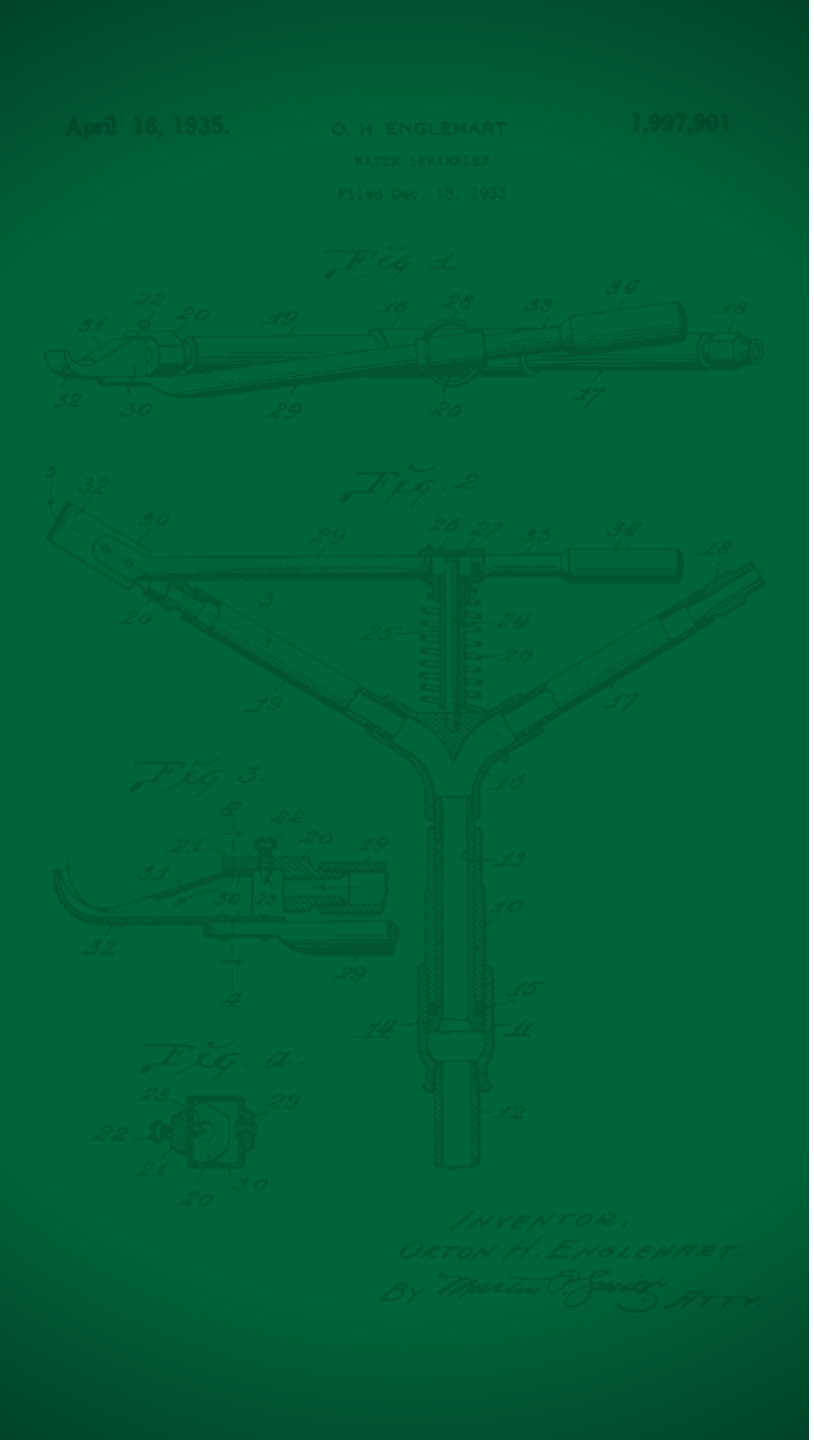
Saving Water with Automated Irrigation in Smart Cities

Mr. Choon Hing Goh
Area Manager – Southeast Asia – Rain Bird
All Certified Equipment Trading Corporation

3:00 p.m.



GREEN THUMBS 2023

RAIN BIRD®

SAVING WATER WITH AUTOMATED IRRIGATION IN SMART CITIES

Water Conservation & Preserving Investments

28/09/2023 – Choon Hing (CH)

The Intelligent Use of Water™

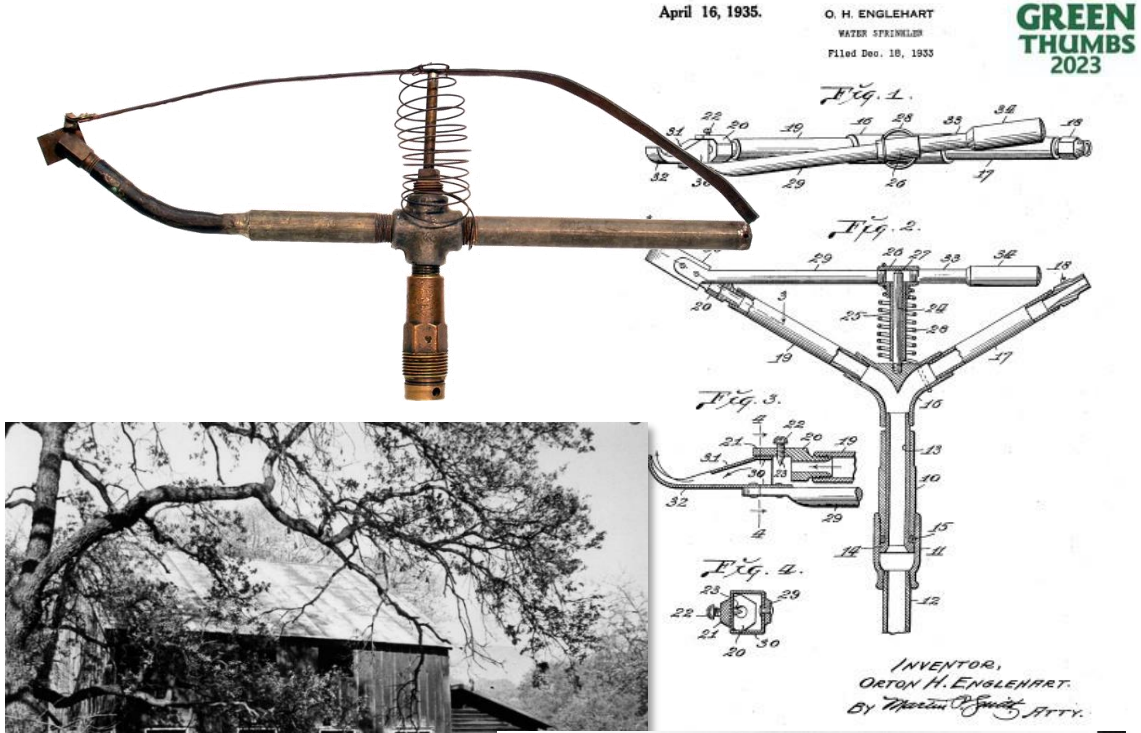
Leadership · Education · Partnerships · Products

History

Orton Englehart, a citrus farmer in Southern California, revolutionized irrigation in 1933 with his creation of the horizontal action impact drive sprinkler.

Rain Bird was founded the same year by Clem, a boyhood friend of Orton, and Mary LaFetra. They marketed and sold this remarkable innovation including their first sale to the Los Angeles Country Club.

Manufacturing started from humble beginnings in the LaFetra family barn. Rain Bird quickly expanded and helped shape California's agricultural boom.



Rain Bird Today - A Global Irrigation Company

Sales in over 130 countries

- Rain Bird Europe (Based in France)
- Rain Bird Trading (Based in China)
- Rain Bird Australia
- Rain Bird Mexico
- Rain Bird Brazil

Rain Bird International services customers in The Middle East, Africa, Asia, India as well as Central and South America

Offices and manufacturing facilities in Arizona, Alabama, Mexico, France, and elsewhere around the world

Broad Range of Products & Services

Training

Services

Controls & Sensors

Central Control

Controller

Sensors

Water Source

Pumps & Filters

Pump

Filters (i-series.jpg)

Valves

Valve

Valve Boxes

Emission Devices

Sprinklers

Nozzles

Drip

Sprays & Rotors

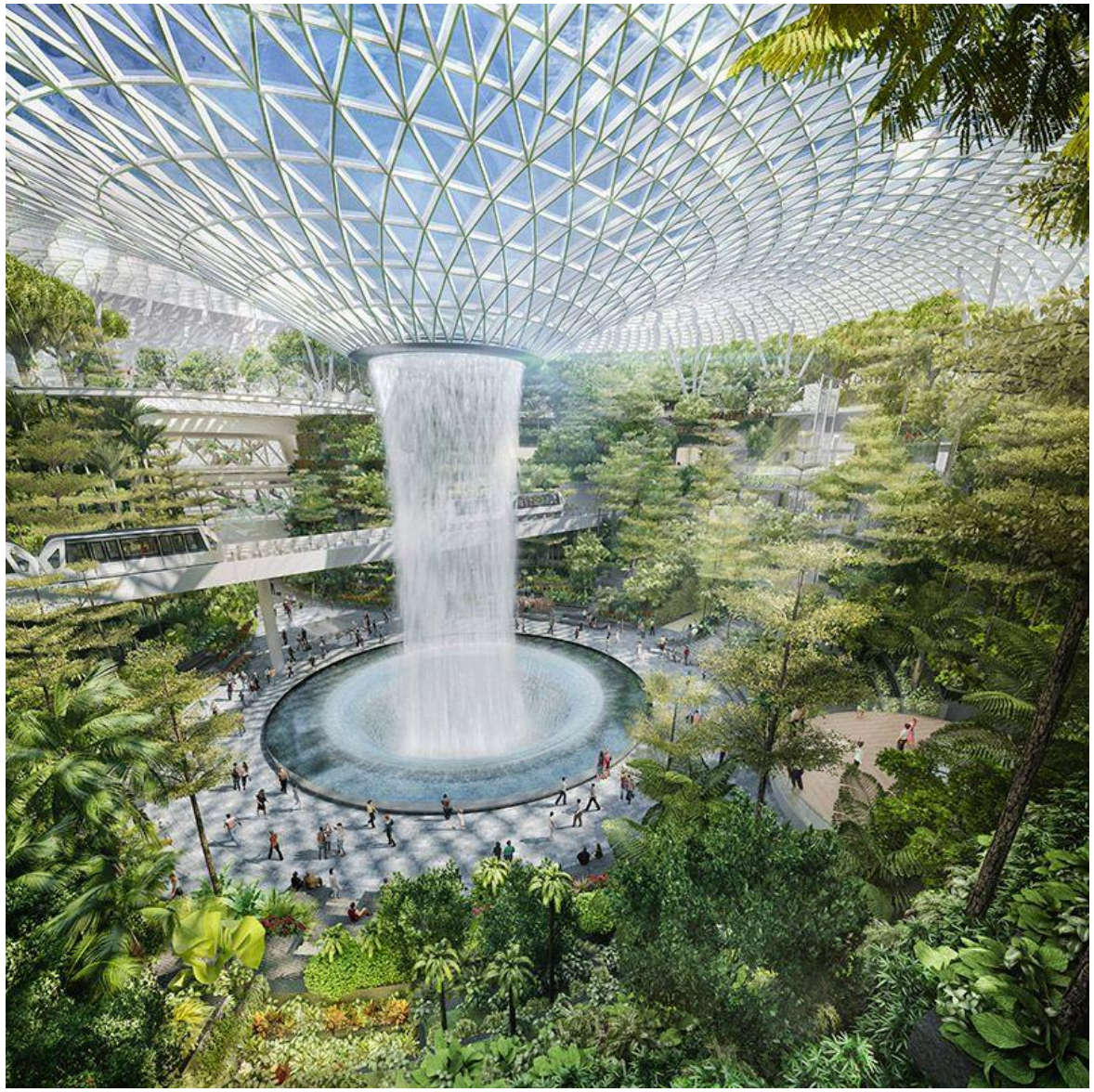
Drainage

Rain Bird offers the most comprehensive line of solutions in the industry.

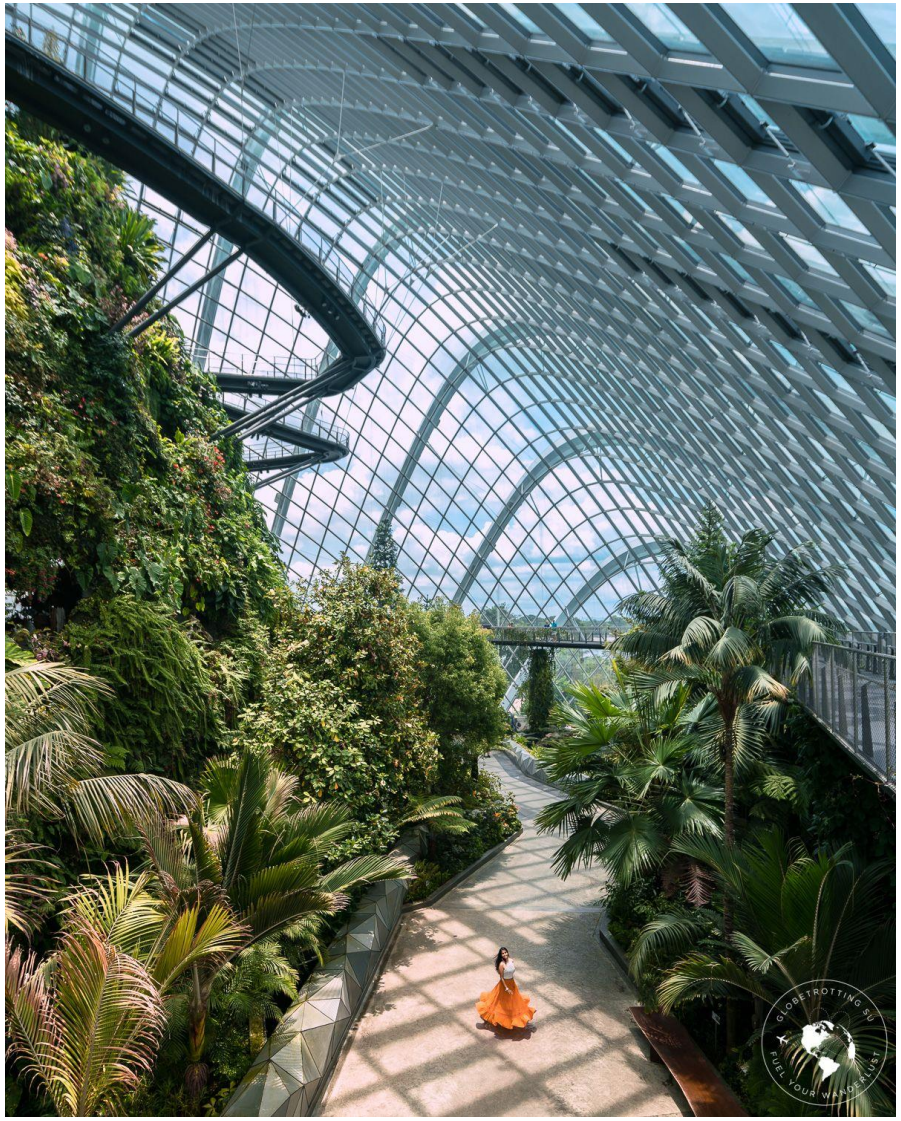
Where?

Jewel Changi Airport

Jewel Changi Airport



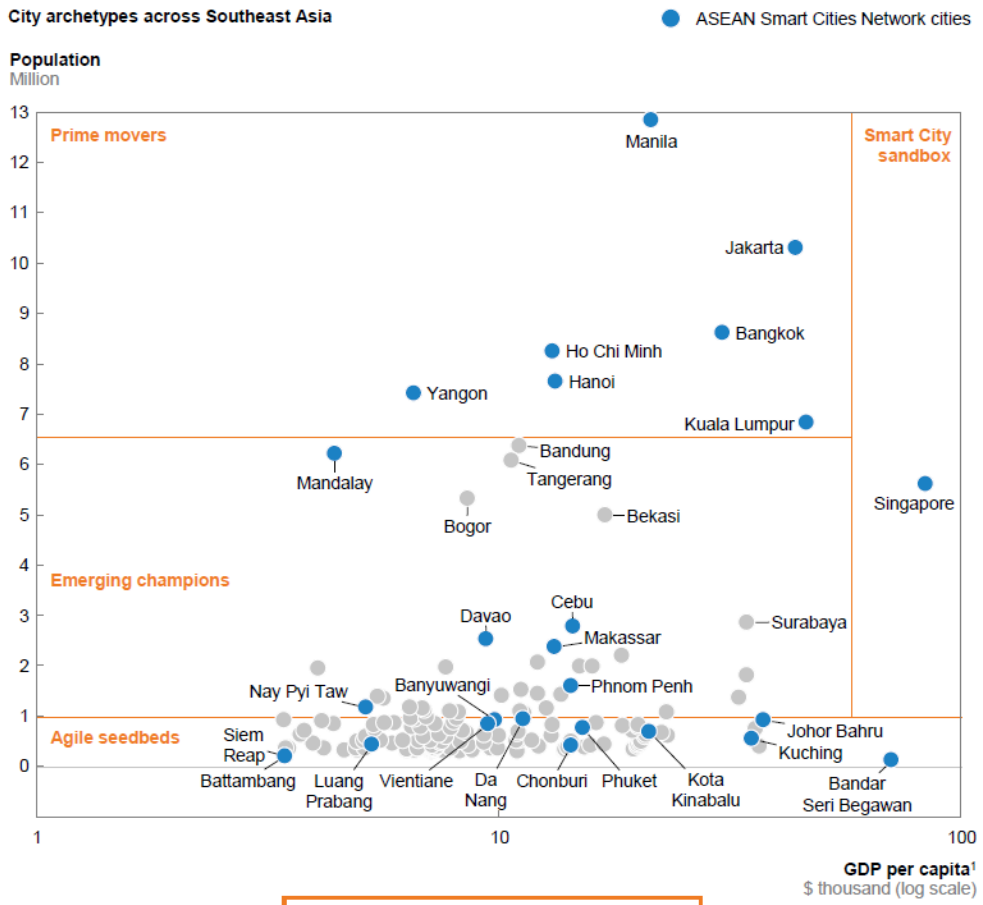
Gardens by the Bay



Agenda

1. Introduction to Smart Cities
2. The Importance of Water Conservation
3. Efficient Irrigation Scheduling
4. Automated Irrigation Systems
5. Benefits of Automated Irrigation in Smart Cities
6. Case Studies
7. Conclusion and Q&A

Introduction to Smart Cities - SEA



City type	Population growth rate (%) Average	Range
Smart City sandbox	1.2	1.2–1.2
Prime mover	2.0	1.6–2.4
Emerging champion	2.5	1.6–4.9
Agile seedbed	2.3	1.6–4.4

1 National GDP per capita figures used for Bandar Seri Begawan, Battambang, Siem Reap, Luang Prabang, and Phuket due to limited data availability.

SOURCE: MGI CityScope database; McKinsey Global Institute analysis

The Importance of Water Conservation

Singapore **ranks fifth** among the top **33 countries likely to face extremely high water stress** by 2040

By **2060**, population growth and economic development could **almost double Singapore's total water demand**

SOURCE: SINGAPORE NATIONAL WATER AGENCY

Water Waste via Manual Irrigation Systems

Water Waste via Manual Irrigation Systems

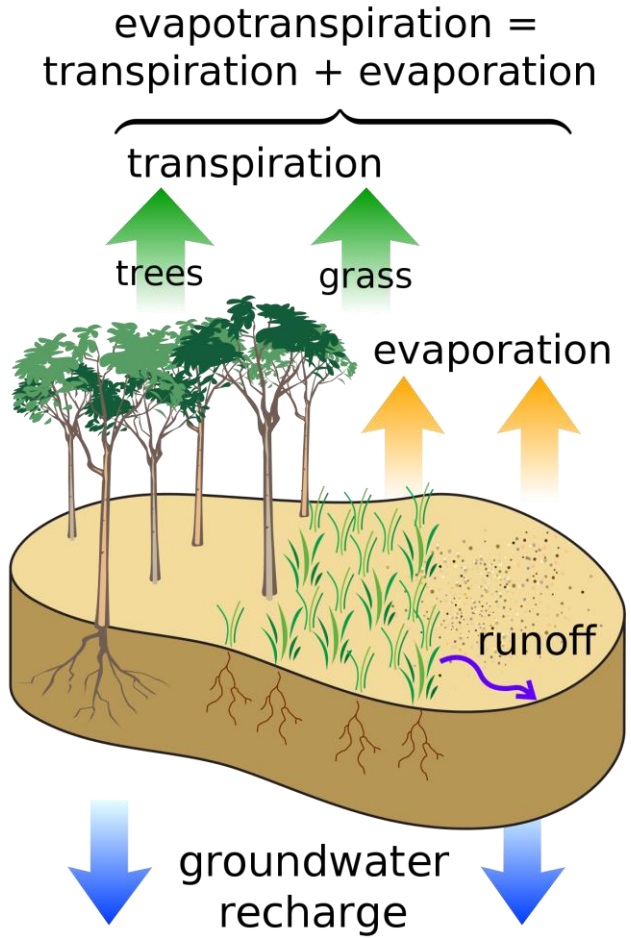
GREEN THUMBS 2023

Manual watering uses up to 10x more water than automated irrigation!
Adding CO_2 emission, diesel, labor, liability and maintenance costs

Efficient Irrigation Scheduling

Evapotranspiration (ET) in Irrigation Management

- ET is the water loss from soil evaporation and plant transpiration, influenced by solar intensity, relative humidity, temperature, and wind speed
- Weather factors like solar intensity, relative humidity, temperature, and wind speed play a significant role in determining ET rates

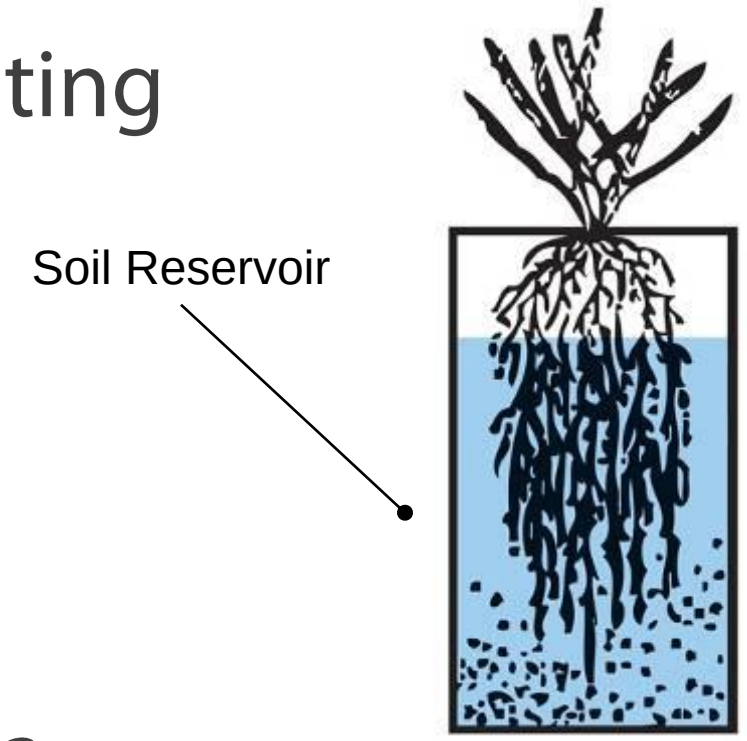


Evapotranspiration:

- Total inches or millimeters of water that are EVAPORATED and TRANSPIRATED by plants

Efficient Irrigation Scheduling

- Landscape ET Value, Adjusting Irrigation Schedules
- $ET_L = K_L \times ET_o$
  - ET_L : Landscape ET Rate
  - ET_o : Reference ET
  - K_L: Landcape Coefficient
- Effective Rainfall is always a consideration for adapting irrigation schedules

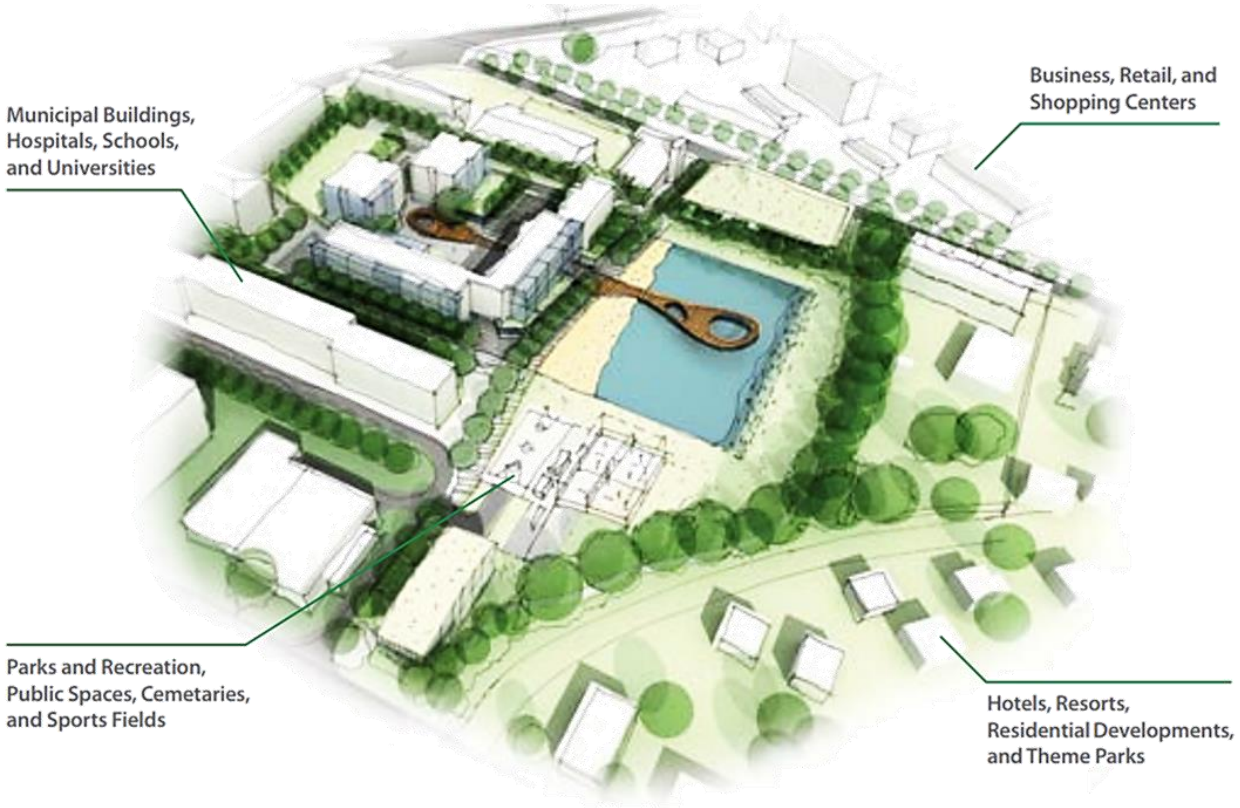


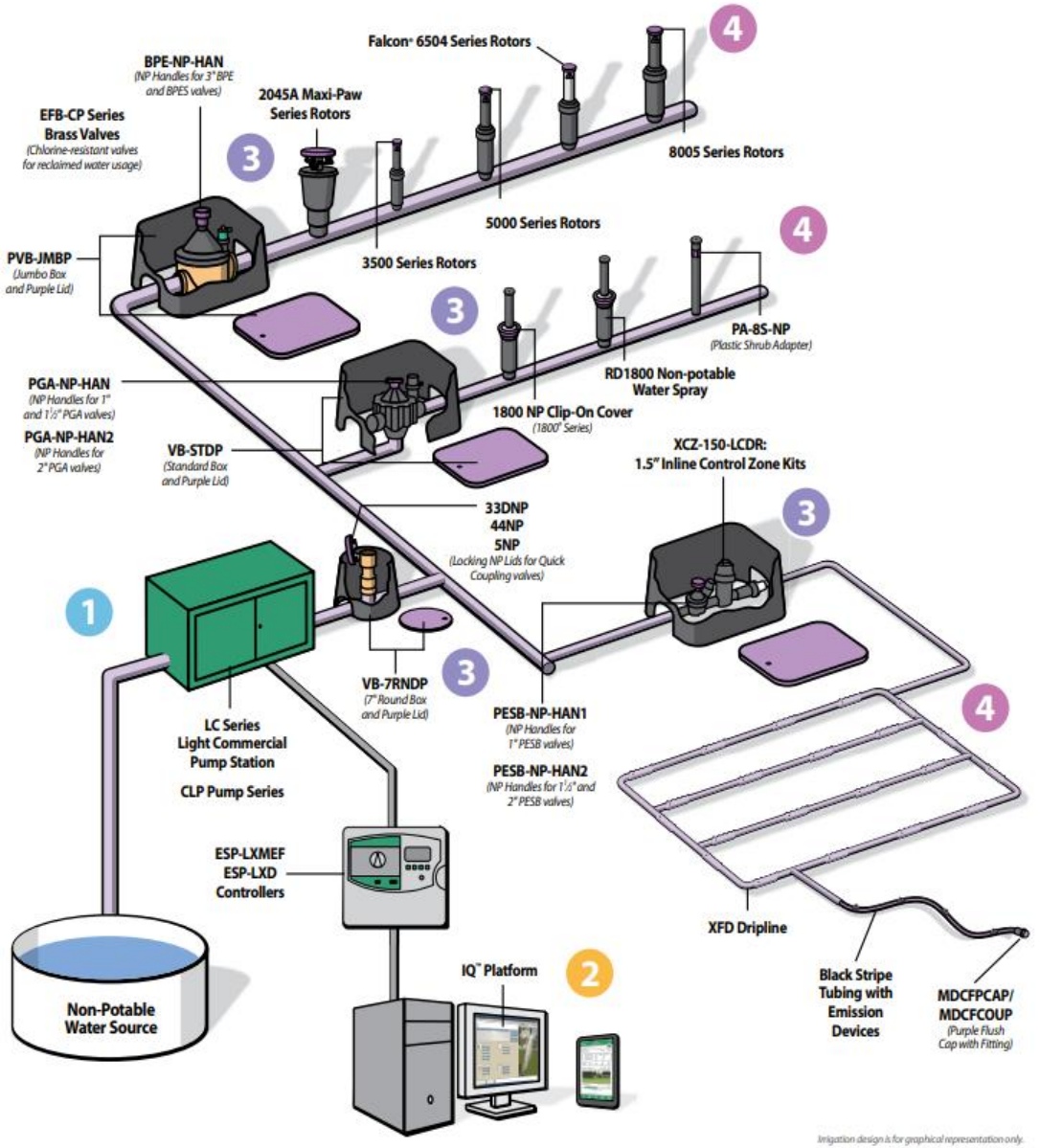
ET Factors:
- Solar radiation
- Relative humidity
- Wind run
- Temperature
- Rain

On-site ET Factors:
- Plant type
- Slope
- Sun/shade
- Sprinkler type
- Plant density

Automated Irrigation Systems

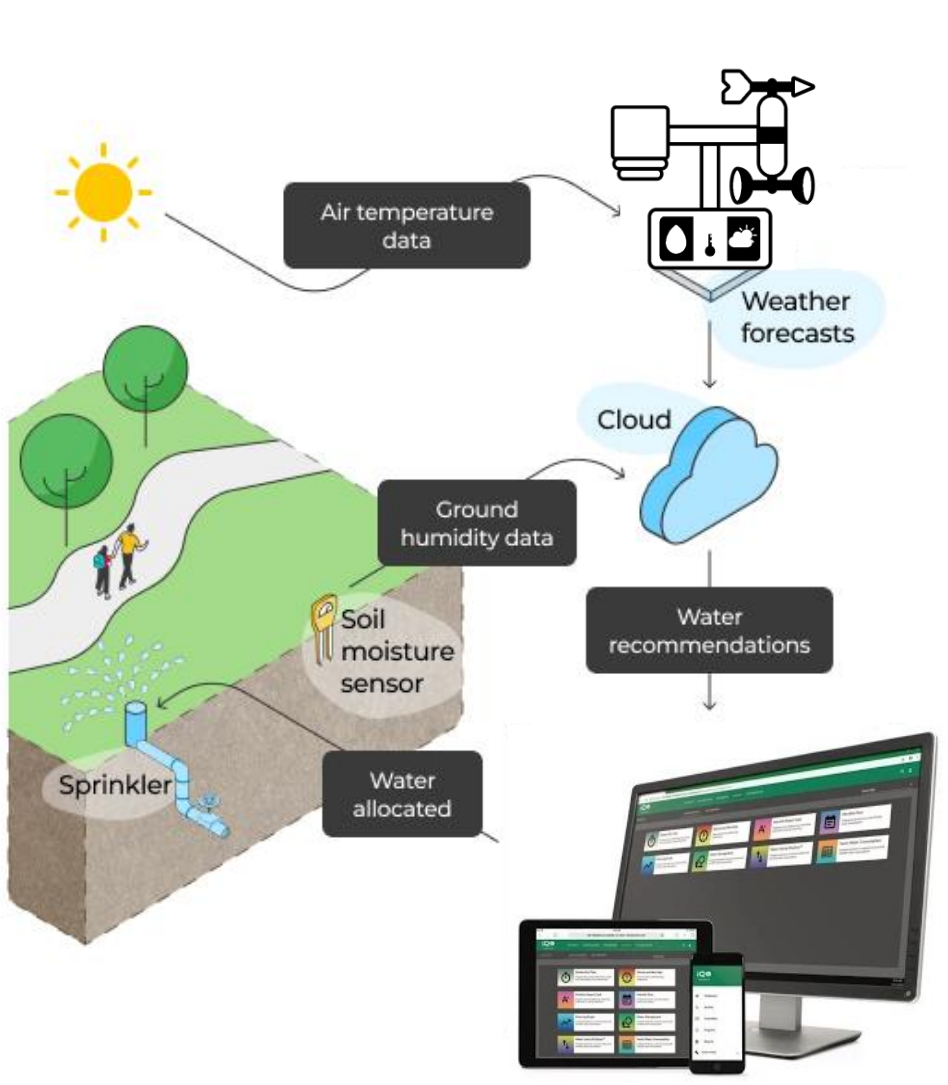
Pump Stations · Central Control · Valves · Emitters

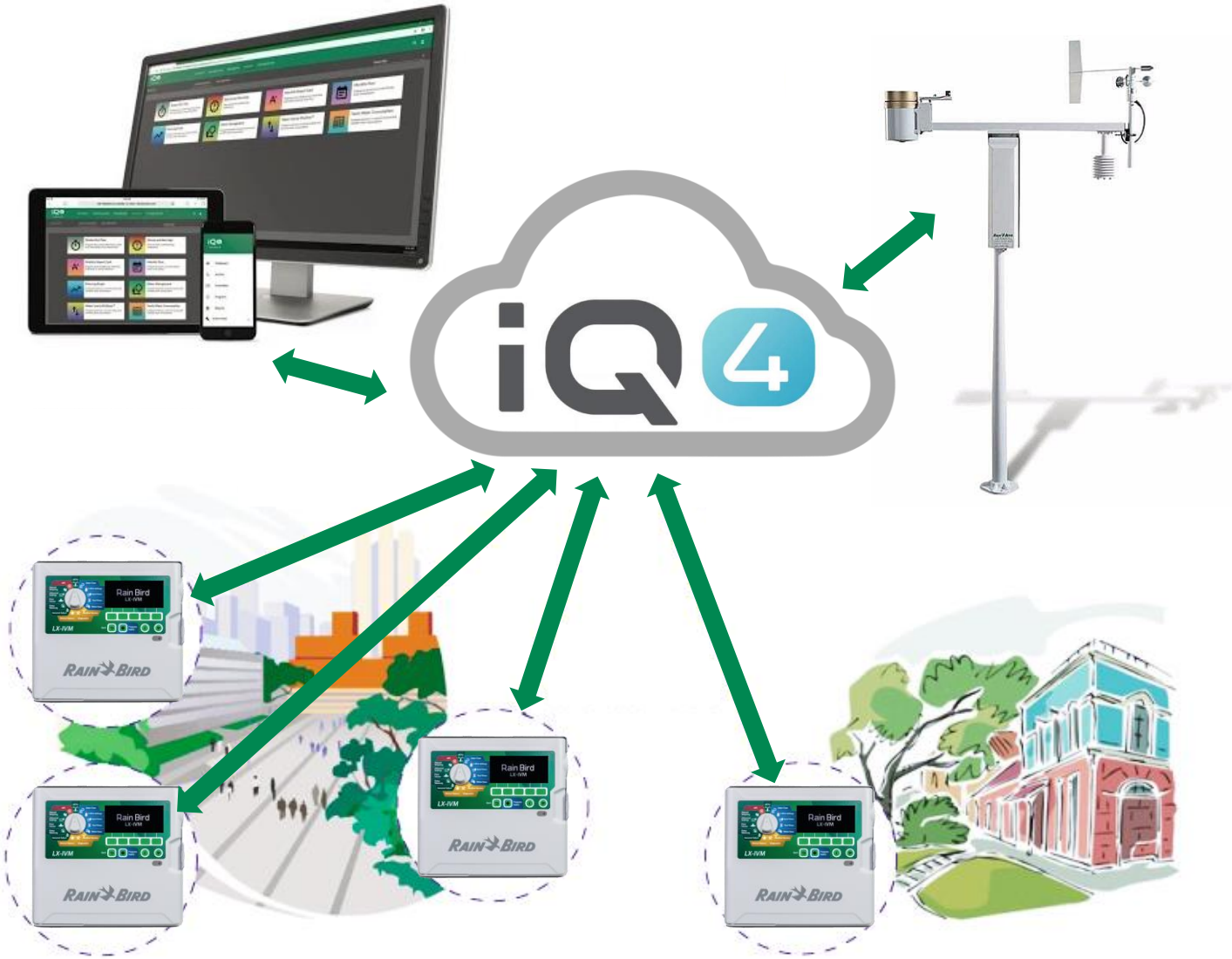




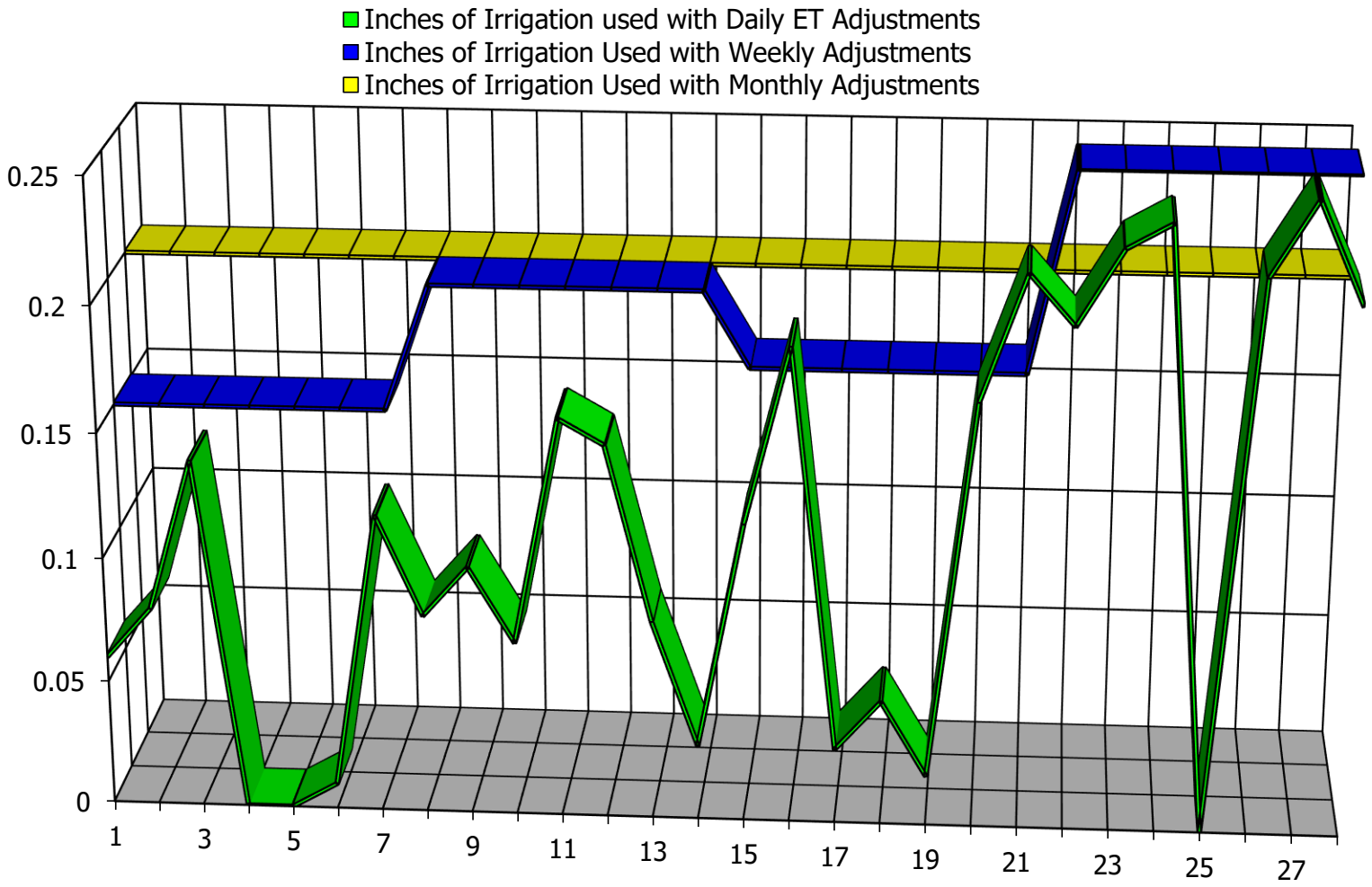
Irrigation design is for graphical representation only.

Smart Irrigation System for Smart City





Smart Irrigation System for Smart City



IQ4 Smart Weather Based Centralized Irrigation system provides typically per year

- **80-90% water saving** compared to manual & truck irrigation
- **25-45% water saving** compared to a non-centralized basic irrigation systems

Case Study – Ho Chi Minh City, Vietnam

- Population : 9 million
- Fast urban development
- Water scarcity is an issue
- Ho Chi Minh City has initiated large-scale upgrade of their green areas 10 years ago, from water trucks and manual irrigation, to Automated Smart Irrigation.

Case Study – Ho Chi Minh City, Vietnam

- First 12 sites upgraded in 2015
- Average of 80% reduction in cost of running irrigation with smart automated irrigation Vs Manual Irrigation and Water trucks
- Estimated 85% water savings compared to manual irrigation
- **ROI attained within 3 years**

STT	Tên công trình Name	Tổng mức đầu tư	Kinh phí tưới nước bằng xe bồn Truck	Kinh phí tưới nước tự động bằng [illegible] Auto	Kinh phí tiết kiệm Save
1	Mảng xanh tiểu đảo cầu vượt thép Hoàng Văn Thụ, quận Tân Bình	1.400	300	80	220
2	Mảng xanh dải phân cách đường Cộng Hòa, quận Tân Bình	1.800	530	150	380
3	Mảng xanh dải phân cách đường Nguyễn Hữu Cảnh	950	230	66	164
4	Mảng xanh dải phân cách đường Nguyễn Văn Cừ	1.600	640	184	480
5	Mảng xanh dải phân cách đường Hồng Bàng, quận 6 -11	1.800	470	142	350
6	Mảng xanh nút giao thông Bình Thuận	2.950	1.830	380	1.650
7	Mảng xanh đường Phạm Văn Đồng (Nguyễn Thái Sơn - cầu Bình Lợi)	5.957	1.260	270	990
8	Mảng xanh đường Điện Biên Phủ	1.350	529	81	448
9	Mảng xanh đường Xuyên Á (cầu Bình Phước - nút giao Sóng Thần)	3.060	741	102	639
10	Mảng xanh dải phân cách Quốc lộ 22 (An Sương – Trung Chánh)	753	439	56	383
11	Mảng xanh đường Xuyên Á (Ngã tư Ga – Tô Ngọc Vân)	628	208	31	177
12	Mảng xanh Tỉnh lộ 15 – Chợ Cầu	2.116	391	134	257
	Tổng cộng	**24.364**	**7.568**	**1.430**	**6.138**

COMPARISION BETWEEN NORMAL IRRIGATION AND AUTO IRRIGATION

QL1A High way, TL15 Street and QL22 High way of Area 3

QL22	Invest (VND)	Water flow per year (m3)	Cost per year (VND)	Electric cost only
Auto	753.000.000	4745	56,460,300	2,989,350
Truck		27125	439,702,749	
Save			383,242,449	
Drip irrigation			87%	

QL1A	Invest (VND)	Water flow per year (m3)	Cost per year (VND)	Electric cost only
Auto	628.000.000	2555	31,104,780	2,299,500
Truck		16884	208,443,043	
Save			177,338,263	
Drip irrigation			85%	

TL15	Invest (VND)	Water flow per year (m3)	Cost per year (VND)	Electric cost only
Auto	2.116.000.000	51465	134,337,885	6,208,650
Truck		401946	391,087,148	
Save			256,749,263	
Drip and pop up			66%	

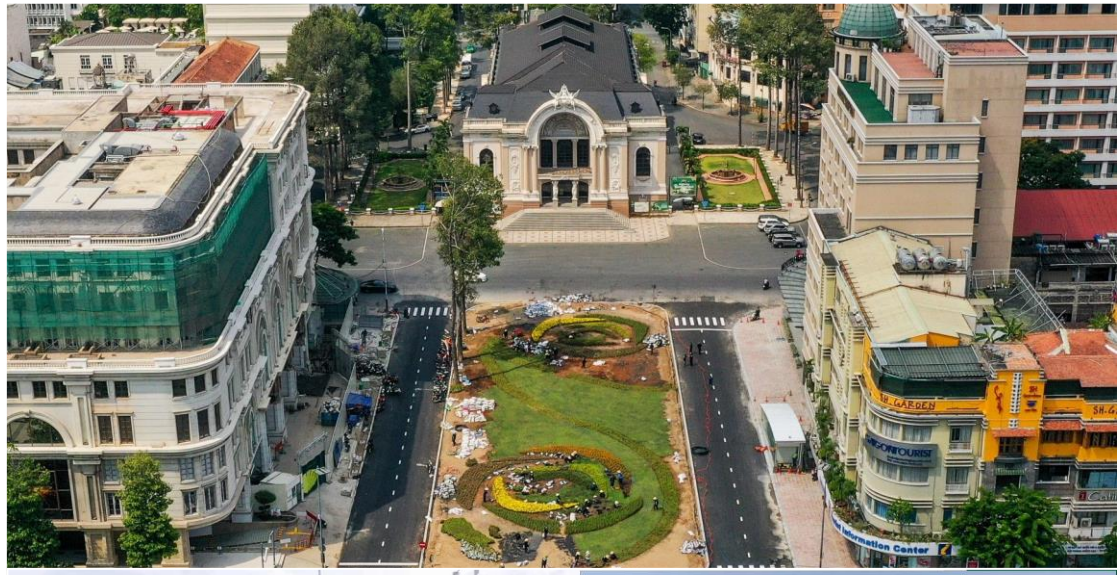
110 Controllers in 30 streets and parks up to now and more in the future.

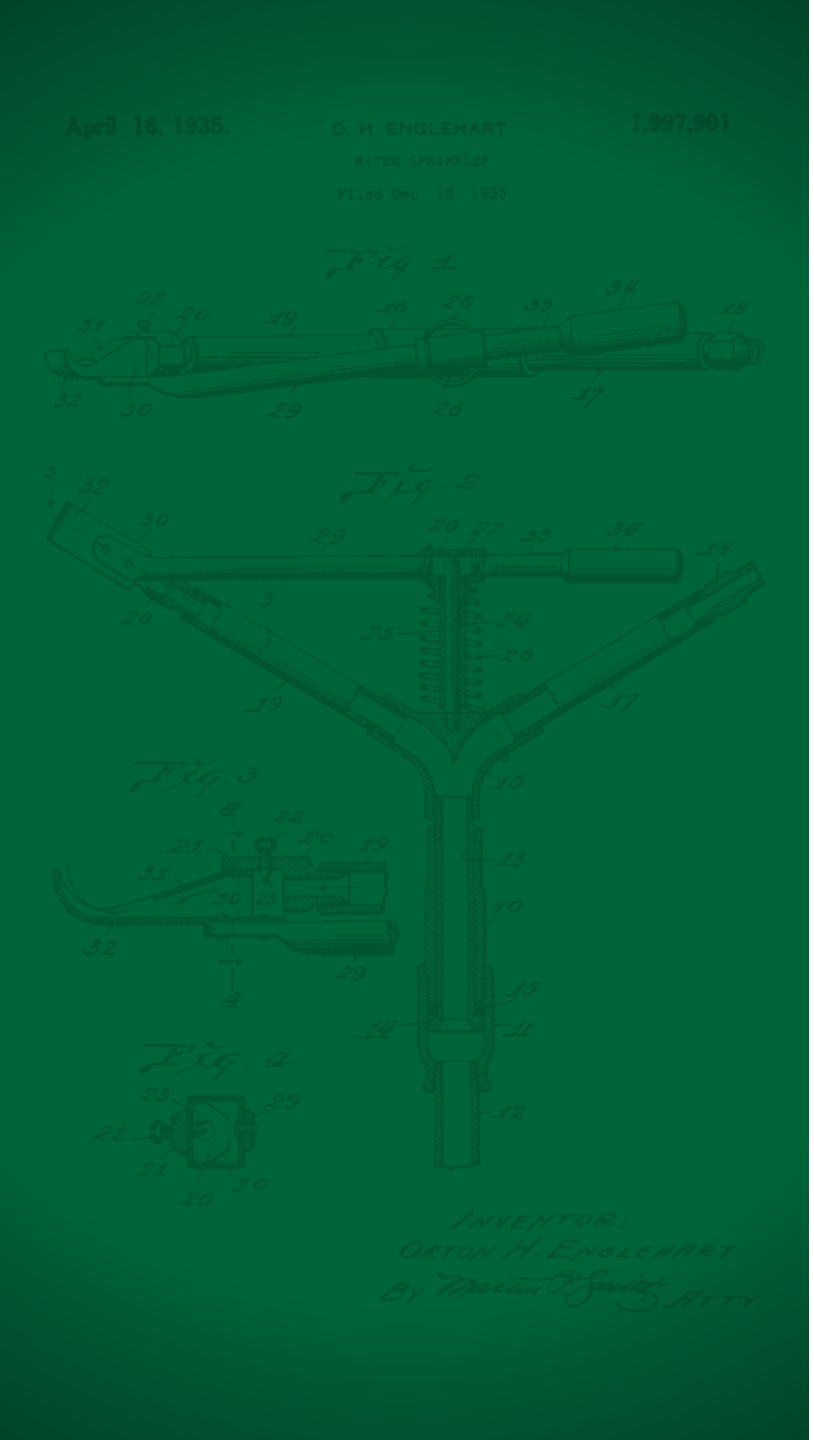
BEFORE Use water truck and labor	AFTER USE Automatic irrigation
1 Year 35 000 000 000 VND	1 Year 7 000 000 000 VND

City save **80%** money than truck and hand irrigation

Case Study – Ho Chi Minh City, Vietnam

- IQ4 Cloud & Central Control system
- Upgrade to ET based irrigation in 2018 for even more water savings
- Total of 120+ location equipped with smart control systems in 2023
- Recent projects include
  - 7.5km of urban railway embellishments
  - 30km of riverside development





THANK YOU

Q&A

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