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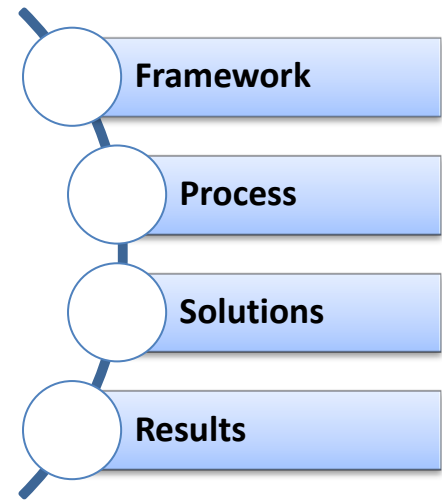
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ISO 14034

Environmental Technology Verification



TRIECA 2018 Conference - March 21-22, 2018

John Neate, VerifiGlobal



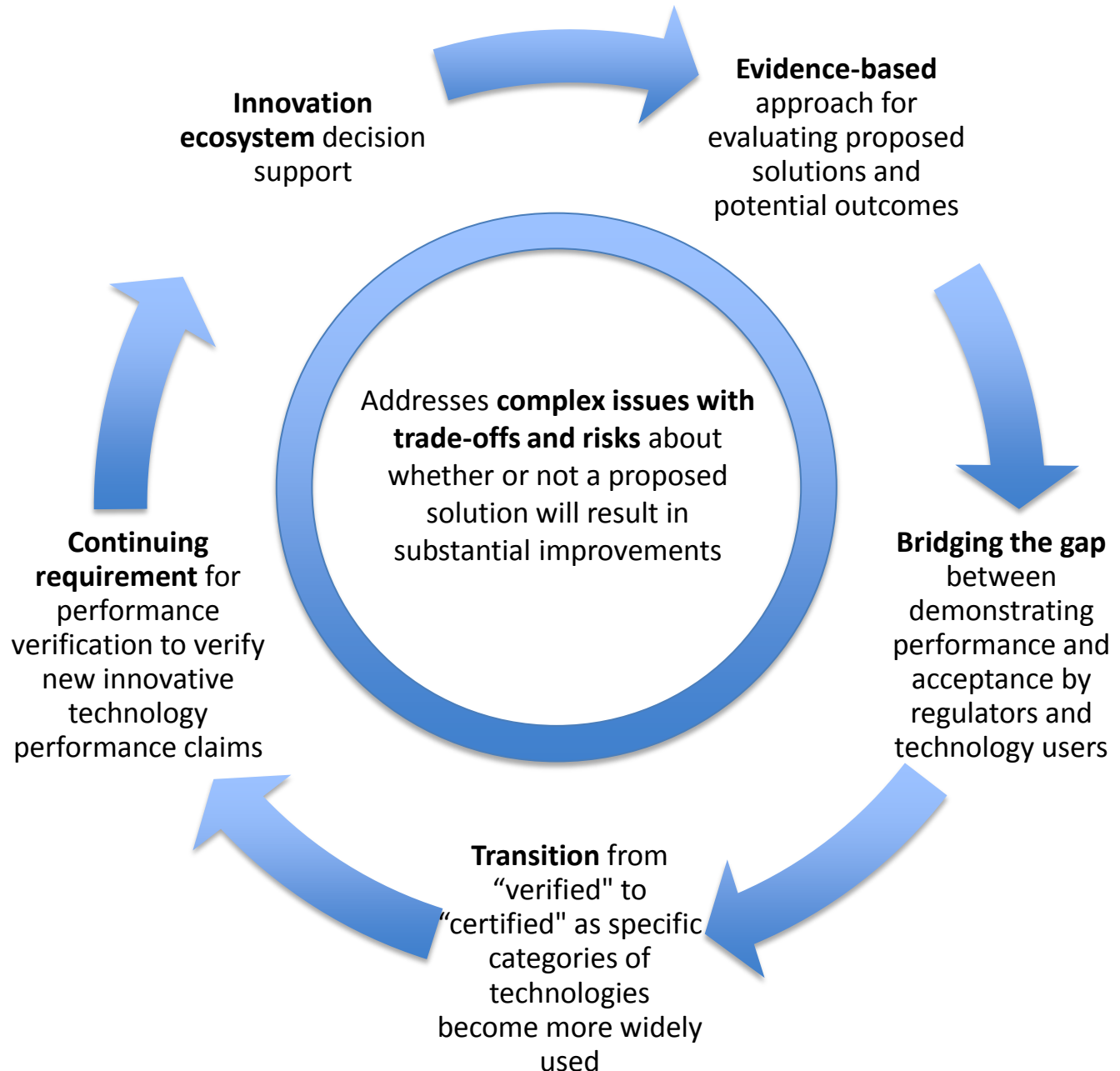
Global performance testing and verification platform



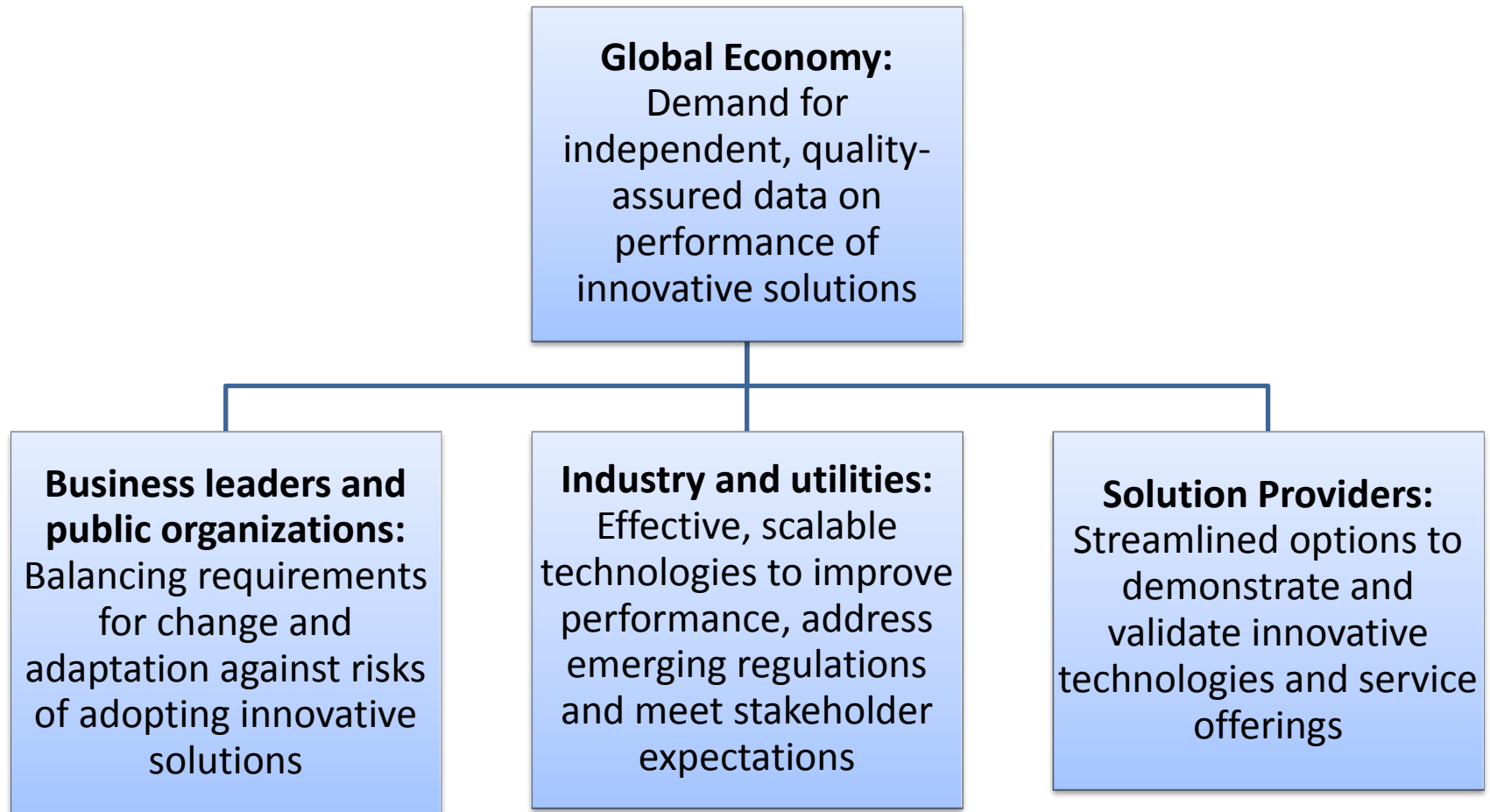
Presentation Objective

- Describe ISO 14034 standard and benefits of environmental technology verification ... including how ISO 14034 increases market acceptance of innovative technologies.

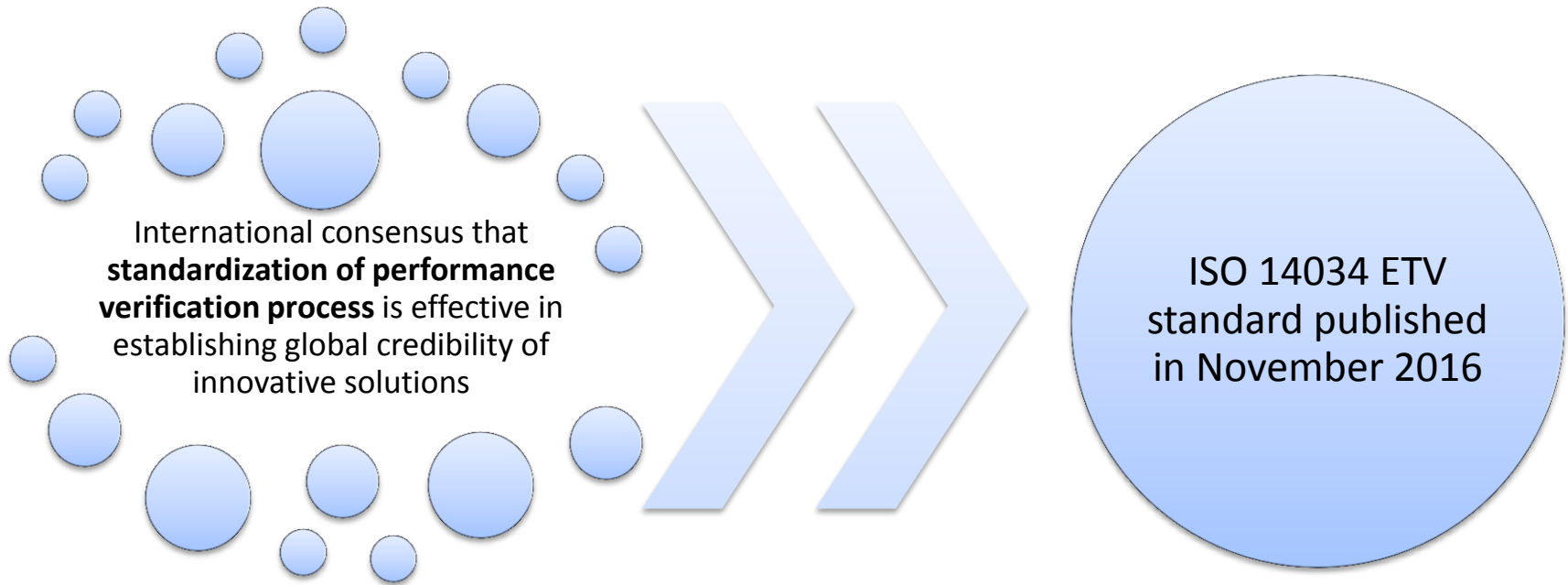
Technology Performance Verification



Technology Performance Verification - Market Drivers



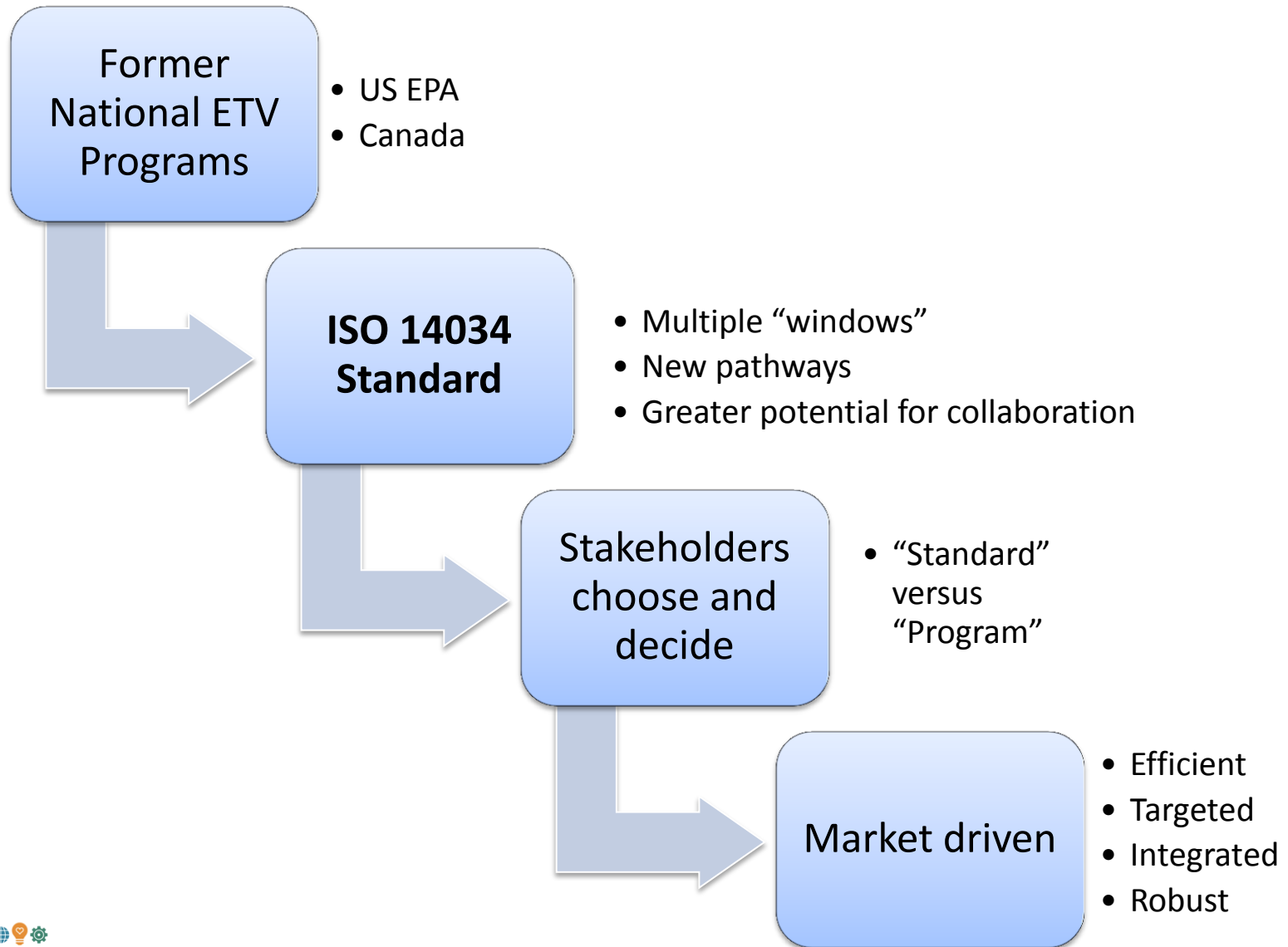
ISO 14034 - ETV Standard



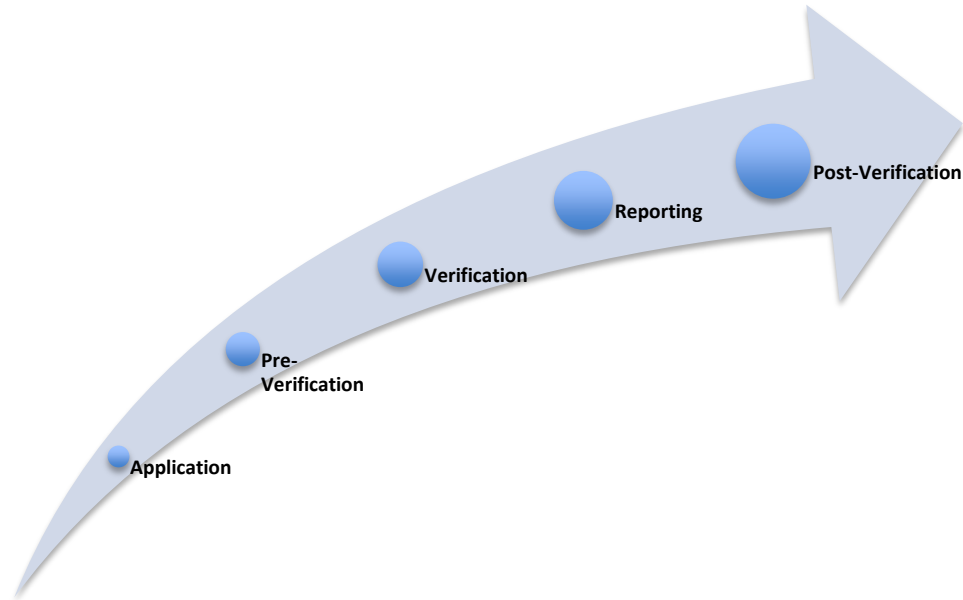
- Structured, pre-normative procedure to verify performance of innovative products, technologies and services
- Objective, quality-assured performance data

- Informed decisions about purchasing, applying and regulating these technologies and products
- Benefits users, developers, regulators, investors and other stakeholders

Evolution of ETV



Basic Process (simplified)



Application – Sufficient information on technology in relation to specific performance parameters

Pre-verification - Verifiability of the performance claim, preparation of verification plan and specification of test data requirements

Verification - Acceptance of existing test data, generation of additional test data (if needed), and confirmation of performance based on the test data

Reporting - Verification report

Post-verification - Verification statement and possible conditions of use

ISO 14034 verification

Supports transparent, evidence-based decisions and value-based procurement

Assists in gaining market acceptance and regulatory approval

Helps technology companies access global markets

Investment

- Independent information to mitigate market, technical and financial risks
- Sustainable solutions with increased market acceptance

Procurement

- Reliable information on technology performance
- Greater certainty in buying decisions and improved probability of success

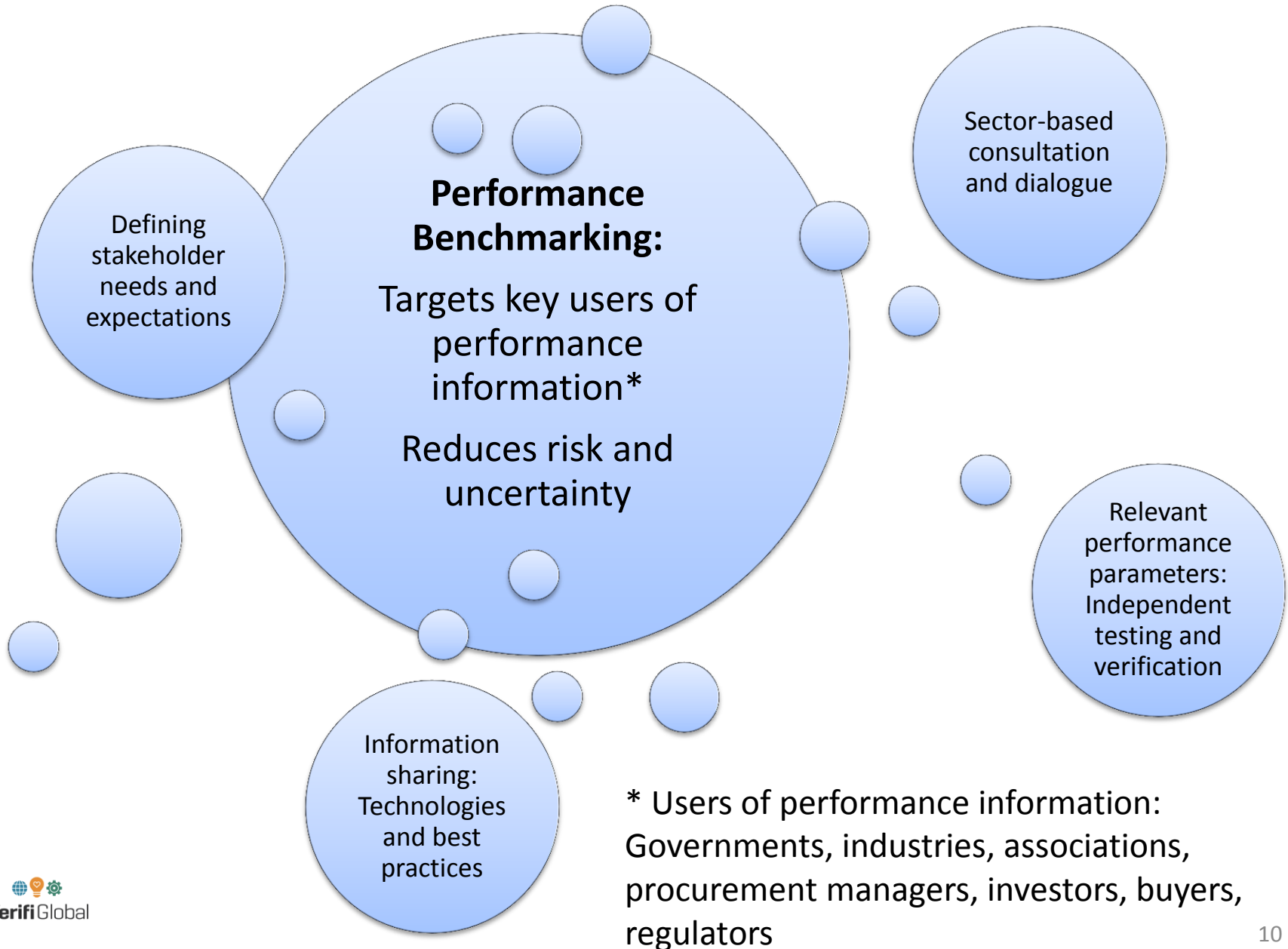
Compliance

- Evidence-based information to support regulatory requirements
- Protection and enhancement of ecosystem health

Acceptance

- Information for integrating environmental, social and economic performance
- Meeting the needs of changing communities in a dynamic marketplace

Performance Benchmarking and Stakeholder Engagement



5. VerifiGlobal

Creating value through informed decisions and sustainable results



Global network of organizations providing testing and verification services

Comprehensive critical mass of performance assessment and validation capability across multiple sectors and areas of expertise



Mission

Strengthen long term, sustainable performance through improved efficiency, quality assurance and accountability



Market Alignment

Market acceptance and deployment of sustainable, eco-efficient solutions through:

- Cooperation, collaboration and collective action among third-party performance testing organizations, verification bodies and analytical laboratories
- Effective application of standardized performance testing and verification procedures based on ISO 14034
- International recognition of verifications through a distinct verification statement and logo
- Commitment to meaningful dialogue and informed decision-making

Mission

Strengthen long term, sustainable performance through improved efficiency, quality assurance and accountability

Membership-based **global network** of testing and verification organizations

Comprehensive critical mass of performance assessment and validation capability across multiple sectors and areas of expertise

Cooperation, collaboration and **collective action** among third-party performance testing organizations, verification bodies and analytical laboratories



Alignment with ISO 14034 ETV standard

- Effective application of standardized performance testing and verification procedures
- Performance benchmarking and quality management
- Establishment of credible performance parameters and metrics with high probability of stakeholder acceptance

Global market deployment of sustainable, eco-efficient solutions

- Advice and capacity-building
- Web-based technology information platform
- Innovative technology demonstrations and investment
- Assessment of complex issues and global impacts
- Meaningful dialogue and informed decisions

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BATTELLE





ISO 14034: Environmental Technology Verification

VerifiGlobal

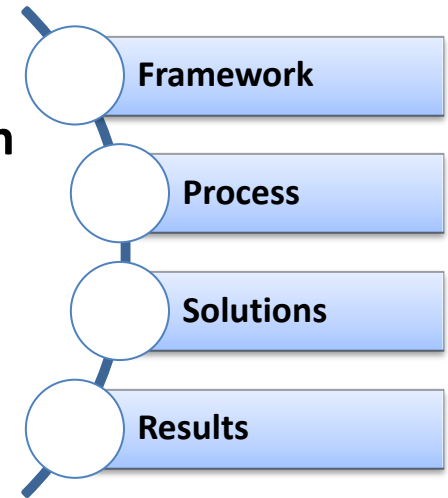
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Global performance testing and verification platform

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Manufactured Treatment Devices(MTD) Evaluation Practice in the City of Toronto

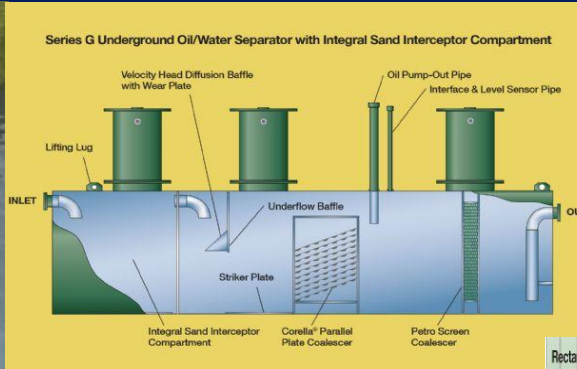
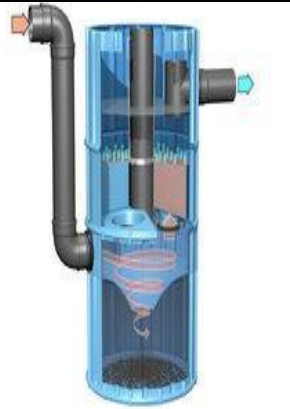
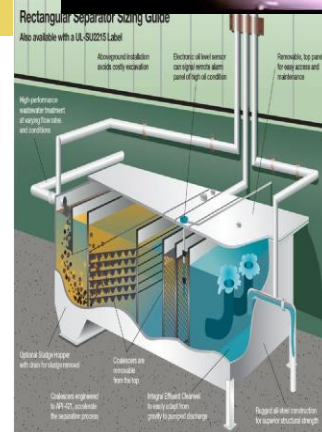
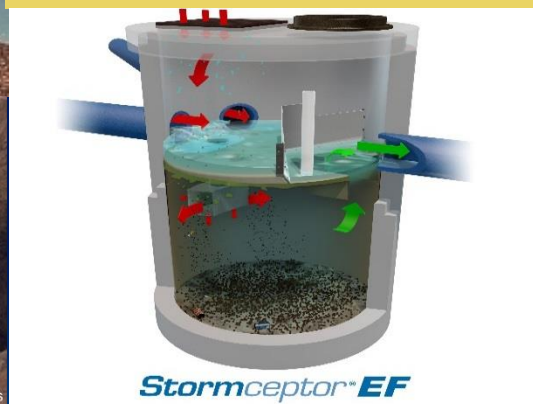


Photo courtesy of Contech Engineered Solutions



Vicky Shi, Ph. D., P Eng.
Policy and Program Development
Toronto Water, City of Toronto

Presentation to TRIECA
March 22nd, 2018

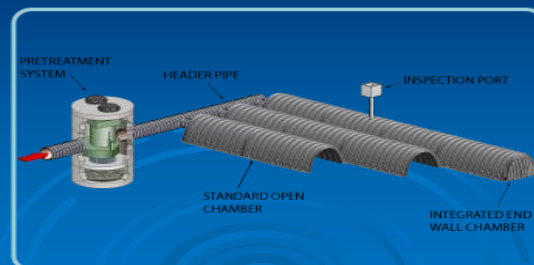
SUMMARY

- Background of MTD Acceptance
- Issues and Concerns with NJDEP Certification
- New Policy Adoption_ ISO 14034
- MTD Registration and Verification
- City's Evaluation Process
- Site Approval Process
- Sizing Example
- Conclusions

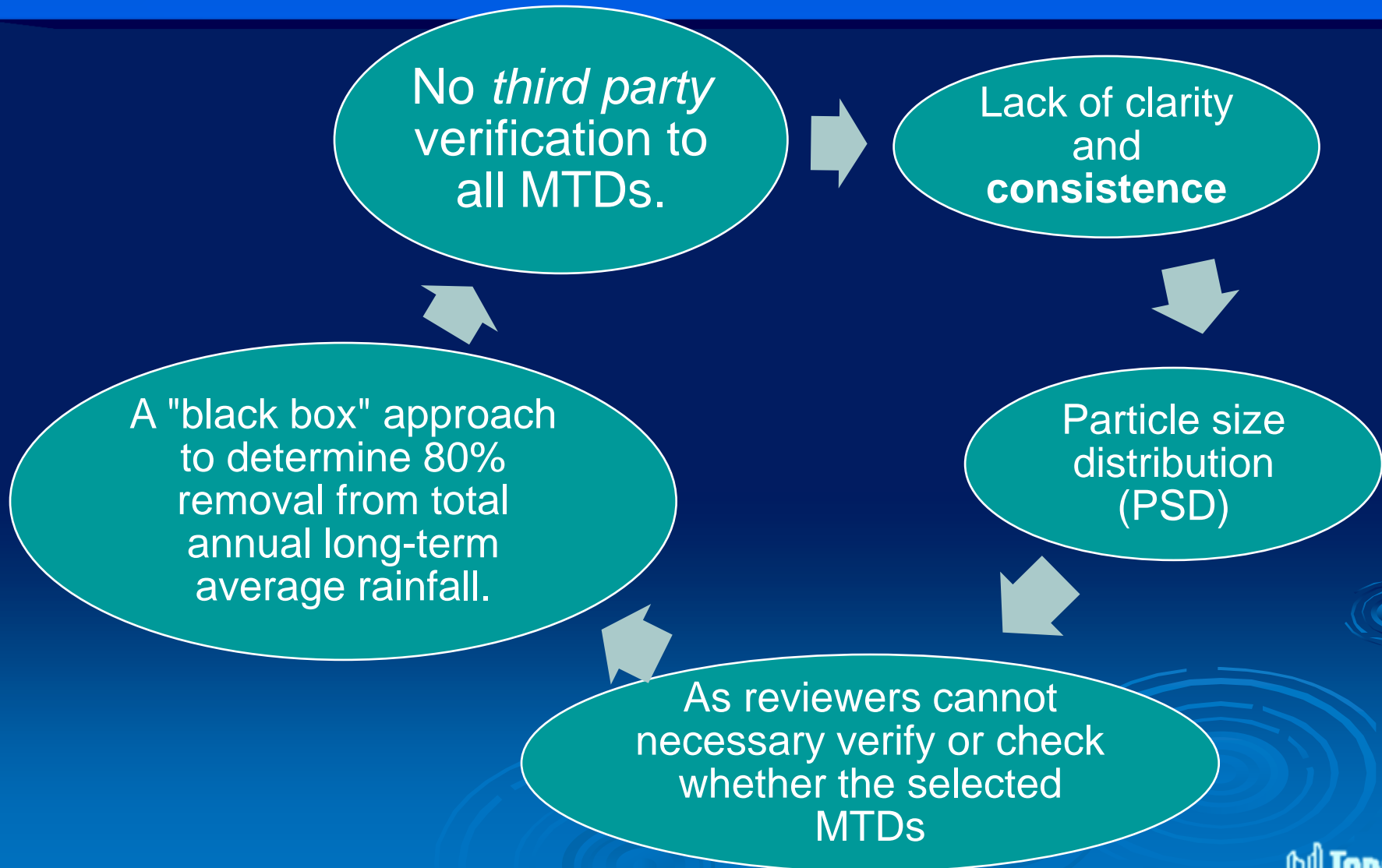


BACKGROUND OF MTD ACCEPTANCE

- A manufactured treatment device is a pre-fabricated stormwater treatment structure utilizing settling, filtration, absorptive/adsorptive materials, vortex separation, vegetative components, and/or other appropriate technology to remove pollutants from stormwater.
- The City of Toronto Wet Weather Flow Management Guidelines_2006 version, water quality control target is 80 % TSS removal Efficiency. The guidelines require that MTDs proposed for installation in the city be certified by the New Jersey Department of Environmental Protection(NJDEP) after verification by the New Jersey Corporation for advanced Technology(NJCAT).



ISSUES & CONCERNS with NJDEP CERTIFICATION



NEW POLICY ADOPTION ISO_14034

The City is using the ISO 14034 standard to guide the process of evaluating MTDs

The ISO_14034 has the following objectives:

Reliable
assessment
process

Third-party
verification of
environmental
performance

Building
vendor
credibility

Buyer
confidence

MTD REGISTRATION AND VERIFICATION



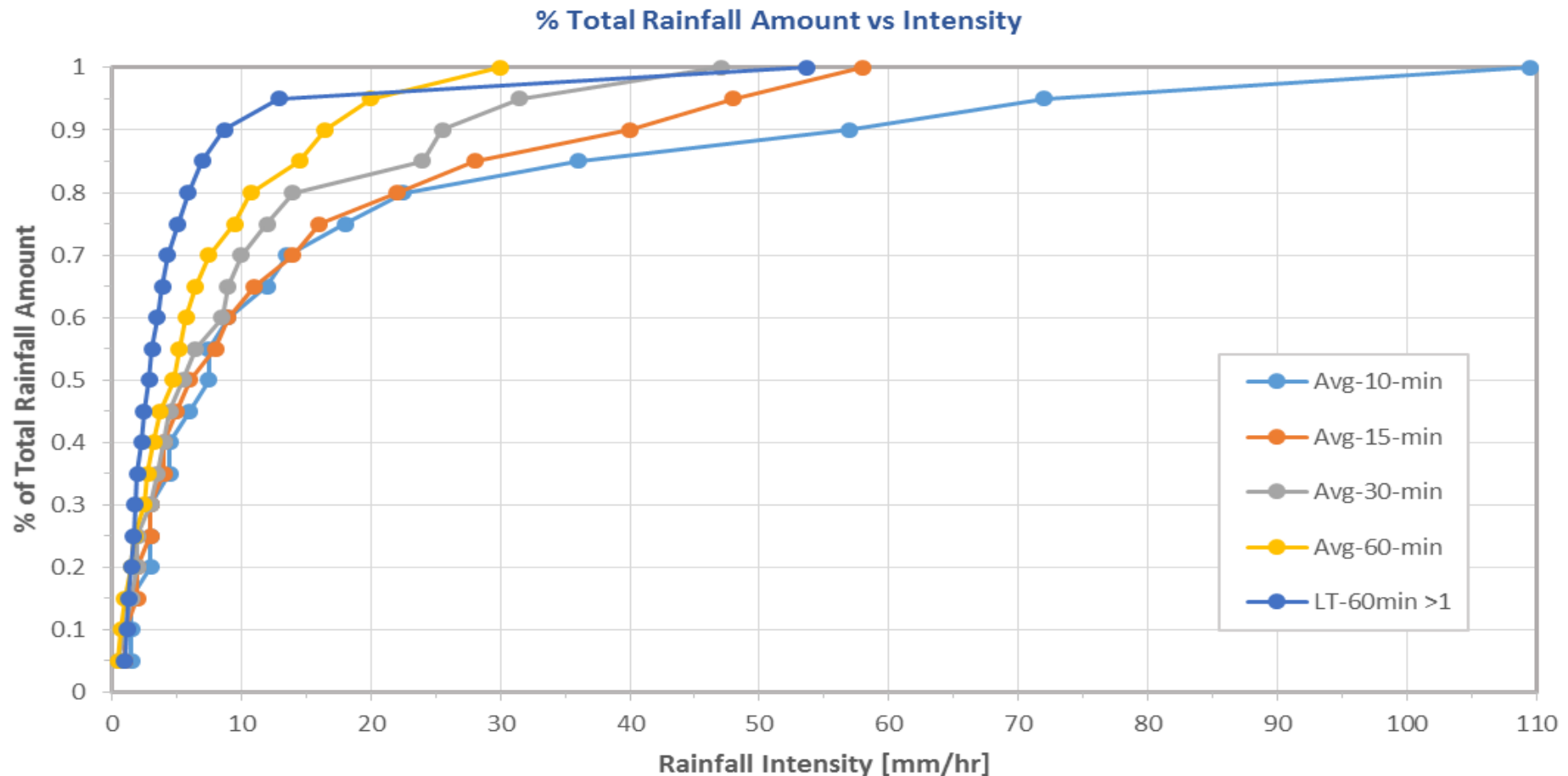
- ❑ The City requires all the MTDs manufacturers to register and verify their product in accordance with the ISO-14034 standard.



- ❑ Inform the City of MTD to tested, along with device details, initiating City's MTD approval process.

CITY'S EVALUATION PROCESS

Independently verified removal efficiency data is converted to overall annual removal efficiency for verified device based on City' historical rainfall distribution. Step 1) City set a 100% Maximum Treatment Flow Rate(MTFR) equivalent to a rainfall event depth(i.e. 90th percentile = 100% MTFR) based on historical long-term rainfall distribution.



CITY'S EVALUATION PROCESS

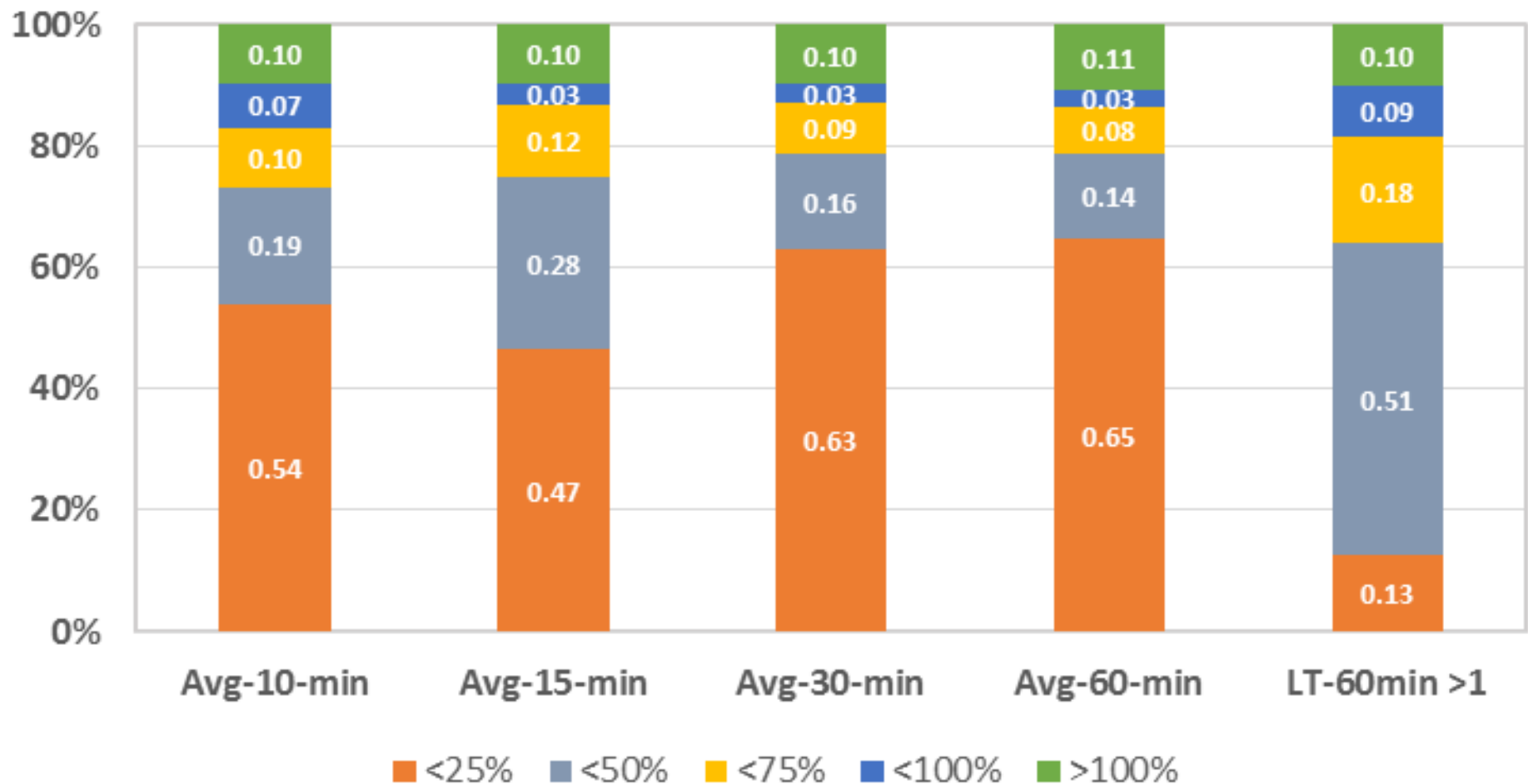
Step 2) City derives weighting factors for % MTR based on the historical long-term rainfall distribution.

Step 3) City calculates overall annual removal efficiency for MTRs set to tested loading rates and applying weighting factors for rainfall distribution.

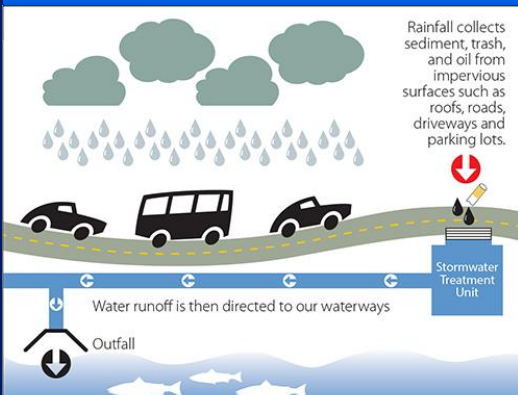
% MTR	Percentile				Weighting Factors			
	Avg-10-min	Avg-15-min	Avg-30-min	Avg-60-min	Avg-10-min	Avg-15-min	Avg-30-min	Avg-60-min
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.54	0.47	0.63	0.65	0.54	0.47	0.63	0.65
50	0.73	0.75	0.79	0.79	0.19	0.28	0.16	0.14
75	0.83	0.87	0.87	0.86	0.10	0.12	0.09	0.08
100	0.90	0.90	0.90	0.89	0.07	0.03	0.03	0.03
125	1.00	1.00	1.00	1.00	0.10	0.10	0.10	0.11

CITY'S EVALUATION PROCESS

MTFR - Weighting Factors



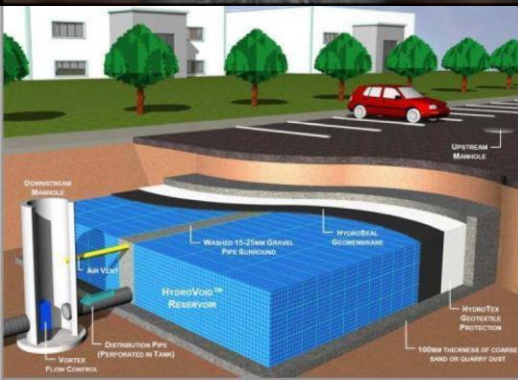
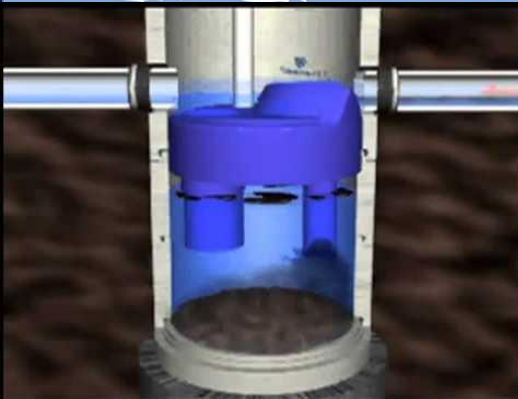
CITY'S EVALUATION PROCESS



Step 4) :
Tested device is confirmed for MTR for minimum acceptable removal efficiency.

1) City to set minimum acceptable removal efficiency criteria (i.e., 60% for OGS, more than 60% for Filtration Devices).

2) City to determine conditions/restrictions of usage of MTD.



CITY'S EVALUATION PROCESS

Step 5):

Confirmation of scaling of models using same method. The manufacturer provides City with characteristics(model#, treatment diameter, surface, etc) of other scalable models of the same technology for certification

- a) City to evaluate applicability and scalability of models to tested device.
- b) City to apply scaling factors (for example, treatment surface area) in order to determine.
- c) City to define conditions/restrictions of usage of various models

SITE APPROVAL PROCESS

For Site specific calculation for project site (private or municipal):

Step1:

City to provide rainfall data and process required to calculate MTFR based on water quality design criteria(for example, 90% percentile of historic rainfall data, 25 mm storm) in WWFMG.

SITE APPROVAL PROCESS

Step 2:

Designer/consultant:

- a) to calculate MTFR based on appropriate design rainfall data.
- b) to identify applicable minimum removal efficiency rate from WWFMG.
- c) to select MTD that treats the estimated MTFR from certification document

SITE APPROVAL PROCESS

Step3:

For Site-specific MTD approval ,

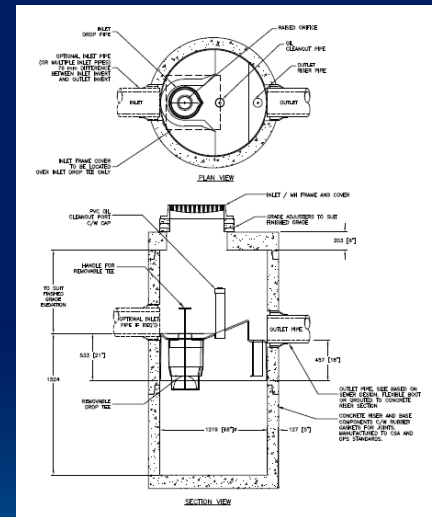
City review staff confirm that selected MTD model indeed meets the minimum removal efficiency rate required for the estimated MTFR through the review of certification document.



SIZING EXAMPLE

MTD TEST RESULTS. For example:

Technology	Tested SLR [L/s/m2]	Removal Rate [%]
CDS	40	73.5
CDS	80	70.5
CDS	200	63.4
CDS	400	52.6
CDS	600	45.1
CDS	1000	41.5
CDS	1400	32.4
CDS	1893	23
SDD3	40	73
SDD3	80	67
SDD3	200	61
SDD3	400	53
SDD3	600	50
SDD3	1000	52
SDD3	1400	49
SDD3	1800	47
Downstream Defender	40	72.4
Downstream Defender	80	67.7
Downstream Defender	200	57.9
Downstream Defender	400	52.4
Downstream Defender	600	42.6
Downstream Defender	1000	35.9
Downstream Defender	1400	26.6
CB Shield	40	64
CB Shield	80	59.9
CB Shield	200	52.4
CB Shield	400	42.6
CB Shield	1000	25.2
CB Shield	1400	26.7

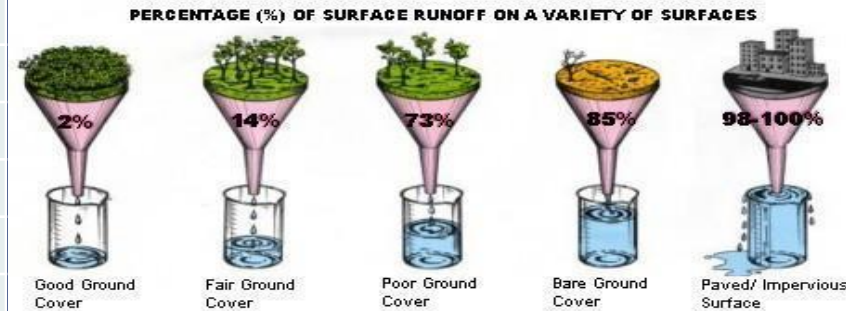


Note: Example of MTDs list, just for display

SIZING EXAMPLE

Project Details:

Catchment Characteristics		
	Contributing Catchment Area, A [ha]	1.00
	Post-Development Imperviousness [%]	90%
	Soil Type for Pervious Areas	B - Sandy-Loam
	Weighted Runoff Coefficient, C [-]	0.88



Consultant to provide schematic showing grading, overland flow direction and delineated catchment to proposed MTD

Consultant to provide schematic showing post development land cover within catchment

Consultant to reference soil characteristics from Geotechnical report

Rainfall Statistics and Hydrology

90th Percentile Intensity, I ₉₀ [mm/hr]	6.4		
100% Maximum Treatment Flow Rate, MTFR [L/s]	15.56		
% MTFR	Intensity, I [mm/hr]	MTFR [L/s]	Weighting Factor [-]
25	1.60	3.89	0
50	3.20	7.78	0.56
75	4.80	11.67	0.25
100	6.40	15.56	0.09
125	8.00	19.44	0.1

Note:
Rainfall data is still using annual average year rain data according to WWFMG.

$$100\% \text{ MTFR} = C * I_{90} * A$$

SIZING EXAMPLE

MTD Selection and CETV Test Results

Manufactured Technology		
Model #		
Model Dimensions, Diameter [m] or Width x Length [m x m]	1.83	
Model Surface Area [m2]	2.63	
Tested SLR [L/min/m2]	Tested Flow Rate [L/s]	Tested Total Removal Efficiency [%]
40	1.75	75
80	3.51	69
200	8.77	62
400	17.53	57
600	26.30	51
1000	43.84	47
1400	61.37	41
	0.00	
100% MTFR < Max Tested Flow Rate?	Yes	
25% MTFR > Min Tested Flow Rate?	Yes	
125% MTFR < Max Tested Flow Rate?	Yes	

SIZING EXAMPLE

Catchment Specific MTD Performance

% MTFR	MTFR [L/s]	Estimated Removal Efficiency [%]	Weighting Factor [-]	Weighted Performance [%]
25	3.89	68	0	0
50	7.78	63	0.56	35
75	11.67	60	0.25	15
100	15.56	58	0.09	5
125	19.44	56	0.1	6
				61

CONCLUSIONS

- The City requires all the MTDs manufacturers to register and verify their product in accordance with the ISO-14034 standard.
- Inform the City of MTD to tested, along with device details, initiating City's MTD approval process.
- An Evaluation Directive is being developed soon in 2018 by the City. It will complete the new evaluation and approval process for MTDs.
- At last, MTDs are just one kind of stormwater measurements, such as Green Infrastructures, ponds, etc. The selection of storm measures will be up to the site specific conditions in order to meet the City's WWFM Guidelines.





Thanks

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