strategies achieves a 77% energy saving

Chillers only needed for 10% of year

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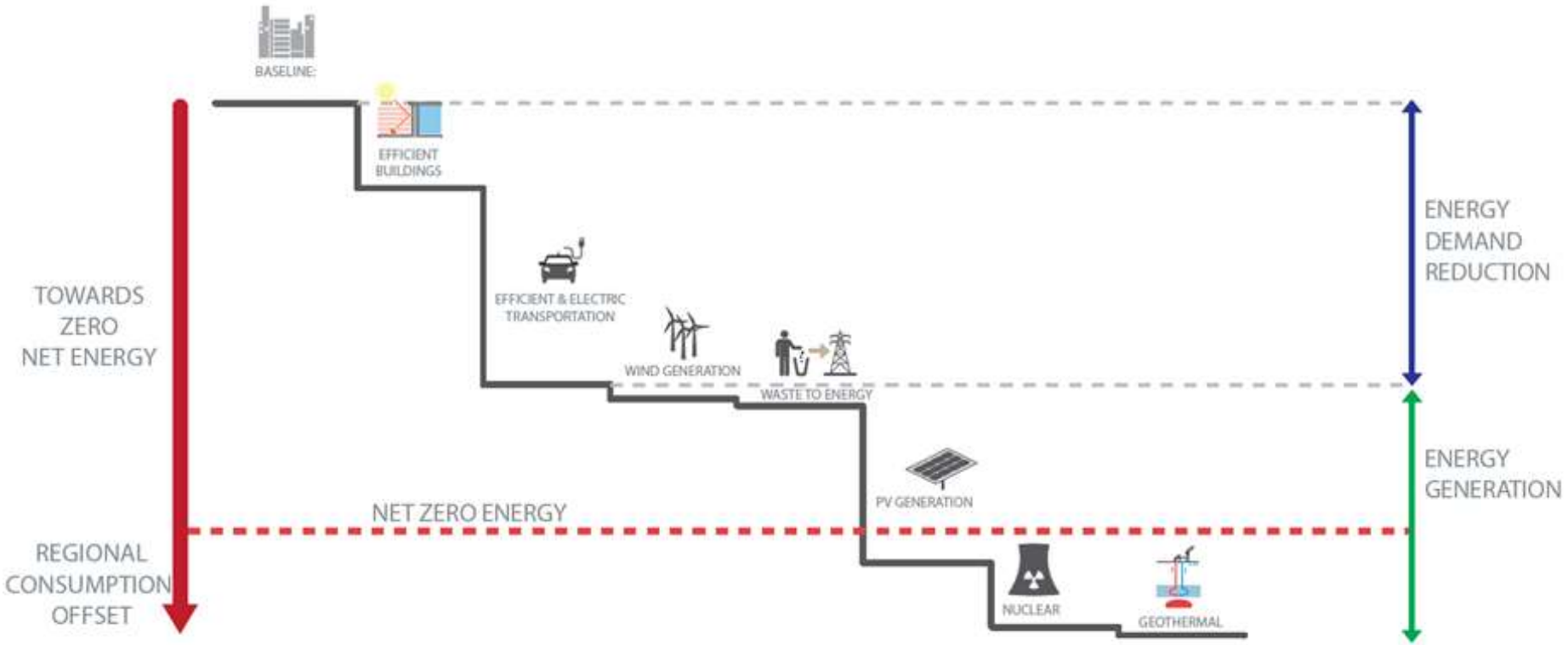
Energy story



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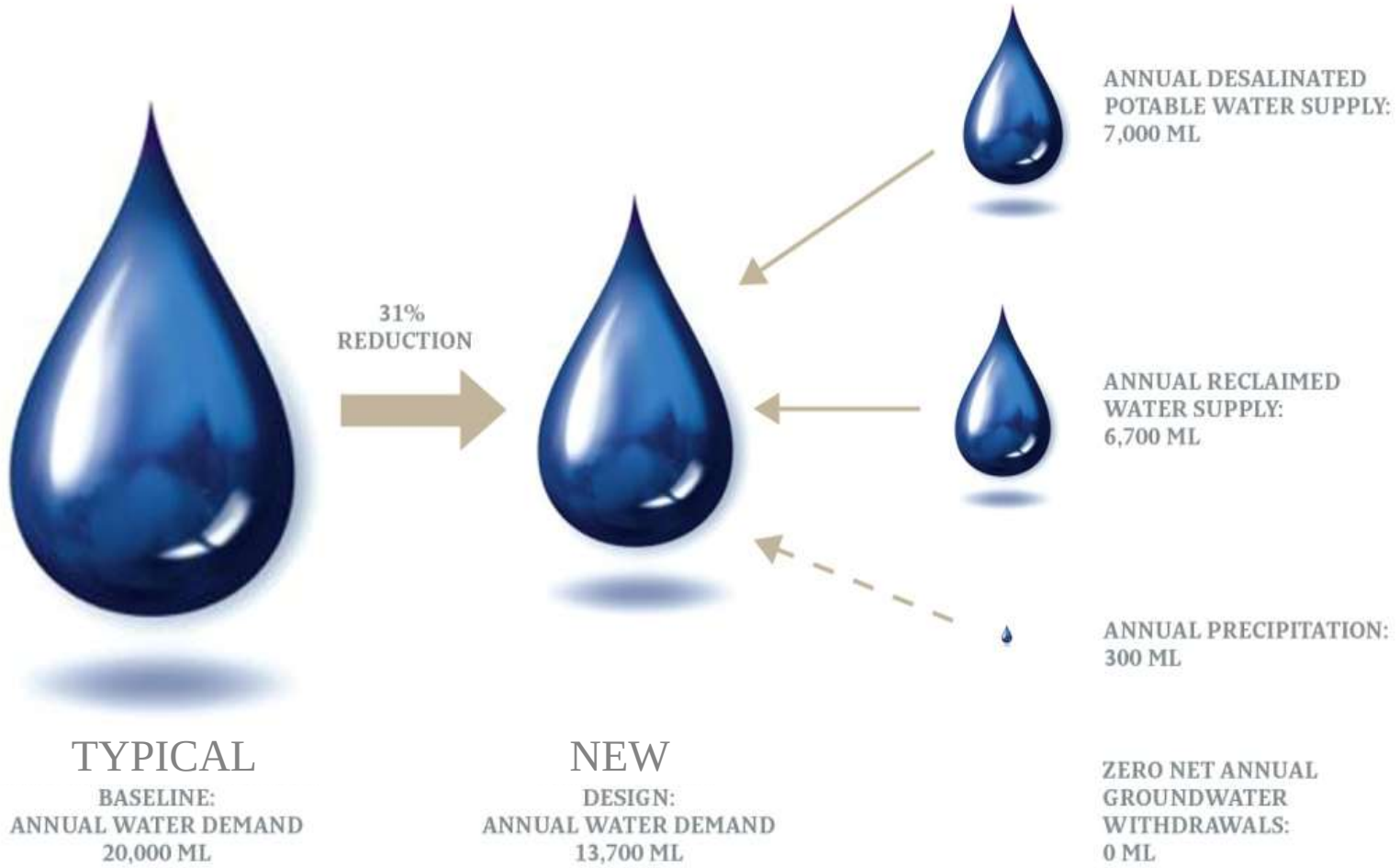
Water reduction



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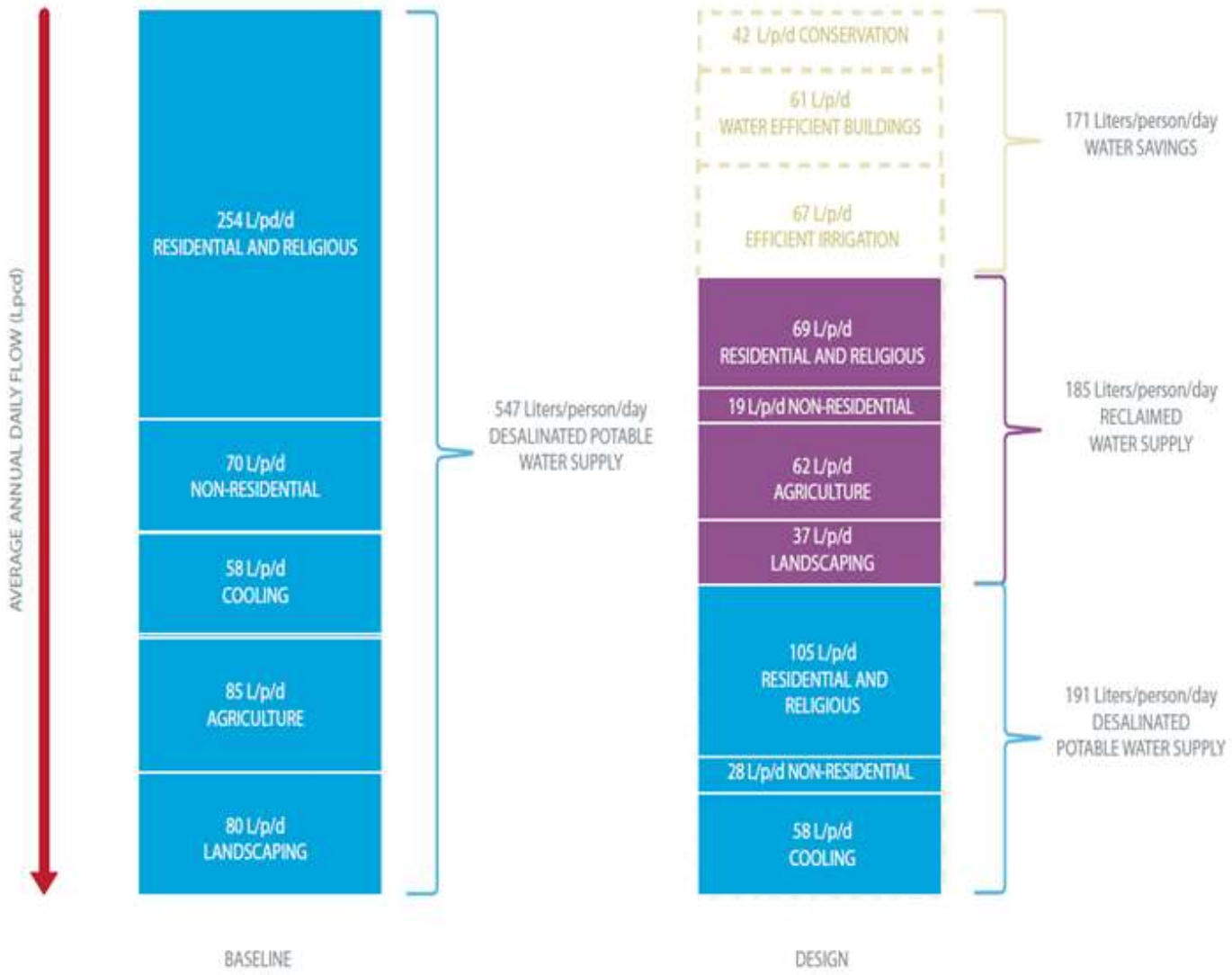
Minimizing imported potable water



ARUP

Water Neutral Design

edited by: Vincent Lee

Dec 29 2008

Estimates water usage and the impacts of various strategies (Conservation, Efficiency and Reuse) for site developments at the master planning level

APPL. SCALE	Product	Building	Multi Bldg	Campus	Neighborhd	City	Region
APPL. PHASE	Planning	Concept	Schematic	Design Dev	Const Doc	Const Admin	Post Occup
APPL. REGION	Americas	Australasia	Europe	East Asia	UNITS	Imperial	Metric
TOOL TYPE	Excel	Excel + Macros	Software	Software Add-on	Database	Web Interface	Other
TOPIC AREAS	Age & Rdg	Carbon	Economy	Energy	Land & Food	Occup. Comfort	Materials	Society	Transport	Waste	Water

APPROXIMATE USE TIME

1min. | 1hour | 1day | 1week +

USER PROFILE

Generalist | Specialist

QUALITY ASSURANCE PROCESS

None | PeerReview | FormalApproval

SUMMARY

To develop water management strategies for master planning and conceptual level by estimating baseline demands (through a conventional design), demands from water efficient building and landscape designs, harvested rainwater, reclaimed water and reduced potable water supply. The tool is intended for master planning purposes only, and shall be used as a basis for schematic design or design development. Peak demand is not accounted for in modelling the baseline case. The underlying concept of this tool is: 1) The buildings will be designed (at a minimum) to meet LEED requirements for water efficiency; 2) The landscaping will be designed to use water efficient irrigation or no irrigation; 3) The rainwater will be reused for irrigation and other non-potable uses; and 4) The wastewater from the buildings will be reclaimed for non-potable and even potable uses.

PROCESS MAP

Project Information and Climate Data
↓
Create Baseline Demand
↓
Estimate Conservation Reduction
↓
Estimate Efficiency Reduction
↓
Estimate Water Reuse Scenarios
↓
Generate Summary
↓
Generate Graphs and Charts

INPUTS

Climate Data, Land Use, Master Plan Program, Landscape Demand, Conservation Measures, Building Efficiency Reductions, Landscape Efficiency Reductions, Stormwater Runoff Estimation, Rainwater Harvesting Sizing, Percent Wastewater Reuse

OUTPUTS

Summary Sheet, Various Graphs and Charts

BENEFITS

Comprehensive water management tool

Provides quick assessment of various strategies to move towards a Water Neutral Development

Powerful visual output

User-Friendly

ROOM FOR IMPROVEMENT

The software could have estimates of capital costs or operational costs/savings

More comprehensive estimates for wastewater generated

Baseline criteria could be refined (to include more recent data and international demands)

Combine with "Water Demands for Master Plans" Tool developed by RRJ in SF

LIMITATIONS

Not for use for buildings

Not for use on projects beyond concept planning or schematic design

RELATED PROJECTS

Poplar Point, Washington D.C.

Yongsan IBD, Korea

North Innisfil Lands, Canada

RELATED TOOLS

Water Story - Buildings

RELATED SOURCES

Pioneer Institute - "Managing Water Demand: Price vs. Non-Price Conservation Programs"

U.S.D.o.E. Energy Efficiency and Renewable Energy - Federal Emergency Mgmt. Programs

NJDEP Safe Drinking Water Act Regulations (N.J.A.C. 7:10)

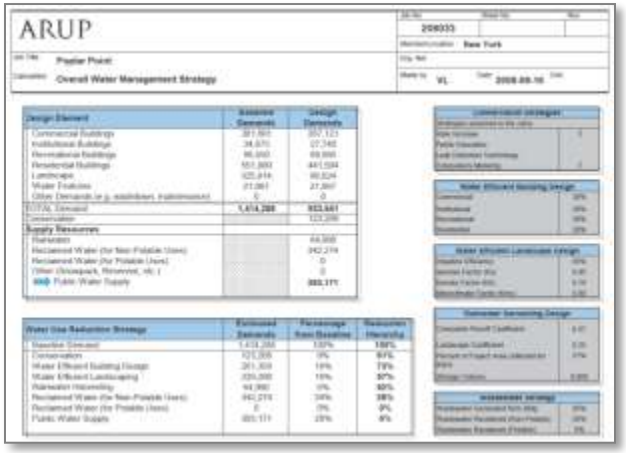
TOOL DEVELOPMENT SOURCE

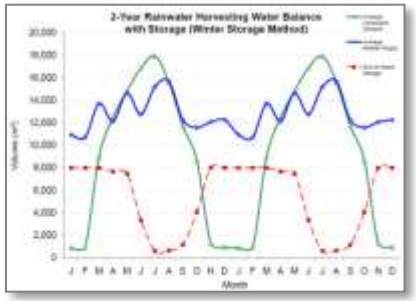
ARUP New York

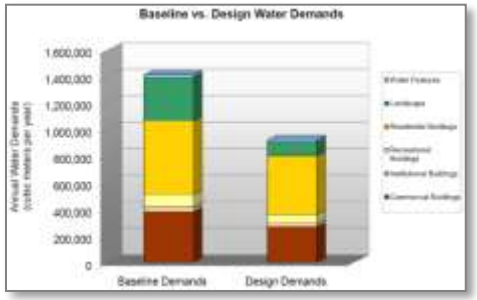
KEY CONTACTS

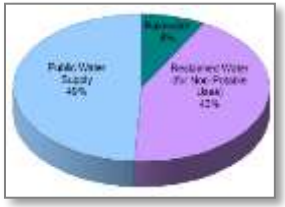
Vincent Lee | Margaret Garcia | James DeMarco

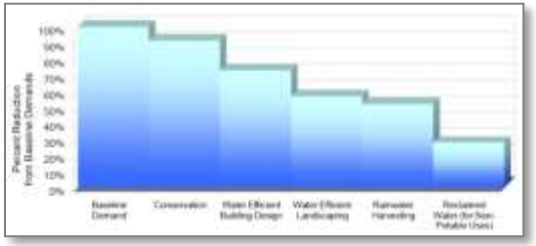
TOOL REVIEW AT ARUP

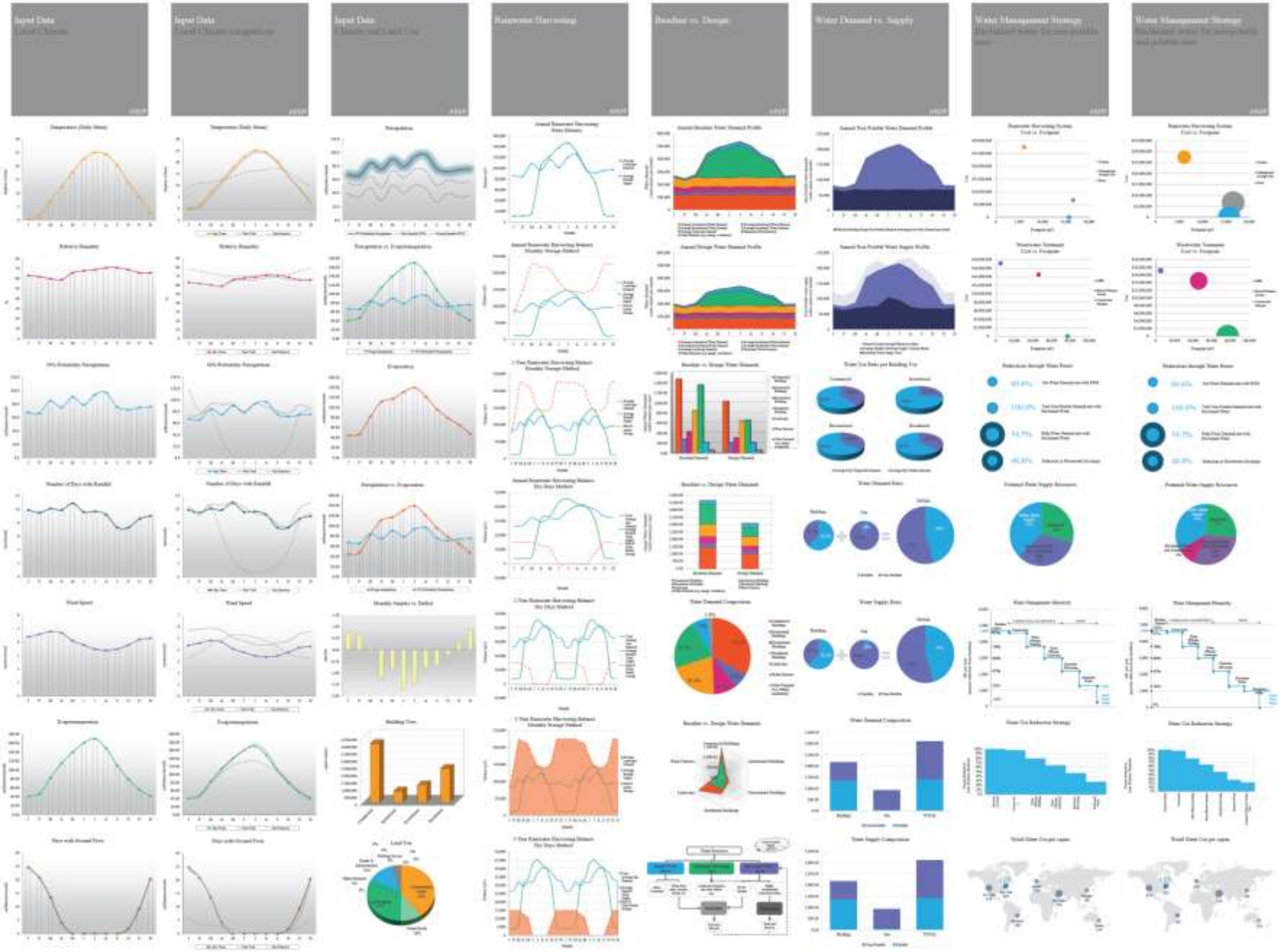








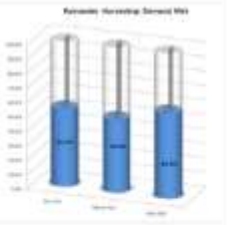




OveRain

edited by: Margaret Garcia
Apr 6 2010

Design Rain Harvesting System and Estimates Water Usage for Building and Site Projects in Detailed Design



APPL. SCALE: Product | Building | Multi-Bldg | Campus | Nghbrhd | City | Region

APPL. PHASE: Planning | Concept | Schematic | Design/Dev. | Const. Doc. | Const. Admin | Post Occup.

APPL. REGION: Americas | Australasia | Europe | East Asia | **UNITS**: Imperial | Metric

TOOL TYPE: Excel | Excel + Macros | Software | Software Add-on | Database | Web interface | Other

TOPIC AREAS: Appr & Reg | Carbon | Economy | Energy | Land & Food | Occup. Comfort | Materials | Society | Transport | Waste | Water

APPROXIMATE USE TIME: 1min | 1hour | 1day | 1week

USER PROFILE: Generalist | Specialist

QUALITY ASSURANCE PROCESS: None | PeerReview | FormalApproval

SUMMARY

OveRain is a tool to aid the design of rainwater harvesting systems. This tool is intended for use in the detailed design phase. The tool works with daily rainfall data and detailed demands to help the user size the rainwater harvesting system. The tool estimates runoff water quality based on the collection area land use to aid the user in treatment system desing. Climate change scenarios gauge the system's resilience with changes in average temperature and precipitation. Cost analysis calculates annualized cost and payback period.

PROCESS MAP

Project Info & Climate Data
↓
Calculate Demands
↓
Determine Size of Storage
↓
Analyze Climate Change Implications
↓
Determine Runoff Water Quality
↓
Analyze Cost
↓
Generate Summary, Graphs and Charts

INPUTS

Climate Data, Land Use, Master Plan Program, Landscape Demand, Coloservation Measures,

OUTPUTS

Summary Sheet, Various Graphs and Charts

BENEFITS

- Comprehensive water management tool
- Covers the schematic and detailed design phases
- Powerful visual output
- User-Friendly

ROOM FOR IMPROVEMENT

- Incorporation of cost information
- Link to reference material on landscape costs
- Write users guide

LIMITATIONS

- Requires specialist knowledge
- Requires substantial setup time

PROJECTS

East River Waterfront

RELATED TOOLS

- Water Story - Rainbird
- Water Neutral Design
- Water Demands for Masterplans

RELATED SOURCES

- Pioneer Institute - "Managing Water Demand: Price
- U.S.D.o.E. Energy Efficiency and Renewable
- NJDEP Rule Devising Water Act Regulations

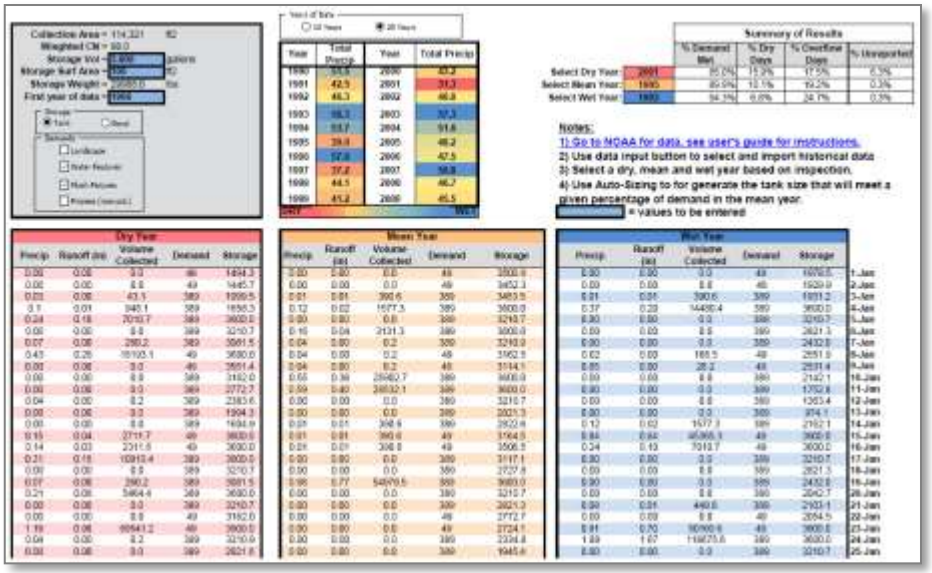
TOOL DEVELOPMENT SOURCE

ARUP — New York

KEY CONTACTS

Vincent Lee | Margaret Garcia | Marwin Dela

TOOL REVIEW AT ARUP

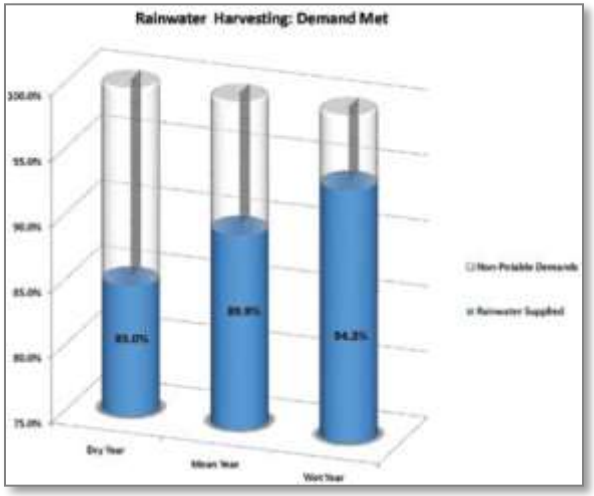


Collection Area = 114,321 ft2
Weighted CN = 80.0
Storage Vol = 6,000 gallons
Storage Surf Area = 800 ft2
Storage Weight = 50,081 lbs
First year of data = 1950

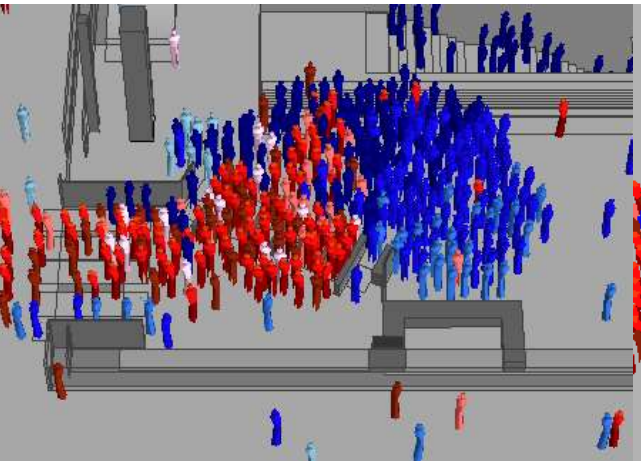
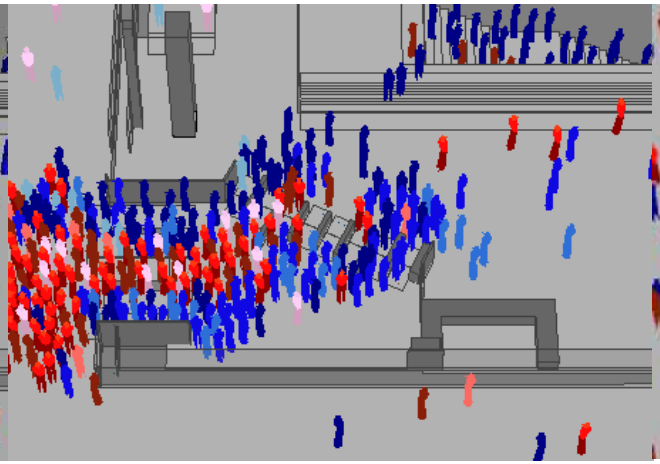
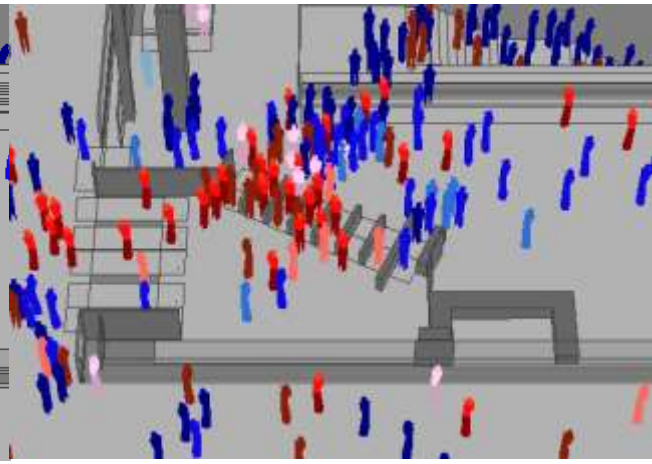
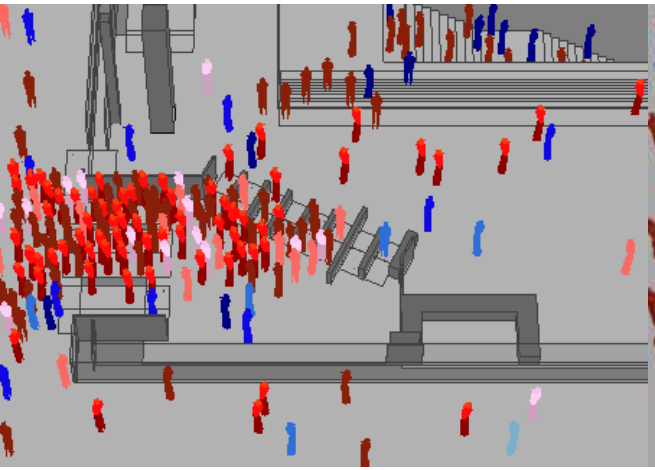
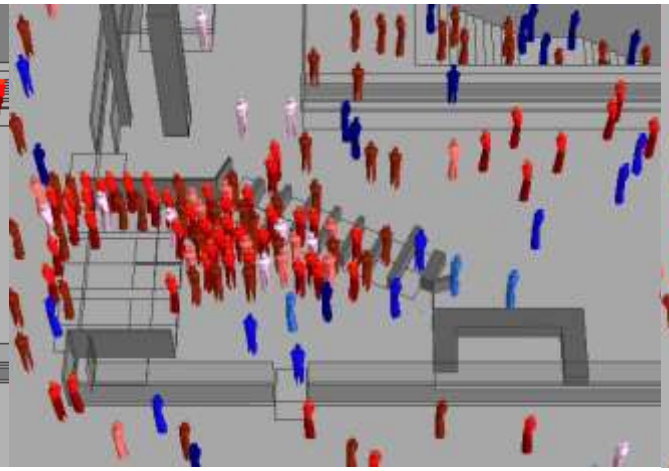
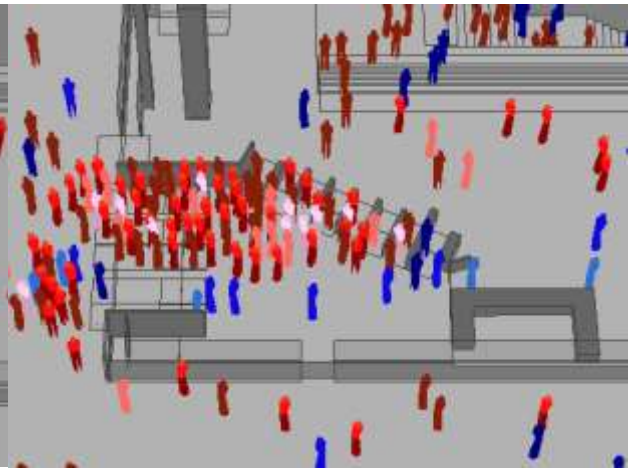
Summary of Results

		% Demand Met	% Dry Days	% Overflow Days	% Unreported
Select Dry Year	2001	80.0%	15.9%	17.5%	0.3%
Select Mean Year	1990	85.9%	12.1%	14.2%	0.3%
Select Wet Year	1983	94.3%	6.8%	24.7%	0.3%

Notes:
1) Go to NOAA for data, see user's guide for instructions.
2) Use data input button to select and import historical data
3) Select a dry, mean and wet year based on inspection.
4) Use Auto-Sizing to for generate the tank size that will meet a given percentage of demand in the mean year.
= values to be entered

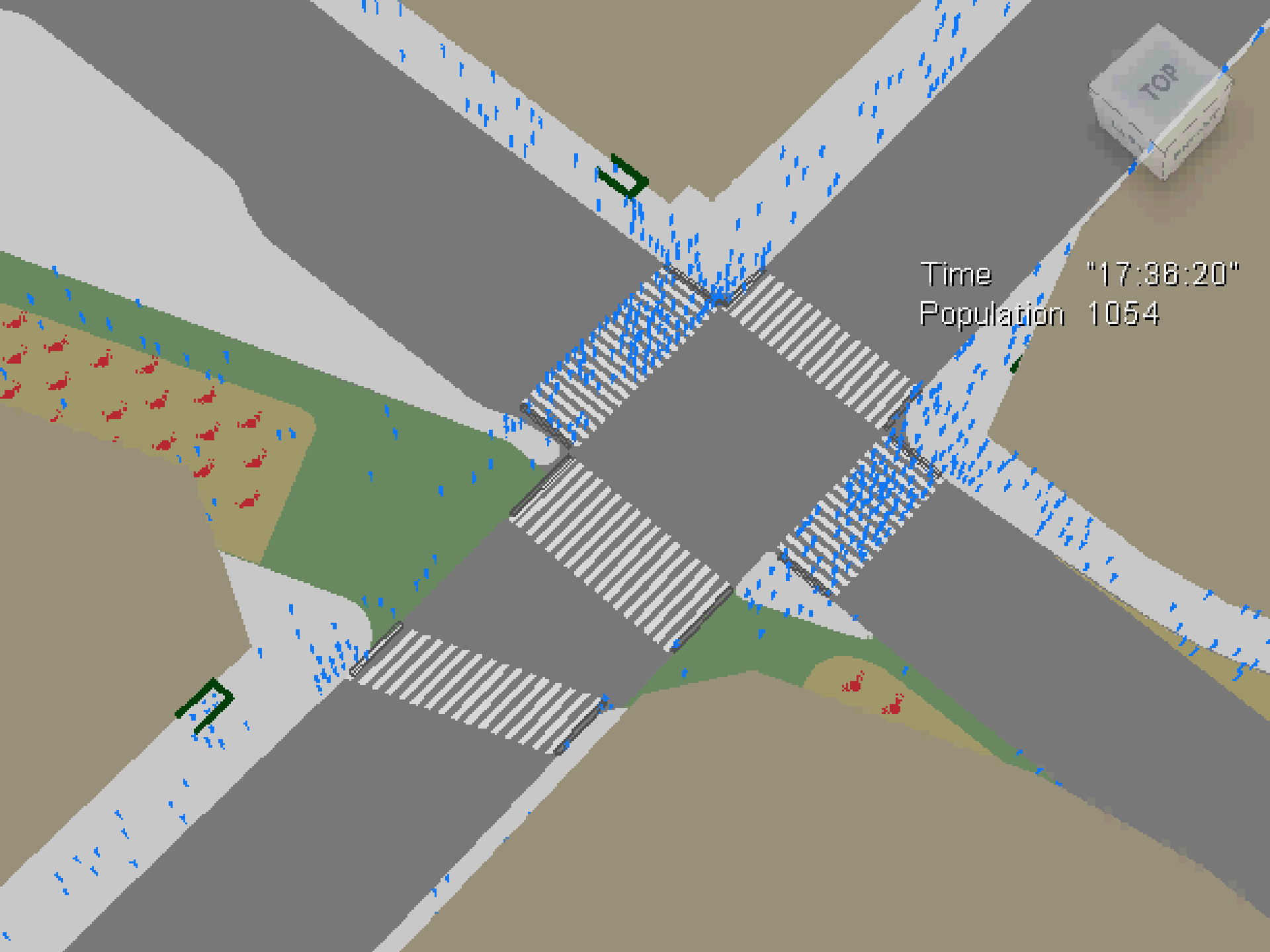


Pedestrian Planning in the Urban Realm

Pedestrian Planning in the Urban Realm

34th Street Herald Square, New York City


TOP
Time "17:38:20"
Population 1054

Pedestrian Planning in the Urban Realm

 Fulton Center, New York, New York

ARUP

Pedestrian Planning in the Urban Realm

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